1-1-1997

Test 1722: Caterpiller Challenger 75D Diesel 10-Speed

Nebraska Tractor Test Lab
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NEBRASKA OECD TRACTOR TEST 1722—SUMMARY 222
CATERPILLAR CHALLENGER 75D DIESEL
10 SPEED

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

Dates of Test: April 1-14, 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** 6.524 gal *(24.698 l)* **Drained from motor** 6.193 gal *(23.445 l)* **Transmission and final drive lubricant** SAE 30W API CD/TO-2 fluid **Hydraulic lubricant** Caterpillar CXP fluid **Total time engine was operated** 21.0 hours.

ENGINE: Make Caterpillar Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler **Serial No.** *7ZR00192* **Crankshaft** lengthwise **Rated rpm** 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 hydraulic oil and steering oil **Fuel filter** one cartridge and water separator **Muffler** vertical **Cooling medium temperature control** thermostat.

ENGINE OPERATING PARAMETERS: Fuel rate: 108.0-118.6 lb/h *(49.0-53.8 kg/h)* **High idle:** 2260-2340 rpm **Turbo boost** nominal 12.8-18.4 psi *(88-127 kPa)* as measured 15.8 psi *(109 kPa)*

CHASSIS: Type tracklayer-rubber tracked **Serial No.** *5AR00320* **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 2.66 *(4.28)* second 4.02 *(6.47)* third 4.70 *(7.56)* fourth 5.38 *(8.65)* fifth 6.16 *(9.92)* sixth 7.10 *(11.42)* seventh 8.10 *(13.06)* eighth 9.31 *(14.98)* ninth 12.00 *(19.31)* tenth 18.09 *(29.11)* reverse 1.95 *(3.14)*, 4.52 *(7.27)* **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** 35720 lb *(16202 kg)*

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)					
284.30 *(212.01)*	2097	15.71 *(59.47)*	0.388 *(0.236)*	18.10 *(3.56)*	
Standard Power Take-off Speed (1000 rpm)					
292.57 *(218.17)*	2050	15.95 *(60.37)*	0.382 *(0.233)*	18.34 *(3.61)*	
Maximum Power (2 hours)					
300.58 *(224.15)*	1948	16.14 *(61.11)*	0.377 *(0.229)*	18.62 *(3.67)*	
VARYING POWER AND FUEL CONSUMPTION					
284.30 *(212.01)*	2097	15.71 *(59.47)*	0.377 *(0.236)*	18.62 *(3.56)*	Air temperature
247.51 *(184.57)*	2150	14.03 *(53.09)*	0.398 *(0.242)*	17.65 *(3.48)*	75°F *(24°C)*
190.85 *(142.32)*	2212	11.67 *(44.19)*	0.429 *(0.265)*	16.35 *(3.22)*	Relative humidity
131.27 *(97.89)*	2280	9.28 *(35.12)*	0.496 *(0.302)*	14.15 *(2.79)*	49%
66.17 *(49.34)*	2298	6.50 *(24.60)*	0.689 *(0.419)*	10.18 *(2.01)*	Barometer
1.07 *(0.80)*	2298	3.85 *(14.57)*	25.300 *(15.384)*	0.28 *(0.05)*	29.10"Hg *(98.58 kPa)*

Maximum Torque 954 lb.-ft. *(1294 Nm)* at 1197 rpm
Maximum Torque Rise 34.2%
Torque rise at 1697 rpm 25%

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									
254.52 *(189.80)*	20943 *(93.16)*	4.56 *(7.33)*	2095	1.87	0.435 *(0.265)*	16.13 *(3.18)*	191 *(88)*	54 *(12)*	28.84 *(97.66)*
75% of Pull at Maximum Power—3rd Gear									
199.19 *(148.53)*	15710 *(69.88)*	4.75 *(7.65)*	2172	1.34	0.468 *(0.284)*	15.00 *(2.96)*	191 *(88)*	49 *(9)*	29.09 *(98.51)*
50% of Pull at Maximum Power—3rd Gear									
137.62 *(102.62)*	10478 *(46.61)*	4.93 *(7.93)*	2240	0.87	0.539 *(0.328)*	13.03 *(2.57)*	190 *(88)*	50 *(10)*	29.09 *(98.51)*
75% of Pull at Reduced Engine Speed—5th Gear									
199.74 *(148.94)*	15692 *(69.80)*	4.77 *(7.68)*	1663	1.24	0.421 *(0.256)*	16.65 *(3.28)*	191 *(88)*	49 *(9)*	29.08 *(98.48)*
50% of Pull at Reduced Engine Speed—5th Gear									
137.33 *(102.40)*	10496 *(46.69)*	4.91 *(7.90)*	1702	0.82	0.462 *(0.281)*	15.18 *(2.99)*	191 *(88)*	50 *(10)*	29.09 *(98.51)*

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					
211.73 *(157.89)*	34631 *(154.04)*	2.29 *(3.69)*	2119	13.84	0.500 *(0.304)*	14.02 *(2.76)*	191 *(88)*	57 *(14)*	28.86 *(97.73)*
				2nd Gear					
247.94 *(184.89)*	24086 *(107.14)*	3.86 *(6.21)*	2100	3.05	0.442 *(0.269)*	15.86 *(3.13)*	191 *(88)*	46 *(8)*	29.09 *(98.51)*
				3rd Gear					
254.52 *(189.80)*	20943 *(93.16)*	4.56 *(7.33)*	2095	1.87	0.435 *(0.265)*	16.13 *(3.18)*	191 *(88)*	54 *(12)*	28.84 *(97.66)*
				4th Gear					
253.46 *(189.00)*	18163 *(80.79)*	5.23 *(8.42)*	2095	1.55	0.435 *(0.265)*	16.13 *(3.18)*	191 *(88)*	53 *(12)*	28.86 *(97.73)*
				5th Gear					
247.41 *(184.49)*	15381 *(68.42)*	6.03 *(9.71)*	2099	1.19	0.445 *(0.271)*	15.75 *(3.10)*	192 *(89)*	53 *(12)*	28.90 *(97.87)*
				6th Gear					
246.08 *(183.50)*	13264 *(59.00)*	6.96 *(11.20)*	2097	0.87	0.449 *(0.273)*	15.61 *(3.08)*	192 *(89)*	55 *(13)*	28.86 *(97.73)*
				7th Gear					
241.42 *(180.03)*	11378 *(50.61)*	7.96 *(12.81)*	2097	0.82	0.458 *(0.278)*	15.33 *(3.02)*	192 *(89)*	56 *(13)*	28.84 *(97.66)*
				8th Gear					
236.52 *(176.37)*	9704 *(43.17)*	9.14 *(14.71)*	2098	0.71	0.469 *(0.285)*	14.95 *(2.95)*	191 *(88)*	58 *(14)*	28.82 *(97.60)*

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					
212.15 *(158.20)*	34760 *(154.62)*	2.29 *(3.68)*	2117	13.88	0.503 *(0.306)*	13.95 *(2.75)*	191 *(88)*	46 *(8)*	29.10 *(98.54)*
				2nd Gear					
260.15 *(194.00)*	27714 *(123.28)*	3.52 *(5.67)*	1946	4.60	0.434 *(0.264)*	16.15 *(3.18)*	192 *(89)*	47 *(8)*	29.08 *(98.48)*
				3rd Gear					
265.30 *(197.84)*	23652 *(105.21)*	4.21 *(6.77)*	1946	2.39	0.426 *(0.259)*	16.47 *(3.24)*	192 *(89)*	55 *(13)*	28.86 *(97.73)*
				4th Gear					
268.28 *(200.06)*	20745 *(92.28)*	4.85 *(7.80)*	1948	1.76	0.424 *(0.258)*	16.56 *(3.26)*	192 *(89)*	53 *(12)*	28.88 *(97.80)*
				5th Gear					
264.29 *(197.08)*	17743 *(78.92)*	5.59 *(8.99)*	1949	1.40	0.427 *(0.260)*	16.41 *(3.23)*	192 *(89)*	53 *(12)*	28.89 *(97.83)*
				6th Gear					
261.98 *(195.36)*	15215 *(67.68)*	6.46 *(10.39)*	1951	1.13	0.433 *(0.264)*	16.19 *(3.19)*	193 *(89)*	56 *(13)*	28.85 *(97.70)*
				7th Gear					
260.28 *(194.09)*	13237 *(58.88)*	7.37 *(11.87)*	1946	0.97	0.434 *(0.264)*	16.17 *(3.19)*	192 *(89)*	57 *(14)*	28.83 *(97.63)*
				8th Gear					
255.76 *(190.72)*	11298 *(50.26)*	8.49 *(13.66)*	1950	0.87	0.443 *(0.270)*	15.82 *(3.12)*	192 *(89)*	57 *(14)*	28.83 *(97.63)*

TRACTOR SOUND LEVEL WITH CAB	**dB(A)**
At 75% load in 5th gear	75.9
Bystander	NA

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	17.5 in *(445 mm)*
Static Weight with Operator—Rear	NA
—Front	NA
—Total	35885 lb *(16277 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 152° F *(67°C)*. Fans were 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 restricted standard test code procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1722**, Summary 222 April 22, 1997.

LOUIS I. LEVITICUS
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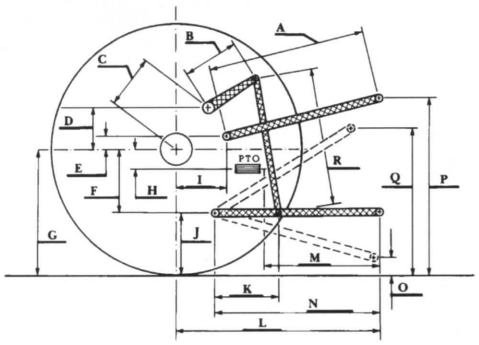
THREE POINT HITCH PERFORMANCE (OECD Static Test)

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:	2750 psi	*(190 bar)*
ii) Pump delivery rate at minimum pressure and rated engine speed:	35.2 GPM	*(133.2 l/min)*
iii) Pump delivery rate at maximum hydraulic power:	29.9 GPM	*(113.2 l/min)*
Delivery pressure:	2540 psi	*(175 bar)*
Power:	44.3 HP	*(33.0 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 75D DIESEL

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