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Test 1751: Caterpillar Challenger 95E Diesel 10-Speed

Nebraska Tractor Test Lab

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NEBRASKA OECD TRACTOR TEST 1751—SUMMARY 267

CATERPILLAR CHALLENGER 95E DIESEL

10 SPEED

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

Dates of Test: May 19-June 2, 1998

Manufacturer: Caterpillar Inc., 100 N.E. Adams St., Peoria, IL 61629

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—1023 rpm)					
305.95 (228.14)	2101	16.10 (60.93)	0.372 (0.226)	19.01 (3.74)	
Standard Power Take-off Speed (1000 rpm)					
306.34 (228.44)	2053	15.94 (60.35)	0.368 (0.224)	19.21 (3.79)	
Maximum Power (2 hours)					
341.88 (254.94)	1800	16.79 (63.54)	0.347 (0.211)	20.37 (4.01)	

VARYING POWER AND FUEL CONSUMPTION

305.95 (228.14)	2101	16.10 (60.93)	0.372 (0.226)	19.01 (3.74)	Air temperature
267.15 (199.21)	2158	14.74 (55.79)	0.390 (0.237)	18.13 (3.57)	78°F (25°C)
207.29 (154.58)	2230	12.41 (46.95)	0.423 (0.257)	16.71 (3.29)	Relative humidity
142.58 (106.32)	2302	10.02 (37.95)	0.497 (0.302)	14.22 (2.80)	67%
70.38 (52.48)	2302	7.09 (26.86)	0.712 (0.433)	9.92 (1.95)	Barometer
1.60 (1.19)	2302	4.42 (16.72)	19.490 (11.856)	0.36 (0.07)	28.84"Hg (97.67 kPa)

Maximum Torque 1094 lb.-ft. (1483 Nm) at 1401 rpm

Maximum Torque Rise 43.0%

Torque rise at 1700 rpm 34%

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—5th Gear									
327.74 (244.39)	19244 (85.60)	6.39 (10.28)	2097	1.64	0.415 (0.252)	17.03 (3.36)	190 (88)	68 (20)	28.69 (97.16)
75% of Pull at Maximum Power—5th Gear									
255.66 (190.65)	14401 (64.06)	6.66 (10.71)	2175	1.21	0.439 (0.267)	16.10 (3.17)	189 (87)	69 (21)	28.66 (97.05)
50% of Pull at Maximum Power—5th Gear									
176.44 (131.57)	9604 (42.72)	6.89 (11.09)	2243	0.78	0.503 (0.306)	14.04 (2.77)	188 (87)	70 (21)	28.66 (97.05)
75% of Pull at Reduced Engine Speed—7th Gear									
255.56 (190.57)	14446 (64.26)	6.63 (10.68)	1735	1.21	0.400 (0.243)	17.65 (3.48)	190 (88)	70 (21)	28.66 (97.05)
50% of Pull at Reduced Engine Speed—7th Gear									
176.48 (131.60)	9576 (42.59)	6.91 (11.12)	1801	0.89	0.447 (0.272)	15.81 (3.12)	189 (87)	70 (21)	28.66 (97.05)

FUEL OIL and TIME: Fuel No. 2 Diesel Cetane No. 50.6 Specific gravity converted to 60°/60° F (15°/15°C) 0.8483 Fuel weight 7.063 lbs/gal (0.846 kg/l) Oil SAE 15W40 API service classification CG-4 Transmission and final drive lubricant SAE 30W API CD/TO-2 fluid Hydraulic lubricant Caterpillar CXP fluid Total time engine was operated 48.0 hours.

ENGINE: Make Caterpillar Diesel Type six cylinder vertical with turbocharger and air to air intercooler Serial No. *6AR00796* Crankshaft lengthwise Rated engine speed 2100 Bore and stroke (as specified) 5.118" x 5.906" (130 mm x 150 mm) Compression ratio 16 to 1 Displacement 729 cu in (11946 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 transmission oil, radiator for hydraulic and steering oil, radiator for differential oil Fuel filter one cartridge and water separator Fuel Cooler radiator for return fuel Muffler vertical Cooling medium temperature control thermostat.

ENGINE OPERATING PARAMETERS: Fuel rate: Gears 1, 2 and neutral 106.0-117.0 lb/h (48.1-53.1 kg/h) Gear 3 116.2-134.5 lb/h (52.7-61.0 kg/h) Gears 4-10 127.9-141.3 lb/h (58.0-64.1 kg/h) High idle: 2260-2340 rpm Turbo boost nominal 20.7-28.0 psi (143-193 kPa) as measured 23.9 psi (164 kPa)

CHASSIS: Type tracklayer-rubber tracked Serial No. *6KS00205* Tread width 90.1" (2285 mm) Length of track on ground 107.1" (2721 mm) Hydraulic control system direct engine drive Transmission selective gear fixed ratio with full range operator controlled powershift Nominal travel speeds mph (km/h) first 2.79 (4.49) second 4.00 (6.44) third 4.93 (7.93) fourth 5.64 (9.08) fifth 6.45 (10.38) sixth 7.06 (11.36) seventh 8.07 (12.99) eighth 9.25 (14.89) ninth 12.54 (20.18) tenth 17.99 (28.95) reverse 2.03 (3.27), 4.71 (7.58) Clutch multiple wet disc hydraulically actuated by foot pedal Brakes caliper disc hydraulically actuated by foot pedal Steering differential steering hydrostatically actuated by steering wheel Power take-off 1000 rpm at 2050 engine rpm Unladen tractor mass 35520 lb (16112 kg)

DRAWBAR PERFORMANCE AT 2100 RPM(Unballasted) 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)	Temp. °F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
1st Gear								
229.22 (170.93)	35202 (156.58)	2.44 (3.93)	2118	13.77	0.484 (0.295)	14.58 (2.87)	189 (87)	28.67 (97.09)
2nd Gear								
264.52 (197.25)	25366 (112.83)	3.91 (6.29)	2100	2.80	0.431 (0.262)	16.39 (3.23)	189 (87)	28.68 (97.12)
3rd Gear								
299.18 (223.10)	23159 (103.01)	4.84 (7.80)	2099	2.22	0.416 (0.253)	16.96 (3.34)	189 (87)	28.68 (97.12)
4th Gear								
328.84 (245.22)	22234 (98.90)	5.55 (8.93)	2098	2.12	0.413 (0.251)	17.09 (3.37)	190 (88)	28.68 (97.12)
5th Gear								
327.74 (244.39)	19244 (85.60)	6.39 (10.28)	2097	1.64	0.415 (0.252)	17.03 (3.36)	190 (88)	28.69 (97.16)
6th Gear								
324.93 (242.30)	17423 (77.50)	6.99 (11.26)	2096	1.43	0.418 (0.254)	16.89 (3.33)	190 (88)	28.69 (97.16)
7th Gear								
323.79 (241.45)	15134 (67.32)	8.02 (12.91)	2099	1.21	0.420 (0.255)	16.82 (3.31)	189 (87)	28.69 (97.16)
8th Gear								
319.72 (238.41)	13009 (57.86)	9.22 (14.83)	2098	1.05	0.422 (0.256)	16.75 (3.30)	189 (87)	28.69 (97.16)

DRAWBAR PERFORMANCE AT 1900 RPM (Unballasted) 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)
1st Gear									
226.44 (168.86)	35115 (156.20)	2.42 (3.89)	2119	14.66	0.488 (0.297)	14.46 (2.85)	189 (87)	64 (18)	28.67 (97.09)
2nd Gear									
285.09 (212.59)	31113 (138.40)	3.44 (5.53)	1912	6.26	0.415 (0.252)	17.02 (3.35)	190 (88)	65 (18)	28.68 (97.12)
3rd Gear									
326.93 (243.79)	28639 (127.39)	4.28 (6.89)	1899	4.58	0.402 (0.244)	17.58 (3.46)	190 (88)	68 (20)	28.68 (97.12)
4th Gear									
362.25 (270.13)	27548 (122.54)	4.93 (7.94)	1900	3.93	0.402 (0.245)	17.55 (3.46)	191 (88)	69 (21)	28.69 (97.16)
5th Gear									
365.38 (272.46)	23896 (106.29)	5.73 (9.23)	1898	2.43	0.399 (0.243)	17.68 (3.48)	191 (88)	68 (20)	28.69 (97.16)
6th Gear									
363.68 (271.20)	21629 (96.21)	6.31 (10.15)	1902	1.96	0.402 (0.244)	17.57 (3.46)	191 (88)	69 (21)	28.69 (97.16)
7th Gear									
363.75 (271.25)	18874 (83.95)	7.23 (11.63)	1898	1.53	0.400 (0.243)	17.67 (3.48)	191 (88)	69 (21)	28.69 (97.16)
8th Gear									
365.10 (272.26)	16436 (73.11)	8.33 (13.41)	1902	1.32	0.398 (0.242)	17.77 (3.50)	191 (88)	70 (21)	28.69 (97.16)

TRACTOR SOUND LEVEL WITH CAB

dB(A)

At 75% load in 6th gear

77.1

Bystander

—

TRACKS, BALLAST AND WEIGHT

Track Width—

Ballast—Cast Iron—Front
—Center
—Rear

Height of Drawbar

Static Weight with operator

With Ballast

30.0 in (760 mm)
2150 lb (975 kg)
365 lb (165 kg)
1565 lb (710 kg)
18.5 in (470 mm)
39765 lb (18037 kg)

Without Ballast

30.0 in (760 mm)
none
365 lb (165 kg)
none
18.5 in (470 mm)
36050 lb (16352 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 of the returned fuel was maintained at 145° F (63°C). Water was used to cool the PTO reduction box during the PTO test sequence. The performance figures on this summary were taken from a test conducted under the OECD Code II test code procedure.

NOTE: The Challenger 95E engine is electronically controlled to give 3 different power levels depending on gear selection. The engine produces 292 PTO Hp when the gear shift lever is in neutral, first and second gear. The engine produces 323 PTO Hp in third gear. The engine produces 353 PTO Hp in fourth through tenth gear.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1751**, Summary 267, June 24, 1998.

LEONARD L. BASHFORD

Director

M. F. KOCHER

R. D. GRISSO

G.J. HOFFMAN

Board of Tractor Test Engineers

DRAWBAR PERFORMANCE AT 2100 RPM (Ballasted)
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)
1st Gear									
250.54 (186.84)	37332 (166.06)	2.52 (4.05)	2098	10.49	0.452 (0.276)	15.61 (3.08)	188 (87)	67 (19)	28.82 (97.60)
2nd Gear									
270.36 (201.61)	25780 (114.67)	3.93 (6.33)	2099	2.50	0.422 (0.257)	16.72 (3.29)	189 (87)	68 (20)	28.82 (97.60)
3rd Gear									
300.62 (224.17)	23167 (103.05)	4.87 (7.83)	2099	2.02	0.410 (0.249)	17.22 (3.39)	189 (87)	70 (21)	28.82 (97.60)
4th Gear									
331.44 (247.15)	22350 (99.42)	5.56 (8.95)	2097	2.02	0.409 (0.249)	17.26 (3.40)	189 (87)	72 (22)	28.85 (97.70)
5th Gear									
329.20 (245.48)	19268 (85.71)	6.41 (10.31)	2098	1.65	0.411 (0.250)	17.18 (3.39)	190 (88)	72 (22)	28.85 (97.70)
6th Gear									
327.10 (243.92)	17488 (77.79)	7.01 (11.29)	2098	1.49	0.412 (0.251)	17.14 (3.38)	189 (87)	73 (23)	28.84 (97.66)
7th Gear									
325.21 (242.50)	15183 (67.54)	8.03 (12.93)	2098	1.28	0.416 (0.253)	16.98 (3.35)	189 (87)	72 (22)	28.84 (97.66)
8th Gear									
323.01 (240.87)	13144 (58.47)	9.22 (14.83)	2096	1.22	0.419 (0.255)	16.87 (3.32)	189 (87)	73 (23)	28.84 (97.66)

DRAWBAR PERFORMANCE AT 1900 RPM (Ballasted)
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)	
1st Gear									
248.93 (185.63)	38958 (173.29)	2.40 (3.86)	2052	12.77	0.458 (0.279)	15.42 (3.04)	189 (87)	60 (16)	28.81 (97.56)
2nd Gear									
289.84 (216.13)	33581 (149.38)	3.24 (5.22)	1799	6.32	0.404 (0.246)	17.46 (3.44)	190 (88)	69 (21)	28.82 (97.60)
3rd Gear									
331.89 (247.49)	28644 (127.41)	4.35 (6.99)	1901	3.48	0.393 (0.239)	17.96 (3.54)	190 (88)	71 (22)	28.83 (97.63)
4th Gear									
365.67 (272.67)	27560 (122.59)	4.98 (8.01)	1902	3.33	0.393 (0.239)	17.97 (3.54)	190 (88)	72 (22)	28.85 (97.70)
5th Gear									
366.98 (273.66)	23815 (105.93)	5.78 (9.30)	1903	2.18	0.397 (0.242)	17.77 (3.50)	191 (88)	73 (23)	28.84 (97.66)
6th Gear									
368.80 (275.01)	21867 (97.26)	6.32 (10.18)	1901	1.86	0.395 (0.240)	17.89 (3.52)	190 (88)	73 (23)	28.84 (97.66)
7th Gear									
366.56 (273.35)	18942 (84.25)	7.26 (11.68)	1902	1.54	0.396 (0.240)	17.83 (3.51)	190 (88)	72 (22)	28.84 (97.66)
8th Gear									
364.47 (271.79)	16395 (72.93)	8.34 (13.42)	1901	1.44	0.399 (0.243)	17.72 (3.49)	191 (88)	73 (23)	28.84 (97.66)

NEBRASKA OECD TRACTOR TEST 1751—SUMMARY 267

CATERPILLAR CHALLENGER 95E DIESEL

10 SPEED

POWER TAKE-OFF PERFORMANCE (HIGH POWER SETTING)

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—1023 rpm)					
• 374.75 (279.45)	2100	19.18 (72.62)	0.362 (0.220)	19.54 (3.85)	
Standard Power Take-off Speed (1000 rpm)					
388.46 (289.67)	2053	19.64 (74.34)	0.357 (0.217)	19.78 (3.90)	
Maximum Power (2 hours)					
416.30 (310.44)	1899	20.76 (78.58)	0.352 (0.214)	20.05 (3.95)	

VARYING POWER AND FUEL CONSUMPTION

374.75 (279.45)	2100	19.18 (72.62)	0.362 (0.220)	19.54 (3.85)	Air temperature
326.60 (243.54)	2151	17.03 (64.47)	0.368 (0.224)	19.17 (3.78)	75°F (24°C)
251.92 (187.86)	2216	14.06 (53.22)	0.394 (0.240)	17.92 (3.53)	Relative humidity
172.56 (128.67)	2283	11.13 (42.13)	0.456 (0.277)	15.51 (3.05)	82%
87.30 (65.10)	2302	7.77 (29.42)	0.629 (0.383)	11.23 (2.21)	Barometer
1.17 (0.87)	2302	4.37 (16.56)	26.322 (16.012)	0.27 (0.05)	28.88"Hg (97.80 kPa)

Maximum Torque 1315 lb.-ft. (1783 Nm) at 1401 rpm

Maximum Torque Rise 40.4%

Torque rise at 1701 rpm 33%

This tractor model operates at three power levels. A high power setting (353 PTO Hp) is available in gears 4 through 10. To comply with test code rules an override system was used to allow that power setting to be transmitted through the PTO gears.

NEBRASKA OECD TRACTOR TEST 1751—SUMMARY 267

CATERPILLAR CHALLENGER 95E DIESEL

10 SPEED

POWER TAKE-OFF PERFORMANCE (MID POWER SETTING)

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—1022 rpm)					
339.44 (253.12)	2099	17.52 (66.30)	0.364 (0.222)	19.38 (3.82)	
Standard Power Take-off Speed (1000 rpm)					
350.95 (261.70)	2054	17.84 (67.54)	0.359 (0.218)	19.67 (3.87)	
Maximum Power (2 hours)					
377.64 (281.61)	1900	18.72 (70.85)	0.350 (0.213)	20.18 (3.97)	

VARYING POWER AND FUEL CONSUMPTION

339.14 (253.12)	2099	17.52 (66.30)	0.364 (0.222)	19.38 (3.82)	Air temperature
295.92 (220.67)	2151	15.80 (59.80)	0.377 (0.229)	18.73 (3.69)	76°F (24°C)
229.19 (170.91)	2223	13.29 (50.33)	0.410 (0.249)	17.24 (3.40)	Relative humidity
157.65 (117.56)	2293	10.53 (39.87)	0.472 (0.287)	14.97 (2.95)	74%
78.65 (58.65)	2302	7.39 (27.98)	0.664 (0.404)	10.64 (2.10)	Barometer
1.60 (1.91)	2302	4.37 (16.56)	19.303 (11.742)	0.37 (0.07)	28.90"Hg (97.88 kPa)

Maximum Torque 1205 lb.-ft. (1634 Nm) at 1402 rpm

Maximum Torque Rise 42.0%

Torque rise at 1700 rpm 33%

This tractor model operates at three power levels. A mid range level (323 PTO Hp) is available in gear 3. To comply with test code rules an override system was used to allow that power setting to be transmitted through the PTO gears.

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: No 3 Point Hitch Available

Quick Attach: NA

Maximum Force Exerted Through Whole Range:

NA

i) Opening pressure of relief valve:

NA

Sustained pressure with pump stalled:

2940 psi (203 bar)

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

41.5 GPM (157.1 l/min)

iii) Pump delivery rate at maximum

hydraulic power:

40.0 GPM (151.4 l/min)

Delivery pressure:

2600 psi (179 bar)

Power:

60.7 HP (45.2 kW)



CATERPILLAR CHALLENGER 95E DIESEL

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