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January 1996

## Test 1706: Caterpillar Challenger 65D Diesel 10-Speed

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA OECD TRACTOR TEST 1706—SUMMARY 201

## CATERPILLAR CHALLENGER 65D 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
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>					
<b>Rated Engine Speed—(PTO speed—1024 rpm)</b>					
256.15 (191.01)	2100	15.49 (58.65)	0.425 (0.258)	16.53 (3.26)	
<b>Maximum Power (2 hours)</b>					
268.39 (200.14)	2050	16.10 (60.93)	0.421 (0.256)	16.67 (3.28)	
<b>Standard Power Take-off Speed (1000 rpm)</b>					
268.39 (200.14)	2050	16.10 (60.93)	0.421 (0.256)	16.67 (3.28)	

#### VARYING POWER AND FUEL CONSUMPTION

256.15 (191.01)	2100	15.49 (58.65)	0.425 (0.258)	16.53 (3.26)	Air temperature
223.84 (166.92)	2157	13.80 (52.23)	0.433 (0.263)	16.22 (3.20)	76°F (24°C)
171.07 (127.56)	2207	11.23 (42.53)	0.461 (0.288)	15.23 (3.00)	Relative humidity
116.55 (86.11)	2252	8.93 (33.80)	0.538 (0.327)	13.05 (2.57)	26%
59.60 (44.45)	2292	6.41 (24.26)	0.755 (0.459)	9.30 (1.83)	Barometer
1.08 (0.81)	2320	4.06 (15.36)	26.470 (16.101)	0.27 (0.05)	28.57"Hg (96.70 kPa)

Maximum Torque 894 lb.-ft. (1212 Nm) at 1300 rpm

Maximum Torque Rise 39.6%

Torque rise at 1699 rpm 27%

#### 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)
<b>Maximum Power—3rd Gear</b>									
235.26 (175.43)	19258 (85.66)	4.58 (7.37)	2092	1.55	0.475 (0.289)	14.79 (2.91)	180 (82)	48 (9)	28.60 (96.85)
<b>75% of Pull at Maximum Power—3rd Gear</b>									
181.87 (135.62)	14245 (63.36)	4.79 (7.70)	2177	1.02	0.516 (0.314)	13.62 (2.68)	177 (81)	49 (9)	28.66 (97.05)
<b>50% of Pull at Maximum Power—3rd Gear</b>									
124.82 (93.08)	9516 (42.33)	4.92 (7.92)	2230	0.75	0.595 (0.362)	11.80 (2.32)	174 (79)	49 (9)	28.66 (97.05)
<b>75% of Pull at Reduced Engine Speed—5th Gear</b>									
181.44 (135.30)	14261 (63.44)	4.77 (7.68)	1655	1.07	0.461 (0.280)	15.24 (3.00)	177 (81)	49 (9)	28.66 (97.05)
<b>50% of Pull at Reduced Engine Speed—5th Gear</b>									
124.77 (93.04)	95.05 (42.28)	4.92 (7.92)	1701	0.75	0.506 (0.308)	13.87 (2.73)	173 (78)	49 (9)	28.66 (97.05)

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

**Dates of Test:** April 1-4, 1996

**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) 0.8435 Fuel weight 7.023 lbs/gal  
(0.842 kg/l) Oil SAE 10W30 API service  
classification CF-4, CE To motor 5.991 gal  
(22.678 l) Drained from motor 5.487 gal (20.770 l)  
Transmission and final drive lubricant SAE  
30W API CD/TO-2 fluid Hydraulic lubricant  
Caterpillar CXP fluid Total time engine was  
operated 17.0 hours.

**ENGINE:** Make Caterpillar Diesel Type six  
cylinder vertical with turbocharger and intercooler  
Serial No. \*08Z88981\* Crankshaft lengthwise  
Rated rpm 2100 Bore and stroke (as specified)  
4.75" × 6.00" (120.6 mm × 152.4 mm) Compression  
ratio 15.0 to 1 Displacement 638 cu in (10450 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 hydraulic  
oil, radiator for steering and PTO oil Fuel filter one  
element and one cartridge Muffler vertical Cooling  
medium temperature control thermostat.

**ENGINE OPERATING PARAMETERS:** Fuel  
rate: 106.9-117.9 lb/h (48.5-53.5 kg/h) High idle:  
2260-2380 rpm Turbo boost nominal 22.8 psi (157  
kPa) as measured 20.2 psi (139 kPa)

**CHASSIS:** Type tracklayer-rubber tracked Serial  
No. \*2ZJ02010\* 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 2.6 (4.2) second 4.0 (6.4)  
third 4.7 (7.5) fourth 5.3 (8.6) fifth 6.1 (9.9) sixth 7.0  
(11.3) seventh 8.1 (13.0) eighth 9.3 (14.9) ninth 12.0  
(19.3) tenth 18.1 (29.3) reverse 1.9 (3.1), 4.5 (7.2)  
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 35235 lb (15982 kg)

**REPAIRS AND ADJUSTMENTS:** No repairs  
or adjustments

# **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)
<b>1st Gear</b>									
217.71 (162.34)	33636 (149.62)	2.43 (3.91)	2098	8.16	0.509 (0.310)	13.79 (2.72)	178 (81)	47 (8)	28.60 (96.85)
<b>2nd Gear</b>									
231.52 (172.64)	22247 (98.96)	3.90 (6.28)	2096	2.07	0.483 (0.293)	14.56 (2.87)	178 (81)	47 (8)	28.60 (96.85)
<b>3rd Gear</b>									
235.26 (175.43)	19258 (85.66)	4.58 (7.37)	2092	1.55	0.475 (0.289)	14.79 (2.91)	180 (82)	48 (9)	28.60 (96.85)
<b>4th Gear</b>									
233.59 (174.18)	16681 (74.20)	5.25 (8.45)	2094	1.34	0.480 (0.292)	14.65 (2.89)	180 (82)	50 (10)	28.64 (96.99)
<b>5th Gear</b>									
228.49 (170.38)	14201 (63.17)	6.03 (9.71)	2092	1.18	0.489 (0.298)	14.35 (2.83)	181 (83)	51 (11)	28.64 (96.99)
<b>6th Gear</b>									
223.55 (166.70)	12029 (53.51)	6.97 (11.22)	2096	0.97	0.505 (0.307)	13.90 (2.74)	180 (82)	51 (11)	28.64 (96.99)
<b>7th Gear</b>									
219.49 (163.67)	10338 (45.99)	7.96 (12.81)	2093	0.86	0.511 (0.311)	13.73 (2.71)	181 (83)	51 (11)	28.64 (96.99)
<b>8th Gear</b>									
212.86 (158.73)	8719 (38.78)	9.16 (14.79)	2096	0.81	0.520 (0.316)	13.50 (2.66)	185 (83)	51 (11)	28.64 (96.99)

# **DRAWBAR PERFORMANCE AT 2050 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)
<b>1st Gear</b>									
213.58 (159.27)	35502 (157.92)	2.26 (3.63)	2064	13.21	0.537 (0.327)	13.09 (2.58)	178 (81)	47 (8)	28.60 (96.85)
<b>2nd Gear</b>									
239.96 (178.94)	23603 (104.99)	3.81 (6.14)	2054	2.28	0.477 (0.290)	14.71 (2.90)	180 (82)	47 (8)	28.60 (96.85)
<b>3rd Gear</b>									
241.42 (180.03)	20197 (89.84)	4.48 (7.21)	2055	1.86	0.474 (0.289)	14.80 (2.92)	180 (82)	49 (9)	28.62 (96.92)
<b>4th Gear</b>									
240.14 (179.07)	17492 (77.81)	5.15 (8.29)	2055	1.34	0.477 (0.290)	14.74 (2.90)	181 (83)	50 (10)	28.64 (96.99)
<b>5th Gear</b>									
237.33 (176.97)	15073 (67.05)	5.90 (9.50)	2049	1.18	0.483 (0.294)	14.53 (2.86)	182 (83)	51 (11)	28.64 (96.99)
<b>6th Gear</b>									
233.00 (173.75)	12881 (57.30)	6.78 (10.92)	2042	1.02	0.495 (0.301)	14.19 (2.80)	182 (83)	51 (11)	28.64 (96.99)
<b>7th Gear</b>									
228.92 (170.71)	11035 (49.08)	7.78 (12.52)	2045	0.97	0.502 (0.306)	13.98 (2.75)	182 (83)	51 (11)	28.64 (96.99)
<b>8th Gear</b>									
224.18 (167.17)	9383 (41.74)	8.96 (14.42)	2052	0.81	0.509 (0.310)	13.81 (2.72)	182 (83)	51 (11)	28.64 (96.99)

## **TRACTOR SOUND LEVEL WITH CAB**

	<b>dB(A)</b>
At 75% load in 6th gear	75.5
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

35400 lb (16057 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 injection pump return was maintained at 182° F (83°C). This tractor did not meet manufacturers claim of 27 GPM (103.5 l/min) hydraulic flow. Fans were used to cool the PTO reduction box 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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1706**, Summary 201 April 17, 1996.

LOUIS I. LEVITICUS

Engineer-in-Charge

L.L. BASHFORD

R.D. GRISSO

M.L. KOCHER

Board of Tractor Test Engineers

### THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: None

Maximum Force Exerted Through Whole Range:

13086 lbs (58.2 kN)

i) Opening pressure of relief valve:

NA

Sustained pressure of the open relief valve:

2790 psi (192 bar)

ii) Pump delivery rate at minimum pressure:

25.7 GPM (97.3 l/min)

iii) Pump delivery rate at maximum

hydraulic power:

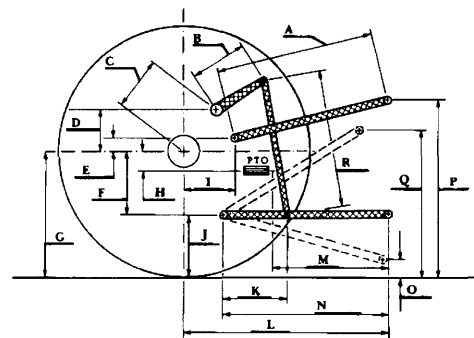
21.3 GPM (80.6 l/min)

Delivery pressure:

2640 psi (182 bar)

Power:

32.8 HP (24.5 kW)



### THREE POINT HITCH PERFORMANCE (SAE Static Test)

Observed Maximum Pressure psi (bar)

2720 (187)

Location

lift cylinder

Hydraulic oil Temperature °F (°C)

146 (63)

Location

hydraulic reservoir

Category

III

Quick Attach

no

Hitch point distance

to ground level in. (mm)

10.2 (259)

16.0 (406)

24.0 (610)

32.0 (813)

40.0 (1016)

Lift force on frame lb.

30015

28818

24471

20376

15084

" " " " (kN)

(133.5)

(128.2)

(108.9)

(90.6)

(67.1)

### HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	mm
A	26.7	678
B	21.5	545
C	18.6	472
D	16.3	415
E	16.6	422
F	3.9	98
G	23.9	606
*H	-5.1	-130
I	14.6	370
J	20.0	508
K	21.1	535
L	40.6	1030
M	25.5	648
N	30.1	765
O	9.0	229
P	47.0	1194
Q	38.7	984
R	26.1	663

\*PTO is above rear axle



**CATERPILLAR CHALLENGER 65D DIESEL**

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