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1-1-1997

## Test 1729: John Deere 7810 Powershift Diesel 19-Speed

Nebraska Tractor Test Lab

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

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# NEBRASKA OECD TRACTOR TEST 1729—SUMMARY 229

## JOHN DEERE 7810 POWERSHIFT DIESEL

### 19 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
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>					
<b>Rated Engine Speed—(PTO speed—1007 rpm)</b>					
150.17 (111.98)	2100	8.99 (34.01)	0.420 (0.255)	16.71 (3.29)	
<b>Maximum Power (2 hours)</b>					
165.42 (123.35)	1750	9.07 (34.35)	0.385 (0.234)	18.23 (3.59)	

#### VARYING POWER AND FUEL CONSUMPTION

150.17 (111.98)	2100	8.99 (34.01)	0.420 (0.255)	16.71 (3.29)	Air temperature
129.98 (96.93)	2137	8.21 (31.09)	0.433 (0.269)	15.83 (3.12)	78°F (26°C)
98.82 (73.69)	2165	6.75 (25.57)	0.480 (0.292)	14.63 (2.88)	Relative humidity
66.85 (49.85)	2203	5.30 (20.07)	0.556 (0.338)	12.61 (2.48)	51%
34.19 (25.50)	2236	3.98 (15.05)	0.816 (0.496)	8.60 (1.69)	Barometer
1.03 (0.77)	2266	2.65 (10.03)	17.991 (10.943)	0.39 (0.08)	28.84" Hg (97.66 kPa)

Maximum Torque 563 lb.-ft. (764 Nm) at 1300 rpm  
Maximum Torque Rise 50.0%  
Torque rise at 1703 engine rpm 35%

#### 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)
<b>Maximum Power—9th Gear</b>									
129.42 (96.51)	11241 (50.00)	4.32 (6.95)	2098	3.73	0.490 (0.298)	14.33 (2.82)	203 (95)	72 (22)	28.97 (98.10)
<b>75% of Pull at Maximum Power—9th Gear</b>									
100.69 (75.08)	8428 (37.49)	4.48 (7.21)	2149	2.38	0.529 (0.322)	13.27 (2.61)	195 (91)	79 (26)	28.98 (98.14)
<b>50% of Pull at Maximum Power—9th Gear</b>									
68.77 (51.28)	5620 (25.00)	4.59 (7.39)	2181	1.52	0.610 (0.371)	11.51 (2.27)	191 (88)	79 (26)	28.98 (98.14)
<b>75% of Pull at Reduced Engine Speed—11th Gear</b>									
100.73 (75.11)	8433 (37.51)	4.48 (7.21)	1644	2.56	0.467 (0.284)	15.02 (2.96)	195 (91)	79 (26)	28.98 (98.14)
<b>50% of Pull at Reduced Engine Speed—11th Gear</b>									
68.51 (51.09)	5640 (25.09)	4.56 (7.33)	1656	1.52	0.509 (0.310)	13.78 (2.72)	185 (85)	79 (26)	28.98 (98.14)

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

**Dates of Test:** May 30-June 18, 1997

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

**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 5.544 gal  
(20.972 l) Drained from motor 5.461 gal  
(20.671 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 31.0  
hours.

**ENGINE:** Make John Deere Diesel Type six  
cylinder vertical with turbocharger Serial No.  
\*RG6081T014115\* 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 19.2 psi (133 kPa)

**CHASSIS:** Type front wheel assist Serial No.  
\*RW7810P002932\* 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 full range operator  
controlled powershift Nominal travel speeds mph  
(km/h) first 1.00 (1.60) second 1.43 (2.30) third 1.79  
(2.88) fourth 2.17 (3.49) fifth 2.50 (4.02) sixth 2.83  
(4.56) seventh 3.26 (5.25) eighth 3.88 (6.25) ninth 4.48  
(7.20) tenth 5.08 (8.17) eleventh 5.85 (9.42) twelfth  
6.72 (10.81) thirteenth 7.74 (12.45) fourteenth 8.78  
(14.13) fifteenth 10.11 (16.28) sixteenth 11.33 (18.23)  
seventeenth 14.02 (22.56) eighteenth 19.58 (31.52)  
nineteenth 24.23 (38.99) reverse 1.60 (2.58), 2.29  
(3.69), 3.48 (5.60), 4.01 (6.45), 4.55 (7.32), 5.24 (8.44),  
10.15 (16.33) 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 15564 lb (7060  
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/kWh)	Temp. °F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
6th Gear									
108.96 (81.25)	15737 (70.00)	2.60 (4.18)	2141	10.24	0.536 (0.326)	13.09 (2.58)	193 (89)	68 (20)	28.74 (97.32)
7th Gear									
120.22 (89.65)	14858 (66.09)	3.03 (4.88)	2120	8.10	0.510 (0.310)	13.75 (2.71)	200 (93)	69 (20)	28.98 (98.14)
8th Gear									
130.86 (97.58)	14452 (64.29)	3.40 (5.46)	1971	7.10	0.492 (0.299)	14.27 (2.81)	203 (95)	70 (21)	28.97 (98.10)
9th Gear									
136.04 (101.44)	14319 (63.69)	3.56 (5.73)	1810	7.72	0.474 (0.288)	14.79 (2.91)	210 (99)	72 (22)	28.97 (98.10)
10th Gear									
139.61 (104.11)	13034 (57.98)	4.02 (6.46)	1750	5.28	0.459 (0.279)	15.30 (3.01)	210 (99)	71 (22)	28.98 (98.14)
11th Gear									
142.36 (106.16)	11347 (50.47)	4.71 (7.57)	1750	3.82	0.450 (0.274)	15.59 (3.07)	214 (101)	72 (22)	28.97 (98.10)
12th Gear									
141.75 (105.71)	9783 (43.51)	5.43 (8.75)	1748	2.98	0.451 (0.275)	15.55 (3.06)	216 (102)	71 (22)	28.98 (98.14)
13th Gear									
142.00 (105.89)	8458 (37.62)	6.30 (10.13)	1748	2.38	0.449 (0.273)	15.61 (3.08)	218 (103)	71 (22)	28.98 (98.14)
14th Gear									
141.67 (105.64)	7405 (32.94)	7.17 (11.55)	1748	1.96	0.452 (0.275)	15.53 (3.06)	216 (102)	71 (22)	28.99 (98.17)
15th Gear									
140.97 (105.12)	6380 (28.38)	8.29 (13.34)	1746	1.60	0.453 (0.276)	15.49 (3.05)	217 (103)	72 (22)	28.99 (98.17)

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

5th Gear									
123.71 (92.25)	20200 (89.85)	2.30 (3.70)	2106	8.19	0.509 (0.309)	13.79 (2.72)	196 (91)	67 (19)	28.90 (97.87)
6th Gear									
128.92 (96.14)	19522 (86.84)	2.48 (3.99)	2011	8.72	0.496 (0.302)	14.15 (2.79)	203 (95)	71 (22)	28.91 (97.90)
7th Gear									
136.64 (101.89)	18551 (82.52)	2.76 (4.45)	1903	6.58	0.470 (0.286)	14.94 (2.94)	204 (95)	72 (22)	28.91 (97.90)
8th Gear									
139.38 (103.93)	16960 (75.44)	3.08 (4.96)	1750	4.83	0.460 (0.280)	15.26 (3.01)	208 (98)	74 (23)	28.90 (97.87)
9th Gear									
141.41 (105.45)	14684 (65.32)	3.61 (5.81)	1752	3.34	0.450 (0.274)	15.58 (3.07)	211 (99)	74 (23)	28.89 (97.83)
10th Gear									
143.38 (106.92)	13050 (58.05)	4.12 (6.63)	1750	2.58	0.448 (0.272)	15.68 (3.09)	212 (100)	74 (23)	28.86 (97.73)
11th Gear									
144.06 (107.42)	11312 (50.32)	4.78 (7.69)	1751	2.33	0.445 (0.270)	15.78 (3.11)	216 (102)	74 (23)	28.88 (97.80)
12th Gear									
142.38 (106.17)	9716 (43.22)	5.50 (8.84)	1749	1.81	0.450 (0.274)	15.58 (3.07)	216 (102)	74 (23)	28.87 (97.77)
13th Gear									
141.94 (105.84)	8413 (37.42)	6.33 (10.18)	1743	1.47	0.450 (0.273)	15.61 (3.08)	212 (100)	74 (23)	28.86 (97.73)
14th Gear									
139.95 (104.36)	7271 (32.34)	7.22 (11.62)	1749	1.21	0.455 (0.277)	15.43 (3.04)	208 (98)	73 (23)	28.85 (97.70)
15th Gear									
138.83 (103.52)	6253 (27.81)	8.33 (13.40)	1748	1.12	0.459 (0.279)	15.28 (3.01)	218 (103)	74 (23)	28.84 (97.66)

**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 141°F (65°C). The pull in 5th gear (ballasted tractor) and 6th gear (unballasted tractor) was limited to prevent excessive 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. **1729**, Summary 229, 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)	Hp.hr/gal (kW.h/l)	Temp. °F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
<b>Maximum Power—9th Gear</b>									
126.16 (94.08)	10871 (48.35)	4.35 (7.00)	2098	2.60	0.499 (0.304)	14.06 (2.77)	199 (93)	74 (23)	28.88 (97.80)
<b>75% of Pull at Maximum Power—9th Gear</b>									
97.88 (72.99)	8143 (36.22)	4.51 (7.25)	2155	1.91	0.535 (0.325)	13.12 (2.58)	200 (93)	76 (24)	28.82 (97.60)
<b>50% of Pull at Maximum Power—9th Gear</b>									
66.55 (49.63)	5422 (24.12)	4.60 (7.41)	2188	1.48	0.624 (0.380)	11.24 (2.21)	190 (88)	76 (24)	28.78 (97.46)
<b>75% of Pull at Reduced Engine Speed—11th Gear</b>									
97.90 (73.01)	8117 (36.11)	4.52 (7.28)	1654	1.74	0.471 (0.286)	14.90 (2.94)	195 (90)	76 (24)	28.80 (97.53)
<b>50% of Pull at Reduced Engine Speed—11th Gear</b>									
66.56 (49.63)	5411 (24.07)	4.61 (7.42)	1679	1.39	0.520 (0.316)	13.50 (2.66)	185 (85)	76 (24)	28.78 (97.46)

**MAXIMUM POWER IN SELECTED GEARS**

<b>5th Gear</b>									
106.28 (79.26)	17874 (79.51)	2.23 (3.59)	2134	12.02	0.552 (0.336)	12.72 (2.51)	201 (94)	70 (21)	28.91 (97.90)
<b>6th Gear</b>									
122.83 (91.59)	17752 (78.96)	2.59 (4.18)	2100	8.26	0.512 (0.311)	13.71 (2.70)	198 (92)	69 (21)	28.91 (97.90)
<b>7th Gear</b>									
125.46 (93.56)	15265 (67.90)	3.08 (4.96)	2100	5.48	0.501 (0.305)	14.02 (2.76)	198 (92)	73 (23)	28.90 (97.87)
<b>8th Gear</b>									
125.78 (93.79)	12578 (55.95)	3.75 (6.03)	2099	3.27	0.499 (0.304)	14.06 (2.77)	204 (96)	73 (23)	28.90 (97.87)
<b>9th Gear</b>									
126.16 (94.08)	10871 (48.35)	4.35 (7.00)	2098	2.60	0.499 (0.304)	14.06 (2.77)	199 (93)	74 (23)	28.88 (97.80)
<b>10th Gear</b>									
126.71 (94.49)	9596 (42.68)	4.95 (7.97)	2095	2.08	0.493 (0.300)	14.23 (2.80)	207 (97)	74 (23)	28.88 (97.80)
<b>11th Gear</b>									
126.07 (94.01)	8247 (36.68)	5.73 (9.23)	2097	1.74	0.499 (0.304)	14.05 (2.77)	203 (95)	74 (23)	28.87 (97.77)
<b>12th Gear</b>									
123.48 (92.08)	7003 (31.15)	6.61 (10.64)	2102	1.48	0.509 (0.310)	13.79 (2.72)	203 (95)	74 (23)	28.86 (97.73)
<b>13th Gear</b>									
121.85 (90.86)	5992 (26.65)	7.63 (12.27)	2099	1.22	0.515 (0.314)	13.61 (2.68)	208 (98)	73 (23)	28.85 (97.70)
<b>14th Gear</b>									
121.69 (90.75)	5274 (23.46)	8.65 (13.93)	2096	1.13	0.518 (0.315)	13.54 (2.67)	212 (100)	74 (23)	28.84 (97.66)

<b>TRACTOR SOUND LEVEL WITH CAB</b>	<b>Front Wheel Drive</b>	
	<b>Disengaged dB(A)</b>	<b>Engaged dB(A)</b>
At 75% load in 10th Gear	72.7	72.7
Bystander 19th Gear	84.4	—

**TIRES, BALLAST AND WEIGHT**

		<b>With Ballast</b>	<b>Without Ballast</b>
<b>Rear Tires</b>	—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)	1940 lb (880 kg)	None
<b>Front Tires</b>	—No., size, ply & psi (kPa)	Two 14.9R30:***, 14 (95)	Two 14.9R30:***, 12 (85)
Ballast	—Liquid (total)	None	None
	—Cast Iron (total)	416 lb (189 kg)	None
<b>Height of Drawbar</b>		22.0 in (560 mm)	21.0 in (535 mm)
<b>Static Weight with Operator</b>	—Rear	13550 lb (6146 kg)	10190 lb (4622 kg)
	—Front	6060 lb (2749 kg)	5540 lb (2513 kg)
	—Total	19610 lb (8895 kg)	15730 lb (7135 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:

2830 psi (195 bar)

ii) Pump delivery rate at minimum pressure and rated engine speed:

26.9 GPM (101.8 l/min)

iii) Pump delivery rate at maximum

hydraulic power:

25.2 GPM (95.4 l/min)

Delivery pressure:

2500 psi (172 bar)

Power:

36.8 HP (27.4 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)

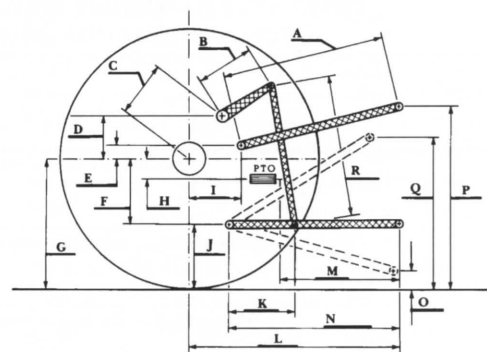
7.7 (196) 16.0 (406) 24.0 (610) 32.0 (813) 40.0 (1016)

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 POWERSHIFT DIESEL

Agricultural Research Division  
Institute of Agriculture and Natural Resources  
University of Nebraska—Lincoln  
Darrell Nelson, Dean and Director