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January 1953

Test 490: John Deere 60 All-Fuel

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: April 15 to April 21, 1953.
Manufacturer: JOHN DEERE WATERLOO TRACTOR WORKS OF DEERE MFG. CO., WATERLOO, IOWA.
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 490

JOHN DEERE 60 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										
32.48	975	3.151	10.31	0.644	0.00	168	50	28.940		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
31.09	975	2.807	11.08	0.600	0.00	165	48	28.915		
TEST D—RATED LOAD—ONE HOUR										
28.33	975	2.630	10.77	0.617	0.00	167	49	28.910		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
28.36	976	2.633	10.77	0.617	...	168	49	.....	
2.13	1050	1.201	1.77	3.746	...	165	55	.....	
14.96	1026	1.924	7.78	0.854	...	157	52	.....	
30.37	937	2.750	11.04	0.602	...	166	52	.....	
7.60	1038	1.418	5.36	1.239	...	156	58	.....	
21.86	1002	2.267	9.64	0.689	...	170	54	.....	
17.55	1005	2.032	8.64	0.769	0.00	164	53	28.905		
TORQUE (At Dynamometer)										
RPM	1000	949	901	848	807	756	707	648	597	545
Lb-ft	181.7	189.0	195.0	200.9	204.8	207.6	210.4	213.9	211.2	211.2

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		Cooling med	Air	
TEST F—100% MAXIMUM LOAD—4th Gear											
29.17	2491	4.39	976	5.47	.....	Not Recorded	.....		160	52	28.780
TEST G—OPERATING MAXIMUM LOAD											
14.60	4499	1.22	973	17.40	.....	Not Recorded	.....		171	53	28.695
25.98	4263	2.29	977	14.30	.....	Not Recorded	.....		170	56	29.130
27.09	2967	3.42	975	6.67	.....	Not Recorded	.....		160	44	28.770
28.00	2386	4.40	975	5.13	.....	Not Recorded	.....		172	39	29.100
26.24	1537	6.40	974	3.26	.....	Not Recorded	.....		166	53	28.770
22.99	761	11.33	973	1.75	.....	Not Recorded	.....		169	53	28.770
TEST H—RATED LOAD—TEN HOURS—4th Gear											
22.68	1918	4.44	975	4.27	2.410	9.41	0.706	0.00	169	57	28.970
TEST J—OPERATING MAXIMUM LOAD—4th Gear											
28.00	2408	4.36	975	6.44	.....	Not Recorded	.....		170	46	29.100
TEST K—OPERATING MAXIMUM LOAD—4th Gear											
27.81	2495	4.18	977	7.10	.....	Not Recorded	.....		168	46	29.070

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	420 lb. each	None	None
Added cast iron	None	None	None
Rear tires			
No. and size	Two 12-38	Two 12-38	Two 11-38
Ply	6	6	6
Air pressure	12 lb.	12 lb.	12 lb.
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 6.00-16	Two 6.00-16	Two 6.00-16
Ply	4	4	4
Air pressure	28 lb.	28 lb.	28 lb.
Height of drawbar	18 inches	18 inches	16½ inches
Static weight			
Rear end	4959 lb.	4120 lb.	4044 lb.
Front end	1638 lb.	1655 lb.	1649 lb.
Total weight as tested with operator	6772 lb.	5950 lb.	5868 lb.

FUEL, OIL and TIME Tractor Fuel octane No ASTM 40 (rating taken from oil company's typical inspection data); weight per gallon 6.643 lb OIL SAE 20; to motor 1.718 gal; drained from motor 1.073 gal Total time motor was operated 54½ hours.

CHASSIS Type Tricycle Serial No 6015516 Tread width rear 56" to 88" front 8 5/16" to 12 3/16" Wheel Base 90" Hydraulic control system direct engine drive with throwout lever Advertised speeds mph first 1½ second 2½ third 3½ fourth 4½ fifth 6¼ sixth 11 reverse 3 Belt pulley diam 12 3/16" face 7¾" 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 with independent clutch.

ENGINE Make John Deere Type 2 cylinder horizontal Serial No 6015516 Crankshaft mounted cross-wise Head I Lubrication pressure Bore and Stroke 5½" x 6¼" Rated rpm 975 Compression ratio 4.70 to 1 Displacement 321 cu in Port Diameter Valves inlet 1 15/16" exhaust 1 49/64" 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 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.

HORSEPOWER SUMMARY

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	30.09	33.26
2. Observed maximum horsepower (tests F & B)	29.17	32.48
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)	22.57	28.27

We, the undersigned, certify that this is a true and correct report of official tractor test No. 490.

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.

