Australian tractor test report no. 52 : Chamberlain champion 306

G H. Vasey

W. F. Baillie

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THE Chamberlain Champion 306 is a general purpose farm tractor of 57 drawbar horsepower. With 68 h.p. at the P.T.O. at rated engine speed it comes within Class 6 of the Australian Standard Classification of Wheeled Tractors for Agricultural Purposes, A.S. D-10:1967. It is equipped with 18.4 x 30 pneumatic tyres. It has a three-speed gear box with High, Intermediate, and Low ratio changes giving 9 forward and 3 reverse speeds.

The tractor is designed primarily for drawbar working, although a Category 2 three-point linkage may be fitted as an optional extra.

The tractor has a Perkins 6-cylinder 4-stroke, direct injection diesel engine of 306 cubic inches capacity, rated speed 2,000 r.p.m. The recommended fuel is distillate. The manufacturer's advertised value for power output of 70 shaft h.p. at rated speed refers to a fully equipped engine.

Further details, including an abstract of the manufacturer's specifications, are contained in the full Technical Report from which this abridgement has been made.

The test tractor

The test tractor was chosen at random from stock at Chamberlain's Welshpool, W.A. manufacturing plant by a representative of the W.A. Director of Agriculture. It was run-in at the Testing Station for 12 hours. Full power was measured in a 2-hour test after running in; a check test after a further 30 hours of test running showed no significant change in output. As will be seen from the Performance Summary the test value of full power output confirmed the manufacturer's expectations, especially as the hydraulic pump was inadvertently in operation.

Fuel pump calibration was set within specified limits; governor setting, 2,200 r.p.m. was as specified by the manufacturer. Fuel used was "Shell Diesoline" weighing 8.34 lb. per gallon.

Tractor identification numbers were:
No water was added during the tests. Oil consumption for the 35 hours of test running was approximately 3 pints. The p.t.o. clutch slipped under full load during the belt tests; this was adjusted. The engine and the transmission were partly dismantled after the test, and found to be in satisfactory condition.

Drawbar tests were done with the tractor ballasted to the maximum recommended by the Company for normal agricultural drawbar work. Total weight, including the driver was 9,850 lb. (front axle, 2,560 lb.; rear axle 7,290 lb.). This weight included no ballast on the front (7.50 x 18) wheels, but 75 per cent. water ballast in the rear (18.4 x 30) tyres, and solid ballast of 880 lb. comprising 4 x 110 lb. weights per rear wheel.

Drawbar height was 18 in. The tests were done on a level tarmac road.

Further information on the effect on performance of varying drawbar height, weight, wheel equipment, road surface and other questions of the interpretation of tractor test data may be obtained from the Tractor Testing Officers at the University of Melbourne.

Inspection report

Power Take-Off

The p.t.o. gives 540 r.p.m. at 1,600 r.p.m. engine speed not at rated engine speed of 2,000 r.p.m.; this is on the limit of 80 per cent. of rated speed specified in B.S. 1495 : 1964.

The p.t.o. is a standard 6-spline 1\(\frac{3}{4}\) in. dia. independent drive with guard and cover according to B.S. 1495 : 1964, located 1\(\frac{3}{4}\) in. right of centre, rear, 33 in. above the ground on 18.4 x 30 tyres. Control is by hand operated independent clutch; floor lever at driver's left hand.
Clearance around p.t.o. generally accords with B.S. 1495, but clearance to drawbar at maximum height is 5\(\frac{1}{2}\) in.; 8 in. is minimum recommended.

**Belt Pulley**

The belt pulley unit mounts on the P.T.O. for rearward working, in either direction of rotation at 1,188 r.p.m. at 1,600 r.p.m. engine speed. At this speed, speed of belt is 3,100 r.p.m. in accordance with B.S. 1495 : 1964. Pulley 10\(\frac{1}{2}\) in. dia. 6\(\frac{1}{2}\) in. face width. In practice, the power delivered through the belt would be limited to the capacity of the 6 in. belt employed; this limit was approached in the belt tests.

**Hydraulics, Three-Point Linkage**

A vane pump, 2\(\frac{1}{2}\) gallon reservoir, and control valve are mounted on the right hand side of the engine. This system gives 11.67 g.p.m. at 1,900 p.s.i. at 2,000 engine r.p.m. and supplies power for external hydraulic circuits, and the linkage if fitted.

A category 2 three-point linkage is optionally available.

**Drawbar**

A fixed drawbar mounting plate 23 in. above ground is provided with 15—\(\frac{1}{2}\) in. clearance holes. A swinging roller-mounted drawbar runs on this; 17 positions are available offsetting the drawbar pin 2.6 in., 5.2 in., 7.8 in., 10.3 in., 12.9 in., 15.4 in., 17.6 in., 20.1 in. either side of centre. Height is adjustable (17 in., by 6 steps, to 24\(\frac{1}{2}\) in., to centre of clevis) by refitting the clevis unit on the drawbar mast. Drawbar and clevis dimensions conform with B.S. 1495.

**Driver’s Accommodation**

There is good access to the seat from either side forward of the rear wheels with a footstep and handgrips on either side. The driver’s area has a full width platform.

The seat is a full width bench seat rigidly mounted on the tractor. It has a loose cushion and back rest upholstered with foam rubber. Fore-and-aft adjustment is 2 in. Stand-up working is possible.

All controls are conveniently placed and easily operated and conform generally to B.S. 1495 : 1964, except that the P.T.O. independent clutch lever moves forward to disengage not towards the operator; also, the STOP control returns to the RUN position, and the engine may be started in gear. Since the tests the manufacturer has advised that these last two matters are to be rectified in future production.

### Performance Summary

<table>
<thead>
<tr>
<th>Engine Crankshaft</th>
<th>P.T.O.</th>
<th>Belt Pulley</th>
<th>Drawbar (4th Gear)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer’s rating*</td>
<td>70</td>
<td>70†</td>
<td>58</td>
</tr>
<tr>
<td>Full power—h.p.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At engine speed—r.p.m.</td>
<td>2000</td>
<td>1600</td>
<td>1600</td>
</tr>
<tr>
<td>Fuel economy—lb./h.p.-hr</td>
<td>0.41</td>
<td>0.42</td>
<td>0.44</td>
</tr>
<tr>
<td>Fuel consumption—gal./hr</td>
<td>28.4</td>
<td>23.9</td>
<td>24.1</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
* From current advertising. † Includes hydraulic pump.

Full crankshaft torque—at rated speed, 184 ft. lb. at 1,000 r.p.m., 212 ft. lb. (max.).

Best economy—0.385 lb./shaft h.p.-hr. at 85 per cent. load, at about 1,000 r.p.m.

High idle speed—as specified, 2,200 r.p.m.

### Drawbar Performance

<table>
<thead>
<tr>
<th>Gear</th>
<th>At Maximum Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d.b.h.p.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1 (L. 1)</th>
<th>2 (L. 1)</th>
<th>3 (L. 2)</th>
<th>4 (L. 2)</th>
<th>5 (L. 3)</th>
<th>6 (L. 3)</th>
<th>7 (H. 1)</th>
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<tr>
<td></td>
<td>35</td>
<td>47</td>
<td>53*</td>
<td>57*</td>
<td>57*</td>
<td>58*</td>
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<td>6850</td>
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<td>4200</td>
<td>3050</td>
<td>2350</td>
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</tr>
<tr>
<td></td>
<td>1.8</td>
<td>2.2</td>
<td>2.9</td>
<td>4.3</td>
<td>5.1</td>
<td>7.1</td>
<td>9.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>15</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* These correspond with engine at full power rated speed.

### Fuel Consumption

<table>
<thead>
<tr>
<th>Pull (lb.)</th>
<th>Speed (m.p.h.)</th>
<th>d.b.h.p.</th>
<th>Slip (%)</th>
<th>Fuel Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>3300</td>
<td>4.7</td>
<td>29</td>
<td>2</td>
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<td>3000</td>
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<tr>
<td>4600</td>
<td>4.4</td>
<td>56</td>
<td>8</td>
<td>3.4</td>
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</tbody>
</table>

24
**Operating Features**

Turning circles (minimum outside diameters on a consolidated gravel surface) with track widths front 60 in. and rear 66 in. were: no brakes, 31 ft., with brakes, 25 ft. Ground clearance is 14 in. under the drawbar fitting; 18½ in. without drawbar fitted.

Centre of gravity is 3 in. above and 24 in. ahead of the rear axle for the tractor as tested in the maximum weight condition.

The tractor has a sprung front axle.

**Standard and Optional Features**

Standard equipment includes tachometer incorporating an hour meter, water temperature gauge, oil pressure gauge, ammeter; independent p.t.o.; lighting equipment; fixed and swinging drawbar.

Optional features fitted on the test tractor included the belt pulley unit and wheelweights. Other optional equipment includes power steering and three-point linkage.

**Users' Service**

A well selected kit of hand tools is supplied and were delivered with the test tractor; a well illustrated Operator's Handbook is supplied. Service is available throughout Australia from Chamberlain dealers and agencies.

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

W. F. BAILLIE,
Testing Officer.

University of Melbourne,
February, 1968.
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