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Test 1085: John Deere 2030/John Deere 2440

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1085 - JOHN DEERE 2030 DIESEL

(ALSO JOHN DEERE 2440 DIESEL)

Department of Agricultural Engineering

Dates of Test: October 23 to November 4, 1971

Manufacturer: JOHN DEERE DUBUQUE TRACTOR WORKS, DUBUQUE, IOWA

POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—651 rpm)								
60.65	2500	3.970	0.457	15.28	191	62	75	28.953
Standard Power Take-off Speed (540 rpm)—One Hour								
55.23	2076	3.397	0.429	16.26	192	63	75	28.970
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
53.06	2573	3.592	0.472	14.77	188	63	75	.....
0.00	2675	1.372	.....	.....	178	62	74	.....
27.13	2632	2.344	0.603	11.57	187	63	75	.....
60.68	2501	3.958	0.455	15.33	192	63	75	.....
13.78	2655	1.833	0.927	7.52	179	63	75	.....
40.21	2602	2.921	0.507	13.77	185	63	75	.....
Av. 32.48	2606	2.670	0.573	12.16	185	63	75	28.960

DRAWBAR PERFORMANCE

Hp	Drawbar pull lbs	Speed miles per hr	Crankshaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr		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)											
50.42	3194	5.92	2502	5.28	3.961	0.547	12.73	183	44	57	28.955
75% of Pull at Maximum Power—Ten Hours—10th Gear (5th Hi)											
39.91	2420	6.19	2589	4.39	3.376	0.589	11.82	171	40	42	29.034
50% of Pull at Maximum Power—Two Hours—10th Gear (5th Hi)											
28.50	1688	6.33	2615	3.08	2.706	0.662	10.53	175	50	52	28.605
50% of Pull at Reduced Engine Speed—Two Hours—13th Gear (7th Lo)											
28.56	1699	6.30	1654	3.08	2.258	0.551	12.65	173	50	53	28.530

MAXIMUM POWER WITH BALLAST

37.97	6472	2.20	2580	14.82	5th Gear (3rd Lo)		174	37	39	29.000	
48.83	5854	3.13	2502	10.66	7th Gear (4th Lo)		183	45	56	28.900	
51.44	4410	4.37	2497	7.24	9th Gear (4th Hi)		183	45	57	28.990	
52.33	3312	5.92	2503	5.25	10th Gear (5th Hi)		184	45	57	28.990	
50.83	3026	6.30	2498	4.82	11th Gear (6th Lo)		187	46	57	28.960	
51.51	2251	8.58	2500	3.88	12th Gear (6th Hi)		187	45	56	28.960	

MAXIMUM PULL WITHOUT BALLAST

35.01	4382	3.00	2594	14.95	6th Gear (3rd Hi)		178	44	55	29.070	
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—10th Gear (5th Hi)

Pounds Pull	3312	3535	3679	3850	3975	4022	3994
Horsepower	52.33	49.97	46.07	41.94	36.79	31.04	25.10
Crankshaft Spced rpm	2503	2251	2001	1744	1488	1241	1010
Miles Per Hour	5.92	5.30	4.70	4.08	3.47	2.89	2.36
Slip of Drivers %	5.25	5.74	6.11	6.35	6.71	6.83	6.71

TRACTOR SOUND LEVEL WITHOUT CAB

	dB (A)
Maximum Available Power 2 Hours	97.0
75% of Pull at Max. Power 10 Hours	97.0
50% of Pull at Max. Power 2 Hours	96.5
50% of Pull at Reduced Engine Speed (2 Hours)	90.5
Bystander—16th (8th Hi)	86.5

TIRES, BALLAST and WEIGHT

	With Ballast	Without Ballast
Rear tires	—No. size, ply & psi	Two 16.9-28; 6; 16
Ballast	—Liquid	655 lb each
	Cast iron	360 lb each
Front tires	—No. size, ply & psi	Two 7.50-16; 6; 40
Ballast	—Liquid	None
	Cast iron	15 lb each
Height of drawbar		16 inches
Static weight with operator—rear		5430 lb
	front	2000 lb
	total	7430 lb

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° 0.8376 Weight per gallon 6.974 lb. Oil SAE 30 API service classification MS DG DM DS To motor 1.335 gal. Drained from motor 1.132 gal. Transmission and final drive lubricant John Deere Special 303 Oil Total time engine was operated 44 hours.

ENGINE Make John Deere Diesel Type 4 cylinder vertical Serial No. 4219DR06202611T Crankshaft Mounted Lengthwise Rated rpm 2500 Bore and stroke 4.02" x 4.33" Compression ratio 16.3 to 1 Displacement 219 cu. in. Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable pleated paper element Oil Cooler radiator for transmission and hydraulic oil Fuel filter sediment bowl and replaceable pleated paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type Standard Serial No. T5R3-H135574T Tread width rear 54" to 78" front 49 5/8" to 77-5/16" Wheel base 78 3/4" 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 28.6" Vertical distance above roadway 25.7" 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 1.1 second 1.5 third 1.6 fourth 2.1 fifth 2.4 sixth 3.2 seventh 3.3 eighth 4.5 ninth 4.5 tenth 6.0 eleventh 6.3 twelfth 8.5 thirteenth 9.4 fourteenth 12.7 fifteenth 13.2 sixteenth 17.8 reverse 1.3, 1.8, 1.9, 2.6, 2.7, 3.7, 3.9, and 5.2 Clutch single plate dry disc in combination with PTO clutch operated by a 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 133.5" left 133.5" Turning space diameter (on concrete surface with brake applied) right 240" left 240" (on concrete surface without brake) right 279" left 279" Power take-off 547 rpm at 2100 engine rpm.

REPAIRS and ADJUSTMENTS: During the 10 hour run the tractor engine fan belt failed. A new belt was installed and test continued.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or Nebraska test procedure. Six gears were chosen between 15% slip and 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1085.

L. F. 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 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. 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, $\frac{1}{2}$ 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.

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 2030 DIESEL