

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

January 2007

Test 1896: John Deere 7930 Autoquad-Plus 20-Speed

Tractor Museum

University of Nebraska-Lincoln, TractorMuseumArchives@unl.edu

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



Part of the [Applied Mechanics Commons](#)

Museum, Tractor, "Test 1896: John Deere 7930 Autoquad-Plus 20-Speed" (2007). *Nebraska Tractor Tests*. 2072.
<http://digitalcommons.unl.edu/tractormuseumlit/2072>

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 1896—SUMMARY 563

JOHN DEERE 7930 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
MAXIMUM POWER AND FUEL CONSUMPTION					
Rated Engine Speed—(PTO speed—1075 rpm)					
183.10 (136.54)	2100	10.52 (39.82)	0.403 (0.245)	17.41 (3.43)	
Standard Power Take-off Speed (1000 rpm)					
200.73 (149.68)	1953	11.26 (42.64)	0.393 (0.239)	17.82 (3.51)	
Maximum Power (1 hour)					
203.38 (151.66)	1850	11.37 (43.04)	0.392 (0.238)	17.89 (3.52)	

VARYING POWER AND FUEL CONSUMPTION

183.10 (136.54)	2100	10.52 (39.82)	0.403 (0.245)	17.41 (3.43)	Air temperature
159.74 (119.12)	2157	9.58 (36.28)	0.421 (0.256)	16.67 (3.28)	76°F (24°C)
120.41 (89.79)	2165	7.73 (29.26)	0.450 (0.274)	15.58 (3.07)	Relative humidity
80.73 (60.20)	2176	6.08 (23.00)	0.528 (0.321)	13.29 (2.62)	55%
40.50 (30.20)	2188	4.08 (15.44)	0.706 (0.430)	9.93 (1.96)	Barometer
1.23 (0.92)	2196	2.74 (10.37)	15.589 (9.482)	0.45 (0.09)	28.76" Hg (97.39 kPa)

Maximum torque - 653 lb.-ft. (885 Nm) at 1601 rpm
 Maximum torque rise - 42.5%
 Torque rise at 1701 engine rpm - 36%
 Power increase at 1850 engine rpm - 11.1%

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									
165.51 (123.42)	13175 (58.60)	4.71 (7.58)	2102	4.85	0.445 (0.271)	15.75 (3.10)	199 (93)	54 (12)	28.70 (97.19)
75% of Pull at Maximum Power—7th (B3) Gear									
128.93 (96.14)	9823 (43.69)	4.92 (7.92)	2157	3.03	0.476 (0.290)	14.72 (2.90)	199 (93)	58 (14)	28.70 (97.19)
50% of Pull at Maximum Power—7th (B3) Gear									
87.63 (65.34)	6552 (29.15)	5.02 (8.07)	2170	1.86	0.551 (0.335)	12.73 (2.51)	193 (89)	59 (15)	28.70 (97.19)
75% of Pull at Reduced Engine Speed—10th (C2) Gear									
128.52 (95.84)	9845 (43.79)	4.90 (7.88)	1613	3.04	0.433 (0.263)	16.20 (3.19)	188 (87)	61 (16)	28.70 (97.19)
50% of Pull at Reduced Engine Speed—10th (C2) Gear									
87.28 (65.09)	6557 (29.17)	4.99 (8.03)	1625	1.83	0.478 (0.291)	14.67 (2.89)	180 (82)	60 (16)	28.70 (97.19)

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

Dates of tests: March 28 - April 9, 2007

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) 0.8421 Fuel weight 7.011 lbs/gal (0.840 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: 22.5 hours

ENGINE: Make John Deere Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler **Serial No.** *PE6068L004262* **Crankshaft** lengthwise **Rated engine speed** 2100 **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 **Fuel cooler** radiator for pump return fuel **Muffler** vertical **Cooling medium temperature control** 2 thermostats and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel rate: 68.6 - 75.8 lb/h (31.1 - 34.4 kg/h) **High idle:** 2175 - 2225 rpm **Turbo boost:** nominal 20.3-23.2 psi (140-160 kPa) as measured 22.1 psi (152 kPa)

CHASSIS: Type front wheel assist **Serial No.** *RW7930A002240* **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)		
5th(B1) Gear									
136.63 (101.88)	16141 (71.80)	3.17 (5.11)	2155	9.81	0.497 (0.302)	14.11 (2.78)	181 (83)	54 (12)	28.74 (97.33)
6th(B2) Gear									
158.59 (118.26)	15735 (69.99)	3.78 (6.08)	2097	8.30	0.467 (0.284)	15.01 (2.96)	198 (92)	50 (10)	28.78 (97.46)
7th(B3) Gear									
177.01 (131.99)	15506 (68.97)	4.28 (6.89)	1970	7.78	0.447 (0.272)	15.68 (3.09)	202 (94)	46 (8)	28.82 (97.60)
8th(C1) Gear									
182.34 (135.97)	15080 (67.08)	4.53 (7.30)	1861	6.27	0.439 (0.267)	15.97 (3.15)	203 (95)	53 (12)	28.71 (97.22)
9th(B4) Gear									
182.99 (136.45)	13469 (59.91)	5.09 (8.20)	1858	4.98	0.435 (0.265)	16.11 (3.17)	203 (95)	53 (12)	28.71 (97.22)
10th(C2) Gear									
183.45 (136.80)	12319 (54.80)	5.58 (8.99)	1855	3.83	0.436 (0.265)	16.08 (3.17)	203 (95)	50 (10)	28.72 (97.26)
11th(C3) Gear									
185.02 (137.97)	10349 (46.03)	6.70 (10.79)	1845	3.06	0.429 (0.261)	16.34 (3.22)	203 (95)	51 (11)	28.72 (97.26)
12th(C4) Gear									
181.28 (135.18)	8218 (36.56)	8.27 (13.31)	1847	2.45	0.441 (0.268)	15.90 (3.13)	204 (95)	56 (13)	28.70 (97.26)

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** 17720 lb (8038 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. This tractor did not meet the manufacturer's initial advertised claims of 43% torque rise nor 13% power bulge. For the maximum power tests the fuel temperature at the injection pump inlet was maintained at 130°F (54°C). The pull in 3rd (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. **1896**, Nebraska Summary 563, July 2, 2007.

Roger M. Hoy
 Director

M.F. Kocher
 V.I. Adamchuk
 J.A. Smith
 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	67.7	67.6
Transport speed - no load - 20th (E4) gear		70.7
Bystander in 20th (E4) gear		81.8

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires - No., size, ply & psi(kPa)	Four 480/80R46;***;11(75)	Two 480/80R46;***;17(115)
Ballast - Duals (total)	1760 lb (798 kg)	None
- Cast Iron (total)	3555 lb (1612 kg)	None
Front Tires - No., size, ply & psi(kPa)	Two 420/90R30;***;20(140)	Two 420/90R30;***;14(95)
Ballast - Liquid (total)	None	None
- Cast Iron (total)	2120 lb (962 kg)	None
Height of Drawbar	21.0 in (535 mm)	22.0 in (420 mm)
Static Weight with operator - Rear	15780 lb (7157 kg)	11365 lb (5155 kg)
- Front	9550 lb (4332 kg)	6530 lb (2962 kg)
- Total	25330 lb (11489 kg)	17895 lb (8117 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									
133.15 (99.29)	23174 (103.09)	2.15 (3.47)	2154	9.37	0.503 (0.306)	13.93 (2.74)	188 (87)	45 (7)	29.20 (98.88)
4th(A4) Gear									
155.31 (115.82)	22279 (99.10)	2.61 (4.21)	2093	7.60	0.478 (0.291)	14.66 (2.89)	198 (92)	45 (7)	29.20 (98.88)
5th(B1) Gear									
173.28 (129.22)	21141 (94.04)	3.07 (4.95)	2013	5.81	0.450 (0.274)	15.59 (3.07)	197 (92)	44 (7)	29.20 (98.88)
6th(B2) Gear									
181.29 (135.19)	19685 (87.56)	3.45 (5.56)	1853	4.52	0.441 (0.268)	15.90 (3.13)	204 (96)	44 (7)	29.20 (98.88)
7th(B3) Gear									
187.46 (139.79)	16727 (74.40)	4.20 (6.76)	1854	3.07	0.427 (0.260)	16.40 (3.23)	204 (96)	44 (7)	29.21 (98.92)
8th(C1) Gear									
187.12 (139.53)	15080 (67.08)	4.65 (7.49)	1851	2.60	0.427 (0.260)	16.42 (3.23)	204 (96)	45 (7)	29.22 (98.95)
9th(B4) Gear									
185.21 (138.11)	13419 (59.69)	5.18 (8.33)	1848	2.22	0.433 (0.263)	16.20 (3.19)	204 (96)	45 (7)	29.22 (98.95)
10th(C2) Gear									
184.16 (137.33)	12230 (54.40)	5.65 (9.09)	1854	1.96	0.432 (0.263)	16.22 (3.19)	205 (96)	46 (8)	29.22 (98.95)
11th(C3) Gear									
184.24 (137.39)	10186 (45.31)	6.78 (10.92)	1852	1.55	0.428 (0.260)	16.37 (3.23)	204 (96)	46 (8)	29.21 (98.92)
12th(C4) Gear									
178.50 (133.10)	8041 (35.77)	8.32 (13.40)	1848	1.15	0.449 (0.273)	15.62 (3.08)	204 (96)	45 (7)	29.21 (98.92)

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: Yes

Lift cylinders:

	<u>2 x 90 mm</u>	<u>2x100 mm</u>
Maximum force exerted through whole range:	10987 lbs (48.9 kN)	15574 lbs (69.3 kN)

	<u>45 cc pump</u>	<u>63 cc pump</u>
i) Sustained pressure at compensator cutoff:	2914 psi (201 bar)	2894 psi (200 bar)

three outlet sets combined

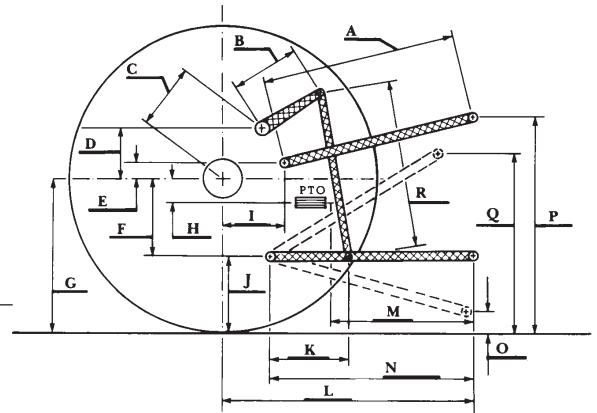
ii) Pump delivery rate at minimum pressure and rated engine speed:	32.0 GPM (121.1 l/min)	45.2 GPM (171.1 l/min)
--	------------------------	------------------------

iii) Pump delivery rate at maximum hydraulic power:	31.3 GPM (118.5 l/min)	44.1 GPM (166.9 l/min)
Delivery pressure:	2567 psi (177 bar)	2540 psi (175 bar)
Power:	46.9 HP (35.0 kW)	65.4 HP (48.7 kW)

single outlet set

ii) Pump delivery rate at minimum pressure and rated engine speed:	31.4 GPM (118.9 l/min)	40.5 GPM (153.3 l/min)
--	------------------------	------------------------

iii) Pump delivery rate at maximum hydraulic power:	31.0 GPM (117.3 l/min)	38.4 GPM (145.4 l/min)
Delivery pressure:	2265 psi (156 bar)	1919 psi (132 bar)
Power:	41.0 HP (30.5 kW)	43.0 HP (32.1 kW)



HITCH DIMENSIONS AS TESTED—NO LOAD

	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

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				

SAE Static Test—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)



JOHN DEERE 7930 PS DIESEL

Institute of Agriculture and Natural Resources
University of Nebraska—Lincoln