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Test 760: John Deere 4010 LPG

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 760 - JOHN DEERE 4010 LPG

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean and Acting Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool- ing med	Air wet bulb	Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
80.60	2200	9.242	0.487	8.72	190	61	75	28.988
Standard Power Take-off Speed (1000 rpm)—One Hour								
72.82	1900	8.089	0.472	9.00	190	61	75	29.010
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
71.00	2280	8.075	0.483	8.79	178	61	74	.....
0.00	2463	3.049	.....	.....	155	62	77	.....
36.05	2314	6.092	0.719	5.91	159	62	76	.....
80.43	2200	9.296	0.491	8.65	188	62	77	.....
18.82	2420	4.511	1.019	4.17	158	61	76	.....
53.48	2289	6.946	0.552	7.70	160	62	76	.....
Av 43.30	2328	6.329	0.621	6.84	166	61	76	29.007

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—5th Gear											
71.77	4691	5.74	2204	5.55	9.115	0.540	7.87	182	66	78	28.660
75% of Pull at Maximum Power—Ten Hours—5th Gear											
57.11	3506	6.11	2300	3.62	7.520	0.560	7.59	156	61	68	28.879
50% of Pull at Maximum Power—Two Hours—5th Gear											
39.50	2379	6.23	2315	2.55	6.455	0.695	6.12	152	65	71	28.905
MAXIMUM POWER WITH BALLAST											
61.00	6741	3.39	2294	14.30	3rd Gear	.....	.....	156	53	58	28.865
70.39	6021	4.38	2200	10.09	4th Gear	.....	.....	160	53	58	28.865
72.13	4767	5.67	2205	6.65	5th Gear	.....	.....	162	55	62	28.865
71.68	3526	7.62	2199	4.11	6th Gear	.....	.....	166	61	68	28.825
72.24	2708	10.00	2210	3.16	7th Gear	.....	.....	162	64	70	28.825
MAXIMUM POWER WITHOUT BALLAST											
69.51	4989	5.23	2223	14.57	5th Gear	.....	.....	160	53	56	28.950
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear											
Pounds pull			4750		4850	4900	4900	4950		4900	
Horsepower			72.1		66.0	58.8	52.3	44.9		37.9	
Miles per hour			5.7		5.1	4.5	4.0	3.4		2.9	

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38;6;18	Two 15.5-38;6;14
Ballast	—Liquid	553 lb each	None
	—Cast iron	700 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16;6;40	Two 6.00-16;6;40
Ballast	—Liquid	None	None
	—Cast iron	None	None
Height of drawbar		18 inches	18 inches
Static weight	—Rear	7320 lb	4815 lb
	—Front	2240 lb	2290 lb
Total weight with operator		9735 lb	7280 lb

Department of Agricultural Engineering

Dates of Test: September 12 to September 23, 1960

Manufacturer: JOHN DEERE WATERLOO TRACTOR WORKS, WATERLOO, IOWA

Manufacturer's Power Rating: 80 PTO Horsepower (observed)

FUEL, OIL and Time Fuel commercial propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 20-20W API service classification ML, MM, MS, DG To motor 1.571 gal Drained from motor 1.098 gal Transmission and final-drive lubricant John Deere Special 303 oil Total time engine was operated 49 hours.

ENGINE Make John Deere LPG Type 6 cylinder vertical Serial No 22E 1405 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 4" x 4" Compression ratio 9.0 to 1 Displacement 302 cu in Carburetor size 1¹¹/₁₆" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire screen Oil filter full flow replaceable paper element Oil cooler radiator for transmission and hydraulic oil Fuel filter felt pack in fuel lock strainer Muffler was used Cooling medium temperature control two thermostats.

CHASSIS Type tricycle Serial No 21T 1530 Tread width rear 60" to 88" front 8³/₄" to 18¹/₄" Wheel base 96¹/₂" Center of gravity (without operator or ballast with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.2" Vertical distance above roadway 37" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio partial range synchro-mesh Advertised speeds mph (at 1900 rpm) first 1¹/₂ second 2¹/₂ third 3³/₄ fourth 4¹/₄ fifth 5¹/₄ sixth 6³/₄ seventh 8³/₄ eighth 14¹/₄ reverse first 3³/₄ second 5 third 8¹/₂ Clutch dry disc operated by foot pedal Brakes wet disc hydraulically power actuated operated by foot pedals Steering power assisted Turning radius (on concrete surface with brake) right 120" left 120" (on concrete surface without brake) right 146" left 146" Turning space diameter (on concrete surface with brake applied) right 283" left 283" (on concrete surface without brake) right 335" left 335" Belt pulley 967 rpm at 1900 engine rpm diam 12" face 8¹/₂" Belt speed 3035 fpm Power take-off 1003 rpm at 1900 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First and second gears were not run as it was necessary to limit the pull in third gear to avoid excessive wheel slippage. Eighth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 760.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
G. W. STEINBRUEGGE
J. J. SULEK
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ the 85% torque; maximum power; $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.



John Deere 4010 LPG