1-1-1971

Test 1064: John Deere 4620 Power Shift

NEBRASKA TRACTOR TEST 1064 – JOHN DEERE 4620 POWER SHIFT DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1155 rpm)								
135.62	2200	9.180	0.466	14.77	190	60	75	28.553
Standard Power Take-off Speed (1000 rpm)—One Hour								
130.79	1904	8.332	0.438	15.70	185	59	75	28.595
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
120.51	2300	8.712	0.497	13.83	184	60	75	.....
0.00	2403	3.036	.....	.....	178	58	70	.....
61.53	2343	5.907	0.660	10.42	185	60	74	.....
135.03	2200	9.170	0.467	14.73	194	61	76	.....
31.16	2375	4.546	1.003	6.85	179	60	75	.....
91.21	2323	7.342	0.554	12.42	188	60	75	.....
Av 73.24	**2324**	**6.451**	**0.606**	**11.35**	**185**	**60**	**74**	**28.630**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool-ing med	Temp Degrees F Air wet bulb	Temp Degrees F Air dry bulb	Barometer inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear											
110.92	8823	4.71	2197	7.68	9.070	0.562	12.23	180	52	66	28.715
75% of Pull at Maximum Power—Ten Hours—4th Gear											
91.77	6822	5.04	2298	5.50	8.140	0.610	11.27	178	53	61	28.934
50% of Pull at Maximum Power—Two Hours—4th Gear											
62.33	4501	5.19	2323	3.85	6.803	0.750	9.16	175	52	52	28.820
50% of Pull at Reduced Engine Speed—Two Hours—5th Gear											
62.64	4545	5.17	1773	3.73	5.538	0.608	11.31	173	55	56	28.720
MAXIMUM POWER WITH BALLAST											
85.76	14471	2.22	2286	14.94	2nd Gear			178	45	52	28.600
111.81	11910	3.52	2202	10.59	3rd Gear			176	52	60	28.615
115.58	9154	4.73	2197	7.23	4th Gear			179	52	61	28.615
112.90	6703	6.32	2206	5.29	5th Gear			178	52	60	28.615
113.62	5118	8.33	2207	4.01	6th Gear			178	52	60	28.615
MAXIMUM PULL WITHOUT BALLAST											
104.64	11333	3.46	2279	14.73	3rd Gear			180	51	65	29.090

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear						
Pounds Pull	9154	10069	10707	10748	10150	9505
Horsepower	115.58	112.59	105.97	92.63	75.45	59.19
Crankshaft Speed rpm	2197	1968	1752	1531	1311	1092
Miles Per Hour	4.73	4.19	3.71	3.23	2.79	2.34
Slip of Drivers %	7.23	8.28	8.87	9.16	8.57	7.83

TRACTOR SOUND LEVEL	**dB(A)**
Maximum Available Power 2 Hours	94.5
75% of Pull at Max. Power 10 Hours	95.0
50% of Pull at Max. Power 2 Hours	96.5
50% of Pull at Reduced Engine Speed 2 Hours	92.5
Bystander 16th gear—(8 Hi)	86.7

TIRES, BALLAST and WEIGHT		**With Ballast**	**Without Ballast**
Rear tires	—No, size, ply & psi	Two 20.8-38; 10; 20	Two 20.8-38; 10; 14
Ballast	—Liquid	1305 lb each	None
	Cast iron	500 lb each	None
Front tires	—No, size, ply & psi	Two 14L-16.1; 6; 24	Two 14L-16.1; 6; 24
Ballast	—Liquid	None	None
	Cast iron	23 lb each	None
Height of drawbar		24 inches	24½ inches
Static weight with operator—Rear		14190 lb	10580 lb
Front		4395 lb	4350 lb
Total		18585 lb	14930 lb

Department of Agricultural Engineering

Dates of Test: April 20 to May 4, 1971

Manufacturer: John Deere Waterloo Tractor Works, Waterloo, Iowa

FUEL, OIL and TIME Fuel No 2 Diesel **Cetane** No 53.5 (rating taken from oil company's typical inspection data) **Specific gravity converted to** 60°/60° 0.8261 **Weight per gallon** 6.878 lb **Oil SAE** 30 **API service classification** MS, DG, DM, DS **To motor** 4.158 gal **Drained from motor** 4.026 gal **Transmission and final drive lubricant SAE** John Deere special 303 oil **Total time engine was operated** 48½ hours.

ENGINE Make John Deere Diesel **Type** 6 cylinder vertical with turbo-charger and intercooler **Serial No** 297216R **Crankshaft Mounted** lengthwise **Rated rpm** 2200 **Bore and stroke** 4¼" x 4¾" **Compression ratio** 15.7 to 1 **Displacement** 404 cu in **Cranking system** 12 volt electric (two 6-volt batteries) **Lubrication** pressure **Air Cleaner** precleaner and two dry type in series with replaceable treated paper elements **Oil filter** full flow replaceable paper cartridge **Oil Cooler** engine coolant heat exchanger for crankcase oil and radiator for transmission and hydraulic system **Fuel filter** sediment bowl and screen with replaceable paper primary and secondary filter elements **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type standard **Serial No** T813PO-1219OR **Tread width** front 59.25" to 83.25" rear 63.0" to 107.5" **Wheel base** 106.25" **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 33.02" Vertical distance above roadway 40.66" Horizontal distance from center of rear wheel tread 0" to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with operator control full range power shifting **Advertised speeds mph** first 1.72 second 2.46 third 3.83 fourth 4.99 fifth 6.50 sixth 8.45 seventh 10.92 eighth 18.47 reverse 2.11, 3.02, 4.72 and 6.14 **Clutch** multiple disc wet clutches within transmission hydraulically operated **Brakes** wet disc hydraulically power actuated operated by two foot pedals that can be locked together **Steering** hydrostatic power **Turning radius** (on concrete surface with brake applied) right 151" left 151" (on concrete surface without brake) right 171" left 171" **Turning space diameter** (on concrete surface with brake applied) right 302" left 302" (on concrete surface without brake) right 342" left 342" **Power take-off** 1156 rpm at 2200 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. First gear was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage. Seventh and eighth gears were not run as test procedure requires only one gear over eight miles per hour.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1064.

F. L. LARSEN
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
D. E. LANE
Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

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 Tir 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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

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 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, ½ of the 85% torque; maximum power, ¼ and ¾ 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.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine, governor, automatic transmission, 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. 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 Pull without Ballast. All added ballast is removed from the tractor The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

Varying Drawbar Pull 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.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.**

JOHN DEERE 4620 POWER SHIFT DIESEL