

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

7-9-1956

Test 581: Allis-Chalmers HD-11B

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 581: Allis-Chalmers HD-11B" (1956). *Nebraska Tractor Tests*. 1064.
<https://digitalcommons.unl.edu/tractormuseumlit/1064>

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.

The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: July 9, 1956 to July 13, 1956
Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, SPRINGFIELD, ILLINOIS
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 581

ALLIS-CHALMERS HD-11B

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury		
		Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling medium	Air wet bulb	Air dry bulb			
TEST B & C—100% MAXIMUM LOAD—TWO HOURS										
89.75	1800	6.926	12.96	0.543	167	63	80	28.970		
TEST D—RATED LOAD—ONE HOUR										
80.82	1800	6.324	12.78	0.551	157	64	78	28.990		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
80.21	1798	6.284	12.76	0.551	156	64	76		
2.84	1915	2.622	1.08	6.496	143	63	75		
41.71	1861	4.293	9.72	0.724	152	63	75		
89.07	1758	6.847	13.01	0.541	157	62	70		
21.15	1887	3.368	6.28	1.121	144	61	68		
61.15	1822	5.286	11.57	0.608	152	61	67		
49.36	1840	4.783	10.32	0.682	151	62	72	29.001		
TEST L—OPERATING MAXIMUM TORQUE										
% of rated rpm (engine)	100	95	90	85	80	75	70	65	60	55
% of rated-speed torque	100	103	108	108	110	114	115	118	122	120

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
					Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
59.33	10646	2.09	1801	0.97	5.738	10.34	0.681	160	73	83	28.737
TEST F & G—100% MAXIMUM LOAD											
72.69	20468	1.33	1795	4.57	1st gear			163	69	78	28.780
73.80	13410	2.06	1796	1.89	2nd gear			160	67	73	28.780
70.58	9074	2.92	1798	0.93	3rd gear			165	74	91	28.650
68.12	6798	3.76	1797	0.64	4th gear			168	71	86	28.820
65.37	5540	4.43	1802	0.34	5th gear			168	73	88	28.810
59.11	3901	5.68	1801	0.34	6th gear			168	73	88	28.810

FUEL, OIL, WATER and TIME Fuel Diesel Cetane No. 49 (rating taken from oil company's typical inspection data) Weight per gallon 7.037 lb Oil SAE 30 To motor 3.746 gal Drained from motor 3.526 gal Water used none Total time motor was operated 38 hours.

CHASSIS TYPE Track layer Serial No. HD11B-1675 Tread width 74" Wheel base 85 3/4" Measured length of track 266" Cleats integral with shoes Cleats per track 38 Size of cleats 20" x 2 5/16" Advertised speeds mph first 1.39 second 2.10 third 2.93 fourth 3.77 fifth 4.41 sixth 5.68 1st reverse 1.56 2nd reverse 3.45 3rd reverse 4.43 Belt pulley diam 20" Face 15" rpm 1045 Belt speed 3660 fpm Belt flat Length 49' Width 12" Thickness 0.240" Maximum slip 0.75% Clutch single plate over center operated by hand lever Seat upholstered Brakes contracting bands operated by two foot pedals Steering hand levers controlling multiple disc clutches Drawbar height 18" Total weight (with operator) 22,375 pounds.

ENGINE Make Allis-Chalmers Type 6 cylinder vertical Diesel Serial No. 89087 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 4 7/16" x 5 9/16" Rated rpm 1800 Compression ratio 15 to 1 Displacement 516 cu in Port diameter valves inlet 1 11/16" exhaust 1 7/16" Governor variable speed centrifugal Starting system 24 volt Air cleaner oil washed crimped wire with precleaner Muffler was used Oil filter replaceable pleated paper element Fuel filters full flow replaceable wound cotton yarn element Cooling medium temperature control thermostat.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with fuel pump set to develop approximately 94 corrected maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H & L were made with the same setting.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" Hg)	77.67	94.46
2. Observed maximum horsepower (tests F and B)	73.80	89.75
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	58.25	80.29

We, the undersigned certify that this is a true and correct report of official Tractor Test No. 581.

L. F. LARSEN
Engineer-in-Charge

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

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each; rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

TEST L: This torque test is run with wide open throttle. Loads are applied to reduce engine speed in approximately ten 5% increments. Rated speed equals 100%. The corresponding dynamometer torque is recorded as a per cent of torque at rated speed.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instru-

ment in the test car. When rubber tires are used, all tests are made on the concrete test course. All crawler type tractors are tested on a dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

