Aircraft Tire Care & Maintenance

GOODYEAR

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Introduction

The information in this manual is designed to help aircraft owners and maintenance personnel obtain optimum service from their bias and radial aircraft tires. The discussions contained in this part are designed not only to teach how to properly operate and maintain aircraft tires, but also to demonstrate why these techniques and procedures are necessary.

Aircraft operating conditions require a wide variety of tire sizes and constructions. The modern aircraft tire is a highly-engineered composite structure designed to carry heavy loads at high speeds in the smallest and lightest configuration practical. Tires are a multi-component item consisting of three major materials: steel, rubber and fabric. There are different types of fabric and rubber compounds in a tire construction, each with its own special properties designed to successfully complete the task assigned.

Goodyear aircraft tire technology utilizes Computer Aided Design and Analysis, as well as the science of compounds and materials applications. Materials and finished tires are subjected to a variety of laboratory, dynamometer, and field evaluations to confirm performance objectives and obtain certification.

The manufacturing process requires the precision assembly of tight-tolerance components and a curing process under carefully controlled time, temperature and pressure conditions. Quality assurance procedures help to ensure that individual components and finished tires meet specifications. The Goodyear Innovation Center and all Goodyear Aviation Tire new and retread tire plants are ISO 9001:2000 certified.

NOTE: The procedures and standards included in this manual are intended to supplement the specific instructions issued by aircraft and wheel/rim manufacturers.

Notice: This Aircraft Tire Care and Maintenance Manual effective 01/2011 combines information from previous Goodyear Aircraft Tire Care and Maintenance manuals and supersedes all previous manuals.

4. Preventive Maintenance

Tires cannot be taken for granted on any aircraft. Tire maintenance costs will be at their lowest and tire life will be at its longest if proper maintenance practices are observed. Safe tire operation also depends on proper maintenance. Thus, preventive tire maintenance leads to safer, more economical operations.

Proper Inflation Procedures

NOTE: Keeping aircraft tires at their correct inflation pressure is the most important factor in any preventive maintenance program. The problems caused by incorrect inflation can be severe. Overinflation can cause uneven treadwear, reduce traction, make the tread more susceptible to cutting and increase stress on aircraft wheels. Underinflation produces uneven tire wear and greatly increases stress and flex heating in the tire, which shortens tire life and can lead to tire incidents. More information about the effects of improper inflation is available in the section "Effects of Operating Conditions."

INFLATION PRACTICES

1. CHECK DAILY OR BEFORE FIRST FLIGHT WHEN TIRES ARE COOL
2. AMBIENT TEMPERATURE EFFECTS ON INFLATION
3. USE DRY NITROGEN GAS (SAFELY)
4. INCREASE PRESSURE 4% FOR TIRES UNDER LOAD
5. ALLOW 12 HOUR STRETCH AFTER MOUNTING
6. NEVER REDUCE THE PRESSURE OF A HOT TIRE
   REMEMBER - 1% PRESSURE CHANGE FOR 5°F (3°C)
7. EQUAL PRESSURE FOR DUALS
8. CALIBRATE INFLATION GAUGE REGULARLY

1. CHECK DAILY WHEN TIRES ARE COOL

Tire pressures should always be checked with the tire at ambient temperatures. Tire temperatures can rise in excess of 200°F (93°C) above ambient during operation. A temperature change of 5°F (3°C) produces approximately one percent (1%) pressure change. It can take up to 3 hours or more after a flight for tire temperatures to return to ambient.

A tire/wheel assembly can lose as much as five percent (5%) of the inflation pressure in a 24-hour period and still be considered normal. This means that tire pressures change on a daily basis. Even a tire which does not normally lose pressure can become damaged by FOD or other outside factors that can suddenly increase pressure loss. These are all reasons why it is important to check pressure daily or before each flight.

2. AMBIENT TEMPERATURE EFFECTS ON INFLATION

When tires are going to be subjected to ambient temperature differences between two locations in excess of 50°F (27°C), inflation pressures should be adjusted to the colder temperature prior to takeoff. An ambient temperature change of 5°F (3°C) produces approximately one percent (1%) pressure change. For example, tire pressure should be adjusted for a plane flying from Phoenix at 95°F (35°C) to Chicago at 45°F (7°C). The difference is 50°F (28°C), pressure should be increased by 10% before departing Phoenix. This also applies when checking pressure in a heated hangar in the winter.

3. USE DRY NITROGEN GAS

Nitrogen will not sustain combustion and will reduce degradation of the liner material, casing plies and wheel due to oxidation. Follow the appropriate regulatory agency requirements for nitrogen inflation. FAR 25 requires nitrogen inflation for an airplane with a maximum certified takeoff weight of more than 75,000 lbs.

Tire Inflation

Heavy loads and high speeds are here to stay. In fact, these demands will probably increase in the future. If they do, centrifugal force, heat generation, tensile, compression and shear forces will also increase.

This section has shown that aircraft tires will function properly only when they have the correct inflation pressure. It has also shown that there is a relatively small amount of tolerance in the amount of deflection in which the tire can operate effectively.

Many times we think we can look at the tire deflection and determine if it is under-inflated, as one might do with passenger car tires. Except in rare circumstances, this cannot be done. This judgment is even more difficult with the aircraft sitting unloaded and low fuel, a condition typical when tire pressures are taken.

QUESTION: Can you tell which tire in this nose gear is underinflated?

ANSWER: No. You cannot tell by looking. The "mate" tire will share the load and the two tires will look equal. Therefore, you should always use a calibrated inflation gauge to check tire pressure.

On a four-wheel or six-wheel gear, visual inspection of a low pressure tire is even less helpful, as there are more tires picking up the load from the underinflated tire.

IMPORTANT - INFLATION PRACTICES

(See Section 4, Proper Inflation Procedures)

1. **CHECK DAILY WHEN TIRES ARE COOL**
2. **INFLATE TO WORST CONDITIONS**
3. **USE DRY NITROGEN GAS (SAFELY)**
4. **INCREASE PRESSURE 4% FOR TIRES UNDER LOAD**
5. **ALLOW 12-HOUR STRETCH AFTER MOUNTING**
6. **NEVER REDUCE THE PRESSURE OF A HOT TIRE**
7. **REMEMBER – 1% PRESSURE CHANGE FOR 5°F (3° C)**
8. **EQUAL PRESSURE FOR DUALS**
9. **CALIBRATE INFLATION GAUGE REGULARLY**

NOTE: Following the suggested maintenance procedures and operating techniques in this manual can greatly extend tire life.