

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

January 2000

Test 1775: John Deere 8310 Diesel 16-Speed

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 1775: John Deere 8310 Diesel 16-Speed" (2000). *Nebraska Tractor Tests*. 2202.

<https://digitalcommons.unl.edu/tractormuseumlit/2202>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

NEBRASKA OECD TRACTOR TEST 1775—SUMMARY 310

JOHN DEERE 8310 DIESEL

16 SPEED

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

Dates of Test: April 13-May 12, 2000

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)
0.8487 **Fuel weight** 7.067 lbs/gal (0.847 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: 29.0 hours

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—1009 rpm)					
207.25 (154.55)	2200	11.63 (44.01)	0.396 (0.241)	17.82 (3.51)	
Maximum Power (2 hours)					
236.74 (176.54)	2000	12.43 (47.04)	0.371 (0.226)	19.05 (3.75)	

VARYING POWER AND FUEL CONSUMPTION

207.25 (154.55)	2200	11.63 (44.01)	0.396 (0.241)	17.82 (3.51)	Air temperature
180.63 (134.70)	2254	10.57 (40.01)	0.414 (0.252)	17.09 (3.37)	76°F (24°C)
136.00 (101.42)	2265	8.58 (32.46)	0.446 (0.271)	15.86 (3.12)	Relative humidity
90.77 (67.68)	2273	6.62 (25.07)	0.516 (0.314)	13.71 (2.70)	48%
45.89 (34.22)	2286	4.58 (17.35)	0.706 (0.429)	10.01 (1.97)	Barometer
1.00 (0.75)	2293	2.72 (10.28)	19.171 (11.661)	0.37 (0.07)	28.91" Hg (97.90 kPa)

Maximum Torque - 741 lb.-ft. (1005 Nm) at 1100 rpm
Maximum Torque Rise - 49.8%
Torque rise at 1800 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 cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
Maximum Power—8th Gear									
176.22 (131.41)	14149 (62.94)	4.67 (7.52)	2200	6.26	0.467 (0.284)	15.12 (2.98)	195 (90)	64 (18)	28.96 (98.07)
75% of Pull at Maximum Power—8th Gear									
139.21 (103.81)	10659 (47.41)	4.90 (7.88)	2259	4.31	0.490 (0.298)	14.41 (2.84)	191 (88)	64 (18)	28.98 (98.14)
50% of Pull at Maximum Power—8th Gear									
94.47 (70.45)	7096 (31.56)	4.99 (8.04)	2271	2.91	0.561 (0.341)	12.60 (2.48)	184 (84)	65 (18)	28.99 (98.17)
75% of Pull at Reduced Engine Speed—10th Gear									
139.16 (103.77)	10672 (47.47)	4.89 (7.87)	1772	4.31	0.425 (0.258)	16.63 (3.28)	194 (90)	64 (18)	28.98 (98.14)
50% of Pull at Reduced Engine Speed—10th Gear									
94.36 (70.36)	7106 (31.61)	4.98 (8.01)	1780	2.91	0.468 (0.285)	15.10 (2.97)	188 (86)	65 (18)	28.99 (98.17)

ENGINE: Make John Deere Diesel **Type** six
cylinder vertical with turbocharger and air to air
aftercooler **Serial No.** *RG6081H098910*
Crankshaft lengthwise **Rated engine speed** 2200
Bore and stroke 4.56" x 5.06" (115.8 mm x 128.5 mm)
Compression ratio 16.5 to 1 **Displacement** 496 cu
in (8134 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 pump return fuel **Muffler**
vertical **Cooling medium temperature control** 2
thermostats and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel
rate: 79.9 - 87.4 lb/h (36.3 - 39.7 kg/h) **High idle:**
2275 - 2325 rpm **Turbo boost:** nominal 18.7 - 23.1
psi (129 - 159 kPa) as measured 21.3 psi (147 kPa)

CHASSIS: **Type** front wheel assist **Serial**
No. *RW8310P001626* **Tread width** rear 65.3"
(1659 mm) to 141.1 (3585 mm) front 60.0" (1524 mm)
to 88.0" (2235 mm) **Wheelbase** 116.1" (2950 mm)
Hydraulic control system direct engine drive
Transmission selective gear fixed ratio with full
range operator controlled power shift **Nominal**
travel speeds mph (km/h) first 1.35 (2.18) second
1.73 (2.79) third 2.21 (3.55) fourth 2.81 (4.53) fifth
3.41 (5.49) sixth 3.85 (6.19) seventh 4.36 (7.01) eighth
4.92 (7.91) ninth 5.54 (8.92) tenth 6.26 (10.07)
eleventh 7.08 (11.40) twelfth 7.99 (12.86) thirteenth
10.17 (16.36) fourteenth 12.99 (20.91) fifteenth
16.53 (26.61) sixteenth 23.04 (37.08) @ 2400 engine
rpm reverse 1.18 (1.90), 2.98 (4.79), 3.66 (5.89),
6.45 (10.38) @ 1600 engine rpm **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** 1 3/4" shaft - 1000 rpm
at 2179 engine rpm, (optional - 1 3/8" shaft, 540 rpm
at 1978 engine rpm or 1000 rpm at 2179 engine
rpm) **Unladen tractor mass** 19860 lb (9008 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)	Consumption Hp.hr/gal (kW.h/l)	Temp. °F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
5th Gear									
149.29 (111.33)	18508 (82.33)	3.03 (4.87)	2253	14.50	0.522 (0.318)	13.54 (2.67)	193 (89)	59 (15)	28.96 (98.07)
6th Gear									
163.43 (121.87)	17622 (78.38)	3.48 (5.60)	2244	12.60	0.506 (0.308)	13.98 (2.75)	192 (89)	61 (16)	28.96 (98.07)
7th Gear									
176.48 (131.60)	17105 (76.09)	3.87 (6.23)	2159	10.84	0.478 (0.291)	14.78 (2.91)	196 (91)	64 (18)	28.96 (98.07)
8th Gear									
188.92 (140.88)	16946 (75.38)	4.18 (6.73)	2066	10.61	0.462 (0.281)	15.31 (3.02)	196 (91)	64 (18)	28.96 (98.07)
9th Gear									
198.91 (148.33)	15960 (70.99)	4.67 (7.52)	1997	8.61	0.443 (0.269)	15.96 (3.14)	198 (92)	64 (18)	28.97 (98.10)
10th Gear									
202.42 (150.94)	14083 (62.64)	5.39 (8.67)	1999	6.43	0.439 (0.267)	16.11 (3.17)	198 (92)	64 (18)	28.97 (98.10)
11th Gear									
203.56 (151.80)	12339 (54.88)	6.19 (9.96)	1999	5.08	0.428 (0.261)	16.49 (3.25)	199 (93)	66 (19)	28.97 (98.10)
12th Gear									
203.01 (151.38)	10824 (48.15)	7.03 (11.32)	1998	4.40	0.432 (0.263)	16.37 (3.22)	198 (92)	64 (18)	28.98 (98.13)
13th Gear									
200.95 (149.85)	8314 (36.98)	9.06 (14.59)	2000	3.17	0.436 (0.265)	16.21 (3.19)	201 (94)	64 (18)	28.98 (98.13)

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 115°F(46°C).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. **1775**, Nebraska Summary 310, July 7, 2000.

Brent T. Sampson
 Test Engineer

L. L. Bashford
 M. F. Kocher
 R. D. Grisso, Jr.
 Board of Tractor Test Engineers

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive	
	Engaged dB(A)	Disengaged dB(A)
At no load in 8th gear	73.5	73.5
Transport speed - no load - 16th gear		75.8
Bystander in 16th Gear		88.6

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires - No., size, ply & psi(kPa)	Four 620/70R42;**,9(60)	Two 620/70R42;**,13(90)
Ballast - Duals (total)	2310 lb (1048 kg)	None
- Cast Iron (total)	3075 lb (1395 kg)	None
Front Tires - No., size, ply & psi(kPa)	Two 480/70R30;***;25(170)	Two 480/70R30;***;16(110)
Ballast - Liquid (total)	None	None
- Cast Iron (total)	1750 lb (794 kg)	None
Height of Drawbar	20.5 in (520 mm)	21.0 in (535 mm)
Static Weight with operator - Rear	16715 lb (7582 kg)	11905 lb(5400 kg)
- Front	10450 lb (4740 kg)	8125 lb(3685 kg)
- Total	27165 lb(12322 kg)	20030 lb(9085 kg)

DRAWBAR PERFORMANCE
BALLASTED- FRONT DRIVE ENGAGED(2000 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. ^o F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
3rd Gear									
136.87 (102.06)	26601 (118.32)	1.93 (3.11)	2255	14.94	0.537 (0.327)	13.15 (2.59)	187 (86)	57 (14)	29.01 (98.24)
4th Gear									
165.87 (123.69)	24858 (110.57)	2.50 (4.03)	2188	11.21	0.496 (0.302)	14.24 (2.81)	191 (88)	58 (14)	29.02 (98.27)
5th Gear									
188.10 (140.26)	24417 (108.61)	2.89 (4.65)	2068	10.32	0.459 (0.279)	15.40 (3.03)	193 (89)	60 (16)	29.02 (98.27)
6th Gear									
197.30 (147.13)	22942 (102.05)	3.23 (5.19)	1998	8.32	0.444 (0.270)	15.93 (3.14)	197 (92)	64 (18)	29.01 (98.24)
7th Gear									
204.17 (152.25)	20419 (90.83)	3.75 (6.03)	2001	5.90	0.430 (0.261)	16.45 (3.24)	198 (92)	65 (18)	29.02 (98.27)
8th Gear									
205.52 (153.26)	18009 (80.11)	4.28 (6.89)	2000	4.55	0.427 (0.259)	16.57 (3.26)	199 (93)	66 (19)	29.02 (98.27)
9th Gear									
206.74 (154.17)	15933 (70.87)	4.87 (7.83)	2000	3.95	0.425 (0.259)	16.63 (3.28)	199 (93)	68 (20)	29.01 (98.24)
10th Gear									
206.62 (154.08)	14030 (62.41)	5.52 (8.89)	2000	3.43	0.423 (0.258)	16.69 (3.29)	200 (93)	71 (22)	28.99 (98.17)
11th Gear									
205.21 (153.03)	12260 (54.54)	6.28 (10.10)	1999	2.91	0.428 (0.260)	16.51 (3.25)	195 (91)	73 (23)	28.97 (98.10)
12th Gear									
203.44 (151.71)	10730 (47.73)	7.11 (11.44)	1998	2.55	0.432 (0.263)	16.37 (3.22)	198 (92)	73 (23)	28.97 (98.10)
13th Gear									
198.58 (148.08)	8162 (36.31)	9.12 (14.68)	2002	2.11	0.442 (0.269)	16.01 (3.15)	198 (92)	73 (18)	28.96 (98.07)

DRAWBAR PERFORMANCE
BALLASTED-FRONT DRIVE ENGAGED (2200 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. inch Hg (kPa)
					lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	cool- ing med	Air dry bulb	
3rd Gear									
135.36 (100.94)	26123 (116.20)	1.94 (3.13)	2256	14.34	0.537 (0.327)	13.15 (2.59)	186 (86)	57 (14)	29.01 (98.24)
4th Gear									
167.85 (125.16)	24475 (108.87)	2.57 (4.14)	2201	9.10	0.487 (0.296)	14.51 (2.86)	192 (89)	57 (14)	29.01 (98.24)
5th Gear									
177.90 (132.66)	20655 (91.88)	3.23 (5.20)	2201	5.90	0.461 (0.280)	15.33 (3.02)	194 (90)	62 (17)	29.01 (98.24)
6th Gear									
177.74 (132.54)	18114 (80.58)	3.68 (5.92)	2198	4.72	0.462 (0.281)	15.28 (3.01)	194 (90)	64 (18)	29.01 (98.24)
7th Gear									
181.38 (135.25)	16213 (72.12)	4.20 (6.75)	2197	4.13	0.453 (0.276)	15.60 (3.07)	195 (90)	64 (18)	29.02 (98.27)
8th Gear									
180.46 (134.57)	14183 (63.09)	4.77 (7.68)	2201	3.35	0.455 (0.277)	15.53 (3.06)	197 (91)	67 (19)	29.02 (98.27)
9th Gear									
179.88 (134.14)	12479 (55.51)	5.41 (8.70)	2200	2.99	0.459 (0.279)	15.41 (3.04)	197 (92)	69 (21)	29.00 (98.21)
10th Gear									
179.10 (133.55)	10969 (48.79)	6.12 (9.85)	2200	2.46	0.460 (0.280)	15.35 (3.02)	195 (91)	72 (22)	28.98 (99.13)
11th Gear									
175.26 (130.70)	9444 (42.01)	6.96 (11.20)	2200	2.20	0.468 (0.284)	15.11 (2.98)	196 (91)	73 (23)	28.97 (98.10)
12th Gear									
173.90 (129.68)	8296 (36.90)	7.86 (12.65)	2196	1.93	0.475 (0.289)	14.88 (2.93)	197 (91)	73 (23)	28.96 (98.07)

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: Yes

Maximum Force Exerted Through Whole Range:

lift cylinders 2x90 mm	lift cylinders 2x100 mm
10827 lbs (48.2 kN)	15147 lbs (67.4 kN)

i) Opening pressure of relief valve:

NA	NA
----	----

Sustained pressure at compensator cutoff:

2920 psi (201 bar)	2910 psi (201 bar)
two outlet sets combined	

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

35.1 GPM (132.9 l/min)	44.3 GPM (167.7 l/min)
------------------------	------------------------

iii) Pump delivery rate at maximum

hydraulic power:

33.2 GPM (125.7 l/min)	41.6 GPM (157.5 l/min)
------------------------	------------------------

Delivery pressure:

2550 psi (176 bar)	2460 psi (170 bar)
--------------------	--------------------

Power:

49.4 HP (36.8 kW)	59.7 HP (44.5 kW)
-------------------	-------------------

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

31.8 GPM (120.4 l/min)	32.9 GPM (124.5 l/min)
------------------------	------------------------

iii) Pump delivery rate at maximum

hydraulic power:

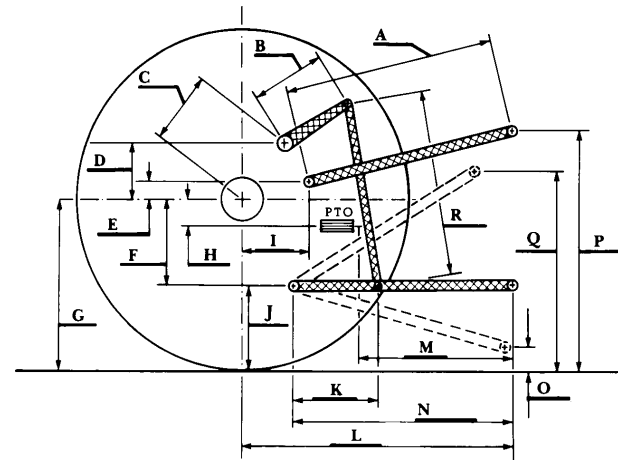
30.4 GPM (115.1 l/min)	29.8 GPM (112.8 l/min)
------------------------	------------------------

Delivery pressure:

2250 psi (155 bar)	2230 psi (154 bar)
--------------------	--------------------

Power:

39.9 HP (29.8 kW)	38.8 HP (28.9 kW)
-------------------	-------------------



THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi. (bar)

2920 (201)

Location:

remote outlet

Hydraulic oil temperature: °F (°C)

150 (65)

Location:

pump inlet

Category:

III

Quick attach:

yes

SAE Static Test—System pressure 2640 psi (182 Bar)
with lift cylinders (2) 90 mm

Hitch point distance to ground level in. (mm)	8.0 (203)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb	11637	12371	11957	11642	10755
" " " " " " (kN)	(51.8)	(55.0)	(53.2)	(51.8)	(47.8)

with lift cylinders (2) 100 mm

Hitch point distance to ground level in. (mm)	8.0 (203)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb	16799	17262	16754	16430	15260
" " " " " " (kN)	(74.7)	(76.8)	(74.5)	(73.1)	(67.9)

ASAE Static Test—System pressure 2900 psi (200 Bar)
with lift cylinders (2) 90 mm

Hitch point distance to ground level in. (mm)	8.0 (203)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb	12821	13643	13196	12820	11852
" " " " " " (kN)	(57.0)	(60.7)	(58.7)	(57.0)	(52.7)

with lift cylinders (2) 100 mm

Hitch point distance to ground level in. (mm)	8.0 (203)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb	18591	19018	18376	18070	16742
" " " " " " (kN)	(82.7)	(84.6)	(81.7)	(80.4)	(74.5)

HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	mm
A	28.3	718
B	19.5	495
C	21.7	550
D	19.5	495
E	4.8	123
F	13.8	350
G	35.6	905
H	7.8	197
I	20.3	515
J	21.8	555
K	28.2	716
L	48.9	1242
*L'	52.4	1331
M	22.0	558
N	38.1	967
O	9.0	229
P	43.8	1114
Q	40.1	1019
R	41.5	1054

*L' to Quick Attach ends



JOHN DEERE 8310 DIESEL

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