

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

January 1997

Test 1726: John Deere 7710 Powrquad 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 1726: John Deere 7710 Powrquad Diesel 16-Speed" (1997). *Nebraska Tractor Tests*. 2034.

<https://digitalcommons.unl.edu/tractormuseumlit/2034>

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 1726—SUMMARY 226

JOHN DEERE 7710 POWRQUAD DIESEL

16 SPEED

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

Dates of Test: May 13 to June 19, 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)					
130.79 (97.53)	2100	8.13 (30.79)	0.437 (0.266)	16.08 (3.17)	
Maximum Power (2 hours)					
151.46 (112.94)	1750	8.41 (31.84)	0.390 (0.237)	18.01 (3.55)	

VARYING POWER AND FUEL CONSUMPTION

130.79 (97.53)	2100	8.13 (30.79)	0.437 (0.266)	16.06 (3.17)	Air temperature
115.62 (86.22)	2183	7.60 (28.78)	0.462 (0.281)	15.21 (3.00)	76°F (25°C)
87.96 (65.59)	2215	6.36 (24.09)	0.508 (0.309)	13.82 (2.72)	Relative humidity
59.63 (44.47)	2252	5.25 (19.89)	0.619 (0.376)	11.35 (2.24)	44%
30.20 (22.52)	2281	4.06 (15.36)	0.944 (0.574)	7.44 (1.47)	Barometer
1.05 (0.78)	2303	2.86 (10.83)	19.107 (11.622)	0.37 (0.07)	28.87" Hg (97.77 kPa)

Maximum Torque 497 lb.-ft. (674 Nm) at 1299 rpm

Maximum Torque Rise 51.9%

Torque rise at 1700 engine rpm 42%

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									
118.34 (88.24)	9926 (44.15)	4.47 (7.20)	2104	2.99	0.481 (0.292)	14.61 (2.88)	190 (88)	53 (12)	29.03 (98.31)
75% of Pull at Maximum Power—7th (B3) Gear									
93.67 (69.85)	7439 (33.09)	4.72 (7.60)	2204	2.22	0.530 (0.322)	13.26 (2.61)	188 (86)	61 (16)	29.04 (98.34)
50% of Pull at Maximum Power—7th (B3) Gear									
64.08 (47.78)	4971 (22.11)	4.83 (7.78)	2240	1.52	0.621 (0.378)	11.30 (2.23)	183 (84)	62 (17)	29.03 (98.31)
75% of Pull at Reduced Engine Speed—10th (C2) Gear									
93.82 (69.96)	7435 (33.07)	4.73 (7.62)	1663	2.30	0.453 (0.275)	15.51 (3.06)	190 (88)	62 (17)	29.03 (98.31)
50% of Pull at Reduced Engine Speed—10th (C2) Gear									
64.05 (47.77)	4986 (22.18)	4.82 (7.75)	1681	1.52	0.500 (0.304)	14.04 (2.76)	182 (83)	63 (17)	29.02 (98.27)

FUEL OIL and TIME: Fuel No. 2 Diesel **Cetane**
No. 50.6 **Specific gravity converted to 60°/60°**
F (15°/15°C) 0.8435 **Fuel weight** 7.023 lbs/gal
(0.842 kg/l) **Oil SAE** 15W-40 **API service**
classification CD, CE, CF-4 **To motor** 5.783 gal
(21.891 l) **Drained from motor** 5.670 gal
(21.464 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** 33.0
hours.

ENGINE: Make John Deere Diesel **Type** six
cylinder vertical with turbocharger **Serial No.**
RG6081T014112 **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: 55.0-57.2 lb/h (24.9-26.0 kg/h) **High idle:**
2225-2325 rpm **Turbo boost** nominal 13.1-17.4 psi
(90-120 kPa) as measured 16.2 psi (112 kPa)

CHASSIS: **Type** front wheel assist **Serial No.**
RW7710H001644 **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 (2.92) 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), 17.95 (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

**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)
4th (A4) Gear									
103.28 (77.01)	15636 (69.55)	2.48 (3.99)	2178	10.20	0.543 (0.330)	12.93 (2.55)	186 (85)	53 (12)	29.00 (98.21)
5th (B1) Gear									
115.64 (86.23)	14615 (65.01)	2.97 (4.78)	2095	6.89	0.493 (0.300)	14.24 (2.81)	188 (87)	53 (12)	29.02 (98.27)
6th (B2) Gear									
127.15 (94.82)	14557 (64.75)	3.28 (5.27)	1920	6.89	0.458 (0.279)	15.32 (3.02)	193 (89)	53 (12)	29.02 (98.27)
7th (B3) Gear									
135.08 (100.73)	14046 (62.48)	3.61 (5.80)	1754	6.26	0.438 (0.267)	16.02 (3.16)	199 (93)	53 (12)	29.04 (98.34)
8th (C1) Gear									
136.89 (102.08)	12730 (56.62)	4.03 (6.49)	1749	5.06	0.434 (0.264)	16.18 (3.19)	197 (92)	53 (12)	29.04 (98.34)
9th (B4) Gear									
136.51 (101.79)	11306 (50.29)	4.53 (7.29)	1752	3.91	0.436 (0.265)	16.11 (3.17)	198 (92)	53 (12)	29.04 (98.34)
10th (C2) Gear									
137.43 (102.48)	10444 (46.46)	4.93 (7.94)	1754	3.49	0.432 (0.263)	16.25 (3.20)	197 (91)	53 (12)	29.04 (98.34)
11th (C3) Gear									
136.72 (101.95)	8623 (38.36)	5.95 (9.57)	1751	2.99	0.434 (0.264)	16.18 (3.19)	193 (89)	55 (13)	29.04 (98.34)
12th (C4) Gear									
134.32 (100.16)	6842 (30.43)	7.36 (11.85)	1758	2.05	0.443 (0.269)	15.86 (3.12)	202 (94)	58 (14)	29.04 (98.34)
13th (D1) Gear									
131.70 (98.21)	5734 (25.50)	8.61 (13.86)	1746	1.70	0.449 (0.273)	15.64 (3.08)	195 (91)	59 (15)	29.04 (98.34)

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

3rd (A3) Gear									
103.42 (77.12)	18651 (82.96)	2.08 (3.35)	2190	7.90	0.531 (0.323)	13.23 (2.61)	183 (84)	57 (14)	28.95 (98.04)
4th (A4) Gear									
115.98 (86.48)	17773 (79.06)	2.45 (3.94)	2064	6.27	0.491 (0.299)	14.29 (2.82)	188 (87)	58 (14)	28.95 (98.04)
5th (B1) Gear									
125.00 (93.21)	16719 (74.37)	2.80 (4.51)	1954	5.40	0.461 (0.280)	15.24 (3.00)	193 (89)	61 (16)	28.95 (98.04)
6th (B2) Gear									
133.79 (99.77)	16573 (73.72)	3.03 (4.87)	1753	5.61	0.442 (0.269)	15.89 (3.13)	198 (92)	63 (17)	28.95 (98.04)
7th (B3) Gear									
135.99 (101.41)	13825 (61.50)	3.69 (5.94)	1749	3.59	0.435 (0.265)	16.13 (3.18)	195 (90)	66 (19)	28.95 (98.04)
8th (C1) Gear									
136.75 (101.98)	12534 (55.75)	4.09 (6.58)	1749	3.17	0.434 (0.264)	16.17 (3.18)	200 (93)	64 (18)	28.95 (98.04)
9th (B4) Gear									
135.55 (101.08)	11121 (49.47)	4.57 (7.36)	1751	2.58	0.438 (0.266)	16.03 (3.16)	196 (91)	65 (18)	28.95 (98.04)
10th (C2) Gear									
136.47 (101.77)	10306 (45.84)	4.97 (7.99)	1750	2.49	0.436 (0.265)	16.10 (3.17)	197 (91)	64 (18)	28.95 (98.04)
11th (C3) Gear									
135.84 (101.30)	8505 (37.83)	5.99 (9.64)	1753	1.98	0.438 (0.266)	16.05 (3.16)	198 (92)	64 (18)	28.92 (97.93)
12th (C4) Gear									
132.05 (98.47)	6741 (29.98)	7.35 (11.82)	1748	1.47	0.446 (0.272)	15.73 (3.10)	198 (92)	64 (18)	28.92 (97.93)
13th (D1) Gear									
130.81 (97.54)	5681 (25.27)	8.63 (13.90)	1747	1.20	0.453 (0.276)	15.50 (3.05)	197 (91)	64 (18)	28.92 (97.93)

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 140° F (60°C). The pull in 3rd (A3) gear (ballasted tractor) and 4th (A4) gear (unballasted tractor) was limited to avoid excessive 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. **1726**, Summary 126, July 11, 1997.

LOUIS I. LEVITICUS
Engineer-in-Charge

L.L. BASHFORD
R.D. GRISSE
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)
Maximum Power—7th (B3) Gear									
118.35 (88.25)	9946 (44.24)	4.46 (7.18)	2099	2.55	0.484 (0.294)	14.52 (2.86)	195 (91)	64 (18)	28.95 (98.04)
75% of Pull at Maximum Power—7th (B3) Gear									
93.98 (70.08)	7561 (33.19)	4.72 (7.60)	2206	1.78	0.531 (0.323)	13.23 (2.61)	190 (88)	64 (18)	28.92 (97.93)
50% of Pull at Maximum Power—7th (B3) Gear									
64.00 (47.73)	4976 (22.13)	4.82 (7.76)	2241	1.35	0.625 (0.380)	11.24 (2.21)	185 (85)	64 (18)	28.92 (97.93)
75% of Pull at Reduced Engine Speed—10th (C2) Gear									
94.03 (70.12)	7427 (30.03)	4.75 (7.64)	1669	1.69	0.461 (0.281)	15.23 (3.00)	190 (88)	64 (18)	28.92 (97.93)
50% of Pull at Reduced Engine Speed—10th (C2) Gear									
63.98 (47.71)	4941 (21.98)	4.86 (7.82)	1698	1.35	0.505 (0.307)	13.91 (2.74)	184 (84)	64 (18)	28.92 (97.93)

MAXIMUM POWER IN SELECTED GEARS

4th (A4) Gear									
104.46 (77.90)	16679 (74.19)	2.35 (3.78)	2130	12.62	0.545 (0.331)	12.89 (2.54)	188 (87)	60 (16)	28.95 (98.04)
5th (B1) Gear									
115.44 (86.08)	14396 (64.04)	3.01 (4.84)	2100	5.44	0.494 (0.300)	14.22 (2.80)	192 (89)	65 (18)	28.95 (98.04)
6th (B2) Gear									
118.35 (88.25)	12009 (53.42)	3.70 (5.95)	2100	3.39	0.483 (0.294)	14.54 (2.86)	186 (85)	66 (19)	28.95 (98.04)
7th (B3) Gear									
118.35 (88.25)	9946 (44.24)	4.46 (7.18)	2099	2.55	0.484 (0.294)	14.52 (2.86)	195 (91)	64 (18)	28.95 (98.04)
8th (C1) Gear									
117.88 (87.90)	8950 (39.81)	4.94 (7.95)	2099	2.38	0.484 (0.295)	14.50 (2.86)	193 (89)	64 (18)	28.95 (98.04)
9th (B4) Gear									
116.39 (86.79)	7944 (35.33)	5.49 (8.84)	2098	2.04	0.491 (0.299)	14.30 (2.82)	194 (90)	65 (18)	28.95 (98.04)
10th (C2) Gear									
117.89 (87.91)	7415 (32.98)	5.96 (9.60)	2095	1.87	0.483 (0.294)	14.53 (2.86)	193 (89)	66 (19)	28.94 (98.00)
11th (C3) Gear									
115.79 (86.34)	6040 (26.87)	7.19 (11.57)	2101	1.52	0.495 (0.301)	14.19 (2.79)	193 (89)	65 (18)	28.93 (97.97)
12th (C4) Gear									
110.63 (82.49)	4702 (20.91)	8.82 (14.20)	2099	1.26	0.518 (0.315)	13.56 (2.67)	194 (90)	64 (18)	28.92 (97.93)

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive	
	Disengaged dB(A)	Engaged dB(A)
At 75% load in 7th (B3) Gear	73.5	74.0
Bystander 16th (D4) Gear	82.8	—

TIRES, BALLAST AND WEIGHT

		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi (kPa)	Four 18.4R42: **; 8 (55)	Two 18.4R42: **, 13 (90)
Ballast	—Duals (total)	1524 lb (691 kg)	None
	—Cast Iron (total)	1116 lb (506 kg)	None
Front Tires	—No., size, ply & psi (kPa)	Two 14.9R30: **, 12 (85)	Two 14.9R30: **, 12 (85)
Ballast	—Liquid (total)	None	None
	—Cast Iron (total)	None	None
Height of Drawbar		22.0 in (560 mm)	21.0 in. (535 mm)
Static Weight with Operator	—Rear	12510 lb (5674 kg)	9870 lb (4477 kg)
	—Front	5400 lb (2449 kg)	5400 lb (2449 kg)
	—Total	17910 lb (8123 kg)	15270 lb (6926 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:	2890 psi	(199 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	26.7 GPM	(101.1 l/min)
iii) Pump delivery rate at maximum hydraulic power:	25.1 GPM	(95.0 l/min)
Delivery pressure:	2560 psi	(176 bar)
Power:	37.5 HP	(28.0 kW)

THREE POINT HITCH PERFORMANCE

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

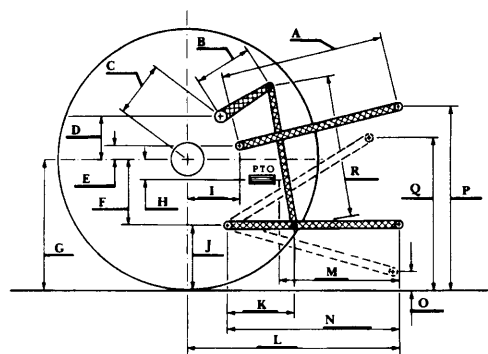
Hitch point distance to ground level in. (mm)	7.7 (196)	16.0 (406)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb.	12177	12564	12177	11268	9549
Lift force on frame (kN)	(54.1)	(55.9)	(54.2)	(50.1)	(42.5)

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 7710 POWRQUAD DIESEL

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