

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

1-1-1959

Test 728: Porche-Diesel Super L 318

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 728: Porche-Diesel Super L 318" (1959). *Nebraska Tractor Tests*. 1149. <https://digitalcommons.unl.edu/tractormuseumlit/1149>

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 728 - PORSCHE-DIESEL SUPER L 318

University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

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								
37.21	2300	2.872	0.541	12.96	Air Cooled	71	75	29.025
Standard Power Take-off Speed (1000 rpm)—One Hour								
33.93	2001	2.435	0.503	13.93	Air Cooled	72	75	29.023
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
32.97	2398	2.478	0.527	13.31	Air Cooled	72	75
2.44	2441	1.023	2.939	2.39	Air Cooled	72	74
19.72	2440	1.785	0.634	11.05	Air Cooled	71	73
37.04	2303	2.876	0.544	12.88	Air Cooled	70	73
9.83	2428	1.327	0.946	7.41	Air Cooled	70	72
29.14	2402	2.239	0.538	13.01	Air Cooled	69	72
Av 21.86	2402	1.955	0.627	11.18	Air Cooled	70	73	29.077

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption		Hp-hr per gal	Temp. Degrees F			Barometer inches of mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—6th Gear											
32.37	2848	4.26	2305	5.07	2.876	0.623	11.26	Air Cooled	38	50	28.863
75% of Pull at Maximum Power—Ten Hours—6th Gear											
26.41	2207	4.49	2382	3.64	2.427	0.644	10.88	Air Cooled	37	46	28.847
50% of Pull at Maximum Power—Two Hours—6th Gear											
18.74	1533	4.58	2403	2.78	1.952	0.739	9.60	Air Cooled	34	43	28.865
MAXIMUM POWER WITH BALLAST											
29.18	6411	1.71	2322	14.33	3rd	Gear	Air	Cooled	30	33	28.990
33.03	5378	2.30	2304	9.98	4th	Gear	Air	Cooled	30	33	28.990
32.51	3950	3.09	2297	7.02	5th	Gear	Air	Cooled	33	41	28.960
33.40	2946	4.25	2305	5.29	6th	Gear	Air	Cooled	33	41	28.960
30.75	1698	6.79	2296	3.17	7th	Gear	Air	Cooled	34	44	28.945
27.83	900	11.60	2300	2.59	8th	Gear	Air	Cooled	34	44	28.945
MAXIMUM POWER WITHOUT BALLAST											
29.63	2581	4.30	2305	5.93	6th	Gear	Air	Cooled	40	52	28.601
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—6th Gear											
Pounds pull			2950	2950	3000		3050	2950	2750		
Horsepower			33.4	29.9	27.2		23.6	19.7	14.7		
Miles per hour			4.3	3.8	3.4		2.9	2.5	2.0		

Department of Agricultural Engineering

Dates of Test: November 14 to November 21, 1959

Manufacturer: PORSCHE-DIESEL, FRIEDRICH-SCHAFEN, GERMANY

Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel No. 2 Diesel Cetane No 51 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8418 Weight per gallon 7.009 lb Oil SAE 20 API service classification DS To motor 2.633 gal Drained from motor 2.056 gal Transmission and final-drive lubricant SAE No 90 Type universal gear oil Total time motor was operated 44½ hours.

ENGINE Make Porsche-Diesel Type 3 cylinder vertical air cooled Serial No 12 755 Crankshaft mounted lengthwise Rated rpm 2300 Lubrication pressure Bore and stroke 3.74" x 4.56" Compression ratio 19 to 1 Displacement 150.6 cu in Cranking system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter oil pump screen, cylindrical screen and replaceable pleated paper element Oil cooler air cooled Fuel filter two replaceable paper elements Cooling medium temperature control air cooled, manually controlled damper.

CHASSIS Type standard Serial No 318 L 007 Tread width rear 59" to 69" front 58" to 70" Wheel base 79.1" 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 26.1" Vertical distance above roadway 30.0" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Advertised speeds mph first 0.7 second 1.3 third 2.1 fourth 2.7 fifth 3.5 sixth 4.7 seventh 7.3 eighth 12.3 reverse 1.3, 2.3, 3.6 and 6.0 Belt pulley diam 8.66" face 5.90" rpm 1460 Belt speed 3307 fpm Clutch double disc dry clutch operated by foot pedal Brakes internal expanding shoes operated independently by foot pedals which may be locked together and contracting band operated by hand lever Power take-off (front) 1000 rpm at 2000 engine rpm, (rear) 1000 rpm at 2080 engine rpm or 540 rpm at 2200 engine rpm Steering no power assistance Turning radius (on concrete surface with brake applied) right 129" left 128" (on concrete surface without brake) right 154" left 151" Turning space diameter (on concrete surface with brake applied) right 268" left 266" (on concrete surface without brake) right 319" left 313".

REPAIRS AND ADJUSTMENTS During the limber-up run the valve stem pulled out of the right rear tire, causing the tire to deflate. A new tube was installed and the solution replaced before the test was resumed.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code. Following the limber-up run the electrical starting aid failed to function properly. This condition continued throughout the remainder of the test. First and second gears were not run as it was necessary to limit pull in third gear to avoid excessive slippage.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 728.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT
G. W. STEINBRUEGGE
J. J. SULEK
Boar of Tractor
Test Engineers

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13-30;6;14	Two 13-30;6;14
	—Liquid	559 lb each	None
	—Cast iron	792 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-20;6;32	Two 6.00-20;6;20
	—Liquid	81 lb each	None
	—Cast iron	261 lb each	None
Height of drawbar		22 inches	23 ½ inches
Static weight	—Rear	5806 lb	3104 lb
	—Front	2244 lb	1560 lb
Total weight with operator		8225 lb	4839 lb

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.



Porsche-Diesel Super L 318