

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

2008

Nebraska Summary: S645 Challenger MT535B

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, "Nebraska Summary: S645 Challenger MT535B" (2008). *Nebraska Tractor Tests*. 2901.

<https://digitalcommons.unl.edu/tractormuseumlit/2901>

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.

SUMMARY OF OECD TEST 2431–NEBRASKA SUMMARY 645

CHALLENGER MT 535B TECHSTAR DIESEL

CONTINUOUSLY VARIABLE TRANSMISSION

Tractor chassis S/N S082002 and higher

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—1081 rpm)					
128.4 (95.7)	2200	8.16 (30.88)	0.452 (0.275)	15.74 (3.10)	
Standard Power Take-off Speed(1000 rpm)					
138.2 (103.1)	2034	8.05 (30.47)	0.415 (0.252)	17.17 (3.38)	
Maximum Power (1 hour)					
145.9 (108.8)	1800	8.10 (30.64)	0.395 (0.240)	18.02 (3.55)	
VARYING POWER AND FUEL CONSUMPTION					
128.4 (95.7)	2200	8.16 (30.88)	0.452 (0.275)	15.74 (3.10)	Air temperature
109.2 (81.5)	2202	7.31 (27.68)	0.477 (0.290)	14.94 (2.94)	70°F (21°C)
82.1 (61.2)	2210	6.18 (23.40)	0.535 (0.326)	13.28 (2.62)	Relative humidity
55.0 (41.0)	2223	4.65 (17.59)	0.602 (0.366)	11.83 (2.33)	51%
27.8 (20.7)	2237	3.12 (11.80)	0.799 (0.486)	8.91 (1.76)	Barometer
--	2245	1.90 (7.19)	--	--	29.9" Hg (101.1 kPa)
--			--	--	
Maximum Torque - 457.9 lb.-ft. (620.9 Nm) at 1399 rpm					
Maximum Torque Rise - 49.2%					
Torque rise at 1750 engine rpm - 43%					

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)
Maximum Power—Turtle 8									
107.3 (80.0)	8160 (36.3)	4.93 (7.94)	2191	5	0.542 (0.330)	13.16 (2.59)	183 (84)	45 (7)	29.3 (99.1)
75% of Pull at Maximum Power—Turtle 8									
81.9 (61.1)	6105 (27.2)	5.03 (8.10)	2193	4	0.595 (0.362)	11.97 (2.36)	180 (82)	45 (7)	29.3 (99.1)
50% of Pull at Maximum Power—Turtle 8									
56.1 (41.8)	4090 (18.2)	5.14 (8.27)	2209	2	0.676 (0.411)	10.54 (2.08)	181 (83)	45 (7)	29.3 (99.1)
75% of Pull at Reduced Engine Speed—Turtle 9									
82.9 (61.8)	6150 (27.4)	5.05 (8.13)	2012	4	0.541 (0.329)	13.15 (2.59)	181 (83)	45 (7)	29.3 (99.1)
50% of Pull at Reduced Engine Speed—Turtle 9									
55.7 (41.5)	4070 (18.1)	5.13 (8.26)	2003	2	0.607 (0.369)	11.73 (2.31)	180 (82)	45 (7)	29.3 (99.1)

Location of tests: Groupement d'Antony, Parc de Touvoie, BP 44 Antony, France 92163

Dates of tests: March - May, 2008

Manufacturer: AGCO S.A. BP 307, Avenue Blaise Pascal, 60026 Beauvais, France

FUEL and OIL: Fuel No. 2 Diesel **Specific gravity converted to 60°/60°F (15°/15°C)** 0.855 **Fuel weight** 7.11 lbs/gal (0.853 kg/l) **Oil SAE** 15W40 **API service classification** CH4 **Transmission and hydraulic lubricant** BP Terrac Tractan 9 10W/40 **Front axle lubricant** SAE 85W140 API GL-5

ENGINE: Make Perkins Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler **Serial No.** U004188P **Crankshaft** lengthwise **Rated engine speed** 2200 **Bore and stroke** 4.134" x 5.000" (105.0 mm x 127.0 mm) **Compression ratio** 16.2 to 1 **Displacement** 402 cu in (6596 ml) **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **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 **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** thermostat and variable speed fan

CHASSIS: **Type** front wheel assist **Serial No.** S171018 **Tread width** rear 61.7" (1566 mm) to 74.6" (1896 mm) front 63.4" (1610 mm) to 78.1" (1984 mm) **Wheelbase** 109.4" (2780 mm) **Hydraulic control system** direct engine drive **Transmission** 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 0-18 (0-29), high range 0-25 (0-40) reverse: Low range 0-18 (0-29), high range 0-25 (0-40) **Clutch** a foot pedal controls the hydrostatic oil flow **Brakes** multiple wet disc hydraulically operated by two foot pedals that can be locked together **Steering** hydrostatic **Power take-off** 540 rpm at 2062 engine rpm or 1000 rpm at 2034 engine rpm **Unladen tractor mass** 14780 lb (6705 kg)

DRAWBAR PERFORMANCE

(Unballasted - Front Drive Engaged) 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)
91.2 (68.0)	13060 (58.1)	2.62 (4.22)	2197	15	Turtle 5 0.604 (0.368)	11.78 (2.32)	174 (79)	45 (7)	29.3 (99.1)
105.7 (78.8)	12950 (57.6)	3.06 (4.92)	2131	14	Turtle 6 0.533 (0.324)	13.35 (2.63)	174 (79)	45 (7)	29.3 (99.1)
113.6 (84.7)	12545 (55.8)	3.39 (5.46)	1864	11	Turtle 7 0.508 (0.309)	14.01 (2.76)	176 (80)	45 (7)	29.3 (99.1)
117.6 (87.7)	11130 (49.5)	3.96 (6.38)	1840	10	Turtle 8 0.494 (0.301)	14.41 (2.84)	176 (80)	45 (7)	29.3 (99.1)
118.9 (88.7)	10230 (45.5)	4.36 (7.02)	1811	8	Turtle 9 0.483 (0.294)	14.72 (2.90)	180 (82)	45 (7)	29.3 (99.1)
120.3 (89.7)	9035 (40.2)	4.99 (8.03)	1813	7	Turtle 10 0.459 (0.279)	15.49 (3.05)	180 (82)	45 (7)	29.3 (99.1)
119.9 (89.4)	7620 (33.9)	5.90 (9.49)	1801	6	Turtle 11 0.478 (0.291)	14.87 (2.93)	181 (83)	45 (7)	29.3 (99.1)
112.6 (84.0)	9645 (42.9)	4.38 (7.05)	1925	8	Rabbit 9 0.512 (0.311)	13.90 (2.74)	176 (80)	46 (8)	29.3 (99.1)
120.3 (89.7)	7870 (35.0)	5.73 (9.22)	1796	7	Rabbit 12 0.464 (0.282)	15.33 (3.02)	180 (82)	46 (8)	29.3 (99.1)
120.7 (90.0)	6700 (29.8)	6.76 (10.88)	1803	6	Rabbit 14 0.480 (0.292)	14.82 (2.92)	181 (83)	46 (8)	29.3 (99.1)
119.9 (89.4)	5415 (24.1)	8.30 (13.36)	1807	4	Rabbit 16 0.482 (0.293)	14.77 (2.91)	181 (83)	46 (8)	29.3 (99.1)

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

NOTE 1: The performance figures on this report apply to tractors with chassis S/N S82002 and higher.

NOTE 2: The data on this summary was obtained from OECD report 2431 conducted on the Massey Ferguson 7475 Diesel.

REMARKS: All test results were determined from observed data obtained in accordance with official OECD test procedures. The manufacturer's three point lift claim of 10915 lbs (4950 kg) with category III hitch was not verified. The performance figures on this summary were taken from a test conducted under the OECD Code 2 test procedure.

We, the undersigned, certify that this is a true summary of data from OECD Report No. **2431**, Nebraska Summary 645, January 14, 2010.

Roger M. Hoy
Director

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

TRACTOR SOUND LEVEL WITH CAB

dB(A)

At no load in Turtle 7	69.0
Bystander	---

TIRES, BALLAST AND WEIGHT

Rear tires - No., size, ply & psi(kPa)

Ballast - Duals(total)
- Cast iron(total)

Front tires - No., size, ply & psi(kPa)

Ballast - Liquid(total)
- Cast Iron(total)

Height of Drawbar

Static Weight with operator- Rear
- Front
- Total

With Ballast

Four 480/80R42; **,15(100) 1390 lb (630 kg)
1145 lb (520 kg)
Two 16.9R28; **,15 (100) 860 lb (390 kg)
18.5 in (470 mm)
11685 lb (5300 kg)
6655 lb(3020 kg)
18340 lb(8320 kg)

Without Ballast

Two 480/80R42; **,15(100) None
None
Two 16.9R28; **,15(100) None
18.5 in (470 mm)
9090 lb (4260 kg)
5555 lb (2520 kg)
14945 lb (6780 kg)

DRAWBAR PERFORMANCE
(Ballasted - Front Drive Engaged)
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)
Turtle 4									
97.9 (73.0)	16230 (72.2)	2.26 (3.64)	2172	15	0.594 (0.361)	11.98 (2.36)	172 (78)	45 (7)	29.3 (99.1)
Turtle 5									
105.1 (78.4)	14895 (66.3)	2.65 (4.26)	2134	11	0.552 (0.336)	12.89 (2.54)	174 (79)	45 (7)	29.3 (99.1)
Turtle 6									
111.3 (83.0)	14165 (63.0)	2.95 (4.75)	1963	10	0.519 (0.316)	13.71 (2.70)	176 (80)	45 (7)	29.3 (99.1)
Turtle 7									
116.9 (87.2)	13030 (58.0)	3.37 (5.42)	1815	8	0.494 (0.300)	14.42 (2.84)	176 (80)	45 (7)	29.3 (99.1)
Turtle 8									
119.2 (88.9)	11040 (49.1)	4.05 (6.52)	1825	7	0.483 (0.294)	14.72 (2.90)	180 (82)	46 (8)	29.3 (99.1)
Turtle 9									
119.8 (89.3)	10070 (44.8)	4.46 (7.18)	1804	6	0.470 (0.286)	15.13 (2.98)	180 (82)	46 (8)	29.3 (99.1)
Turtle 10									
119.9 (89.4)	8905 (39.6)	5.05 (8.12)	1809	6	0.480 (0.292)	14.82 (2.92)	180 (82)	46 (8)	29.3 (99.1)
Turtle 11									
119.6 (89.2)	7420 (33.0)	6.05 (9.73)	1799	6	0.483 (0.294)	14.92 (2.90)	183 (84)	46 (8)	29.3 (99.1)
Rabbit 9									
111.3 (83.0)	9225 (41.0)	4.52 (7.28)	1935	10	0.521 (0.317)	13.65 (2.69)	185 (85)	46 (8)	29.3 (99.1)
Rabbit 12									
119.6 (89.2)	7755 (34.5)	5.78 (9.31)	1803	7	0.485 (0.295)	14.67 (2.89)	180 (82)	46 (8)	29.3 (99.1)
Rabbit 14									
119.9 (89.4)	6570 (29.2)	6.84 (11.01)	1810	6	0.480 (0.292)	14.82 (2.92)	176 (80)	46 (8)	29.3 (99.1)
Rabbit 16									
119.8 (89.3)	5395 (24.0)	8.32 (13.39)	1805	3	0.483 (0.294)	14.72 (2.90)	180 (82)	46 (8)	29.2 (99.0)

HYDRAULIC PERFORMANCE

CATEGORY: II

Quick Attach: None

OECD Static test

Maximum force exerted through whole range: 12630 lbs (56.2 kN)

i) Opening pressure of relief valve: NA

Sustained pressure of the open relief valve: 2900 psi (200 bar)

ii) Pump delivery rate at minimum pressure: 30.2 GPM (114.2 l/min)

iii) Pump delivery rate at maximum

hydraulic power: 25.9 GPM (98.2 l/min)

Delivery pressure: 2395 psi (165 bar)

Power: 36.2 HP (27.0 kW)

THREE POINT HITCH PERFORMANCE - SAE Test

Observed Maximum Pressure psi. (bar)	2900 (200)
Location:	lift cylinder
Hydraulic oil temperature: °F (°C)	158 (70)
Location:	hydraulic sump
Category:	II
Quick attach:	None

System pressure 2610 psi (180 bar)

Hitch point distance to ground level in. (mm)	12.0 (280)	17.7 (419)	23.6 (560)	27.6 (679)	33.5 (825)	38.3 (964)
Lift force on frame lb	14300	14815	15175	15510	15445	14410
" " " " " " (kN)	(63.6)	(65.9)	(67.5)	(69.0)	(68.7)	(64.1)

HITCH DIMENSIONS AS TESTED - NO LOAD

	SAE TEST		OECD TEST	
	inch	mm	inch	mm
A	30.5	775	30.0	763
B	13.4	340	13.4	340
C	13.9	354	13.9	354
D	11.9	303	11.9	303
E	12.9	328	10.9	276
F	10.3	261	10.3	261
G	34.5	875	34.5	875
H	2.4	60	2.4	60
I	13.7	348	14.4	367
J	24.2	614	24.2	614
K	26.2	665	26.2	665
L	45.9	1166	45.9	1166
M	26.4	670	26.4	670
N	40.2	1021	40.2	1021
O	10.8	274	8.4	214
P	43.2	1097	48.2	1224
Q	37.1	942	37.8	959
R	28.7	729	30.5	775

