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DUNLOP AIRCRAFT TYRES

Abbreviated Component Maintenance Manual
Aircraft Tyres And Tubes

STATEMENT OF CERTIFICATION

The technical content of this ACMM is approved under the authority of Dunlop Aircraft Tyres Ltd. And conforms to CAP533, Section A, Chapter A5-3.

DUNLOP AIRCRAFT TYRES

CONTENTS

1. GENERAL

A. This Abbreviated Component Maintenance Manual (ACMM) contains general maintenance and servicing procedures for aircraft tyres manufactured by Dunlop Aircraft Tyres Limited (DATL). The information contained in this ACMM is applicable to:

(A.1) *bias (cross-ply) tyres, which can be tubeless or tubed*

(A.2) *radial-ply tubeless tyres.*

B. This ACMM is divided into the sections given in the ATA i2200 Specification and listed in the Table of Contents. Sections which are not applicable have been omitted. The information given will let the user:

(B.1) *Make an analysis of the condition of the component removed from service.*

(B.2) *Do the procedures necessary (if required) to put the component back to a serviceable condition.*

C. The procedures in this ACCM make sure that the component is in good condition before it is returned into service.

D. If necessary, use other instructions given in the Aircraft Maintenance Manual (AMM), the Component Maintenance Manual (CMM) for the aircraft wheel, a Technical Order (TO) or an Airworthiness Directive.

E. The UK Government Regulations make it necessary to include a Statement of Initial Certification in the manual; you can find it on the Title Page. This statement certifies that a given standard of quality control was used in the production of the manual.

F. If you require information about publications, spares and support engineering, refer to:

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40 Fort Parkway
Erdington
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Web: www.dunlopaircrafttyres.com

2. REVISION STATUS

G. The user is responsible for ensuring that they are using the latest revision.

3. LIST OF ABBREVIATIONS

ACMM	Abbreviated Component Maintenance Manual
AEA	Association of European Airlines
AMM	Aircraft Maintenance Manual
CMM	Component Maintenance Manual
DATL	Dunlop Aircraft Tyres Limited
EASA	European Aviation Safety Agency
ETSO	European Technical Standard Order
FAA	Federal Aviation Administration
ITF	Inter-Tread Fabric
lbs	Pounds
LR	Load Rating
NATO	North Atlantic Treaty Organisation
NSN	Nato Stock Number
mph	Miles Per Hour
PR	Ply Rating
RTO	Rejected Take-Off
S/N	Serial Number
TO	Technical Order
TSO	Technical Standard Order

DUNLOP AIRCRAFT TYRES

DESCRIPTION

1

1. GENERAL TYRE INFORMATION

A. This page block gives information on the tyre markings and the tyre construction.

B. Tyre Markings

(B.1) *Fig. 1 shows an example of the tyre markings moulded into the rubber of a Dunlop aircraft tyre. The markings can include:*

(a) *The tyre size.*

(b) *The speed rating.*

(c) *The Federal Aviation Agency (FAA) /European Aviation Safety Agency (EASA) standards.*

(d) *The serial number.*

(e) *An Association of European Airlines (AEA) code.*

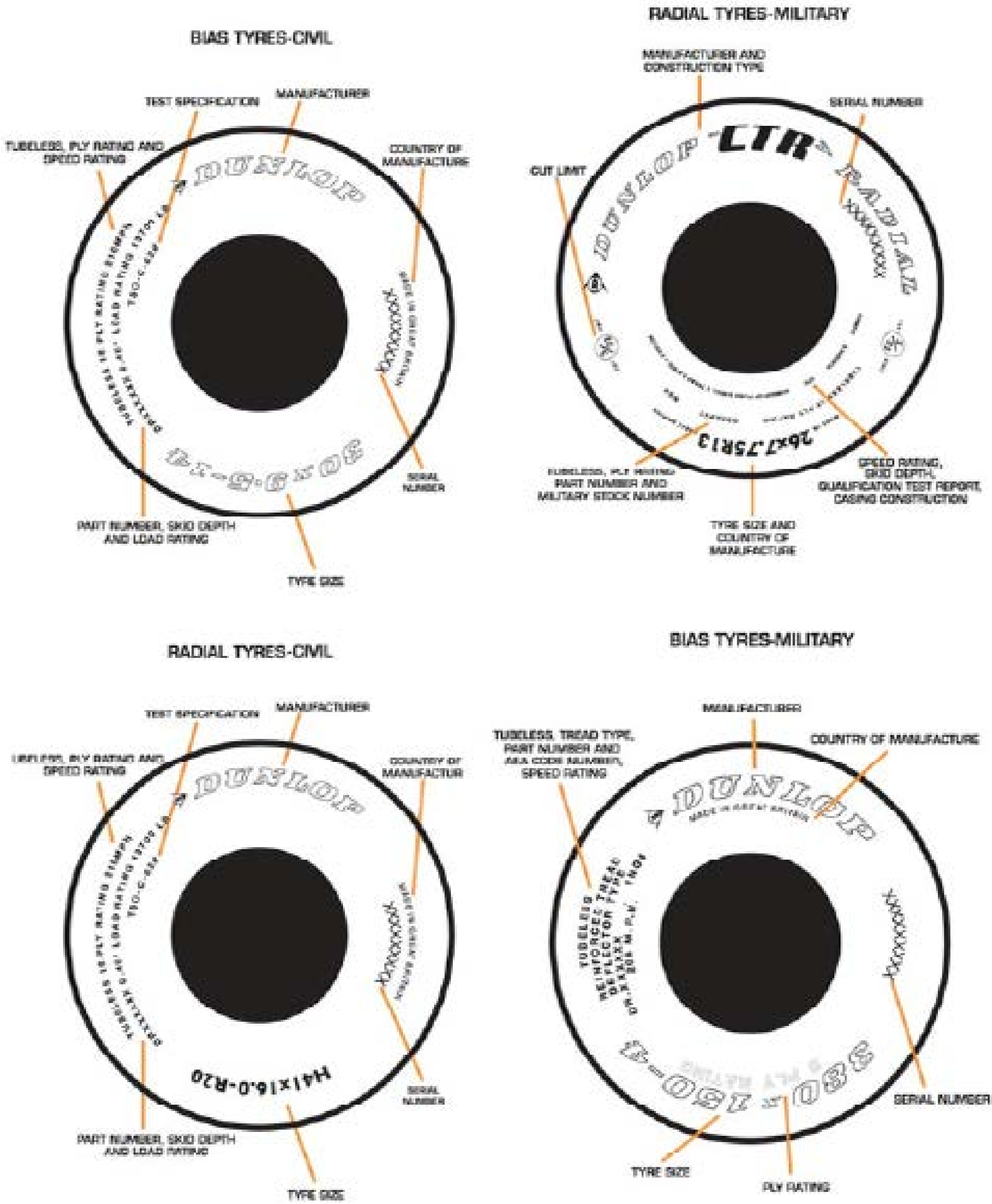
(f) *A Dunlop part number.*

(g) *Special markings for military tyres.*

(h) *Vent hole markings.*

(i) *Balance point markings.*

(j) *Retread markings.*



EXAMPLES OF TYRE MARKINGS

FIGURE 1

C. Tyre Size (Ref Fig. 2)

C.1 The tyre size can be shown on the tyre as follows:

(a) *A only, for example 44”, or*

(b) *B-C only, for example 8.50–10, or*

(c) *AxB only, for example 49X17, or*

(d) *AxB-C, for example 49x19.0-20, or*

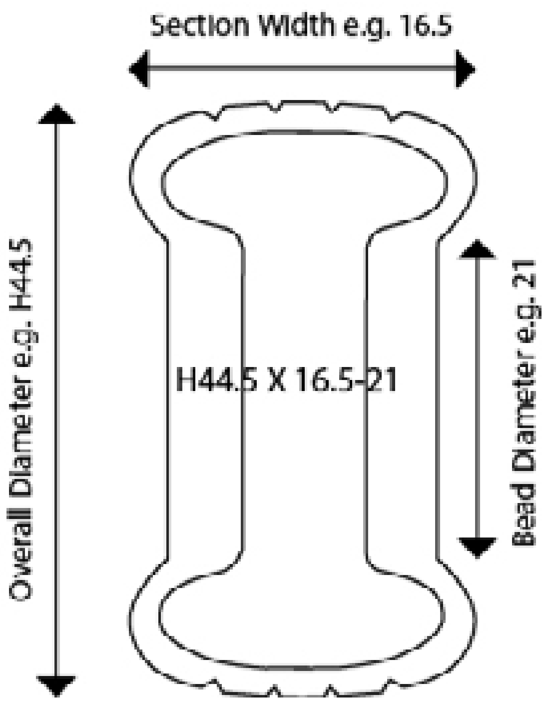
(e) *AxBRC, for example 46x17R20 for radial-ply tyres.*

NOTE: The size specifications shown in Para C. (1) (d) and (e) above are the tyre size standards now used for tyres of new design.

(C.2) *A tyre size could have a prefix H (for example, H44.5x16.5-21). The H indicates that the wheel rim, on which the tyre is to be installed, must have a specified width between the flanges (in a range of 0.60 to 0.70 x the nominal width of the tyre.*

(C.3) *Dimensions A, B and C can be inches or millimetres. For example, for a tyre size specified as 750x230-15, dimension A = 750 mm, dimension B = 230 mm and dimension C = 15 in.*

(C.4) *An inner tube size is specified the same as the tyres size it is related to.*



DIMENSIONS USED FOR TYRE SIZE SPECIFICATION

FIGURE 2

D. Speed Rating

(D.1) *The speed rating of a tyre (for example, 225 mph) is its maximum rated ground speed (approved after completion of tests on the tyre at that speed).*

E. Rating and Load Rating.

(E.1) *The Ply Rating (PR), (for example, 22 PR), is an index which can identify the maximum. rated static load that can be applied to the tyre when it is inflated to a specified pressure and is used in specified conditions of operation.*

(E.2) *The Load Rating (LR) is the maximum static working load that is permitted.*

F. Federal Aviation Agency Standard TSO C62/European Aviation Safety Agency ETSO-C-62

(F.1) *These are standards of the FAA and EASA for the minimum qualification tests of aircraft tyres.*

G. Serial Number

(G.1) *Each Dunlop tyre has a different serial number which includes the date of manufacture. For example, in the serial number 13001123:*

- **(a)** *13 is the year of manufacture.*
- **(b)** *001 is the day of manufacture.*
- **(c)** *123 identifies the tyre.*

H. Association of European Airlines Code

(H.1) *For the AEA, it is necessary to show an AEA code. This code identifies the number of casing plies (carcass and breaker plies) and the modification status of the tyre design. For example, in the AEA code N018-2A:*

- **(a)** *N018 N indicates nylon and 18 is the number of carcass plies.*
- **(b)** *-2 is the number of breaker plies.*
- **(c)** *A is the tread modification number.*

I. Dunlop Part Number

(I.1) *Dunlop part numbers are 4 or 5 digit numbers with a prefix of 2 or 3 alpha characters. If used, the suffix T indicates that a tyre is tubeless. For example, a Dunlop part number could be shown as DR15348T.*

(I.2) *The prefix of 2 or 3 alpha characters is used to indicate specified characteristics of a tyre as follows:*

(a) *DR – indicates a bias tyre with a rib tread.*

(b) *DRR indicates a tyre with fabric in the tread giving more strength (the second R indicates Reinforced).*

(c) *DZ indicates a radial-ply tyre.*

(d) *DA indicates an anti-shimming tyre or a twin-contact tyre.*

(e) *DB indicates a tyre with a serrated rib.*

(f) *The prefix DT is used for the part number of an inner tube.*

J. Military Tyre Markings

(J.1) *Tyres for military aircraft have special markings related to the military specification. These markings could include a stores reference number (for example a NATO Stock Number (NSN)).*

K. Vent Hole Marking

(K.1) *Vent holes are small holes (awl holes) made in the lower sidewall of the tyre and above the wheel flange area.*

(K.2) *On a tubeless tyre, green litho ink or paint is used to indicate the positions of the vent holes. The depth of the hole penetrates only to the first 2 or 3 plies of the casing. The holes allow the release of the small quantity of inflation gas which can diffuse through the inner liner. Without the vent holes, the diffused gas could cause ply or tread separation.*

(K.3) *On tyres for which an inner tube is necessary, grey or silver litho ink or paint is used to indicate the positions of the vent holes. These vent holes are fully through the tyre casing and allow the release of diffused inflation gas caught between the tube and the inner wall of the tyre. The holes also allow for the release of air trapped in the casing during tyre manufacture.*

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L. Balance Point Marking

(L.1) *The balance mark on a tyre is a red spot or a red triangle which identifies the 'light' point.*

(L.2) *When you install a tubeless tyre, use the applicable instructions in the wheel manufacturer's CMM. If there are no maintenance instructions for the wheel, (or no other special instructions), align the red balance mark on the tyre with the inflation valve on the wheel.*

(L.3) *The balance mark for an inner tube is a red stripe which identifies the 'heavy' point. This is usually adjacent to the valve stem of the tube. When you install an inner tube, align the balance marks of the tube and the tyre. If an inner tube has no balance mark, align the valve stem of the inner tube with the balance mark on the tyre.*

M. Retread Markings (Ref Fig. 3 on the next page)

(M.1) *A Dunlop retreaded tyre has a number of markings added in a retread panel on the sidewall. The markings could include:*

- **(a)** *The identity of the owner of the tyre.*
- **(b)** *The date of the retread.*
- **(c)** *The retread level.*
- **(d)** *The AEA tread identification code and the mould skid depth.*

(M.2) *For example, retread markings could include:*

- **(a)** *CRANSHAW AIR, (Airline Name)*
- **(b)** *DR11657T, 1, 24PR, (Part Number; Drawing Revision Status; Ply Rating).*
- **(c)** *S/N 11236150, (Serial Number).*
- **(d)** *F2A, DR2 or R02, 11/11, P1, (Retread Process; Number of Retreads; Date of Retread; Plant Number).*
- **(e)** *Load Rating, 21525 lbs, (Maximum Load Rating).*
- **(f)** *28 Skid, 235 mph, (Tread Groove Depth; Maximum Speed Rating).*
- **(g)** *TSOC26D, ETSOC26D, (FAA Qualification; EASA Qualification).*

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RETREAD TYRE MARKING PLATE
FIGURE 3

(M.3) *More information on a retreaded tyre is shown on the tread buttress. For example, this could include the tyre size or the AEA code.(a) The identity of the owner of the tyre.*

N.Tube Markings

(a) *The markings on a Dunlop tube could include:*

(b) *A date code, (for example, JUN 99) or*

(c) *Year/month, day of the month, production number code.*

(d) *Manufacturer.*

(e) *Part Number.*

(f) *Issue Number.*

(g) *Stores ID Number.*

(h) *Other markings.*

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2. TYRE CONSTRUCTION

(Ref Figs.4 and 5):

A. Introduction

(A.1) *Fig. 4 shows a cross-ply (bias) tyre. Fig. 4 shows the different construction of a radial-ply tyre (Fig. 5).*

B. Tread

(B.1) *The tread is a special rubber compound which is resistant to abrasive wear, cutting, chunking and heat. Around its circumference the tread has moulded grooves which help to remove water between the tread and the runway during wet conditions and increase the traction and grip.*

C. Inter-Tread Fabric

(C.1) *An aircraft tyre can include Inter-Tread Fabric (ITF) also known as tread reinforcement layers. This is one or more layers of nylon fabric between the casing plies and the base of the tread. The ITF keeps the tread stable and free from distortion during high speeds when there is increased centrifugal force. The ITF also gives protection to the casing plies if debris cuts the tread. For tyres which can be retreaded, the ITF can be used as a wear indicator.*

(C.2) *For special high speed applications, the ITF can be moulded into the rubber of the tread. As the tyre wears, the ITF is seen in the tread pattern.*

D. Casing (Bias Tyres Ref Fig. 4)

(D.1) *The primary strength of a tyre is in the casing plies. A casing ply is a layer of high modulus cord which is coated with rubber compound to make a fabric. The fabric is assembled in layers, (the casing plies).*

(D.2) *For bias (cross-ply) aircraft tyres, the casing plies are installed around the bead coils to make the sidewalls of the tyre. This gives the bias tyre its strength. Adjacent layers of casing ply are put at opposite bias angles. The strength and load capacity of the tyre is related to the number of plies and bias angles.*

(D.3) *In a tyre for a military application, the casing cord could be a red colour for easy visibility and indication of wear.*

E. Breakers

(E.1) *A breaker is an added layer of fabric which gives more strength. The breaker layers are laid directly on the top casing ply across the width of the tread. They are a part of the tyre casing, and are not removed when the tyre is retreaded.*

F. Beads

(F.1) *The tyre beads hold the tyre on its wheel. The beads are made of high tensile wire strands. Each wire strand is coated with rubber compound and is wound into a coil of the specified diameter for the tyre. A rubber component known as the apex is applied to the top of the bead coil to make the bead assembly.*

(F.2) *The bead filler is a fabric component which helps to hold the bead coil assembly together. The bead filler also gives more strength to the bead assembly and more stiffness to the area of the tyre that is compressed with a high load against the wheel rim.*

G. Chafers

(G.1) *A chafer component prevents chafing damage where the tyre is against the rim. It also decreases the conduction of brake heat to the tyre from the rim.*

(G.2) *The chafer component is a strong nylon material which is coated with rubber. The chafer assembly is attached to the first ply and pulled around the bead face to the clinch area.*

H. Sidewall

(H.1) *The sidewall is a layer of special rubber formulated with anti-oxidants. This rubber layer provides protection against weathering to the casing plies and is resistant to contamination, cuts and flexing.*

I. Inner Liner

(I.1) *The inner liner is a layer of special rubber compound around the inner face of a tubeless tyre. The inner liner is attached to the first casing ply (between one bead toe and the other) and is a seal which prevents leakage of inflation gas and moisture into the tyre casing.*

J. Chined Tyres

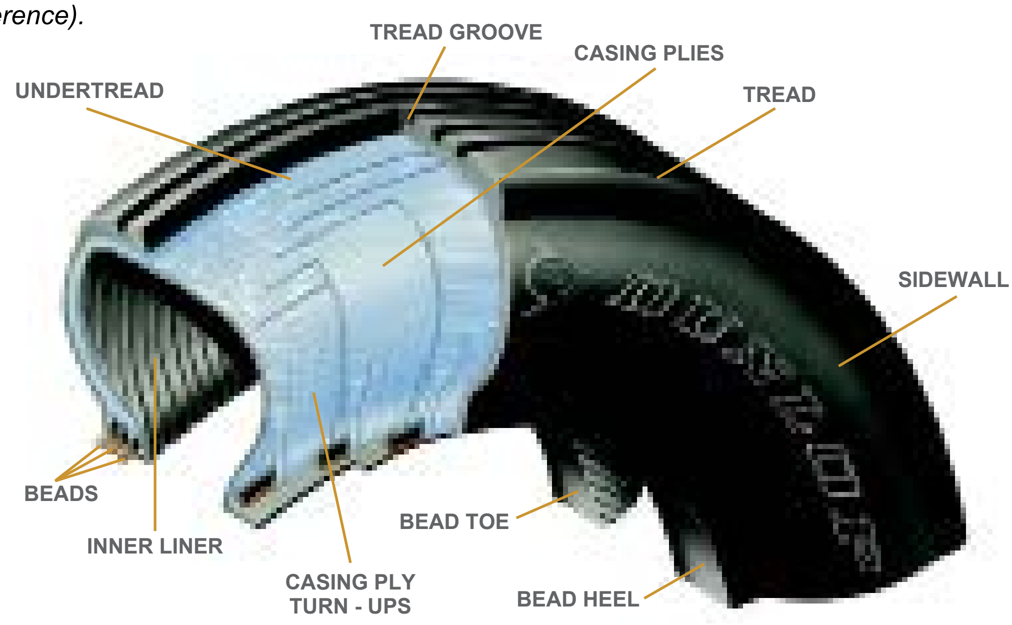
(J.1) *Some types of nose wheel tyres include one (or two) chines moulded into the rubber at one of (or each of) the shoulder buttresses. A chine is a rubber extension, (around the tyre circumference), that deflects water away from rear fuselarge mounted engines during aircraft movement on a wet runway.*

K. Breaker Package (Radial-Ply Tyres) (Ref. Fig. 5)

(K.1) *The breaker package, (also known as the belt plies), is a number of plies, made of nylon or aramid, attached below the tread of a radial-ply tyre. The breaker package gives stiffness in the tread area and helps to keep the circumference constant as the tyre expands when it is inflated.*

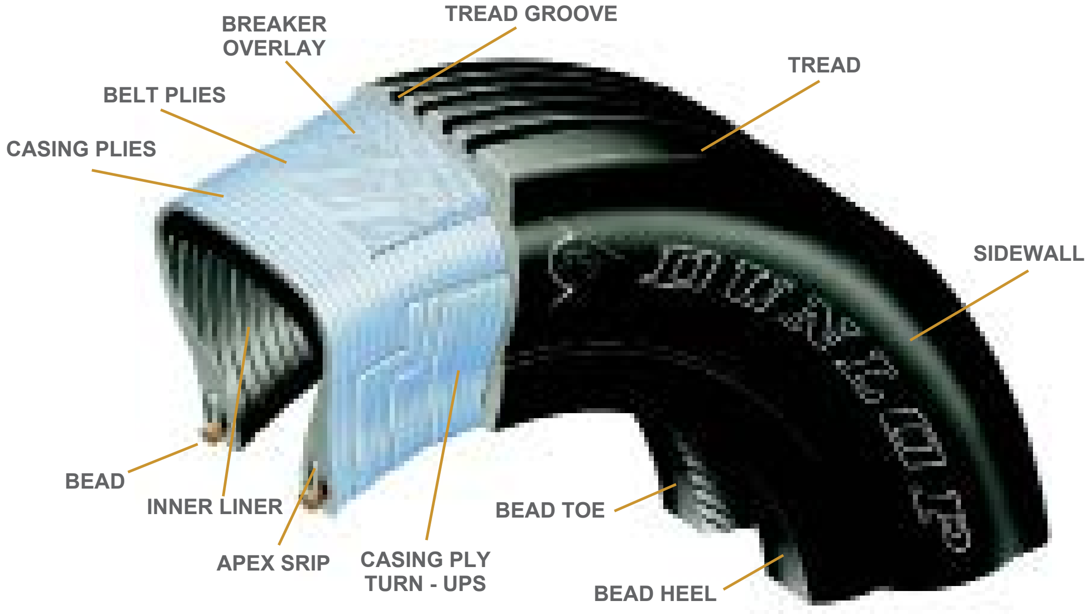
L. Casing (Radial-Ply Tyres) (Ref. Fig. 5)

(L.1) *The casing of a radial-ply tyre is not the same as that in a bias (cross-ply) tyre. A ply of casing fabric for a radial-ply tyre is made of rubber coated cords as usual. But in a radial-ply tyre, the plies are laid so that the cord direction is from bead to bead (at approximately 90 degrees to the circumference).*



BIAS (CROSS-PLY) TYRE

FIGURE 4



RADIAL-PLY TYRE

FIGURE 5

3. RETREAD TYRE

A. General

(A.1) *This section has information for retreading of aircraft tyres.*

(A.2) *The term retreading refers to the method of restoring a worn tyre to operational condition by renewing the tread rubber.*

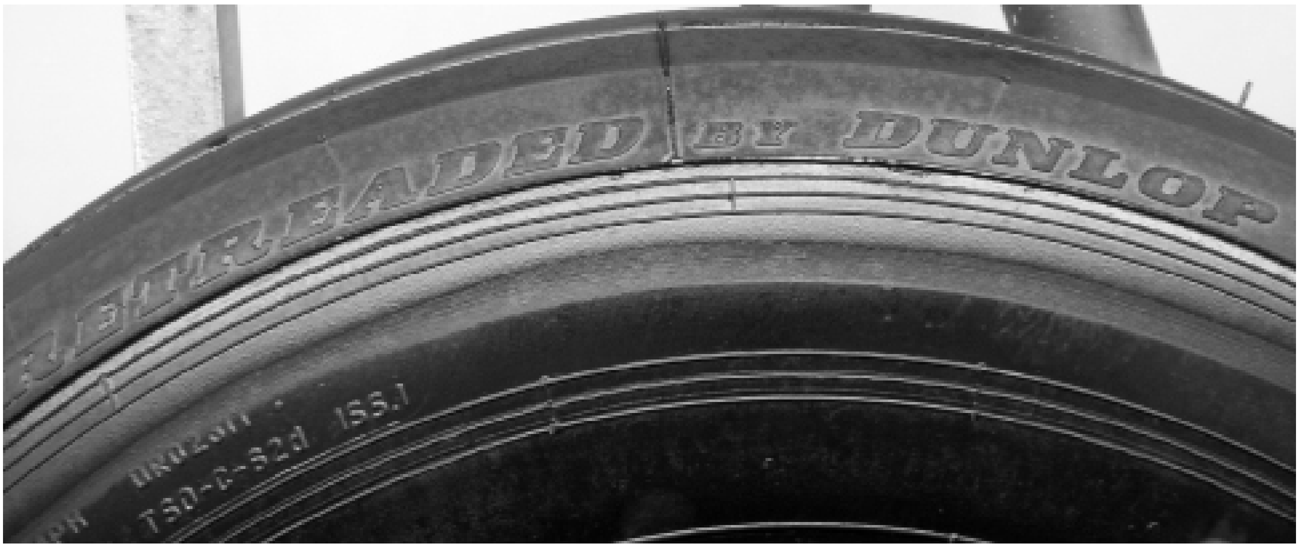
(A.3) *During the retread process, any remaining tread and Inter Tread Fabric is removed and replaced with new materials. The tread rubber extends beyond the shoulder of the tyre by several inches. Due to the process, a buffed or roughened surface will be visible where the old rubber was removed and the new products join the sidewall. Refer to Fig. 6.*

(A.4) *Cross retreading is where one manufacturer retreads the tyre casings of another tyre manufactures. This practice is based on agreement with the customer and any manufacturers restrictions.*

(A.5) *The practice of cross retreading tyres currently only applies to bias casings.*

(A.6) *Cross retreading of civil and military radial aircraft tyres is not currently permitted and can only be carried out by the original tyre manufacturer.*

(A.7) *Normal appearance of retread tyre, Fig. 6.*



NORMAL APPEARANCE OF A RETREAD TYRE
FIGURE 6

INSPECTION CHECK

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4. GENERAL

A. This section gives the instructions necessary for the inspection and checks of tyres and inner tubes installed on aircraft. Use these instructions only if no other instructions are contained in the AMM or in an Airworthiness Notice/Directive.

B. The instructions in this section are for ground crew and flight personnel to make sure that:

(B.1) *Tyres are safe for flight.*

(B.2) *Unserviceable tyres with wear or damage more than the specified limits are replaced.*

(B.3) *Worn tyres are removed correctly at the correct time to enable them to be retreaded.*

5. INFLATION PRESSURES

WARNING:

(B.1) BE CAREFUL AT ALL TIMES WITH AIRCRAFT TYRES INFLATED TO HIGH PRESSURES. TYRES INFLATED TO HIGH PRESSURES CAN BE DANGEROUS.

(B.2) USE THE CORRECT HANDLING EQUIPMENT AND TOOLS FOR THE TYRES. MAKE SURE THAT EQUIPMENT IS CALIBRATED ACCURATELY AND REGULARLY.

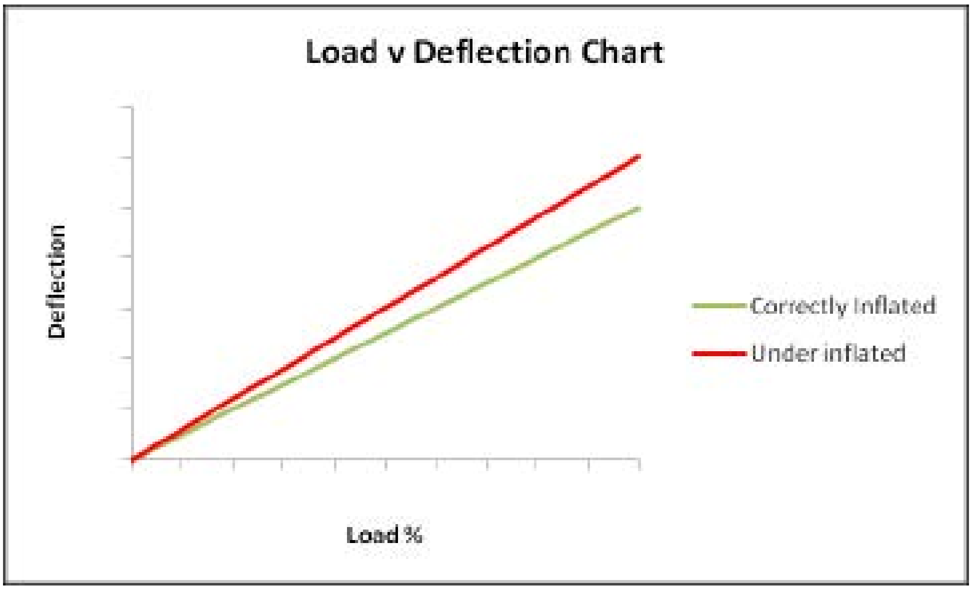
(B.3) ALWAYS USE THE CORRECT EYE PROTECTION WHEN YOU INFLATE OR DEFLATE TYRES.

(B.4) DO NOT INFLATE TYRES DIRECTLY FROM A HIGH PRESSURE BOTTLE. ALWAYS MAKE SURE THAT A PRESSURE REDUCING VALVE IS USED TO DECREASE PRESSURE INITIALLY, AND THAT A PRESSURE REGULATOR VALVE IS USED TO CONTROL PRESSURE.

A. Inflation Pressure Checks

(A.1) *Tyres on aircraft must be kept at the correct operational pressure. An increase or decrease in pressure from the correct specified operational value can cause deterioration of a tyre, and have an effect on the life and safety of the tyre.*

(A.2) *An under inflated tyre (in which the pressure is too low) has an increased deflection, and becomes hotter during aircraft movement on the ground. An increase of heat in the carcass can cause separation of the plies, tread separation and possibly tyre failure.*



LOAD V DEFLECTION
FIGURE 7

(A.3) *Figure 7 shows that an underinflated tyre deflects more than a correctly inflated tyre for a given load. This can lead to increased casing fatigue, increased wear, reduced retreadability, creep on the wheel or induce the wheel to pinch the tyre or the wheel to strike the runway.*

(A.4) *An over inflated tyre (in which the pressure is too high) wears more quickly on the crown of the tread and can be damaged more easily.*

(A.5) *Measure tyre pressures regularly, at least every 24 hours, or before each flight.*

(A.6) *Measure tyre pressures with a calibrated gauge with a minum tolerance of ±2% of its full scale that is suitable to the pressure range being measured. DATL recommend using a guage with a tolerance of ±0.25% of its full scale.*

WARNING:

DO NOT USE TYRE DEFLECTION TO MEASURE TYRE PRESSURE. ALWAYS USE A PRESSURE GAUGE WHICH IS ACCURATELY CALIBRATED. INCORRECT TYRE PRESSURES CAN INCREASE THE RATE OF WEAR DUE TO THE BUILD UP OF MORE HEAT AND WILL DECREASE THE FATIGUE LIFE. FAILURES SUCH AS COMPONENT SEPARATION CAN OCCUR QUICKLY IN TYRES WITH INCORRECT PRESSURES. TYRE FAILURES CAN BE DANGEROUS TO PERSONNEL AND COULD CAUSE DAMAGE TO THE AIRCRAFT.

(A.7) *Do not use tyre deflection to measure tyre pressure. For example, a tyre on a strut with two wheels could be under inflated (have a pressure which is too low). But its deflection will look the same as the other tyre which has the correct pressure. This is because the tyre with the correct pressure has an increased load.*

B. Pressure Checks at Ambient Temperature

(B.1) *Measure tyre pressures (and adjust tyre pressures) while the tyres are at ambient temperature.*

(B.2) *After an aircraft landing, let the tyres cool to ambient temperature for approximately three hours. Then you can measure the tyre pressures correctly.*

C. Inflation Pressures

(C.1) *The usual diffusion of gas through the inner liner of a tyre decreases the tyre pressure. A pressure decrease of 5% of the operational pressure in 24 hours can be accepted.*

(C.2) *Before each flight (or each day), make sure that the pressures of the tyres are in the operational pressure range (as specified in the AMM). When you measure tyre pressure, use a pressure gauge which is accurately and regularly calibrated.*

(C.3) *Tyre pressures must be as specified in the AMM. The specified pressures are related to the gross weight of the aircraft and the centre of gravity of the aircraft.*

(C.4) *Tyre deflection increases the pressure in a tyre. A tyre with which is supporting the aircraft weight has a pressure which is approximately 4% higher (1.04 x higher) than a tyre which is not supporting the aircraft weight.*

(C.5) *Table 1 shows the maintenance tolerances recommended for tyre pressures. Always refer to the AMM for the correct tyre pressures.*

TABLE 1

RECOMMENDED TYRE PRESSURE TOLERANCES

TYRE PRESSURE RANGE (bar)	(psi)	TOLERANCE (bar)	(psi)
0 to 3.4	0 to 49	+ 0.3 / - 0	+ 4 / - 0
3.5 to 6.8	50 to 99	+ 0.4 / - 0	+ 6 / - 0
7.0 to 13.7	100 to 199	+ 0.7 / - 0	+ 10 / - 0
13.8 and higher	200 and higher	+ 1.0 / - 0	+ 15 / - 0

D. Recommended Tyre Pressure Maintenance

(D.1) *Table 2 shows different measured pressure ranges as a percentage of operational pressure. For each pressure range the table gives the tyre status and the pressure adjustment which is necessary.*

(D.2) *The pressure values and adjustments in Table 2 are only applicable to tyres which are at ambient temperature.*

(D.3) *Make sure that you use the correct operational pressure value (Ref. the AMM).*

NOTE: The pressure value for a tyre on the aircraft (with the aircraft weight on the tyre) is 1.04 x the pressure value for a tyre off the aircraft (without the aircraft weight on the tyre).

TABLE 2

RECOMMENDED TYRE PRESSURE MAINTENANCE

MEASURED PRESSURE RANGE (% of Operational Pressure)	TYRE STATUS	MAINTENANCE
More than 105%	Over Inflated (pressure too high)	Decrease the pressure to the maximum of the operational pressure range.
From 105% to 100%	Pressure in usual operational range.	None
From 100% to 95%	Pressure decrease which can be permitted each day.	Increase the pressure to the maximum of the operational range.
From 95% to 90%	Under inflated. Pressure has decreased accidentally to limits which are less than those permitted for pressure decrease each day.	1. Increase the pressure to the maximum of the operational pressure range. 2. Record the tyre status and the pressure adjustments in the Service Logbook. 3. Do a pressure check after 24 hours. If the pressure has decreased more that 5%, remove the wheel assembly from the aircraft and investigate the cause.
From 90% to 80%	Under inflated. Pressure has decreased to limits which are less than those permitted for accidental pressure decrease.	1. Remove the wheel from the aircraft. 2. Inflate the tyre to the specified operating pressure. 3. Do a pressure check after 24 hours. If the pressure has decreased more that 5%, investigate the cause. 4. If you cannot find and rectify the cause of the pressure decrease, replace the tyre. Send the removed tyre for more checks and repair if necessary.
From 80% to 0% (see Note below)	Flat tyre. Pressure has decreased too quickly.	Remove the wheel assembly and, if applicable, remove the wheel assembly on the same strut. Replace the tyre(s).

NOTE: You could find that one or more of the fuse plugs are blown in a wheel. If a wheel fuse plug has blown and the aircraft has moved on the ground, the tyre (and the tyre(s) for the wheel(s) on the same strut) will be permanently damaged. Replace the tyre(s). If a wheel fuse plug has blown and the aircraft has not moved on the ground, the tyre(s) could be serviceable.

E. Pressure Maintenance of Hot Tyres

(E.1) *Movement of the aircraft on the ground causes heat in the tyres. Also, tyres can receive heat transmitted through the wheel from hot brakes, or from the aircraft structure. The tyres on an aircraft can be at different temperatures related to the different degrees of heat transmitted.*

WARNING:

DO NOT DECREASE THE PRESSURES OF HOT TYRES, BECAUSE AT AMBIENT TEMPERATURE, THEIR PRESSURES WILL BE LESS THAN THE CORRECT OPERATIONAL PRESSURE.

(E.2) *Let hot tyres become cool to ambient temperature before you do a check of tyre pressures.*

NOTE: The time necessary for a tyre to become cool at ambient temperature can be up to three hours after a landing (and is related to the tyre size).

(E.3) *In special operational conditions, it could be necessary to do a tyre pressure check while the tyres are hot. If necessary, follow the instructions below:*

NOTE: You can use a temperature compensated pressure gauge to do pressure checks of hot tyres. The subsequent instructions (a), (b) and (c) are not then necessary.

a) *For a landing gear strut with one wheel, the tyre pressure must be at (or more than) the specified operational pressure.*

b) *For a landing gear strut with two wheels, with the two tyres at approximately the same temperature, the pressures must be equal. If not, inflate the tyre with the lowest pressure so that its pressure is the same as that of the tyre with the highest pressure. Record the pressures of the tyres before and after the pressure check, and the ambient temperature in the Service Logbook. If at the subsequent pressure check, the pressure is lower in the tyre which you inflated, replace the tyre if the pressure decrease is more than the specified limits given in Table 2.*

c) *The pressures of tyres on a strut with a multi-bogie landing gear must be in the limits of +/-5% of the highest pressure (if all the tyres are at approximately the same temperature). Inflate a tyre which has a pressure which is too low until its pressure is in the correct limits. In the Service Logbook, record the inflation pressures of the tyres before and after the pressure check, and the ambient temperature. If at the subsequent check, the pressure is lower in the tyre which you inflated, replace the tyre if the pressure decrease is more than specified limits given in Table 2.*

F. Pressure Maintenance with Changes of Ambient Temperature

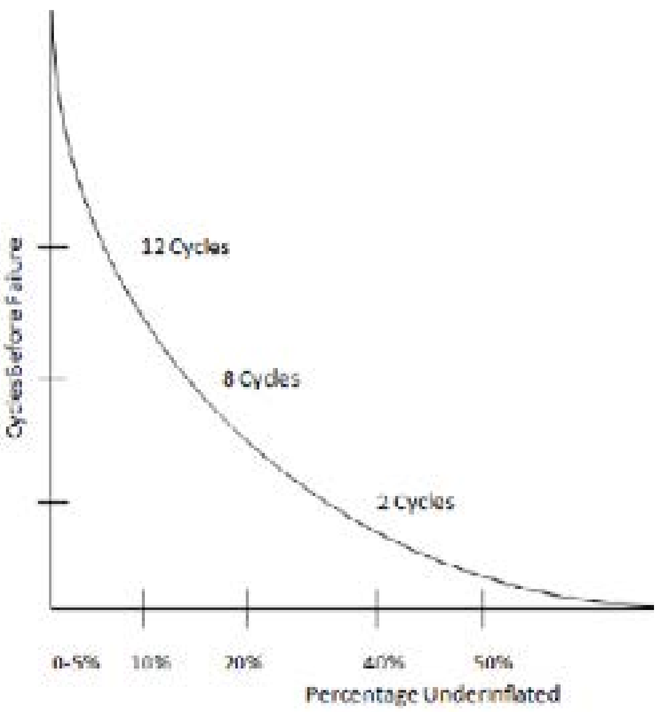
(F.1) *An increase in ambient temperature of 3 deg. C causes an increase of 1% in tyre pressure. A decrease in ambient temperature of 3 deg. C causes a decrease of 1% in tyre pressure. If the change in ambient temperature is more than 25 deg. C, (as can occur for flights between different climates), you must inflate the tyre to the correct pressure before the start of the flight.*

(F.2) *For a flight from a cold to a hot climate, inflate the tyre to its usual operational pressure in the cold climate before a take-off. For an ambient temperature increase of 35 deg. C (for example), the calculated pressure increase is 35 ÷ 3 = 11.6%. In the hot climate, the increased pressure will be safe for a landing and a take-off.*

(F.3) *For a flight from a hot climate to a cold climate you must increase the tyre pressure in the hot climate (to a calculated value) before a take-off. For an ambient temperature decrease of 35 deg. C (for example), the calculated pressure decrease is 35 ÷ 3 = 11.6%. Thus an increase in tyre pressure of 11.6% is necessary in the hot climate before a take-of. The decreased pressure in the cold climate will then be safe for a landing and take-off.*

WARNING:

ALWAYS APPROACH TYRES AT A 45 DEGREE ANGLE FROM THE TREAD TO MINIMISE THE RISK OF INJURY IF THE TYRE BURSTS.



APPROXIMATE CYCLES TO FAILURE V UNDER INFLATION

FIGURE 8

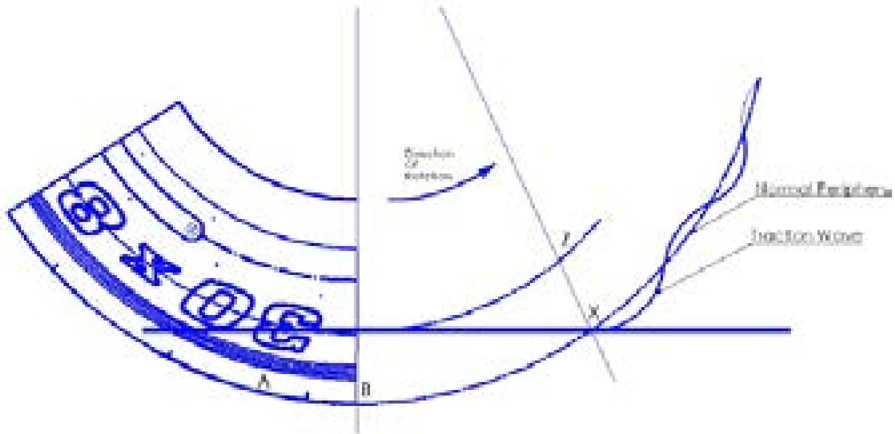
G. Approximate Cycles to failure v Under Inflation

(G.1) *The chart shows that failure will occur sooner when a tyre is underinflated.*

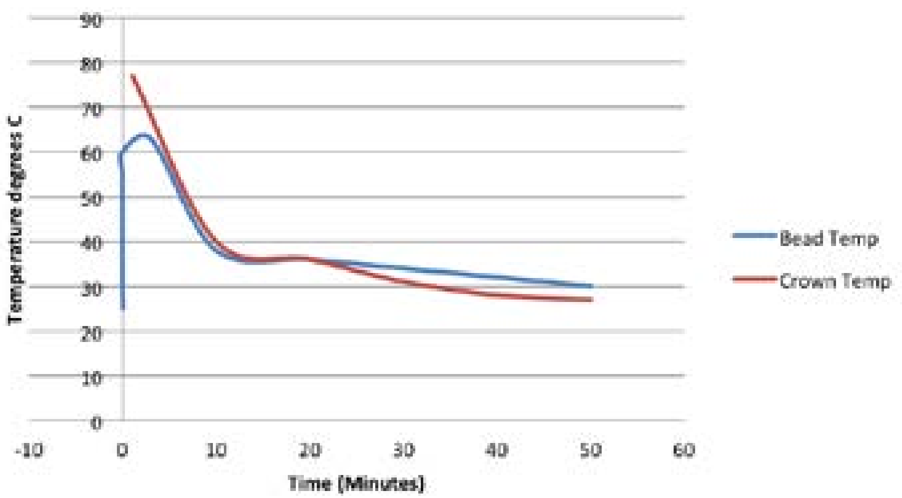
H. Tyre Leaving Contact Area, (Ref Fig. 9).

(H.1) *The chart below shows the effect of the traction wave on the tyre as the footprint leaves the moment of inertia.*

(H.2) *The higher the deflection the greater the traction wave.*



TYRE LEAVING CONTACT AREA
FIGURE 9



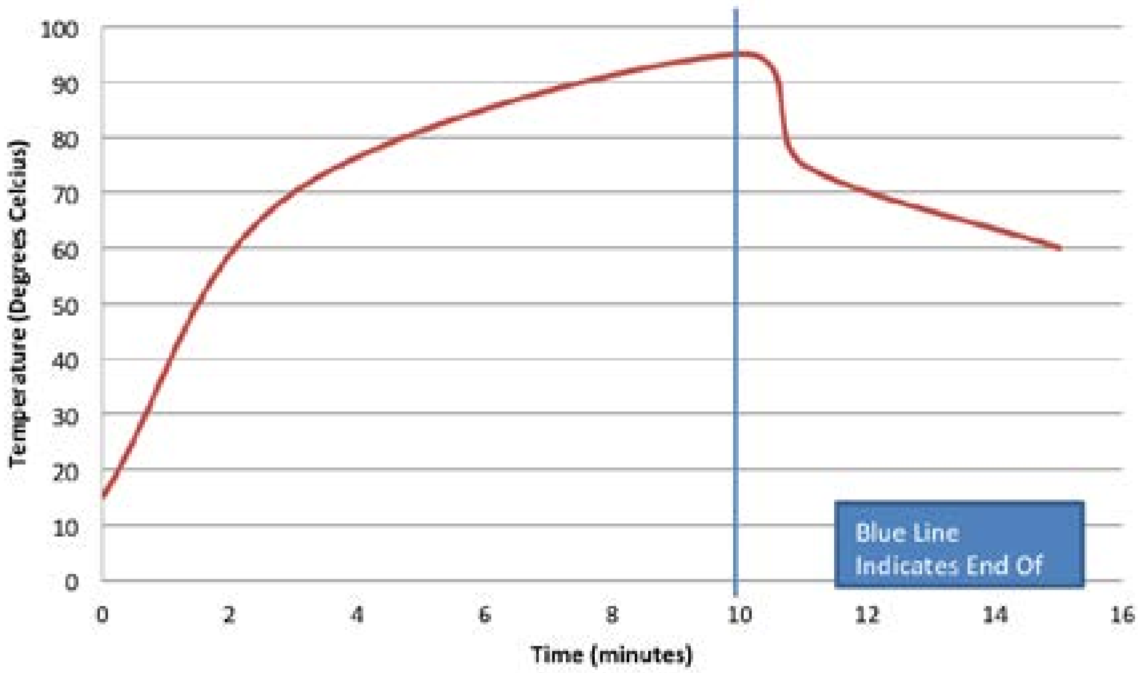
NATURAL TYRE COOLING
FIGURE 10

I. Natural Tyre Cooling

(I.1) *The chart shows the typical cooling cycle of an aircraft that has just landed. The temperature remains high for a period of roughly five minutes and then reduces rapidly.*

J. Temperature During Taxi.

(J.1) *The chart shows the typical cycle taxi (hot) when an aircraft is moving out to the runway. When the taxi has finished a rapid fall in temperature occurs followed by a gradual reduction in overall temperature.*



TEMPERATURES DURING TAXI

FIGURE 11

6. TYRE INSPECTION (WEAR LIMITS)

A. Introduction

(A.1) *You must examine tyres installed on an aircraft regularly for wear as a part of routine maintenance. Replace a tyre which is worn more than the limits specified in Para. 6.B. thru 6.F. A tyre which is worn less than the limits specified is serviceable (unless damage to the tyre is more than specified limits given in Para. 6.B thru 6.F.*

B. Retreadable Tyre

(B.1) *Replace a retreadable tyre when it is worn to these limits:*

(a) *The first time the wear (where the wear occurs most quickly), is down to the bottom of a groove at a point on the tread circumference, or*

(b) *The first time the fabric can be seen at a point on the tread circumference (although the remaining tread is satisfactory.*

NOTE: 1. Usually a tyre is not retreaded if it is worn more than the above limits.

2. Tyres having reached the above limits on aircraft away from a maintenance base can perform up to an additional five cycles to return to base.Tyres in such a case may not be able to be retreaded.

(C) *In wet conditions, the first time the wear, (where the wear occurs most quickly), is down to 2mm, (0.080 in), of the bottom of a groove at a point on the tread circumference, (refer to CAP 562 – Book 2, Leaflet 32-30).*

C. Non-Retreadable Tyre

(C.1) *Remove and discard a non-retreadable tyre if it is worn to these limits:*

(a) *For a bias (cross-ply) tyre, the first time the casing ply can be seen (at the location where the wear occurs most quickly).*

(b) *For a radial-ply tyre, the first time the belt package can be seen (at the location where the wear occurs most quickly).*

D. Tyre with Nylon Fabric Included

(D.1) *In some types of high speed tyre, the tread can include Nylon fabric to give more strength. This fabric shows in the tread pattern as the tyre wears during the life of the tread.*

(D.2) *Replace a tyre with nylon fabric included when it is worn as specified in Para. 6,B,B1.*

E. Multi-dimple Tyre

(E.1) *Replace a multi-dimple tyre the first time the tread in a row of dimples is worn to the bottom of the dimples.*

F. Twin-contact Tyre

(F.1) *Replace a twin-contact tyre the first time the centre of the crown shows signs (roughness or marks) that it has touched the ground.*

7. TYRE INSPECTION (DAMAGE LIMITS AND TYRE FAILURES)

A. Introduction

WARNING:

ALWAYS APPROACH TYRES AT A 45 DEGREE ANGLE FROM THE TREAD TO MINIMISE THE RISK OF INJURY IF THE TYRE BURSTS.

(A.1) *You must examine tyres installed on an aircraft regularly for damage and failures as a part of routine maintenance. Replace a tyre which has a failure, or is damaged more than the limits specified in Para. 7.B. thru 7.P.*

NOTE: A tyre which is damaged less than the limits specified in Para. 7.B. thru 7.P. is serviceable (unless the tyre wear is more than the specified limits given in Para. 7.B thru 7.P).

B. Chevron Cutting (Ref. Fig. 12)

(B.1) *Chevron cutting can occur when there is wheel spin-up during a landing on a runway which has cross groove cuts. Replace a tyre with chevron cutting if:*

(a) *The first time fabric can be seen, or*

(b) *The area of the chevron cutting is more than the tread footprint, or*

(c) *The chevron cutting extends below a tread rib.*

CHEVRON CUTTING
FIGURE 12

C. Tread Chunking (Ref. Fig. 13)

(C.1) *A tight aircraft turn, or an aircraft turning when taxied quickly, or operation on rough runways can cause tread chunking. Replace a tyre with tread chunking if:*

- **(a)** *You can see more than 7 cm2 (1 .0 in.2) of tread chunking on a tread rib, or*
- **(b)** *The first time fabric can be seen or*
- **(c)** *The tread chunking extends below a tread rib.*

TREAD CHUNKING
FIGURE 13

D. Cut Damage (Ref. Fig. 14)

WARNING:

IMMEDIATELY REPLACE A TYRE WHICH HAS CUTS MORE THAN THE LIMITS SPECIFIED BELOW. CUTS CAN CAUSE THE SEPARATION OF A TREAD RIB.

NOTE: Some very high speed tyres have nylon fabric reinforcement in the ribs of the tread. You will see this fabric as the tread wears. Cuts in this fabric are not necessarily a cause for tyre replacement (unless the cuts are more than the limits specified below).

(D.1) *Debris on the runway can cause cuts to the tread and the sidewall of a tyre. Replace a tyre with cuts if:*

- **(a)** *The cuts are into the casing plies, or*
- **(b)** *The cuts have a depth in the tread of 50 % or more of the tread depth at that time, or*
- **(c)** *The cuts extend across more than 35 mm (1.4 in.) or 50 % of a tread rib, or*
- **(d)** *You can visually see the casing cords.*

WARNING:

DO NOT USE TOOLS TO OPEN CUTS.

(D.2) *Before retreading, it is possible to repair some tyres with small cuts in the casing plies. Send a tyre that has small cuts in the casing plies to the Supplier for inspection and possible repair.*

CUT DAMAGE
FIGURE 14

E. Dry Braking Flats (Ref. Fig. 15)

(E.1) *Locked, (or almost locked) wheels during a landing on a dry runway can cause a dry braking flat spot on a tyre. This is a flat scuffed surface on a part of the tread.*

(E.2) *Replace the tyre that has a dry braking flat spot if the wear is more than the specified wear limits given in Para. 6.*

E.3) *Replace the tyre if the dry braking flat spot causes out-of-balance or shimmy movements of its wheel.*

DRY BRAKING FLATS

FIGURE 15

F. Wet Braking Flats (Ref. Fig. 16)

(F.1) *Hydroplaning during a landing on a wet runway can cause a wet braking flat spot on a tyre. This has a surface that looks almost the same as melted rubber.*

(F.2) *Replace a tyre that has a wet braking flat spot if the wear is more than the specified wear limits given in Para. 3.*

(F.3) *Replace the tyre if the wet braking flat spot causes out-of-balance or shimmy movements of its wheel.*

WET BRAKING FLATS
FIGURE 16

G. Bulges (Tyre Failure) (Ref. Fig. 17)

(G.1) *A bulge in the tread or sidewall can occur if there is a separation of tyre components (for example, because the tyre was too hot). A tyre bulge could occur if an aircraft is taxied quickly over a long distance.*

WARNING:

IMMEDIATELY REPLACE A TYRE WHICH SHOWS A BULGE. A TYRE WHICH SHOWS A BULGE IN THE TREAD OR SIDEWALL COULD HAVE CASING SEPARATION.

(G.2) *Immediately identify the position of the bulge with a crayon mark and replace the tyre.*

(G.3) *Send the tyre to the supplier for inspection.*

BULGE
FIGURE 17

H. Shoulder Wear (Ref. Fig. 18)

(H.1) *Wear more than the specified limits on a shoulder of the tyre is usually related to operation with low tyre pressures. Low tyre pressures cause more deflection of the tyre sidewalls. Also, the increased deflection causes more heat in the tyre, the result of which could be component separation and possibly a tyre burst.*

(H.2) *Wear more than the specified limits*

(a) *It is found to be under inflated - the pressure has decreased to limits less than those permitted each day as given in Table 2, or*

(b) *The tyre wear is more than the specified wear limits given in Para. 6.*

SHOULDER WEAR
FIGURE 18

I. Burst (Tyre Failure) (Ref. Fig. 19)

(I.1) *The causes of a tyre burst could be:*

(a) *Debris on the runway*

(b) *Operation with low tyre pressures, or the aircraft is taxied quickly for a long time. These operations can cause impact concussion or increase the rate of fatigue in the carcass.*

(I.2) *A tyre burst increases the load on the other tyre(s) on the same strut. The carcass(es) of the tyre(s) which receive the added load could be damaged. The burst tyre and its related tyre on the same axle must be removed and discarded if the aircraft has moved on the ground with a burst tyre.*

BURST (TYRE FAILURE)
FIGURE 19

J. Lateral Scoring (Ref. Fig. 20)

(J.1) *A landing in a high cross wind can cause lateral scoring across the tread of a tyre. Tight aircraft turns can cause lateral scoring on the shoulders of the tread.*

(J.2) *With large lateral scoring damage, adjacent tears can also occur in the interface between the tread and the casing. Subsequently, during the life of the tyre, the tears can be related to separation of tyre components.*

(J.3) *Replace a tyre if the scoring has related tread chunking more than the specified limits as given in Para, 7. C. or cuts below a rib.*

LATERAL SCORING
FIGURE 20

K. Sidewall Cracking (Ref. Fig. 21)

(K.1) *Large tyre deflection, or weathering, can cause cracks in the sidewall of a tyre.*

(K.2) *Sidewall cracks can also occur in a tyre which is kept in unsatisfactory storage conditions.*

(K.3) *If cords are not visible a tyre with weathering can remain in service.*

SIDEWALL CRACKING
FIGURE 21

L. Tread Groove Cracking (Ref. Fig. 22)

(L.1) *Tread groove cracking is related to high stresses in the tyre. For example, high stresses are caused during aircraft movements with the tyre under inflated (pressure too low). Contamination (fuel or grease on the tyre) can also cause tread groove cracking.*

(L.2) *Replace a tyre with tread groove cracking if:*

- **(a)** *You can see fabric cords through the cracking, or*
- **(b)** *The groove cracking extends to undercuts below a tread rib.*

TREAD GROOVE CRACKING
FIGURE 22

M. High Brake Heat (Ref. Fig. 23)

(M.1) *Heat from the brakes can be transmitted through the wheel to the bead areas of the tyre. A high braking force can increase the heat transmitted which then causes damage to the tyre.*

(M.2) *Examine the tyre in the area adjacent to the wheel rim for signs of heat damage. Replace the tyre if:*

- **(a)** *There are blisters on the bead rubber, or*
- **(b)** *There are large blue or brittle areas of bead rubber, or*
- **(c)** *The rubber in the bead area has melted.*

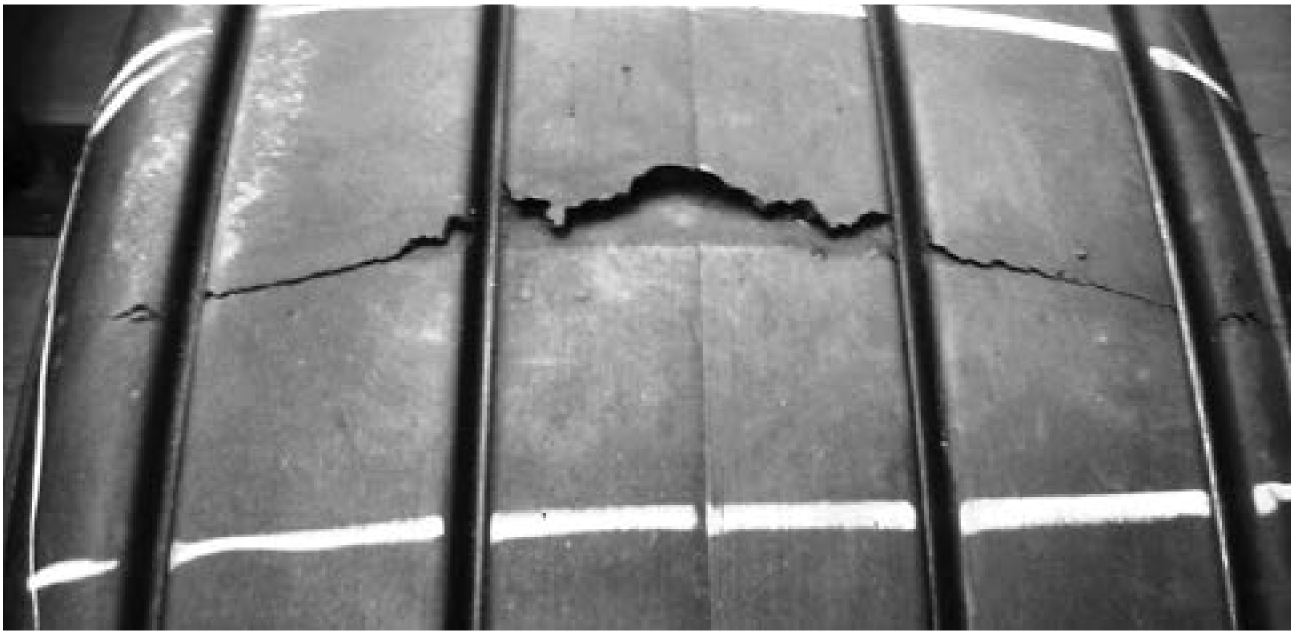
HIGH BRAKE HEAT
FIGURE 23

N. Open Tread Joint (Ref. Fig. 24)

(N.1) *Replace a tyre with an open tread joint or splice, refer to the witness mark shown on Fig. 24 if:*

(a) *The open tread splice is more than 3 mm (0.12 in.) at the tread surface (at a point around the circumference of the tyre, or*

(b) *The depth of an open splice is more than 1 mm (0.04 in.) at a point on the tread.*



OPEN TREAD JOINT
FIGURE 24

O. Tread Rib Strip (Ref. Fig. 25)

(O.1) *Tread rib strip can be caused by cuts to the tread that undermine the tread rib. The cut continues to tear until centrifugal force throws the rib from the casing.*

TREAD RIB STRIP
FIGURE 25

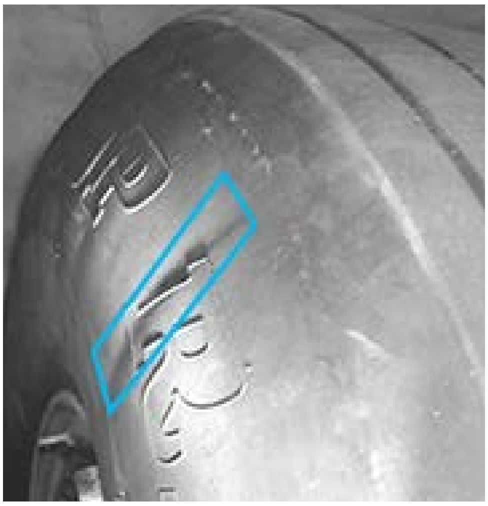
P. Lateral Scuffing, High Speed or Pivot Turns (Ref. Fig. 26)

(P.1) *Lateral Scuffing, is caused when aircraft conduct at high speed turns or pivot turns. The tyre can remain in service.*

LATERAL SCUFFING
FIGURE 26

Q. Undulations In The Sidewall of Radial Tyres (Ref. Fig. 27)

(Q.1) *The undulations are caused by joints in the sidewall material where two layers of material overlap. The overlap area is stiffer than the adjacent material and does not stretch in the same manner. Tyres with undulations in the sidewall can remain in service if the depth of the undulation does not exceed 3mm (0.12 inch). Refer to SAE ARP6307.*



UNDULATIONS IN THE SIDEWALL
FIGURE 27

8. REJECTED TAKE-OFF

A. Procedure After a Rejected Take-Off

(A.1) *There are different levels of Rejected Take-Off (RTO) related to aircraft speeds, loads and distances. For some levels of RTO the aircraft tyres can become unserviceable. For other levels of RTO it is not necessary to replace the tyres.*

(A.2) *Replace the tyres after an RTO if:*

- **(a)** *The aircraft speed during the RTO was more than its usual landing speed, and*
- **(b)** *The braking energies used were usually high.*
- **(c)** *The fuse plugs in the wheel were blown.*

(A.3) *Send tyres removed after an RTO for inspection and repair.*

(A.4) *After an RTO for which the tyres stay serviceable, it is recommended that you let the tyres become cool for a minimum of 30 minutes and then continue the usual aircraft operations.*

9. FLAT SPOTS

(A) *If an aircraft does not move for a time its tyres can get temporary flat spots as the tyre fabric sets. The effect can be worse during cold weather. Flat spots are usually removed when the aircraft is taxied.*

(B) *If the aircraft is to be kept in a store for a long time you must be careful to prevent flat spots on the tyres. Lift the aircraft with jacks so that the wheels are off the ground. Or, move the aircraft regularly.*

(C) *Replace tyres with flat spots if they cause too much aircraft vibration. Send the removed tyres for inspection and repair.*

10. VIBRATION AND BALANCE

NOTE: Vibration is the act of an object rapidly moving back and forth. Conditions such as flat-spotting can cause the rotating tyre/tyres to generate a force that will initiate a vibration.

NOTE: Vibration can be caused by incorrect tyre balance. Incorrect balance is a cause of vibration, but in many cases, incorrect balance may not be the cause. There are a number of factors of the tyre, wheel, and landing gear assembly which contribute to aircraft vibration. A systematic approach should be taken to isolate the cause.

NOTE: Some aircraft may be more sensitive to vibration than others and may require that tyre wheel assemblies be balanced as a unit.

(A) *If vibration is unacceptable for aircraft operation then remove the tyre from service. When dual tyres are in nose positions then both tyres should be removed unless the vibration can be identified to a specific tyre.*

(B) *ICheck that the tyre has the proper inflation pressure by using a calibrated gauge. Follow the Aircraft Maintenance Manual, (AMM), for the recommended pressure. If tyres are mounted in dual or twin configuration then check the pressure in both tyres.*

(C) *Inspect the tyre for flat-spotting, out of round, bulges, or other damage. If found, remove the tyre(s) from service.*

(D) *Verify that tyres have been properly installed and that the tyre was allowed to stretch 12 hours at normal operating pressure.*

(E) *Check that the beads of the tyre are correctly seated. The decorative mould line on the lower sidewall of the tyre should be equidistant from the top of the wheel flange concentrically around the tyre. If the distance is not equal around the tyre then remove the tyre/wheel assembly from the aircraft for further examination.*

(F) *If operationally there is insufficient time to change nose tyres then a temporary fix may be to jack the nose of the aircraft and rotate one tyre 180 degrees and then lower the aircraft. This may offset imbalance sufficiently to allow flight operations to continue.*

(G) *Check the wheel for damage.*

(H) *Check the wheel for correct assembly. Incorrect assembly could cause the wheel assembly to be out of balance.*

(I) *Check that the red balance spot or red triangle on the lower sidewall of the tyre is aligned with the wheel valve or heavy spot on the wheel assembly. (Refer to the AMM).*

(J) *Check for a loose wheel bearing caused by an incorrectly torqued axle nut.*

(K) *Check for worn or loose components on the landing gear, especially loose/worn torque links.*

(L) *Check for worn hydraulic components, particularly steering control units.*

(M) *Check for incorrect gear alignment. This would be evident by uneven tyre wear.*

(N) *If the tyre has an Inner Tube fitted then check for trapped air between the tyre and tube.*

- **(1)** *During taxiing any trapped air will normally work out from between the tube and tyre.*
- **(2)** *Check to ensure that the tube is not wrinkled due to incorrect mounting/inflation procedures.*

11. CONTAMINATION

(A) *Contamination of tyres with hydraulic fluid, fuel, oil or grease can cause deterioration of the rubber.*

(B) *Remove tyre contamination as quickly as possible. Use denatured alcohol, or detergent and clean water.*

(C) *Examine the tyre for swelling, softness, delamination or cracking in the area affected. If found, remove the tyre.*

TABLE 3
CONTAMINATION

CONTAMINATED AREA	EXPOSURE	RECOMMENDATION
Tread or Sidewall	Up to 12 hours	Wash as soon as possible (1)
Tread or Sidewall	12 to 48 hours	Wash, remove & send to retreader for inspection / possible repair (2)
Any Surface	Over 48 hours	Wash, remove & send to retreader for inspection / possible repair (2)
Any Fabric	Any Period	Wash, remove & send to retreader for inspection / possible repair (2)
Cleaning: Clean thoroughly with denatured alcohol to remove the contaminant then wash with a soap (detergent) & water solution.		
(1) Ensure that the contaminated rubber surface is not swelled. An easy check is to push your finger nail into the contaminated surface, and in case of swelling, the nail will leave a permanent imprint. In this case the tyre must be returned to the retreader for inspection / possible repair.		
(2) If the subject tyre needs to be removed and sent to the retreader for inspection, clearly identify the tyre by marking with white chalk "Contaminated Tyre".		

12. UNEVEN WEAR

A. Geometry

(A.1) *The geometry of some aircraft is such that the tyres wear more on one side of the tread. Some tyres with this type of wear can be removed, turned around and installed again if the wear is not more than the specified limits given in Para. 6. If you are not sure about this procedure, speak to a technical representative of the aircraft manufacturer or a technical representative of DATL, (refer to DATL contact details on page 3).*

B. Over Inflation

(B.1) *An over inflated tyre can wear more in the centre of its tread. To prevent this type of wear, inflate the tyre to its correct pressure as given in the AMM.*

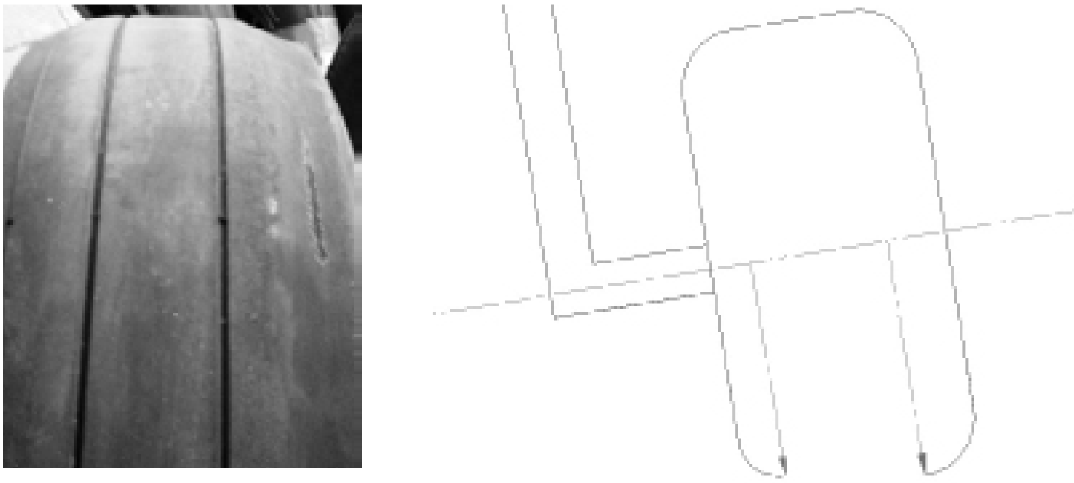
C. Asymmetrical Wear

(C.1) *Asymmetrical wear occurs more on one side of the tread than the other side and is more generalized than scallop wear.*

(C.2) *The cause of asymmetrical wear is when a tyre has been operated under prolonged yaw and/or camber conditions.*

(C.3) *In some occurrences the reinforcing fabric may be visible in the shoulder area. Refer to Fig. 28.*

(C.4) *Use the normal wear removal criteria.*

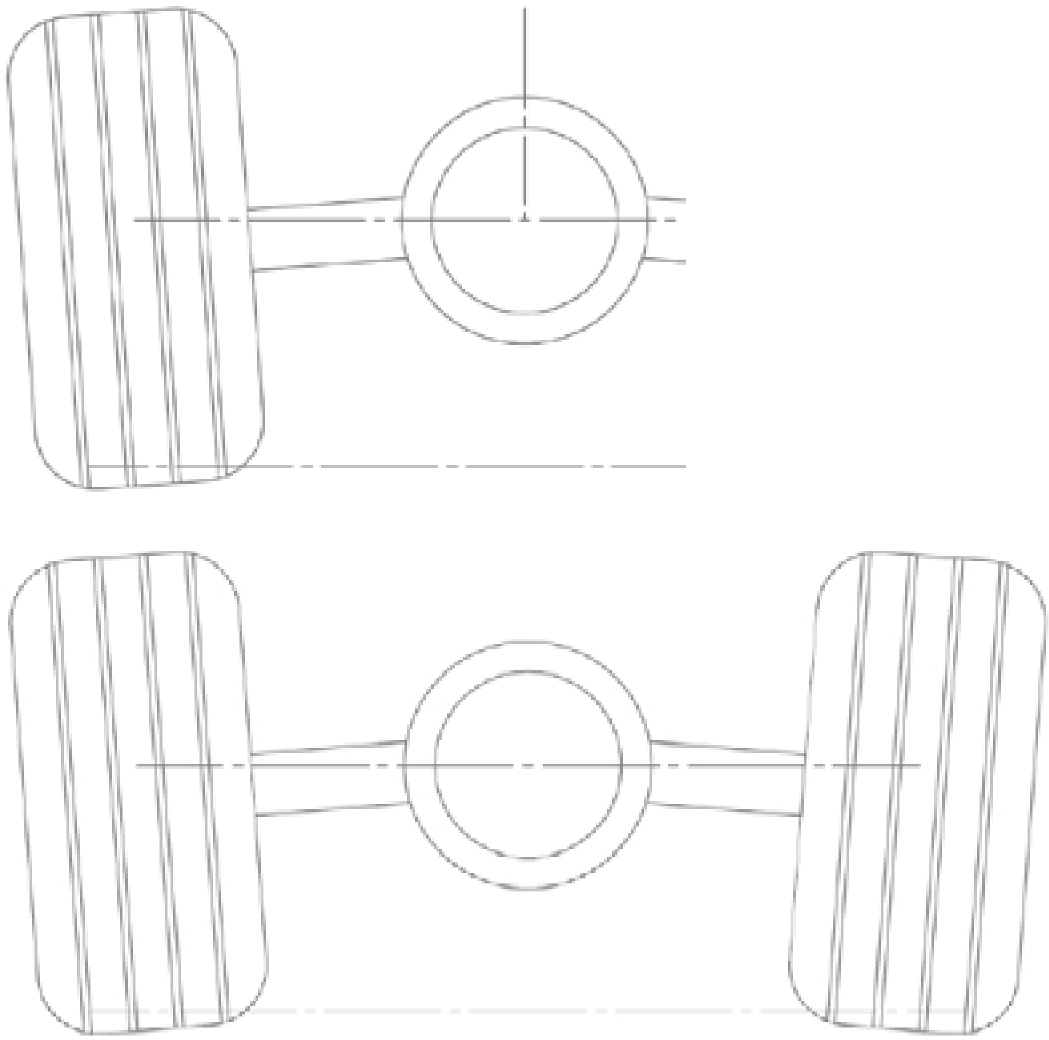


CAMBER ANGLE
FIGURE 28

(C.5) Camber angle can be induced through the deformation of landing gear or landing gear constructor's settings or tolerances. Refer to Fig. 29.

(1) *Negative camber = inside shoulder wear*

(2) *Positive camber = outside shoulder wear.*



YAW ANGLE
FIGURE 29

(C.6) *A yaw angle is induced when the tyre does not roll in the direction of travel. Refer to Fig. 28.*

(C.7) *Yaw angle can be produced through the axle flexing under aircraft load or during braking. Faster wear will consistently be on the undercarriage leg side shoulder of the tyre despite the wheel position. The tread may have a feathered appearance on the rib edges. This is called "Toe Wear."*

Toe-out = wear is more rapid on the inside shoulder

Toe-in = wear is more rapid on the outside shoulder

NOTE: Yaw will have more affect on wear than camber.

(C.8) *Taxiing with one engine shut down or high speed cornering will induce a yaw angle.*

(C.9) *If asymmetrical wear is found then it is recommended that tyres are operated at the maximum operating pressure, (Refer to the AMM).*

(C.10) *A tyre with asymmetrical wear that does not have exposed fabric can be removed and reversed on the wheel to extend the wear life.*

(C.11) *Apply normal wear removal criteria.*

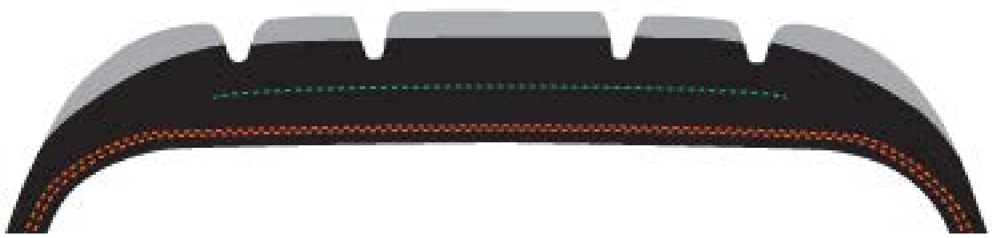
13. INDICATIVE TYRE WEAR PROFILES

A. Typical wear paterns

(A.1) *The following figures show typical tyre wear patterns that might be encountered.*

B. Even Wear

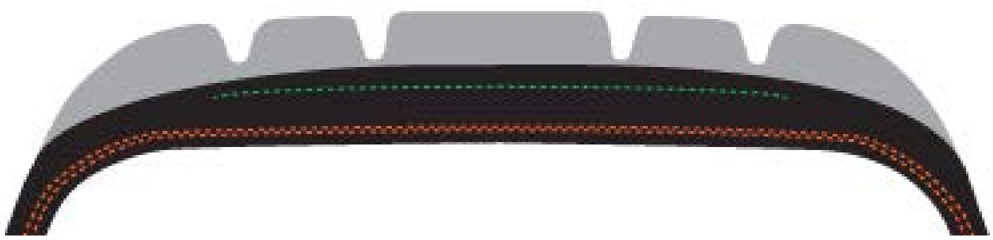
(B.2) *The illustration shows even tread wear across the profile of the tyre.*



EVEN WEAR
FIGURE 30

C. Wear Below The Tread Grooves.

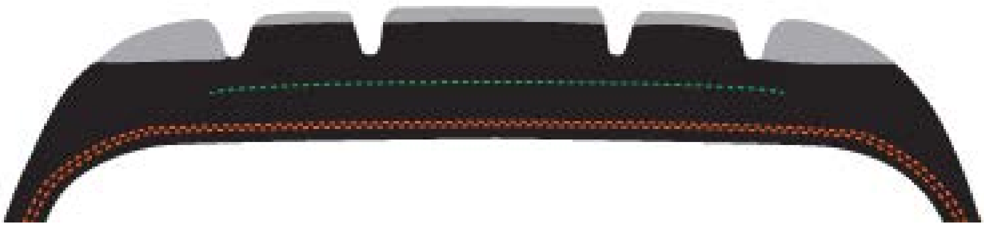
(C)



WEAR BELOW TREAD GROOVES
FIGURE 31

D. Stepped Wear

(D.1) *The illustration shows stepped wear. This is more prevelant for certain tyres such as 'H Section' tyres and can be made worse by under inflation.*



STEPPED WEAR
FIGURE 32

E. Shoulder Wear

(E.1) *The illustration shows wear has occurred towards one shoulder more than the other. This is normally caused by a non-tyre issue such as un-even loading.*

SHOULDER WEAR
FIGURE 33

14. TYRE SLIPPAGE ON THE RIM TUBELESS TYRES

(A) *After installation of a new tyre on the rim, some cycles on the aircraft may be necessary before the tyre reaches its final position. During this period of time, a slippage of the tyre on the rim may be observed (e.g the red mark on the tyre is no longer aligned with the inflation valve or the wheel heavy point if marked).*

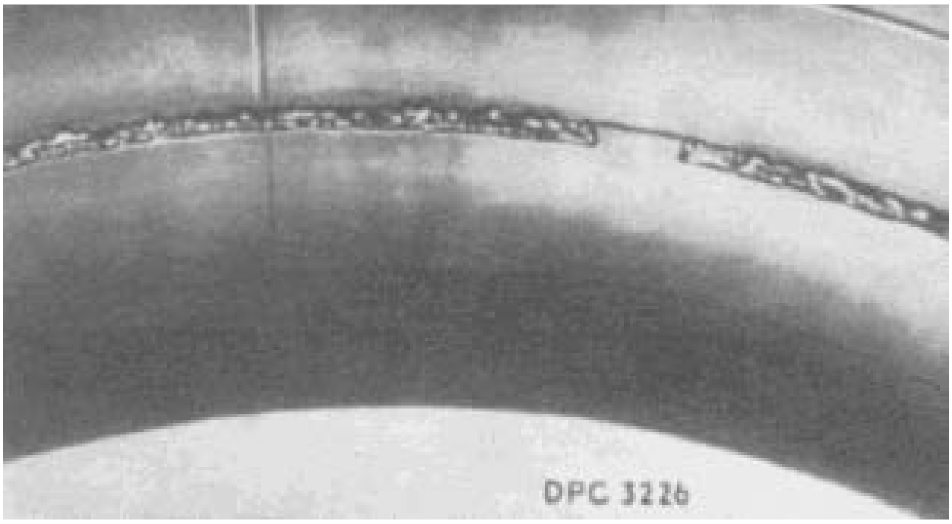
(B) *In service, tyre-to-wheel circumferential movement up to a maximum of 20 degrees per installation is acceptable. Assemblies that move more than the limit should be disassembled and evaluated for appropriate action with regard to the tyre and/or wheel. Circumferential movement that affects the ability of the tyre to provide an air seal at the wheel is unacceptable.*

15. TUBE INSPECTION (DAMAGE LIMITS)

(A) *Tube Chafing (Related to Tyre Creep) (Ref. Fig. 34)*

(B) *Creep (movement of the tyre in relation to the wheel) can cause chafing of the tube against the toes of the tyre, or it can cause damage to the valve.*

(C) *Examine the creep marks painted on the tyre and wheel. If the creep is more than 25 mm (1.0 in.), replace the tube.*



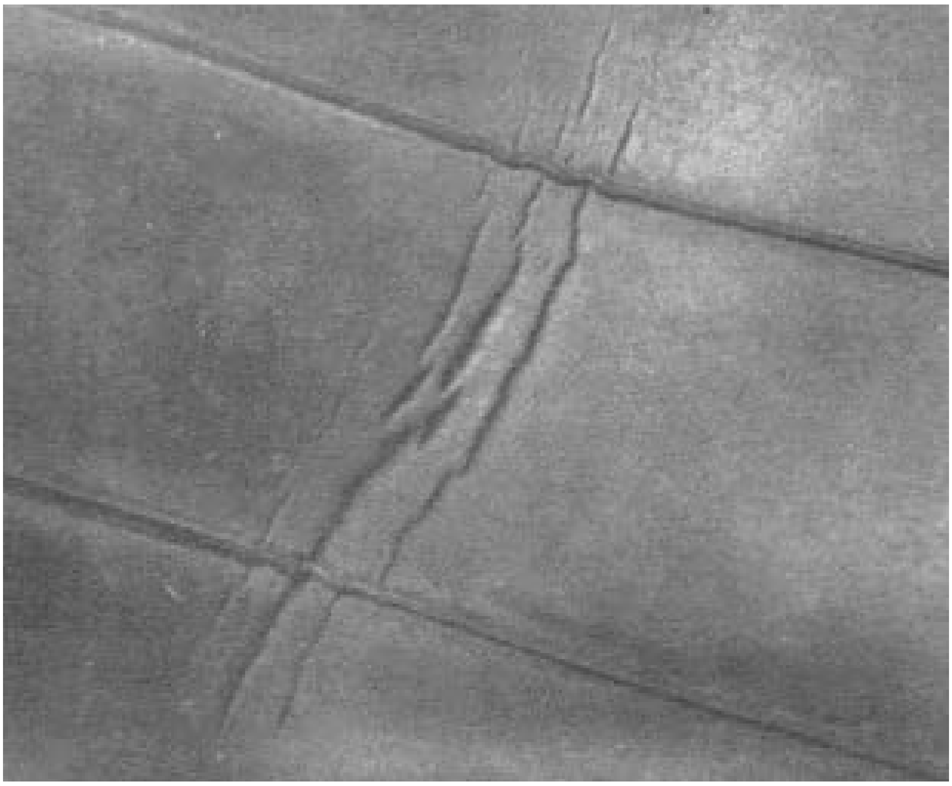
TUBE CHAFING
FIGURE 34

16. CREASING (REF. FIG. 35)

(A) *Incorrect installation can cause creasing of a tube. Tube creasing can also occur when pressure is decreased after a tube and tyre have been over inflated.*

(B) *Replace a tube which shows signs of creasing.*

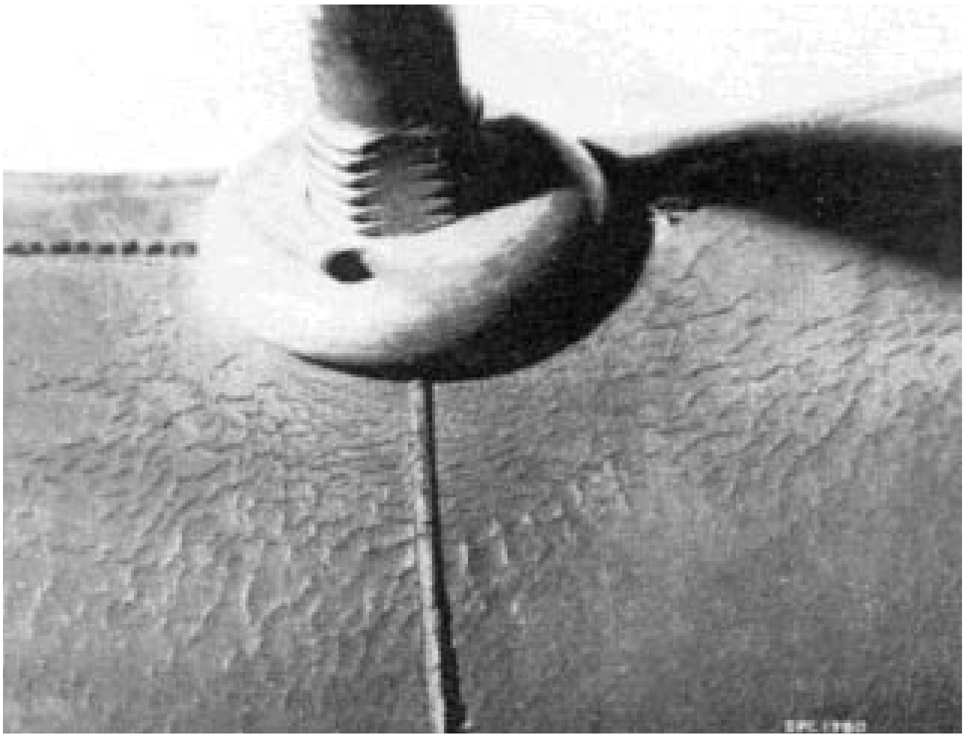
(C) *The fuse plugs in the wheel were blown.*



TUBE CREASING
FIGURE 35

17. TUBE CRACKING (REF. FIG. 36)

(A) To examine a tube for cracking, hold the rubber between your thumb and finger and apply pressure. Replace a tube with cracking if the cracking is more than on the surface (the cracking extends into the rubber of the tube) .



TUBE CRACKING

FIGURE 36

Removal

3

GENERAL

A. Use these instructions unless you have other instructions.

18. TYRE DEFLATION AND REMOVAL

B. Tyre Deflation.

WARNING:

USE THE CORRECT EYE PROTECTION WHEN YOU DEFLATE A TYRE. GAS FLOWS AT HIGH PRESSURES COULD BLOW DUST OR DEBRIS INTO YOUR EYES.

(B.1) *Remove the valve cap.*

(B.2) *Deflate the tyre as given in the CMM for the wheel.*

WARNING:

MAKE SURE THAT THE TYRE IS FULLY DEFLATED. WHEN THE GAS FROM THE TYRE IS RELEASED, ICE CAN OCCUR IN THE VALVE AND CAUSE TEMPORARY BLOCKAGE.

(B.3) *Remove the valve core with the correct tool as given in the CMM for the wheel.*

C. Tyre Removal

(C.1) *Make sure that the tyre is fully deflated and that the valve core is removed as given in the manual.*

CAUTION:

DO NOT USE TYRE LEVERS OR SHARP TOOLS TO MOVE THE TYRE BEADS OUT OF THEIR BEAD SEATS. YOU COULD CAUSE PERMANENT DAMAGE TO THE TYRE OR THE WHEEL, AND PREVENT A GOOD GAS SEAL.

(C.2) *Carefully move the tyre beads out of their bead seats in the wheel. If necessary use an applicable bead breaking machine as given in the CMM for the wheel.*

(C.2) *Disassemble the wheel and remove the tyre as given in the CMM for the wheel.*

(C.3) *Remove the valve core with the correct tool as given in the CMM for the wheel.*

(C.4) *If the tyre is to be retreaded subsequently, keep it in an applicable store, Refer to RECEIVING INSTRUCTIONS AND STORAGE.*

INSTALLATION

4

GENERAL

A. Use these instructions unless you have other instructions.

19. TYRE INSTALLATION

B. Installation of a Tubeless Tyre

(B.1) *Make sure that the-tyre is the correct size for the wheel as given in DESCRIPTION in the manual.*

(B.2) *Make sure that the tyre specification (part number, ply rating, TSO rating, for example) is correct for the aircraft wheel.*

(B.3) *Before you install the tyre, examine the tyre for damage and contamination. Make sure that the inner surface of the tyre is free from objects or contamination.*

(B.4) *Check the inside of the tyre for secure attachment of the balance patch if fitted. (The balance patch is an oval shaped piece of rubber which is applied to ensure that the tyre conforms to the correct balance specification).*

CAUTION:

DO NOT ATTEMPT TO REMOVE A BALANCE PATCH AS DAMAGE TO THE LINER MIGHT RESULT.

(B.5) *Examine the tyre for wear and damage as given in Para. 6 Tyre Inspection (Wear Limits) and Para. 7 Tyre Inspection (Damage Limits and Tyre Failures). If the wear or damage is less than the specified limits, send the tyre to be repaired or retreaded, as applicable. Discard the tyre if the wear or damage is such that the tyre cannot be repaired or retreaded.*

(B.6) *Prepare the wheel assembly to install the tyre as given in the CMM for the wheel as follows:*

(B.7) *Make sure that the mating surfaces of the hubs are free from damage.*

(B.8) *Make sure that the inflation valve and the fuse plugs are in good condition and are tightened to their specified torques.*

(B.9) *Get a new O-ring seal of the correct size for the wheel. Lubricate the O-ring seal with the correct lubricant and install the seal.*

(B.10) *Carefully apply a small quantity of an applicable bead lubricant (for example a mild soap solution) to the bead toe areas. The lubricant lets you install and remove the tyre more easily.*

CAUTION:

MAKE SURE THAT YOU KEEP THE TYRE BEAD FACES FREE FROM GREASE. GREASE COULD CAUSE MOVEMENT BETWEEN THE TYRE AND THE WHEEL DURING BRAKING. THIS COULD CAUSE DAMAGE TO THE TYRE (AND THE TUBE, IF INSTALLED) AND THE BRAKING PERFORMANCE COULD BECOME UNSATISFACTORY.

(B.11) *Make sure (unless you have other installation instructions), that you align the 'light' spot on the tyre (where there is a red triangle or spot) with the wheel valve, or with the wheel 'heavy' spot (which the wheel manufacturer shows on the wheel).*

(B.12) *If there is no light spot (red dot or triangle) align the serial number with the heavy spot marked on the wheel or the inflation valve.*

(B.13) *During installation of the tyre, make sure that you do not move the O-ring seal from its correct location.*

(B.14) *If distortion of the tyre prevents a good seal against the wheel. apply a load (such as a tourniquet) to the tyre with the wheel vertical.*

C. Installation of a Tubed Tyre

(C.1) *Before you install a tube, examine it for damage and contamination. Reject a tube which shows signs of cracking, or splitting at the bottom of the valve stem, or creasing as given in Tube Inspection (Damage Limits) Para. 14.*

WARNING:

USE THE CORRECT SAFETY EQUIPMENT TO PREVENT INHALATION OF FRENCH CHALK OR TALC.

(C.2) *Apply French chalk or lubricating talc to the inner wall of the tyre. Shake the tyre to remove unwanted chalk or talc.*

(C.3) *Align the 'heavy' spot on the tube (if there is a red stripe on the tube). or the tube valve stem with the 'light' spot on the tyre (where there is a red triangle or spot).*

(C.4) *Carefully put the tube in the tyre. Use your fingers to make the tube smooth so that it is not creased or pinched. This will also make sure that air is not caught between the tube and the tyre.*

(C.5) *Complete the assembly of the tyre to the wheel and install the bolts which hold the wheel half hubs together as given in the CMM for the wheel.*

(C.6) *Inflate and then deflate the tube and tyre to remove air from between the tube and tyre. This also helps the tube to expand correctly so that it is not creased or pinched in the toe of the bead.*

20. TYRE INFLATION

A. Initial Checks

(A.1) *Make sure that the wheel is assembled correctly as given in the CMM for the wheel.*

(A.2) *Make sure that you have an applicable safety cage for inflating the tyre safely.*

(A.3) *For pressures more than 7.0 bar (100 psi), make sure that you have an inflation connector which has a screw thread.*

(A.4) *Make sure that the inflation gas is Nitrogen (or other inert gas) which contains less than 5% of oxygen (Refer to EASA CS-25 Amendment 5 dated 5th September 2008).*

(A.5) *Make sure that there is a pressure-reducing valve in the gas supply line.*

(A.6) *Make sure that there is a pressure regulator in the gas supply line, and that the regulator is calibrated correctly and regularly.*

(A.7) *Make sure that the pressure gauge which you use to measure the tyre pressure is calibrated correctly and regularly.*

B. Inflation

WARNING:

WHEN YOU INFLATE THE TYRE, ALWAYS PUT THE TYRE AND WHEEL ASSEMBLY IN A SAFETY CAGE. TYRES AT HIGH PRESSURES CAN BE DANGEROUS.

(B.1) *Put the tyre and wheel assembly in a safety cage.*

(B.2) *Put the gas supply line of the inflation equipment in a safety cage.*

(B.3) *Attach the screw thread of the inflation connector to the inflation valve.*

(B.4) *Initially, inflate the tyre slowly until the tyre beads are in their seats on the wheel.*

(B.5) *Continue to inflate the tyre (and do pressure checks at the same time) until the tyre is at its specified operational pressure as given in the AMM.*

(B.6) *Disconnect the gas supply line.*

(B.7) *Use an applicable spray solution or a water immersion tank to examine the tyre and wheel assembly for gas leaks from:*

- **(1)** *The valve.*
- **(2)** *The valve core.*
- **(3)** *The fuse plugs.*
- **(4)** *The mating area of the wheel half hubs.*
- **(5)** *The bead seat areas.*

C. Checks for Loss of Pressure

NOTE: New tyres can expand for up to 12 hours after inflation. This decreases the internal pressure. Also for up to 24 hours after inflation, diffusion of gas through the inner liner into the casing can occur. Subsequently, this diffusion decreases to a low constant level. The awl vent holes in the lower sidewall of the tyre release the diffused gas to the atmosphere, to prevent tyre damage.

NOTE: It is recommended by Airbus (SIL32-119) & Boeing (SL 6 Dec 2006) that a twelve hour stretch and 24 hour leak check are carried out.

(C.1) *Check pressure after a minimum of 12 hours after initial inflation with a calibrated pressure gauge. If necessary, re-inflate the tyre as given in Para 20. B. (Inflation) to its specified operational pressure.*

(C.2) *24 hours or more after inflation, measure the pressure. The assembly should not lose more than 5% of the initial inflation pressure. Should pressure loss exceed 5%, test the assembly by water check to find the cause of leakage. If the cause cannot be found, de-mount the tyre as given in Removal Para 18. (Tyre Deflation and Removal) and re-mount on a different wheel. Inflate the tyre as given in Para. 20. B. Inflation), check for pressure loss as given in Para. 20. C.*

(C.3) *In an emergency situation, tyres that must be put into use without being inflated for a minimum of 12 hours should be inflated to 105% of the unloaded service pressure. The tyre/wheel assembly and inflation valve should be sprayed with a soap solution and checked for abnormal leakage (abnormal leakage occurs when the soap solution bubbles between the tyre and wheel or if a constant stream of bubbles is produced at the tyre vents). If there is abnormal leakage, the tyre/wheel assembly should be disassembled and reassembled in accordance with the CMM. If, there is no abnormal leakage, the tyre can be placed inservice, as long as tyre pressure is checked before every flight within the following 48 hours and the tyre is re-inflated if necessary.*

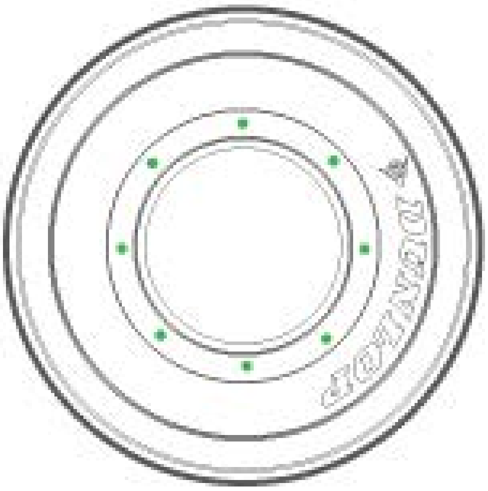
(C.4) *If the pressure drops below 90% of normal service pressure during these checks, follow the guidelines per Table 2 Recommended Tyre Pressure Maintenance.*

(C.5) *If pressure loss persists, check the wheel for correct assembly, if correctly assembled remove tyre and return to DATL for investigation.*

NOTE: The ambient air temperature has an effect on tyre pressure Ref. INSPECTION CHECK Para. 2.F. section. Pressure Maintenance with Changes of Ambient Temperature).

D. Diffusion from Awl Vent Holes

(D.1) *Diffusion of gas from the awl vent holes (where there is green litho ink) is usual, and can occur at all times. Gas bubbles from the awl vent holes are seen during leakage checks when you use a water immersion tank or an applicable spray solution.*



AWL VENT HOLES
FIGURE 37

BUBBLES FROM AWL VENT HOLES
FIGURE 37

(D.2) *Do not reject a tyre only because there is diffusion of gas from its awl vent holes if pressure loss is below the specified limits. The quantity of diffused gas is different for each tyre.*

DUNLOP AIRCRAFT TYRES

Receiving Instructions and Storage

5

21. INTRODUCTION

A. Aircraft tyres can be damaged accidentally during transportation, when they are received or if they are kept in unsatisfactory conditions in a store. To keep the tyres serviceable it is recommended that the procedures in this section are followed.

22. INSTRUCTIONS TO RECEIVE TYRES AND TUBES

B. Tyres

(B.1) *Examine the tyre for damage which could have occurred during transport. Tyres with only small damage (for example, cuts, scuffing, scratches or cracks not down to the cords) are serviceable. For a tyre to be serviceable, the damage must be less than that specified in INSPECTION CHECK Para 4. (Tyre Inspection (Damage Limits and Tyre Failures).*

NOTE: If you are not sure about the serviceability of a tyre. speak to a technical representative of DATL.

C. Tubes

(C.1) *It is not necessary to examine a tube which is in packaging (unless the packaging is damaged). If the packaging is damaged, examine the tube as given in INSPECTION CHECK Para. 15. (Tube Inspection (Damage Limits).*

23. STORAGE

A. Storage Conditions

(A.1) *Keep tyres protected from high levels of oxygen, ozone and direct sunlight.*

(A.2) *It is advisable to keep tyres in a cool dry store.*

(A.3) *Do not keep tyres where they will be in air currents. Air currents contain increased levels of oxygen and ozone gas which can cause deterioration of rubber components.*

(A.4) *Do not keep tyres near to electrical equipment (such as a generators, fluorescent lights, motors and photocopiers), which could be a source of ozone gas. Ozone gas can cause deterioration of rubber components.*

(A.5) *It is adviseable to keep the temperature of the store between -20 and +50 deg. C (-4 and +122 deg. F).*

(A.6) *Keep the tyres away from hot pipes and radiators.*

(A.7) *Do not keep tyres directly in sunlight or strong ultra-violet light.*

B. Storage Instructions

Tyres

(B.1) *Keep tyres stored on their treads and not on their sidewalls. This prevents distortion or reduction of the bead to bead width. This will help prevent problems assembling the tyre onto the wheel.*

NOTE: This is specially applicable to radial-ply tyres which have more flexible sidewalls than bias tyres.

(B.2) *Where necessary for transportation or storage, tyres can be stacked as follows: Up to 39" diameter 4 high maximum. Over 39" diameter 3 high maximum. There are a number of tyre sizes that cannot be stored or transported on their sidewalls. These sizes are specified in Table 4.*

TABLE 4

TYRE SIZES NOT TO BE STORED OR TRANSPORTED ON SIDEWALLS

8.50-10	*9.00-6*	*11.00-12*	*17.5x6.25-6*
20.00-20	*24x7.7*	*28x9.00-12*	*H31x9.75-13*
32x10.75-14	*32x11.50-15*	*33.5x10.75-15*	*34x10.75-16*
H34.5x12.0-14	*34x14.0-14*	*37x11.75-16*	*37x14.0-14*
37x14.0-14	*42x15*	*43x15.5-17*	*56x20.0-20*

(B.3) *Keep tyres away from contamination, such as oil, grease, hydraulic fluid or other solvents.*

Tubes

(B.4) *It is best to keep a tube in the packaging in which it was supplied.*

(B.5) *Alternatively, inflate the tube to a low pressure while the tube is in a tyre of the correct size.*

(B.6) *Keep tubes away from contamination such as oil, grease, hydraulic fluid or other solvents.*

C. Storage of Tyres Installed on Wheel Assemblies

(C.1) *Decrease the pressure of an installed tyre which is to be kept in a store for more than 7 days, or if the tyre and wheel assembly is to be transported. Decrease the pressure to 25% of the operational pressure, or to a maximum of 2,75 bar (40 psi) if this is more than the 25% calculated pressure.*

(C.2) *The above paragraph is the best practice for storage but tyres can be stored at service pressure for up to 12 months if operations dictate.*

D. Shelf Life

(D.1) *There is a 12 year shelf life for rubber tyres as there is no traceability after 12 years. The storage conditions must be as detailed in Para. 23.A. thru 23.C.*

(D.2) *Tyres kept in the correct storage conditions as detailed in Para. 23.A. thru 23.C. for more than 12 years are to be used for one tread life only. Dunlop recommends that such tyres are not retreaded.*

(D.3) *Tubes kept in the correct storage conditions as detailed in Para. 23.A. thru 23.C for more than 12 years are to be for one tyre life only.*

DUNLOP AIRCRAFT TYRES