Australian tractor test No. 26 - McCormick International Super AWD-6 (Diesel)
THIS Report is taken from the full Technical Report No. 26 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 twelve 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.—The engine was under the control of the governor set to give maximum power and full throttle at rated engine speed.

(4) Fuel.—Distillate, Diesel Index 53, Specific Gravity 0.84; weight per Imperial gallon 8.41 lb.

(5) Specification.—Engine No. AD264 2636. For a brief specification of this tractor see Section 6 at the end of this report.

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.
2. SUMMARY OF POWER OUTPUT

Table A.

<table>
<thead>
<tr>
<th>Corrected maximum power</th>
<th>Rated power</th>
<th>engine speed, r.p.m.</th>
<th>At the Belt.</th>
<th>At the Drawbar.</th>
</tr>
</thead>
<tbody>
<tr>
<td>47-6</td>
<td>42-9</td>
<td>1,450</td>
<td>1,450</td>
<td></td>
</tr>
<tr>
<td>40-5</td>
<td>32-2</td>
<td>(b1) 1,450</td>
<td>42-9</td>
<td></td>
</tr>
</tbody>
</table>

(a) Corrected maximum h.p. is calculated by a suitable formula from observed maximum h.p. corrected to 60° F. and 29-92" (sea level) barometric pressure. No correction is applied to diesel engines because there is no suitable formula; the values shown above are therefore the observed maximum powers.

(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:

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

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

3. BELT TESTS

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, 1,450 r.p.m.
2. Fast idling speed about 1,580 r.p.m.
3. Observed maximum b.h.p. at rated speed
4. Corrected maximum b.h.p. at rated speed
5. Calculated rated load (61)
6. Test at approximately rated load
7. Average loading under governor (e)
8. Equivalent engine torque at full throttle
9. Repeat of (3) above after 55 hours

(b) 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.

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 30, carrying maximum weight (2,350 lb. front, 6,090 lb. rear; total 8,440 lb.), working in the gears named in the tables. Height of drawbar 16 inches.

Drawbar tests, using standard and minimum weights 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.

Table C.—Maximum Power, Rated (3rd) Gear

<table>
<thead>
<tr>
<th>Engine Speed</th>
<th>Fuel</th>
<th>DBHP</th>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>Wheel Slip %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,450 r.p.m.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47-6</td>
<td>1,449</td>
<td>2-62</td>
<td>0-46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(6) 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).

Table D.—Pull at Maximum d.b.h.p.

All gears, rated engine speed. See note (b).

<table>
<thead>
<tr>
<th>Gear</th>
<th>D.B.H.P.</th>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>Wheel Slip %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
<td>5,900</td>
<td>1-4</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>42</td>
<td>4,960</td>
<td>3-2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>43</td>
<td>3,760</td>
<td>4-3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>43</td>
<td>3,060</td>
<td>5-3</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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Table E.—Fuel Consumption, Various Loads, Rated (3rd) Gear

<table>
<thead>
<tr>
<th>Pull. lb.</th>
<th>Speed. m.p.h.</th>
<th>DBHP.</th>
<th>Per cent. of Maximum d.b.p.h.</th>
<th>Slip. %</th>
<th>Fuel. Gall./hr.</th>
<th>lb./d.b.p.h. hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,600</td>
<td>4.73</td>
<td>20</td>
<td>47</td>
<td>3</td>
<td>1.5</td>
<td>0.61</td>
</tr>
<tr>
<td>2,100</td>
<td>4.64</td>
<td>26</td>
<td>61</td>
<td>4</td>
<td>1.7</td>
<td>0.55</td>
</tr>
<tr>
<td>2,700†</td>
<td>4.53</td>
<td>33†</td>
<td>76†</td>
<td>5</td>
<td>2.0</td>
<td>0.52</td>
</tr>
<tr>
<td>3,400</td>
<td>4.40</td>
<td>40</td>
<td>93</td>
<td>7</td>
<td>2.4</td>
<td>0.50</td>
</tr>
</tbody>
</table>

† 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.—55 hours, including running-in.

(2) Repairs and Adjustments.—None.

(3) Engine.—

Fuel settings—one only.
Heat controls—radiator, thermostat on water by-pass.
Radiator water used—negligible.
Lubricating oil—type used, S.A.E. 20.
Weight to engine, 14.9 lb.;
Weight from engine after tests, 12.4 lb.

(4) Tractor Weights (lb.)

<table>
<thead>
<tr>
<th>Minimum weight, unballasted</th>
<th>Front.</th>
<th>Rear.</th>
<th>Total.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Added weights</td>
<td>80</td>
<td>280</td>
<td>360</td>
</tr>
<tr>
<td>Weight, as usually supplied</td>
<td>2,250</td>
<td>4,615</td>
<td>6,860</td>
</tr>
<tr>
<td>Water Ballast</td>
<td></td>
<td>920</td>
<td>920</td>
</tr>
<tr>
<td>Standard weight</td>
<td>2,250</td>
<td>5,535</td>
<td>7,780</td>
</tr>
<tr>
<td>Added weight</td>
<td></td>
<td>560</td>
<td>560</td>
</tr>
<tr>
<td>Water ballast</td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Maximum weight, heaviest</td>
<td>2,350</td>
<td>6,090</td>
<td>8,440</td>
</tr>
<tr>
<td>recommended</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* This weight, less driver and fuel, was used in finding centre of gravity.
† Weight of tractor in drawbar tests quoted in this report.

(5) Wheels and Tyres.

<table>
<thead>
<tr>
<th>Tyres.</th>
<th>Front.</th>
<th>Rear.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Rib</td>
<td>Open centre bar tread</td>
</tr>
<tr>
<td>Size</td>
<td>7.50 x 16 x 6 ply</td>
<td>14 x 30 x 6 ply</td>
</tr>
<tr>
<td>Pressure</td>
<td>36 psi.</td>
<td>12 psi.</td>
</tr>
</tbody>
</table>

(6) Steering.—With track widths, front 47", rear 55". Wheel base 76½"

Turning circles: Without brakes, 26' L.H., 25' R.H.; with brakes, 23' L.H., 22' R.H.

Comment: Easy to steer under load, sensitive to steering wheel.

(7) Centre of Gravity, with tractor in standard weight less water ballast and driver.—4½" above, 2' 2" forward of rear axle.

(8) Driver's Accommodation.—Access to seat, from back of tractor. Foot-room and support, adequate. Comfort, seat flexibly sprung, adjustable fore and aft. Accessibility to controls, clutch and brake pedals 23½" apart, centre to centre, pedal treads approximately 4" below loaded seat. Parking brake latch under right heel awkward to apply. Handling of gear lever in low gear conflicts with left leg.
6. BRIEF SPECIFICATIONS: International Super AWD—6
(Based on Information Supplied by Manufacturers)

(1) Engine—No. AD264 2636. (I.H.C., Australia.)

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

Bore, 4"; stroke, 5½"; compression ratio, 16.7 : 1.

Rated speeds: Belt work, 1,450 r.p.m.;

drawbar work, 1,450 r.p.m.

Fuel type: Distillate.

Fuel system: C.A.V. pump and injectors Filter, water traps and replaceable element. Tank capacity, 17½ gallons.

Air Cleaner: Oil bath.

Governor: C.A.V. centrifugal.

Electrical system: 12-volt battery and generator.

Starting: Electric, Bosch glowplugs.

Cooling: Pressurised water, fan, pump and thermostat, no radiator shutters.

Exhaust: Straight-through type; I.H.C. spark arrester usually fitted.

Lubrication: Oil pump and by-pass filter.

(2) Chassis—

4-wheel; pneumatic tyres.

Wheel base 76½".

Track width: Front 47"; rear 55"; adjustable.

Tyre sizes: Front 7.50 x 16; rear 14 x 30.

Steering Gear: Worm and gear.

Weight: Maximum weight, 8,440 lb. (see "Other Observations," section 5).

(3) Belt Pulley—

Optional; right side, clockwise rotation.

Diameter 11"; face width 7¼".

Speed (at rated engine speed), 899 r.p.m.

Belt speed (at rated engine speed), 2,590 ft./min., not in accordance with overseas standards (namely, 3,100 ± 100 f.p.m.). Using 13" diameter pulley should give belt speed approximately 3,060 f.p.m.

(4) Power Take-off—

Optional; guarded; location, centre rear.

Speed: 537 r.p.m., in accordance with overseas standards (namely, 536 ± 10 r.p.m.).

Dimensions: 6 spline, 1⅝" diameter.

(5) Drawbar—Swinging.—

Height, as tested 16", adjustable 8½" to 18".

(6) Transmission—Conventional gears.

Clutch: Single dry plate; 12" dia; pedal control.

Gear ratios and road speeds (assuming no wheel slip) on 14 x 30 tyres, at rated engine speed, as advertised:

<table>
<thead>
<tr>
<th>Gear.</th>
<th>Forward.</th>
<th>Reverse.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Ratio</td>
<td>139.6 64.8 49.9 41.2 14.8</td>
<td>106.5</td>
</tr>
<tr>
<td>Speed, m.p.h.</td>
<td>1.7 3.7 4.8 5.6 16.1</td>
<td>2.3</td>
</tr>
</tbody>
</table>

(7) Hydraulics—Optional, not fitted.

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

(9) Spark Arrester.—Standard but not fitted. Muffler fitted for test.
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