

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

2007

Nebraska Summary: S621 Case-IH Puma 180

Nebraska Tractor Test Laboratory

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](#)

Laboratory, Nebraska Tractor Test, "Nebraska Summary: S621 Case-IH Puma 180" (2007). *Nebraska Tractor Tests*. 2923.

<https://digitalcommons.unl.edu/tractormuseumlit/2923>

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 2423-NEBRASKA SUMMARY 621

CASE IH PUMA 180 DIESEL

19 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—1022 rpm)					
158.6 (118.3)	2200	9.77 (37.00)	0.427 (0.260)	16.23 (3.20)	
Standard Power Take-off Speed (1000 rpm)					
164.4 (122.6)	2153	9.81 (37.12)	0.413 (0.251)	16.76 (3.30)	
Maximum Power (1 hour)					
179.8 (134.1)	1900	10.01 (37.89)	0.386 (0.235)	17.96 (3.54)	

VARYING POWER AND FUEL CONSUMPTION

158.6 (118.3)	2200	9.77 (37.00)	0.427 (0.260)	16.23 (3.20)	Air temperature
138.5 (103.3)	2260	9.30 (35.22)	0.466 (0.283)	14.89 (2.93)	72°F (22°C)
105.3 (78.5)	2290	7.46 (28.24)	0.491 (0.299)	14.11 (2.78)	Relative humidity
70.9 (52.9)	2315	5.63 (21.33)	0.551 (0.335)	12.61 (2.48)	47%
35.7 (26.6)	2330	3.85 (14.57)	0.746 (0.454)	9.29 (1.83)	Barometer
--	2348	2.20 (8.32)	--	--	29.5" Hg (100.0 kPa)

Maximum Torque - 572.4 lb.-ft. (776.2 Nm) at 1400 rpm
 Maximum Torque rise - 51.1%
 Torque rise at 1800 engine rpm - 36%

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—8th Gear									
132.7 (98.9)	12525 (55.71)	3.97 (6.40)	2197	6.1	0.517 (0.315)	13.44 (2.65)	183 (84)	55 (13)	29.5 (99.9)
75% of Pull at Maximum Power—8th Gear									
102.7 (76.6)	9375 (41.70)	4.11 (6.61)	2254	5.3	0.585 (0.356)	11.88 (2.34)	181 (83)	55 (13)	29.5 (99.9)
50% of Pull at Maximum Power—8th Gear									
71.7 (53.5)	6260 (27.84)	4.30 (6.92)	2300	2.9	0.665 (0.404)	10.46 (2.06)	181 (83)	55 (13)	29.5 (99.9)
75% of Pull at Reduced Engine Speed—9th Gear									
106.4 (79.3)	9350 (41.60)	4.27 (6.87)	1955	5.7	0.513 (0.312)	13.55 (2.67)	176 (80)	55 (13)	29.5 (99.9)
50% of Pull at Reduced Engine Speed—9th Gear									
72.4 (54.0)	6230 (27.72)	4.36 (7.01)	1950	3.5	0.585 (0.356)	11.88 (2.34)	176 (80)	55 (13)	29.5 (99.9)

Location of tests: HBLFA Francisco Josephinum
 BLT Biomass-Logistics-Technology,
 Rottenhauser, StraBe, 1, AT, 3250, Wieselburg,
 Austria

Dates of tests: June -September, 2007.

Manufacturer: CNH Osterreich GmbH
 SteyrerstraBe, 32, 4300, St. Valentin, Austria

FUEL and OIL: Fuel No. 2 Diesel **Specific gravity converted to 60°/60°F (15°/15°C)** 0.835
Fuel weight 6.95 lbs/gal (0.833 kg/l) **Oil SAE** 10W30 **API service classification** CG-4
Transmission and hydraulic lubricant Case IH Hytran Ultra fluid **Front axle lubricant** Case IH Hytran Ultra fluid

ENGINE: Make CNH Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler
Serial No. 374056 **Crankshaft** lengthwise **Rated engine speed** 2200 **Bore and stroke** 4.094" x 5.197" (104.0 mm x 132.0 mm) **Compression ratio** 16.5 to 1 **Displacement** 410 cu in (6728 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 canisters **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** thermostat and variable speed fan

CHASSIS: Type front wheel assist **Serial No.** Z6BH01004 **Tread width** rear 60.2" (1530 mm) to 87.8" (2230 mm) front 61.4" (1560 mm) to 89.0" (2260 mm) **Wheelbase** 113.5" (2884 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 1.21 (1.94) second 1.45 (2.33) third 1.74 (2.80) fourth 2.09 (3.36) fifth 2.52 (4.05) sixth 3.03 (4.87) seventh 3.49 (5.62) eighth 4.20 (6.76) ninth 5.05 (8.12) tenth 6.06 (9.76) eleventh 7.30 (11.75) twelfth 8.78 (14.13) thirteenth 10.09 (16.24) fourteenth 12.13 (19.52) fifteenth 14.57 (23.45) sixteenth 17.52 (28.20) seventeenth 21.08 (33.92) eighteenth 25.35 (40.79) nineteenth 25.35 (40.80) (1700 engine rpm) reverse 2.67 (4.30), 3.21 (5.16), 3.85 (6.20), 4.63 (7.45), 5.57 (8.96), 6.70 (10.78) **Clutch** multiple wet disc electro-hydraulically operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals that can be locked together **Steering** hydrostatic **Power take-off** 540 rpm at 1950 engine rpm or 1000 rpm at 2154 engine rpm **Unladen tractor mass** 17595 lb (7980 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)
6th Gear									
121.6 (90.7)	16805 (74.76)	2.71 (4.37)	2254	13.1	0.564 (0.343)	12.33 (2.43)	180 (82)	59 (15)	29.4 (99.7)
7th Gear									
137.5 (102.5)	16680 (74.20)	3.09 (4.97)	2131	9.5	0.506 (0.308)	13.75 (2.71)	180 (82)	59 (15)	29.4 (99.7)
8th Gear									
146.8 (109.5)	16625 (73.96)	3.31 (5.33)	1905	9.7	0.474 (0.288)	14.67 (2.89)	185 (85)	59 (15)	29.4 (99.7)
9th Gear									
149.1 (111.2)	13635 (60.65)	4.10 (6.60)	1902	6.7	0.471 (0.286)	14.77 (2.91)	181 (83)	57 (14)	29.4 (99.7)
10th Gear									
146.8 (109.5)	11010 (48.97)	5.00 (8.05)	1900	5.3	0.473 (0.289)	14.65 (2.89)	183 (84)	59 (15)	29.4 (99.7)
11th Gear									
148.7 (110.9)	9215 (40.99)	6.05 (9.74)	1897	4.6	0.468 (0.285)	14.86 (2.93)	181 (83)	57 (14)	29.4 (99.7)
12th Gear									
142.8 (106.5)	7325 (32.59)	7.31 (11.77)	1895	4.1	0.487 (0.296)	14.26 (2.81)	180 (82)	57 (14)	29.4 (99.7)

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with official OECD test procedures. This tractor did not meet the manufacturer's claims of 35 Hp "power growth", 39.6 gpm (150 lpm) remote hydraulic flow nor 3 point lift capacities of 12787 lbs (5800 kg) or 15873 lbs (7200 kg). 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 summary of data from OECD Report No. **2423** Nebraska Summary 621, November 17, 2008.

Roger M. Hoy
 Director

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

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive	
	Disengaged dB(A)	Engaged dB(A)
At no load in 8th gear	70.0	70.0
Bystander	--	--

TIRES, BALLAST AND WEIGHT

Rear Tires - No., size, ply & psi(kPa)
Front Tires - No., size, ply & psi(kPa)
Height of Drawbar
Static Weight with operator - Rear
 - Front
 - Total

Tested without ballast

Two 710/70R38;**,15(100)
 Two 600/65R28;**,15(100)
 24.0 in (610 mm)
 10650 lb (4830 kg)
 7110 lb (3225 kg)
 17760 lb (8055 kg)

DRAWBAR PERFORMANCE
(Unballasted - Front Drive Disengaged)
FUEL CONSUMPTION CHARACTERISTICS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel lb/hp.hr (kg/kW.h)	Consumption Hp.hr/gal (kW.h/l)	Temp. °F cool- ing med	°C Air dry bulb	Barom. inch Hg (kPa)
Maximum Power—10th Gear									
128.2 (95.6)	8410 (37.42)	5.72 (9.20)	2203	5.1	0.537 (0.327)	12.94 (2.55)	178 (81)	70 (21)	29.8 (101.0)
75% of Pull at Maximum Power—10th Gear									
100.7 (75.1)	6340 (28.21)	5.96 (9.59)	2271	4.0	0.602 (0.366)	11.56 (2.28)	180 (82)	70 (21)	29.8 (101.0)
50% of Pull at Maximum Power—10th Gear									
68.4 (51.0)	4235 (18.83)	6.06 (9.76)	2298	3.0	0.713 (0.434)	9.75 (1.92)	180 (82)	70 (21)	29.8 (101.0)
75% of Pull at Reduced Engine Speed—11th Gear									
103.8 (77.4)	6395 (28.44)	6.09 (9.80)	1938	4.4	0.521 (0.317)	13.35 (2.63)	176 (80)	70 (21)	29.8 (101.0)
50% of Pull at Reduced Engine Speed—11th Gear									
70.9 (52.8)	4245 (18.89)	6.26 (10.07)	1959	2.9	0.603 (0.367)	11.52 (2.27)	176 (80)	68 (20)	29.8 (101.0)
MAXIMUM POWER IN SELECTED GEARS									
7th Gear									
99.9 (74.5)	11840 (52.67)	3.16 (5.09)	2273	14.0	0.598 (0.364)	11.63 (2.29)	181 (83)	64 (18)	29.5 (99.9)
8th Gear									
113.5 (84.6)	11395 (50.69)	3.73 (6.01)	2257	12.6	0.591 (0.360)	11.76 (2.32)	183 (84)	66 (19)	29.5 (99.9)
9th Gear									
133.4 (99.5)	11190 (49.77)	4.47 (7.20)	2153	8.2	0.525 (0.319)	13.28 (2.61)	178 (81)	64 (18)	29.5 (100.0)
10th Gear									
141.5 (105.5)	11185 (49.76)	4.74 (7.63)	1905	8.1	0.498 (0.303)	13.97 (2.75)	178 (81)	64 (18)	29.5 (100.0)
11th Gear									
146.0 (108.9)	9320 (41.45)	5.88 (9.46)	1902	6.0	0.483 (0.294)	14.41 (2.84)	180 (82)	66 (19)	29.5 (100.0)
12th Gear									
144.3 (107.6)	7540 (33.53)	7.18 (11.55)	1902	4.5	0.488 (0.297)	14.26 (2.81)	181 (83)	64 (18)	29.5 (100.0)

This vehicle is equipped with an electronically controlled engine Power management system that monitors and boosts engine power output in certain circumstances. This is achieved by electronically changing the characteristics of the engine power-speed curve. The engine Power management function ("boosted" power level) becomes active in the higher transmission gears (16th and above) and for road transport applications. The system is also activated when power transfer through the PTO exceeds a preset level (and forward speed exceeds 0.5 km/h), for mobile PTO driven implement applications. An override system is provided to enable PTO operations at the "boosted" power level while the vehicle is stationary for test purposes. The results of of this PTO output test are presented below.

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—1022 rpm)					
189.1 (141.0)	2200	11.27 (42.67)	0.413 (0.251)	16.77 (3.30)	
Standard Power Take-off Speed - (1000 rpm)					
195.0 (145.4)	2153	11.47 (43.44)	0.407 (0.248)	17.00 (3.35)	
Maximum Power (1 hour)					
213.6 (159.3)	1900	11.88 (44.95)	0.385 (0.234)	17.98 (3.54)	

VARYING POWER AND FUEL CONSUMPTION

189.1 (141.0)	2200	11.27 (42.67)	0.413 (0.251)	16.77 (3.30)	Air temperature
164.0 (122.3)	2245	10.33 (39.12)	0.436 (0.266)	15.87 (3.13)	73°F (23°C)
124.6 (93.0)	2275	8.51 (32.19)	0.473 (0.288)	14.64 (2.88)	Relative humidity
84.2 (62.8)	2305	6.32 (23.91)	0.519 (0.316)	13.33 (2.63)	50%
42.5 (31.7)	2325	4.19 (15.87)	0.682 (0.415)	10.15 (2.00)	Barometer
--	2348	2.19 (8.28)	--	--	29.5"Hg (100.0kPa)

Maximum Torque 644.5 lb.-ft. (873.8 Nm) at 1600 rpm
 Maximum Torque Rise - 42.8%
 Torque rise at 1800 rpm - 38%

HYDRAULIC PERFORMANCE

CATEGORY: IHN

Quick Attach: No

OECD Static test

Lift cylinders:

	<u>2 x 90 mm</u>	<u>2 x 100 mm</u>
Maximum force exerted through whole range:	10275 lbs (45.7 kN)	13490 lbs (60.0 kN)

	<u>Standard pump</u>	<u>High flow pump</u>
i) Sustained pressure at compensator cutoff:	3175 psi (219 bar)	3175 psi (219 bar)
two outlet sets combined		
ii) Pump delivery rate at minimum pressure:	32.0 GPM (121.0 l/min)	39.1 GPM (148.1 l/min)
iii) Pump delivery rate at maximum		
hydraulic power:	27.0 GPM (102.0 l/min)	35.6 GPM (134.5 l/min)
Delivery pressure:	2830 psi (195 bar)	2610 psi (180 bar)
Power:	44.5 HP (33.2 kW)	54.1 HP (40.4 kW)
single outlet set		
ii) Pump delivery rate at minimum pressure:	26.2 GPM (99.3 l/min)	26.2 GPM (99.2 l/min)
iii) Pump delivery rate at maximum		
hydraulic power:	25.8 GPM (97.7 l/min)	25.7 GPM (97.4 l/min)
Delivery pressure:	2540 psi (175 bar)	2540 psi (175 bar)
Power:	38.2 HP (28.5 kW)	38.1 HP (28.4 kW)

THREE POINT HITCH PERFORMANCE (SAE Static test)

Observed Maximum Pressure psi. (bar)	3175 (219)				
Location:	lift cylinder				
Hydraulic oil temperature: °F (°C)	150 (65)				
Location:	hydraulic sump				
Category:	IHN				
Quick attach:	none				
System pressure 2865 psi (197 Bar) Lift cylinders - 2 x 90 mm					
Hitch point distance to ground level in. (mm)	19.7 (500)	21.9 (555)	25.8 (655)	33.7 (855)	45.3 (1150)
Lift force on frame lb	13195	13155	13195	13080	11690
" " " " " " (kN)	(58.7)	(58.5)	(58.7)	(58.2)	(52.0)
System pressure 2865 psi (197 Bar) Lift cylinders - 2 x 100 mm					
Hitch point distance to ground level in. (mm)	19.7 (500)	21.9 (555)	25.8 (655)	35.8 (910)	45.3 (1150)
Lift force on frame lb	14930	15015	15175	15150	14230
" " " " " " (kN)	(66.4)	(66.8)	(67.5)	(67.4)	(63.3)

HITCH DIMENSIONS AS TESTED—NO LOAD

	OECD test		SAE test	
	inch	mm	inch	mm
A	31.9	810	31.5	800
B	17.9	454	17.9	454
C	15.1	383	15.1	383
D	14.6	372	14.6	372
E	10.9	277	10.9	277
F	10.6	270	10.6	270
G	36.4	925	36.4	925
H	2.4	60	2.4	60
I	19.7	440	19.7	440
J	25.8	655	25.8	655
K	26.9	682	26.9	682
L	48.2	1224	48.2	1224
M	23.1	587	23.1	587
N	38.3	974	38.3	974
O	9.0	230	19.7	500
P	52.8	1340	47.8	1214
Q	38.2	970	45.3	1150
R	40.2	1022	34.4	875

