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## Test 1192: John Deere 2240 Diesel

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 1192 – JOHN DEERE 2240 DIESEL

## POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Cooling medium	Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>								
<b>Rated Engine Speed—Two Hours (PTO Speed—651 rpm)</b>								
50.37	2500	3.467	0.475	14.53	186	60	75	28.913
<b>Standard Power Take-off Speed (540 rpm)—One Hour</b>								
46.78	2074	3.077	0.454	15.20	186	62	76	28.890
<b>VARYING POWER AND FUEL CONSUMPTION—Two Hours</b>								
44.56	2602	3.159	0.489	14.11	184	64	78	.....
0.00	2686	1.590	.....	.....	176	65	79	.....
22.83	2666	2.120	0.641	10.77	180	65	80	.....
49.75	2501	3.497	0.485	14.22	187	66	81	.....
11.52	2691	1.707	1.023	6.75	178	66	82	.....
33.84	2634	2.585	0.527	13.09	182	67	83	.....
Av 27.08	2630	2.443	0.623	11.08	181	66	80	28.850

## 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	Temp Cool- ing med	Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
<b>VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST</b>											
<b>Maximum Available Power—Two Hours 10th (5 H) Gear</b>											
39.58	2682	5.53	2498	6.71	3.421	0.597	11.57	187	46	56	29.025
<b>75% of Pull at Maximum Power—Ten Hours 10th (5 H) Gear</b>											
32.05	2027	5.93	2618	4.58	2.867	0.618	11.18	182	52	63	28.812
<b>50% of Pull at Maximum Power—Two Hours 10th (5 H) Gear</b>											
22.71	1399	6.09	2648	3.14	2.390	0.726	9.51	184	68	89	28.625
<b>50% of Pull at Reduced Engine Speed—Two Hours 13th (7 L) Gear</b>											
23.19	1422	6.12	1596	3.11	1.955	0.582	11.86	187	67	88	28.590
<b>MAXIMUM POWER WITH BALLAST</b>											
31.77	5433	2.19	2558	14.96	5th Gear (3 L)			182	37	41	29.060
39.72	3656	4.07	2501	9.00	8th Gear (4 H)			186	46	61	29.000
39.64	3485	4.27	2499	8.41	9th Gear (5 L)			187	46	61	29.000
41.28	2793	5.54	2500	6.62	10th Gear (5 H)			187	45	59	29.010
39.90	2379	6.29	2499	5.59	11th Gear (6 L)			187	47	62	29.010
40.64	1876	8.12	2503	4.23	12th Gear (6 H)			187	47	62	29.010

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—10th (5 H) Gear

Pounds Pull	2793	3041	3259	3463	3461	3541	3331
Horsepower	41.28	40.21	37.84	34.93	29.86	25.36	19.16
Crankshaft Speed rpm	2500	2250	1990	1740	1489	1236	989
Miles Per Hour	5.54	4.96	4.35	3.78	3.24	2.69	2.16
Slip of Drivers %	6.62	7.07	7.86	8.30	8.52	8.41	8.19

## TRACTOR SOUND LEVEL WITHOUT CAB db(A)

Maximum Available Power 2 Hours	97.5
75% of Pull at Max. Power 10 Hours	98.0
50% of Pull at Max. Power 2 Hours	97.5
50% of Pull at Reduced Engine Speed 2 Hours	92.0
Bystander (in 16th—8 H—gear)	88.0

## TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
<b>Rear Tires</b>	Two 14.9-28; 6; 18	Two 14.9-28; 6; 18
<b>Ballast</b>	533 lb each	None
	Cast iron	None
<b>Front Tires</b>	Two 6.50-16; 6; 32	Two 6.50-16; 6; 32
<b>Ballast</b>	None	None
	55 lb each	None
<b>Height of drawbar</b>	17.5 inches	18.0 inches
<b>Static weight with operator—rear</b>	5350 lb	3070 lb
<b>front</b>	1990 lb	1880 lb
<b>total</b>	7340 lb	4950 lb

Department of Agricultural Engineering

Dates of Test: October 9 to 20, 1975

**MANUFACTURER:** JOHN DEERE WERKE  
MANNHEIM, MANNHEIM, GERMANY

**FUEL, OIL AND TIME** Fuel No 2 Diesel  
Cetane No. 51.7 (rating taken from oil com-  
pany's typical inspection data) Specific gravity  
converted to 60°/60° 0.8293 Weight per gallon  
6.905 lb Oil SAE 30 API service classification  
CD-SD To motor 1.527 gal Drained from  
motor 0.918 gal Transmission and final drive  
lubricant John Deere Hy-GARD Total time  
engine was operated 43.5 hours.

**ENGINE** Make John Deere France Type 3  
cylinder Serial No. 3179DL-225183CD Crank-  
shaft Mounted lengthwise Rated rpm 2500  
Bore and stroke 4.19" x 4.33" Compression  
ratio 16.9 to 1 Displacement 179 cu. in. Lubri-  
cation pressure Cranking system 12 volt Air  
cleaner dry type with pleated paper element  
and dust evacuator Oil filter one full flow  
pleated paper screw-on cartridge Oil cooler  
radiator for transmission and hydraulic oil  
Fuel filter two-stage paper cartridge Muffler  
vertical Cooling medium temperature control  
thermostat.

**CHASSIS** Type standard Serial No. 2240B-  
180981 Tread width rear 53.1" to 76.8" front  
49" to 79" Wheel base 74.37" 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 28.9" Vertical dis-  
tance above roadway 31.0" Horizontal distance  
from center of rear wheel tread 0" to the  
right/left Hydraulic control system direct en-  
gine drive Transmission selected gear fixed  
ratio with partial range operator controlled  
power shift Advertised speeds mph first 1.2  
second 1.5 third 1.7 fourth 2.2 fifth 2.5 sixth  
3.2 seventh 3.5 eighth 4.5 ninth 4.7 tenth 6.0  
eleventh 6.7 twelfth 8.5 thirteenth 9.9 fourteenth  
12.6 fifteenth 13.9 sixteenth 17.6 reverse 1.4; 1.8;  
2.0; 2.5; 2.9; 3.7; 4.1 5.2 Clutch single plate  
dry disc operated by foot pedal (in combination  
with PTO clutch) Brakes wet disc hydraulically  
operated by two foot pedals which can be  
locked together Steering mechanical with power  
assist Turning radius (on concrete surface with  
brake applied) right 110" left 110" (on con-  
crete surface without brake) right 122" left 122"  
Turning space diameter (on concrete surface  
with brake applied) right 244" left 244" (on  
concrete surface without brake) right 268" left  
268" Belt pulley 967 rpm at 2100 engine rpm  
diam. 12" face 8.5" Belt speed fpm 3038  
Power take-off 540 rpm at 2074 engine rpm.

**REPAIRS AND ADJUSTMENTS:** No re-  
pairs 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. Fuel temperature at injection  
pump return was 149°F. 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 1192.

LOUIS I. LEVITICUS

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The Agricultural Experiment Station  
Institute of Agriculture and Natural Resources  
University of Nebraska-Lincoln  
H. W. Ottoson, Director

# EXPLANATION OF TEST REPORT

## GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories may be disconnected only when the means for disconnecting can be reached from the operator station. 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 use.

## 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 effects 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 mph. The slip limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

**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 68583.



JOHN DEERE 2240 DIESEL