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Test 1672: John Deere 8870 Powersync Diesel 12 and 24 Speeds

Nebraska Tractor Test Lab

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NEBRASKA OECD TRACTOR TEST 1672—SUMMARY 140

JOHN DEERE 8870 POWRSYNC DIESEL

24 SPEED ALSO 12 SPEED

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

Dates of Test: October 27 to November 23, 1993

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—1108 rpm)					
302.75 (225.76)	2100	17.79 (67.35)	0.411 (0.250)	17.02 (3.35)	
Maximum Power (2 Hours)					
335.69 (250.33)	1900	18.65 (70.61)	0.389 (0.236)	18.00 (3.55)	
Standard Power Take-off Speed (1003 rpm)					
335.69 (250.33)	1900	18.65 (70.61)	0.389 (0.236)	18.00 (3.55)	

VARYING POWER AND FUEL CONSUMPTION

302.75 (225.76)	2100	17.79 (67.35)	0.411 (0.250)	17.02 (3.35)	Air temperature
266.52 (198.75)	2165	15.87 (60.08)	0.416 (0.253)	16.79 (3.31)	76°F (24°C)
202.45 (150.96)	2193	12.57 (47.57)	0.434 (0.264)	16.11 (3.17)	Relative humidity
136.64 (101.89)	2220	9.57 (36.21)	0.490 (0.298)	14.29 (2.81)	43%
69.07 (51.50)	2244	6.65 (25.17)	0.673 (0.410)	10.39 (2.05)	Barometer
1.42 (1.06)	2266	3.86 (14.61)	18.972 (11.540)	0.37 (0.07)	28.58" Hg (96.77 kPa)

Maximum Torque 1124 lb.-ft. (1524 Nm) at 1399 rpm
Maximum Torque Rise 48.4%
Torque rise at 1000 engine rpm 45%

DRAWBAR PERFORMANCE 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—8th (C1) Gear									
280.34 (209.05)	21500 (95.64)	4.89 (7.87)	2101	2.45	0.448 (0.272)	15.63 (3.08)	179 (81)	47 (8)	28.72 (97.26)
75% of Pull at Maximum Power—8th (C1) Gear									
218.26 (162.76)	16084 (71.55)	5.09 (8.19)	2176	1.82	0.468 (0.285)	14.95 (2.95)	177 (81)	56 (13)	29.07 (98.44)
50% of Pull at Maximum Power—8th (C1) Gear									
148.59 (110.81)	10730 (47.73)	5.19 (8.36)	2206	1.26	0.519 (0.315)	13.49 (2.66)	173 (78)	56 (13)	29.07 (98.44)
75% of Pull at Reduced Engine Speed—13th (B4) Gear									
218.15 (162.67)	16096 (71.60)	5.08 (8.18)	1552	1.91	0.401 (0.244)	17.44 (3.44)	179 (82)	56 (13)	29.07 (98.44)
50% of Pull at Reduced Engine Speed—13th (B4) Gear									
148.70 (110.88)	10730 (47.73)	5.20 (8.36)	1577	1.17	0.428 (0.260)	16.34 (3.22)	177 (80)	56 (13)	29.07 (98.44)

FUEL OIL and TIME: Fuel No. 2 Diesel Cetane No. 53.9 Specific gravity converted to 60°/60° F (15°/15°C) 0.8400 Fuel weight 6.994 lbs/gal (0.838 kg/l) Oil SAE 15W-40 API service classification SG/CE To motor 8.072 gal (30.555 l) Drained from motor 7.541 gal (28.547 l) Transmission and hydraulic lubricant and final drive lubricant John Deere Hy-Gard fluid Total time engine was operated 28.5 hours.

ENGINE: Make John Deere Diesel Type six cylinder vertical with turbocharger and air to air intercooler Serial No. *6101HRW10-500939* Crankshaft lengthwise Rated engine speed 2100 Bore and stroke (as specified) 5.12" × 5.00" (130.0 mm × 127.0 mm) Compression ratio 15.75 to 1 Displacement 619 cu in (10144 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 two paper cartridges Muffler vertical Cooling medium temperature control two thermostats and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel rate: 123.4-131.0 lb/h (56.0-59.4 kg/h) High idle: 2210-2310 rpm Turbo boost nominal 23.5-26.4 psi (162-182 kPa) as measured 25.0 psi (172 kPa)

CHASSIS: Type four wheel drive with duals Serial No. *RW8870H001299* Tread width rear 68.4" (1738 mm) to 143.9" (3655 mm) front 68.4" (1738 mm) to 143.9" (3655 mm) Wheel base 133.9" (3400 mm) Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial (2) range operator controlled powershift Nominal travel speeds mph (km/h) first 2.09 (3.36) second 2.50 (4.03) third 2.69 (4.33) fourth 3.23 (5.19) fifth 3.68 (5.92) sixth 4.41 (7.10) seventh 4.45 (7.16) eighth 4.90 (7.90) ninth 5.34 (8.59) tenth 5.73 (9.22) eleventh 5.88 (9.47) twelfth 6.32 (10.17) thirteenth 6.87 (11.06) fourteenth 7.57 (12.19) fifteenth 7.84 (12.62) sixteenth 8.65 (13.92) seventeenth 9.40 (15.13) eighteenth 10.37 (16.69) nineteenth 10.46 (16.83) twentieth 12.54 (20.18) twenty-first 13.47 (21.67) twenty-second 16.15 (25.99) twenty-third 18.43 (29.66) twenty-fourth 22.10 (35.56) reverse 2.50 (4.03), 3.00 (4.83), 5.34 (8.59), 5.88 (9.47), 6.40 (10.30), 7.06 (11.36) Clutch multiple wet disc hydraulically actuated by foot pedal Brakes wet multiple disc hydraulically actuated by foot pedal Steering hydrostatic and articulated Power take-off 1000 rpm at 1895 engine rpm Unladen tractor mass 35130 lb (15935 kg)

DRAWBAR PERFORMANCE AT 2100 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									
240.68 (179.48)	35026 (155.80)	2.58 (4.15)	2157	8.55	0.492 (0.299)	14.22 (2.80)	174 (79)	48 (9)	29.17 (98.78)
4th (A4) Gear									
265.74 (198.16)	32072 (142.66)	3.11 (5.00)	2097	5.51	0.469 (0.285)	14.91 (2.94)	176 (80)	52 (11)	29.19 (98.85)
5th (A5) Gear									
273.11 (203.66)	28455 (126.57)	3.60 (5.79)	2098	3.96	0.457 (0.278)	15.30 (3.01)	178 (81)	56 (13)	29.12 (98.61)
6th (A6) Gear									
272.72 (203.36)	23432 (104.23)	4.36 (7.02)	2098	2.81	0.457 (0.278)	15.30 (3.01)	180 (82)	55 (13)	29.14 (98.68)
7th (B1) Gear									
278.66 (207.80)	23707 (105.45)	4.41 (7.09)	2096	2.63	0.447 (0.272)	15.65 (3.08)	178 (81)	43 (6)	28.74 (97.33)
8th (C1) Gear									
280.34 (209.05)	21500 (95.64)	4.89 (7.87)	2101	2.45	0.448 (0.272)	15.63 (3.08)	179 (81)	47 (8)	28.72 (97.26)
9th (B2) Gear									
275.31 (205.30)	19361 (86.12)	5.33 (8.58)	2102	2.09	0.453 (0.276)	15.44 (3.04)	182 (83)	48 (9)	28.71 (97.22)
10th (B3) Gear									
276.47 (206.16)	18114 (80.58)	5.72 (9.21)	2099	2.00	0.450 (0.274)	15.53 (3.06)	179 (82)	41 (5)	28.76 (97.39)
11th (C2) Gear									
273.41 (203.88)	17419 (77.48)	5.89 (9.47)	2102	2.09	0.452 (0.275)	15.46 (3.05)	182 (83)	56 (13)	29.07 (98.44)
12th (C3) Gear									
277.00 (206.56)	16425 (73.06)	6.32 (10.18)	2101	1.91	0.450 (0.274)	15.55 (3.06)	180 (82)	56 (13)	29.07 (98.44)
13th (B4) Gear									
272.37 (203.10)	14813 (65.89)	6.90 (11.10)	2100	1.54	0.458 (0.279)	15.25 (3.01)	184 (84)	57 (14)	28.64 (96.99)
14th (C4) Gear									
271.50 (202.46)	13382 (59.52)	7.61 (12.24)	2101	1.45	0.459 (0.279)	15.25 (3.00)	182 (83)	55 (13)	29.08 (98.48)
15th (B5) Gear									
273.87 (204.22)	13011 (57.87)	7.89 (12.70)	2101	1.36	0.457 (0.278)	15.32 (3.02)	182 (83)	52 (11)	28.67 (97.09)
16th (C5) Gear									
272.00 (202.83)	11726 (52.16)	8.70 (14.00)	2097	1.26	0.458 (0.278)	15.28 (3.01)	182 (83)	51 (11)	28.69 (97.16)

LUGGING ABILITY IN 8th (C1) Gear

Crankshaft Speed rpm	2101	1887	1673	1473	1258	1049
Pull—lbs (kN)	21500 (95.63)	26344 (117.18)	28844 (128.30)	30058 (133.70)	30897 (137.44)	30833 (137.15)
Increase in Pull %	0	23	34	40	44	43
Power—Hp (kW)	280.34 (209.05)	305.05 (227.47)	294.06 (219.28)	268.53 (200.24)	234.68 (175.00)	195.29 (145.63)
Speed—Mph (km/h)	4.89 (7.87)	4.34 (6.99)	3.82 (6.15)	3.35 (5.39)	2.85 (4.58)	2.38 (3.82)
Slip %	2.45	3.52	4.05	4.57	4.92	4.92

TRACTOR SOUND LEVEL WITH CAB

	dB(A)
At 75% load in 8th (C1) Gear	73.5
Bystander in 24th (D6) Gear	85.5

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 165° F (74°C). The pull in 3rd (A3) gear was limited to avoid tractor bouncing. 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. **1672**, Summary 140, Jan. 5, 1994.

LOUIS I. LEVITICUS

Engineer-in-Charge

L.L. BASHFORD

R.D. GRISSO

K. VON BARGEN

Board of Tractor Test Engineers

DRAWBAR PERFORMANCE AT 1900 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	Air dry bulb	Barom. inch Hg (kPa)	
3rd (A3) Gear									
238.99 (178.21)	34808 (154.83)	2.57 (4.14)	2157	8.55	0.494 (0.300)	14.17 (2.79)	175 (79)	48 (9)	29.17 (98.78)
4th (A4) Gear									
270.45 (201.68)	34357 (152.83)	2.95 (4.75)	2047	7.91	0.473 (0.288)	14.78 (2.91)	177 (81)	53 (12)	29.17 (98.78)
5th (A5) Gear									
291.24 (217.17)	32832 (146.04)	3.33 (5.35)	1982	6.10	0.451 (0.274)	15.50 (3.05)	180 (82)	55 (13)	29.15 (98.71)
6th (A6) Gear									
297.86 (222.12)	28584 (127.15)	3.91 (6.29)	1901	4.14	0.437 (0.266)	16.00 (3.15)	182 (83)	55 (13)	29.13 (98.65)
7th (B1) Gear									
303.29 (226.17)	28724 (127.77)	3.96 (6.37)	1901	3.70	0.430 (0.262)	16.26 (3.20)	185 (85)	42 (6)	28.75 (97.36)
8th (C1) Gear									
307.58 (229.36)	26292 (116.95)	4.39 (7.06)	1899	3.08	0.425 (0.258)	16.47 (3.24)	183 (84)	45 (7)	28.73 (97.29)
9th (B2) Gear									
306.11 (228.27)	24000 (106.76)	4.78 (7.70)	1898	2.81	0.426 (0.259)	16.43 (3.24)	186 (85)	47 (8)	28.71 (97.22)
10th (B3) Gear									
306.19 (228.32)	22256 (99.00)	5.16 (8.30)	1901	2.63	0.425 (0.259)	16.45 (3.24)	184 (84)	40 (4)	28.77 (97.43)
11th (C2) Gear									
302.53 (225.59)	21395 (95.17)	5.30 (8.53)	1904	2.54	0.428 (0.261)	16.32 (3.22)	186 (86)	56 (13)	29.07 (98.44)
12th (C3) Gear									
305.52 (227.82)	20139 (89.58)	5.69 (9.16)	1899	2.45	0.424 (0.258)	16.51 (3.25)	186 (86)	56 (13)	29.07 (98.44)
13th (B4) Gear									
303.65 (226.43)	18380 (81.76)	6.20 (9.97)	1897	2.09	0.428 (0.260)	16.35 (3.22)	185 (85)	56 (13)	29.07 (98.44)
14th (C4) Gear									
301.48 (224.82)	16463 (73.23)	6.87 (11.05)	1901	1.82	0.432 (0.263)	16.20 (3.19)	190 (88)	54 (12)	28.67 (97.09)
15th (B5) Gear									
304.42 (227.00)	16043 (71.36)	7.12 (11.45)	1900	1.72	0.427 (0.260)	16.38 (3.23)	190 (88)	51 (11)	28.68 (97.12)
16th (C5) Gear									
303.73 (226.49)	14490 (64.45)	7.86 (12.65)	1900	1.45	0.429 (0.261)	16.30 (3.21)	189 (87)	50 (10)	28.70 (97.19)
17th (B6) Gear									
300.20 (223.86)	13186 (58.65)	8.54 (13.74)	1896	1.36	0.434 (0.264)	16.12 (3.17)	189 (87)	49 (9)	28.70 (97.19)

TIRES, BALLAST AND WEIGHT

Rear Tires—No., size, ply & psi (kPa)

Front Tires—No., size, ply & psi (kPa)

Height of Drawbar

Static Weight with Operator—Rear

—Front

—Total

Tested Without Ballast

Four 20.8R42; **, 12 (85)

Four 20.8R42; **, 12 (85)

19.5 in (495 mm)

15870 lb (7198 kg)

19425 lb (8811 kg)

35295 lb (16009 kg)

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: yes

Maximum Force Exerted Through Whole Range:	10890 lbs	(48.4 kN)
	*14148 lbs	(62.9 kN)
i) Opening pressure of relief valve:	NA	
Sustained pressure with pump stalled:	2560 psi	(176 bar)
ii) Pump delivery rate at minimum pressure:	44.5 GPM	(168 l/min)
iii) Pump delivery rate at maximum		
hydraulic power:	42.6 GPM	(161 l/min)
Delivery pressure:	1870 psi	(129 bar)
Power:	46.5 HP	(34.7 kW)

*with Cat IV hitch

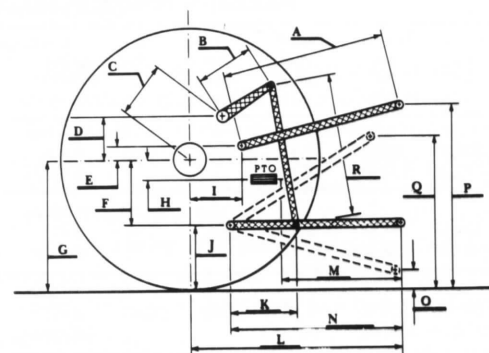
THREE POINT HITCH PERFORMANCE (SAE Static Test)

Observed Maximum Pressure psi. (bar)	2560 (176)
Location	remote outlet
Hydraulic oil temperature °F (°C)	142 (61)
Location	hydraulic sump
Category	III (with 90 mm lift cylinders)
Quick attach	yes

Hitch point distance to ground level in. (mm)	8.0 (203)	16.1 (409)	24.0 (610)	32.0 (813)	40.0 (1016)
Lift force on frame lb.	14180	13510	13450	13060	12195
" " " " (kN)	(63.1)	(60.1)	(59.8)	(58.1)	(54.2)

Category IV hitch and Quick coupler (100 mm lift cylinders)

Hitch point distance to ground level in. (mm)	9.0 (229)	16.2 (411)	26.4 (670)	38.4 (975)	46.0 (1168)
Lift force on frame lb.	15978	16368	16514	15334	13968
" " " " (kN)	(71.1)	(72.8)	(73.5)	(68.2)	(62.1)



HITCH DIMENSIONS AS TESTED—NO LOAD

	Cat III		Cat IV	
	inch	mm	inch	mm
A	31.5	800	31.0	787
B	18.6	472	18.6	472
C	26.2	666	26.2	666
D	24.4	620	24.4	620
E	11.3	288	11.3	288
F	13.8	350	13.8	350
G	36.1	918	36.1	918
H	4.8	122	4.8	122
I	22.7	577	22.7	577
J	22.3	568	22.3	568
K	28.8	731	28.3	718
L	55.3	1405	54.5	1384
L'	61.8	1570	60.5	1537
M	25.4	645	24.6	625
N	44.0	1117	43.2	1097
O	8.0	203	8.9	226
P	49.3	1252	49.3	1254
Q	40.5	1029	40.9	1039
R	44.5	1130	44.6	1133



JOHN DEERE 8870 POWRSYNC DIESEL

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