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9-9-1953

## Test 505: John Deere 40 C

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: September 9 to September 23, 1953  
Manufacturer: JOHN DEERE DUBUQUE TRACTOR  
WORKS OF DEERE MANUFACTURING COM-  
PANY, DUBUQUE, IOWA  
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 505

JOHN DEERE 40 C

**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										
24.09	1850	2.272	10.60	0.577	0.00	174	61	28.872		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
23.64	1850	2.036	11.61	0.527	0.00	202	74	28.915		
TEST D—RATED LOAD—ONE HOUR										
21.28	1850	1.825	11.66	0.525	0.00	201	78	28.915		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
21.31	1852	1.838	11.59	0.528	...	201	78	.....		
0.49	1955	0.775	0.63	9.673	...	191	81	.....		
11.00	1907	1.221	9.01	0.679	...	197	81	.....		
23.24	1808	2.000	11.62	0.527	...	208	81	.....		
5.63	1949	1.015	5.55	1.103	...	194	82	.....		
16.35	1894	1.569	10.42	0.587	...	199	82	.....		
13.00	1894	1.403	9.27	0.660	0.00	198	81	28.920		
TORQUE (At Dynamometer)										
Eng rpm	1854	1760	1658	1549	1443	1348	1254	1147	1039	934
Lb-ft	129.6	149.9	152.0	153.6	156.2	157.5	158.9	156.0	150.0	142.4

**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		Cool- ing med	Air	
TEST F—100% MAXIMUM LOAD—3rd Gear											
19.63	2504	2.94	1855	1.06	.....	Not Recorded	.....	.....	205	62	29.220
TEST G—OPERATING MAXIMUM LOAD											
9.20	4515	0.76	1852	6.49	.....	Not Recorded	.....	.....	202	75	28.870
19.61	3433	2.14	1852	2.58	.....	Not Recorded	.....	.....	208	71	29.190
19.22	2463	2.93	1850	1.25	.....	Not Recorded	.....	.....	208	68	29.200
15.67	1109	5.30	1851	0.46	.....	Not Recorded	.....	.....	206	74	29.180
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
15.08	1938	2.92	1852	1.57	1.811	8.33	0.735	0.034	207	71	29.060

**FUEL, OIL and TIME** Gasoline octane No ASTM 76 Research 82 (rating taken from oil company's typical inspection data); weight per gallon 6.120 lb OIL SAE 10; to motor 1.063 gal; drained from motor 0.895 gal Total time motor was operated 48½ hours.

**CHASSIS TYPE** Tracklayer Serial No 84362 Tread width rear 36 25/32" and 46 9/32" Wheel Base 56" Measured length of track 14.98 feet Cleats Integral with shoes Cleats per track 31 Size of cleats 9¾" x 1½" Hydraulic control system direct engine drive Advertised speeds mph first 0.82 second 2.21 third 2.95 fourth 5.31 reverse 1.64 Belt pulley diam 9 1/16" face 6¾" rpm 1267 Belt speed 3006 fpm Clutch single plate dry disc operated by foot pedal Seat upholstered seat with back rest Brakes contracting bands operated by steering levers or one foot pedal that can be locked by latch Steering hand levers controlling multiple disc clutches and brakes Power take-off standard type.

**ENGINE** Make John Deere Type 2 cylinder vertical Serial No 62310 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and Stroke 4" x 4" Rated rpm 1850 Compression ratio 6.5 to 1 Displacement 101 cu in Port Diameter Valves Inlet 1 31/64" Exhaust 1 23/64" Governor variable speed centrifugal Carburetor Size 1" Ignition System battery Starting System 6 volt battery Air Cleaner oil washed wire mesh Muffler was used Oil Filter replaceable treated paper element Cooling medium temperature control thermosiphon.

**TOTAL WEIGHT AS TESTED** (with operator) 4669 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 carburetor set for 100% 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 an operating setting of the carburetor (selected by the manufacturer) of 99.2% of maximum belt horsepower.

Following Test A, a decrease in horsepower occurred. Engine head was removed and combustion chamber cleaned. Test was resumed with improved performance.

**HORSEPOWER SUMMARY**

	Draw- bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	20.14	24.99
2. Observed maximum horsepower (tests F & B)	19.63	24.09
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)	15.11	21.24

We, the undersigned, certify that this is a true and correct report of official tractor test No. 505.

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.

