

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

---

1-1-1951

## Test .463 :Allis Chalmers HD-9

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 .463 :Allis Chalmers HD-9" (1951). *Nebraska Tractor Tests*. 583.  
<https://digitalcommons.unl.edu/tractormuseumlit/583>

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 17 to July 28, 1951.

Manufacturer: ALLIS-CHALMERS MANUFACTURING CO., MILWAUKEE, WISCONSIN

Manufacturer's rating: 70 drawbar, 84 belt, corrected maximum horsepower

NEBRASKA TRACTOR TEST NO. 463

ALLIS CHALMERS HD-9

**BELT HORSEPOWER TESTS**

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air	
TESTS B and C—100% MAXIMUM LOAD—TWO HOURS								
79.10	1602	5.857	13.51	0.519	0.03	178	94	28.885
TEST D—RATED LOAD—ONE HOUR								
71.93	1601	5.396	13.33	0.526	0.02	170	88	28.875
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
72.05	1603	5.392	13.36	0.524	...	166	86	.....
1.90	1636	2.236	0.85	8.242	...	150	85	.....
36.44	1620	3.576	10.19	0.687	...	154	84	.....
78.93	1557	5.687	13.88	0.505	...	169	84	.....
18.45	1625	2.887	6.39	1.096	...	150	82	.....
54.27	1615	4.428	12.26	0.572	...	155	82	.....
43.67	1609	4.034	10.83	0.647	0.02	157	84	28.820

**DRAWBAR HORSEPOWER TESTS**

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cooling med	Air	
TESTS F and G—100% MAXIMUM LOAD											
65.99	19035	1.30	1599	6.20	—Not Recorded—				170	92	28.975
67.39	12239	2.06	1599	1.71	—Not Recorded—				175	95	28.735
67.27	8692	2.90	1600	1.00	—Not Recorded—				175	95	28.740
65.79	6591	3.74	1600	0.76	—Not Recorded—				175	95	28.725
63.43	5409	4.40	1602	0.65	—Not Recorded—				175	94	28.725
59.20	3927	5.65	1600	0.45	—Not Recorded—				171	94	28.725
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
54.46	9858	2.07	1600	1.46	4.890	11.14	0.629	0.05	163	86	28.720

**FUEL, OIL and TIME** Diesel fuel cetane No 47 (rating taken from oil company's typical inspection data); weight per gallon 7.005 lb Oil SAE 30; to motor 3.926 gal; drained from motor 3.605 gal **Total time motor was operated** 39 1/2 hours.

**CHASSIS** Type tracklayer Serial No HD9B-196 Tread width 74" Measured length of track 22.16 feet 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 reverse 1.56, 3.45, 4.43 Belt pulley diam 13 3/8" face 10" rpm 929 Belt speed 3253 fpm Clutch single plate over center operated by hand lever Seat upholstered Brakes contracting bands operated by two foot pedals Steering hand levers controlling multiple disk clutches.

**ENGINE** Make General Motors 4-71 2 cycle diesel Type 4 cylinder vertical Serial No 4A13663 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and Stroke 4 1/4" x 5" Rated rpm 1600 Compression ratio 16 to 1 Displacement 284 cu in Port Diameter Valves inlet multiple ports exhaust 1.280 Governor flyball variable speed Starting System 12 volt Air Cleaner oil washed crimped wire mat Muffler was used Oil Filter partial flow absorption type renewable element Fuel Filter full flow renewable absorption type elements in both primary and secondary filters Cooling medium temperature control thermostat.

**Total weight as tested (with operator)** 19945 lbs.

**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 pumps as manufactured to develop approximately 84.50 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 were made with the same setting.

**HORSEPOWER SUMMARY**

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	72.49	84.57
2. Observed maximum horsepower (tests F & B)	67.39	79.10
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	54.37	71.88

We, the undersigned, certify that this is a true and correct report of official tractor test No. 463.

L. F. LARSEN  
Engineer in Charge

C. W. SMITH  
F. D. YUNG  
L. W. HURLBUT  
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 preliminary period for limber up, general observation and adjustments. No data are recorded during this preliminary run.

### BELT HORSEPOWER TESTS

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

**TEST C:** The manufacturer has an opportunity to select a more practical carburetor setting which may slightly lower the power output but give better fuel economy. As in test B, the throttle valve is held wide open and the load is adjusted to give the rated engine speed. Tests B and C may be the same, as in the case of a diesel engine where the manufacturer wants to use the same setting as in test B. The same setting is used for tests D, E, G, H, J and K.

**TEST D:** The throttle control lever is set so 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.

**TEST E:** This test serves to show how well the governor controls the engine speed when the following loads are applied: rated load, no load,  $\frac{1}{2}$  load, maximum load at wide-open throttle,  $\frac{1}{4}$  load and  $\frac{3}{4}$  load. This test also shows some significant fuel consumption results for these loads. The average fuel consumption given for this test is quite significant. The average farm tractor is subjected to a varying load condition throughout the year.

### DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same 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:** The tractor is operated in the gear designated by the manufacturer as rated gear (the gear recommended as most suitable for plowing). The carburetor is set as in test B. The throttle valve is held wide open and the drawbar load adjusted to maintain rated engine speed. Results of this test are used to determine the rated load for test H.

**TEST G:** The tractor is tested for maximum drawbar horsepower in each gear, using the more efficient carburetor setting as determined 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 the lower gears the tractor often is unable to develop maximum horsepower because of excessive wheel slippage. Then the load is reduced until slippage approaches 16%.

**TEST H:** This test lasts 10 hours and is the only drawbar test where fuel consumption is measured. The load applied is 75% of 100% maximum drawbar horsepower (test F) corrected to standard conditions. The throttle lever is set so that the governor gives rated engine speed.

**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.

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

