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Test 1728: John Deere 7810 Powrquad Diesel 16-Speed

Nebraska Tractor Test Lab

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NEBRASKA OECD TRACTOR TEST 1728—SUMMARY 228

JOHN DEERE 7810 POWRQUAD DIESEL

16 SPEED

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

Dates of Test: June 3-16, 1997

Manufacturer: John Deere Tractor Works, P.O.
Box 270, Waterloo, Iowa 50704

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—1007 rpm)					
151.32 (112.84)	2100	9.25 (35.00)	0.429 (0.261)	16.37 (3.22)	
Maximum Power (2 hours)					
166.08 (123.85)	1700	9.21 (34.86)	0.389 (0.237)	18.04 (3.55)	

VARYING POWER AND FUEL CONSUMPTION

151.32 (112.84)	2100	9.25 (35.00)	0.429 (0.261)	16.37 (3.22)	Air temperature
132.67 (98.93)	2169	8.51 (32.21)	0.450 (0.274)	15.59 (3.07)	78°F (25°C)
101.24 (75.50)	2197	7.10 (26.87)	0.492 (0.299)	14.27 (2.81)	Relative humidity
68.18 (50.85)	2229	5.60 (21.20)	0.576 (0.351)	12.17 (2.40)	63%
34.67 (25.85)	2266	4.32 (16.35)	0.874 (0.532)	8.03 (1.58)	Barometer
1.05 (0.78)	2295	2.95 (11.17)	19.767 (12.024)	0.35 (0.07)	28.96" Hg (98.07 kPa)

Maximum Torque 579 lb.-ft. (785 Nm) at 1400 rpm

Maximum Torque Rise 52.9%

Torque rise at 1699 engine rpm 36%

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									
138.85 (103.54)	11777 (52.38)	4.42 (7.12)	2100	3.98	0.471 (0.286)	14.91 (2.94)	196 (91)	65 (18)	28.82 (97.60)
75% of Pull at Maximum Power—7th (B3) Gear									
108.91 (81.21)	8808 (39.18)	4.64 (7.46)	2177	2.89	0.510 (0.310)	13.75 (2.71)	192 (89)	80 (27)	28.81 (97.56)
50% of Pull at Maximum Power—7th (B3) Gear									
74.54 (55.59)	5871 (26.12)	4.76 (7.66)	2210	1.86	0.587 (0.357)	11.96 (2.36)	186 (86)	82 (28)	28.81 (97.56)
75% of Pull at Reduced Engine Speed—10th (C2) Gear									
108.88 (81.19)	8792 (39.11)	4.64 (7.47)	1641	2.97	0.450 (0.274)	15.58 (3.07)	193 (89)	81 (27)	28.81 (97.56)
50% of Pull at Reduced Engine Speed—10th (C2) Gear									
74.60 (55.63)	5891 (26.20)	4.75 (7.64)	1660	1.77	0.481 (0.292)	14.60 (2.88)	184 (84)	84 (29)	28.81 (97.56)

FUEL OIL and TIME: Fuel No. 2 Diesel Cetane No. 50.6 Specific gravity converted to 60°/60° F (15°/15°C) 0.8427 Fuel weight 7.017 lbs/gal (0.841 kg/l) Oil SAE 15W-40 API service classification CD, CE, CF-4 To motor 5.761 gal (21.809 l) Drained from motor 5.668 gal (21.454 l) Transmission and hydraulic lubricant John Deere Hy-Gard fluid Front axle lubricant John Deere Hy-Gard fluid and API GL-5 Gear Lubricant Total time engine was operated 28.5 hours.

ENGINE: Make John Deere Diesel Type six cylinder vertical with turbocharger Serial No. *RG6081T014114* Crankshaft lengthwise Rated engine speed 2100 Bore and stroke (as specified) 4.56" × 5.06" (115.9 mm × 128.5 mm) Compression ratio 16.5 to 1 Displacement 496 cu in (8132 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 Fuel cooler radiator for return fuel Muffler underhood Exhaust vertical Cooling medium temperature control two thermostats and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel rate: 62.6-65.2 lb/h (28.4-29.6 kg/h) High idle: 2225-2325 rpm Turbo boost nominal 16.5-20.9 psi (114-144 kPa) as measured 18.9 psi (130 kPa)

CHASSIS: Type front wheel assist Serial No. *RW7810H002909* Tread width rear 60.0" (1525 mm) to 130.6" (3318 mm) front 60.0" (1524 mm) to 88.0" (2235 mm) Wheel base 110.2" (2800 mm) Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial (4) range operator controlled powershift Nominal travel speeds mph (km/h) first 1.50 (2.41) second 1.80 (2.90) third 2.16 (3.48) fourth 2.65 (4.26) fifth 3.18 (5.11) sixth 3.83 (6.16) seventh 4.58 (7.37) eighth 5.06 (8.14) ninth 5.61 (9.03) tenth 6.09 (9.80) eleventh 7.29 (11.73) twelfth 8.93 (14.37) thirteenth 10.48 (16.87) fourteenth 12.62 (20.31) fifteenth 15.12 (24.33) sixteenth 18.52 (29.80) reverse 1.78 (2.86), 2.14 (3.44), 2.57 (4.13), 3.14 (5.05), 3.77 (6.06), 4.54 (7.30), 5.43 (8.74), 6.00 (9.65), 6.66 (10.71), 7.22 (11.62), 8.65 (13.92), 10.59 (17.05) 12.43 (20.01), 14.97 (24.09), 17.93 (28.85), 21.97 (35.35) Clutch multiple wet disc hydraulically actuated by foot pedal Brakes wet multiple disc hydraulically actuated by two foot pedals which can be locked together Steering hydrostatic Power take-off 540 rpm at 2072 engine rpm and 1000 rpm at 2086 engine rpm Unladen tractor mass 15215 lb (6901 kg)

**DRAWBAR PERFORMANCE
(UNBALLASTED—FRONT DRIVE ENGAGED)
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)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
5th (B1) Gear									
120.83 (90.10)	15391 (68.46)	2.94 (4.74)	2163	10.55	0.522 (0.318)	13.43 (2.65)	189 (87)	63 (17)	28.82 (97.60)
6th (B2) Gear									
136.38 (101.70)	14663 (65.22)	3.49 (5.61)	2061	7.65	0.481 (0.292)	14.60 (2.88)	192 (89)	64 (18)	28.82 (97.60)
7th (B3) Gear									
145.41 (108.43)	14202 (63.17)	3.84 (6.18)	1879	6.80	0.456 (0.277)	15.39 (3.03)	196 (91)	66 (19)	28.83 (97.63)
8th (C1) Gear									
145.98 (108.86)	13616 (60.56)	4.02 (6.47)	1779	6.72	0.451 (0.274)	15.57 (3.07)	202 (94)	70 (21)	28.83 (97.63)
9th (B4) Gear									
145.71 (108.66)	12623 (56.15)	4.33 (6.97)	1703	5.29	0.442 (0.269)	15.86 (3.12)	205 (96)	72 (22)	28.82 (97.60)
10th (C2) Gear									
147.91 (110.30)	11740 (52.22)	4.72 (7.60)	1697	4.47	0.437 (0.266)	16.06 (3.16)	205 (96)	72 (22)	28.82 (97.60)
11th (C3) Gear									
148.60 (110.81)	9665 (42.99)	5.77 (9.28)	1707	3.48	0.432 (0.263)	16.23 (3.20)	206 (96)	73 (23)	28.82 (97.60)
12th (C4) Gear									
146.97 (109.60)	7773 (34.58)	7.09 (11.41)	1699	2.46	0.441 (0.268)	15.92 (3.14)	203 (95)	74 (23)	28.82 (97.60)
13th (D1) Gear									
146.02 (108.89)	6540 (29.09)	8.37 (13.47)	1702	2.03	0.445 (0.271)	15.77 (3.11)	198 (92)	76 (24)	28.83 (97.63)

**DRAWBAR PERFORMANCE
(BALLASTED—FRONT DRIVE ENGAGED)
MAXIMUM POWER IN SELECTED GEARS**

4th (A4) Gear									
130.14 (97.04)	19825 (88.19)	2.46 (3.96)	2114	8.02	0.498 (0.303)	14.08 (2.77)	190 (88)	64 (18)	28.61 (96.88)
5th (B1) Gear									
139.57 (104.08)	18813 (83.68)	2.78 (4.48)	1976	7.25	0.472 (0.287)	14.88 (2.93)	196 (91)	67 (19)	28.62 (96.92)
6th (B2) Gear									
146.62 (109.34)	17735 (78.89)	3.10 (4.99)	1801	5.92	0.448 (0.272)	15.67 (3.09)	198 (92)	68 (20)	28.62 (96.92)
7th (B3) Gear									
148.71 (110.89)	15591 (69.35)	3.58 (5.76)	1704	4.30	0.438 (0.267)	16.02 (3.15)	201 (94)	70 (21)	28.63 (96.95)
8th (C1) Gear									
148.25 (110.55)	13978 (62.17)	3.98 (6.40)	1705	3.64	0.439 (0.267)	15.98 (3.15)	206 (96)	75 (24)	28.63 (96.95)
9th (B4) Gear									
147.52 (110.01)	12462 (55.43)	4.44 (7.14)	1704	2.88	0.437 (0.266)	16.06 (3.16)	203 (95)	75 (24)	28.63 (96.95)
10th (C2) Gear									
150.34 (112.11)	11683 (51.97)	4.83 (7.77)	1702	2.54	0.434 (0.264)	16.17 (3.19)	202 (94)	74 (23)	28.64 (96.99)
11th (C3) Gear									
148.18 (110.50)	9554 (42.50)	5.82 (9.36)	1703	2.03	0.435 (0.265)	16.12 (3.18)	203 (95)	75 (24)	28.63 (96.95)
12th (C4) Gear									
146.59 (109.32)	7673 (34.13)	7.16 (11.53)	1704	1.59	0.441 (0.268)	15.90 (3.13)	201 (94)	76 (24)	28.62 (96.92)
13th (D1) Gear									
145.12 (108.22)	6465 (28.76)	8.42 (13.55)	1701	1.33	0.447 (0.272)	15.69 (3.09)	201 (94)	77 (25)	28.63 (96.95)

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 return was maintained at 146° F (63°C). The pull in 4th (A4) gear (ballasted tractor) and 5th (B1) gear (unballasted tractor) was limited to prevent tractor bouncing. This tractor did not meet the manufacturers claim of 72.0 dB (A) cab sound level. The performance results on this summary were taken from OECD tests conducted under the Code II Restricted Standard Test Code procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1728**, Summary 228, July 11, 1997.

LOUIS I. LEVITICUS
Engineer-in-Charge

L.L. BASHFORD
R.D. GRISSO
M.F. KOCHER
Board of Tractor Test Engineers

DRAWBAR PERFORMANCE
(BALLASTED—FRONT DRIVE DISENGAGED)
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)	Fuel Consumption Hp.hr/gal (kW.h/l)	Temp. °F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
Maximum Power—7th (B3) Gear									
136.59 (101.86)	11532 (51.30)	4.44 (7.15)	2097	3.19	0.476 (0.289)	14.75 (2.91)	196 (91)	72 (22)	28.63 (96.95)
75% of Pull at Maximum Power—7th (B3) Gear									
107.45 (80.13)	8658 (38.51)	4.65 (7.49)	2177	2.35	0.515 (0.313)	13.64 (2.69)	189 (87)	78 (26)	28.64 (96.99)
50% of Pull at Maximum Power—7th (B3) Gear									
73.43 (54.76)	5771 (25.67)	4.77 (7.68)	2213	1.40	0.594 (0.361)	11.82 (2.33)	183 (84)	79 (26)	28.63 (96.95)
75% of Pull at Reduced Engine Speed—10th (C2) Gear									
107.63 (80.25)	8658 (38.51)	4.66 (7.50)	1641	2.35	0.446 (0.271)	15.73 (3.10)	191 (88)	79 (26)	28.64 (96.99)
50% of Pull at Reduced Engine Speed—10th (C2) Gear									
73.42 (54.75)	5773 (25.68)	4.77 (7.67)	1664	1.31	0.494 (0.301)	14.21 (2.80)	183 (84)	79 (26)	28.63 (96.95)

MAXIMUM POWER IN SELECTED GEARS

4th (A4) Gear									
112.84 (84.15)	17820 (79.27)	2.37 (3.82)	2164	13.21	0.549 (0.334)	12.78 (2.52)	188 (86)	64 (18)	28.61 (96.88)
5th (B1) Gear									
133.11 (99.26)	16886 (75.11)	2.96 (4.76)	2101	7.22	0.489 (0.297)	14.35 (2.83)	193 (89)	66 (19)	28.62 (96.92)
6th (B2) Gear									
136.43 (101.74)	13955 (62.07)	3.67 (5.90)	2099	4.36	0.475 (0.289)	14.76 (2.91)	196 (91)	69 (21)	28.63 (96.95)
7th (B3) Gear									
136.59 (101.86)	11532 (51.30)	4.44 (7.15)	2097	3.19	0.476 (0.289)	14.75 (2.91)	196 (91)	72 (22)	28.63 (96.95)
8th (C1) Gear									
135.69 (101.19)	10306 (45.84)	4.94 (7.95)	2103	2.69	0.478 (0.291)	14.67 (2.89)	198 (92)	73 (23)	28.64 (96.99)
9th (B4) Gear									
134.93 (100.62)	9219 (41.01)	5.49 (8.83)	2098	2.35	0.479 (0.291)	14.65 (2.89)	198 (92)	75 (24)	28.63 (96.95)
10th (C2) Gear									
135.31 (100.90)	8522 (37.91)	5.95 (9.58)	2095	2.18	0.479 (0.291)	14.66 (2.89)	198 (92)	75 (24)	28.63 (96.95)
11th (C3) Gear									
135.66 (101.16)	7095 (31.56)	7.17 (11.54)	2098	2.00	0.480 (0.292)	14.62 (2.88)	197 (92)	76 (24)	28.62 (96.92)
12th (C4) Gear									
131.24 (97.87)	5579 (24.82)	8.82 (14.20)	2097	1.22	0.493 (0.300)	14.22 (2.80)	203 (95)	77 (25)	28.63 (96.95)

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive	
	Disengaged dB(A)	Engaged dB(A)
At 75% load in 7th (B3) Gear	73.9	73.6
Bystander 16th (D4) Gear	83.3	—

TIRES, BALLAST AND WEIGHT

		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi (kPa)	Four 18.4R42:***, 9 (60)	Two 18.4R42: **, 13 (90)
Ballast	—Duals (total)	1524 lb (691 kg)	None
	—Cast Iron (total)	1950 lb (885 kg)	None
Front Tires	—No., size, ply & psi (kPa)	Two 14.9R30:***, 14 (95)	Two 14.9R30:***, 12 (85)
Ballast	—Liquid (total)	None	None
	—Cast Iron (total)	406 lb (184 kg)	None
Height of Drawbar		22.0 in (560 mm)	21.0 in (535 mm)
Static Weight with Operator	—Rear	13360 lb (6060 kg)	9970 lb (4522 kg)
	—Front	5900 lb (2676 kg)	5410 lb (2454 kg)
	—Total	19260 lb (8736 kg)	15380 lb (6976 kg)

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: Walterscheid lower link ends

Maximum Force Exerted Through Whole Range:	10161 lbs	(45.2 kN)
i) Opening pressure of relief valve:	NA	
Sustained pressure with pump stalled:	2870 psi	(198 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	27.4 GPM	(103.7 l/min)
iii) Pump delivery rate at maximum hydraulic power:	26.2 GPM	(99.2 l/min)
Delivery pressure:	2450 psi	(169 bar)
Power:	37.5 HP	(27.9 kW)

THREE POINT HITCH PERFORMANCE (SAE Static Test)

Observed Maximum Pressure psi. (bar)	2950 (203)
Location	lift cylinder
Hydraulic oil temperature °F (°C)	144 (62)
Location	hydraulic sump
Category	IIIN
Quick attach	No

SAE Static test—system pressure-2650 psi (182 bar) lift cylinders 1 × 70 mm and 1 × 80 mm

Hitch point distance to ground level	8.1 (206)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb	10953	10944	10629	9855	8397
Lift force on frame (kN)	(48.7)	(48.7)	(47.3)	(43.8)	(37.4)

lift cylinders 2 × 80 mm

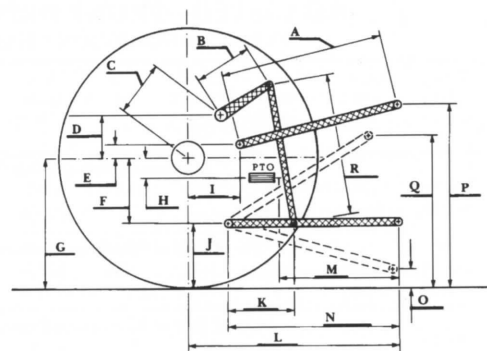
Hitch point distance to ground level in. (mm)	7.7 (196)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb.	12177	12564	12177	11268	9549
Lift force on frame (kN)	(54.1)	(55.9)	(54.2)	(50.1)	(42.5)

ASAE Static test—system pressure-2860 psi (197 bar) lift cylinders 1 × 70 mm and 1 × 80 mm

Hitch point distance to ground level	8.1 (206)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb	11959	11949	11605	10760	9168
Lift force on frame (kN)	(53.2)	(53.2)	(51.6)	(47.9)	(40.8)

lift cylinders 2 × 80 mm

Hitch point distance to ground level in. (mm)	7.7 (196)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb.	13295	13718	13295	12303	10426
Lift force on frame (kN)	(59.1)	(61.0)	(59.1)	(54.7)	(46.4)



HITCH DIMENSIONS AS TESTED—NO LOAD

	OECD test		SAE test	
	inch	mm	inch	mm
A	27.2	692	26.6	676
B	14.8	375	14.8	375
C	24.5	623	24.5	623
D	23.1	588	23.1	588
E	11.1	283	7.5	190
F	10.8	275	10.8	275
G	35.6	905	34.2	870
H	4.1	105	4.1	105
I	19.8	504	19.8	504
J	24.8	630	23.4	595
K	24.1	612	23.1	587
L	47.5	1206	46.4	1179
M	23.1	586	22.0	559
N	39.8	1011	38.7	984
O	9.0	229	8.0	203
P	51.8	1315	45.4	1153
Q	38.8	984	36.8	933
R	38.1	968	35.9	911



JOHN DEERE 7810 POWRQUAD DIESEL

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