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University of Nebraska - Lincoln

Year 2006

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Test 1876: Challenger MT 645B Diesel

# NEBRASKA OECD TRACTOR TEST 1876 - SUMMARY 533

## CHALLENGER MT 645B DIESEL

### CONTINUOUSLY VARIABLE TRANSMISSION

#### 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—1083 rpm)</b>					
204.79 (152.71)	2200	12.07 (45.70)	0.412 (0.251)	16.96 (3.34)	
<b>Standard Power Take-off Speed (1000 rpm)</b>					
221.55 (165.21)	2032	12.04 (45.59)	0.380 (0.231)	18.40 (3.62)	
<b>Maximum Power (1 Hour)</b>					
222.92 (166.23)	1949	11.83 (44.78)	0.371 (0.226)	18.85 (3.71)	

#### VARYING POWER AND FUEL CONSUMPTION

204.79 (152.71)	2200	12.07 (45.70)	0.412 (0.251)	16.96 (3.34)	Air temperature
175.89 (131.16)	2215	10.77 (40.78)	0.428 (0.260)	16.33 (3.22)	79°F (26°C)
131.97 (98.41)	2225	8.60 (32.55)	0.455 (0.277)	15.35 (3.02)	Relative humidity
88.04 (65.65)	2236	6.19 (23.45)	0.492 (0.299)	14.21 (2.80)	37%
43.84 (32.69)	2249	3.99 (15.11)	0.636 (0.387)	10.98 (2.16)	Barometer
2.01 (1.50)	2259	2.35 (8.88)	8.154 (4.960)	0.86 (0.17)	29.01" Hg (98.24 kPa)

Maximum torque - 698 lb.-ft. (947 Nm) at 1451 rpm

Maximum torque rise - 42.9%

Torque rise at 1796 engine rpm - 29%

#### DRAWBAR PERFORMANCE

##### UNBALLASTED - FRONT DRIVE ENGAGED 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—6.2 mph (10.0 km/h)</b>									
172.30 (128.48)	10824 (48.15)	5.97 (9.61)	2196	4.15	0.489 (0.297)	14.31 (2.82)	185 (85)	65 (18)	28.84 (97.66)
<b>75% of Pull at Maximum Power—6.2 mph (10.0 km/h)</b>									
131.33 (97.93)	8099 (36.03)	6.08 (9.79)	2217	3.38	0.524 (0.319)	13.35 (2.63)	185 (85)	77 (25)	28.77 (97.43)
<b>50% of Pull at Maximum Power—6.2 mph (10.0 km/h)</b>									
89.00 (66.37)	5387 (23.96)	6.20 (9.97)	2227	1.90	0.574 (0.349)	12.19 (2.40)	183 (84)	79 (26)	28.75 (97.36)
<b>75% of Pull at Reduced Engine Speed—8.3 mph (13.4 km/h)</b>									
131.73 (98.23)	8060 (35.85)	6.13 (9.86)	1699	3.56	0.435 (0.265)	16.07 (3.17)	188 (87)	82 (28)	28.73 (97.29)
<b>50% of Pull at Reduced Engine Speed—9.8 mph (15.8 km/h)</b>									
89.15 (66.48)	5416 (24.09)	6.17 (9.93)	1408	1.92	0.461 (0.281)	15.15 (2.99)	180 (82)	81 (27)	28.74 (97.33)

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

**Dates of tests:** April 12-20, 2006

**Manufacturer:** AGCO Corporation, 4205 River Green Parkway, Duluth, Georgia, 30096 USA.

**FUEL, OIL and TIME:** Fuel No. 2 Diesel Specific gravity converted to 60°/60° F (15°/15°C) 0.8395 Fuel weight 6.990 lbs/gal (0.838 kg/l) Oil SAE 15W40 API service classification CE/CF-4 /CD-II Transmission and hydraulic lubricant AGCO Power Fluid 821 XL fluid Front axle lubricant AGCO Gear Lube 715 SAE 80W90 Total time engine was operated 21.5 hours

**ENGINE:** Make Sisu Diesel Type six cylinder vertical with turbocharger and air to air intercooler Serial No. R083304 Crankshaft lengthwise Rated engine speed 2200 Bore and stroke 4.252" x 5.276" (108.0 mm x 134.0 mm) Compression ratio 17.5 to 1 Displacement 449 cu in (7365 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 final drive oil, radiator for transmission oil Fuel filter two paper elements and water separator Muffler vertical Cooling medium temperature control one thermostat and variable speed fan

**ENGINE OPERATING PARAMETERS:** Fuel rate: 81.3 - 86.8 lb/h (36.9 - 39.4 kg/h) High idle: 2235 - 2265 rpm Turbo boost: nominal 18.1 - 21.8 psi (125 - 150 kPa) as measured 20.4 psi (140 kPa)

**CHASSIS:** Type front wheel assist Serial No. P201040 Tread width rear 60.0" (1524 mm) to 126.0" (3200 mm) front 68.5" (1740 mm) to 93.3" (2369 mm) Wheelbase 121.1" (3075 mm) Hydraulic control system direct engine drive Transmission Techstar CVT. A combination of mechanical and hydrostatic sections allow an infinite speed adjustment within the ranges noted. The transmission has two mechanical ranges. Nominal travel speeds mph (km/h) forward: Low range 0-17 (0-28), high range 0-25 (0-40) reverse: Low range 0-10 (0-16), high range 0-24 (0-38) Clutch a foot pedal controls the hydrostatic oil flow Brakes wet multiple disc hydraulically actuated by two foot pedals which can be locked together Steering hydrostatic Power take-off 540 rpm at 2062 engine rpm or 1000 rpm at 2033 engine rpm Unladen tractor mass 19595 lb (8888 kg)

**DRAWBAR PERFORMANCE**  
**UNBALLASTED - FRONT DRIVE ENGAGED**  
**MAXIMUM POWER AT SELECTED SPEEDS**

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)
128.69 (95.96)	16954 (75.41)	2.85 (4.58)	2199	10.49	3.2 mph(5.1 km/h) 0.549 (0.334)	12.73 (2.51)	182 (83)	65 (18)	28.51 (96.55)
147.68 (110.13)	16021 (71.26)	3.46 (5.56)	2194	8.09	3.7 mph(6.0 km/h) 0.524 (0.319)	13.34 (2.63)	185 (85)	66 (19)	28.51 (96.55)
164.82 (122.91)	15682 (69.76)	3.94 (6.34)	2174	7.84	4.3 mph(7.0 km/h) 0.512 (0.311)	13.66 (2.69)	187 (86)	71 (22)	28.55 (96.68)
172.11 (128.34)	15266 (67.91)	4.23 (6.80)	2142	7.65	4.7 mph(7.5 km/h) 0.493 (0.300)	14.18 (2.79)	187 (86)	71 (22)	28.55 (96.68)
176.17 (131.37)	14846 (66.04)	4.45 (7.16)	2131	6.54	5.0 mph(8.0 km/h) 0.481 (0.292)	14.55 (2.87)	187 (86)	70 (21)	28.54 (96.65)
183.05 (136.50)	14345 (63.81)	4.78 (7.70)	2014	5.80	5.6 mph(9.0 km/h) 0.463 (0.281)	15.11 (2.98)	189 (87)	74 (23)	28.56 (96.71)
187.55 (139.85)	13459 (59.87)	5.23 (8.41)	1956	4.46	6.2 mph(10.0 km/h) 0.446 (0.271)	15.67 (3.09)	188 (87)	66 (19)	28.83 (97.63)
186.40 (139.00)	12254 (54.51)	5.70 (9.18)	1951	4.32	6.8 mph(11.0 km/h) 0.447 (0.272)	15.65 (3.08)	189 (87)	71 (22)	28.82 (97.60)
185.82 (138.57)	11005 (48.95)	6.33 (10.19)	1952	3.55	7.5 mph(12.0 km/h) 0.448 (0.272)	15.61 (3.08)	190 (88)	72 (22)	28.81 (97.56)
185.58 (138.39)	10197 (45.36)	6.83 (10.98)	1964	3.39	8.1 mph(13.0 km/h) 0.449 (0.273)	15.57 (3.07)	189 (87)	74 (23)	28.80 (97.53)
184.60 (137.66)	9362 (41.64)	7.39 (11.90)	1952	3.05	8.7 mph(14.0 km/h) 0.451 (0.274)	15.50 (3.05)	190 (88)	75 (24)	28.79 (97.49)
182.82 (136.33)	8310 (36.96)	8.25 (13.28)	1947	2.80	9.6 mph(15.5 km/h) 0.451 (0.274)	15.51 (3.06)	191 (88)	75 (24)	28.79 (97.49)

**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. The pull at speed setting 2.4 mph (3.8 km/h) was limited to avoid excessive tractor bouncing. This tractor did not meet the manufacturer's claim of 39.0 GPM (147 lpm) flow at the remote outlets. For the maximum power tests, the fuel temperature at the injection pump inlet was maintained at 144°F (62°C). The performance figures on this Summary were taken from a test conducted under the OECD Code II test procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1876**, Nebraska Summary 533, June 16, 2006.

Leonard L. Bashford  
 Director

M.F. Kocher  
 V.I. Adamchuk  
 J.A. Smith  
 Board of Tractor Test Engineers

<b>TRACTOR SOUND LEVEL WITH CAB</b>	<b>Front Wheel Drive</b>	
	<b>Engaged dB(A)</b>	<b>Disengaged dB(A)</b>
At no load - 4.6 mph(7.5 km/h)(engine - 2250 rpm)	67.5	67.4
Bystander in Rabbit range	--	87.5

**TIRES, BALLAST AND WEIGHT**

	<b>With Ballast</b>	<b>Without Ballast</b>
<b>Rear tires</b> - No., size, ply & psi(kPa)	Four 480/80R46; ***,12 (85)	Two 480/80R46; ***,17(115)
Ballast - Duals(total)	2190 lb (993 kg)	None
- Cast Iron(total)	2575 lb (1168 kg)	None
<b>Front tires</b> - No., size, ply & psi(kPa)	Two 380/85R34; **,23 (160)	Two 380/85R34; ***,17(115)
Ballast - Liquid(total)	None	None
- Cast Iron(total)	1800 lb (816 kg)	None
<b>Height of Drawbar</b>	19.5 in (495 mm)	20.0 in (510 mm)
<b>Static Weight with operator</b> - Rear	16175 lb (7337 kg)	11945 lb (5418 kg)
- Front	10160 lb (4608 kg)	7825 lb (3549 kg)
- Total	26335 lb(11945 kg)	19770 lb(8967 kg)

**DRAWBAR PERFORMANCE**  
**BALLASTED - FRONT DRIVE ENGAGED**  
**MAXIMUM POWER AT SELECTED SPEEDS**

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)
136.39 (101.71)	24706 (109.90)	2.07 (3.33)	2204		2.4 mph (3.8 km/h)				
				10.99	0.556 (0.338)	12.56 (2.47)	182 (84)	44 (7)	28.73 (97.29)
155.19 (115.72)	23716 (105.49)	2.45 (3.95)	2198		2.8 mph (4.5 km/h)				
				9.44	0.527 (0.321)	13.26 (2.61)	186 (85)	45 (7)	28.73 (97.29)
171.25 (127.70)	22787 (101.36)	2.82 (4.54)	2132		3.1 mph (5.0 km/h)				
				7.68	0.490 (0.298)	14.26 (2.81)	186 (86)	46 (8)	28.73 (97.29)
184.65 (137.69)	22266 (99.05)	3.11 (5.00)	1981		3.7 mph (6.0 km/h)				
				6.65	0.452 (0.275)	15.47 (3.05)	187 (86)	47 (8)	28.73 (97.29)
188.72 (140.73)	19194 (85.38)	3.69 (5.93)	1952		4.3 mph (7.0 km/h)				
				4.76	0.438 (0.266)	15.97 (3.15)	188 (87)	48 (9)	28.73 (97.29)
188.40 (140.49)	18163 (80.79)	3.89 (6.26)	1948		4.7 mph (7.5 km/h)				
				4.45	0.442 (0.269)	15.82 (3.12)	188 (87)	49 (9)	28.73 (97.29)
189.89 (141.60)	16958 (75.43)	4.20 (6.76)	1952		5.0 mph (8.0 km/h)				
				3.52	0.435 (0.264)	16.08 (3.17)	189 (87)	50 (10)	28.73 (97.29)
190.32 (141.92)	14770 (65.70)	4.83 (7.78)	1951		5.6 mph (9.0 km/h)				
				3.08	0.435 (0.265)	16.06 (3.16)	189 (87)	52 (11)	28.73 (97.29)
190.72 (142.22)	13521 (60.14)	5.29 (8.51)	1954		6.2 mph (10.0 km/h)				
				2.67	0.434 (0.264)	16.10 (3.17)	186 (86)	54 (12)	28.73 (97.29)
189.24 (141.11)	12256 (54.52)	5.79 (9.32)	1952		6.8 mph (11.0 km/h)				
				2.32	0.435 (0.265)	16.05 (3.16)	188 (87)	56 (13)	28.73 (97.29)
188.37 (140.47)	11099 (49.37)	6.36 (10.24)	1954		7.5 mph (12.0 km/h)				
				2.00	0.438 (0.266)	15.97 (3.15)	188 (87)	57 (14)	28.74 (97.33)
187.40 (139.74)	10234 (45.52)	6.87 (11.05)	1948		8.1 mph (13.0 km/h)				
				1.73	0.441 (0.268)	15.84 (3.12)	188 (87)	58 (14)	28.74 (97.33)
185.84 (138.58)	9366 (41.66)	7.44 (11.97)	1953		8.7 mph (14.0 km/h)				
				1.67	0.448 (0.273)	15.59 (3.07)	189 (87)	60 (16)	28.74 (97.33)
183.27 (136.67)	8181 (36.39)	8.40 (13.52)	1951		9.6 mph (15.5 km/h)				
				1.39	0.453 (0.276)	15.41 (3.04)	190 (88)	62 (17)	28.74 (97.33)

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

CATEGORY: III

Quick Attach: Yes

Maximum force exerted through whole range: 15895 lbs (70.7 kN)

i) Opening pressure of relief valve: NA

Sustained pressure of the open relief valve: 2818 psi (194 bar)

ii) Pump delivery rate at minimum pressure and rated engine speed: 37.9 GPM (143.5 l/min)

iii) Pump delivery rate at maximum hydraulic power: 36.5 GPM (138.2 l/min)

Delivery pressure: 2441 psi (168 bar)

Power: 52.0 HP (38.8 kW)

### THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi. (bar) 2800 (193)

Location: lift cylinder

Hydraulic oil temperature: °F (°C) 150 (66)

Location: hydraulic sump

Category: III

Quick attach: Yes

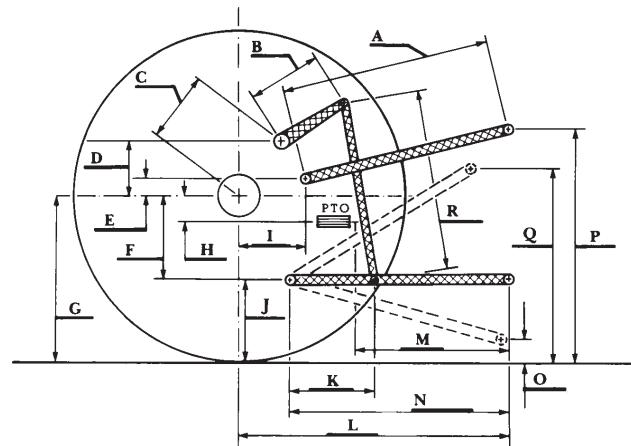
#### SAE Static Test—System pressure 2520 psi (174 Bar)

Hitch point distance to ground level in. (mm)	8.6 (217)	16.3 (414)	24.4 (620)	32.3 (820)	40.3 (1024)
Lift force on frame lb	16726	17682	17713	17118	15672
" " " " " " (kN)	(74.7)	(78.7)	(78.8)	(76.1)	(69.7)

### HITCH DIMENSIONS AS TESTED - NO LOAD

	OECD test		SAE test	
	inch	mm	inch	mm
A	29.2	743	29.2	743
B	14.2	360	14.2	360
C	17.7	449	17.7	449
D	15.4	390	15.4	390
E	8.9	225	8.9	225
F	13.0	330	13.0	330
G	36.2	920	36.2	920
H	3.4	85	3.4	85
I	18.7	475	18.7	475
J	23.2	590	23.2	590
K	26.8	680	26.8	680
L	50.4	1281	50.4	1281
*L'	55.4	1407	55.4	1407
M	27.9	709	27.9	709
N	41.1	1045	41.1	1045
O	9.0	230	8.0	203
P	46.2	1173	46.2	1173
Q	39.8	1011	38.6	981
R	34.5	876	35.0	889

\*L' to Quick Attach ends



CHALLENGER MT 645B Diesel