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Australian tractor test No. 25 - New Fordson Major - Kerosene Model

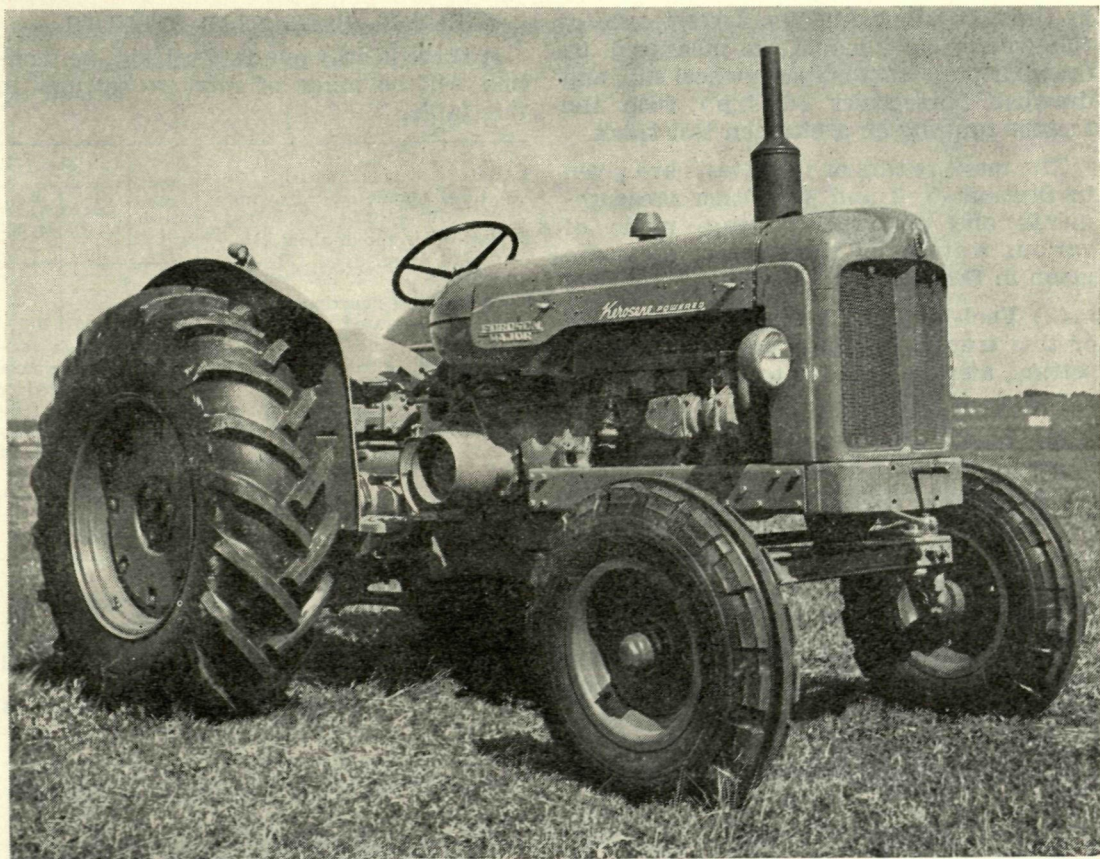
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AUSTRALIAN TRACTOR TESTS

REPORT ON TEST No. 25 (Farmers' Edition)

NEW FORDSON MAJOR—KEROSENE MODEL

TESTED FOR THE FORD MOTOR COMPANY OF AUSTRALIA, GEELONG.

THIS Report is taken from the full Technical Report No. 25 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 Primary Industry.

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

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 Primary Industry, 301 Flinders Lane, Melbourne.

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.**—Power Kerosene, Octane No. 56; Specific Gravity 0.829; weight per Imperial gallon 8.29 lb.

(5) **Specification.**—Engine No. 1273097. 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)	32.3	29.0
Rated power (b)	27.5 (b1)	21.8 (b2)

Note.—Letters in brackets inside the tables refer to explanatory footnotes.

(a) Corrected maximum h.p. for carburettor engines is 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:—

(b1) Rated b.h.p. is defined as 85 per cent. of corrected maximum b.h.p.;

(b2) 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.

TABLE B—BELT TEST RESULTS.—

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

1. Rated engine speed, 1,600 r.p.m.	B.H.P.	Engine Speed.	Fuel.	
			Gall./hr. (c).	lb./b.h.p. hr. (d).
2. Fast idling speed, about 1,720 r.p.m.				
3. Observed maximum b.h.p. at rated speed	31.8	1,599	2.75	0.72
4. Corrected maximum b.h.p. rated speed (a)	32.3	Observed maximum value corrected for atmospheric temperature and pressure at time of test.		
5. Calculated rated load (b1)	27.5			
6. Test at approximately rated load*	27.0	1,603	2.54	0.78
7. Average reading under governor (e)	17	1,640	2.1	1.0
8. Equivalent engine torque at full throttle	104 ft. lb. at maximum power and rated speed			
	125 ft. lb. (maximum) at 986 r.p.m.			

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

(c) Fuel consumption in gallons/hr. may be a simple unit, but it has little meaning unless we also quote the corresponding h.p. output.

(d) This is the "specific fuel consumption," the weight of fuel consumed per unit of energy developed by the engine; the unit of energy here is the h.p.-hr., similar to the electrical "unit," the kilowatt-hr. 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:—

2.75 galls./hr. while developing 31.8 h.p. means $2.75 \div 31.8$ gall./b.h.p./hr. = 0.087 gall./b.h.p./hr.

0.087 gall./b.h.p./hr. \times 8.29 lb./gallon for this fuel = 0.72 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 average fuel consumption, it means about 2 to 2½ gallons an hour.

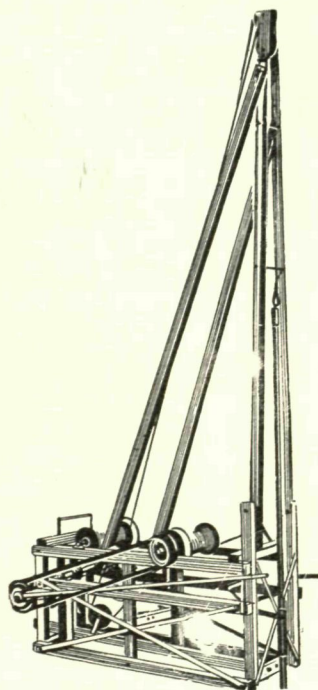
4. DRAWBAR TESTS

(1) 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 (1,930 lb. front, 5,380 lb. rear; total, 7,310 lb.), working in the gears named in the tables. Height of drawbar 14½ inches.

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

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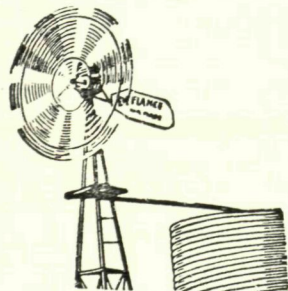


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Mr. J. D. Johnston,
BOKAL, W.A.

We have been receiving "The Chronicle" for over 30 years and find it a boon to all farmers.

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

TABLE C—MAXIMUM POWER IN RATED (3rd) GEAR

	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	29.2	3,160	3.46	7
3. Corrected maximum d.b.h.p., at rated engine speed (a)	29.0	Observed maximum value above, corrected for at- mospheric conditions at time of test.		
4. Calculated rated load (b2)	21.8			

TABLE D—PULL AT MAXIMUM D.B.H.P.
All gears, rated engine speed (see note (h)).

Gear.	D.B.H.P.	Pull lb.	Speed m.p.h.	Wheel Slip %
			m.p.h.	%
1	24	5,400	1.7	20
2	29	4,170	2.6	10
3	29	3,160	3.5	7
4	29	2,190	5.0	4
5	28	1,500	7.1	2
6	20	580*	13.0	$\frac{1}{2}$

* The accuracy of the drawbar dynamometer at this load is suspect.

(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.

TABLE E—VARIOUS LOADS IN RATED (3rd) GEAR.*

Pull. lb.	Speed. m.p.h.	DBHP.	Per cent. of Maxi- mum d.b.h.p.	Slip. %	Fuel.	
					Gall./ hr.	lb./ d.b.h.p. hr.
1,320	3.50	12	42	2	1.9	1.25
1,830	3.54	17	60	3	2.1	1.00
2,320†	3.55	22†	76†	3	2.3	0.87
2,820	3.54	27	92	4	2.6	0.79

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

† Approximately the rated drawbar load.

(2) 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.**—68 hours, including running-in.

(2) **Repairs and Adjustments.**—It was necessary to bend arm from governor to throttle valve to ensure extreme throttle opening.

(3) Engine.—

Fuel settings—one only.

Heat controls—radiator; hand-controlled shutter; vaporiser.

Radiator water used—none.

Lubricating oil—type used:—S.A.E. 30.

Weight to engine, 15.4 lb.;

Weight from engine after tests, 17.7 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	1,910	4,420	6,330
Added weights
Water ballast	980	980
†Standard weight, as usually supplied and recommended	1,930	5,380	7,310

* 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	Open 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, 28½' L. H., 27½' R.H.; with brakes, 25½' L.H., 25' 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, 10/9/54.

6. **BRIEF SPECIFICATIONS**

New Fordson Major Kerosene

(Supplied by Manufacturers)

(1) **Engine**—No. 1273097 (Ford, England). 4-stroke; 4 cylinders, vertical crankshaft along tractor.

Bore, 3.937"; stroke, 4.528"; compression ratio, 4.62 : 1.*

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

Fuel type: Power kerosene.

Fuel system: Mechanical fuel pump and fixed jet carburettor. Tank capacity, 14 gallons plus 1 gallon petrol tank.

Air cleaner: Oil bath.

Governor: Mechanical.

Electrical and Ignition system: 12-volt battery, generator, coil.

Starting: 12-V electric; petrol fuel.

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 tyres.

Wheel base, 80".

Track width: Front 54", rear 60", both adjustable.

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

Steering gear: recirculatory ball.

Weight: Maximum weight, 7,310 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 (at rated engine speed): 723 r.p.m., not in accordance with overseas standards (namely, 536 \pm 10 r.p.m.).

Dimensions: 6-spline, 1 $\frac{3}{8}$ " diameter.

(5) **Drawbar—Swinging.**

Height as tested: 14 $\frac{1}{2}$ ", adjustable.

(6) **Transmission—Conventional Gears.**

Clutch: Single dry plate, 11" dia., 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	3.7	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.**

* Engine tests with a cylinder head giving a compression ratio of 5.5 to 1 were carried out (Test No. 25A), but are not reported here.

THE NUFFIELD FOUNDATION TRAVELLING SCHOLARSHIPS FOR AUSTRALIAN FARMERS

1. The Nuffield Foundation, with the object of promoting a better understanding between farmers of Australia and Great Britain and increasing practical farming knowledge, including horticultural knowledge, will award two travelling scholarships in 1956, to farmers in Australia to enable them to study farming practice and conditions of agricultural life in Great Britain. Upon return to Australia it is hoped they will be able to spread the knowledge and understanding they have gained among their farmer and other neighbours.

2. The scholarships will be awarded by the Nuffield Foundation on the recommendation of the Foundation's Australian Advisory Committee.

3. The scholarships are tenable for not less than six months. It is considered that a shorter period would result in incomplete study. In general, the scholars will be expected to arrive in the United Kingdom in February, 1957.

4. The scholarships are open to persons of either sex who are citizens of Australia, who are now engaged and intend in future to engage in farming in Australia, and who are persons likely to be able to spread their knowledge and experience upon their return to Australia. In making the awards, regard will be paid to the value of the experience which the applicant could gain in the United Kingdom. Applicants should be not less than 25 and not much more than 35 years of age.

5. The Nuffield Foundation, in consultation with the National Farmers' Union in the United Kingdom, will make arrangements to ensure that each scholar is placed initially and thereafter during his scholarship with progressive practical farmers in the United Kingdom whose farming interests correspond with those of the scholar and whose knowledge of agriculture in the United Kingdom generally is comprehensive.

6. The value of each scholarship will be adjusted to meet the scholar's needs and circum-

stances generally, but will be sufficient to meet reasonable expenses in the United Kingdom.

Travelling expenses (by air if necessary) from the scholars' farms to Great Britain, in Great Britain, and back to their farms in Australia will be paid by the Foundation in addition to the Scholarship award.

7. During the tenure of award a scholar will be required to devote the whole of his or her time to a course of practical study approved by the Foundation.

Other work, paid or unpaid, may not be undertaken during the period of the Scholarship without the permission of the Trustees.

8. The Foundation's Australian Advisory Committee will, where necessary, assist the scholar in making arrangements to ensure that his farming business is properly looked after during his absence.

9. A scholar will be expected to resume residence in Australia on the completion of his or her scholarship.

10. A scholar will be required in consultation with the Australian Advisory Committee to write notes on his work in the United Kingdom and submit them to the Foundation's Australian Advisory Committee after returning to Australia.

11. Should the Trustees of the Nuffield Foundation at any time find that a scholar neglects or has neglected the obligations implicit in the scholarship award, they shall have power immediately to terminate the scholarship.

12. In 1956 scholarships are being offered to residents of the Northern Territory, South Australia and Western Australia. In 1955, scholars were selected from the Australian Capital Territory, New South Wales and Queensland.

Applications for scholarships should be submitted to the Secretary of the Nuffield Foundation Australian Advisory Committee, c/o University of Melbourne, Carlton, N.3, Victoria, from whom application forms may be obtained. Applications for the present awards will close on the 20th July, 1956.

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