

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

5-27-1968

Test 977: David Brown Selectamatic 990 (Diesel)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 977: David Brown Selectamatic 990 (Diesel)" (1968). *Nebraska Tractor Tests*. 1337.

<https://digitalcommons.unl.edu/tractormuseumlit/1337>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

NEBRASKA TRACTOR TEST 977 – DAVID BROWN SELECTAMATIC 990 DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Temperature Degrees F				Barometer inches of Mercury	
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
52.07	2200	3.175	0.425	16.40	196	61	75	28.877	
Standard Power Take-off Speed (540 rpm)—One Hour									
46.00	1828	2.792	0.423	16.48	201	64	75	28.870	
Standard Power Take-off Speed (1000 rpm)—One Hour									
49.65	2000	2.981	0.419	16.66	198	61	76	28.860	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
45.24	2249	2.759	0.425	16.40	186	61	76	.....
0.00	2315	0.749	.....	.....	178	60	75	.....
23.07	2293	1.687	0.510	13.68	180	60	75	.....
51.67	2200	3.181	0.429	16.24	196	61	77	.....
11.61	2307	1.184	0.711	9.81	178	62	77	.....
34.24	2270	2.152	0.438	15.91	182	61	77	.....
Av	27.64	2272	1.952	0.492	14.16	183	61	76	28.837

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med.	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours—3rd Gear (1st Hi)											
43.31	3689	4.40	2201	6.37	3.138	0.505	13.80	179	66	78	28.810
75% of Pull at Maximum Power—Ten Hours—3rd Gear (1st Hi)											
35.26	2873	4.60	2261	4.69	2.522	0.499	13.98	169	66	69	28.733
50% of Pull at Maximum Power—Two Hours—3rd Gear (1st Hi)											
25.63	2038	4.72	2282	3.23	2.031	0.552	12.62	172	69	77	28.730
MAXIMUM POWER WITH BALLAST											
34.93	7142	1.83	2251	14.70	1st Gear (1st Lo)			155	58	67	28.930
43.68	5187	3.16	2201	9.32	2nd Gear (2nd Lo)			177	64	73	28.885
44.83	3832	4.39	2200	6.56	3rd Gear (1st Hi)			175	64	73	28.885
44.37	2735	6.08	2204	4.60	4th Gear (3rd Lo)			174	65	75	28.885
44.15	2206	7.51	2202	3.69	5th Gear (2nd Hi)			172	65	75	28.885
41.53	1110	14.03	2207	1.75	6th Gear (3rd Hi)			170	65	76	28.840
MAXIMUM PULL WITHOUT BALLAST											
31.86	3870	3.09	2255	14.85	2nd Gear (2nd Lo)			169	60	75	28.925
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST											
3rd Gear (1st Hi)											
Pounds pull				3832	4035	4180	4197	4170	4010		
Horsepower				44.83	42.25	38.73	33.89	28.87	23.22		
Crankshaft speed rpm				2200	1978	1754	1531	1312	1093		
Miles per hour				4.39	3.93	3.48	3.03	2.60	2.17		
Slip of drivers, %				6.56	7.18	7.30	7.30	7.42	7.18		

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 16.9/14-30; 6; 16	Two 16.9/14-30; 6; 16
Ballast	—Liquid	662 lb each	None
	Cast iron	990 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 6; 28	Two 7.50-16; 6; 28
Ballast	—Liquid	None	None
	Cast iron	257 lbs	None
Height of drawbar		19½ inches	20½ inches
Static weight with operator—Rear		6525 lb	3220 lb
Front		2235 lb	1720 lb
Total		8760 lb	4940 lb

Department of Agricultural Engineering

Dates of Test: May 27 to June 3, 1968

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

FUEL, OIL and TIME Fuel No 2 diesel Cetane 52.4 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8371 Weight per gallon 6.970 lb Oil SAE 20-20W API service classification MS, DM To motor 1.854 gal Drained from motor 1.606 gal Transmission lubricant SAE 20W-40 Final drive lubricant SAE 140 Total time engine was operated 55½ hours.

ENGINE Make David Brown Diesel Type 4 cylinder vertical Serial No 449001 1004 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3.939" x 4.000" Compression ratio 17 to 1 Displacement 194.9 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh Oil filter full flow replaceable paper element Fuel filter primary and secondary filters with replaceable paper elements and sediment bowl Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 990/A 801152 Tread width rear 52" to 76" front 52" to 72" Wheel base 78¾" Center of gravity (with-out operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 29.2" Vertical distance above roadway 32.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive except when PTO clutch is disengaged Transmission selective gear fixed ratio Advertised speeds mph first 2.04 second 3.38 third 4.56 fourth 6.18 fifth 7.57 sixth 13.8 reverse 3.36 and 7.51 Clutch single plate dry disc in combination with PTO clutch operated by foot pedal Brakes internal expanding shoe operated by hand lever or independently by two foot pedals Steering no power assist Turning radius (on concrete surface with brake applied) right 123.5" left 122.5" (on concrete surface without brake) right 136" left 135" Turning space diameter (on concrete surface with brake applied) right 253" left 251" (on concrete surface without brake) right 278" left 276" Belt pulley 1412 rpm at 2000 engine rpm diameter 8½" face 5¾" Power take-off 540 rpm at 1828 engine rpm and 1000 rpm at 2000 engine rpm Belt speed 3140 fpm.

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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 977.

L. F. LARSEN

Engineer in Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

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. 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, $\frac{1}{2}$ 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. 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

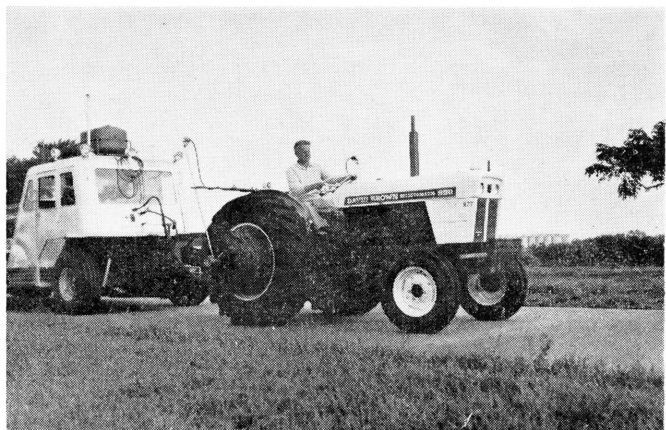
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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 Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

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 SELECTAMATIC 990 DIESEL