

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

10-13-1967

Test 965: Allis-Chalmers 170 (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 965: Allis-Chalmers 170 (Diesel)" (1967). *Nebraska Tractor Tests*. 1327. <https://digitalcommons.unl.edu/tractormuseumlit/1327>

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 965 – ALLIS-CHALMERS 170 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								
54.04	1800	3.300	0.426	16.38	188	56	76	29.287
Standard Power Take-off Speed (540 rpm)—One Hour								
50.59	1624	3.082	0.425	16.41	188	57	75	29.300
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
48.27	1891	2.992	0.433	16.13	186	57	76	.....
0.00	2001	1.006	.....	.....	177	57	75	.....
24.86	1948	1.904	0.535	13.06	180	57	76	.....
54.35	1800	3.331	0.428	16.32	187	56	74	.....
12.62	1977	1.453	0.803	8.69	177	56	74	.....
36.84	1924	2.424	0.459	15.20	182	57	75	.....
Av 29.49	1923	2.185	0.517	13.50	182	57	75	29.270

DRAWBAR PERFORMANCE

Hp	Drawbar pull lbs	Speed miles per hr	Crankshaft 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	Cooling med	Air wet bulb	Air dry bulb	

VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—5th Gear											
47.39	4008	4.43	1802	6.98	3.354	0.494	14.13	185	46	60	29.125
75% of Pull at Maximum Power—Ten Hours—5th Gear											
39.43	3083	4.80	1910	5.10	2.829	0.501	13.94	181	49	62	29.018
50% of Pull at Maximum Power—Two Hours—5th Gear											
27.62	2078	4.99	1956	3.65	2.277	0.575	12.13	182	36	38	29.080

MAXIMUM POWER WITH BALLAST

35.53	6881	1.94	1913	14.88	1st Gear	.....	185	45	55	29.100
45.70	6571	2.61	1801	13.98	2nd Gear	.....	176	43	56	29.170
46.17	5817	2.98	1801	11.22	3rd Gear	.....	173	43	56	29.180
47.63	4242	4.21	1804	7.42	4th Gear	.....	174	43	56	29.180
48.62	4120	4.43	1799	6.86	5th Gear	.....	183	43	52	29.180
48.51	2966	6.13	1801	4.28	6th Gear	.....	186	43	52	29.180
47.37	1862	9.54	1800	3.14	7th Gear	.....	186	43	52	29.180
44.86	1233	13.64	1798	2.32	8th Gear	.....	184	43	52	29.180

MAXIMUM PULL WITHOUT BALLAST

43.87	3996	4.12	1864	14.52	4th Gear	195	62	73	28.450
-------	------	------	------	-------	----------	-------	-----	----	----	--------

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear

Pounds pull	4120	4267	4384	4441	4355	4323
Horsepower	48.62	45.11	41.24	36.20	30.81	25.61
Crankshaft speed rpm	1799	1619	1443	1252	1085	908
Miles per hour	4.43	3.96	3.53	3.06	2.65	2.22
Slip of drivers %	6.86	7.73	7.73	7.73	7.73	7.73

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18.4-28; 6; 16	Two 18.4-28; 6; 16
Ballast	—Liquid	775 lb each	None
	Cast iron	800 lb each	None
Front tire	—No, size, ply & psi	Two 7.50-16; 6; 28	Two 7.50-16; 6; 28
Ballast	—Liquid	None	None
	Cast iron	30 lb each	None
Height of drawbar		19½ inches	21 inches
Static weight with operator—Rear		7190 lb	4040 lb
	Front	1970 lb	1910 lb
	Total	9160 lb	5950 lb

Department of Agricultural Engineering

Dates of Test: October 13 to October 27, 1967

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 54.7 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8382 Weight per gallon 6.979 lb Oil SAE 30 API service classification DS To motor 1.817 gal Drained from motor 1.598 gal Transmission and final-drive lubricant Allis-Chalmers special lube oil Total time engine was operated 43½ hours.

ENGINE Make Perkins Diesel Type 4 cylinder vertical Serial No 236U9003 Crankshaft mounted lengthwise Rated rpm 1800 Bore and stroke 3⅞" x 5" Compression ratio 16 to 1 Displacement 235.9 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable pleated paper cartridge Fuel filter one sediment bowl with screen, primary and secondary filters with replaceable elements Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type Standard Serial No 1133D Tread width rear 58" to 82" front 53" to 73" Wheel base 95.5" 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 33" Vertical distance above roadway 30.6" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running Transmission selective gear fixed ratio plus operator controlled partial range power shifting Advertised speeds mph first 2.0 second 2.9 third 3.2 fourth 4.3 fifth 4.5 sixth 6.1 seventh 9.4 eighth 13.3 reverse 2.7 and 3.8 Clutch single plate dry disc operated by foot pedal Brakes contracting band and disc operated by two foot pedals Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 122" left 122" (on concrete surface without brake) right 138" left 138" Turning space diameter (on concrete surface with brake applied) right 253" left 253" (on concrete surface without brake) right 288" left 288" Power take-off 540 rpm at 1624 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 965.

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.



ALLIS-CHALMERS 170 DIESEL