

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

January 1997

Test 1723: Caterpillar Challenger 85D Diesel 10-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 1723: Caterpillar Challenger 85D Diesel 10-Speed" (1997). *Nebraska Tractor Tests*. 2032.

<https://digitalcommons.unl.edu/tractormuseumlit/2032>

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 1723—SUMMARY 223

CATERPILLAR CHALLENGER 85D DIESEL

10 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—1023 rpm)					
312.46 (233.00)	2097	16.48 (62.37)	0.370 (0.225)	18.97 (3.74)	
Standard Power Take-off Speed (1000 rpm)					
318.59 (237.57)	2050	16.64 (63.00)	0.367 (0.223)	19.14 (3.77)	
Maximum Power (2 hours)					
334.95 (249.77)	1945	17.13 (64.83)	0.359 (0.218)	19.56 (3.85)	

VARYING POWER AND FUEL CONSUMPTION

312.46 (233.00)	2097	16.48 (62.37)	0.370 (0.225)	18.97 (3.74)	Air temperature
272.84 (203.46)	2153	15.09 (57.14)	0.388 (0.236)	18.08 (3.56)	75°F (24°C)
209.78 (156.43)	2208	12.49 (47.26)	0.418 (0.254)	16.80 (3.31)	Relative humidity
143.56 (106.98)	2263	9.96 (37.71)	0.487 (0.296)	14.40 (2.84)	31%
72.45 (54.03)	2296	7.14 (27.03)	0.692 (0.421)	10.15 (2.00)	Barometer
1.07 (0.80)	2296	4.32 (16.35)	28.418 (17.286)	0.25 (0.05)	29.05"Hg (98.37 kPa)

Maximum Torque 1055 lb.-ft. (1430 Nm) at 1396 rpm
Maximum Torque Rise 35.0%
Torque rise at 1697 rpm 23%

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—3rd Gear									
271.64 (202.56)	21162 (94.13)	4.81 (7.75)	2097	2.01	0.422 (0.257)	16.63 (3.28)	195 (91)	54 (12)	28.97 (98.10)
75% of Pull at Maximum Power—3rd Gear									
212.34 (158.34)	15835 (70.44)	5.03 (8.09)	2174	1.03	0.468 (0.284)	15.00 (2.96)	193 (89)	47 (8)	29.24 (99.02)
50% of Pull at Maximum Power—3rd Gear									
146.17 (109.00)	10549 (46.92)	5.20 (8.36)	2238	0.66	0.537 (0.327)	13.07 (2.57)	193 (89)	50 (10)	29.26 (99.09)
75% of Pull at Reduced Engine Speed—5th Gear									
212.36 (158.35)	15829 (70.41)	5.03 (8.10)	1658	0.97	0.412 (0.250)	17.05 (3.36)	196 (91)	48 (9)	29.24 (99.02)
50% of Pull at Reduced Engine Speed—5th Gear									
146.18 (109.00)	10564 (46.99)	5.19 (8.35)	1704	0.66	0.455 (0.277)	15.40 (3.03)	188 (87)	50 (10)	29.26 (99.09)

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

Dates of Test: April 9-16, 1997

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

FUEL OIL and TIME: Fuel No. 2 Diesel Cetane
No. 50.6 Specific gravity converted to 60°/60°
F (15°/15°C) 0.8426 Fuel weight 7.016 lbs/gal
(0.841 kg/l) Oil SAE 15W40 API service
classification CG-4, To motor 7.056 gal (26.708 l)
Drained from motor 6.693 gal (25.336 l)
Transmission and final drive lubricant SAE
30W API CD/TO-2 fluid Hydraulic lubricant
Caterpillar CXP fluid Total time engine was
operated 19.0 hours.

ENGINE: Make Caterpillar Diesel Type six
cylinder vertical with turbocharger and air to air
intercooler Serial No. *6AR00417* Crankshaft
lengthwise Rated rpm 2100 Bore and stroke (as
specified) 5.118" × 5.906" (130 mm × 150 mm)
Compression ratio 16 to 1 Displacement 729 cu
in (11950 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, engine
coolant heat exchanger and radiator for transmission
oil, radiator for hydraulic oil and steering oil Fuel
filter one cartridge and water separator Muffler
vertical Cooling medium temperature control
thermostat.

**ENGINE OPERATING PARAMETERS: Fuel
rate:** Gears 1-2 103.2-113.3 lb/h (46.8-51.4 kg/h)
gears 3-5 112.0-122.6 lb/h (50.8-55.6 kg/h), gears 6-
10 114.5-125.5 lb/h (51.9-56.9 kg/h) High idle:
2260-2340 rpm Turbo boost nominal 12.8-18.4 psi
(88-127 kPa) as measured 16.0 psi (110 kPa)

CHASSIS: Type tracklayer-rubber tracked Serial
No. *4GR00446* 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 2.80 (4.51) second 4.02
(6.47) third 4.95 (7.96) fourth 5.66 (9.11) fifth 6.49
(10.45) sixth 7.10 (11.42) seventh 8.12 (13.06) eighth
9.31 (14.98) ninth 12.62 (20.31) tenth 18.09 (29.11)
reverse 2.04 (3.29), 4.74 (7.63) Clutch multiple wet
disc hydraulically actuated by foot pedal Brakes
caliper disc hydraulically operated by foot pedal
Steering differential steering hydrostatically actuated
by steering wheel Power take-off 1000 rpm at 2050
engine rpm Unladen tractor mass 34234 lb (15528
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)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
1st Gear									
231.50 (172.63)	34234 (152.28)	2.54 (4.08)	2100	8.97	0.456 (0.277)	15.39 (3.03)	191 (88)	53 (12)	28.95 (98.04)
2nd Gear									
243.97 (181.93)	23553 (104.77)	3.88 (6.25)	2096	2.53	0.434 (0.264)	16.17 (3.19)	197 (92)	53 (12)	28.95 (98.04)
3rd Gear									
271.64 (202.56)	21162 (94.13)	4.81 (7.75)	2097	2.01	0.422 (0.257)	16.63 (3.28)	195 (91)	54 (12)	28.97 (98.10)
4th Gear									
268.58 (200.28)	18181 (80.87)	5.54 (8.92)	2101	1.54	0.427 (0.260)	16.43 (3.24)	189 (87)	58 (14)	28.97 (98.10)
5th Gear									
268.34 (200.10)	15819 (70.36)	6.36 (10.24)	2097	1.28	0.427 (0.260)	16.44 (3.24)	188 (87)	59 (15)	28.98 (98.14)
6th Gear									
269.68 (201.10)	14528 (64.62)	6.96 (11.20)	2097	1.17	0.428 (0.260)	16.39 (3.23)	186 (85)	61 (16)	29.01 (98.24)
7th Gear									
267.17 (199.23)	12578 (55.95)	7.97 (12.82)	2095	1.01	0.434 (0.264)	16.15 (3.18)	192 (89)	63 (17)	29.01 (98.24)
8th Gear									
263.09 (196.19)	10774 (47.93)	9.16 (14.74)	2098	0.96	0.439 (0.267)	15.97 (3.15)	194 (90)	65 (18)	29.01 (98.24)

DRAWBAR PERFORMANCE AT 1950 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)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
1st Gear									
217.59 (162.25)	35299 (157.02)	2.31 (3.72)	2040	14.58	0.499 (0.304)	14.05 (2.77)	185 (85)	49 (9)	28.92 (97.93)
2nd Gear									
254.73 (189.95)	26661 (118.59)	3.58 (5.77)	1954	3.65	0.418 (0.254)	16.78 (3.31)	193 (89)	53 (12)	28.96 (98.07)
3rd Gear									
279.21 (208.20)	23585 (104.91)	4.44 (7.14)	1946	2.63	0.410 (0.249)	17.12 (3.37)	187 (86)	56 (13)	28.97 (98.10)
4th Gear									
279.35 (208.31)	20497 (91.18)	5.11 (8.22)	1945	1.96	0.410 (0.249)	17.13 (3.37)	189 (87)	58 (14)	28.98 (98.13)
5th Gear									
281.41 (209.85)	17938 (79.79)	5.88 (9.47)	1944	1.49	0.407 (0.248)	17.23 (3.39)	186 (86)	60 (16)	29.00 (98.21)
6th Gear									
293.94 (219.19)	17055 (75.86)	6.46 (10.40)	1952	1.33	0.411 (0.250)	17.07 (3.36)	184 (84)	61 (16)	29.01 (98.24)
7th Gear									
291.00 (217.00)	14740 (65.56)	7.40 (11.91)	1951	1.17	0.412 (0.251)	17.01 (3.35)	187 (86)	62 (17)	29.01 (98.24)
8th Gear									
287.38 (214.30)	12637 (56.21)	8.53 (13.72)	1956	1.01	0.418 (0.254)	16.77 (3.30)	189 (87)	64 (18)	29.01 (98.24)

TRACTOR SOUND LEVEL WITH CAB

	dB(A)
At 75% load in 5th gear	76.8
Bystander	NA

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

NA
NA
18.0 in (455 mm)
NA
NA
34400 lb (15605 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 temperature of the returned fuel was maintained at 151° F (66°C). Fans were used to cool the PTO reduction gearbox during the PTO test sequence. The performance figures on this summary were taken from a test conducted under the OECD Code II restricted standard test code procedure.

NOTE: The engine on this tractor is electronically controlled to give 3 different power levels dependent on the position of the gear shift lever. A low setting (330 engine hp) is available in gears 1 and 2. A mid range level (360 engine hp) is available in gears 3, 4 and 5. A high power setting (370 engine hp) is available in neutral and gears 6 through 10.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1723**, Summary 223 April 22, 1997.

LOUIS I. LEVITICUS
Engineer-in-Charge

LEONARD L. BASHFORD
ROBERT D. GRISSO
MICHAEL F. KOCHER
Board of Tractor Test Engineers

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: No 3 point lift system provided

Quick Attach:

Maximum Force Exerted Through Whole Range:

NA

i) Opening pressure of relief valve:

NA

Sustained pressure of the open relief valve:

2770 psi (191 bar)

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

35.6 GPM (134.8 l/min)

iii) Pump delivery rate at maximum

hydraulic power:

31.2 GPM (118.1 l/min)

Delivery pressure:

2510 psi (173 bar)

Power:

45.7 HP (34.1 kW)



CATERPILLAR CHALLENGER 85D DIESEL

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