

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

January 2003

Test 1822: Challenger MT745 Diesel

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 1822: Challenger MT745 Diesel" (2003). *Nebraska Tractor Tests*. 342.
<https://digitalcommons.unl.edu/tractormuseumlit/342>

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 1822—SUMMARY 399

CHALLENGER MT745 DIESEL

16 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—1060 rpm)					
207.93 (155.05)	2100	12.07 (45.70)	0.405 (0.247)	17.22 (3.39)	
Standard Power Take-off Speed - (PTO speed - 1000 rpm)					
220.81 (164.66)	1982	12.23 (46.29)	0.387 (0.235)	18.06 (3.56)	
Maximum Power (2 hours)					
236.19 (176.13)	1700	12.37 (46.83)	0.366 (0.222)	19.09 (3.76)	

VARYING POWER AND FUEL CONSUMPTION

207.93 (155.05)	2100	12.07 (45.70)	0.405 (0.247)	17.22 (3.39)	Air temperature
182.93 (136.41)	2177	11.30 (42.78)	0.431 (0.262)	16.19 (3.19)	75°F (24°C)
138.38 (103.19)	2200	9.50 (35.95)	0.479 (0.291)	14.57 (2.87)	Relative humidity
92.46 (68.95)	2201	7.61 (28.79)	0.574 (0.349)	12.16 (2.39)	51%
46.50 (34.67)	2201	5.46 (20.66)	0.819 (0.498)	8.52 (1.68)	Barometer
2.11 (1.58)	2201	3.52 (13.34)	11.640 (7.080)	0.60 (0.12)	28.49" Hg (96.49 kPa)

Maximum Torque - 804 lb.-ft. (1090 Nm) at 1200 rpm
Maximum Torque Rise - 54.7%
Torque rise at 1700 engine rpm - 40%

DRAWBAR PERFORMANCE (Unballasted)

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—6th Gear									
177.67 (132.49)	15116 (67.24)	4.41 (7.09)	2098	2.42	0.477 (0.290)	14.64 (2.88)	181 (83)	53 (12)	28.93 (97.97)
75% of Pull at Maximum Power—6th Gear									
140.78 (104.98)	11323 (50.36)	4.66 (7.50)	2200	1.50	0.537 (0.327)	13.01 (2.56)	180 (82)	64 (18)	28.95 (98.04)
50% of Pull at Maximum Power—6th Gear									
94.61 (70.55)	7556 (33.61)	4.70 (7.56)	2199	0.71	0.634 (0.386)	11.01 (2.17)	180 (82)	68 (20)	28.95 (98.04)
75% of Pull at Reduced Engine Speed—9th Gear									
140.72 (104.93)	11328 (50.39)	4.66 (7.50)	1541	1.58	0.460 (0.280)	15.19 (2.99)	182 (83)	66 (19)	28.95 (98.04)
50% of Pull at Reduced Engine Speed—9th Gear									
94.63 (70.57)	7563 (33.64)	4.69 (7.55)	1539	0.71	0.511 (0.311)	13.68 (2.69)	181 (83)	69 (21)	28.93 (97.97)

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

Dates of Test: April 16-May 19, 2003

Manufacturer: AGCO Corp, 4205 River Green Parkway, Duluth Ga 30096

FUEL, OIL and TIME: Fuel No. 2 Diesel Specific gravity converted to 60°/60°F (15°/15°C) 0.8386 Fuel weight 6.982 lbs/gal (0.837 kg/l) Oil SAE 10W-30 API service classification CH-4 Transmission and hydraulic lubricant Caterpillar MTO fluid Total time engine was operated: 28.5 hours

ENGINE: Make Caterpillar Diesel Type six cylinder vertical with turbocharger and air to air aftercooler Serial No.*4ZF04281* Crankshaft lengthwise Rated engine speed 2100 Bore and stroke 4.409" x 5.866" (112.0 mm x 149.0 mm) Compression ratio 16.0 to 1 Displacement 537 cu in (8810 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 hydraulic and transmission oil Fuel filter one paper element and water separator Muffler vertical Cooling medium temperature control 1 thermostat

ENGINE OPERATING PARAMETERS: Fuel rate: 81.2 - 90.4 lb/h (36.8 - 41.0 kg/h) High idle: 2175 - 2225 rpm Turbo boost: nominal 16.7 - 21.0 psi (115 - 145 kPa) as measured 17.5 psi (120 kPa)

CHASSIS: Type tracklayer-rubber tracked Serial No.*AGCMT745PALA30220* Track width 88.0" (2235 mm) to 119.5 (3035 mm) Length of track on ground 102.4" (2600 mm) Hydraulic control system direct engine drive Transmission selective gear fixed ratio with full range operator controlled power shift Nominal travel speeds mph (km/h) first 1.66 (2.67) second 2.11 (3.40) third 2.66 (4.28) fourth 3.38 (5.44) fifth 4.03 (6.49) sixth 4.54 (7.31) seventh 5.12 (8.24) eighth 5.76 (9.27) ninth 6.48 (10.43) tenth 7.29 (11.73) eleventh 8.22 (13.23) twelfth 9.26 (14.90) thirteenth 11.02 (17.73) fourteenth 14.00 (22.53) fifteenth 17.72 (28.52) sixteenth 24.64 (39.65) at 2300 rpm, reverse 1.33 (2.14), 3.22 (5.18), 3.63 (5.84), 8.82 (14.19) Clutch wet multiple disc hydraulically actuated by foot pedal Brakes wet multiple disc hydraulically actuated foot pedal Steering electro-hydraulic differential steering controlled by steering wheel Power take-off 1000 rpm at 1980 engine rpm Unladen tractor mass 28020 lb (12710 kg)

DRAWBAR PERFORMANCE

Unballasted 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)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
2nd Gear									
132.17 (98.56)	26433 (117.58)	1.88 (3.02)	2192	14.32	0.604 (0.367)	11.56 (2.28)	179 (82)	44 (7)	28.94 (98.00)
3rd Gear									
158.25 (118.00)	25088 (111.59)	2.37 (3.81)	2102	10.88	0.536 (0.326)	13.03 (2.57)	180 (82)	47 (8)	28.95 (98.04)
4th Gear									
164.24 (122.48)	19277 (85.75)	3.20 (5.14)	2096	4.96	0.513 (0.312)	13.62 (2.68)	180 (82)	63 (17)	28.94 (98.00)
5th Gear									
174.10 (129.83)	16811 (74.78)	3.88 (6.25)	2100	3.26	0.484 (0.294)	14.42 (2.84)	181 (83)	63 (17)	28.95 (98.04)
6th Gear									
177.67 (132.49)	15116 (67.24)	4.41 (7.09)	2098	2.42	0.477 (0.290)	14.64 (2.88)	181 (83)	53 (12)	28.93 (97.97)
7th Gear									
173.75 (129.56)	13036 (57.99)	5.00 (8.04)	2097	1.65	0.486 (0.296)	14.37 (2.83)	181 (83)	55 (13)	28.94 (98.00)
8th Gear									
173.78 (129.59)	11519 (51.24)	5.66 (9.10)	2100	1.42	0.485 (0.295)	14.40 (2.84)	181 (83)	58 (14)	28.94 (98.00)
9th Gear									
170.49 (127.13)	10044 (44.68)	6.37 (10.24)	2096	1.03	0.497 (0.302)	14.05 (2.77)	181 (83)	50 (10)	28.93 (97.97)
10th Gear									
168.87 (125.93)	8792 (39.11)	7.20 (11.59)	2101	0.95	0.498 (0.303)	14.03 (2.76)	181 (83)	60 (16)	28.95 (98.04)
11th Gear									
161.16 (120.17)	7424 (33.02)	8.14 (13.10)	2102	0.63	0.523 (0.318)	13.36 (2.63)	181 (83)	62 (17)	28.96 (98.07)

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 at the injection pump inlet was maintained at 118°F (48°C). The performance figures on this summary were taken from a test conducted under the OECD Code II test code procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1822**, Nebraska Summary 399, June 12, 2003.

Leonard L. Bashford
Director

M.F. Kocher
V.I. Adamchuk
W.P. Campbell
Board of Tractor Test Engineers

TRACTOR SOUND LEVEL WITH CAB

dB(A)

At no load in 6th gear	74.7
Bystander	--

TIRES, BALLAST AND WEIGHT

Track width

Ballast - Cast iron(front)

- Cast iron(front idlers)

Height of Drawbar

Static Weight with operator

With Ballast

18.0 in (455 mm)

670 lb (304 kg)

1760 lb (798 kg)

20.5 in (520 mm)

30625 lb(13891 kg)

Without Ballast

18.0 in (455 mm)

None

None

20.5 in (520 mm)

28195 lb(12789 kg)

DRAWBAR PERFORMANCE
(Unballasted at 1700 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)	Consumption Hp.hr/gal (kW.h/l)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
2nd Gear									
133.58 (99.61)	26932 (119.80)	1.86 (2.99)	2185	14.72	0.601 (0.365)	11.62 (2.29)	180 (82)	44 (7)	28.94 (98.00)
3rd Gear									
159.30 (118.79)	25240 (112.27)	2.37 (3.81)	2100	10.81	0.533 (0.324)	13.09 (2.58)	180 (82)	47 (8)	28.95 (98.04)
4th Gear									
173.57 (129.43)	23288 (103.59)	2.80 (4.50)	1942	9.98	0.497 (0.302)	14.06 (2.77)	181 (83)	64 (18)	28.93 (97.97)
5th Gear									
184.89 (137.87)	21371 (95.06)	3.24 (5.22)	1842	7.43	0.466 (0.283)	14.98 (2.93)	181 (83)	65 (18)	28.92 (97.93)
6th Gear									
192.04 (143.20)	21316 (94.82)	3.38 (5.44)	1705	7.64	0.451 (0.274)	15.50 (3.05)	181 (83)	66 (19)	28.91 (97.90)
7th Gear									
197.85 (147.54)	18772 (83.50)	3.95 (6.36)	1702	4.37	0.439 (0.267)	15.91 (3.13)	182 (83)	63 (17)	28.95 (98.04)
8th Gear									
203.11 (151.46)	16934 (75.33)	4.50 (7.24)	1697	3.03	0.427 (0.260)	16.36 (3.22)	182 (83)	54 (12)	28.93 (97.97)
9th Gear									
200.22 (149.31)	14719 (65.47)	5.10 (8.21)	1700	2.35	0.433 (0.263)	16.12 (3.18)	182 (83)	57 (14)	28.94 (98.00)
10th Gear									
202.48 (150.99)	13147 (58.48)	5.78 (9.30)	1700	1.73	0.429 (0.261)	16.27 (3.20)	182 (83)	52 (11)	28.93 (97.97)
11th Gear									
195.26 (145.61)	11176 (49.71)	6.55 (10.54)	1702	1.26	0.445 (0.270)	15.70 (3.09)	182 (83)	63 (17)	28.95 (98.04)
12th Gear									
196.84 (146.78)	9955 (44.28)	7.42 (11.93)	1707	1.11	0.440 (0.267)	15.88 (3.13)	182 (83)	61 (16)	28.95 (98.04)
13th Gear									
194.03 (144.69)	8264 (36.76)	8.81 (14.17)	1698	0.86	0.443 (0.270)	15.75 (3.10)	182 (83)	62 (17)	28.96 (98.07)

DRAWBAR PERFORMANCE
(Ballasted at 1700 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)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
2nd Gear									
141.73 (105.69)	28555 (127.02)	1.86 (3.00)	2160	13.57	0.573 (0.349)	12.18 (2.40)	180 (82)	54 (12)	28.79 (97.49)
3rd Gear									
164.06 (122.34)	26239 (116.71)	2.34 (3.77)	2064	9.94	0.520 (0.316)	13.43 (2.65)	181 (83)	57 (14)	28.82 (97.60)
4th Gear									
178.77 (133.31)	23808 (105.90)	2.82 (4.53)	1916	8.42	0.485 (0.295)	14.40 (2.84)	181 (83)	69 (21)	28.69 (97.16)
5th Gear									
190.16 (141.80)	22648 (100.74)	3.15 (5.07)	1779	7.33	0.455 (0.277)	15.33 (3.02)	181 (83)	69 (21)	28.69 (97.16)
6th Gear									
197.10 (146.97)	21428 (95.31)	3.45 (5.55)	1700	5.57	0.439 (0.267)	15.91 (3.13)	182 (83)	68 (20)	28.70 (97.19)
7th Gear									
198.10 (147.73)	18777 (83.52)	3.96 (6.37)	1698	3.90	0.436 (0.265)	16.03 (3.16)	182 (83)	66 (19)	28.70 (97.19)
8th Gear									
201.50 (150.26)	16762 (74.56)	4.51 (7.26)	1700	2.92	0.431 (0.262)	16.19 (3.19)	181 (83)	65 (18)	28.70 (97.19)
9th Gear									
200.62 (149.60)	14706 (65.42)	5.12 (8.23)	1703	2.16	0.435 (0.265)	16.05 (3.16)	181 (83)	60 (16)	28.70 (97.19)
10th Gear									
201.68 (150.39)	13088 (58.22)	5.78 (9.30)	1701	1.69	0.431 (0.262)	16.19 (3.19)	182 (83)	61 (16)	28.70 (97.19)
11th Gear									
195.20 (145.56)	11193 (49.79)	6.54 (10.52)	1699	1.23	0.442 (0.269)	15.79 (3.11)	182 (83)	62 (17)	28.70 (97.19)
12th Gear									
194.61 (145.12)	9898 (44.03)	7.37 (11.87)	1701	1.15	0.444 (0.270)	15.72 (3.10)	182 (83)	63 (17)	28.70 (97.19)
13th Gear									
192.10 (143.25)	8191 (36.43)	8.80 (14.15)	1696	0.75	0.450 (0.274)	15.53 (3.06)	182 (83)	64 (18)	28.70 (97.19)

THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: yes

Maximum Force Exerted Through Whole Range: 17263 lbs (76.8 kN)

i) Opening pressure of relief valve: NA

Sustained pressure at compensator cutoff: 2855 psi (197 bar)

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

43.8 GPM (165.8 l/min)

iii) Pump delivery rate at maximum

hydraulic power:

41.5 GPM (157.1 l/min)

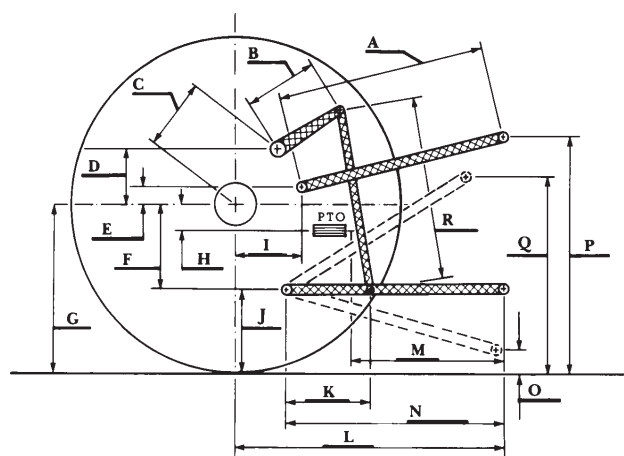
Delivery pressure:

2750 psi (190 bar)

Power:

66.6 HP (49.7 kW)

HITCH DIMENSIONS AS TESTED—NO LOAD



	inch	mm
A	27.6	702
B	21.7	550
C	23.5	596
D	23.0	583
E	11.4	290
F	11.8	300
G	33.4	849
H	1.3	34
I	16.7	425
J	21.6	549
K	27.1	688
L	48.4	1230
*L'	52.2	1325
M	27.9	709
N	39.6	1005
O	9.0	230
P	48.6	1234
Q	40.2	1022
R	42.5	1079

*L' to Quick Attach ends



CHALLENGER MT745 DIESEL

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