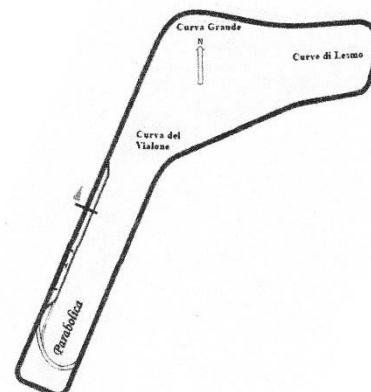




Note 140 Ferrari Lap Speeds at Monza, 1948 – 1967

This Note 140 is a complement to Note 136 Ferrari Racing Engines, 1948 - 2012 by providing an “Index of Performance” for a range of the cars whose engines are analysed there. The chosen parameter is the Lap Speed at Monza, up to the date, post-1967, when aero downforce made it impossible to quantify the cause of speed increases.

A plan of Monza is shown. Over 1948 – 1954 it had two right-angle bends at the Curva Sud. When the high-speed banked loop to the East of the basic track was constructed for 1955 this end of the circuit was altered as shown to the “Parabolica”. Only the two level layouts are considered in this review. Taking account of the difference in lap length, 6.300 km before the change and 5.750 afterwards, it is considered that the effect on Lap Speed is within the co-relation margin for error.

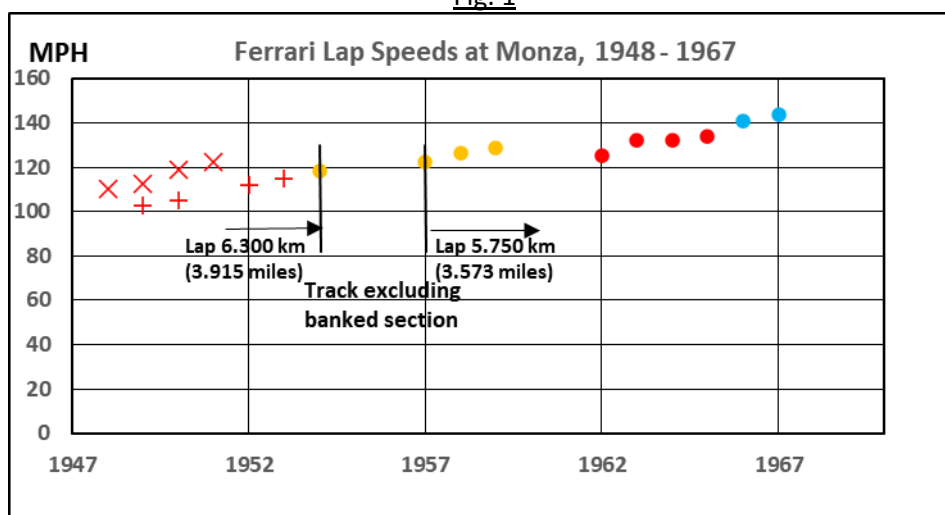


Lap Speed v, Date

Fig. 1 below gives the history of the cars selected, over the 5 formulae. The markers on the charts are coloured according to the racing formula of the time, described below (only the main limits are mentioned).

- **Red Cross**:- 1.5 litres Pressure-Charged (PC)/4.5 Litres Naturally-aspirated (NA); PC up to that time was obtained by Mechanical Supercharging (MSC).
- **Red Plus**:- 2 Litres NA – Formula Two treated as “honorary Grand prix” because of shortage of previous Formula 1 cars:-
- **Orange**:- 2.5 Litres NA;
- **Red**:- 1.5 Litres NA;
- **Blue**:- 3 litres NA.

Fig. 1

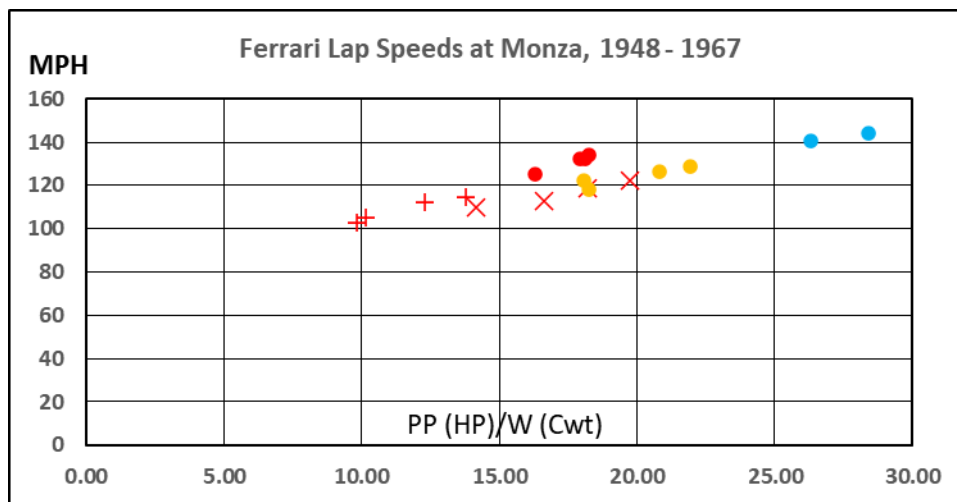


Data are given in Appendix A on P. 5

Continued on P.2

Lap Speeds related to Power/Weight ratio

Fig. 2



It can be seen clearly that the 1.5 Litre car speeds involved a parameter in addition to PP/W. Being an open high-speed circuit this must be associated with aero drag. Being similar in shape, the Co-efficient of Drag would be expected to be much-of-a-muchness, so Frontal Area would be the distinguishing factor. This is not available in the source (DASO 1252, Ferrari: all the cars), but Width and Height are. However, Width appears to be inconsistent across the range, so it has been preferred to use a surrogate Envelope Area (AE), defined as:-

$$AE = \text{Track (Ft)} \times \text{Height (Ft)} \text{ Sq.Ft.}$$

Both Track and Height are given in DASO 1252 in mm.

A Multi-Variable Regression Analysis (MRA) carried out with the three factors Power (PP), Weight (W) and Envelope area (AE) for 16 Ferraris yielded the following:-

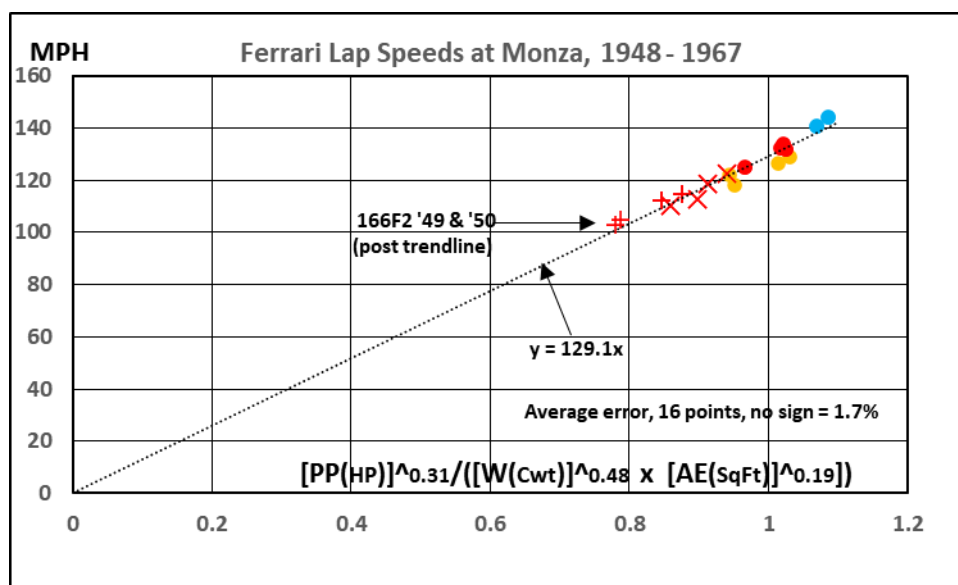
$$\text{Monza Lap Speed } \propto \text{ [PP (HP)]}^{0.31} / \text{ [W (Cwt)]}^{0.48} \times \text{ [AE (Sq.Ft.)]}^{0.19}$$

with $R^2 = 0.93$ (i.e. a good co-relation).

Lap Speed as a function of PP, W and AE

—The result of the MRA is charted on Fig. 3 below. Appendix A on P. 5 gives the data.

Fig. 3



The additional two points for the type 166F2 cars, for which the data is not certain, were not part of the trendline but generally confirm it.

Conclusions

With the usual caution about time-related changes, driver skill and weather (wind, humidity), Fig.3 does provide an interesting picture of Ferrari Lap Speeds at Monza, 1948 – 1967.

Weight is shown to be the major factor in determining the speed.

Illustrations

Some of the more-famous Ferraris are shown below.

The first Gran Premio Ferrari



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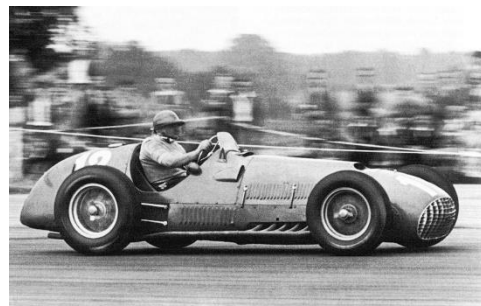
The first Gran Premio Compressore Ferrari, afterwards typed as 125F1, raced in the wet 1948 Italian GP at Turin. A team of three cars competed, 2 DNF (Farina -accident; "Bira" – transmission) but Raymond Sommer (seen here) finished 3rd. Admittedly he was 2 laps behind the winning Alfa 158 driven by Wimille, but he nearly caught the 2nd place Maserati 4CLT/48 of Villolosi.

The Ferrari was 1-stage MSC, the two cars ahead were 2-stage.

The first Major GP victory

At the 5th attempt Ferrari produced a car which achieved a major victory against its principal rival – the Alfa Romeo 158/159. This was the 4.5 Litre NA type 375F1, following on from:- 125F1 Short-chassis (as above); 125F1 Long-chassis (with 2-stage MSC); 275F1 (3.3 Litre NA); 340F1 (4.1 Litre NA).

While it gave the Alfas a fright at Monza in September 1950, its victory driven by Froilan Gonzalez came in July 1951 at Silverstone. He beat Fangio's Alfa by 51 seconds.



primotipo.com

The first World Drivers' Championship car



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Having been given a lesson by HWM of the advantages on some circuits in minor F2 races of the 4 cylinder engine versus the famous Ferrari 12 cylinder, Aurelio Lampredi produced one for 1952, the 500F2. In the 2 Litre class accepted for the Drivers' Championship in 1952, Alberto Ascari showed how well the lesson had been learned by winning 6 races out of 7 and became the 1st Ferrari-mounted Champion.

With a slightly improved 500F2 the following year he gained a repeat Championship with 5 wins from 8 races.

Continued on P.4

The third Drivers' Championship

Juan Fangio only drove in the works' Ferrari GP team for one season, in 1956. It was not a very harmonious year, but he secured his 4th Championship and Ferrari's 3rd as operator of the Champion's car. This actually was, first of all, by courtesy of Lancia, who let their D50 GP cars go to Ferrari with a FIAT subsidy in mid-1955 (Ferrari modified them slightly); and, secondly, by the generosity of Fangio's team-mate, Peter Collins, who gave up his D50 to his retired leader in the final race.



pinterest.co.uk

The long-nose body was used only in the 1956 German GP. It certainly made the car look prettier!

Champion Drivers' mount, but not Champion car



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The 1958 246F1 was a brilliant example of building a successful car by "growing it up" from an original 1.5 litres to 2.4 (see Note 59). In competition with the Vanwalls of Stirling Moss and Tony Brooks, Mike Hawthorn pulled off the 1958 Drivers' Championship by one point, courtesy of Moss' support against disqualification by the Stewards at the Portuguese GP; and by his team-mate Phil Hill yielding 2nd place to him in the final race.

However, the Vanwall team secured the new Constructors' Championship.

The first American Drivers' Champion drove a Ferrari

The first American to win the Drivers' Championship*, Phil Hill in 1961, drove a Ferrari type 156F1/120⁰ (seen here). That year Enzo Ferrari had an advantage over his British-based rivals in that he had accepted without complaint the new 1.5 Litre formula and had got on to develop a mid-engined chassis to take an engine improved from a F2 unit which first raced in 1957. The others, complaining, had been slow to start new 1.5 Litre cars. The result was that the 156F1 won 5 of 8 races. However, Stirling Moss beat them at Monaco and the Nurburgring with an out-dated Lotus run by Rob Walker and prepared by Alf Francis.



philhill.com

*Long before the multi-race Championship, Jimmy Murphy (USA) won the French Grand Prix for Duesenberg in 1921.

Champion's mount for a multiple Motor-cycle Champion



ferrarimagazine

John Surtees had won four 500 cc and three 350 cc Motor-Cycle Championships over 1956 -1960 before turning to cars completely in 1960. He joined the Ferrari team in 1963 and won the Drivers' Championship in 1964 driving the 158F1. He had a bad smash which was not his fault in 1965 driving another make of sports car. A disagreement with the Ferrari manager and no backing from Enzo Ferrari led to his leaving the firm in mid-1966. This probably cost both of them the Championships that year.

The last Ferrari in this Note

The 312F1 with an engine having 4 valves per cylinder was introduced at Monza in September 1967. This followed the “Four valve Renaissance” led by Weslake and Cosworth in 1966. The Ferrari engine almost-certainly did not have the power-enhancing “Barrel Turbulence” (aka “Tumble Swirl”) introduced by Keith Duckworth (KD kept that secret for some years).

Chris Amon was the driver -a fast but unlucky driver who never won a F1 Grand Prix.

1967 was the last year in which the cars had no aero downforce and so is the last in this Note. After that became a feature of racing it was no longer possible to quantify the effect on speed, without access to wind-tunnel data known only to teams.



youtube

References

The DASO can be found in Appendix 3:- 8,22,793,1252. IN = Internet.

Appendix A

Ferrari Lap Speeds at Monza 1948 - 1967						
	Red cross	Red cross	Red cross	Red cross	Red Plus	Red Plus
Race	GP Practice	GP Practice	GP Practice	GP Practice	GP Practice	GP Practice
Year	1948	1949	1950	1951	1952	1953
Make	Ferrari	Ferrari	Ferrari	Ferrari	Ferrari	Ferrari
Model	125F1	125F1/49	375F1	375F1/245P	500F2	500F2/53
V (L)/CN	1.5/12	1.5/12	4.5/12	4.5/12	2./4	2./4
Driver	R. Sommer	A. Ascari	A. Ascari	A. Ascari	A. Ascari	A. Ascari
Power PP CV	230	280	350	380	165	185
Power PP HP	226.9	276.2	345.2	374.8	162.7	182.5
Data source	D1252	D1252	D1252	D1252	D1252	D1252
Dry Weight kg	700	730	850	850	560	560
Dry Weight lb	1543	1609	1874	1874	1235	1235
Data Source	D22	D22	D1252	D1252	D1252	D1252
+ Load lb	250	250	250	250	250	250
Total Weight lb	1793	1859	2124	2124	1485	1485
Total Wgt W Cwt	16.01	16.60	18.96	18.96	13.26	13.26
PP/W HP/Cwt	14.17	16.64	18.20	19.76	12.28	13.77
Lap Speed MPH	110.11	112.75	118.64	122.45	112.12	114.86
Data source	M. Sport	M. Sport	D793	D793	D793	D793
Year	1948	1949	1950	1951	1952	1953
Track mm	1278	1278	1278	1250	1270	1270
Track ft	4.19	4.19	4.19	4.10	4.17	4.17
Height mm	1025	1025	960	960	1050	1050
Height ft	3.36	3.36	3.15	3.15	3.44	3.44
Envelope Area (AE) Sq. Ft.	14.10	14.10	13.21	12.92	14.35	14.35
f(PP,W,AE)	0.858636	0.896896	0.912976	0.9405	0.845275	0.875793

	GP Practice	GP Practice	GP Practice	GP Practice	GP Practice	GP Practice
Year	1954	1957	1958	1959	1962	1963
Make	Ferrari	Ferrari	Ferrari	Ferrari	Ferrari	Ferrari
Model	625/553	801F1	246F1	256F1	156F1	156F1
V (L)/CN	2.5/4	2.5/8	2.5/6	2.5/6	1.5/6	1.5/6
Driver	A. Ascari	P. Collins	M. Hawthorn	A. Brooks	W. Mairesse	J. Surtees
Power PP CV	260	275	280	295	190	205
Power PP HP	256.4	271.2	276.2	291.0	187.4	202.2
Data source	D1252	D1252	D1252	D1252	D1252	D1252
Dry Weight kg	600	650	560	560	470	460
Dry Weight lb	1323	1433	1235	1235	1036	1014
Data Source	D1252	D1252	D1252	D1252	D1252	D1252
+ Load lb	250	250	250	250	250	250
Total Weight lb	1573	1683	1485	1485	1286	1264
Total Wgt W Cwt	14.04	15.03	13.26	13.26	11.48	11.29
PP/W HP/Cwt	18.26	18.05	20.83	21.95	16.32	17.91
Lap Speed MPH	118.24	122.15	126.35	128.89	125.12	132.2
Data source	D793	D793	D793	D793	D793	D793
Year	1954	1957	1958	1959	1962	1963
Track mm	1278	1305	1240	1240	1200	1330
Track ft	4.19	4.28	4.07	4.07	3.94	4.36
Height mm	1020	962	980	980	1000	810
Height ft	3.35	3.16	3.22	3.22	3.28	2.66
Envelope Area (AE) Sq. Ft.	14.03	13.51	13.08	13.08	12.92	11.60
f(PP,W,AE)	0.950746	0.943193	1.013591	1.030121	0.965168	1.01704

Appendix A completed

	GP Practice	GP Practice	GP Practice	GP Practice	Red Plus	Red Plus
Year	1964	1965	1966	1967	1949	1950
Make	Ferrari	Ferrari	Ferrari	Ferrari	Ferrari	Ferrari
Model	158F1	512F1	312F1/3v/c	312F1/4v/c	166F2	166F2
V (L)/CN	1.5/8	1.5/12	3./12	3./12	2./12	2./12
Driver	J. Surtees	J. Surtees	M. Parkes	C. Amon	J. Fangio	L. Villoresi
Power PP CV	210	220	380	410	155	160
Power PP HP	207.1	217.0	374.8	404.4	152.9	157.8
Data source	D1252	D1252	M. Sport	D1252	D1252	D8
Dry Weight kg	468	490	610	610	700	700
Dry Weight lb	1032	1080	1345	1345	1543	1543
Data Source	D1252	D1252	D1252	Corrected	IN	IN
+ Load lb	250	250	250	250	200	200
Total Weight lb	1282	1330	1595	1595	1743	1743
Total Wgt W Cwt	11.44	11.88	14.24	14.24	15.56	15.56
PP/W HP/Cwt	18.10	18.27	26.32	28.40	9.82	10.14
Lap Speed MPH	132.06	133.85	140.88	143.96	102.73	104.87
Data source	D793	D793	M. Sport	M. Sport	IN	IN
Year	1964	1965	1966	1967	1949	1950
Track mm	1350	1350	1450	1550	1200	1200
Track ft	4.43	4.43	4.76	5.09	3.94	3.94
Height mm	768	768	870	850	1025	1025
Height ft	2.52	2.52	2.85	2.79	3.36	3.36
Envelope Area (AE) Sq. Ft.	11.16	11.16	13.58	14.18	13.24	13.24
f(PP,W,AE)	1.025311	1.021824	1.068957	1.085442	0.77946	0.787165