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1952

## Test 472: John Deere 60 Gas

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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: May 26 to June 2, 1952.  
Manufacturer: JOHN DEERE WATERLOO TRACTOR WORKS OF DEERE MFG. CO., WATERLOO, IOWA.  
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 472

JOHN DEERE MODEL 60 GASOLINE

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										
40.24	976	3.841	10.48	0.579	0.00	157	62	29.020		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
38.58	976	3.322	11.61	0.522	0.00	155	59	29.030		
TEST D—RATED LOAD—ONE HOUR										
35.30	975	3.032	11.64	0.521	0.00	152	59	29.035		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
35.36	975	3.048	11.60	0.523	...	152	59	...		
2.11	1074	1.197	1.76	3.441	...	146	58	...		
19.14	1041	2.058	9.30	0.652	...	152	61	...		
37.50	927	3.221	11.64	0.521	...	156	61	...		
10.91	1059	1.593	6.85	0.885	...	150	62	...		
27.92	1025	2.573	10.85	0.559	...	154	61	...		
22.16	1017	2.282	9.71	0.624	0.00	152	60	29.090		
TORQUE (at dynamometer)										
Eng. RPM	1000	950	902	850	800	750	701	653	605	551
Lb-ft	229.4	233.5	239.4	244.1	248.9	250.6	251.1	251.3	236.8	234.3

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	
TEST F—100% MAXIMUM LOAD—4th Gear											
35.18	3057	4.32	976	7.03	.....	Not Recorded	.....	161	67	28.880	
TEST G—OPERATING MAXIMUM LOAD											
14.19	4319	1.23	977	16.70	.....	Not Recorded	.....	154	75	28.850	
26.01	4372	2.23	976	16.23	.....	Not Recorded	.....	158	72	28.860	
32.32	3636	3.33	975	9.20	.....	Not Recorded	.....	163	70	28.870	
33.32	2881	4.34	976	6.77	.....	Not Recorded	.....	162	68	28.880	
31.96	1894	6.33	973	4.55	.....	Not Recorded	.....	168	74	28.830	
28.62	950	11.30	976	2.29	.....	Not Recorded	.....	168	80	28.800	
TEST H—RATED LOAD—TEN HOURS—4th Gear											
28.04	2402	4.38	975	5.56	2.744	10.22	0.593	0.00	157	71	28.895
TEST J—OPERATING MAXIMUM LOAD—4th Gear											
32.70	2895	4.24	976	9.49	.....	Not Recorded	.....	171	83	28.770	
TEST K—OPERATING MAXIMUM LOAD—4th Gear											
31.75	3030	3.93	976	12.21	.....	Not Recorded	.....	160	80	28.730	

TIRES, WHEELS and WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels	Cast iron	Cast iron	Cast iron
Type	Liquid ballast	None	None
	Added cast iron	None	None
Rear tires	Two 12-38	Two 12-38	Two 11-38
No. and size	Ply	6	6
	Air pressure	14 lb	12 lb
Front wheels	Pressed steel	Pressed steel	Pressed steel
Type	Liquid ballast	None	None
	Added cast iron	None	None
Front tires	Two 6.00-16	Two 6.00-16	Two 6.00-16
No. and size	Ply	4	4
	Air pressure	28 lb	28 lb
Height of drawbar	18 inches	18 inches	17 inches
Static weight	5604 lb	4111 lb	4048 lb
Rear end	1634 lb	1625 lb	1615 lb
Front end			
Total weight as tested with operator	7413 lb	5911 lb	5838 lb

HORSEPOWER SUMMARY

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" Hg.)	36.94	41.57
2. Observed maximum horsepower (tests F & B)	35.18	40.24
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)	27.71	35.33

We, the undersigned, certify that this is a true and correct report of official tractor test No. 472.

L. F. LARSEN  
Engineer in Charge

C. W. SMITH  
F. D. YUNG  
L. W. HURLBUT  
Board of Tractor  
Test Engineers

FUEL, OIL and TIME Gasoline octane No ASTM 76 Research 82 (rating taken from oil company's typical inspection data) weight per gallon 6.063 lb Oil SAE 20; to motor 1.802 gal; drained from motor 1.203 gal Total time motor was operated 56 hours.

CHASSIS Type Tricycle Serial No 6000003 Tread width rear 56" to 88" front 8 5/16" to 12 3/16" Wheel Base 90" Hydraulic Control System direct engine drive with throw out lever Advertised speeds mph first 1 1/2 second 2 1/2 third 3 1/2 fourth 4 1/2 fifth 6 1/4 sixth 11 reverse 3 Belt pulley diam 12 13/16" face 7 3/8" rpm 975 Belt speed 3270 fpm Clutch dry double 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.

ENGINE Make John Deere Type 2 cylinder horizontal Serial No 6000003 Crankshaft mounted cross-wise Head I Lubrication pressure Bore and Stroke 5 1/2" x 6 3/4" Rated rpm 975 Compression ratio 6.00 to 1 Displacement 321 cu in Port Diameter Valves inlet 1 15/16" exhaust 1 49/64" Governor variable speed centrifugal Carburetor Size 1 1/2" double barrel Ignition System battery Starting System 2-6 volt batteries Air Cleaner oil washed wire mesh Muffler was used Oil Filter replaceable impregnated paper element Cooling medium temperature control shutter controlled by 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 95.6% of maximum belt horsepower.

## 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.

