

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.  
Larsen

---

January 2004

## Test 1834: John Deere 7820 Autoquad-Plus Diesel 20-Speed

Tractor Museum

University of Nebraska-Lincoln, TractorMuseumArchives@unl.edu

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



Part of the [Applied Mechanics Commons](#)

---

Museum, Tractor, "Test 1834: John Deere 7820 Autoquad-Plus Diesel 20-Speed" (2004). *Nebraska Tractor Tests*. 2130.

<https://digitalcommons.unl.edu/tractormuseumlit/2130>

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 1834—SUMMARY 426

## JOHN DEERE 7820 AUTOQUAD-PLUS DIESEL

### 20 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—1077 rpm)</b>					
156.55 (116.74)	2101	9.36 (35.44)	0.420 (0.255)	16.72 (3.29)	
<b>Standard Power Take-off Speed (1000 rpm)</b>					
170.96 (127.49)	1950	9.59 (36.32)	0.394 (0.240)	17.82 (3.51)	
<b>Maximum Power (2 hours)</b>					
174.31 (129.99)	1850	9.55 (36.15)	0.385 (0.234)	18.25 (3.60)	

#### VARYING POWER AND FUEL CONSUMPTION

156.55 (116.74)	2101	9.36 (35.44)	0.420 (0.255)	16.72 (3.29)	Air temperature
136.75 (101.98)	2155	8.67 (32.83)	0.445 (0.271)	15.77 (3.11)	77°F (25°C)
103.03 (76.83)	2165	7.18 (27.17)	0.489 (0.298)	14.35 (2.83)	Relative humidity
68.93 (51.40)	2172	5.77 (21.84)	0.588 (0.357)	11.95 (2.35)	42%
34.65 (25.84)	2184	4.02 (15.20)	0.814 (0.495)	8.63 (1.70)	Barometer
1.07 (0.80)	2193	2.52 (9.54)	16.541 (10.062)	0.42 (0.08)	29.12" Hg (98.61 kPa)

Maximum Torque - 616 lb.-ft. (835 Nm) at 1150 rpm  
 Maximum Torque Rise - 57.1%  
 Torque rise at 1700 engine rpm - 38%

#### 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—7th (B3) Gear</b>									
143.52 (107.02)	11494 (51.13)	4.68 (7.54)	2094	3.01	0.464 (0.282)	15.14 (2.98)	181 (83)	48 (9)	28.90 (97.87)
<b>75% of Pull at Maximum Power—7th (B3) Gear</b>									
111.61 (83.23)	8600 (38.26)	4.87 (7.83)	2157	2.11	0.541 (0.329)	12.97 (2.56)	182 (84)	60 (16)	28.89 (97.83)
<b>50% of Pull at Maximum Power—7th (B3) Gear</b>									
75.35 (56.19)	5731 (25.49)	4.93 (7.93)	2165	1.20	0.605 (0.368)	11.60 (2.29)	179 (82)	65 (18)	28.87 (97.77)
<b>75% of Pull at Reduced Engine Speed—10th (C2) Gear</b>									
111.66 (83.26)	8598 (38.24)	4.87 (7.84)	1624	2.11	0.433 (0.264)	16.21 (3.19)	187 (86)	64 (18)	28.88 (97.80)
<b>50% of Pull at Reduced Engine Speed—10th (C2) Gear</b>									
75.52 (56.31)	5739 (25.53)	4.93 (7.94)	1630	1.19	0.477 (0.290)	14.73 (2.90)	183 (84)	68 (20)	28.84 (97.66)

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

**Dates of Test:** March 31-April 21, 2004

**Manufacturer:** John Deere Tractor Works, 3500 East Donald Street, P.O. Box 270, Waterloo Ia, 50704-0270

**FUEL, OIL and TIME:** Fuel No. 2 Diesel Specific gravity converted to 60°/60°F (15°/15°C) 0.8432 Fuel weight 7.021 lbs/gal (0.841 kg/l) Oil SAE 15W-40 API service classification CF-4 Transmission and hydraulic lubricant John Deere Hy-Gard fluid Front axle lubricant John Deere Hy-Gard fluid Total time engine was operated: 32.5 hours

**ENGINE: Make** John Deere Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler **Serial No.** \*RG6081H233734\* **Crankshaft** lengthwise **Rated engine speed** 2100 **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 inlet fuel **Muffler** vertical **Cooling medium temperature control** 2 thermostats and variable speed fan

**ENGINE OPERATING PARAMETERS:** Fuel rate: 64.8 - 72.3 lb/h (29.4 - 32.8 kg/h) High idle: 2175 - 2225 rpm Turbo boost: nominal 14.5-17.4 psi (100-120 kPa) as measured 16.7 psi (115 kPa)

**CHASSIS: Type** front wheel assist **Serial No.** \*RW7820A010736\* **Tread width** rear 60.0" (1524 mm) to 117.5 (2984 mm) front 60.0" (1524 mm) to 88.0" (2235 mm) **Wheelbase** 112.5" (2860 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 1.56 (2.51) second 1.88 (3.02) third 2.25 (3.62) fourth 2.75 (4.43) fifth 3.31 (5.32) sixth 3.98 (6.40) seventh 4.77 (7.67) eighth 5.26 (8.46) ninth 5.83 (9.39) tenth 6.33 (10.19) eleventh 7.58 (12.20) twelfth 9.29 (14.95) thirteenth 9.74 (15.67) fourteenth 11.73 (18.87) fifteenth 14.04 (22.60) sixteenth 14.42 (23.21) seventeenth 17.20 (27.68) eighteenth 17.37 (27.95) nineteenth 20.80 (33.47) twentieth 25.48 (41.01) reverse 1.63 (2.62), 1.96 (3.15), 2.35 (3.78), 2.88 (4.63), 3.45 (5.55), 4.15 (6.68), 4.97 (8.00), 5.49 (8.83), 6.09 (9.80), 6.61 (10.63), 7.92 (12.74), 9.69 (15.60), 10.16 (16.35), 12.24 (19.69), 14.65 (23.58), 15.05 (24.22), 17.95 (28.88), 18.12 (29.16), 21.71 (34.93), 26.59 (42.79)

**DRAWBAR PERFORMANCE**  
**UNBALLASTED - FRONT DRIVE ENGAGED-1850 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	Barom. inch Hg (kPa)		
4th(A4) Gear									
117.58 (87.68)	17061 (75.89)	2.58 (4.16)	2149	9.71	0.541 (0.329)	12.98 (2.56)	182 (83)	60 (16)	28.57 (96.75)
5th(B1) Gear									
137.76 (102.73)	16253 (72.30)	3.18 (5.12)	2138	7.00	0.497 (0.303)	14.12 (2.78)	183 (84)	59 (15)	28.58 (96.78)
6th(B2) Gear									
149.60 (111.56)	15544 (69.14)	3.61 (5.81)	1990	5.78	0.456 (0.277)	15.40 (3.03)	185 (85)	51 (11)	28.90 (97.87)
7th(B3) Gear									
157.38 (117.36)	13895 (61.81)	4.25 (6.84)	1924	4.24	0.422 (0.257)	16.63 (3.28)	187 (86)	50 (10)	28.90 (97.87)
8th(C1) Gear									
159.29 (118.78)	13267 (59.01)	4.50 (7.25)	1847	4.16	0.415 (0.252)	16.92 (3.33)	187 (86)	52 (11)	28.90 (97.87)
9th(B4) Gear									
157.34 (117.33)	11717 (52.12)	5.04 (8.10)	1844	3.30	0.421 (0.256)	16.67 (3.28)	190 (88)	57 (14)	28.89 (97.83)
10th(C2) Gear									
158.50 (118.19)	10838 (48.21)	5.48 (8.83)	1845	2.97	0.417 (0.253)	16.85 (3.32)	190 (88)	54 (12)	28.90 (97.87)
11th(C3) Gear									
157.99 (117.81)	8958 (39.85)	6.61 (10.64)	1845	2.24	0.423 (0.257)	16.60 (3.27)	191 (88)	58 (14)	28.89 (97.83)
12th(C4) Gear									
154.84 (115.47)	7137 (31.75)	8.14 (13.09)	1841	1.62	0.431 (0.262)	16.31 (3.21)	193 (89)	59 (15)	28.89 (97.83)

**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 1950 engine rpm or 1000 rpm at 1950 engine rpm **Unladen tractor mass** 17230 lb (7815 kg)

**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 96°F (36°C). The pull in 3<sup>rd</sup> (A3) gear (ballasted tractor) 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. **1834**, Nebraska Summary 426, July 19, 2004.

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	72.0	72.6
Transport speed - no load - 20th (E4) gear		72.6
Bystander in 20th (E4) Gear		86.1

**TIRES, BALLAST AND WEIGHT**

	With Ballast	Without Ballast
<b>Rear Tires</b> - No., size, ply & psi(kPa)	Four 480/80R46;***;9(60)	Two 480/80R46;***;16(110)
<b>Ballast</b> - Duals (total)	1830 lb (830 kg)	None
- Cast Iron (total)	1365 lb (619 kg)	None
<b>Front Tires</b> - No., size, ply & psi(kPa)	Two 420/90R30;***;16(110)	Two 420/90R30;***;11(115)
<b>Ballast</b> - Liquid (total)	None	None
- Cast Iron (total)	920 lb (417 kg)	None
<b>Height of Drawbar</b>	21.5 in (545 mm)	21.5 in (545 mm)
<b>Static Weight with operator</b> - Rear	13830 lb (6273 kg)	11065 lb (5019 kg)
- Front	7690 lb (3488 kg)	6340 lb (2876 kg)
- Total	21520 lb (9761 kg)	17405 lb (7895 kg)

**DRAWBAR PERFORMANCE**  
**BALLASTED - FRONT DRIVE ENGAGED - 1850 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)	Fuel Consumption Hp.hr/gal (kW.h/l)	Temp.°F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
3rd(A3)Gear									
122.80 (91.57)	21634 (96.23)	2.13 (3.43)	2147	8.68	0.521 (0.317)	13.48 (2.66)	180 (82)	51 (11)	28.96 (98.07)
4th(A4)Gear									
140.74 (104.95)	20832 (92.67)	2.53 (4.08)	2043	6.72	0.474 (0.289)	14.80 (2.91)	185 (85)	52 (11)	29.02 (98.27)
5th(B1)Gear									
154.43 (115.16)	19990 (88.92)	2.90 (4.66)	1922	5.55	0.445 (0.271)	15.78 (3.11)	186 (86)	52 (11)	29.04 (98.34)
6th(B2)Gear									
159.44 (118.89)	17496 (77.83)	3.42 (5.50)	1850	3.87	0.420 (0.256)	16.71 (3.29)	188 (87)	53 (12)	29.06 (98.41)
7th(B3)Gear									
160.03 (119.33)	14511 (64.55)	4.14 (6.66)	1852	2.92	0.423 (0.257)	16.59 (3.27)	187 (86)	54 (12)	29.08 (98.48)
8th(C1)Gear									
158.85 (118.46)	13004 (57.84)	4.58 (7.37)	1851	2.54	0.426 (0.259)	16.46 (3.24)	188 (87)	54 (12)	29.08 (98.48)
9th(B4)Gear									
158.05 (117.86)	11619 (51.68)	5.10 (8.21)	1851	2.24	0.426 (0.259)	16.47 (3.24)	189 (87)	55 (13)	29.08 (98.48)
10th(C2)Gear									
157.18 (117.21)	10643 (47.34)	5.54 (8.91)	1849	2.06	0.425 (0.258)	16.54 (3.26)	187 (86)	54 (12)	29.08 (98.48)
11th(C3)Gear									
156.50 (116.70)	8807 (39.18)	6.66 (10.72)	1850	1.67	0.434 (0.264)	16.16 (3.18)	191 (88)	56 (13)	29.08 (98.48)
12th(C4)Gear									
152.11 (113.43)	6935 (30.85)	8.23 (13.24)	1858	1.25	0.440 (0.268)	15.95 (3.14)	191 (88)	56 (13)	29.08 (98.48)

**DRAWBAR PERFORMANCE**  
**BALLASTED - FRONT DRIVE DISENGAGED**  
**FUEL CONSUMPTION CHARACTERISTICS**

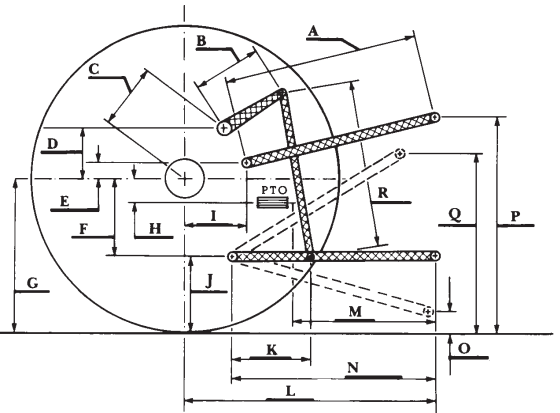
Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
<b>Maximum Power—7th (B3) Gear</b>									
142.08 (105.95)	11398 (50.70)	4.67 (7.52)	2100	2.60	0.475 (0.289)	14.79 (2.91)	183 (84)	53 (12)	29.07 (98.44)
<b>75% of Pull at Maximum Power—7th(B3) Gear</b>									
109.72 (81.82)	8534 (37.96)	4.82 (7.76)	2150	1.83	0.532 (0.323)	13.20 (2.60)	180 (82)	56 (13)	29.08 (98.48)
<b>50% of Pull at Maximum Power—7th (B3) Gear</b>									
74.09 (55.25)	5690 (25.31)	4.88 (7.86)	2163	1.21	0.630 (0.383)	11.15 (2.20)	175 (80)	56 (13)	29.08 (98.48)
<b>75% of Pull at Reduced Engine Speed—10th(C2) Gear</b>									
109.80 (81.88)	8544 (38.00)	4.82 (7.76)	1617	1.87	0.434 (0.264)	16.19 (3.19)	185 (85)	56 (13)	29.08 (98.48)
<b>50% of Pull at Reduced Engine Speed—10th(C2) Gear</b>									
74.18 (55.32)	5691 (25.31)	4.89 (7.87)	1629	1.18	0.487 (0.296)	14.40 (2.84)	178 (81)	56 (13)	29.08 (98.48)
<b>MAXIMUM POWER IN SELECTED GEARS</b>									
4th(A4) Gear									
120.36 (89.75)	17952 (79.85)	2.51 (4.05)	2147	11.34	0.544 (0.331)	12.91 (2.54)	182 (83)	52 (11)	29.00 (98.21)
5th(B1) Gear									
139.13 (103.75)	16733 (74.43)	3.12 (5.02)	2099	6.24	0.484 (0.295)	14.50 (2.86)	184 (84)	52 (11)	29.03 (98.31)
6th(B2) Gear									
141.98 (105.87)	13774 (61.27)	3.87 (6.22)	2099	3.47	0.476 (0.290)	14.75 (2.91)	183 (84)	53 (12)	29.05 (98.37)
7th(B3) Gear									
142.08 (105.95)	11398 (50.70)	4.67 (7.52)	2100	2.60	0.475 (0.289)	14.79 (2.91)	183 (84)	53 (12)	29.07 (98.44)
8th(C1) Gear									
142.19 (106.03)	10302 (45.83)	5.18 (8.33)	2101	2.28	0.477 (0.290)	14.73 (2.90)	184 (84)	54 (12)	29.08 (98.48)
9th(B4) Gear									
138.58 (103.34)	9006 (40.06)	5.77 (9.29)	2103	1.97	0.486 (0.296)	14.44 (2.85)	181 (83)	55 (13)	29.08 (98.48)
10th(C2) Gear									
139.16 (103.77)	8328 (37.05)	6.27 (10.08)	2102	1.82	0.478 (0.291)	14.69 (2.89)	182 (83)	54 (12)	29.08 (98.48)
11th(C3) Gear									
136.98 (102.15)	6816 (30.32)	7.54 (12.13)	2104	1.47	0.497 (0.302)	14.12 (2.78)	182 (83)	56 (13)	29.08 (98.48)
12th(C4) Gear									
132.34 (98.69)	5366 (23.87)	9.25 (14.89)	2099	1.10	0.506 (0.308)	13.87 (2.73)	184 (84)	56 (13)	29.08 (98.48)

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

CATEGORY: III

Quick Attach: yes

	<u>lift cylinders</u> 2 x 90 mm	<u>lift cylinders</u> 2 x 100 mm
Maximum Force Exerted Through Whole Range:	10987 lbs (48.9 kN)	15574 lbs (69.3 kN)
i) Opening pressure of relief valve:	NA	NA
	<u>one outlet set</u>	<u>two outlet sets combined</u>
Sustained pressure at compensator cutoff:	2910 psi (201 bar)	2905 psi (200 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	32.0 GPM (121.1 l/min)	32.1 GPM (121.7 l/min)
iii) Pump delivery rate at maximum		
hydraulic power:	32.1 GPM (121.4 l/min)	31.4 GPM (118.8 l/min)
Delivery pressure:	2090 psi (144 bar)	2575 psi (178 bar)
Power:	39.1 HP (29.2 kW)	47.2 HP (35.2 kW)



HITCH DIMENSIONS AS TESTED—NO LOAD

### THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi. (bar)	2910 (201)				
Location:	lift cylinders				
Hydraulic oil temperature: °F (°C)	144 (62)				
Location:	hydraulic sump				
Category:	III				
Quick attach:	Yes				
<b>SAE Static Test</b> —System pressure 2610 psi (180 Bar) with lift cylinders 2 x 90 mm					
Hitch point distance to ground level in. (mm)	7.9 (201)	16.0 (406)	23.9 (607)	31.8 (807)	40.0 (1015)
Lift force on frame lb	13290	13349	13110	12120	10573
" " " " " " (kN)	(59.1)	(59.4)	(58.3)	(53.9)	(47.0)
with lift cylinders 2 x 100 mm					
Hitch point distance to ground level in. (mm)	7.9 (201)	16.1 (409)	24.0 (609)	31.9 (810)	40.0 (1017)
Lift force on frame lb	18660	18544	17958	16558	14432
" " " " " " (kN)	(83.0)	(82.5)	(79.9)	(73.7)	(64.2)

	OECD test		SAE test	
	inch	mm	inch	mm
A	29.6	752	26.4	670
B	16.7	425	16.7	425
C	25.6	650	25.6	650
D	23.9	608	23.9	608
E	11.1	283	7.5	190
F	12.7	323	12.7	323
G	35.6	905	35.6	905
H	4.7	120	4.7	120
I	20.9	530	20.6	523
J	22.9	582	22.9	582
K	28.1	713	27.8	706
L	51.2	1300	47.4	1204
*L'	--	--	50.9	1293
M	24.7	628	20.9	532
N	44.1	1120	40.3	1024
O	9.0	230	8.0	203
P	50.2	1275	45.2	1149
Q	40.4	1025	37.6	954
R	38.4	975	39.8	1010

\*L' to Quick Attach ends



JOHN DEERE 7820 DIESEL

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