Australian tractor tests : no. 30

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W. F. Baillie

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REPORT ON TEST No. 30
(Farmers' Edition)
McCORMICK INTERNATIONAL
-SUPER AWD-7 (DIESEL)
(Tested for the International Harvester Co. of Australia, Geelong)

This Report is taken from the full Technical Report No. 30 of this test; test results are shown here in briefer form; fuller explanations are added. Values quoted may be rounded out to two instead of three significant figures; to this extent the values 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 it may be seen at, and copies of this farmers' report may be had from 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 horse-power (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 Settings.—The engine of this tractor has only one fuel setting, sealed, at which all the tests were carried out.

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.
(3) **Governor Control.**—The engine was under the control of the governor set to give full throttle, and so maximum power at rated engine speed.

(4) **Fuel.**—Distillate, Diesel Index 67, Specific Gravity 0.82; weight per Imperial gallon 8.17 lb.

(5) **Specification.**—Engine No. AD264 5265. For a brief specification of this tractor see Section 6 at the end of this report.

### 2. SUMMARY OF POWER OUTPUT

#### Table A

<table>
<thead>
<tr>
<th>Tit.</th>
<th>At the Belt</th>
<th>At the Drawbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated engine speed, r.p.m.</td>
<td>1,450</td>
<td>1,450</td>
</tr>
<tr>
<td>Corrected maximum power (a)</td>
<td>48-8</td>
<td>44-6</td>
</tr>
<tr>
<td>Rated power (b)</td>
<td>41½ (b1)</td>
<td>33½ (b2)</td>
</tr>
</tbody>
</table>

(a) Corrected maximum b.h.p. is calculated by a suitable formula from observed maximum b.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:—

(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 horse-power, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

#### Table B—Belt Test Results

<table>
<thead>
<tr>
<th>Gear</th>
<th>B.H.P.</th>
<th>Engine Speed</th>
<th>Fuel Gall./hr. (c)</th>
<th>lb./b.h.p./hr. (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.050 r.p.m.</td>
<td>48-8</td>
<td>1,450</td>
<td>2-68</td>
<td>0-45</td>
</tr>
<tr>
<td>2. Observed maximum b.h.p. at rated speed</td>
<td>48-8</td>
<td>1,450</td>
<td>2-68</td>
<td>0-45</td>
</tr>
<tr>
<td>4. Corrected maximum b.h.p. at rated speed (a)</td>
<td>48-8</td>
<td>No correction made for diesel engines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Calculated rated load (b1)</td>
<td>41½</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Test at approximately rated load</td>
<td>41-½</td>
<td>1,515</td>
<td>2-22</td>
<td>0-46</td>
</tr>
<tr>
<td>7. Average loading under governor (e)</td>
<td>25</td>
<td>1,530</td>
<td>1-8</td>
<td>0-58</td>
</tr>
<tr>
<td>8. Equivalent engine torque at full throttle</td>
<td>177 ft. lb. at maximum power and rated speed</td>
<td>187 ft. lb. (maximum) at 1,050 r.p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Repeat of (8) above after 55 hours</td>
<td>No significant change</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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 (2,480 lb. front, 6,060 lb. rear; total 8,540 lb.), working in the gears named in the tables. Height of drawbar 15 inches.

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

#### Table C—Maximum Power, Rated (3rd)

<table>
<thead>
<tr>
<th>Gear</th>
<th>1,450 r.p.m.</th>
<th>DBHP</th>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>Wheel Slip %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rated engine speed</td>
<td>DBHP</td>
<td>Pull lb.</td>
<td>Speed m.p.h.</td>
<td>Wheel Slip %</td>
<td></td>
</tr>
<tr>
<td>2. Observed maximum d.b.h.p. at rated engine speed</td>
<td>44-6</td>
<td>3,980</td>
<td>4-21</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>3. Corrected maximum d.b.h.p. at rated engine speed (a)</td>
<td>44-6</td>
<td>33½</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Calculated rated load (b2)</td>
<td>No correction made for diesel engines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(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).

#### 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>20</td>
<td>5,000</td>
<td>1-5</td>
<td>14</td>
</tr>
<tr>
<td>2. -</td>
<td>42</td>
<td>5,175</td>
<td>3-0</td>
<td>14</td>
</tr>
<tr>
<td>3. -</td>
<td>44½</td>
<td>3,980</td>
<td>4-2</td>
<td>9</td>
</tr>
<tr>
<td>4. -</td>
<td>33½</td>
<td>3,980</td>
<td>4-2</td>
<td>7</td>
</tr>
<tr>
<td>5. -</td>
<td>Road speed not tested</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) These are not the maximum pulls available in the gears (i.e. not the maximum sustained pulls), but the pull's at maximum d.b. power, i.e., at full-throttle at rated engine speed.
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.h.p.</th>
<th>Slip %</th>
<th>Gall./ hr.</th>
<th>lb. / d.b.h.p. hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,600</td>
<td>4-78</td>
<td>20</td>
<td>46</td>
<td>3</td>
<td>1-5</td>
<td>0-61</td>
</tr>
<tr>
<td>2,200</td>
<td>4-66</td>
<td>27</td>
<td>61</td>
<td>4</td>
<td>1-9</td>
<td>0-56</td>
</tr>
<tr>
<td>2,750†</td>
<td>4-61</td>
<td>34†</td>
<td>76†</td>
<td>5</td>
<td>2-1</td>
<td>0-50</td>
</tr>
<tr>
<td>3,200</td>
<td>4-54</td>
<td>39</td>
<td>87</td>
<td>6</td>
<td>2-2</td>
<td>0-47</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 a 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 horsepower 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.—After twelve hours running-in, a ball race in the belt pulley attachment failed. A new belt pulley attachment was fitted after the gearbox had been drained and flushed out to remove metal particles from the failed bearing.

(3) Engine—


(4) Tractor Weights (lb.).

<table>
<thead>
<tr>
<th>Weight Condition</th>
<th>Front</th>
<th>Rear</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum, unballasted</td>
<td>2,360</td>
<td>4,200</td>
<td>6,560</td>
</tr>
<tr>
<td>Added weights</td>
<td>80</td>
<td>280</td>
<td>360</td>
</tr>
<tr>
<td>As usually sold</td>
<td>2,400</td>
<td>4,480</td>
<td>6,880</td>
</tr>
<tr>
<td>Water Ballast</td>
<td>1,020</td>
<td>1,020</td>
<td></td>
</tr>
<tr>
<td>Standard weight</td>
<td>2,400</td>
<td>5,500</td>
<td>7,900</td>
</tr>
<tr>
<td>Added weights</td>
<td>560</td>
<td>560</td>
<td></td>
</tr>
<tr>
<td>Water ballast</td>
<td>120</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Maximum weight, heaviest recommended</td>
<td>2,480</td>
<td>6,060</td>
<td>8,540</td>
</tr>
</tbody>
</table>

* This weight, including 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 54 in., rear 61 in. Wheel base 75 in. Turning circles: Without brakes, 31 ft. 4 in. L.H., 31 ft. 4 in. R.H.; with brakes, 22 ft. L.H., 22 ft. R.H.

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

(7) Centre of Gravity, with tractor in standard weight—1 in. above, 22½ in. 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 24 in. apart, centre to centre, pedal treads approximately 6 in. below loaded seat. Parking brake latch—it is easy for this to be inadvertently released.

(9) Instruments.—All clearly visible, markings adequate. Indications were consistent throughout tests.

(10) Inspection of Engine and Transmission after Test.—After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(11) Instruction Books.—Instructions for starting, running, and maintenance were satisfactory.

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

6.—BRIEF SPECIFICATIONS

International Super AWD—7

(Based on Information Supplied by Manufacturers)

(1) Engine—No. AD264 5265. (I.H.C., Australia.)

4-stroke; 4 cylinders, vertical; crank-shaft along tractor.

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

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

Fuel type: Distillate.


(2) Chassis—
4-wheel; pneumatic tyres.
Wheel base 75 in.
Track width: Front 54 in.; rear 61 in.
Tyre sizes: Front 7.50 x 16; rear 14 x 30.
Steering: Worm and gear, hydraulic. Weight: Maximum, 8,540 lb. (see “Other Observations,” section 5).

(3) Belt Pulley—
Optional; right side, clockwise rotation.
Diameter 11 in.; face width 7½ in.
Speed (at rated engine speed), 898 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 in. diameter pulley should give belt speed approximately 3,060 f.p.m.

(4) Power Take-off—
Optional; guarded; location, centre rear; anti-clockwise.
Speed: 537 r.p.m., in accordance with overseas standards (namely, 536 ± 10 r.p.m.).
Dimensions: 6 spline, 1¾ in. diameter.

(5) Drawbar—Swinging—
Heights, as tested, 15 in., adjustable 12 in. to 20 in.

(6) Transmission—Conventional gears.
Clutch: Single dry plate; 12 in. diameter; pedal control.
Gear ratios and roads speeds (assuming no wheel slip) on 14 x 30 tyres, at rated engine speed, as advertised:

<table>
<thead>
<tr>
<th>Gear</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Reverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio</td>
<td>130.6</td>
<td>64.8</td>
<td>49.9</td>
<td>41.2</td>
<td>14.8</td>
<td>106.5</td>
</tr>
<tr>
<td>Speed, m.p.h.</td>
<td>1.7</td>
<td>3.6</td>
<td>4.6</td>
<td>5.6</td>
<td>15.6</td>
<td>2.2</td>
</tr>
</tbody>
</table>

(7) Hydraulic—Optional, not fitted.

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

ERADICATING ZAMIA PALMS

Mr. J. Thompson, Mt. Helena writes: "The notes on zamia palm poisoning of cattle in the February issue prompted me to pass on this hint to new farmers who may not be familiar with methods of destroying the palms.

"During late spring and early summer, work over the paddock in strips or sections and treat the palms with kerosene. I use a 2 oz. round fine-cut tobacco tin as a measure. Pull out the centre leaf and pour about half a tinfoil of kerosene into the heart of the plant, then lay the detached leaf across the palm as an indication that it has been treated.

"Cattle will usually steer clear of the kerosene-treated palms and the plants soon die. Where the leaves are firmly attached and do not pull out easily, apply the kerosene to the centre of the palm and then repeat the treatment at a later date when the leaves loosen."

(The kerosene treatment is the standard control method advocated by the Department. The use of a "spear" or metal spike thrust into the heart of the palm to speed up penetration of the kerosene was recommended at one time, but in later years, good results were obtained simply by pouring the kerosene into the crown of the plant. Pulling out a leaf would probably be still more effective—Ed.).
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