Australian tractor tests : International A554D : report on test no. 36 (farmers' edition)

G H. Vasey

Follow this and additional works at: http://researchlibrary.agric.wa.gov.au/journal_agriculture4

Recommended Citation

This article is brought to you for free and open access by Research Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 4 by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au.
IMPORTANT DISCLAIMER

This document has been obtained from DAFWA's research library website (researchlibrary.agric.wa.gov.au) which hosts DAFWA's archival research publications. Although reasonable care was taken to make the information in the document accurate at the time it was first published, DAFWA does not make any representations or warranties about its accuracy, reliability, currency, completeness or suitability for any particular purpose. It may be out of date, inaccurate or misleading or conflict with current laws, policies or practices. DAFWA has not reviewed or revised the information before making the document available from its research library website. Before using the information, you should carefully evaluate its accuracy, currency, completeness and relevance for your purposes. We recommend you also search for more recent information on DAFWA's research library website, DAFWA's main website (https://www.agric.wa.gov.au) and other appropriate websites and sources.

Information in, or referred to in, documents on DAFWA's research library website is not tailored to the circumstances of individual farms, people or businesses, and does not constitute legal, business, scientific, agricultural or farm management advice. We recommend before making any significant decisions, you obtain advice from appropriate professionals who have taken into account your individual circumstances and objectives.

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia and their employees and agents (collectively and individually referred to below as DAFWA) accept no liability whatsoever, by reason of negligence or otherwise, arising from any use or release of information in, or referred to in, this document, or any error, inaccuracy or omission in the information.
AUSTRALIAN TRACTOR TESTS

INTERNATIONAL A554D

REPORT ON TEST No. 36 (FARMERS' EDITION)

TESTED FOR INTERNATIONAL HARVESTER COMPANY OF AUSTRALIA PTY. LTD.

THIS Report is taken from the full Technical Report No. 36; 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. Some values are taken from graphs shown in the Technical Report, which 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

Note: The tests are now carried out under a procedure in which the main tests of engine performance are done directly on the engine itself (removed from the tractor for the purpose), and not through the belt pulley.

The belt outlet has been abandoned as the main test at several overseas testing stations in favour of tests on the engine itself (Germany) or on the pto (Nebraska and British Standard tests).

After running-in, three types of tests were carried out, in order to measure the performance of the engine, as directly measured by the power in the engine crankshaft (shaft horse-power, shp), the performance of the power outlets, measured on the pto and belt pulley at their proper speeds, and the performance of the tractor as a whole, as measured by drawbar pull, tractor speed, wheel slip, and drawbar horse-power (dbhp), with the tractor running on a bitumen test track.

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

2. SUMMARY OF POWER OUTPUT

Table A (See note (a) below)

<table>
<thead>
<tr>
<th>Engine</th>
<th>P.T.O.</th>
<th>Belt Pulley</th>
<th>Drawbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>C'shaft</td>
<td>56-9</td>
<td>54-0</td>
<td>51-7</td>
</tr>
</tbody>
</table>

Rated Speed—1,800 rpm.

Fast Idling Speed required to give full power at rated engine speed—1,920 rpm.

Crankshaft Torque—at rated speed, 166 lb ft; maximum 189 lb ft at 1,100 rpm.

Best Economy—0.44 lb/shp-hr at 85% load at about 1,200 rpm.

(a) Observed values, no atmospheric corrections applied to diesel engines.

(b) Engine speed required to give British Standard pto speed of 540 rpm.

(c) See note in section 7 (3).

3. DRAWBAR TESTS

(1) The following Tables B. C. and D, show the drawbar performance of the tractor, on the bitumen test track, on rear tyres 18.4 x 30, carrying maximum weight (2,530 lb. front, 7,290 lb. rear; total 9,820 lb.), working in the gears named in the tables. Height of drawbar 20 inches.

Drawbar tests, using unballedast weight of tractor (6,920 lb.), were carried out, but are not reported here.

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

<table>
<thead>
<tr>
<th>Rated engine speed, 1,800 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>Observed maximum dbhp at rated engine speed</td>
<td>50-8</td>
<td>4,140</td>
<td>4-6</td>
<td>5</td>
</tr>
</tbody>
</table>

Table C.—Pull at Maximum d.b.h.p.

<table>
<thead>
<tr>
<th>Gear</th>
<th>DBHP</th>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>Wheel Slip %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45</td>
<td>7,610</td>
<td>2-23</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>5,350</td>
<td>3-46</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>4,140</td>
<td>4-50</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>51</td>
<td>3,410</td>
<td>5-64</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Road gear, not tested</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Pull lb.</th>
<th>Percent. of full load</th>
<th>Speed m.p.h.</th>
<th>DBHP</th>
<th>Slip %</th>
<th>Fuel Gal./hr.</th>
<th>lb./dbhp hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,690</td>
<td>40</td>
<td>5-05</td>
<td>23</td>
<td>1</td>
<td>1-0</td>
<td>0.70</td>
</tr>
<tr>
<td>2,470</td>
<td>60</td>
<td>4-92</td>
<td>32</td>
<td>2</td>
<td>2-4</td>
<td>0.60</td>
</tr>
<tr>
<td>3,080</td>
<td>75</td>
<td>4-84</td>
<td>40</td>
<td>3</td>
<td>2-7</td>
<td>0.56</td>
</tr>
<tr>
<td>3,740</td>
<td>90</td>
<td>4-74</td>
<td>47</td>
<td>4</td>
<td>3-1</td>
<td>0.54</td>
</tr>
</tbody>
</table>

(d) DBHP is the product of pull (lb.) and speed (mph) divided by 375.

(e) 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 differences 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).

(f) These are not the maximum pulls available in the gears (i.e., not the maximum sustained pulls), but the pulls at maximum db power, i.e., at full engine power at rated engine speed.

(2) Tractor Weights (lb.)

<table>
<thead>
<tr>
<th>Weight Condition</th>
<th>Front</th>
<th>Rear</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (h)</td>
<td>2,380</td>
<td>4,900</td>
<td>7,280</td>
</tr>
<tr>
<td>Includes—</td>
<td>2,530</td>
<td>7,290</td>
<td>9,820</td>
</tr>
<tr>
<td>Water ballast (lb./wheel)</td>
<td>75</td>
<td>715</td>
<td>790</td>
</tr>
<tr>
<td>Solid ballast (lb./wheel)</td>
<td>40</td>
<td>630</td>
<td>660</td>
</tr>
</tbody>
</table>

(h) Weight as usually sold.

(1) Weight of tractor in drawbar tests quoted in this report.

3. Wheels and Tyres

<table>
<thead>
<tr>
<th>Tyres</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>7-50 x 16, 6-ply</td>
<td>Open centre bar tread</td>
</tr>
<tr>
<td>Size</td>
<td>18-4 x 30, 6-ply</td>
<td>18-4 x 30, 6-ply</td>
</tr>
<tr>
<td>Pressure</td>
<td>36 p.s.i.</td>
<td>36 p.s.i.</td>
</tr>
</tbody>
</table>

4. THE TEST TRACTOR

(1) The test tractor was chosen at random from the current run of production by a representative of the Victorian
Wheat and Woolgrowers Association. The tractor was run-in for 12 hrs. at the testing station.

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

(3) Governor Control.—The engine was under the control of the governor set to give full power at rated engine speed. (See Section 2 above, fast idling speed).

(4) Fuel.—Distillate, Diesel Index 66, Specific Gravity 0.82; weight per Imperial gallon 8.20 lb.

(5) Specification.—Engine No. AD264-12252. See also Section 7.

5. OTHER OBSERVATIONS

(1) Duration of Test.—65 hours, including running-in.

(2) Repairs and Adjustments.—As part of preliminary running and adjustment was made on the “torque control” setting of the fuel pump.

(3) Engine.—Fuel pump setting checked with specified limits.

Radiator water used—none.

Lubricating oil—S.A.E., 30.

Weight to engine, 19.8 lb.;

Weight from engine after tests, 13.8 lb.

(4) Steering.—With track widths, front 54”, rear 641/2”, wheel base 761/2”:

Turning circles: Without brakes, 29’ 0” L.H., 28’ 7” R.H.; with brakes, 22’ 9” L.H., 23’ 9” R.H.

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

(5) Centre of Gravity, with tractor in standard weight condition but not including driver, 41/2” above and 251/2” forward of rear axle.

(6) Driver’s Accommodation.—Access to seat, from rear, either side. With seat in most forward position steering wheel impedes access to seat. Footroom and support: flat top of transmission housing, foot plates either side; rear platform for stand-up working. Seat: permanently upholstered dish seat with fixed back rest, mounted on arm pivoted forward, and suspended on coil spring and damper. Seat can be tilted to alternative higher riding position or folded back for weather protection. Whole assembly can be set central or 15° to left or right. Accessibility to controls: all controls readily accessible. Pedals 25” apart and 6” below loaded seat. Reach for operation of pedals may be difficult for short people.

Noise: sound pressure level measured at the driver’s head in open field (tractor fitted with prototype spark arrester/muffler now declared to be standard fitting)—

at full power, rated speed—102 units;

at fast idling speed—98 units.

The special unit is the decibel (db) of pressure compared with a base level of virtual silence. The levels quoted above are typical of tractors, which generally are noisy by accepted industrial standards.

(7) Instruments.—Indications were consistent throughout tests.

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

(9) Instruction Books.—Adequate.

6. INTERPRETATION OF TESTS

(1) Power at Outlets (pto and Belt)

Pto and belt outlets should run at their recommended speeds, which in this instance substantially conform to international standards. The figures shown in Table A represent the powers available at those speeds. (See also section 7 (3).)

(2) Fuel Consumption

Fuel consumption in gals./hour, though a simple unit often quoted has little meaning unless the corresponding power output is also quoted. Specific fuel consumption (lb./hp-hr), the weight of fuel consumed per unit of energy developed, is a
better guide. The unit of energy here is the hp-hr (similar to the electrical unit, the kilowatt-hr). When specific fuel consumption is least, the engine is giving its best economy or efficiency.

Gallons per/hr may be changed to lb/hp-hr as follows (referring to table A above):

\[ 3.2 \text{ gals/hr while developing } 56.9 \text{ hp means } 3.2 \div 56.9 \text{ gals/shp/hr}=0.056 \text{ gal./shp/hr}. \]

\[ 0.056 \text{ gall./shp/hr} \times 8.20 \text{ lb/gallon for this fuel}=0.46 \text{ lb/shp/hr}, \text{ as shown.} \]

(3) **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.

7. **BRIEF SPECIFICATIONS**

**International A554 D**

*(Based on Information Supplied by Manufacturers)*

(1) **Engine**—No. AD264-12252.

4-stroke; 4 cylinders, vertical; crankshaft along tractor; indirect injection diesel.

Bore, 4"; stroke 5\(\frac{1}{4}\)"; compression ratio, 16.7 : 1.

Rated speed: 1,800 rpm.

Fuel type: Distillate.

Fuel system: C.A.V. 4-cyl. in-line pump, single hole pintle type injectors. IHC replaceable-element full flow filter. Tank capacity, 17\(\frac{1}{2}\) gallons.

Air Cleaner: Oil bath, centrifugal pre-cleaner.

Governor: Mechanical, centrifugal, incorporated in fuel pump.

Electrical system: 12-volt battery and generator.

Starting: Electric, glow plugs in pre-combustion chambers.

Cooling: Water (pressure system), 6-blade fan, pump, and thermostat.

Exhaust: Vertical, ahead of operator, effluent upwards.

Lubrication: Oil pump, sump gauze filter, external full flow replaceable element by-pass filter.

(2) **Chassis**—

4-wheel; pneumatic tyres. Wheelbase 76\(\frac{3}{4}\)".

Track widths: Front 54"; rear 64\(\frac{1}{4}\)".

Tyre sizes: Front 7.50 x 16; rear 18.4 x 30.

Steering: Power assisted, worm drive.

Weight: Maximum, 9,820 lb.

(See Section 3 (2) above).

(3) **Belt Pulley**—

Right hand side, forward working.

Diameter 11"; face width 7\(\frac{1}{4}\)".

Speed (at 1,800 rpm engine speed), 1,115 rpm.

Belt speed at 1,800 rpm engine speed is 3,212 ft./min.; this differs slightly from overseas standards (namely, 3,100±100 fpm). Belt speed would be 3,100 fpm at 1,740 rpm.

(4) **Power Take-Off**—

Centre rear; anti-clockwise; 29\(\frac{1}{4}\)" above ground; guarded.

Speed: at 1,800 rpm engine speed, 543 rpm, in accordance with overseas standards (namely, 536 ± 10 rpm).

Dimensions: 6 spline, 1\(\frac{3}{4}\)" diameter.

Independent drive, hand operated over-centre clutch.

(5) **Drawbar**—Swinging—9 positions across.

Height, as tested, 20". adjustable, 16", 18", 20". Removal of swinging drawbar leaves fixed drawbar.
(6) **Transmission**—Conventional gears.
   Clutch: 12" single dry plate.
   Gear ratios and road speeds (assuming no wheel slip) on 18.4 x 30 tyres, at rated engine speed, as advertised (see table).

(7) **Hydraulics**—Optional, not fitted.

(8) **Three-point Linkage**—Optional, not fitted. Conforms to BS 1841-1951, Category 2.

<table>
<thead>
<tr>
<th>Gear Ratio*</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Reverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed m.p.h.</td>
<td>114.7</td>
<td>80.5</td>
<td>61.9</td>
<td>51.1</td>
<td>18.3</td>
<td>63.3</td>
</tr>
<tr>
<td>Speed m.p.h.</td>
<td>2.6</td>
<td>3.7</td>
<td>4.8</td>
<td>5.8</td>
<td>16.1</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* Includes Differential 3.27, Final drive 5.62.

University of Melbourne
December 1961
G. H. VASEY,
Officer in Charge Tractor Testing.
W. F. BAILLIE,
Tractor Testing Officer,

---

**LIFTING JACKS FOR EVERY PURPOSE**

by

TREWHELLA
Bros. Pty. Ltd.
TRENTHAM, VICTORIA

6 Tons Capacity Rack and Pinion Jack.
35 Tons Capacity Ball Bearing Screw Jack (Short Lift), also Other Types and Sizes.
30 Tons Capacity Ball Bearing Screw Jack. 15 inch Rise

Available from

McLean Bros. & Rigg
McPhersons Ltd.
Harris Scarfe & Sandovers Ltd.
J. & W. Bateman Ltd.
Co-operative Wholesale Services Ltd.

Journal of Agriculture Vol 3 No 9, 1962
DALGETY - N.Z.L.

are W.A. DISTRIBUTORS for

Sunbeam

MACHINERY

and therefore offer you without obligation the services of a specialised representative to call on your property to discuss the trade-in value of your plants

For your—

OVERHEAD SHEARING GEAR
ELECTRIC SHEARING GEAR
"ROUNDABOUT" SHEEP-SHOWERS
"RACE TYPE" SHEEP-SHOWERS
GRINDERS
ENGINES
WOOLPRESSES, etc.,
and
ALL SHEARING SUNDRIES

contact our Branches or Agents

DALGETY - N.Z.L.

Please mention the "Journal of Agriculture of W.A." when writing to advertisers