

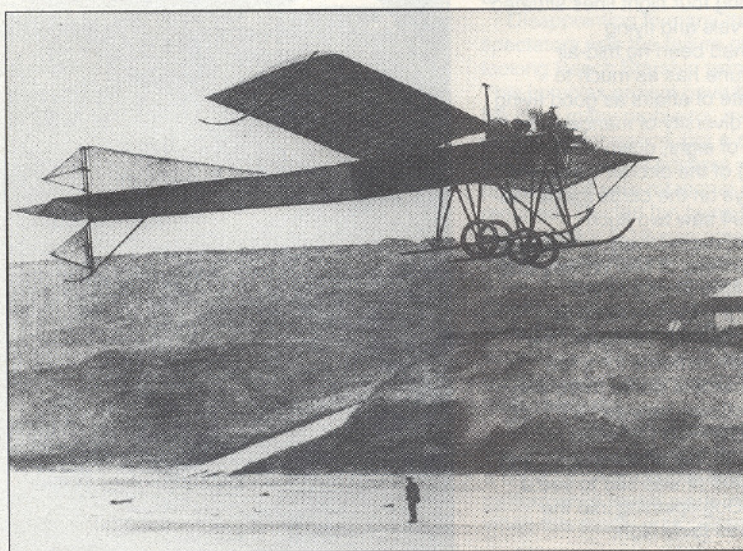
*The Valkyrie monoplane canard built in 1911 shows to advantage Dunlop's bicycle type wheel adapted for a safe ride. The weight of the Valkyrie, even without a pilot, often caused the wheel rims that were only 2 in. wide to sink into the landing field surface. Photo: via Colin E. Read.*

# Early Aeroplane Wheels Part One 1910-1918

Colin E. Read provides the details for the scale modeller to produce authentic wheels

**F**rom the earliest days of powered flight the development of the aeroplane has always given the wheel manufacturer ever increasing problems to solve and to improve upon in a continuous programme. With the introduction of the bicycle and motor car a leading wheel manufacturer, the Dunlop company, famous for their pneumatic tyres, produced one of the first such wheels by offering a strengthened and more robust bicycle wheel. This was issued in three sizes, 22, 24, and 26ins diameter with a rim width of 2ins, to be fitted with Dunlop's own pneumatic tyres now strengthened with wire hoops to withstand the weight of an aeroplane.

Blackburn and the Aeronautical Syndicate Valkyrie, whose canard monoplanes were of such fragile appearance used these wire spoked wheels but they enabled many flights to be made. However with the introduction of the Royal Flying Corps, constituted on the 13th of May 1912 and the subsequent Military Trials aeroplanes were fast becoming larger

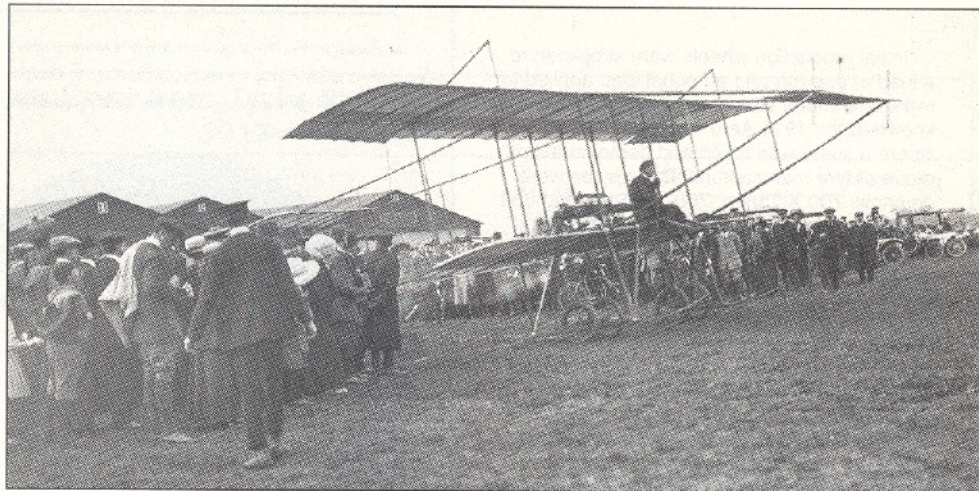


*The Blackburn Mercury monoplane built in 1911 and flying over Filey beach used Dunlop's bicycle type wheel and tyres. Photo: British Aerospace via Colin E. Read.*

Right: 1911. The Farman biplane used Dunlop's modified bicycle wheels and tyres, the rims being 24 ins. in diameter and 3 ins. wide. Sets of these Landing wheels cost £12. 12s in old money (£12.60) and that included axle, shock absorbers and springs, etc.

Below: Builders of the S.P.A.D. VII need to compare photographs as this example flown by US pilots in the 1914-18 war used original French built wheels that used hubs of less width than Palmer ones, although still a wire spoked wheel. It should be remembered that British built S.P.A.D. VII' used standard Palmer Cord Aero Tyres and wheels.

Bottom: A colourful but unidentified De Havilland DH 4 coded 'M' showing the neat doped canvas fairings on Palmer wheels. The original white lettering on the tyre has almost worn away, something that a well flown scale model should perhaps show. Photos: via Colin E. Read.



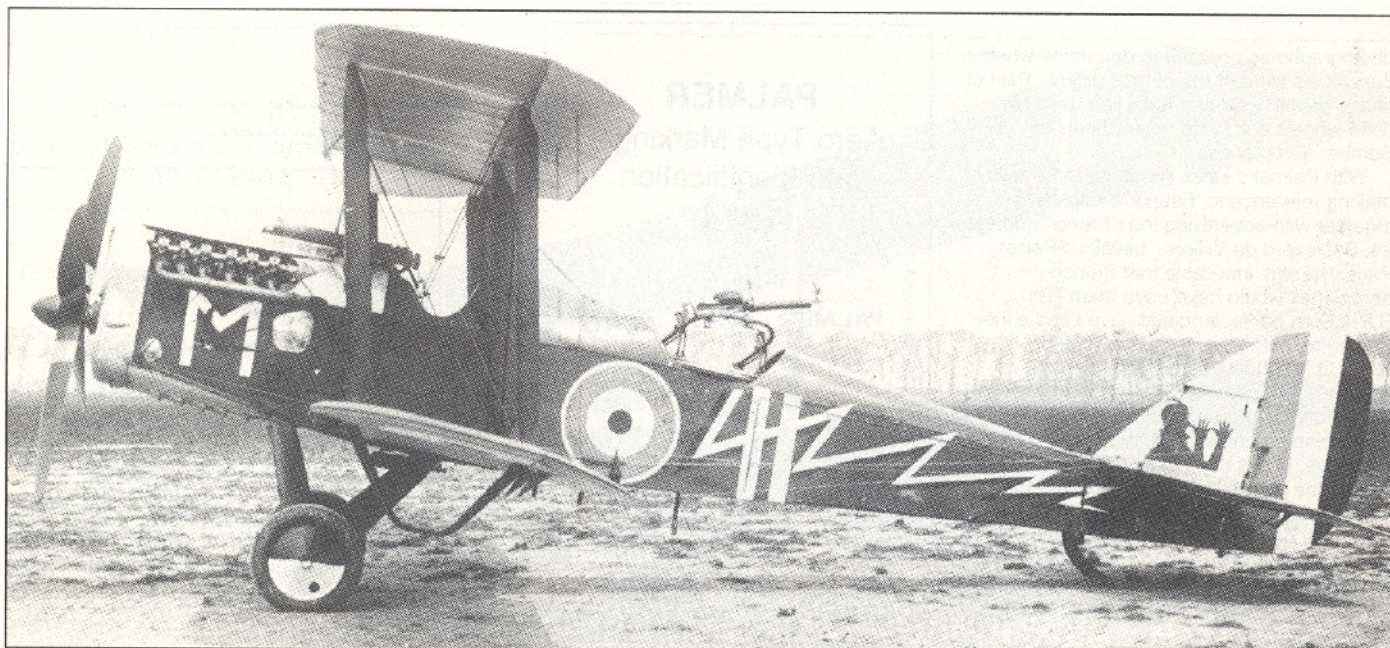
whose Research and Experimental department considered that they had the answer. The company's directors sanctioned the necessary heavy expenditure on an entirely new design of wheel manufacturing machine together with new plant for tyre production. Steel rims could now be pressed into shape, the design being based on the 'Welch' patent that the Dunlop Company had earlier obtained but disbanded being unable to finance a defence against copies or even to obtain royalties. By using a large diameter bushed hub and increasing the number of spokes, now of 13 gauge, to 30 per hub end, a wheel similar to road vehicle wheels was produced. One feature that Palmer did introduce was to fix the wire spoken to the rim but with one eighth or an inch 'play' at the hub end so that they would not push through the rim and repeat the problem of forcing the bead of the tyre off the rim on a heavy landing. The tyres were reinforced with small wire clips to which the cord used in the construction was attached this in turn giving the name 'Palmer Cord Aero Tyre' that was painted in white letters on the side wall of the tyre. Also the completed wheel assembly had a distinctive feature, with the inner side almost vertical and the outer at a slope owing to the much wider hub.

As an aid to streamlining, canvas covers were manufactured and attached to the rims by means of small spring loaded clips that fitted in a series small of holes, provision being made for maintenance and access to a tyre inflation connections

and heavier with an inevitable problem of damage to the wheels and or tyres in most landings or takeoffs due to a side wind. The lateral stress on landing often caused the bead of the tyre to lift with the inner tube exposed with the result that the tyre would be forced of the rim with subsequent damage to the wheel.

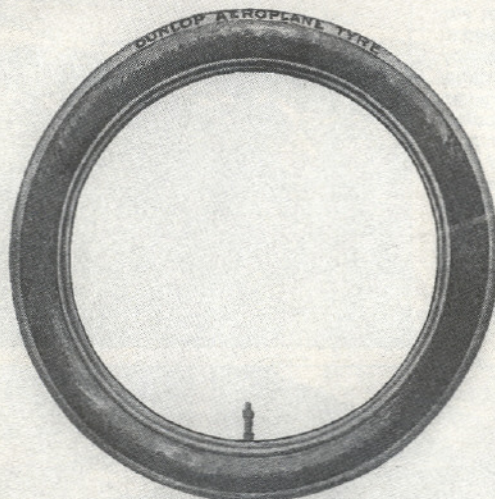
One person, however, the Superintendent of the Royal Aircraft Factory, M.J.P.O'Gorman

who was involved in the development of aeroplane structures, became aware of this problem and from his workshop at Farnborough sent a circular to all the U.K wheel and allied manufacturing industries. The idea was to obtain suitable landing wheels for new Royal Flying Corps Aeroplanes and to keep all current ones in flying condition but only one reply was received and that was from a manufacturing company, Palmer Tyre Ltd,



## THE DUNLOP AEROPLANE TYRE.

A special tyre suitable for aeroplanes is manufactured by the Dunlop Company—evidence, if any were required, that the Company is thoroughly up-to-date in its productions. It is the lightest possible tyre, consistent with necessary strength.



WIRED-ON TYPE ONLY.

Sizes:—

24-in. x 3-in. fits 22-in. x 2-in. rims; 26-in. x 3-in. fits 24-in. x 2-in. rims;  
28-in. x 3-in. fits 26-in. x 2-in. rims.

Left: The first aeroplane wheel and tyre manufactured in the UK was by Dunlop in three sizes - 24, 26 and 28 ins. diameter and included in their bicycle catalogue of 1910. The cost of the 24 in. tyre was £5. 6s in old money (£5.30) and the rim 2/8d, also in old money (£0.14).

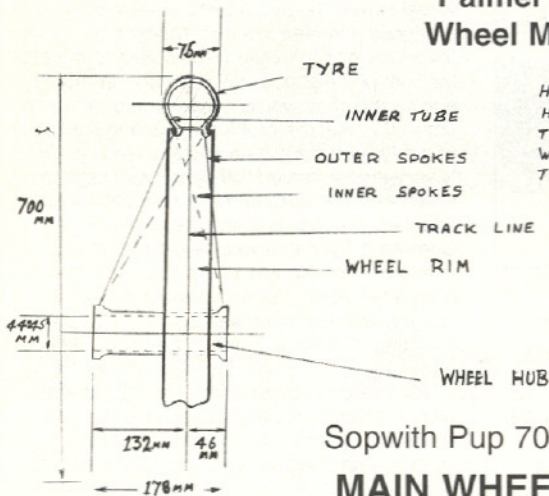
Below left: Diagram of a Palmer typical wheel measurement, in which the basic sizes are shown to enable a scale wheel to be drawn or even constructed.

Below: Dunlop tyre marking and identification.

Bottom: Palmer tyre marking and identification.

Initial production wheels were subjected to a load of one ton and an equal load applied to represent lateral stress and this was made known at the 1914 Aero Show at Olympia where a stand was taken and demonstrations made of tyre manufacture. Three sizes were on show, 700 X 75mm, 750 X 125mm and 800 X 150mm, metric measurement being used in direct contrast to the earlier Dunlop wheels due to a French office being opened by Palmer. M.J.P.O'Gorman now had the wheels he required for his workshops and production of RFC. aeroplanes amongst the earliest being the B.E.2c with subsequent versions of the B.E. using Palmers 700 X 100mm wheel assembly during the latter stages of. the first world war by which time twenty four variant wheel and tyre size combinations were available. Perhaps the most popular size was the one fitted to the Sopwith Pup and Camel, a 700 x 75mm size as shown in detail and for that authentic look on a finished scale model, the letters in white 'Palmer Cord Aero type. It was not until several years after the end of the war that Palmer claimed to have supplied wheels and tyres to every RFC aeroplane that flew from the UK to the front line and aerial combat. This in turn enables the scale model builder to obtain that authentic look what ever prototype he chooses to build, although care should be taken by referring to as many detail

### Palmer Ltd Typical Wheel Measurement



HUB BORE 44-45MM  
HUB LENGTH 178MM  
TYRE DIAMETER 75MM  
WHEEL AND TYRE DIAMETER 700MM  
TRACK LINE 132/46MM

30 SPOKES EACH HUB  
END OF 13 GAUGE

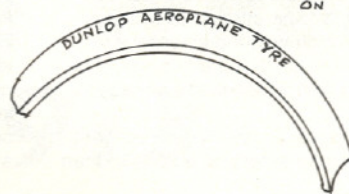
Sopwith Pup 700x75mm  
MAIN WHEEL No.9

COLIN E READ  
MAY 1993

### DUNLOP Aero Type Markings and Identification 1910

#### DUNLOP AEROPLANE TYRE

SMALL LETTERS EMBOSSED IN  
SIDE WALL OF TYRE (RAISED LETTERS)  
ON PRODUCTION



PHOTOGRAPHIC COVERAGE DOES NOT HELP  
IN IDENTIFICATION

photographs as possible to determine whether the wheels were of the normal distinct Palmer shape or with a central track line used for nose wheels and large main wheels far Bomber aeroplanes.

With Palmer's sales literature and drawings making reference to 'Fabrique Angletterre' together with advertising their French address 24, Boulevard de Villiers, Levallois-Perret, Paris it seems inevitable that French aeroplanes would have used them. The S.P.A.D. in particular could have used either French manufacture or Palmer as the S.P.A.D. VII, built by Mann Egerton shows Palmer and a batch a S.P.A.D. XIII on arrival from France were also modified to fit them. No doubt research on a particular chosen prototype, in this case mark number will enable the possibility of authentic and perhaps scale wheels.

It must be reference to actual photographs taken during and up to 1918 and not replica's in order to determine the actual, original wheel fitted as many used machined road vehicle

### PALMER Aero Type Markings and Identification 1914

#### PALMER CORD AERO TYRE

1 INCH LETTERS 1/8 INCH WIDE SPACE  
BETWEEN WORDS 1 1/8 INCH AND 1/4 INCH  
BETWEEN INDIVIDUAL LETTERS

700 x 75

5/8 INCH NUMBERS WITH 1/8 INCH SPACING  
1/2 INCH BETWEEN NUMBERS (INDIVIDUAL)

ALL MEASUREMENTS FULL SIZE



tyres, both smooth and with a tread depending on the prototype, some even using rather 'strange' wheels. However to go one stage further it may be of interest to builders of scale S.P.A.D. XIII's that the ones flown by American pilots in the 1914-1918 war used wheel rims of 76mm width and tyres manufactured by Neuilly-Aviation Aero size 700mm x 100mm, sadly a rather fragile wheel and frequently replaced with stronger Michelin tyres. ●

## Palmer Cord Aero Tyres in Production 1917

Wheel No.	Tyre Size (in mm)	Hub		Track Line (in mm)	Wheel No.	Tyre Size (in mm)	Hub		Track Line (in mm)
		Length in mm	Bore in mm				Length in mm	Bore in mm	
2	700x100	185	55	135/50	21	575x60	160	28	Central
2	750x125	185	55	135/50	21	600x75	160	28	Central
4	700x100	185	55	Central	26	700x100	150	40	Central
4	750x125	185	55	Central	26	750x125	150	40	Central
8	800x150	185	55	135/50	30	450x60	89	31.75	Central
9	800x150	178	44.45	132/46	33	700x100	150	38.1	Central
10	800x150	185	55	Central	33	750x125	150	38.1	Central
14	575x60	150	38.1	104/46	34	600x75	150	31.75	104/46
14	600x75	150	38.1	104/46	34	575x60	150	31.75	104/46
16	300x60	111.12	25.4	Central	38	700x100	185	38.09	132/46
17	300x60	72.39	12.7	Central	42	900x200	185	60.32	125/60
18	700x100	178	44.45	132/46	47	900x200	185	55	125/60
18	750x125	178	44.45	132/46	66	700x100	178	38.89	132/46
20	700x75	178	38.1	132/46	75	700x75	178	31.75	132/46

**Notes:** Tyre size is overall wheel and tyre diameter not just the wheel.  
**Track Line Central** is a wheel with equal distance either side of the wheel central line - Bomber aeroplane wheels or nose wheel.  
**Track line** is the distance either side of the wheel centre line e.g., 135/50 indicates 135mm outer side 50mm inner side. Taken at the broadest measurement - the Hub 185mm.

**PALMER CORD AERO TYRE**

E 700 75 PATENT PALMER CORD FABRIQUE CHARENTAISE 1906 F 4

DETAILS OF PALMER CORD AERO TYRE FITTED TO SOPWITH F1 CAMEL

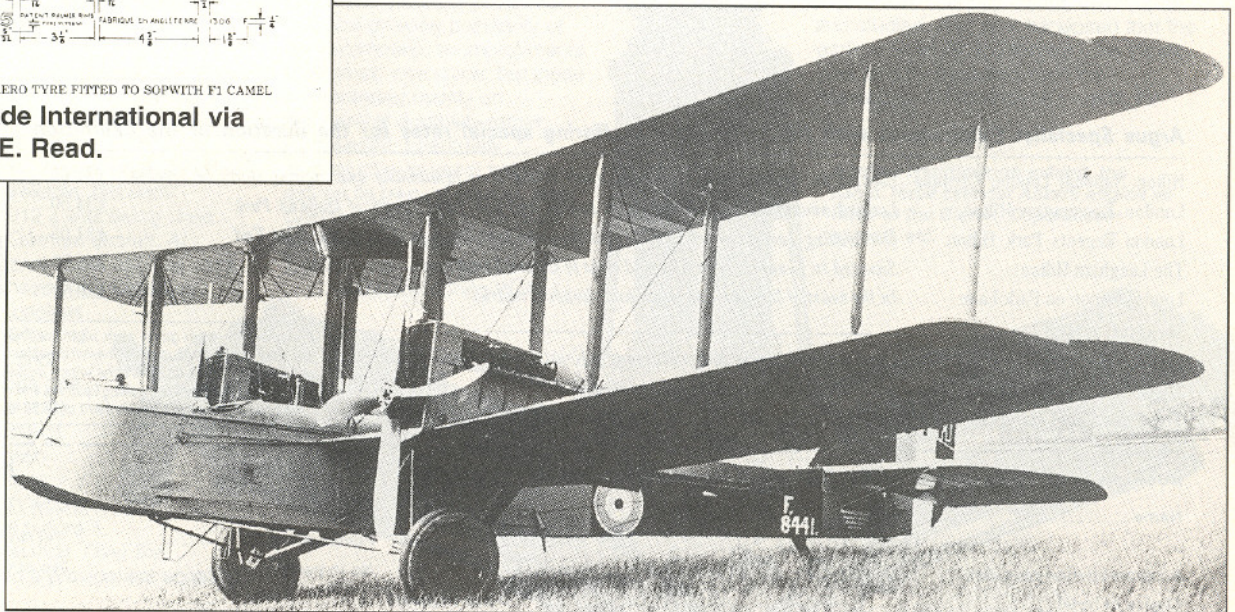
**Cross and Cockade International via  
Colin E. Read.**

### Dunlop Aeroplane Wheels 1910

Wire Spoked Wheel		Tyre	
Diameter	Rim Width	Overall Diameter	Width
22ins	2ins	24ins	3ins
24ins	2ins	26ins	3ins
26ins	2ins	28ins	3ins

### Palmer Cord Aeroplane Tyres and Wheels 1914

Overall Wheel and Tyre Diameter	Tyre Diameter
700mm	75mm
750mm	125mm
800mm	150mm



*This Mann Egerton & Co. built De Havilland DH10c was fitted with Palmer wheels of a 'central track line' type having no sloping outer surface. This type of wheel was used by all the RFC's bomber aircraft. Photo: via Colin E. Read.*