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Test 1136: David Brown 995 Diesel (Also Case 995 Diesel) 12-Speed

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1136 – DAVID BROWN 995 DIESEL

ALSO CASE 995 DIESEL

12 SPEED

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1100 rpm)								
58.77	2200	3.657	0.433	16.07	205	65	75	29.117
Standard Power Take-off Speed (1000 rpm)—One Hour								
55.33	2000	3.334	0.419	16.60	203	66	75	29.130
Standard Power Take-off Speed (540 rpm)—One Hour								
51.87	1828	3.094	0.415	16.76	205	66	76	29.130
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
51.68	2275	3.189	0.430	16.21	191	67	78	.....
0.00	2322	0.905	.....	.....	171	67	78	.....
25.89	2278	1.892	0.509	13.68	180	66	78	.....
59.00	2199	3.676	0.434	16.05	206	67	79	.....
13.07	2301	1.379	0.735	9.48	175	67	79	.....
38.45	2256	2.452	0.444	15.68	183	67	80	.....
Av 31.35	2272	2.249	0.499	13.94	184	67	78	29.120

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool- ing med	Air wet bulb	Air dry bulb	Barometer inches of Mercury
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VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—8th Gear (H-1)											
48.73	3357	5.44	2202	5.62	3.537	0.505	13.78	208	69	80	28.680
75% of Pull at Maximum Power—Ten Hours—8th Gear (H-1)											
39.45	2597	5.70	2265	4.07	2.901	0.512	13.60	192	75	87	28.674
50% of Pull at Maximum Power—Two Hours—8th Gear (H-1)											
27.15	1766	5.77	2266	2.87	2.190	0.561	12.40	182	77	89	28.870
50% of Pull at Reduced Engine Speed—Two Hours—10th Gear (L-3)											
26.83	1746	5.76	1575	2.71	1.777	0.461	15.10	189	80	94	28.825

MAXIMUM POWER WITH BALLAST

38.90	7317	1.99	2266	14.81	3rd Gear (HS-1)	187	70	77	28.910
46.42	6953	2.50	2202	13.93	4th Gear (L-1)	198	73	82	28.910
49.50	4151	4.47	2199	6.64	7th Gear (L-2)	195	69	75	28.920
50.42	3476	5.44	2199	5.52	8th Gear (H-1)	194	69	73	28.930
48.91	2966	6.18	2199	4.89	9th Gear (HS-3)	195	70	77	28.900
49.02	1989	9.24	2198	3.27	11th Gear (H-2)	201	74	84	28.900

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 8th Gear (H-1)

Pounds Pull	3476	3622	3739	3817	3760	3614
Horsepower	50.42	47.23	43.21	38.74	32.61	26.15
Crankshaft Speed rpm	2199	1981	1760	1547	1321	1100
Miles Per Hour	5.44	4.89	4.33	3.81	3.25	2.71
Slip of Drivers %	5.52	5.77	6.04	6.27	6.04	5.77

TRACTOR SOUND LEVEL (Without Cab)

	dB(A)
Maximum Available Power 2 Hours	97.0
75% of Pull at Max. Power 10 Hours	96.0
50% of Pull at Max. Power 2 Hours	95.5
50% of Pull at Reduced Engine Speed 2 Hours	92.5
Bystander 12th Gear (H-3)	85.5

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires		
Ballast	—No., size, ply & psi	Two 16.9-30;6;18
	—Liquid	940 lb each
	Cast Iron	900 lb each
Front Tires		
Ballast	—No., size, ply & psi	Two 7.50-16;6;28
	—Liquid	None
	Cast Iron	323 lb each
Height of drawbar	19 inches	19½ inches
Static weight with operator—rear	7040 lb	3360 lb
front	2435 lb	1790 lb
total	9475 lb	5150 lb

Department of Agricultural Engineering

Dates of Test: June 18 to 29, 1973

Manufacturer: DAVID BROWN TRACTORS LTD., Meltham, Huddersfield, Yorkshire, England

FUEL, OIL AND TIME Fuel No 2 Diesel Cetane 50.1 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8362 Weight per gallon 6.962 lb Oil SAE 20-20W API service classification (Case HDM oil) To motor 1.777 gal Drained from motor 1.490 gal Transmission lubricant SAE 20W-40 Final drive lubricant SAE 140 Total time engine was operated 48 hours.

ENGINE Make David Brown Diesel Type 4 cylinder vertical Serial No 455071 51780 Crankshaft Mounted lengthwise Rated rpm 2200 Bore and stroke 3.939" x 4.500" Compression Ratio 17 to 1 Displacement 219 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh with pleated paper precleaner Oil Filter full flow replaceable pleated paper element Fuel filter primary and secondary replaceable pleated paper elements Muffler vertical Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 995/6 982076 Tread width rear 56" to 76" front 52" to 72" Wheel base 82" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 29.5" Vertical distance above roadway 32" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph first 1.1 second 1.8 third 2.2 fourth 2.8 fifth 3.2 sixth 3.7 seventh 4.7 eighth 5.6 ninth 6.3 tenth 8.1 eleventh 9.3 twelfth 16.1 reverse 1.8, 3.6, 4.7, and 9.3 Clutch single plate dry disc operated by foot pedal in combination with PTO clutch operated by hand lever Brakes internal expanding shoe operated by hand lever or independently by two foot pedals Steering hydrostatic Turning radius (on concrete surface with brake applied) right 129" left 129" (on concrete surface without brake) right 142" left 142" Turning space diameter (on concrete surface with brake applied) right 266" left 266" (on concrete surface without brake) right 292" left 292" Power take-off 540 rpm at 1828 engine rpm or 1000 at 2000 engine rpm.

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. First and second gears were not run as it was necessary to limit the pull in third to avoid excessive wheel slippage. Fifth, sixth, tenth and twelfth gears were not run as test procedure requires only six travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1136.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ of the 85% torque; maximum power, $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effects of speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 4 different runs as follows: (1) as near to the pull at maximum power as

possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe limit for the test course. The manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Varying Drawbar Pull and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



DAVID BROWN 995 DIESEL