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University of Nebraska - Lincoln

Year 1969

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Test 1004: John Deere 1520

# NEBRASKA TRACTOR TEST 1004 - JOHN DEERE 1520 GASOLINE

## POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	Fuel Consumption		Temperature Degrees F				
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>								
<b>Rated Engine Speed—Two Hours</b>								
47.86	2500	4.262	0.539	11.23	190	54	75	29.437
<b>Standard Power Take-off Speed (1000 rpm)—One Hour</b>								
43.95	2066	4.037	0.556	10.89	189	54	75	29.415
<b>VARYING POWER AND FUEL CONSUMPTION—TWO HOURS</b>								
42.76	2627	4.035	0.571	10.60	190	54	75	.....
0.00	2750	1.874			182	54	75	.....
21.92	2698	3.143	0.868	6.97	187	54	75	.....
47.37	2501	4.228	0.540	11.20	192	54	75	.....
11.14	2740	2.518	1.368	4.42	184	55	76	.....
32.51	2665	3.609	0.672	9.01	190	54	75	.....
Av 25.95	2663	3.234	0.754	8.02	187	54	75	29.400

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crankshaft speed rpm	Slip of drivers %	Fuel Consumption		Temp Degrees F				Barometer inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling med	Air wet bulb	Air dry bulb	

### VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—10th Gear (5th Hi)											
37.24	2525	5.53	2483	4.73	4.135	0.672	9.01	193	47	52	28.810
75% of Pull at Maximum Power—Ten Hours—10th Gear (5th Hi)											
31.35	1939	6.06	2681	3.16	3.851	0.743	8.14	192	52	57	28.578
50% of Pull at Maximum Power—Two Hours—10th Gear (5th Hi)											
22.51	1349	6.26	2743	2.34	3.534	0.950	6.37	194	34	36	29.140

### MAXIMUM POWER WITH BALLAST

30.27	5467	2.08	2605	14.96	5th Gear (3rd Lo)		197	57	67	28.670
36.07	4854	2.79	2495	11.58	6th Gear (3rd Hi)		190	45	51	28.890
35.95	4596	2.93	2500	10.41	7th Gear (4th Lo)		191	43	50	28.890
37.88	3530	4.02	2501	7.20	8th Gear (5th Lo)		191	53	45	28.890
37.76	3441	4.11	2503	6.81	9th Gear (4th Hi)		192	42	54	28.890
38.41	2592	5.56	2500	4.88	10th Gear (5th Hi)		193	43	56	28.890
38.07	2416	5.91	2499	4.59	11th Gear (6th Lo)		194	48	56	28.890
37.62	1743	8.09	2506	3.16	12th Gear (6th Hi)		191	48	56	28.890
35.88	1506	8.93	2500	2.74	13th Gear (7th Lo)		193	48	55	28.890
34.31	1061	12.13	2499	1.94	14th Gear (7th Hi)		194	48	55	28.890
33.16	985	12.63	2502	1.76	15th Gear (8th Lo)		193	43	55	28.890

### MAXIMUM PULL WITHOUT BALLAST

28.13	4938	2.14	2664	14.73	5th Gear (3rd Lo)		189	37	40	29.160
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 10th Gear (5th Hi)

Pounds pull	2592	2770	2985	3205	3444	3452	3336
Horsepower	38.41	36.72	35.09	32.53	29.82	24.91	19.26
Crankshaft speed rpm	2500	2246	2001	1737	1491	1243	991
Miles per hour	5.56	4.97	4.41	3.81	3.25	2.71	2.16
Slip of drivers, %	4.88	5.28	5.74	6.31	6.76	6.87	6.53

### TIRES, BALLAST and WEIGHT

	With Ballast	Without Ballast
Rear tires	Two 14.9-28; 6; 14	Two 14.9-28; 6; 14
Ballast	None	None
	417 lb each	None
Front tires	Two 6.00-16; 4; 32	Two 6.00-16; 4; 32
Ballast	None	None
	30 lb each	None
Height of drawbar	14 inches	14½ inches
Static weight with operator—Rear	4895 lb	4060 lb
Front	1770 lb	1710 lb
Total	6665 lb	5770 lb

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

Department of Agricultural Engineering

Date of Test: March 28 to April 2, 1969

Manufacturer: JOHN DEERE DUBUQUE TRACTOR WORKS, DUBUQUE, IOWA

**FUEL, OIL and TIME** Fuel Regular gasoline Octane No Motor 85.2 Research 92.6 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7270 Weight per gallon 6.052 lb Oil SAE 10W 30 API service classification MS, DC, DM To motor 1.673 gal Drained from motor 1.218 gal Transmission and final-drive lubricant John Deere Special 303 Oil Total time engine was operated 44 hours.

**ENGINE** Make John Deere gasoline Type 3 cylinder vertical Serial No 4MTR119050T Crankshaft mounted lengthwise Rated rpm 2500 Bore and stroke 4.02" x 4.33" Compression ratio 8.0 to 1 Displacement 164.55 cu in Carburetor size 1" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable pleated paper cartridge Oil cooler radiator for transmission and hydraulic oil Fuel filter screen in carburetor and fuel pump Muffler was used Cooling medium temperature control Thermostat.

**CHASSIS** Type standard Serial No T4RMH-077251T Tread width rear 48" to 78" front 48" to 74" Wheel base 80.71" 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 25.2" Vertical distance above roadway 26" 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 partial range operator controlled power shifting Advertised speeds mph first 1.46 second 2.09 third 3.11 fourth 4.34 fifth 5.75 sixth 8.22 seventh 12.20 eighth 17.05 reverse first 1.70 second 2.43 third 3.61 fourth 5.05 Clutch single plate dry disc in combination with PTO clutch operated by single foot pedal Brakes wet disc operated hydraulically by two foot pedals that can be locked together Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 114" left 114" (on concrete surface without brake) right 127" left 127" Turning space diameter (on concrete surface with brake applied) right 235" left 235" (on concrete surface without brake) right 261" left 261" Belt pulley 978 rpm at 2100 engine rpm diam 12" face 8.5" Belt speed 3074 fpm Power take-off 1016 rpm at 2100 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, second, third and fourth gears were not run as it was necessary to limit the pull in fifth gear to avoid excessive wheel slippage. Sixteenth gear was not run as it exceeded fifteen miles per hour.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1004.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

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,  $\frac{1}{2}$  of 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 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 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 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 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 1520 GASOLINE