

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

1-1-1962

Test 812: Allis-Chalmers D10 (Gasoline)

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 812: Allis-Chalmers D10 (Gasoline)" (1962). *Nebraska Tractor Tests*. 1218.

<https://digitalcommons.unl.edu/tractormuseumlit/1218>

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 812 - ALLIS-CHALMERS D10 GASOLINE

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean; H. H. Kramer, 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								
33.46	1650	2.564	0.466	13.05	183	57	75	28.978
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
3087	1791	2.446	0.482	12.62	175	57	75	.....
0.00	1964	1.036	.....	.....	156	56	74	.....
16.20	1879	1.657	0.622	9.78	169	57	75	.....
33.41	1650	2.574	0.469	12.98	183	57	76	.....
8.33	1929	1.336	0.976	6.24	160	57	75	.....
23.66	1830	2.032	0.522	11.64	171	57	75	.....
Av	18.75	1.847	0.599	10.15	169	57	75	28.930

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barometer 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											
28.78	2523	4.28	1645	6.41	2.530	0.535	11.38	170	43	52	28.700
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
25.19	1993	4.74	1794	4.82	2.265	0.547	11.12	167	43	52	28.764
50% of Pull at Maximum Power—Two Hours—3rd Gear											
17.38	1322	4.93	1839	3.42	1.870	0.655	9.29	165	38	43	28.753
MAXIMUM POWER WITH BALLAST											
21.38	4106	1.95	1824	13.16	1st Gear			168	47	58	28.950
28.95	3339	3.25	1650	9.26	2nd Gear			173	46	57	28.950
29.97	2636	4.26	1652	7.03	3rd Gear			172	45	57	28.940
27.30	909	11.26	1653	2.65	4th Gear			168	45	57	28.935
MAXIMUM POWER WITHOUT BALLAST											
23.93	2057	4.36	1786	14.76	3rd Gear			165	44	50	29.140
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull			2636	2742	2872	2859	2855	2712			
Horsepower			29.97	27.79	25.75	22.34	19.10	15.28			
Miles per hour			4.26	3.80	3.36	2.93	2.51	2.11			
Slip of drivers, %			7.03	7.22	7.60	7.60	7.60	7.50			

Department of Agricultural Engineering
 Dates of Test: April 3 to April 18, 1962
 Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN
 Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel Regular gasoline Octane No Motor 84.6 Research 92.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7309 Weight per gallon 6.084 lb Oil SAE 10W-30 API service classification MS, DM To motor 1.014 gal Drained from motor 1.029 gal Transmission and final-drive lubricant SAE 20W Type engine oil Total time engine was operated 39½ hours.

ENGINE Make Allis-Chalmers Type 4 cylinder vertical Serial No 12-1002-R Crankshaft mounted lengthwise Rated rpm 1650 Bore and stroke 3½" x 3¾" Compression ratio 7.5 to 1 Displacement 149 cu in Carburetor size 7/8" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire screen Oil filter replaceable cotton waste element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 3501 Tread width rear 42" to 72" front 40" to 64 11/16" Wheel base 78¾" 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 25¼" Vertical distance above roadway 30½" 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 2.0 second 3.5 third 4.5 fourth 11.4 reverse 3.5 Clutch single plate dry disc operated by foot pedal Brakes internal expanding shoe operated by two foot pedals Steering no power assistance Turning radius (on concrete surface with brake applied) right 118" left 114" (on concrete surface without brake) right 130" left 126" Turning space diameter (on concrete surface with brake applied) right 243" left 235" (on concrete surface without brake) right 267" left 259" Belt pulley 1220 rpm at 1650 engine rpm diam 8" face 5½" Belt speed 2556 fpm Power take-off 538 rpm at 1650 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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 812.

L. F. LARSEN
 Engineer-in-Charge

G. W. STEINBRUEGGE
 Acting Chairman
 J. J. SULEK
 F. D. YUNG
 Board of Tractor Test Engineers

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 11-24; 6; 16	Two 11-24; 6; 12
Ballast	—Liquid	323 lb each	None
	—Cast iron	700 lb each	None
Front tires	—No, size, ply & psi	Two 5.00-15; 4; 36	Two 5.00-15; 4; 28
Ballast	—Liquid	21 lb each	None
	—Cast iron	236 lb each	None
Height of drawbar		21 inches	22 inches
Static weight	—Rear	4005 lb	1960 lb
	—Front	1380 lb	866 lb
Total weight with operator		5560 lb	3001 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 trans-

missions, 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.



Allis-Chalmers D10 Gasoline