

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

2016

Test 2169: Challenger MT875E

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractorlab@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 2169: Challenger MT875E" (2016). *Nebraska Tractor Tests*. 2591.
<https://digitalcommons.unl.edu/tractormuseumlit/2591>

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 2169 - SUMMARY 1050

CHALLENGER MT875E DIESEL

16 SPEED

POWER TAKE-OFF PERFORMANCE

Power HP (kW)	Crank shaft speed rpm	Diesel Consumption		D.E.F. Consumption		Mean Atmospheric Conditions
		Gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Gal/hr (l/h)	
MAXIMUM POWER AND FUEL CONSUMPTION						
Rated Engine Speed—(PTO speed—1061 rpm)						
504.83 (376.45)	2100	30.15 (114.14)	0.418 (0.254)	16.74 (3.30)	1.00 (3.80)	
Standard Power Take-off Speed(1000 rpm)						
554.35 (413.38)	1979	31.35 (118.69)	0.396 (0.241)	17.68 (3.48)	0.96 (3.64)	
Maximum Power (1 hour)						
561.47 (418.69)	1799	30.24 (114.48)	0.377 (0.229)	18.57 (3.66)	0.98 (3.72)	

VARYING POWER AND FUEL CONSUMPTION

504.83 (376.45)	2100	30.15 (114.14)	0.418 (0.254)	16.74 (3.30)	1.00 (3.80)	Air temperature
437.34 (326.12)	2140	27.29 (103.31)	0.437 (0.266)	16.03 (3.16)	0.93 (3.53)	73°F (23°C)
331.13 (246.92)	2161	22.55 (85.36)	0.477 (0.290)	14.68 (2.89)	0.54 (2.03)	Relative humidity
221.74 (165.35)	2170	17.81 (67.43)	0.562 (0.342)	12.45 (2.45)	0.27 (1.02)	47%
111.24 (82.95)	2179	13.15 (49.77)	0.827 (0.503)	8.46 (1.67)	0.24 (0.90)	Barometer
1.97 (1.47)	2186	8.46 (32.04)	30.035 (18.270)	0.23 (0.05)	0.02 (0.07)	28.83" Hg (97.64 kPa)

Maximum torque - 1919 lb.-ft. (2602 Nm) at 1251 rpm

Maximum torque rise - 52.0%

Torque rise at 1680 engine rpm - 36%

Power increase at 1799 engine rpm - 11.2%

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)	D.E.F. Consumption Hp.hr/gal (kW.h/l)	Temp. °F (°C)	Barom. inch Hg (kPa)
Power at Rated Engine Speed—8th Gear								
445.03 (331.86)	29413 (130.83)	5.68 (9.13)	2100	2.4	0.473 (0.288)	14.81 (2.92)	0.020 (0.012)	173 (78) 52 (11) 28.94 (98.00)
75% of Pull at Rated Engine Speed—8th Gear								
346.51 (258.39)	22064 (98.15)	5.89 (9.48)	2156	1.4	0.514 (0.312)	13.63 (2.68)	0.016 (0.010)	173 (78) 66 (19) 28.91 (97.90)
50% of Pull at Rated Engine Speed—8th Gear								
234.34 (174.75)	14741 (65.57)	5.96 (9.59)	2167	0.6	0.597 (0.363)	11.72 (2.31)	0.015 (0.009)	171 (77) 68 (20) 28.89 (97.83)
75% of Pull at Reduced Engine Speed—12th Gear								
346.55 (258.42)	22009 (97.90)	5.91 (9.50)	1345	1.4	0.406 (0.247)	17.26 (3.40)	0.028 (0.017)	175 (79) 67 (20) 28.89 (97.83)
50% of Pull at Reduced Engine Speed—12th Gear								
234.42 (174.81)	14695 (65.37)	5.99 (9.63)	1352	0.6	0.437 (0.266)	16.03 (3.16)	0.023 (0.014)	172 (78) 70 (21) 28.89 (97.83)

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

Dates of tests: October 26 to November 7, 2016

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

CONSUMABLE Fluids, OIL and TIME: Fuel No. 2 Diesel **Specific gravity converted to 60°/60°F (15°/15°C)** 0.8408 **Fuel weight** 7.001 lbs/gal (0.839 kg/l) **Diesel Exhaust Fluid (DEF)** 32% aqueous urea solution **DEF weight** 9.071 lbs/gal (1.087 kg/l) **Oil** SAE 10W-40 **API service classification** CJ-4 **Transmission and hydraulic lubricant** AGCO Permatran 821 XL fluid **Total time engine was operated:** 22.0 hours

ENGINE: Make AGCO **Power Diesel Type** twelve cylinder vee with 4 turbochargers, two stage air to water aftercooler and D.E.F. (diesel exhaust fluid) exhaust treatment **Serial No.** *C54854* **Crankshaft** lengthwise **Rated engine speed** 2100 **Bore and stroke** 4.370" x 5.709" (111.0 mm x 145.0 mm) **Compression ratio** 16.7 to 1 **Displacement** 1026 cu in (16838 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** two paper elements and water separator **Fuel cooler** radiator for returned fuel **Exhaust** DOC (diesel oxidation catalyst) and SCR (selective catalyst reduction) integrated within a vertical muffler **Cooling medium temperature control** 2 thermostats

ENGINE OPERATING PARAMETERS: Fuel rate: 196.9 - 213.2 lb/h (89.3 - 96.7 kg/h) **High idle:** 2160 - 2200 rpm **Turbo boost:** nominal 27.6 - 30.5 psi (190 - 210 kPa) as measured 28.7 psi (198 kPa)

CHASSIS: Type tracklayer-rubber tracked **Serial No.** *AGCO875PGN1G1035* **Track width** 100.0" (2540 mm) to 120.0" (3048 mm) **Length of track on ground** 124.3" (3157 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 1.67 (2.69) second 2.13 (3.43) third 2.68 (4.31) fourth 3.41 (5.48) fifth 4.06 (6.54) sixth 4.58 (7.37) seventh 5.16 (8.31) eighth 5.80 (9.34) ninth 6.53 (10.51) tenth 7.34 (11.82) eleventh 8.29 (13.34) twelfth 9.33 (15.02) thirteenth 11.10 (17.87) fourteenth 14.11 (22.71) fifteenth 17.86 (28.75) sixteenth 24.86 (40.00) at 2270 rpm, reverse 1.34 (2.16), 3.24 (5.22), 3.66 (5.89), 8.89 (14.30)

DRAWBAR PERFORMANCE
UNBALLASTED AT 2100 ENGINE 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)	D.E.F Consumption lb/hp.hr (kg/kW.h)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
4th Gear										
355.47 (265.07)	44282 (196.98)	3.01 (4.84)	2127	13.0	0.556 (0.338)	12.58 (2.48)	0.024 (0.014)	177 (81)	73 (23)	28.65 (97.02)
5th Gear										
422.42 (315.00)	42192 (187.68)	3.76 (6.04)	2100	7.6	0.497 (0.302)	14.08 (2.77)	0.021 (0.012)	174 (79)	59 (15)	28.93 (97.97)
6th Gear										
439.20 (327.51)	37759 (167.96)	4.36 (7.02)	2100	4.7	0.480 (0.292)	14.60 (2.88)	0.019 (0.012)	174 (79)	54 (12)	28.94 (98.00)
7th Gear										
440.45 (328.44)	33047 (147.00)	5.00 (8.05)	2100	3.1	0.478 (0.291)	14.65 (2.89)	0.020 (0.012)	173 (78)	54 (12)	28.95 (98.04)
8th Gear										
445.03 (331.86)	29413 (130.83)	5.68 (9.13)	2100	2.4	0.473 (0.288)	14.81 (2.92)	0.020 (0.012)	173 (78)	52 (11)	28.94 (98.00)
9th Gear										
441.71 (329.38)	25798 (114.76)	6.42 (10.33)	2099	1.7	0.477 (0.290)	14.67 (2.89)	0.020 (0.012)	174 (79)	56 (13)	28.94 (98.00)
10th Gear										
442.78 (330.18)	22872 (101.74)	7.26 (11.68)	2100	1.4	0.475 (0.289)	14.74 (2.90)	0.020 (0.012)	174 (79)	56 (13)	28.92 (97.93)
11th Gear										
434.16 (323.75)	19803 (88.09)	8.23 (13.24)	2100	0.9	0.486 (0.296)	14.40 (2.84)	0.021 (0.013)	174 (79)	57 (14)	28.93 (97.97)

Clutch wet multiple disc hydraulically actuated by foot pedal **Brakes** wet multiple disc hydraulically actuated by foot pedal **Steering** electro-hydraulic differential steering controlled by steering wheel **Power take-off** 1000 rpm at 1980 engine rpm **Unladen tractor mass** 44265 lb (20078 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. 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 and correct report of official Tractor Test No. **2169**, Nebraska Summary 1050, January 9, 2017.

Roger M. Hoy
 Director

M.F. Kocher
 P.J. Jasa
 S.K. Pitla
 Board of Tractor Test Engineers

TRACTOR SOUND LEVEL WITH CAB	dB(A)
At no load in 6th gear	74.3
Bystander in 15th gear	90.2

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Track width	36.0 in (915 mm)	36.0 in (915 mm)
Ballast - Cast iron(front end)	4320 lb (1959 kg)	None
- Cast iron(front idlers)	4160 lb (1887 kg)	None
- Cast iron(side)	3080 lb (1397 kg)	None
Height of Drawbar	21.5 in (546 mm)	20.5 in (520 mm)
Static Weight with operator	56000 lb(25401kg)	44440 lb(20158 kg)

DRAWBAR PERFORMANCE
UNBALLASTED AT 1800 ENGINE 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)	D.E.F Consumption lb/hp.hr (kg/kW.h)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
					4th Gear					
360.43 (268.77)	44222 (196.71)	3.06 (4.92)	2126	11.6	0.548 (0.333)	12.77 (2.52)	0.022 (0.013)	177 (80)	73 (23)	28.64 (96.99)
					5th Gear					
417.47 (311.31)	43118 (191.80)	3.64 (5.85)	2085	10.0	0.501 (0.305)	13.96 (2.75)	0.020 (0.012)	179 (82)	73 (23)	28.63 (96.95)
					6th Gear					
446.03 (332.60)	41393 (184.13)	4.05 (6.51)	2020	8.2	0.476 (0.289)	14.72 (2.90)	0.017 (0.010)	181 (83)	75 (24)	28.64 (96.99)
					7th Gear					
471.04 (351.25)	40338 (179.43)	4.38 (7.05)	1908	6.6	0.452 (0.275)	15.48 (3.05)	0.016 (0.010)	181 (83)	72 (22)	28.64 (96.99)
					8th Gear					
484.84 (361.55)	38566 (171.55)	4.72 (7.59)	1805	5.6	0.436 (0.265)	16.07 (3.16)	0.017 (0.010)	182 (83)	71 (22)	28.64 (96.99)
					9th Gear					
487.67 (363.65)	33903 (150.81)	5.40 (8.68)	1800	3.7	0.432 (0.263)	16.21 (3.19)	0.017 (0.011)	183 (84)	71 (22)	28.65 (97.02)
					10th Gear					
498.44 (371.68)	30470 (135.54)	6.14 (9.87)	1800	2.8	0.423 (0.257)	16.57 (3.26)	0.017 (0.010)	181 (83)	68 (20)	28.65 (97.02)
					11th Gear					
492.09 (366.95)	26475 (117.77)	6.97 (11.22)	1800	2.0	0.429 (0.261)	16.32 (3.21)	0.018 (0.011)	181 (83)	67 (19)	28.64 (96.99)
					12th Gear					
494.86 (369.01)	23521 (104.63)	7.89 (12.70)	1800	1.4	0.428 (0.261)	16.34 (3.22)	0.018 (0.011)	181 (83)	67 (20)	28.67 (97.09)
					13th Gear					
498.28 (371.57)	19802 (88.08)	9.44 (15.18)	1800	1.0	0.425 (0.259)	16.47 (3.25)	0.017 (0.010)	182 (83)	69 (21)	28.62 (96.92)

DRAWBAR PERFORMANCE
BALLASTED AT 1800 ENGINE 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)	D.E.F Consumption lb/hp.hr (kg/kW.h)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
357.38 (266.50)	56210 (250.03)	2.39 (3.84)	2131	12.9	3rd Gear 0.546 (0.332)	12.82 (2.52)	0.022 (0.013)	174 (79)	61 (16)	28.81 (97.56)
430.61 (321.11)	53574 (238.31)	3.01 (4.84)	2036	9.3	4th Gear 0.496 (0.302)	14.10 (2.78)	0.018 (0.011)	177 (80)	61 (16)	28.84 (97.66)
469.90 (350.40)	50513 (224.69)	3.49 (5.62)	1936	7.2	5th Gear 0.457 (0.278)	15.33 (3.02)	0.016 (0.010)	178 (81)	62 (16)	28.83 (97.63)
489.71 (365.17)	48367 (215.14)	3.80 (6.12)	1852	6.2	6th Gear 0.435 (0.265)	16.08 (3.17)	0.017 (0.010)	178 (81)	62 (17)	28.82 (97.60)
497.75 (371.17)	44009 (195.76)	4.24 (6.82)	1800	4.5	7th Gear 0.426 (0.259)	16.44 (3.24)	0.017 (0.011)	180 (82)	62 (17)	28.85 (97.70)
504.55 (376.24)	39186 (174.31)	4.83 (7.77)	1800	3.4	8th Gear 0.421 (0.256)	16.64 (3.28)	0.016 (0.010)	179 (82)	60 (16)	28.78 (97.46)
503.38 (375.37)	34436 (153.18)	5.48 (8.82)	1800	2.4	9th Gear 0.422 (0.256)	16.61 (3.27)	0.016 (0.010)	179 (82)	60 (16)	28.77 (97.43)
507.74 (378.62)	30658 (136.37)	6.21 (9.99)	1799	1.8	10th Gear 0.417 (0.254)	16.80 (3.31)	0.016 (0.010)	179 (82)	60 (16)	28.77 (97.43)
500.40 (373.14)	26653 (118.56)	7.04 (11.33)	1799	1.3	11th Gear 0.424 (0.258)	16.51 (3.25)	0.017 (0.010)	179 (81)	60 (16)	28.80 (97.53)
501.53 (373.99)	23659 (105.24)	7.95 (12.79)	1799	1.0	12th Gear 0.422 (0.257)	16.58 (3.27)	0.017 (0.010)	179 (82)	61 (16)	28.78 (97.46)
504.88 (376.49)	19955 (88.76)	9.49 (15.27)	1800	0.7	13th Gear 0.420 (0.255)	16.69 (3.29)	0.017 (0.010)	179 (81)	61 (16)	28.79 (97.49)

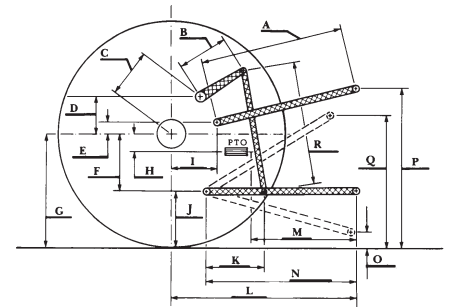
HYDRAULIC PERFORMANCE

CATEGORY: IVN		
Quick Attach: yes		
OECD Static test		
Maximum force exerted through whole range:	20936 lbs (93.1 kN)	
	Standard pump	High flow pump
	<u>3 inlets - 3 outlets</u>	<u>3 inlets - 3 outlets</u>
i) Sustained pressure at compensator cutoff:	2865 psi (198 bar)	2888 psi (199 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	58.3 GPM (220.8 l/min)	86.6 GPM (327.7 l/min)
iii) Pump delivery rate at maximum hydraulic power:	55.1 GPM (208.5 l/min)	82.8 GPM (313.6 l/min)
Delivery pressure:	2826 psi (195 bar)	2769 psi (191 bar)
Power:	90.8 HP (67.7 kW)	133.8 HP (99.8 kW)
	<u>1 inlet - 1 outlet</u>	<u>1 inlet - 1 outlet</u>
i) Sustained pressure at compensator cutoff:	2875 psi (198 bar)	2896 psi (200 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	38.3 GPM (145.2 l/min)	40.0 GPM (151.4 l/min)
iii) Pump delivery rate at maximum hydraulic power:	37.4 GPM (141.6 l/min)	37.2 GPM (140.9 l/min)
Delivery pressure:	2297 psi (158 bar)	2404 psi (166 bar)
Power:	50.1 HP (37.4 kW)	52.2 HP (38.9 kW)

HITCH DIMENSIONS AS TESTED - NO LOAD

	inch	mm
A	30.2	768
B	21.7	550
C	41.4	1051
D	39.4	1000
E	12.4	315
F	11.8	300
G	35.0	890
H	0.4	10
I	23.0	585
J	23.2	590
K	29.0	737
L	53.9	1369
*L'	60.4	1534
M	26.6	676
N	36.6	929
O	9.0	230
P	50.2	1275
Q	46.5	1181
R	55.9	1421

*L' to Quick Attach ends



Challenger MT875E Diesel

Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln