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Test 946: David Brown 880 Selectamatic (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 946 - DAVID BROWN 880 SELECTAMATIC DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
42.29*	2200	2.772	0.456	15.26	186	64	75	28.940
Standard Power Take-off Speed (540 rpm)—One Hour								
38.12	1827	2.335	0.427	16.33	188	65	75	28.955
Standard Power Take-off Speed (1000 rpm)—One Hour								
40.67	2001	2.556	0.438	15.91	187	66	75	28.960
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
37.99	2326	2.511	0.460	15.13	179	65	75	.....
0.00	2355	0.732	.....	.....	170	65	75	.....
18.96	2321	1.456	0.535	13.02	177	66	75	.....
42.12	2201	2.748	0.454	15.33	187	66	76	.....
9.57	2343	1.055	0.768	9.07	173	66	76	.....
28.24	2304	1.900	0.468	14.86	179	67	77	.....
Av 22.81	2308	1.734	0.529	13.15	177	66	76	28.960

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		
VARYING DRAWBAR POWER AND FUEL CONSUMPTION—WITH BALLAST												
Maximum Available Power—Two Hours—3rd Gear												
35.56	2706	4.93	2200	6.32	2.733	0.535	13.01	191	65	73	28.965	
75% of Pull at Maximum Power—Ten Hours—3rd Gear												
29.56	2084	5.32	2334	4.63	2.327	0.548	12.70	181	59	69	28.927	
50% of Pull at Maximum Power—Two Hours—3rd Gear												
21.06	1444	5.47	2358	2.88	1.794	0.593	11.74	181	68	81	28.850	
MAXIMUM POWER WITH BALLAST												
29.66	5331	2.09	2296	14.98	1st Gear			175	59	65	29.060	
34.89	3699	3.54	2204	9.45	2nd Gear			191	65	75	29.000	
36.37	2767	4.93	2206	6.49	3rd Gear			189	65	74	29.000	
36.22	1995	6.81	2201	4.44	4th Gear			192	65	75	28.970	
35.54	1582	8.42	2202	3.44	5th Gear			193	66	74	28.970	
MAXIMUM POWER WITHOUT BALLAST												
34.99	2769	4.74	2201	9.92	3rd Gear			193	65	75	28.980	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear												
Pounds pull				2767	2955	3101	3122	3094	3092	2816		
Horsepower				36.37	34.71	32.01	28.48	24.00	19.99	14.64		
Crankshaft speed, rpm				2206	1979	1750	1547	1315	1098	876		
Miles per hour				4.93	4.40	3.87	3.42	2.91	2.43	1.95		
Slip of drivers, %				6.49	6.87	7.42	7.42	7.53	7.64	6.87		

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13.6-28; 6; 18	Two 13.6-28; 6; 12
	—Liquid	505 lb each	None
	Cast iron	735 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 6; 28	Two 6.00-16; 6; 28
	—Liquid	None	None
	Cast iron	145 lb each	None
Height of drawbar		20½ inches	20½ inches
Static weight with operator—	Rear	5430 lb	2950 lb
	Front	1810 lb	1520 lb
	Total	7240 lb	4470 lb

Department of Agricultural Engineering

Dates of Test: SEPTEMBER 13 to SEPTEMBER 23, 1966

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

FUEL, OIL and TIME Fuel No 2 diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 69°/69° 0.8353 Weight per gallon 6.964 lb Oil SAE 20-20W API service classification MS, DG, DM To motor 1.430 gal Drained from motor 1.258 gal Transmission lubricant SAE 50 Final Drive Lubricant SAE 140 Total time engine was operated 50½ hours.

ENGINE Make David Brown diesel Type 3 cylinder vertical Serial No AD3 55A 4200 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3.939" x 4.500" Compression ratio 17 to 1 Displacement 164.4 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire wool with centrifugal pre-cleaner Oil filter 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 880A 533712 Tread width rear 52" to 76" front 52" to 72" Wheel base 79.75" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 28" Vertical distance above roadway 28¼" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running except when PTO foot clutch is disengaged Transmission selective gear fixed ratio Advertised speeds mph first 2.27 second 3.76 third 5.08 fourth 6.90 fifth 8.43 sixth 15.40 reverse 3.74 and 8.37 Clutch single plate dry disc in combination with PTO clutch operated by single foot pedal Brakes internal expanding shoe operated by hand lever or independently by two foot pedals which may be locked together Steering no power assist Turning radius (on concrete surface with brake applied) right 124" left 124" (on concrete surface without brake) right 138" left 138" Turning space diameter (on concrete surface with brake applied) right 255" left 255" (on concrete surface without brake) right 282" left 282" Belt pulley 1555 rpm at 2200 engine rpm diam 8.5" face 5.687" Belt speed 3160 fpm Power take-off 540 rpm at 1828 engine rpm and 1000 rpm at 2000 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.

Sixth gear was not run as it exceeded 15 mph.

One rear wheel hub bolt was found broken at the end of the test.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 946.

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. H. Kramer, 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 trans-

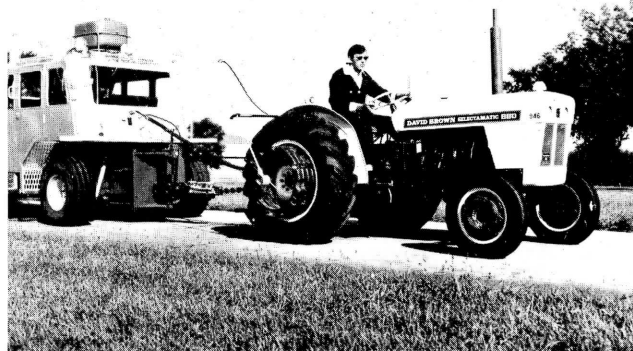
mission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the 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 880 Selectamatic Diesel