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Test 723: Allis-Chalmers D-12 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 723 - ALLIS-CHALMERS D-12 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		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								
28.56	1650	2.339	0.497	12.21	185	70	75	28.830
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
25.50	1733	2.076	0.494	12.28	178	69	74	.....
0.97	1944	0.929	5.814	1.04	162	68	72	.....
13.38	1819	1.502	0.682	8.91	168	67	73	.....
28.57	1650	2.298	0.488	12.43	182	70	75	.....
6.84	1861	1.176	1.044	5.82	166	71	76	.....
19.59	1776	1.824	0.565	10.74	172	71	76	.....
Av 15.81	1797	1.634	0.627	9.68	171	69	74	28.830

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp. Degrees F Cool- ing med	Air wet bulb	Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
23.56	2057	4.29	1651	6.18	2.196	0.566	10.73	160	58	73	28.738
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
20.37	1640	4.66	1753	4.19	1.981	0.590	10.28	147	47	54	29.020
50% of Pull at Maximum Power—Two Hours—3rd Gear											
13.79	1074	4.81	1785	2.74	1.608	0.708	8.58	143	60	78	28.660
MAXIMUM POWER WITH BALLAST											
19.69	4041	1.83	1736	14.59	1st Gear	.....	143	43	50	29.130	
24.70	2858	3.24	1651	9.58	2nd Gear	.....	160	51	57	28.800	
24.86	2188	4.26	1651	6.94	3rd Gear	.....	162	51	57	28.800	
22.09	737	11.24	1642	1.93	4th Gear	.....	150	52	64	28.790	
MAXIMUM POWER WITHOUT BALLAST											
22.37	1961	4.28	1731	14.30	3rd Gear	.....	168	48	53	28.905	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull		2200		2300		2400		2400		2350	2250
Horsepower		24.9		23.3		21.8		18.6		15.7	12.6
Miles per hour		4.3		3.8		3.4		2.9		2.5	2.1

Department of Agricultural Engineering

Dates of Test: October 13 to October 20, 1959

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel regular gasoline Octane No ASTM 84 Research 92 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7292 Weight per gallon 6.070 lb Oil SAE 10W-30 API service classification ML, MM, MS, DG, and DM To motor 0.981 gal Drained from motor 0.975 gal Transmission and final-drive lubricant SAE No 20W Type engine crankcase oil Total time motor was operated 39 hours.

ENGINE Make Allis-Chalmers Type 4 cylinder vertical Serial No 10-1251-S Crankshaft mounted lengthwise Rated rpm 1650 Lubrication pressure Bore and stroke 3 3/8" x 3 3/8" Compression ratio 7.75 to 1 Displacement 138.7 cu in Carburetor size 3/8" Ignition system battery Cranking system 6 volt battery Air cleaner oil washed wire screen Muffler was used Oil filter replaceable cotton waste cartridge Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No D12-1123 Tread width rear 52" to 79 1/4" front 47 1/2" to 72 3/16" Wheel base 78 3/4" 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 27 5/16" Vertical distance above roadway 30" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Advertised speeds mph first 2.0 second 3.5 third 4.5 fourth 11.4 reverse 3.5 Belt pulley diam 8" face 5 1/2" rpm 1220 Belt speed 2555 fpm Clutch single plate dry disc operated by foot pedal Brakes internal expanding shoes operated by two foot pedals Power take-off 538 rpm at 1650 engine rpm Steering no power assistance Turning radius (on concrete surface with brake applied) right 114" left 117" (on concrete surface without brake) right 128" left 131" Turning space diameter (on concrete surface with brake applied) right 240" left 246" (on concrete surface without brake) right 267" left 273".

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 723.

L. F. LARSEN
Engineer-in-Charge

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

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 11-24;6;14	Two 11-24;6;12
	—Liquid	282 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;36
	—Liquid	35 lb each	None
	—Cast iron	236 lb each	None
Height of drawbar		21 inches	22 inches
Static weight	—Rear	3833 lb	1870 lb
	—Front	1441 lb	900 lb
Total weight with operator		5449 lb	2945 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.



Allis-Chalmers D-12 Gasoline