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9-25-1953

## Test 506: John Deere 70 All-Fuel

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 25 to October 1, 1953  
Manufacturer: JOHN DEERE WATERLOO TRACTOR WORKS OF DEERE MANUFACTURING COMPANY, WATERLOO, IOWA  
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 506

JOHN DEERE 70 ALL FUEL

**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										
43.15	975	4.225	10.21	0.649	0.00	173	62	28.773		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
40.90	975	3.697	11.06	0.599	0.00	174	64	28.720		
TEST D—RATED LOAD—ONE HOUR										
38.40	975	3.522	10.90	0.608	0.00	173	66	28.700		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
38.40	974	3.516	10.92	0.607	...	174	66	.....		
1.91	1066	1.394	1.37	4.838	...	170	66	.....		
20.63	1037	2.385	8.65	0.766	...	177	67	.....		
39.50	931	3.575	11.05	0.600	...	175	68	.....		
10.45	1054	1.873	5.58	1.189	...	176	69	.....		
30.17	1018	2.896	10.42	0.636	...	170	71	.....		
23.51	1013	2.606	9.02	0.735	0.00	174	68	28.645		
TORQUE (At Dynamometer)										
Eng rpm	1003	946	894	850	800	759	702	651	606	556
Lb-ft	238.9	246.6	252.9	259.7	264.6	265.3	264.8	263.4	260.2	255.2

**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											
39.58	3292	4.51	976	5.71	.....	Not Recorded	.....		174	72	29.220
TEST G—OPERATING MAXIMUM LOAD											
29.50	5102	2.17	975	16.05	.....	Not Recorded	.....		173	82	29.240
37.17	4130	3.38	975	7.41	.....	Not Recorded	.....		174	69	29.240
36.77	3037	4.54	976	5.08	.....	Not Recorded	.....		182	79	28.720
37.25	2134	6.55	976	3.36	.....	Not Recorded	.....		175	79	28.735
35.25	1469	9.00	978	2.26	.....	Not Recorded	.....		176	82	28.770
33.40	971	12.90	978	1.36	.....	Not Recorded	.....		178	84	28.770
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
31.06	2539	4.59	976	3.93	3.125	9.94	0.667	0.00	173	73	28.959
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
37.01	3114	4.46	974	7.03	.....	Not Recorded	.....		178	80	29.140
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
35.50	3196	4.17	975	10.44	.....	Not Recorded	.....		177	78	29.120

**TIRES, WHEELS AND WEIGHT**

	Tests F, G & H	Test J	Test K
<b>Rear wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	610 lb each	None	None
Added cast iron	140 lb each	None	None
<b>Rear tires</b>			
No. and size	Two 13-38	Two 13-38	Two 12-38
Ply	6	6	6
Air pressure	14 lb	12 lb	12 lb
<b>Front wheels</b>			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
<b>Front tires</b>			
No. and size	Two 6.00-16	Two 6.00-16	Two 6.00-16
Ply	6	6	6
Air pressure	28 lb	28 lb	28 lb
<b>Height of drawbar</b>	18½ inches	18½ inches	18 inches
<b>Static weight</b>			
Rear end	6084 lb	4586 lb	4464 lb
Front end	1876 lb	1894 lb	1896 lb
<b>Total weight as tested with operator</b>	8135 lb	6655 lb	6535 lb

**FUEL, OIL and TIME** Tractor Fuel octane No ASTM 40 (rating taken from oil company's typical inspection data); weight per gallon 6.630 lb **OIL** SAE 20; to motor 2.446 gal; drained from motor 1.866 gal Total time motor was operated 41 hours.

**CHASSIS TYPE** Tricycle Serial No 7001448 Tread width rear 60" to 88" front 8 5/16" and 12 1/16" Wheel Base 91" Hydraulic control system direct engine drive with throw out lever **Advertised speeds mph** first 2.5 second 3.5 third 4.5 fourth 6.5 fifth 8.75 sixth 12.5 reverse 3.25 **Belt pulley diam** 12½" face 7½" rpm 975 **Belt speed** 3285 fpm **Clutch** dry multiple disc operated by hand lever **Seat** upholstered seat with back rest **Brakes** internal expanding shoe operated by two foot pedals **Equalized** no **Power take-off** direct engine drive with independent clutch.

**ENGINE** Make John Deere Type 2 cylinder horizontal Serial No 7001448 Crankshaft mounted cross-wise Head 1 Lubrication pressure Bore and Stroke 6½" x 7" Rated rpm 975 Compression ratio 4.6 to 1 Displacement 412.5 cu in Port Diameter Valves Inlet 2¼" Exhaust 2½" Governor variable speed centrifugal Carburetor Size 1½" double barrel Ignition System battery Starting System two 6 volt batteries Air Cleaner Oil washed wire mesh Muffler was used Oil Filter replaceable impregnated paper element Cooling medium temperature control thermostat

**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, J & K were made with an operating setting of the carburetor (selected by the manufacturer) of 94.8% of maximum belt horsepower.

**HORSEPOWER SUMMARY**

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	41.00	44.96
2. Observed maximum horsepower (tests F & B)	39.58	43.15
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)	30.75	38.22

We, the undersigned, certify that this is a true and correct report of official tractor test No. 506.

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.

