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January 2003

## Test 1816: John Deere 7220 Powrquad Diesel 16-Speed

Nebraska Tractor Test Lab

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

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# NEBRASKA OECD TRACTOR TEST 1816—SUMMARY 393

## JOHN DEERE 7220 POWRQUAD DIESEL

### 16 SPEED

#### POWER TAKE-OFF PERFORMANCE

Power HP (kW)	Crank shaft speed rpm	Gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Mean Atmospheric Conditions
MAXIMUM POWER AND FUEL CONSUMPTION					
Rated Engine Speed—(PTO speed—1041 rpm)					
97.18 (72.47)	2300	6.18 (23.39)	0.444 (0.270)	15.73 (3.10)	
Standard Power Take-off Speed (PTO speed - 1000 rpm)					
100.86 (75.21)	2209	6.18 (23.40)	0.428 (0.260)	16.32 (3.21)	
Maximum Power (2 hours)					
103.99 (77.55)	1950	5.85 (22.14)	0.393 (0.239)	17.78 (3.50)	

#### VARYING POWER AND FUEL CONSUMPTION

97.18 (72.47)	2300	6.18 (23.39)	0.444 (0.270)	15.73 (3.10)	Air temperature
86.41 (64.43)	2401	5.80 (21.96)	0.469 (0.285)	14.90 (2.93)	79°F (26°C)
65.33 (48.72)	2425	4.90 (18.54)	0.523 (0.318)	13.34 (2.63)	Relative humidity
43.97 (32.79)	2459	4.00 (15.13)	0.634 (0.386)	11.00 (2.17)	50%
22.25 (16.59)	2460	3.09 (11.71)	0.971 (0.590)	7.19 (1.42)	Barometer
2.12 (1.58)	2460	2.19 (8.30)	7.220 (4.392)	0.97 (0.19)	29.11" Hg (98.58 kPa)

Maximum Torque - 330 lb.-ft. (448 Nm) at 1300 rpm

Maximum Torque Rise - 48.7%

Torque rise at 1801 engine rpm - 34%

#### DRAWBAR PERFORMANCE

##### UNBALLASTED - FRONT DRIVE ENGAGED

##### FUEL CONSUMPTION CHARACTERISTICS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp. °F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
Maximum Power—7th (B3) Gear									
87.84 (65.51)	7740 (34.43)	4.26 (6.85)	2295	3.23	0.495 (0.301)	14.10 (2.78)	184 (84)	80 (27)	28.95 (98.04)
75% of Pull at Maximum Power—7th (B3) Gear									
69.28 (51.66)	5793 (25.77)	4.49 (7.22)	2403	2.59	0.555 (0.337)	12.59 (2.48)	183 (84)	79 (26)	28.82 (97.60)
50% of Pull at Maximum Power—7th (B3) Gear									
47.34 (35.30)	3867 (17.20)	4.59 (7.39)	2435	1.63	0.664 (0.404)	10.51 (2.07)	178 (81)	82 (28)	28.81 (97.56)
75% of Pull at Reduced Engine Speed—10th (C2) Gear									
69.65 (51.94)	5789 (25.75)	4.51 (7.26)	1758	2.51	0.453 (0.276)	15.41 (3.03)	180 (82)	81 (27)	28.81 (97.56)
50% of Pull at Reduced Engine Speed—10th (C2) Gear									
47.47 (35.40)	3864 (17.19)	4.61 (7.41)	1778	1.54	0.515 (0.314)	13.54 (2.67)	174 (79)	83 (28)	28.80 (97.53)

**Location of Test:** Nebraska Tractor Test Laboratory, University of Nebraska, Lincoln, Nebraska 68583-0832

**Dates of Test:** May 27-June 2, 2003

**Manufacturer:** John Deere Waterloo Works, P.O. Box 270, Waterloo Ia, USA, 50704

**FUEL, OIL and TIME:** Fuel No. 2 Diesel Specific gravity converted to 60°/60°F (15°/15°C) 0.8386 Fuel weight 6.982 lbs/gal (0.836 kg/l) Oil SAE 15W-40 API service classification CF-4 Transmission and hydraulic lubricant John Deere Hy-Gard fluid Front axle lubricant SAE 85W-140 API GL-5 Total time engine was operated: 23.0 hours

**ENGINE: Make** John Deere Diesel **Type** six cylinder vertical with turbocharger **Serial No.** \*PE6068T249360\* **Crankshaft** lengthwise **Rated engine speed** 2300 **Bore and stroke** 4.19" x 5.00" (106.5 mm x 127.0 mm) **Compression ratio** 17.0 to 1 **Displacement** 414 cu in (6788 ml) **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper element and prestrainer **Muffler** vertical **Cooling medium temperature control** 2 thermostats and variable speed fan

**ENGINE OPERATING PARAMETERS:** Fuel rate: 43.0 - 45.9 lb/h (19.5 - 20.8 kg/h) High idle: 2455 - 2465 rpm Turbo boost: nominal 6.8 - 11.0 psi (46 - 76 kPa) as measured 8.5 psi (59 kPa)

**CHASSIS: Type** front wheel assist **Serial No.** \*RW7220R001875\* **Tread width** rear 60.0" (1525 mm) to 85.7 (2178 mm) front 59.4" (1510 mm) to 88.0" (2235 mm) **Wheelbase** 104.3" (2650 mm) **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (4) range operator controlled power shift **Nominal travel speeds mph (km/h)** first 1.53 (2.46) second 1.84 (2.96) third 2.21 (3.55) fourth 2.70 (4.35) fifth 3.06 (4.93) sixth 3.69 (5.94) seventh 4.42 (7.11) eighth 5.04 (8.11) ninth 5.41 (8.71) tenth 6.07 (9.77) eleventh 7.27 (11.70) twelfth 8.90 (14.33) thirteenth 10.38 (16.70) fourteenth 12.50 (20.11) fifteenth 14.96 (24.09) sixteenth 18.34 (29.51) reverse 1.60 (2.57), 1.92 (3.09), 2.30 (3.70), 2.82 (4.54), 3.20 (5.15), 3.85 (6.20), 4.61 (7.42), 5.26 (8.47), 5.65 (9.09), 6.33 (10.19), 7.59 (12.21), 9.30 (14.96), 10.83 (17.43), 13.04 (20.99), 15.62 (25.14), 19.13 (30.79) **Clutch** wet multiple disc hydraulically actuated by foot pedal **Brakes** wet multiple disc hydraulically operated by two foot pedals that can be locked together **Steering** hydrostatic **Power take-off** 540 rpm at 2143 engine rpm or 1000 rpm at 2208 engine rpm **Unladen tractor mass** 11830 lb (5366 kg)

**DRAWBAR PERFORMANCE**  
**FRONT DRIVE ENGAGED(2300 RPM)**  
**MAXIMUM POWER IN SELECTED GEARS**

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
4th(A4)Gear								
76.33 (56.92)	11834 (52.64)	2.42 (3.89)	2369	12.30	0.560 (0.341)	12.46 (2.45)	176 (80)	28.87 (97.77)
5th(B1)Gear								
82.69 (61.66)	11094 (49.35)	2.80 (4.50)	2303	8.45	0.519 (0.315)	13.46 (2.65)	182 (83)	28.86 (97.73)
6th(B2)Gear								
86.06 (64.18)	9236 (41.08)	3.49 (5.62)	2301	5.08	0.501 (0.305)	13.94 (2.75)	183 (84)	28.85 (97.70)
7th(B3)Gear								
87.84 (65.51)	7740 (34.43)	4.26 (6.85)	2295	3.23	0.495 (0.301)	14.10 (2.78)	184 (84)	28.95 (98.04)
8th(C1)Gear								
86.28 (64.34)	6647 (29.57)	4.87 (7.83)	2299	2.91	0.503 (0.306)	13.87 (2.73)	184 (84)	28.95 (98.04)
9th(B4)Gear								
85.97 (64.11)	6122 (27.23)	5.27 (8.48)	2297	2.35	0.507 (0.309)	13.77 (2.71)	184 (84)	28.93 (97.97)
10th(C2)Gear								
87.85 (65.51)	5567 (24.76)	5.92 (9.52)	2295	2.03	0.498 (0.303)	14.01 (2.76)	183 (84)	28.93 (97.97)
11th(C3)Gear								
85.62 (63.85)	4511 (20.07)	7.12 (11.45)	2297	1.71	0.509 (0.310)	13.71 (2.70)	183 (84)	28.95 (98.04)
12th(C4)Gear								
81.29 (60.62)	3484 (15.50)	8.75 (14.08)	2295	1.30	0.534 (0.325)	13.07 (2.57)	184 (84)	28.95 (98.04)

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. For the maximum power tests the fuel temperature at the injection pump inlet was maintained at 113°F(45°C). The pull in 4<sup>th</sup>(A4) gear was limited to avoid excessive tractor bouncing. The performance figures on this summary were taken from a test conducted under the OECD Code II test code procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1816**, Nebraska Summary 393, July 1, 2003.

Leonard L. Bashford  
Director

M.F. Kocher  
V.I. Adamchuk  
W.P. Campbell  
Board of Tractor Test Engineers

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive	
	Engaged dB(A)	Disengaged dB(A)
At no load in 7th (B3) gear	72.2	72.4
Transport speed-no load- 16th(D4) gear		72.8
Bystander in 16th(D4) Gear		80.6

**TIRES, BALLAST AND WEIGHT**

**Rear Tires** - No., size, ply & psi(kPa)  
**Front Tires** - No., size, ply & psi(kPa)

**Height of Drawbar**

**Static Weight with operator** - Rear  
- Front  
- Total

**Tested Without Ballast**

Two 480/80R38; \*\*; 10(70)  
Two 380/85R28; \*\*; 9(60)

21.0 in (535 mm)  
7625 lb (3459 kg)  
4380 lb (1987 kg)  
12005 lb (5446 kg)

**DRAWBAR PERFORMANCE**  
**FRONT DRIVE ENGAGED (1950 RPM)**  
**MAXIMUM POWER IN SELECTED GEARS**

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
4th(A4)Gear									
76.96 (57.39)	11906 (52.96)	2.42 (3.90)	2345	11.71	0.556 (0.338)	12.56 (2.47)	172 (78)	59 (15)	28.87 (97.77)
5th(B1)Gear									
83.20 (62.05)	11161 (49.65)	2.80 (4.50)	2295	8.52	0.520 (0.316)	13.42 (2.64)	181 (83)	63 (17)	28.86 (97.73)
6th(B2)Gear									
86.15 (64.24)	9993 (44.45)	3.23 (5.20)	2166	6.72	0.488 (0.297)	14.31 (2.82)	183 (84)	75 (24)	28.83 (97.63)
7th(B3)Gear									
91.98 (68.59)	9728 (43.27)	3.55 (5.71)	1951	5.16	0.444 (0.270)	15.73 (3.10)	184 (84)	65 (18)	28.85 (97.70)
8th(C1)Gear									
90.34 (67.37)	8289 (36.87)	4.09 (6.58)	1946	3.93	0.451 (0.275)	15.47 (3.05)	183 (84)	80 (27)	28.95 (98.04)
9th(B4)Gear									
89.40 (66.67)	7546 (33.56)	4.44 (7.15)	1952	3.07	0.454 (0.276)	15.38 (3.03)	183 (84)	78 (26)	28.94 (98.00)
10th(C2)Gear									
90.21 (67.27)	6778 (30.15)	4.99 (8.03)	1952	2.83	0.450 (0.274)	15.52 (3.06)	183 (84)	79 (26)	28.94 (98.00)
11th(C3)Gear									
89.57 (66.79)	5582 (24.83)	6.02 (9.69)	1950	2.11	0.452 (0.275)	15.44 (3.04)	182 (83)	75 (24)	28.93 (97.97)
12th(C4)Gear									
88.10 (65.70)	4467 (19.87)	7.40 (11.90)	1947	1.63	0.464 (0.282)	15.06 (2.97)	183 (84)	83 (28)	28.95 (98.04)
13th(D1)Gear									
87.75 (65.43)	3793 (16.87)	8.68 (13.96)	1953	1.30	0.466 (0.283)	14.99 (2.95)	183 (84)	85 (29)	28.95 (98.04)

**DRAWBAR PERFORMANCE**  
**FRONT DRIVE DISENGAGED (2100 RPM)**  
**MAXIMUM POWER IN SELECTED GEARS**

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption		Temp. °F(°C)	Barom.	
					lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	cool- ing med	Air dry bulb	inch Hg (kPa)
<b>Maximum Power—10th (C2) Gear</b>									
86.82 (64.74)	5565 (24.75)	5.85 (9.42)	2295	2.41	0.500 (0.304)	13.97 (2.75)	183 (84)	72 (22)	28.92 (97.93)
<b>75% of Pull at Maximum Power—10th (C2) Gear</b>									
68.98 (51.44)	4215 (18.75)	6.14 (9.88)	2404	2.17	0.560 (0.340)	12.48 (2.46)	181 (83)	83 (28)	28.80 (97.53)
<b>50% of Pull at Maximum Power—10th (C2) Gear</b>									
47.13 (35.15)	2812 (12.51)	6.29 (10.12)	2438	1.28	0.681 (0.414)	10.25 (2.02)	178 (81)	84 (29)	28.79 (97.49)
<b>75% of Pull at Reduced Engine Speed—12th (C4) Gear</b>									
69.13 (51.55)	4209 (18.72)	6.16 (9.91)	1640	2.01	0.449 (0.273)	15.54 (3.06)	182 (83)	84 (29)	28.79 (97.49)
<b>50% of Pull at Reduced Engine Speed—12th (C4) Gear</b>									
47.11 (35.13)	2803 (12.47)	6.30 (10.14)	1667	1.28	0.513 (0.312)	13.61 (2.68)	176 (80)	85 (29)	28.78 (97.46)
<b>MAXIMUM POWER IN SELECTED GEARS</b>									
<b>5th (B1) Gear</b>									
68.03 (50.73)	9268 (41.23)	2.75 (4.43)	2393	12.76	0.589 (0.358)	11.86 (2.34)	177 (81)	61 (16)	28.86 (97.73)
<b>6th (B2) Gear</b>									
78.34 (58.42)	8780 (39.06)	3.35 (5.38)	2358	10.64	0.548 (0.333)	12.75 (2.51)	182 (83)	67 (19)	28.85 (97.70)
<b>7th (B3) Gear</b>									
85.30 (63.61)	7745 (34.45)	4.13 (6.65)	2305	5.79	0.506 (0.308)	13.80 (2.72)	182 (83)	71 (22)	28.84 (97.66)
<b>8th (C1) Gear</b>									
85.60 (63.83)	6717 (29.88)	4.78 (7.69)	2298	4.13	0.509 (0.310)	13.72 (2.70)	183 (84)	81 (27)	28.95 (98.04)
<b>9th (B4) Gear</b>									
85.55 (63.80)	6179 (27.49)	5.19 (8.36)	2296	2.96	0.507 (0.309)	13.76 (2.71)	184 (84)	76 (24)	28.93 (97.97)
<b>10th (C2) Gear</b>									
86.82 (64.74)	5565 (24.75)	5.85 (9.42)	2295	2.41	0.500 (0.304)	13.97 (2.75)	183 (84)	72 (22)	28.92 (97.93)
<b>11th (C3) Gear</b>									
86.50 (64.50)	4620 (20.55)	7.02 (11.30)	2294	2.17	0.503 (0.306)	13.88 (2.73)	184 (84)	82 (28)	28.95 (98.04)
<b>12th (C4) Gear</b>									
81.98 (61.13)	3550 (15.79)	8.66 (13.94)	2302	1.77	0.530 (0.323)	13.16 (2.59)	183 (84)	84 (29)	28.95 (98.04)

### THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: II

Quick Attach: None lift cylinders  
Maximum Force Exerted Through Whole Range: 5606 lbs (24.9 kN) (2x 75 mm)

CATEGORY: IIIN

Quick Attach: None  
Maximum Force Exerted Through Whole Range: 8855 lbs (39.4 kN) (2x 90 mm)

Sustained pressure at compensator cutoff: 2935 psi (202 bar)

	<u>1 outlet set</u>	<u>2 outlet sets combined</u>
ii) Pump delivery rate at minimum pressure and rated engine speed:	30.1 GPM(113.9 l/min)	30.3 GPM(114.7 l/min)
iii) Pump delivery rate at maximum hydraulic power:	28.1 GPM(106.4 l/min)	28.4 GPM(107.5 l/min)
Delivery pressure:	2403 psi (166 bar)	2707 psi (187 bar)
Power:	39.4 Hp (29.4 kW)	44.9 HP (33.4 kW)

### THREE POINT HITCH PERFORMANCE-SAE TEST

Observed Maximum Pressure psi. (bar)	2935 (202)
Location:	lift cylinders
Hydraulic oil temperature: °F (°C)	140 (60)
Location:	hydraulic sump
Category:	II, IIIN
Quick attach:	No

#### Category II—75 mm cylinders -System pressure 2545 psi (175 Bar)

Hitch point distance to ground level in. (mm)	8.1 (206)	15.0 (381)	22.0 (559)	29.0 (737)	36.0 (914)
Lift force on frame lb	7290	7902	8060	7808	6939
" " " " " " (kN)	(32.4)	(35.1)	(35.9)	(34.7)	(30.9)

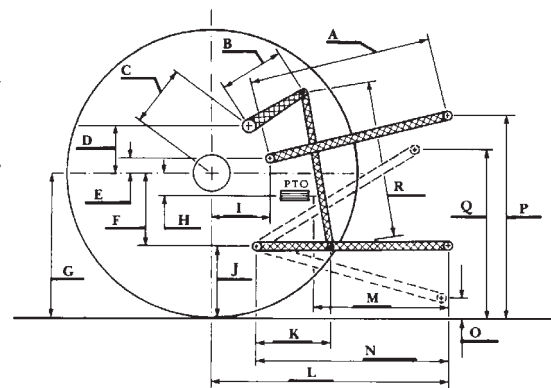
#### Category IIIN—90 mm cylinders -System pressure 2545 psi (175 Bar)

Hitch point distance to ground level in. (mm)	8.1 (206)	16.0 (406)	24.0 (610)	32.1 (815)	38.0 (965)
Lift force on frame lb	13312	12990	13045	12635	11571
" " " " " " (kN)	(59.2)	(57.8)	(58.0)	(56.2)	(51.5)

### HITCH DIMENSIONS AS TESTED—NO LOAD

#### Category II

	SAE TEST		OECD TEST	
	inch	mm	inch	mm
A	24.2	615	25.5	648
B	12.0	305	12.0	305
C	19.9	505	19.9	505
D	18.7	475	18.7	475
E	7.1	180	7.1	180
F	8.8	224	8.8	224
G	32.3	820	32.3	820
H	2.0	50	2.0	50
I	17.8	452	17.8	452
J	23.5	596	23.5	596
K	19.8	503	19.8	503
L	42.5	1080	42.5	1080
M	21.7	550	21.7	550
N	37.2	945	37.2	945
O	8.0	203	8.0	203
P	42.4	1078	47.5	1206
Q	33.4	848	33.4	848
R	31.3	795	31.3	795



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