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Australian tractor test report no. 55 : Nuffield 4/65

G H. Vasey
W. F. Baillie

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THE Nuffield 4/65 is a general purpose farm tractor of 49 drawbar horsepower. With 54 h.p. at the P.T.O. at rated engine speed it comes within Class 5 of the Australian Standard Classification of Wheeled Tractors for Agricultural Purposes, AS D10-1967. It is equipped with 18.4 x 30 pneumatic tyres. It has a five speed gear box with a High and Low ratio change giving 10 forward and 2 reverse speeds.

The tractor is designed primarily for drawbar work, but a three-point linkage is also supplied as standard equipment.

The tractor has a BMC 4-cylinder 4-stroke, direct injection diesel engine of 231 cubic inches capacity, rated speed 2,200 r.p.m. The recommended fuel is distillate. The manufacturer's advertised value for power output of 65 shaft h.p. at rated speed is based on a bare engine rating with allowances for fan and dynamo.

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

**The test tractor**

The test tractor was chosen at random from cased stock at B.M.C.'s N.S.W. assembly plant. It was run-in at the Testing Station for 12 hours. Full power was measured in a 2-hour test after a further 28 hours of running on other tests; a check test on the p.t.o. at the end of the test programme showed no significant change in output during 38 hours of test running. The optional power steering unit with which the test tractor was fitted was disconnected for the tests, but it should be noted that the p.t.o. control lever also engages the two hydraulic pumps for the three-point linkage and auxiliaries. It is difficult, nevertheless, to reconcile the test values of 61 shaft h.p. at rated speed (2,200 r.p.m.) for a fully equipped engine as installed in the tractor, or 50 p.t.o. h.p. at 1,800 engine r.p.m., as shown in the Performance Summary with the manufacturer's ratings of 65 engine h.p. and 53 p.t.o. h.p. respectively.

Fuel pump calibration was set within specified limits; governor setting 2,350, r.p.m. was as specified by the manufacturer. Fuel used was "Ampol Distillate" weighing 8.37 lb. per gallon.

Tractor identification numbers were: Serial No. 65N/300422/Z110822, Engine No. 38TD/1398/15001.

No water was added during the tests. Oil consumption for the 38 hours of test running was approximately 3½ pints. One of the front engine-mounting bolts was found to be broken after the run-in; both front mounting bolts were replaced. 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 9,740 lb. (front axle, 2,900 lb.; rear axle 6,840 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. Front chassis ballast of 528 lb. comprising 8 x 66 lb. weights was fitted.

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 surfaces 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 1,811 r.p.m. engine speed not at the engine rated speed of 2,200 r.p.m.; this is within 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 centre, rear, 31 in. above the ground on 18.4 x 30 tyres. Control is by independent clutch and hand lever at left of seat.

Clearance around p.t.o. generally accords with B.S. 1495, but clearance to drawbar in the higher settings is less than 8 in. minimum recommended.

Belt pulley

The belt pulley unit mounts on the p.t.o. for rearward working, in either direction of rotation at 1,278 r.p.m. at 2,200 r.p.m. rated engine speed. At this speed, speed of belt is 3,120 f.p.m. in accordance with B.S. 1495 : 1964. Pulley 9 in. dia. 6\(\frac{1}{2}\) in. face width.

Hydraulics, Three-point linkage

A double unit gear pump mounted in the rear axle housing supplies power for external hydraulic circuits, and the three-point linkage. The main lift and auxiliaries pump delivers 6\(\frac{1}{2}\) g.p.m. at 2,300-2,600 p.s.i. at 2,200 engine r.p.m.; the depth control pump gives 1\(\frac{1}{2}\) g.p.m. controlled flow at all speeds above 1,200 r.p.m.

The three-point linkage conforms with B.S. 1841 : 1951 for both Category 1 and 2 implements. “Depth” control and “position” control are provided. There is a mechanical lock to hold the linkage raised in the transport position.

Drawbar

A fixed drawbar mounting plate 18\(\frac{3}{4}\) in. above ground is provided, with 4—\(\frac{3}{4}\) in. clearance holes 2\(\frac{1}{2}\) in., 7\(\frac{1}{2}\) in. either side of centre. A roller mounted drawbar has 5 positions offsetting the drawbar pin 6\(\frac{1}{4}\) in. and 12\(\frac{3}{4}\) in. either side of centre. Height is adjustable by refitting the clevis assembly on the drawbar mast, 25\(\frac{1}{4}\) in., 24 in., 22\(\frac{1}{2}\) in., 19\(\frac{1}{2}\) in., 18 in., 16\(\frac{1}{2}\) in., to top of clevis.

Drawbar and clevis dimensions conform generally with B.S. 1495 : 1964, but the pin dia. 1\(\frac{3}{4}\) in. not the standard 1 in. Clearance between p.t.o. and top of drawbar clevis in highest position is 4\(\frac{3}{4}\) in.; 8 in. is recommended minimum.

Driver’s Accommodation

There is good access to the seat from either side forward of the rear wheels with

Performance summary

<table>
<thead>
<tr>
<th>Manufacturer’s rating*</th>
<th>PTO</th>
<th>Belt Pulley</th>
<th>Drawbar (5th (L3) gear)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full power—h.p.</td>
<td>65</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>At engine speed—r.p.m.</td>
<td>61</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>Fuel economy—lb./h.p.-h.r.</td>
<td>2,200</td>
<td>1,800</td>
<td>2,200</td>
</tr>
<tr>
<td>Fuel consumption—lb./hr.</td>
<td>0.47</td>
<td>0.47</td>
<td>0.53</td>
</tr>
<tr>
<td>—gal./hr.</td>
<td>28.3</td>
<td>23.4</td>
<td>27.5</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>2.8</td>
<td>3.3</td>
</tr>
</tbody>
</table>

* From current advertising.

Full crankshaft torque—at rated speed, 145 ft. lb. at 1250 r.p.m., 176 ft. (max.)

Best economy—0.39 lb./shaft h.p.-h.r. at 75% load, at about 1,400 r.p.m.

High idle speed—as specified, 2,350 r.p.m.

Drawbar performance

At Maximum Power

<table>
<thead>
<tr>
<th>Gear</th>
<th>dbhp</th>
<th>Engine (rpm)</th>
<th>Pull (lb.)</th>
<th>Speed (mph)</th>
<th>Slip (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (L1)</td>
<td>28</td>
<td>2340</td>
<td>7000</td>
<td>1.5</td>
<td>16</td>
</tr>
<tr>
<td>2 (H1)</td>
<td>35</td>
<td>2310</td>
<td>7000</td>
<td>1.9</td>
<td>14</td>
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<tr>
<td>3 (L2)</td>
<td>43</td>
<td>2280</td>
<td>7000</td>
<td>2.3</td>
<td>12</td>
</tr>
<tr>
<td>4 (H2)</td>
<td>47*</td>
<td>2200</td>
<td>5950</td>
<td>3.0</td>
<td>10</td>
</tr>
<tr>
<td>5 (L3)</td>
<td>49</td>
<td>2200</td>
<td>4750</td>
<td>3.7</td>
<td>9</td>
</tr>
<tr>
<td>6 (H3)</td>
<td>50*</td>
<td>2200</td>
<td>3700</td>
<td>5.0</td>
<td>4</td>
</tr>
<tr>
<td>7 (L4)</td>
<td>49</td>
<td>2200</td>
<td>3000</td>
<td>7.6</td>
<td>2</td>
</tr>
<tr>
<td>8 (H4)</td>
<td>49</td>
<td>2200</td>
<td>1900</td>
<td>9.4</td>
<td>2</td>
</tr>
<tr>
<td>9, 10 (5 L &amp; H)</td>
<td>Road gears, not tested</td>
<td></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>Gear</th>
<th>Pull (lb.)</th>
<th>Speed (mph)</th>
<th>dbhp</th>
<th>Slip (%)</th>
<th>Fuel Consumption gal/hr</th>
<th>lb./dbhp-hr</th>
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</thead>
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<tr>
<td>1</td>
<td>7900</td>
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<td>4</td>
<td>2.1</td>
<td>0.71</td>
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<td>7900</td>
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<td>5</td>
<td>2.4</td>
<td>0.62</td>
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<td>6</td>
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<td>8</td>
<td>3.1</td>
<td>0.56</td>
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<tr>
<td>5</td>
<td>6000</td>
<td>4.4</td>
<td>25</td>
<td>4</td>
<td>2.1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Journal of Agriculture, Vol 10 No 6, 1969
a footstep on either side. Flat footplates are provided either side of transmission housing.

The seat is a “Bostrom (U.K.)” pressed metal bucket seat with removeable sponge-rubber cushion and back rest. It is mounted on a parallel motion linkage with a torsion-bar spring adjustable to the driver’s weight. Fore-and-aft adjustment is 3 in.

All controls are conveniently placed and easily operated, and conform generally, to B.S. 1495 : 1964.

Operating Features

Turning circles (minimum outside diameters on a consolidated gravel surface) with track widths front 58½ in. and rear 61 in. were: no brakes 26 ft., with brakes 22 ft. Ground clearance is 13 in. under the drawbar mast; 18½ in. with swinging drawbar frame removed.

Centre of gravity is 7 in. above and 24 in. ahead of the rear axle for the tractor as tested in the maximum weight condition.

Standard and Optional Features

Standard equipment includes tachometer incorporating an hour meter and p.t.o. speed indications in all gears; water temperature and oil pressure gauges, volt meter and fuel gauge; lighting equipment; fixed and swinging drawbar, three-point linkage, independent p.t.o.

Optional features fitted on the test tractor included the optional power steering equipment, belt pulley unit, front chassis weight.

Users’ Service

The usual minimum kit of hand tools is supplied and a well illustrated Operator’s Manual, Service is available throughout Australia from B.M.C. Tractor dealers and agencies.

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

W. F. Baillie, Testing Officer.
University of Melbourne,
September, 1968.
"Grandpa, do Southern Cross really make all these pumps, and windmills, and diesel engines too?"

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