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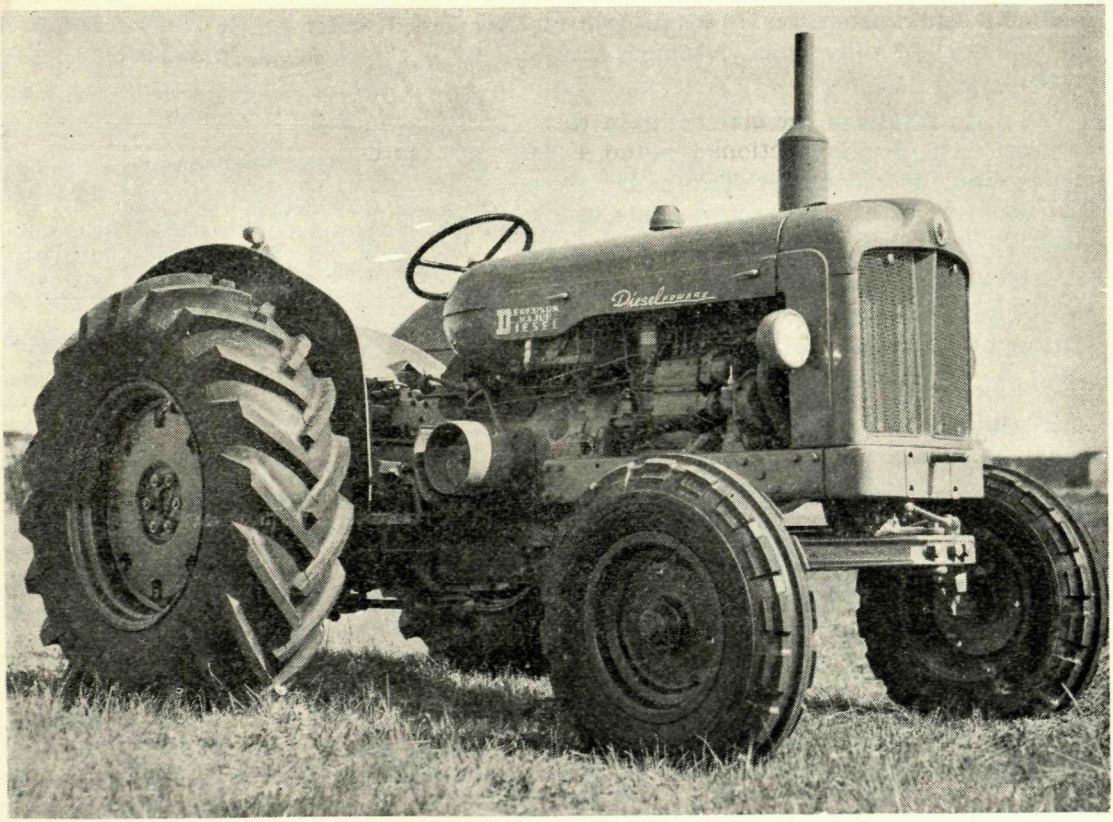
Australian tractor test No. 24 - New Fordson Major diesel



AUSTRALIAN TRACTOR TESTS

REPORT on TEST No. 24 (Farmers' Edition)

NEW FORDSON MAJOR—DIESEL MODEL

(TESTED FOR THE FORD MOTOR CO. OF AUSTRALIA, GEELONG)

THIS report is taken from the full Technical Report No. 24 of this test; test results are shown here in briefer form; fuller explanations are added. Values quoted here may be rounded out to two instead of three significant figures; to this extent the values quoted may differ slightly but not significantly from those shown in the Technical Report. Graphs of belt test performance, shown in the Technical Report, are not shown here. The Technical Report is not available in large numbers, but may be seen at the offices of the State Departments of Agriculture, the Bureau of Sugar Experiment Stations (Queensland), and the Commonwealth Department of Commerce and Agriculture.

1.—THE TESTS

(1) After 12 hours of running-in, two types of tests were carried out, in order to measure **the performance of the engine,** as measured by the power in the belt driven by the belt pulley, and **the performance of the tractor as a whole,** as measured by drawbar pull, tractor speed, wheel slip,

and drawbar horsepower (d.b.h.p.), with the tractor running on a bitumen test track.

The main results of these tests are given in Sections 2, 3, and 4. Other measurements and observations were made of various features of the tractor; these are given in Section 5.

(2) **Fuel Mixture Settings.**—The engine of this tractor has only one fuel-mixture setting, at which all the tests were carried out.

(3) **Governor Control.**—For maximum loads the throttle was full open; for part loads the governor control was set to give rated speed at the desired loads.

(4) **Fuel.**—Distillate; Cetane No. 58; Specific Gravity 0.836; weight per Imperial gallon 8.36 lb.

(5) **Specification.**—Engine No. 1273851. For a brief specification of this tractor see Section 6 at the end of this report.

2.—SUMMARY OF POWER OUTPUT

Table A.

——	At the Belt.	At the Drawbar.
Rated engine speed, r.p.m.	1,600	1,600
Corrected maximum power (*a*)	39·4	36·4
Rated power (*b*)	33·5 (*b*1)	27·3 (*b*2)

Notes.—Letters in brackets refer to explanatory footnotes.

(*a*) Corrected maximum h.p. was calculated by a suitable formula from observed maximum h.p. corrected to 60° F. and 29·92" (sea level) barometric pressure.

(*b*) Engines are not expected to run indefinitely at full or maximum power output. But they can be expected to run continuously for some hours at *rated* output, which is less than maximum, defined as follows :—

(*b*1) Rated b.h.p. is defined as 85 per cent. of corrected maximum b.h.p.

(*b*2) Rated d.b.h.p. is defined as 75 per cent. of corrected maximum d.b.h.p.

3.—BELT TESTS

The belt tests show the power (belt horsepower, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

Belt Test Results.

Table B.

If there is only one fuel setting, uo mention will be made of mixture settings in this table.

	B.H.P.	Engine Speed.	Fuel. Gall./hr. (*c*)	Fuel. lb./b.h.p. hr. (*d*)
1. Rated Engine Speed, 1,600 r.p.m.				
2. Fast Idling Speed about 1,730 r.p.m.				
3. Observed maximum b.h.p. at rated speed	38·7	1,601	2·21	0·48
4. Corrected maximum b.h.p. rated speed (*a*)	39·4	Observed maximum value corrected for atmospheric temperature and pressure at time of test.		
5. Calculated rated load (*b*1)	33·5			
6. Test at approximately rated load*	33·3	1,600	1·83	0·46
7. Average loading under governor (*e*)	20	1,630	1·3	0·54
8. Equivalent engine torque at full throttle	127 ft. lb. at maximum power and rated speed 136 ft. lb. (maximum) at 1,100 r.p.m.			

* Governor set to run this test at approximately rated speed.

(*c*) Fuel consumption in gallons/hour may be a simple unit, but it has no meaning unless we also quote the corresponding h.p. output.

(*d*) This is the "specific fuel consumption," the weight of fue consumed per unit of energy developed by the engine ; the unit of energy here is the h.p.-hour, similar to the electrical "unit" the kilowatt-hour. When this figure is least the engine is giving its best economy or efficiency. It is easy to change from column (*c*) to column (*d*) in Table B., *e.g.*, as follows :—

2·21 galls./hr. while developing 38·7 h.p. means 2·21 ÷ 38·7 galls./b.h.p./hr. = 0·057 gall./b.h.p./hr.
0·057 gall./b.h.p./hr. x 8·36 lb./gallon for this fuel = 0·48 lb./b.h.p./hr., as shown in column (*d*).

(*e*) Line 7, Table B., represents the average performance one might expect from the engine while driving a variety of belt loads, from light to heavy. In terms of averate fuel consumption, it means about 1⅓ gallons an hour.

4.—DRAWBAR TESTS

The following Tables C, D, and E, show the drawbar performance of the tractor, on the bitumen test track, wearing rear tyres 14 x 28, carrying standard weight (1,990 lb. front, 5,630 lb. rear; total 7,620 lb.), working in the gears named in the tables. Height of drawbar 14 inches.

Drawbar tests, using minimum weight of tractor, were carried out, but are not reported here.

If there is only one fuel setting, no mention will be made of mixture settings in these tables.

(1) Maximum Power, Rated (3rd) Gear.

Table C.

	DBHP (*f*).	Pull lb.	Speed m.p.h.	Wheel Slip % (*g*).
1. Rated Engine Speed, 1,600 r.p.m.				
2. Observed maximum d.b.h.p. at rated engine speed	36·4	4,000	3·41	8
3. Corrected maximum d.b.h.p. at rated engine speed (*a*)	36·4	Observed maximum value above, corrected for atmospheric conditions at time of test.		
4. Calculated rated load, (*b*2)	27·3			

(2) Pull at Maximum D.B.H.P.

Table D.

All gears, rated engine speed. See note (*h*).

Gear.	D.B.H.P.	Pull lb.	Speed m.p.h.	Wheel Slip %
1	26	5,570	1·8	20
2	34	4,780	2·6	12
3	36	4,000	3·4	8
4	36	2,660	5·1	4
5	34	1,780	7·2	2
6	29	820	13·3	0½

(*f*) D.B.H.P. is the product of pull (lb.) and speed (m.p.h.) divided by 375.

(*g*) Wheel slip can be measured by noting that, in travelling a given distance, the back wheels make more turns when working under load than when running with no load on the drawbar. The difference in these revolution counts divided by the former count gives the slip as a ratio, which can be written as a percentage (quoted in these tables to the nearest whole number).

(*h*) These are not the maximum pulls available in the gears (*i.e.*, not the maximum sustained pulls), but the pulls at maximum d.b. power, *i.e.*, at full-throttle at rated engine speed.

(3) Various Loads, Rated (3rd) Gear.*

Table E.

Pull. lb.	Speed. m.p.h.	DBHP	Per cent. of Maximum d.b.h.p.	Slip. %	Fuel. Gall./hr.	Fuel. lb./d.b.h.p. hr.
1,510	3·70	15	41	2	1·1	0·63
2,060	3·58	20	54	3	1·3	0·54
2,600	3·55	25	67	4	1·5	0·52
3,160	3·69	31	85	5	2·0	0·54

* Governor set to run these tests at approximately rated engine speed.

(4) Interpretation of Drawbar Tests.

(i) Drawbar tests are carried out on a hard prepared surface. Most field conditions present higher resistance to the tractor's motion, so that, in the field, the maximum drawbar pulls available in any gear will usually be less than those shown in the tables.

(ii) Wheel slip may also be greater in the field; to that extent tractor speeds in miles per hour in the field will be less than those shown in the tables.

(iii) Because of (i) and (ii) above, the drawbar horsepowers available in any gear in the field will usually be less than those shown in the tables.

5.—OTHER OBSERVATIONS

(1) Duration of Test.

Eighty-four hours, including running-in.

(2) Repairs and Adjustments.

(i) When received, it was found that the throttle stop on the intake manifold had been bent during assembly preventing full designed throttle opening. A new intake manifold was fitted. (The Company advises that this defect has been remedied in all subsequent tractors sent from the works.)

(ii) The tachometer supplied with the tractor broke down, possibly due to diesel fuel entering it.

(3) Engine.

Fuel settings—One only.

Heat Controls—radiator, hand-controlled shutter.

Radiator water used—none.

Lubricating oil—type used: S.A.E. 20.

Weight to engine, 15.3 lb.;

Weight from engine after tests, 14.2 lb.

(4) Inspection of Engine and Transmission After Test.

After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(5) Tractor Weights (lb.).

——	Front.	Rear.	Total.
*Minimum weight, unballasted	1,990	4,510	6,500
Added weights	....	....	....
Water ballast	....	1,120	1,120
†Standard weight, as usually supplied and recommended	1,990	5,630	7,620

* This weight, less driver, was used in finding centre of gravity.

† Weight of tractor in drawbar tests quoted in this report.

(6) Wheels and Tyres.

Tyres.	Front.	Rear.
Type	Rib	Closed centre bar tread
Size	7·50 x 16 x 6 ply	14 x 28 x 6 ply
Pressure	25 psi.	14 psi.

(7) Steering.

With track widths, front 54″, rear 60″.

Turning circles: Without brakes, 27′ L.H., 27½′ R.H.; with brakes, 24′ L.H., 23½′ R.H.

Comment: The tractor was easy to steer with the steering wheel while under load.

(8) Centre of Gravity.

With tractor in minimum weight less driver.—Height above ground, 2′ 4″. Distance forward of rear axle, 2′.

G. H. VASEY,
Officer in Charge Tractor Testing.

I. T. NAYLOR,
Tractor Testing Officer.
University of Melbourne.

6.—BRIEF SPECIFICATIONS
New Fordson Major Diesel
(Supplied by Manufacturers).

(1) Engine.

No. 1273851. Fordson, England.

4-stroke; 4 cylinders, vertical; crankshaft along tractor.

Bore, 3.937″; stroke, 4.528″; compression ratio, 16 : 1.

Rated speeds: Belt work, 1,600 r.p.m.; drawbar work, 1,600 r.p.m.

Fuel type: Distillate.

Fuel system: Simms pump and injectors; Fuel filters, two replaceable element units. Tank capacity, 15 gallons.

Air cleaner: Oil bath.

Governor: Type—pneumatic.

Electrical system: 12-volt battery and generator.

Starting: Electric, cold start.

Cooling: Water pump and fan, radiator shutters.

Exhaust: "Yuba" type combined muffler and spark arrester.

Lubrication: Oil pump and full-flow filter.

(2) Chassis.

4-wheel; pneumatic.

Wheel base 80″.

Track width: Front 54″; rear 60″, adjustable.

Tyre sizes: Front 7.50 x 16; rear 14 x 28.

Steering Gear: Recirculatory ball.

Weight: Maximum weight 7,620 lb. (see "Other Observations," section 5).

(3) Belt Pulley.

Standard; right side, clockwise rotation.

Diameter 8½″; face width 6½″.

Pulley speeds (at rated engine speed), 890 and 1,600 r.p.m.

Belt speeds (at rated engine speed), 1,980 and 3,560 ft./min., not in accordance with overseas standards (namely 3,100 ± 100 f.p.m.).

(4) Power Take-Off.

Standard; guarded; location, centre rear.

Speed: 723 r.p.m., not in accordance with overseas standards (namely, 536 ± 10 r.p.m.).

Dimensions: 6 spline, 1⅜″ diameter.

(5) Drawbar—Swinging.

Height as tested, 14″, adjustable.

(6) Transmission—Conventional Gears.

Clutch: Type, single dry plate; size, 11″; pedal control.

Gear ratios and road speeds (assuming no wheel slip) on 11.00 x 36 tyres, at rated engine speed, as advertised:—

Gear.	Forward.						Reverse.	
	1.	2.	3.	4.	5.	6.	Low.	High.
Ratio	123	87·3	68·4	48·6	34·8	19·3	91·1	50·7
Speed, m.p.h.	2·1	2·9	3·7	5·2	7·3	13·2	2·8	5·0

(7) Hydraulics.
Optional, not fitted.

(8) Three-Point Linkage.
Optional, not fitted.

The Australian Tractor Testing Committee is a joint body established by agreement between the Commonwealth, the States, and the University of Melbourne; under this agreement, the tests are carried out by the University of Melbourne. The address of the Tractor Testing Committee is: C/o. Department of Commerce and Agriculture, 301 Flinders Lane, Melbourne.

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