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Test 735: David Brown 850 (Gasoline)

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NEBRASKA TRACTOR TEST 735 - DAVID BROWN 850 GASOLINE

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	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cooling med	Temp Degrees F Air wet bulb	Temp Degrees F Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed— Two Hours									
	32.00	2000	2.998	0.564	10.67	184	58	75	29.050
Standard Power Take-off Speed (540 rpm)—One Hour									
	28.52	1620	2.636	0.556	10.82	190	59	76	29.050
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
	30.17	2227	3.020	0.603	9.99	177	60	78	.....
	0.00	2271	1.380	....	....	148	60	76	.....
	15.81	2324	2.223	0.846	7.11	155	60	77	.....
	32.23	2000	3.055	0.571	10.55	177	59	74	.....
	7.70	2265	1.754	1.371	4.39	152	59	75	.....
	23.02	2258	2.596	0.679	8.87	167	59	76	.....
Av	**18.16**	**2224**	**2.338**	**0.775**	**7.77**	**162**	**59**	**76**	**29.060**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
27.64	2253	4.60	1998	5.78	2.958	0.644	9.34	146	43	48	28.720
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
24.43	1757	5.21	2222	4.02	2.944	0.726	8.30	145	47	54	28.481
50% of Pull at Maximum Power—Two Hours—3rd Gear											
17.26	1226	5.28	2228	3.07	2.432	0.848	7.10	127	33	36	28.595
MAXIMUM POWER WITH BALLAST											
23.16	4275	2.03	2170	14.31	1st Gear.....			136	37	40	28.740
28.36	3181	3.34	2004	7.97	2nd Gear.....			140	34	36	28.720
28.90	2344	4.62	2002	5.46	3rd Gear.....			140	33	35	28.730
28.42	1676	6.36	1999	3.93	4th Gear.....			138	34	36	28.720
28.13	1344	7.85	2001	3.21	5th Gear.....			145	34	37	28.740
MAXIMUM POWER WITHOUT BALLAST											
27.31	2278	4.50	1997	9.14	3rd Gear.....			140	34	38	28.755

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear						
Pounds pull	2350	2400	2550	2650	2600	2500
Horsepower	28.9	26.2	24.5	21.9	18.7	15.3
Mile per hour	4.6	4.1	3.6	3.1	2.7	2.3

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	No, Size, Ply & psi	Two 11-28;4;14	Two 11-28;4;12
Ballast	—Liquid	315 lb each	None
	Cast iron	450 lb each	None
Front tires	No, Size, Ply & psi	Two 5.50-16;4;32	Two 5.50-16;4;32
Ballast	—Liquid	None	None
	Cast iron	92 lb each	None
Height of drawbar		20 inches	20½ inches
Static weight	—Rear	3960 lb	2429 lb
	Front	1673 lb	1490 lb
Total weight with operator		5808 lb	4094 lb

Department of Agricultural Engineering
Dates of Test: March 14 to April 2, 1960
Manufacturer: DAVID BROWN INDUSTRIES, LTD.. MELTHAM, HUDDERSFIELD, YORKSHIRE, ENGLAND
Manufacturer's Power Rating: Not rated.

FUEL, OIL and TIME Fuel regular gasoline **Octane No** Motor 85 Research 92 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.7231 **Weight per gallon** 6.020 lb **Oil** SAE 10W-30 **API service classification** ML, MM, MS **To motor** 2.480 gal **Drained from motor** 2.215 gal **Transmission and final-drive lubricant** SAE 50 **Type** gear oil **Total time engine was operated** 47½ hours.

ENGINE Make David Brown **Type** 4 cylinder vertical **Serial No** UAG-36A-106 **Crankshaft mounted** lengthwise **Rated rpm** 2000 **Bore and stroke** 3½" x 4" **Compression ratio** 6.25 to 1 **Displacement** 154 cu in **Carburetor size** 30 mm. **Ignition system** battery **Cranking system** 12 volt battery **Lubrication** pressure **Air cleaner** oil washed wire mesh **Oil filter** replaceable paper element **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type standard **Serial No** 2A-850-500002 **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 1620 engine rpm.

REPAIRS AND ADJUSTMENTS The brakes were adjusted during the preliminary drawbar run.

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 735.

L. F. LARSEN
Engineer-in-Charge

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, ½ the 85% torque; maximum power; ¼ and ¾ 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 Gasoline