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 economic 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 blowouts. More information about the effects of improper inflation is available in the section "Effects of Operating Conditions."

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 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. INFLATE TO WORST CONDITIONS

When tires are going to be subjected to ground temperature changes in excess of 50˚F (27˚C) because of flight to a different climate, inflation pressures should be adjusted to worst case prior to takeoff. The minimum required inflation must be maintained for the cooler climate; pressure can be readjusted in the warmer climate. Before returning to the cooler climate, adjust inflation pressure for the lower temperature. An ambient temperature change of 5˚F (3˚C) produces approximately one percent (1%) pressure change.

3. USE DRY NITROGEN GAS (WHEN REQUIRED)

Nitrogen will not sustain combustion and will reduce degradation of the liner material, casing plies and wheel due to oxidation.

4. INCREASE PRESSURE 4% FOR TIRES UNDER LOAD

It must be determined if "loaded" or "unloaded" pressure has been specified by the aircraft manufacturer. When a tire is under load, the gas chamber volume is reduced due to tire deflection. Therefore, if unloaded pressure has been specified, that number should be increased by four percent (4%) to obtain the equivalent loaded inflation pressure. The opposite is true as well: if loaded pressure has been specified, that number should be reduced by four percent (4%) if the tire is being inflated while unloaded.

5. ALLOW 12-HOUR STRETCH AFTER MOUNTING

All tires, particularly bias tires, will stretch (or grow) after initial mounting. This increased volume of the tire results in a pressure drop. Consequently, tires should not be placed in service until they have been inflated a minimum of 12 hours, pressure rechecked, and tires re-inflated if necessary.

6. NEVER REDUCE PRESSURE ON A HOT TIRE

Excess inflation pressure should never be bled off from hot tires. All adjustments to inflation pressure should be performed on tires cooled to ambient temperature. Procedures for hot tire inflation pressure checks are described later in this session.

7. EQUAL PRESSURE FOR DUALS

To prevent one tire on a gear from carrying extra load, all tires on a single gear should be inflated equally. The mate tire(s) will share the load, allowing individual tires to run underinflated or overloaded if pressures are unequal, because all tires on the gear will deflect identically.

8. CALIBRATE INFLATION GAUGE REGULARLY

Use an accurate, calibrated gauge. Inaccurate gauges are a major source of improper inflation pressures. Gauges should be checked periodically and recalibrated as necessary. Goodyear recommends the use of a digital or dial gauge with 5 PSI increments and a memory needle.

PROPER INFLATION PROCEDURES (CONT'D)

Mounted Tube-Type Tires

A tube-type tire that has been freshly mounted and installed should be closely monitored during the first week of operation, ideally before every takeoff. Air trapped between the tire and the tube at the time of mounting will seep out under the beads, through sidewall vents or around the valve stem, resulting in an underinflated assembly.

Mounted Tubeless Tires

A slight amount of gas diffusion through the liner material and casing of tubeless tires is normal. The sidewalls are purposely vented in the lower sidewall area to bleed off trapped gases, preventing separation or blisters. *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. If a soap solution is used to check leaks, it is normal for small amounts of bubbles to be observed coming from the vent holes.

COLD PRESSURE SETTING

The following recommendations apply to cold inflation pressure setting:

1. Minimum service pressure for safe aircraft operation is the cold unloaded inflation pressure specified by the airframe manufacturer.
2. The loaded service inflation must be specified four percent (4%) higher than the unloaded inflation.
3. A tolerance of minus zero (-0) to plus five percent (+5%) of the minimum pressure is the recommended operating range.
4. If "in-service" pressure is checked and found to be less than the minimum pressure, the following table should be consulted. An "in-service" tire is defined as a tire installed on an operating aircraft.

Cold Tire Service Pressure	Recommended Action
100 to 105 percent of loaded service pressure	None - normal cold tire operating range.
95 to less than 100 percent of loaded service pressure	Reinflate to specified service pressure.
90 to less than 95 percent of loaded service pressure	Inspect tire/wheel assembly for cause of pressure loss. Reinflate & record in log book. Remove tire/wheel assembly if pressure loss is greater than 5% and reoccurs within 24 hours.
80 to less than 90 percent of loaded service pressure	Remove tire/wheel assembly from aircraft (See **NOTE** below).
Less than 80 percent of loaded service pressure	Remove tire/wheel assembly and adjacent tire/wheel assembly from aircraft (See **NOTE** below).
0 percent	Scrap tire and mate if air loss occurred while rolling (See **NOTE** below).
NOTE: Any tire removed due to a pressure loss condition should be returned to an authorized repair facility or retreader, along with a description of the removal reason, to verify that the casing has not sustained internal degradation and is acceptable for continued service.	

PROCEDURES FOR HOT TIRE INFLATION PRESSURE CHECKS

Do not approach a tire/wheel assembly that shows signs of physical damage which might compromise its structural integrity. If such conditions exist refer to operator safety procedures for damaged tire/wheel assemblies.

THIS PROCEDURE DOES NOT REDUCE OR REPLACE THE NEED AND IMPORTANCE OF 24-HOURLY "COLD" TIRE PRESSURE CHECKS.

When it is deemed necessary to make "hot" tire inflation pressure checks between normal 24 hourly "cold" tire pressure checks, follow these procedures to identify any tire that has lost pressure faster than its axle mate(s).

PROPER INFLATION PROCEDURES (CONT'D)

- This procedure identifies, for a given multi-tire landing gear, the tire/wheel assembly that has lost inflation pressure at the fastest rate on a given landing gear. This procedure does not apply to the normal inflation pressure drop which all tires experience, and proposes no action for this case.
- Tires at elevated temperatures will develop inflation pressures higher than the specified cold inflation pressures. *Excess inflation pressure should never be released from "hot" tires.*
- Inflation pressure should be checked on all tires of a given landing gear before taking action.
  - If any tire is less than 90% of minimum loaded service pressure, remove the tire from service.
  - Determine the average pressure of all tires on the gear. Any tire(s) that is/are less than 95% of the average, should be inflated up to the average.

SPECIAL PROCEDURES – EMERGENCY TIRE STRETCH

In an emergency situation, tires which must be placed in service without being inflated a minimum of 12 hours should be inflated to 105% of the unloaded service pressure. The tire/wheel/valve assembly should be sprayed with a soap solution and checked for abnormal leakage (abnormal leakage is if the soap solution bubbles anywhere on the wheel or if a constant stream of bubbles is produced at the tire vents). If there is abnormal leakage, the tire/wheel assembly should be rebuilt according to normal procedures. If there is no abnormal leakage, the tire can be placed in service, as long as cold tire pressure is checked before every flight within the next 48 hours and the tire is re-inflated if necessary. Note: If the pressure drops below 90% of service pressure during these checks, follow the guidelines per the Cold Tire Service Pressure chart in this section.

OTHER PREVENTIVE MAINTENANCE

CASING FLAT SPOTTING

Loaded tires that are left stationary for any length of time can develop temporary flat spots. The degree of this flat spotting depends upon the load, tire deflection and temperature. Flat spotting is more severe and more difficult to work out during cold weather. Occasionally moving a stationary aircraft can lessen this condition. If possible, an aircraft parked for long periods (30 days or more) should be jacked up to remove weight from the tires. Under normal conditions, a flat spot will disappear by the end of the taxi run.

COLD WEATHER PRECAUTIONARY HINTS

When extreme drops in temperature are experienced, these precautionary tips can help provide safe, trouble-free operation:

1. Follow Goodyear's recommendations on mounting as described on the new tire label.
2. Use only new wheel manufacturer-approved O-ring seals with the proper cold weather properties, properly lubricated and installed.
3. Use only an accurate calibrated pressure gauge.
4. Be sure that wheel bolts are properly torqued per wheel manufacturer's instructions.
5. Aircraft parked and exposed to cold soak for a period of time (1 hour or more), should have tire pressure checked and adjusted accordingly.
6. High speed taxis and sharp turns should be avoided to prevent excessive sideloading.
7. An important fact to remember is that for every 5°F (3° C) change (increase) in temperature will result in a corresponding one percent (1%) change (increase) in tire pressure.
8. Do not reduce the inflation pressure of a cold tire that is subjected to frequent changes of ambient temperature.

OTHER PREVENTIVE MAINTENANCE (CONT'D)

SPECIAL PROCEDURES – ABOVE NORMAL BRAKING ENERGY

Tires that have been subjected to unusually high service braking or operating conditions such as HIGH ENERGY REJECTED TAKEOFFS or HIGH ENERGY OVERSPEED LANDINGS* should be removed and scrapped. Even though visual inspection may show no apparent damage, tires may have sustained internal structural damage. Consequently, affected tires inflated should be clearly marked and/or documented by serial number with a description of the reason for removal and returned to a full service tire supplier.

*Overspeed landings are those that exceed the tire speed rating.

Tires that have deflated due to a FUSE PLUG RELEASE should be removed and scrapped. If this has occurred in dynamic (rolling) conditions, the mate tires have been subjected to high stress conditions and should also be removed. If this has occurred in a static (not rolling) condition, the mate tire does not have to be removed unless it fails to pass other AMM or applicable Goodyear CMM service or inspection criteria.

For "HARD LANDINGS", the AMM should be followed.

Also, all wheels should be checked in accordance with the applicable Wheel Overhaul or Maintenance Manual.

PROTECTING TIRES FROM CHEMICALS AND EXPOSURE

Tires should be kept clean and free of contaminants such as oil, hydraulic fluids, grease, tar, and degreasing agents which have a deteriorating effect on rubber. Contaminants should be wiped off with denatured alcohol, then the tire should be washed immediately with soap and water. When aircraft are serviced, tires should be covered with a waterproof barrier.

Tire coatings or dressings: Goodyear adds antioxidants and antiozonants to the sidewall and tread to help prevent premature aging from ozone and weather exposure. There are many products on the market that are advertised to clean tires and to improve appearance and shine. Since many of these may remove the antioxidants and antiozonants, we do not endorse any of them unless the tires are to be used for display purposes only.

Aircraft tires, like other rubber products, are affected to some degree by sunlight and extremes of weather. While weather-checking does not impair performance, it can be reduced by protective covers. These covers (ideally with light color or aluminized surface to reflect sunlight) should be placed over tires when an aircraft is tied down outside.

Store tires away from fluorescent lights, electric motors, battery chargers, electric welding equipment and electric generators, since they create ozone which has a deteriorating effect on rubber.

CONDITION OF AIRPORT AND HANGER FLOOR SURFACES

Regardless of the excellence of any preventive maintenance program, or the care taken by the pilot and ground crew in handling the aircraft, tire damage will certainly result if runways, taxi strips, ramps and other paved areas of an airfield are in a poor condition or improperly maintained. Foreign object damage (FOD) is the most common cause for early removals.

Chuck holes, cracks in pavement or asphalt, or stepoffs from pavement to ground can cause tire damage. Pavement breaks and debris should be reported to airport personnel for immediate repair or removal.

Another hazardous condition is the accumulation of loose material on paved areas and hangar floors. These areas should be kept clean of stones, tools, bolts, rivets and other foreign materials at all times. With care and caution in the hangars and around the airport, tire damage can be minimized.Many major airports throughout the world have modified their runway surfaces by cutting cross grooves in the touchdown and rollout areas to improve water runoff. This type of runway surface can cause a pattern of chevron-shaped cuts in the center of the tread. As long as this condition does not cause chunking or cuts into the fabric, the tire is suitable for continued service. See picture of a typical example of chevron cutting in the tread photo section at the right.