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Test 734: David Brown 850 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 734 - DAVID BROWN 850 DIESEL

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Cool- ing med	Degrees F Air wet bulb	Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
33.56	2000	2.160	0.451	15.54	205	56	75	28.948
Standard Power Take-off Speed (540 rpm)—One Hour								
28.24	1619	1.699	0.422	16.62	200	56	75	28.940
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
29.10	2041	1.862	0.448	15.63	184	56	75	.....
0.00	2164	0.556	.....	.....	144	55	74	.....
15.10	2114	1.155	0.536	13.07	160	55	74	.....
33.87	1998	2.165	0.448	15.64	198	55	74	.....
7.63	2140	0.843	0.775	9.05	154	55	74	.....
22.33	2087	1.464	0.459	15.25	165	55	74	.....
Av 18.01	2090	1.341	0.522	13.43	168	55	74	28.927

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	Temperature Cooling medium	Degrees F Air wet bulb	Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
30.93	2536	4.57	2004	7.57	2.268	0.514	13.64	159	43	44	28.880
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
24.53	1893	4.86	2080	5.32	1.797	0.514	13.65	148	29	31	29.019
50% of Pull at Maximum Power—Two Hours—3rd Gear											
17.55	1320	4.99	2101	3.83	1.410	0.563	12.45	136	37	39	28.713
MAXIMUM POWER WITH BALLAST											
22.11	4242	1.95	2079	14.78	1st Gear.....	.....	146	38	45	28.940	
31.14	3535	3.30	2008	10.09	2nd Gear.....	.....	150	33	34	29.055	
31.84	2592	4.61	2005	6.84	3rd Gear.....	.....	153	32	34	29.055	
31.90	1872	6.39	2009	4.91	4th Gear.....	.....	141	32	34	29.055	
31.67	1506	7.89	2006	3.91	5th Gear.....	.....	150	32	34	29.055	
MAXIMUM POWER WITHOUT BALLAST											
30.51	2559	4.47	2001	10.41	3rd Gear.....	.....	166	43	49	28.940	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull			2600	2650	2650	2650	2700	2650	.....	
Horsepower			31.8	29.0	26.1	22.6	19.4	16.3	.....	
Miles per hour			4.6	4.1	3.7	3.2	2.7	2.3	.....	

Department of Agricultural Engineering

Dates of Test: March 12 to March 26, 1960

Manufacturer: DAVID BROWN INDUSTRIES, LTD.,
MELTHAM, HUDDERSFIELD, YORKSHIRE,
ENGLAND

Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel No. 2 Diesel Cetane No 50 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8419 Weight per gallon 7.010 lb Oil SAE 20-20W API Service classification MM, MS, DG To motor 2.871 gal Drained from motor 2,659 gal Transmission and final-drive lubricant SAE 50 Type gear oil Total time engine was operated 47 hours.

ENGINE Make David Brown Diesel Type 4 cylinder vertical Serial No AD4-36A-106 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3½" x 4" Compression ratio 17 to 1 Displacement 154 cu in Cranking system 12 volt (two 6 volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter replaceable paper element Fuel filter 2 replaceable plastic impregnated paper elements Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 2A-850L-300001 Tread width rear 52" to 76" front 52" to 76" Wheel base 75¼" 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 28" Vertical distance above roadway 27" 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 2.17 second 3.60 third 4.86 fourth 6.58 fifth 8.06 sixth 14.7 reverse 3.58 and 8.00 Clutch single plate dry disc operated by foot pedal Brakes internal expanding shoe operated by hand lever or independently by two foot pedals which may be locked together Steering no power assistance Turning radius (on concrete surface with brake applied) right 118" left 118" (on concrete surface without brake) right 139" left 139" Turning space diameter (on concrete surface with brake applied) right 242" left 242" (on concrete surface without brake) right 285" left 285" Belt pulley 1415 rpm at 1950 engine rpm Belt speed 3150 fpm diam 8½" face 5¼" Power take-off 540 rpm at 1629 engine rpm.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

This tractor is equipped with a foot operated differential lock. It was not used during the test.

Sixth gear was not run because of the fast travel speed.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 734.

L. F. LARSEN
Engineer-in-Charge

TIRES, BALLAST and WEIGHT

Rear tires No, Size, Ply & psi
Ballast —Liquid

Front tires No, Size, Ply & psi
Ballast —Liquid
Cast iron

Height of drawbar

Static weight —Rear

Front

Total weight with operator

With Ballast

Two 11-28;4;14

309 lb each

450 lb each

Two 5.50-16;4;32

None

89 lb each

20 inches

4011 lb

1688 lb

5874 lb

Without Ballast

Two 11-28;4;12

None

None

Two 5.50-16;4;32

None

None

20½ inches

2494 lb

1510 lb

4179 lb

L. W. HURLBUT, Chairman

G. W. STEINBRUEGGE

J. J. SULEK

Board of Tractor

Test Engineers

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. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR 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 belt pulley or 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, $\frac{1}{2}$ 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. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, 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 3 different levels 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; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 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 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.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power 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.

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



David Brown 850 Diesel