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Test .464: Allis-Chalmers HD-15

Nebraska Tractor Test Lab

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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 17 to August 2, 1951.

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

Manufacturer's rating: 102 drawbar, 122 belt, corrected maximum horsepower

NEBRASKA TRACTOR TEST NO. 464

ALLIS-CHALMERS HD-15

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								
117.68	1600	8.560	13.75	0.510	0.00	176	85	29.100
TEST D—RATED LOAD—ONE HOUR								
105.73	1602	7.864	13.44	0.521	0.00	175	88	29.100
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
105.69	1605	7.863	13.44	0.521	...	175	88
1.95	1658	3.208	0.61	11.523	...	165	89
54.00	1633	5.272	10.24	0.684	...	170	87
115.23	1553	8.287	13.90	0.504	...	174	87
27.27	1648	4.206	6.48	1.080	...	168	87
79.54	1607	6.471	12.29	0.570	...	173	87
63.95	1617	5.884	10.87	0.645	0.00	171	88	29.085

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											
105.04	29400	1.34	1596	2.49	—Not Recorded—				173	90	28.920
104.37	19081	2.05	1601	2.25	—Not Recorded—				163	71	28.950
102.91	13102	2.95	1597	1.31	—Not Recorded—				165	74	28.950
99.26	9677	3.85	1603	0.95	—Not Recorded—				167	79	28.950
95.32	8055	4.44	1599	0.70	—Not Recorded—				166	82	28.950
90.47	5840	5.81	1602	0.48	—Not Recorded—				168	85	28.950
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
81.95	14949	2.06	1600	1.96	7.295	11.23	0.624	0.01	167	82	28.940

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 4.622 gal; drained from motor 3.925 gal Total time motor was operated 50½ hours.

CHASSIS Type tracklayer Serial No HD15A-90 Tread width 74" Measured length of track 24.92 feet Cleats integral with shoes Cleats per track 38 Size of cleats 24" long 2 19/32" high Advertised speeds mph first 1.39 second 2.09 third 2.97 fourth 3.87 fifth 4.46 sixth 5.80 reverse 1.54, 3.47, 4.51 Belt pulley diam 18" face 15" rpm 693 Belt speed 3266 fpm Clutch single plate over center operated by hand lever Seat upholstered Brakes contracting bands operated by two foot pedals Steering hydraulically controlled multiple disk clutches.

ENGINE Make General Motors 6-71 2 cycle diesel Type 6 cylinder vertical Serial No 6A12358 Crankshaft mounted lengthwise Head 1 Lubrication pressure Bore and Stroke 4¼" x 5" Rated rpm 1600 Compression ratio 16 to 1 Displacement 426 cu in Port Diameter Valves inlet multiple ports exhaust 1.280 Governor flyball variable speed Starting System 12 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 AT TESTED (with operator) 30895 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 122 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)	109.01	123.88
2. Observed maximum horsepower (tests F & B)	104.37	117.68
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)	81.76	105.30

We, the undersigned, certify that this is a true and correct report of official tractor test No. 464.

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.

