

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

9-9-1953

Test 503: John Deere 40

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 503: John Deere 40" (1953). *Nebraska Tractor Tests*. 64.
<https://digitalcommons.unl.edu/tractormuseumlit/64>

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: September 9, 1953 to September 17, 1953
Manufacturer: JOHN DEERE DUBUQUE TRACTOR WORKS OF DEERE MANUFACTURING COMPANY, DUBUQUE, IOWA
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 503

JOHN DEERE 40

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			
TEST B—100% MAXIMUM LOAD—TWO HOURS										
24.25	1850	2.315	10.48	0.584	0.00	194	70	29.030		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
23.51	1850	2.106	11.16	0.548	0.00	192	58	29.035		
TEST D—RATED LOAD—ONE HOUR										
21.47	1849	1.899	11.31	0.541	0.00	191	57	29.020		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
21.47	1849	1.897	11.32	0.541	...	191	56	.....	
0.51	2043	0.876	0.58	10.510	...	164	55	.....	
11.10	1907	1.319	8.42	0.727	...	180	53	.....	
22.87	1781	2.020	11.32	0.540	...	190	52	.....	
5.73	1967	1.108	5.17	1.183	...	181	52	.....	
17.18	1969	1.686	10.19	0.601	...	187	55	.....	
13.14	1919	1.484	8.85	0.691	0.00	182	54	29.020		
TORQUE (At Dynamometer)										
Eng rpm	1850	1755	1656	1544	1441	1346	1254	1149	1038	936
Lb-ft	142.2	146.7	151.2	151.2	153.5	152.6	153.3	149.9	147.0	141.9

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 mercur
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cooling med	Air	
TEST F—100% MAXIMUM LOAD—3rd Gear											
21.71	1879	4.33	1845	7.57	.....	Not Recorded	.....	203	80	28.930
TEST G—OPERATING MAXIMUM LOAD											
12.30	3022	1.53	1843	14.81	.....	Not Recorded	.....	200	78	28.920
21.20	2519	3.16	1851	10.36	.....	Not Recorded	.....	204	78	28.930
21.59	1851	4.37	1848	6.86	.....	Not Recorded	.....	205	75	28.930
19.81	661	11.24	1849	2.67	.....	Not Recorded	.....	203	82	28.920
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
17.43	1475	4.43	1849	5.67	1.859	9.38	0.653	0.04	197	70	28.800
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
20.01	1801	4.17	1850	11.72	.....	Not Recorded	.....	211	99	28.460

TIRES, WHEELS AND WEIGHT

	Tests F, G & H	Test J
Rear wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	270 lb each	None
Added cast iron	405 lb each	None
Rear tires		
No. and size	Two 9-34	Two 9-34
Ply	4	4
Air pressure	18 lb	12 lb
Front wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	None	None
Added cast iron	None	None
Front tires		
No. and size	Two 5.00-15	Two 5.00-15
Ply	4	4
Air pressure	28 lb	28 lb
Height of drawbar	17½ inches	18 inches
Static weight		
Rear end	3480 lb	2130 lb
Front end	898 lb	914 lb
Total weight as tested with operator	4553 lb	3219 lb

HORSEPOWER SUMMARY

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	22.88	25.23
2. Observed maximum horsepower (tests F & B)	21.71	24.25
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)	17.16	21.45

We, the undersigned, certify that this is a true and correct report of official tractor test No. 503.

L. F. LARSEN
Engineer-in-Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
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 held 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 held 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.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

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: 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.

