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7-20-1951

## Test. 465: Allis-Chalmers HD-20

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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

Department of Agricultural Engineering

Dates of test: July 20 to August 3, 1951.

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 465

ALLIS-CHALMERS HD-20

DRAWBAR HORSEPOWER SUMMARY

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		Cool- ing med	Air	
TESTS F and G—100% MAXIMUM LOAD											
Low Gear Range											
106.06	41321	0.96	1685	5.77	—Not Recorded—				175	90	28.925
*116.69	30464	1.44	1743	3.01	—Not Recorded—				170	91	28.925
104.08	17870	2.18	1746	1.75	—Not Recorded—				164	88	28.945
High Gear Range											
104.57	17879	2.19	1660	1.90	—Not Recorded—				169	84	28.940
109.45	12642	3.25	1713	0.79	—Not Recorded—				170	84	28.945
85.82	5698	5.65	1744	0.36	—Not Recorded—				164	88	28.945
TEST H—RATED LOAD—TEN HOURS—Low Range											
114.87	28544	1.51	1754	2.82	12.910	8.90	0.787	0.00	170	89	28.835

\* Data shown on this line are for maximum horsepower on this gear range. Other data were obtained in the same gear range at loads selected by the manufacturer's representative.

**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 7.600 gal; drained from motor 5.448 gal  
Total time motor was operated 42 hours.

**CHASSIS** Type tracklayer Serial No HD20H-3275  
Tread width 84" Measured length of track 27.85 feet Cleats integral with shoes Cleats per track 37  
Size of cleats 28" x 2 3/4" Advertised speeds mph low 0 to 3 high 0 to 7 reverse 0 to 5.5 Clutch single plate over center operated by hand lever Seat upholstered Brakes contracting bands operated by two foot pedals Steering hydraulically controlled multiple disk clutch.

**ENGINE** Make General Motors 6-110 2 cycle diesel Type 6 cylinder vertical Serial No 6B847 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and Stroke 5" x 5.6" Rated rpm 1700 Compression ratio 18 to 1 Displacement 660 cu in Port Diameter Valves inlet multiple ports exhaust 1.670 Governor flyball variable speed Starting System 24 volt Air Cleaner (two used) oil washed crimped wire mat Muffler was used Oil Filter partial flow absorption type renewable element Fuel Filter full flow renewable elements in both primary and secondary filters Cooling medium temperature control thermostat.

Total weight as tested (with operator) 42,625 lbs.

**REPAIRS AND ADJUSTMENTS** High idle adjustment made before starting Test H.

**REMARKS** All results were determined from observed data and without allowances, additions or deductions. Tests F, G, and H were made with fuel pumps as set by the manufacturer.

This tractor is equipped with a hydraulic torque converter which automatically loads the engine by controlling the forward travel speed or the belt pulley speed of the tractor according to the load applied. Therefore, rated load and maximum load are approximately the same. No belt tests were made on this tractor due to the limited capacity of the dynamometer used for belt testing.

HORSEPOWER SUMMARY

- |   |         |
|---|---------|
|   | Drawbar |
| 1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg) | 124.25  |
| 2. Observed maximum horsepower (test F)                                     | 116.69  |

We, the undersigned, certify that this is a true and correct report of official tractor test No. 465.

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.

