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Test 1687: Caterpillar Challenger 85C Diesel 10-speed

Nebraska Tractor Test Lab

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NEBRASKA OECD TRACTOR TEST 1687—SUMMARY 173
CATERPILLAR CHALLENGER 85C DIESEL
10 SPEED

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

Dates of Test: April 4-7, 1995

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)** 0.8381 **Fuel weight** 6.972 lbs/gal (0.836 kg/l) **Oil** SAE 10W30 **API service classification** CF-4. CE **To motor** 5.548 gal (21.000l) **Drained from motor** 5.044 gal (19.094 l) **Transmission and final drive lubricant** SAE 30W API CD/TO-2 fluid **Hydraulic lubricant** Caterpillar CXP fluid **Total time engine was operated** 29.0 hours.

ENGINE: Make Caterpillar Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler **Serial No.** *43Z01491* **Crankshaft** lengthwise **Rated engine speed** 2100 **Bore and stroke** (as specified) 4.92"× 5.51" (125 mm× 140 mm) **Compression ratio** 16 to 1 **Displacement** 629 cu in (10308 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 for transmission oil, radiator for steering and PTO oil, radiator for hydraulic oil **Fuel filter** one element and one cartridge **Muffler** vertical **Cooling medium temperature control** thermostat.

ENGINE OPERATING PARAMETERS: **Fuel rate:** Low power setting 109.3-119.9 lb/h (49.6-54.4 kg/h) High power setting 117.8-129.2 lb/h (53.4-58.6 kg/h) **High idle:** 2260-2340 rpm **Turbo boost** nominal 12.8-18.6 psi (88-128 kPa) as measured 16.8 psi (116 kPa)

CHASSIS: **Type** tracklayer-rubber tracked **Serial No.** *9TK1473* **Tread width** 90.1" (2285mm) **Length of track on ground** 107.0" (2718 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 4.01 (6.46) third 4.94 (7.95) fourth 5.65 (9.10) fifth 6.48 (10.43) sixth 7.08 (11.40) seventh 8.10 (13.04) eighth 9.29 (14.96) ninth 12.60 (20.29) tenth 18.06 (29.08) reverse 2.04 (3.28), 4.74 (7.63) **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** 33675lb (15275 kg)

REPAIRS AND ADJUSTMENTS: No repairs or adjustments

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—1024 rpm)					
284.08 (211.84)	2101	16.06 (60.79)	0.394 (0.240)	17.69 (3.48)	
Standard Power Take-off Speed (1001 rpm)					
289.86 (216.15)	2053	16.15 (61.13)	0.388 (0.236)	17.95 (3.54)	
Maximum Power (2 hours)					
304.57 (227.12)	1900	16.52 (62.55)	0.378 (0.230)	18.43 (3.63)	

VARYING POWER AND FUEL CONSUMPTION

284.08 (211.84)	2101	16.06 (60.79)	0.394 (0.240)	17.69 (3.48)	Air temperature
246.59 (183.89)	2151	14.41 (54.57)	0.409 (0.248)	17.11 (3.37)	74°F (23°C)
189.96 (141.66)	2206	12.05 (45.61)	0.442 (0.269)	15.77 (3.11)	Relative humidity
130.29 (97.16)	2264	9.60 (36.32)	0.513 (0.312)	13.58 (2.67)	36%
66.73 (49.76)	2300	6.93 (26.22)	0.724 (0.440)	9.63 (1.90)	Barometer
1.07 (0.80)	2300	4.22 (15.96)	27.542 (16.753)	0.25 (0.05)	29.10"Hg (98.54 kPa)

Maximum Torque 957 lb.-ft. (1297 Nm) at 1199 rpm
Maximum Torque Rise 34.7%
Torque rise at 1700 rpm 28%

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									
272.42 (203.14)	21371 (95.06)	4.78 (7.69)	2093	2.36	0.442 (0.269)	15.78 (3.11)	194 (90)	70 (21)	28.76 (97.39)
75% of Pull at Maximum Power—3rd Gear									
213.92 (159.52)	16031 (71.31)	5.00 (8.05)	2168	1.37	0.466 (0.283)	14.97 (2.95)	193 (89)	72 (22)	28.74 (97.32)
50% of Pull at Maximum Power—3rd Gear									
147.55 (110.02)	10701 (47.60)	5.17 (8.32)	2229	0.78	0.538 (0.328)	12.95 (2.55)	192 (89)	72 (22)	28.74 (97.32)
75% of Pull at Reduced Engine Speed—5th Gear									
211.88 (158.00)	16061 (71.44)	4.95 (7.96)	1634	1.26	0.422 (0.256)	16.54 (3.26)	194 (90)	72 (22)	28.74 (97.32)
50% of Pull at Reduced Engine Speed—5th Gear									
144.82 (110.98)	10733 (47.74)	5.20 (8.37)	1709	0.73	0.463 (0.282)	15.06 (2.97)	193 (89)	72 (22)	28.74 (97.32)

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		Temp.°F (°C)		Barom. inch Hg (kPa)
					lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	cool- ing med	Air dry bulb	
1st Gear									
215.79 (160.91)	33673 (149.78)	2.40 (3.86)	2110	14.03	0.513 (0.312)	13.60 (2.68)	193 (89)	65 (18)	28.60 (96.85)
2nd Gear									
243.23 (181.38)	23699 (105.42)	3.85 (6.20)	2092	3.02	0.456 (0.277)	15.28 (3.01)	193 (89)	67 (19)	28.59 (96.82)
3rd Gear									
272.42 (203.14)	21371 (95.06)	4.78 (7.69)	2093	2.36	0.442 (0.269)	15.78 (3.11)	194 (90)	70 (21)	28.76 (97.39)
4th Gear									
272.47 (203.18)	18516 (82.36)	5.52 (8.88)	2098	1.63	0.444 (0.270)	15.71 (3.09)	194 (90)	71 (22)	28.78 (97.46)
5th Gear									
270.06 (201.38)	15933 (70.87)	6.36 (10.23)	2099	1.21	0.446 (0.271)	15.63 (3.08)	194 (90)	66 (19)	28.78 (97.46)
6th Gear									
268.75 (200.41)	14489 (64.45)	6.96 (11.19)	2098	1.10	0.451 (0.274)	15.46 (3.05)	193 (89)	67 (19)	28.78 (97.46)
7th Gear									
264.91 (197.54)	12477 (55.50)	7.96 (12.81)	2097	0.95	0.455 (0.277)	15.31 (3.02)	194 (90)	71 (22)	28.80 (97.53)
8th Gear									
261.45 (194.96)	10789 (47.99)	9.09 (14.62)	2084	0.84	0.462 (0.281)	15.08 (2.97)	193 (89)	70 (21)	28.79 (97.49)

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		Temp.°F (°C)		Barom. inch Hg (kPa)
					lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	cool- ing med	Air dry bulb	
1st Gear									
217.62 (162.28)	33574 (149.34)	2.43 (3.91)	2110	13.06	0.508 (0.309)	13.71 (2.70)	193 (89)	65 (18)	28.60 (96.85)
2nd Gear									
253.57 (189.09)	27712 (123.27)	3.43 (5.52)	1904	5.12	0.447 (0.272)	15.61 (3.08)	193 (89)	68 (20)	28.61 (96.88)
3rd Gear									
283.53 (211.43)	24681 (109.79)	4.31 (6.93)	1913	3.73	0.431 (0.262)	16.18 (3.19)	194 (90)	71 (22)	28.76 (97.39)
4th Gear									
286.66 (213.76)	21538 (95.81)	4.99 (8.03)	1912	2.36	0.427 (0.260)	16.31 (3.21)	194 (90)	70 (21)	28.77 (97.43)
5th Gear									
287.79 (214.61)	18691 (83.14)	5.77 (9.29)	1911	1.63	0.427 (0.260)	16.33 (3.22)	194 (90)	66 (19)	28.78 (97.46)
6th Gear									
285.96 (213.24)	16919 (75.26)	6.34 (10.20)	1917	1.31	0.432 (0.263)	16.15 (3.18)	194 (90)	69 (21)	28.79 (97.49)
7th Gear									
282.66 (210.78)	14671 (65.26)	7.23 (11.63)	1907	1.00	0.433 (0.264)	16.09 (3.17)	194 (90)	70 (21)	28.79 (97.49)
8th Gear									
279.23 (208.23)	12509 (55.64)	8.37 (13.47)	1922	0.89	0.440 (0.268)	15.84 (3.12)	193 (89)	69 (21)	28.79 (97.49)

TRACTOR SOUND LEVEL WITH CAB	dB(A)
At 75% load in 6th gear	77.0
Bystander	—

TIRES, BALLAST AND WEIGHT	Tested Without Ballast
Rear Tires—No., size, ply & psi (kPa)	NA
Front Tires—No., size, ply & psi (kPa)	NA
Height of Drawbar	18.0 in (455 mm)
Static Weight with Operator—Rear	NA
—Front	NA
—Total	33840 lb (15350 kg)

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 150° F (66°C). 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 2 different power settings dependent on the position of the gear shift lever. A low setting (325 engine hp) is available in neutral and gears 1 and 2. A high setting (355 engine hp) is available in gears 3 through 10.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1687**, Summary 173, April 20, 1995.

LOUIS I. LEVITICUS
Engineer-in-Charge

L.L. BASHFORD
R.D. GRISSO
K. VON BARGEN
Board of Tractor Test Engineers

NEBRASKA OECD TRACTOR TEST 1687—SUMMARY 173
CATERPILLAR CHALLENGER 85C 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)					
311.26 (232.11)	2098	17.40 (65.85)	0.390 (0.237)	17.89 (3.52)	
Standard Power Take-off Speed (999 rpm)					
313.78 (233.99)	2049	17.51 (66.28)	0.389 (0.237)	17.92 (3.53)	
Maximum Power (2 hours)					
325.93 (243.05)	1900	17.68 (66.94)	0.378 (0.230)	18.43 (3.63)	

VARYING POWER AND FUEL CONSUMPTION					
311.26 (232.11)	2098	17.40 (65.86)	0.390 (0.237)	17.89 (3.52)	Air temperature
268.85 (200.48)	2149	15.53 (58.80)	0.403 (0.245)	17.31 (3.41)	77°F (25°C)
205.96 (153.58)	2196	12.69 (48.05)	0.430 (0.261)	16.23 (3.20)	Relative humidity
141.37 (105.42)	2255	10.07 (38.11)	0.497 (0.302)	14.04 (2.77)	28%
72.07 (53.74)	2299	7.14 (27.04)	0.691 (0.420)	10.09 (1.99)	Barometer
1.07 (0.80)	2299	4.22 (15.96)	27.537 (16.750)	0.25 (0.05)	28.61"Hg (96.90 kPa)

Maximum Torque 1028 lb.-ft. (1393 Nm) at 1449 rpm
Maximum Torque Rise 31.9%
Torque rise at 1702 rpm 25%

This tractor's engine operates at two power levels. The lower level is operative in first and second gears and when the tractor is stationary (neutral). This feature cannot be controlled by the operator. In order to comply with test code rules an override switch was installed which enabled the high power level to be transmitted to the PTO (gear in neutral).

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: NA		
Quick Attach: NA		
Maximum Force Exerted Through Whole Range:	NA	
i) Opening pressure of relief valve:	NA	
Sustained pressure with pump stalled:	2560 psi	(176 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	27.0 GPM	(102.2 l/min)
iii) Pump delivery rate at maximum hydraulic power:	23.1 GPM	(87.4 l/min)
Delivery pressure:	2360 psi	(163 bar)
Power:	31.8 HP	(23.7 kW)



CATERPILLAR CHALLENGER 85C DIESEL