OECD APPROVAL # 1234
Date of approval: February 15, 1990

CENTER FOR AGRICULTURAL EQUIPMENT
DEPARTMENT OF AGRICULTURAL ENGINEERING
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
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LINCOLN, NEBRASKA 68583-0832, USA

REPORT ON TEST IN ACCORDANCE WITH OECD STANDARD CODE FOR THE OFFICIAL TESTING OF AGRICULTURAL TRACTOR PERFORMANCE

RESTRICTED TEST-CODE II

JOHN DEERE 4455 POWERSHIFT WITH MECHANICAL FRONT WHEEL DRIVE (4 WD)



MANUFACTURED BY: John Deere Waterloo Works
P.O.Box 3500
Waterloo, Iowa 50706, USA

NEBRASKA TEST NO.1619

Test date: April-May 1989

This test report provides the results of the tests conducted in accordance with the OECD Standard Test Code for the Official Testing of Agricultural Tractor Performance - C(87)53 Final - Annex II, Restricted Code.

This report has been approved by the OECD Coordinating Centre in Paris (CEMAGREF) on February 15, 1990.

John Deere 4455 Powershift with MFWD OECD # 1234

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SPECIFICATIONS OF TRACTOR.

Manufacturers name/address	:	John Deere Waterloo Works P.O.Box 3500 Waterloo, Iowa
Submitted for test by	:	The manufacturer
Selected for test by	:	The manufacturer in agreement with the test station.
Place of running in	:	John Deere P.E.C. Waterloo, Iowa
Duration of running in	:	78 hours
Location of Test	:	Center for Agricultural Equipment, Lincoln, Nebraska, USA.

TRACTOR.

Make	John Deere
Model	4455
Type	Unit construction, mechanical front wheel drive (4 WD)
Number of driving wheels	4
Serial Number	*RW4455P001020*
1st Serial number	*RW4455P001001*

ENGINE.

Make	John Deere
Model	6076TRW04
Type	Diesel, turbocharged.
Serial Number	*RG6076T102604*
Cylinders	
Number & Disposition	6, in-line, vertical
Bore x stroke	115.8 mm x 120.7 mm (4.56 in x 4.75 in)
Cubic capacity	7634 ml (466 cu.in.)
Compression Ratio	16.0 - 1
Arrangement of valves	Overhead
Cylinder liners	Wet, replacable
Super charging	
Make/Model/Type	Air Research/RE29308/ exhaust gas driven
Pressure	95-115 kPa (14-17 psi) at rated speed & load.
Fuel System	
Feed system	Transfer pump integral with injection pump
Make/Type/Model of filters	Stanadyne/RE27091/ paper element
Fuel Tank capacity	246 liter (65 US gallons)

Make/Model/Type Injection Pump	Nippondenso/RE36655/In line
Pump Serial number	10H0019
Production setting of pump	
Flow Rate (Rated Eng.Spd & Full Load)	26.7 +/- 1.2 kg/hr 58.9 +/- 2.6 lb/hr
Make/Model/Type of injectors	Nippondenso/RE30084/21 mm
Injection pressure	29.0 MPa(4200 psi)
Timing	27 degrees before TDC

Governor

Make/Model/Type	Nippondenso/RSV200/mechanical
Governed engine speed range	From 800 to 2400 rev/min
Rated engine speed	2200 rev/min
High-idle speed range	2375 +/-25 rev/min

Air Cleaner.

Pre-cleaner	
Make/Model/Type	Donaldson/plastic mesh chaff screen
Air intake location	top of air stack
Main Cleaner	
Make/Model/Type	Donaldson/AR79679/ pleated paper
Secondary element	
Make/Model/Type	Donaldson/AR79680/ pleated paper
Maintenance indicator	Dash mounted light and horn

Lubrication system.

Type of feed pump	Full pressure, positive displacement.
Type of filters	Full flow with bypass
Number	one
Oil cooler	Heat exchanger with engine coolant

Cooling system.

Type of coolant	Liquid
Type of pump	Centrifugal
Fan specification	Belt driven, variable speed
Number of fan blades	8
Fan diameter	610 mm (24.0 in)
Coolant system capacity	25.6 liter (27 qt)
Type of temperature control	2 thermostats and variable speed fan
Superpressure system	69 kPa (10 psi)

Starting system.

Make/Model/Type of starter	Nippondenso/RE38336/electric
Power Rating	4.75 kW (6.4 hp)
Cold starting aid	Ether spray in intake manifold.
Safety device	Electrical lockout on gearshift

Electrical system.	
Voltage & grounding.	12 Volt DC;negative ground
Generator	
Make/Model/Type	Nippondenso/RE37201/belt driven
Power rating	120 Ampere at 2200 engine rpm.
Batteries	
Number & connection	2-12 V batteries in parallel
Rating	175 Ampere-hours per battery at 20 hour rating 925 cold crank Amps per battery
Exhaust system.	
Make/Model/Type	Donaldson/RE35448/ expansion chamber
Location	Vertical above hood, left of centerline

TRANSMISSION.

Clutch. (travel)	
Make/Type	John Deere/multiple plate oil cooled
Number of plates	2, 3,or 5 (depending on gear)
Plate diameter	279.4 mm (11.0 in)
Method of operation	Hydraulically actuated by foot pedal.
Gear Box.	
Make/Type	John Deere/full powershift
Arrangement	planetary design consisting of: one input planetary gearset, one 2 speed planetary gearset, two compound planetary gearsets, all with multiple wet disc clutches and brakes
Number of gears	15 forward and 4 reverse controlled by a single hand lever
Oil cooler	Heat exchanger with air
Available options	None
Rear axle and final drives.	
Make/Type	John Deere/crown wheel and pinion, differential and inboard planetary reduction
Differential Lock	
Type	Hydraulic
Method of engagement	Foot pedal
Method of disengagement	Self disengaging with brake pedal

Front Axle and final drives.

Make/Model/Type	John Deere/crown wheel and pinion, differential and outboard planetary reduction
Differential lock	
Type	limited slip
Method of engagement	self engaging
Method of disengagement	self disengaging

Gear ratios and travel speeds.

(Tire dynamic radius of 892 mm (35.1 in) ISO 4251/1-1984)

Gear Number	Number of engine revolutions for one revolution of the driving wheels	Nominal travel speed at rated engine speed of 2200 rev/min [km/h]	[mph]
1 fwd	316.55	2.34	1.45
2 fwd	221.11	3.35	2.08
3 fwd	182.88	4.05	2.51
4 fwd	145.60	5.08	3.16
5 fwd	126.36	5.86	3.64
6 fwd	111.34	6.65	4.13
7 fwd	96.66	7.66	4.76
8 fwd	84.13	8.80	5.47
9 fwd	73.02	10.13	6.30
10 fwd	64.35	11.50	7.15
11 fwd	55.85	13.25	8.23
12 fwd	49.92	14.82	9.21
13 fwd	40.34	18.35	11.40
14 fwd	28.84	25.66	15.94
15 fwd	23.31	31.75	19.73
1 rev	228.45	3.24	2.01
2 rev	159.65	4.64	2.88
3 rev	105.16	7.04	4.37
4 rev	69.82	10.60	6.59

Number of front wheel revolutions for one rear wheel revolution. 1.3312

POWER - TAKE - OFF.

Main Power-Take-Off.

Type	Independent
Method of engagement	Hydraulically actuated multi-plate wet clutch operated by hand lever, independent of main drive clutch.
Number of shafts	One
Method of changing PTO shafts ends and speeds	Interchangeable shafts

Standard PTO. 1000 rev/min.

Location	Rear of tractor, vertical center plane.
Diameter of shaft	34.9 mm (1.375 inch)
Number of splines	21; conforms to ISO 500/1979.
Height above ground	726 mm (28.6 in)
Distance from median plane of tractor	0 mm
Distance behind rear axle	498 mm (19.6 in.)
PTO Speed @ rated engine speed	1002 rev/min
Engine speed @ Std. PTO Speed	2195 rev/min
Ratio of Engine rpm to PTO rpm	2.195
Direction of rotation (viewed facing driving end)	Clockwise.

Standard PTO 540 rev/min. (not tested)

Location	Rear of tractor, vertical center plane.
Diameter of PTO shaft end.	34.9 mm (1.375 in)
Number of splines	6; ISO 500/1979
Height above ground	726 mm (28.6 in)
Distance from median plane of tractor	0 mm
Distance behind rear wheels	521 mm (20.5 in)
PTO speed @ rated engine speed	540 rev/min
Engine speed @ Std PTO Speed	2201 rev/min
Ratio of Eng spd./PTO spd.	4.0758
Maximum allowed power	56 kW (75 hp)
Rotation direction when viewed from shaft end	Clockwise.

POWER LIFT.

Make	John Deere
Type of hydraulic system	Hydraulic lift with variable mix of draft and position control; Lower link sensing with adjustable speed of drop. Closed center
Number/Type of cylinders	One internal and one or two optional external, all single acting
Type of linkage lock for transport	Hydraulic
Relief valve setting	17.5 +/- 0.3 MPa (2535 +/- 45 psi)
Opening pressure of cylinder safety valve	20.7 MPa (3000 psi)
Lift pump type	Radial piston,variable delivery constant pressure
Power transmission to pump	direct drive
Type/Number of filters	paper element/one
Location of oil reservoir	Transmission housing
Number/Type/Location of tapping points.	2 pairs of ISO standard couplings at rear of tractor. (A third set is optional)
Max. oil volume available for external cylinders.	5.0 l (5.3 qt) 10.0 l (10.6 qt) with 5.0 l (5.3 qt) allowable overfill

THREE POINT LINKAGE.

- Category 2 or 3N in conformity with ISO 730/1-1977
- Category adaptor - none

THREE POINT LINKAGE.

Figure 1.1

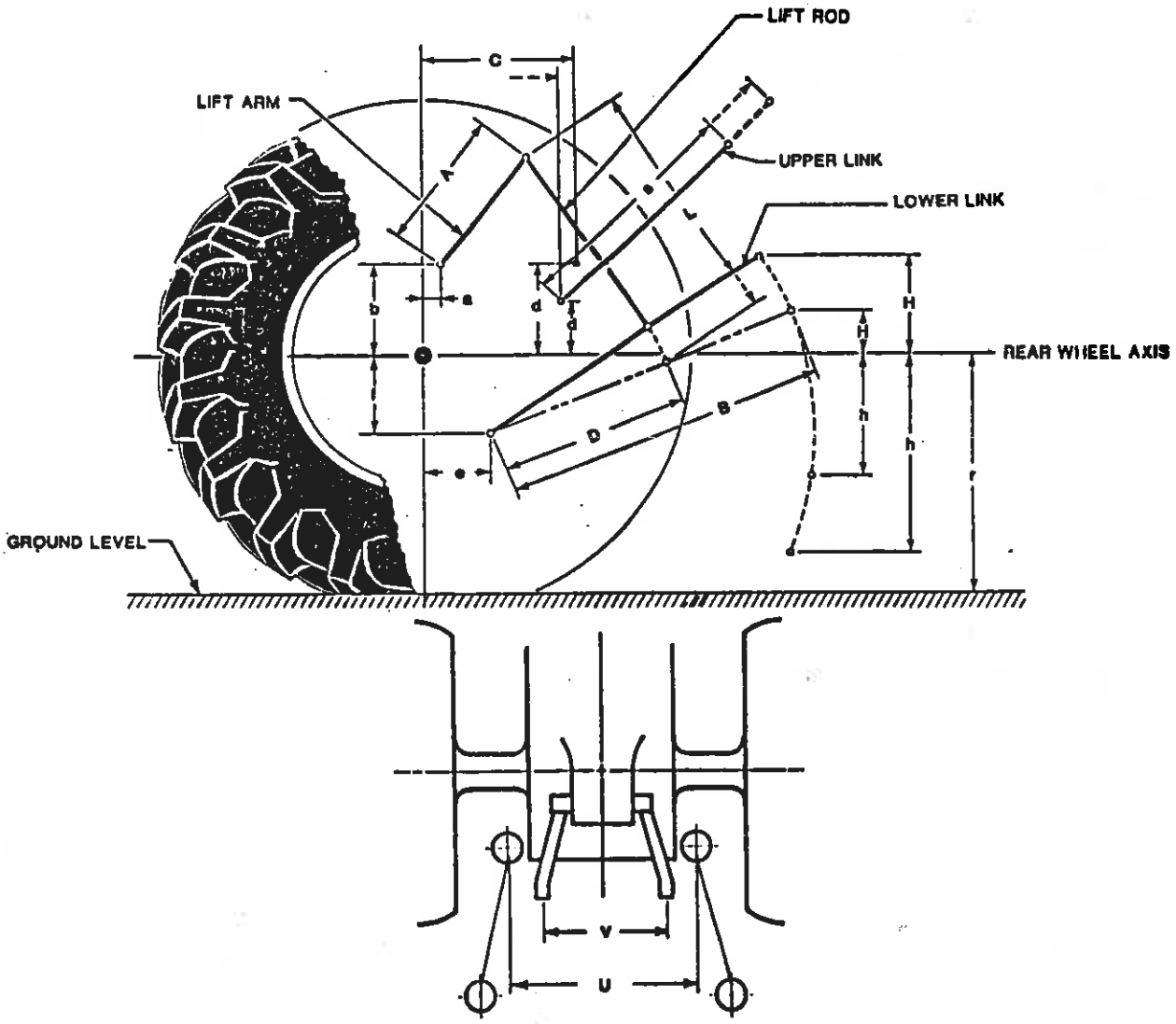


Figure 1.2

Table 1.1 -*Linkage geometry dimensions.

		Dimension or range [mm]	Dimension or range [in]	Settings used on test [mm]	Settings used on test [in]
Lift category		II			
Rear Tire - Radius Index	(r)	892	35.1		
Front Tire - Radius Index	(r')	684	26.9		
Length of lift arms	(A)	292	11.5	same	
Length of lower links	(B)	942	37.1	same	
Distance of lift arm pivot from: horizontal	(a)	70	2.8	same	
rear wheel axis: vertical	(b)	278	10.9	same	
Horizontal distance between the 2 lower link points	(u)	427	16.8	same	
Horizontal distance between the 2 lift arm end points	(v)	583	23.0	same	
Length of upper link	(S)	635	25.0	676	26.6
	to	815	32.1		
Distance of upper link pivot from: horizontal	(c)	349	13.7		
		362	14.3	362	14.3
rear wheel axis: vertical	(d)	216	8.5		
		143	5.6	143	5.6
Distance of lower link pivot from: horizontal	(e)	114	4.5	same	
rear wheel axis: vertical	(f)	259	10.2	same	
Distance of lower link pivot points to lift rod pivot pts on lower links.	(D)	587	23.1	same	
Length of lift rods	(L)	775	30.5	833	32.8
	to	845	33.3		
Height of lower hitch points relative to rear wheel axis In low position	(h)	638	25.1	630	24.8
	to	478	18.8		
In high position	(H)	165	6.5	62	2.5
	to	48	1.9		
Height above ground of lower hitch points when locked in transport position		937	36.9	945	37.2
	to	1057	41.6		

*Assuming (r) with a tire dynamic index of 892 mm (35.1 in)
ISO 4251/1-1984

SWINGING DRAWBAR.

Type	Oscillating
Height above ground	Minimum: 467 mm (18.4 in) Maximum: 582 mm (22.9 in)
Adjustments	Inverting drawbar and repositioning drawbar
Distance of hitch point from rear wheel axis,horizontal	727, 804, 870, 903 mm (28.6,31.7,34.3,35.6 in)
Distance of hitch point from PTO shaft end.....1000 rpm	
Vertical	108 mm (4.3 in),223 mm (8.8 in)
Horizontal	228, 305, 371, 404 mm (9.0,12.0,14.6,15.9 in)
.....540 rpm	
Vertical	108 mm (4.3 in),223 mm (8.8 in)
Horizontal	204, 281, 347, 380 mm (8.0,11.0,13.7,14.9 in)
Lateral adjustment; Right side	218 mm (8.6 in)
Left side	218 mm (8.6 in)
Distance of pivot point from rear wheel axis; horizontal	175 mm (6.9 in) forward.
Diamater of drawbar pin hole	33 mm (1.3 in)
Maximum vertical static permissible load	14.1 kN (3150 lb)

STEERING

Make/Model/Type	John Deere/hydrostatic
Method of operation	steering wheel
Pump	same as main hydraulic pump
Ram(s)	two internal
Working pressure	same as main hydraulic pressure

BRAKE SYSTEM.

Service brake.

Make/Type	John Deere/oil immersed disc
Method of operation	Hydraulically actuated from main system; operated by two pedals which can be locked together.

Parking brake.

Type	Transmission lock
Method of operation	Gear selector lever.

Trailer Brake (optional)

Type	Hydraulic

WHEELS.

Number.	
Front	Two; Driving and steering
Rear	Two or four; Driving
Wheelbase	2675 mm (105.3 in)

Track width adjustment

	Minimum [mm]	Minimum [in]	Maximum [mm]	Maximum [in]	Adjustment method
Front	1538	60.6	2235	88.0	Reversing wheels and offset lug rims
Rear	1574	62.0	2950	116.0	Rack and pinion axle reversing wheels and offset lug rims.

PROTECTIVE STRUCTURE.

Make/Model/Type	John Deere/SG046/ Sound-Gard Body
Manufacturer's name/address	John Deere Tractor Works Waterloo, Iowa
Protective device	Cab, not tiltable.
OECD approval number	CSS 073/13

DRIVER'S SEAT.

Make/Model/Type	John Deere/HydraCushioned
Type of damping and suspension	Gas charged accumulator and spring loaded attenuator
Range of adjustment	
Longitudinal	150 mm (5.9 in)
Vertical	64 mm (2.5 in)
Rotation	25 degrees either way

LIGHTING.

	Height above ground of center [mm]	Height above ground of center [in]	Size [mm]	Distance from outside edge to median plane of tractor. [mm]	Distance from outside edge to median plane of tractor. [in]
Headlights	1819	71.6	50 x 125	250	9.8
	1948	76.7	100 dia.	978	38.5
Rearlights	2776	109.3	100 dia.	813	32.0
	2052	80.8	100 dia.	813	32.0
Rear reflectors	2929	115.3	50 x 197	554	21.8
	1913	75.3	83 x 190	870	34.3

TEST CONDITIONS.

Overall dimensions.

Length		4425 mm (174.2 in)
Width	Minimum	2769 mm (109.0 in)
	Maximum	3023 mm (119.0 in)
Height -	Top of cab	3068 mm (120.8 in)
-	Top of exhaust	3224 mm (126.9 in)
Ground clearance (unballasted)		450 mm (17.7 in)
Clearance-limiting part		bottom of drawbar

Tractor Mass (with Cab, full fuel tank)

		Without driver [kg]	Without driver [lb]	With driver [kg]	With driver [lb]
Unballasted	Front	2472	5450	2472	5450
	Rear	4456	9825	4531	9990
	Total	6928	15275	7003	15440
Ballasted	Front	2526	5570	2526	5570
	Rear	5729	12630	5804	12795
	Total	8255	18200	8330	18365

Ballast:

	Number of weights	Mass (total) [kg]	Mass (total) [lb]	Water [kg]	Water [lb]
Front	none	none		none	
Rear	2	454	1000	none	
Duals (rear)	2	776	1710		
Additional front frame		45	100		
Additional test equipment		52	115		

Tire Specifications.

	Front wheels	Rear wheels
Make	Firestone	Firestone
Dimensions	14.9R30	18.4R42
Ply rating	3 star (10 ply)	2 star (10 ply)
Type	Radial	Radial
Max.load (tire manufacturer)	2270 kg/tire (5010 lb/tire)	3375 kg/tire (7440 lb/tire)
Max.load(tractor manufacturer)	2270 kg/tire (5010 lb/tire)	3355 kg/tire (7400 lb/tire)
Inflation pressure (tire mfr)	205 kPa(30 psi)	165 kPa(24 psi)
Dynamic Radius Index	684 mm(26.9 in)	892 mm (35.1 in)
Chosen track width - singles	1690 mm(66.5 in)	1805 mm (71.1 in)
- duals		3277 mm(129.0 in)

Oils and Lubrication.

Capacity and change interval:

	Capacity liter	Capacity quart	Oil change hrs	Filter change hrs
Engine (w/o filter)	18	19	250	250
Gear Box (includes rear axle and rear final drive)	60	63.6	1500	annually
Front axle housing	8.5	9	1500	NA
Final drive, front	1.9	2	1500	NA
Hydraulic system	commom with gearbox			

Oil and Lubricant specifications:

	Recommended	Used during test
Engine oil		
Type	John Deere Torq-gard Supreme	same
Viscosity	102 cSt	
Classification	API - CD MIL-L-2104D	
Transmission		
Type	John Deere Hy-Gard	same
Viscosity	58 cSt	
Classification	NA	
Hydraulic fluid	same as transmission oil	same
Steering oil	same as transmission oil	same
Front axle and hubs		
Type	Gear Lubricant	same
Viscosity	85W-140	
Classification	GL-5	
Grease		
Number of lubrication points	21	

Fuel

Type/grade	Diesel Fuel "Premier";grade 2-D
Density (Pto test)	0.828 g/cubic-cm (6.912 lbs/gallon) at 15 °C (59 °F)
(Drawbar test)	same as Pto test.
Cetane number	51.1
Viscosity	2.31 cSt at 38 °C (100 °F)

Remarks: This tractor is equipped with a variable speed cooling fan. Since engine power is influenced by fan speed, all power tests were conducted at approximately the same ambient air temperatures.

COMPULSORY TESTS.

(1) MAIN POWER TAKE-OFF PERFORMANCE (1000 rev/min).

Date of tests : 12 April 1989
Location of tests : Center for Agricultural Equipment, University of Nebraska, Lincoln, Nebraska.
Type of Dynamometer: Eaton Dynamatic 2025 D.G.

Power kW (hp)	Speeds engine rev/min	Speeds PTO rev/min	Fuel Consumption hourly l/h (gal/h)	Fuel Consumption hourly kg/h (lb/h)	Fuel Consumption specific kg/kW.h (lb/hp.h)	Specific energy kW.h/l (hp.h/gal)
1.1 Maximum Power- 2 hour test.						
109.51 (146.86)	1850	843	30.48 (8.05)	25.25 (55.66)	0.231 (0.379)	3.59 (18.24)
1.2 Power at rated engine speed. (1 hour)						
105.59 (141.60)	2200	1002	31.74 (8.38)	26.29 (57.95)	0.249 (0.409)	3.33 (16.89)
1.3 Maximum power at standard PTO speed. (1000 rev/min)						
105.59 (141.60)	2200	1002	31.74 (8.38)	26.29 (57.95)	0.249 (0.409)	3.33 (16.89)

1.4 Part Loads - governor hand lever set for maximum power at rated engine speed

Power kW (hp)	Speeds engine rev/min	PTO rev/min	Fuel Consumption hourly l/h (gal/h)	hourly kg/h (lb/h)	specific kg/kW.h (lb/hp.h)	Specific energy kW.h/l (hp.h/gal)
(i) Torque obtained at maximum power at rated engine speed.						
105.59 (141.60)	2200	1002	31.74 (8.38)	26.29 (57.95)	0.249 (0.409)	3.33 (16.89)
(ii) 85% of the torque obtained in (i)						
91.61 (122.85)	2243	1022	28.59 (7.55)	23.68 (52.20)	0.258 (0.425)	3.20 (16.27)
(iii) 75% of the torque defined in (ii)						
69.59 (93.33)	2276	1037	23.82 (6.29)	19.73 (43.50)	0.284 (0.466)	2.92 (14.83)
(iv) 50% of the torque defined in (ii)						
47.07 (63.12)	2310	1052	19.06 (5.03)	15.79 (34.80)	0.335 (0.551)	2.47 (12.54)
(v) 25% of the torque defined in (ii)						
23.82 (31.94)	2338	1065	14.29 (3.78)	11.84 (26.10)	0.497 (0.817)	1.67 (8.46)
(vi) Unloaded						
0.38 (0.51)	2363	1077	9.69 (2.56)	8.03 (17.70)	21.002 (34.526)	0.04 (0.20)

1.5 Part Loads - governor hand lever set for maximum power at standard pto speed.

Power kW (hp)	Speeds engine rev/min	Speeds PTO rev/min	Fuel Consumption hourly l/h (gal/h)	Fuel Consumption hourly kg/h (lb/h)	Fuel Consumption specific kg/kW.h (lb/hp.h)	Specific energy kW.h/l (hp.h/gal)
(i) Torque obtained at standard pto speed.						
105.59 (141.60)	2200	1002	31.74 (8.38)	26.29 (57.95)	0.249 (0.409)	3.33 (16.89)
(ii) 85% of the torque obtained in (i)						
91.61 (122.85)	2243	1022	28.59 (7.55)	23.68 (52.20)	0.258 (0.425)	3.20 (16.27)
(iii) 75% of the torque defined in (ii)						
69.59 (93.33)	2276	1037	23.82 (6.29)	19.73 (43.50)	0.284 (0.466)	2.92 (14.83)
(iv) 50% of the torque defined in (ii)						
47.07 (63.12)	2310	1052	19.06 (5.03)	15.79 (34.80)	0.335 (0.551)	2.47 (12.54)
(v) 25% of the torque defined in (ii)						
23.82 (31.94)	2338	1065	14.29 (3.78)	11.84 (26.10)	0.497 (0.817)	1.67 (8.46)
(vi) Unloaded						
0.38 (0.51)	2363	1077	9.69 (2.56)	8.03 (17.70)	21.002 (34.526)	0.04 (0.20)

No-load maximum engine speed 2363 rev/min

Equivalent engine torque:

at rated engine speed	458 Nm	(2200 rev/min)
at maximum power	565 Nm	(1850 rev/min)
at maximum torque	602 Nm	(1700 rev/min)

Mean atmospheric conditions:

Temperaure-dry bulb	25 °C	(78 °F)
Relative Humidity	39 %	
Barometer -	98.61 kPa	(29.12 in Hg)

Maximum Temperatures :		
Thermostat housing	92 °C	(197 °F)
Engine oil pan	108 °C	(226 °F)
Fuel at injection pump	48 °C	(119 °F)
Engine air intake	34 °C	(93 °F)
Trans./Hydr. Oil	62 °C	(144 °F)
Turbocharger boost pressure		
at rated speed	100 kPa	(14.5 psi)
at maximum power	93 kPa	(13.5 psi)

2. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST.

Date of test: 17 April 1989
Location: CAE/UNL, Lincoln, Nebr.

2.1 HYDRAULIC POWER TEST - Hydraulic pump performance

i. Sustained pressure with pump stalled	17.44 MPa (2530 psi)
ii. Pump delivery rate @ minimum pressure & rated engine speed	102.2 l/m (27.0 gpm)

iii.

	Flow Rate l/min (gal/min)	Pressure MPa (psi)	Power kW (hp)
At 90% of relief valve setting.	55.3 (14.6)	15.86 (2300)	14.6 (19.6)
At maximum hydraulic power.	97.3 (25.7)	14.48 (2100)	23.5 (31.5)

Tapping point(s)	Two hydraulic outlets combined
Hydraulic fluid temperature	
in oil reservoir	66 °C (151 °F)
at flow meter	63 °C (146 °F)

2.2 POWER LIFT TEST.

		Hitch Points	Frame
Lower hitch points above ground - down position.	[mm/in]	286/11.3	225/8.9
Vertical movement without load	[mm/in]	692/27.2	810/31.9
Vertical movement with load	[mm/in]	551/21.7	666/26.2
Maximum corrected force through full range	[kN/lbf]	28.4/6385	24.5/5504
Corresponding pressure	[kPa/psi]	14479/2100	
Moment about rear axle	[kN.m/ft.lb]	29.7/21923	40.5/29903
Maximum mast tilt angle	[degrees]	--	5.0

Lifting height relative to the horizontal position of lower links

[mm]	-408	-347	-269	-170	-68
[in]	-16.1	-13.7	-10.6	-6.7	-2.7

Corrected lift forces.

hitch points	[kN]	--	28.4	28.9	30.6	31.7
	[lb]	--	6385	6507	6880	7134
at frame	[kN]	28.3	--	27.6	28.1	27.7
	[lb]	6367	--	6195	6310	6236

Lifting height relative to the horizontal position of lower links

[mm]	1	102	204	257
[in]	0	4.0	8.0	10.1

Corrected lift forces.

hitch points	[kN]	32.1	32.2	32.6	--
	[lb]	7207	7248	7329	--
at frame	[kN]	27.0	25.8	--	24.5
	[lb]	6071	5808	--	5504

THREE POINT LIFT PERFORMANCE
(With lift assist cylinder)
(for settings used see p.8)

		Hitch Points	Frame
Lower hitch points above ground - down position.	[mm/in]	293/11.5	232/9.1
Vertical movement without load	[mm/in]	692/27.2	810/31.9
Vertical movement with load	[mm/in]	543/21.4	660/26.0
Maximum corrected force through full range	[kN/lbf]	36.9/8287	32.4/7281
Corresponding pressure	[kPa/psi]	14479/2100	
Moment about rear axle	[kN.m/ft.lb]	38.6/28451	53.6/39558
Maximum mast tilt angle	[degrees]	--	5.3

Lifting height relative to the horizontal position of lower links

[mm]	-401	-340	-264	-162	-60
[in]	-15.8	-13.4	-10.4	-6.4	-2.4
Corrected lift forces.					
hitch points [kN]	--	36.9	38.5	40.6	42.0
hitch points [lb]	--	8287	8663	9137	9440
at frame [kN]	36.9	--	36.7	37.0	36.9
at frame [lb]	8293	--	8251	8325	8284

Lifting height relative to the horizontal position of lower links

[mm]	-2	102	204	260
[in]	-0.1	4.0	8.0	10.2
Corrected lift forces.				
hitch points [kN]	43.1	43.3	43.9	--
hitch points [lb]	9694	9726	9865	--
at frame [kN]	35.8	34.1	--	32.4
at frame [lb]	8046	7667	--	7281

3. DRAWBAR POWER AND FUEL CONSUMPTION (UNBALLASTED TRACTOR)

OECD Drawbar Data (SI)

Date of tests: 18-Apr-89 21-Apr-89 Fuel density: 0.828 kg/l
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg C					Rel hum	Pressure
	kW	kN	km/h	rev/min	%	kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	%	kPa
I. Maximum Power (unballasted, fwa @ 1850 rev/min) Tire pressure: 110 kPa, rear 207 kPa, front Drawbar height: 470 mm														
4th	77.21	62.62	4.44	2243	14.00%	0.320	2.59	48	84	102	9	7	76%	98.61
5th	84.45	63.16	4.81	2126	14.74%	0.308	2.69	48	85	101	9	7	76%	98.61
6th	90.66	56.91	5.73	2083	8.53%	0.284	2.91	48	85	101	9	7	76%	98.61
7th	93.29	52.77	6.36	1975	7.14%	0.273	3.03	47	85	102	9	7	76%	98.61
8th	90.56	46.94	6.95	1848	5.69%	0.278	2.97	47	85	101	9	7	74%	98.61
9th	91.58	40.63	8.11	1852	4.62%	0.274	3.02	47	85	101	9	7	74%	98.61
10th	92.19	35.75	9.28	1852	3.87%	0.271	3.05	48	84	100	9	7	74%	98.61
11th	91.67	30.68	10.76	1852	3.27%	0.274	3.02	48	84	101	9	7	74%	98.61
12th	94.47	28.19	12.06	1851	2.93%	0.266	3.11	48	84	101	9	7	74%	98.61
13th	92.73	22.23	15.02	1849	2.32%	0.272	3.04	48	84	101	9	7	74%	98.61

OECD Drawbar Data (US)

Date of tests: 18-Apr-89 21-Apr-89 Fuel density: 6.912 lb/gal
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg F					Rel hum	Pressure
	hp	mph	mph	rpm	%	lb/hp-hr	hp-hr/gal	Fuel	Coolant	Oil	Dry	Wet	%	in Hg
I. Maximum Power (unballasted, fwa @ 1850 rev/min) Tire pressure: 16 psi, rear 30 psi, front Drawbar height: 18.5 in														
4th	103.53	14078	2.76	2243	14.00%	0.526	13.14	118	183	215	48	45	76%	29.12
5th	113.25	14200	2.99	2126	14.74%	0.506	13.66	119	185	215	48	45	76%	29.12
6th	121.57	12794	3.56	2083	8.53%	0.467	14.79	118	185	215	48	45	76%	29.12
7th	125.11	11864	3.95	1975	7.14%	0.449	15.40	116	185	215	48	45	76%	29.12
8th	121.45	10553	4.32	1848	5.69%	0.458	15.10	117	185	215	48	44	74%	29.12
9th	122.81	9134	5.04	1852	4.62%	0.451	15.33	117	185	215	48	44	74%	29.12
10th	123.62	8037	5.77	1852	3.87%	0.446	15.50	118	184	213	48	44	74%	29.12
11th	122.93	6897	6.68	1852	3.27%	0.451	15.34	119	184	214	48	44	74%	29.12
12th	126.69	6338	7.50	1851	2.93%	0.437	15.80	119	184	214	48	44	74%	29.12
13th	124.35	4998	9.33	1849	2.32%	0.448	15.44	119	184	214	48	44	74%	29.12

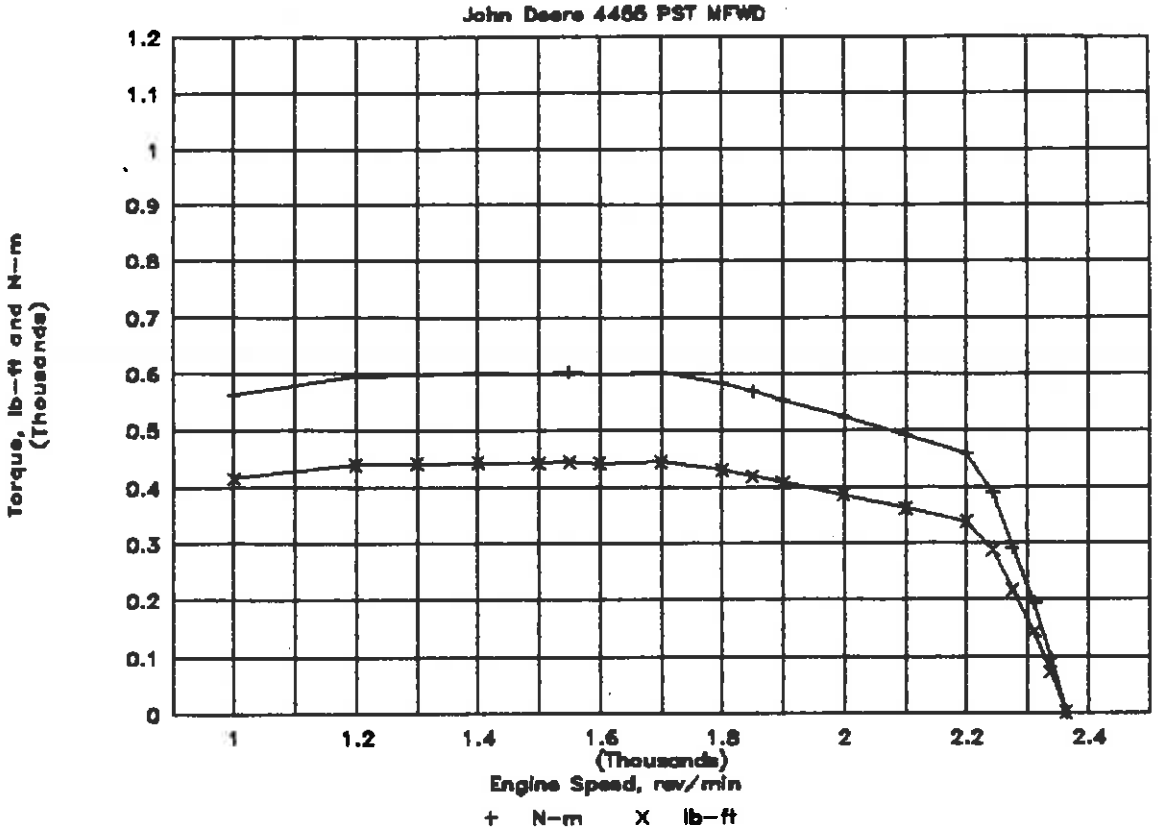
Date of tests: 18-Apr-89 21-Apr-89 Fuel density: 0.828 kg/l
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg C					Rel hum	Pressure
	kW	kN	km/h	rev/min	%	kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	%	kPa
II. Part Loads (unballasted, fwa)								Tire pressure:		110 kPa, rear		207 kPa, front		
								Drawbar height:		470 mm				
II.1 in selected gear at maximum power														
12th	94.47	28.19	12.06	1851	2.93%	0.266	3.11	48	84	101	9	7	74%	98.61
II.1.1 75% of pull at maximum power at rated speed														
12th 75%	70.62	17.09	14.87	2254	1.80%	0.315	2.63	47	85	101	24	16	43%	97.66
II.1.2 50% of pull at maximum power at rated speed														
12th 50%	48.16	11.40	15.21	2291	1.17%	0.371	2.23	46	84	100	25	17	44%	97.66
II.1.3 next higher gear at reduced engine speed, same pull and travel speed as II.1.1														
13th 75%	70.64	17.10	14.87	1821	1.71%	0.290	2.86	46	86	101	24	16	43%	97.66
II.1.4 next higher gear at reduced engine speed, same pull and travel speed as II.1.2														
13th 50%	48.12	11.40	15.20	1850	1.08%	0.330	2.51	46	83	99	27	17	36%	97.66
II.2 in selected gear nearest to 7.5 km/h														
7th	93.29	52.77	6.36	1975	7.14%	0.273	3.03	47	85	102	9	7	76%	98.61
II.2.1 75% of pull at maximum power at rated speed														
7th 75% @	70.54	33.71	7.53	2255	3.70%	0.313	2.65	45	85	101	20	14	51%	97.70
II.2.2 50% of pull at maximum power at rated speed														
7th 50% @	48.49	22.46	7.77	2296	2.32%	0.359	2.31	43	83	101	20	14	51%	97.70
II.2.3 next higher gear at reduced engine speed, same pull and travel speed as II.2.1														
9th 75% @	70.48	33.71	7.53	1702	3.78%	0.284	2.91	44	84	100	20	14	51%	97.70
II.2.4 next higher gear at reduced engine speed, same pull and travel speed as II.2.2														
9th 50% @	48.51	22.47	7.77	1734	2.32%	0.313	2.65	42	83	98	20	14	51%	97.70

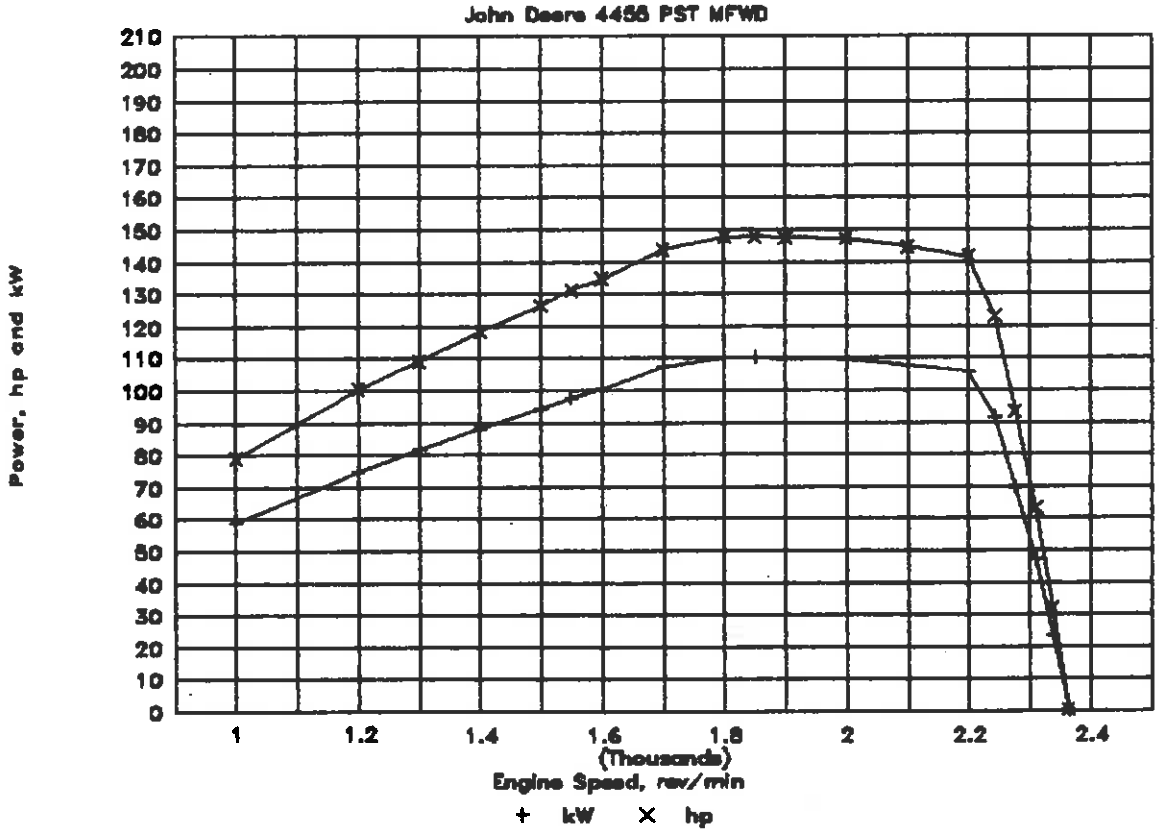
Date of tests: 18-Apr-89 21-Apr-89 Fuel density: 6.912 lb/gal
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg F					Rel hum	Pressure
	hp	mph	mph	rpm	%	lb/hp-hr	hp-hr/gal	Fuel	Coolant	Oil	Dry	Wet	%	in Hg
II. Part Loads (unballasted, fwa) Drawbar height: 18.5 in							Tire pressure:	16 psi, rear			30 psi, front			
II.1 in selected gear at maximum power														
12th	126.69	6338	7.50	1851	2.93%	0.437	15.80	119	184	214	48	44	74%	29.12
II.1.1 75% of pull at maximum power at rated speed														
12th 75%	94.70	3843	9.24	2254	1.80%	0.518	13.33	116	186	213	76	61	43%	28.84
II.1.2 50% of pull at maximum power at rated speed														
12th 50%	64.58	2562	9.45	2291	1.17%	0.611	11.32	114	184	213	77	62	44%	28.84
II.1.3 next higher gear at reduced engine speed, same pull and travel speed as II.1.1														
13th 75%	94.72	3845	9.24	1821	1.71%	0.476	14.51	115	186	213	76	61	43%	28.84
II.1.4 next higher gear at reduced engine speed, same pull and travel speed as II.1.2														
13th 50%	64.53	2563	9.44	1850	1.08%	0.542	12.75	114	182	211	80	62	36%	28.84
II.2 in selected gear nearest to 4.6 mph														
7th	125.11	11864	3.95	1975	7.14%	0.449	15.40	116	185	215	48	45	76%	29.12
II.2.1 75% of pull at maximum power at rated speed														
7th 75% @	94.60	7578	4.68	2255	3.70%	0.514	13.44	113	185	214	68	58	51%	28.85
II.2.2 50% of pull at maximum power at rated speed														
7th 50% @	65.03	5049	4.83	2296	2.32%	0.591	11.70	110	182	213	68	58	51%	28.85
II.2.3 next higher gear at reduced engine speed, same pull and travel speed as II.2.1														
9th 75% @	94.51	7578	4.68	1702	3.78%	0.467	14.79	111	184	212	68	58	51%	28.85
II.2.4 next higher gear at reduced engine speed, same pull and travel speed as II.2.2														
9th 50% @	65.06	5053	4.83	1734	2.32%	0.514	13.45	107	182	209	68	58	51%	28.85

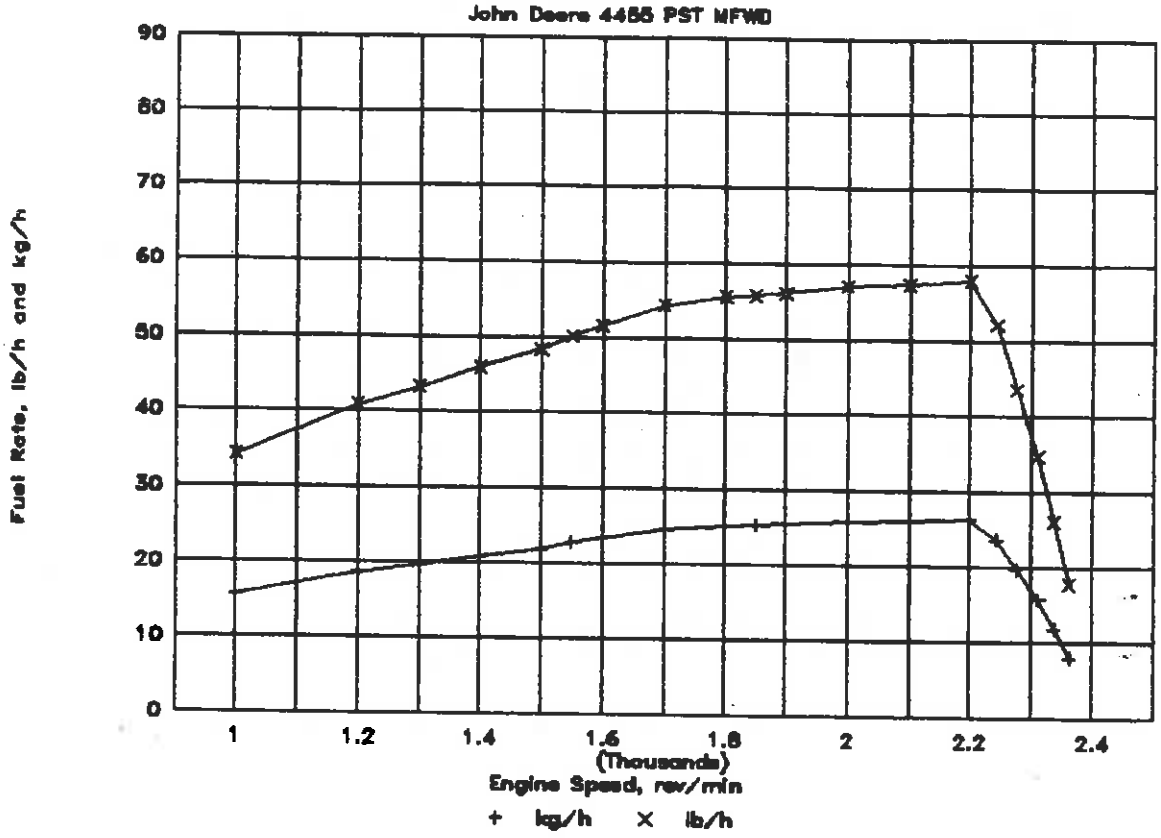
Equivalent Crankshaft Torque



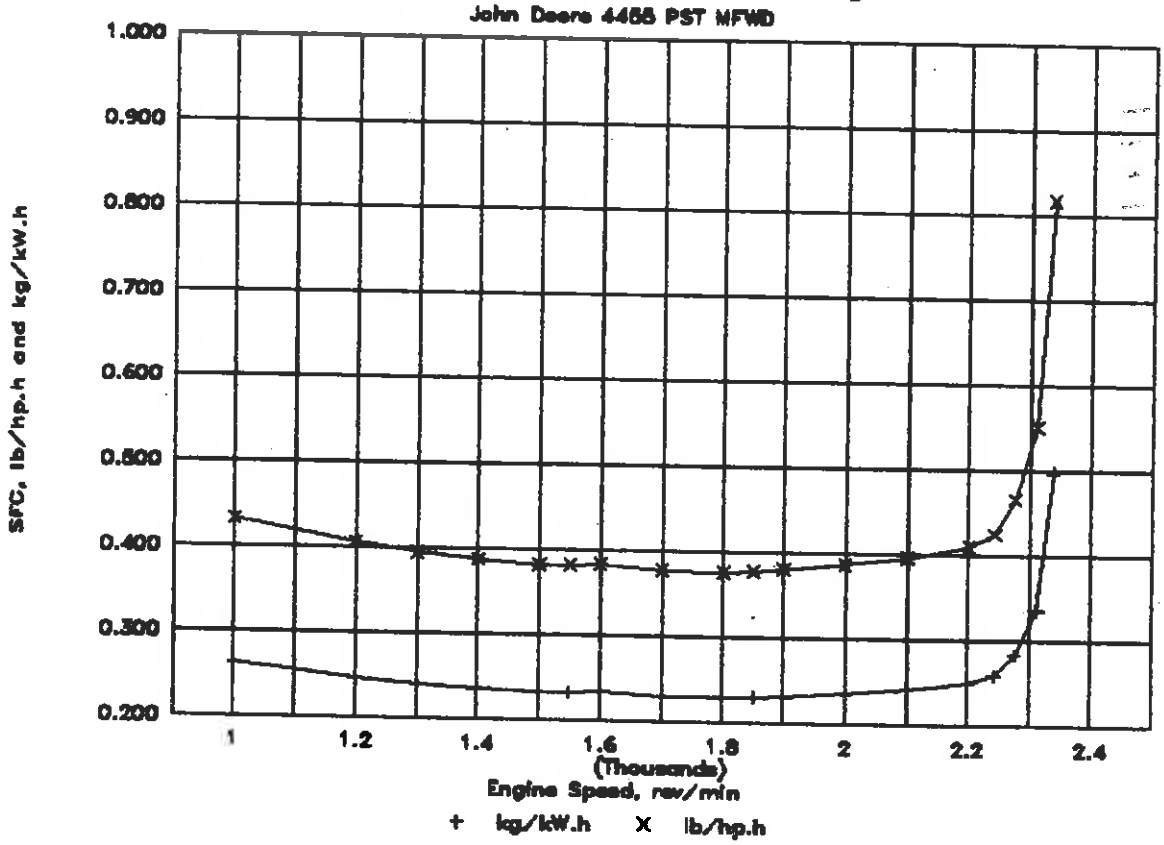
PTO Power



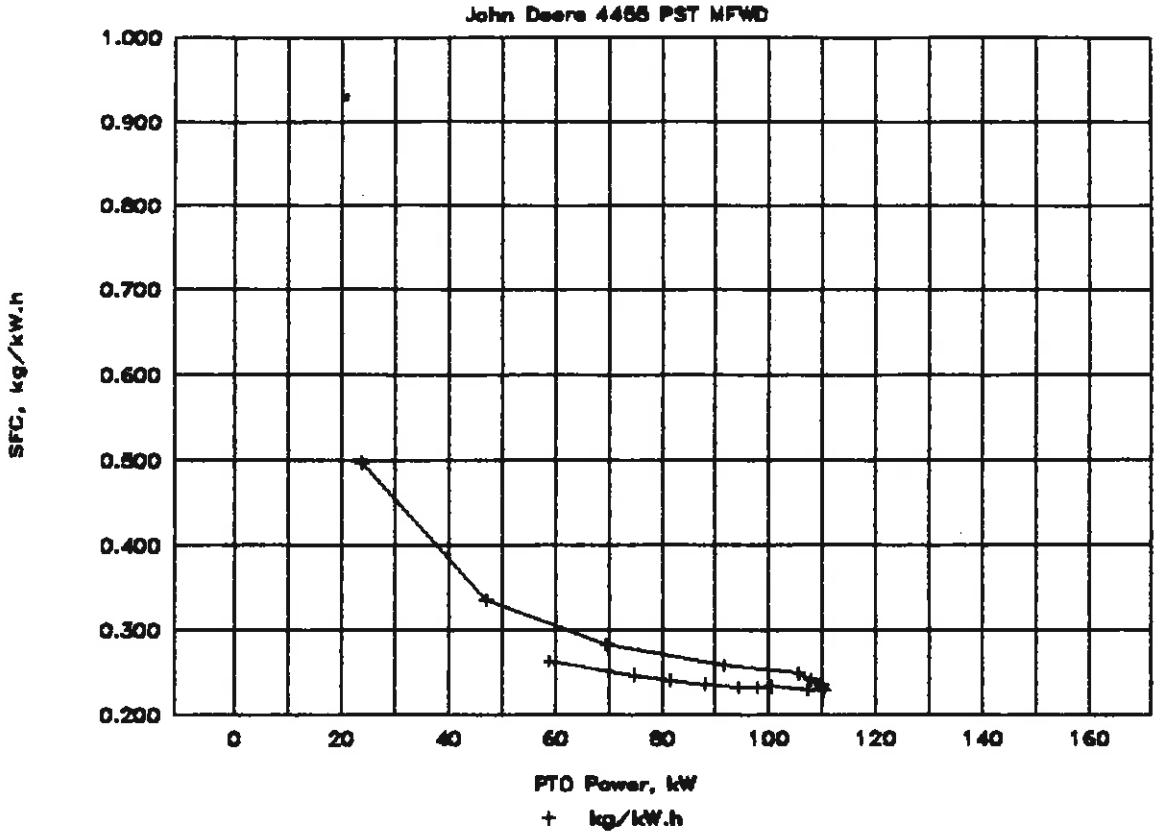
PTO Fuel Consumption



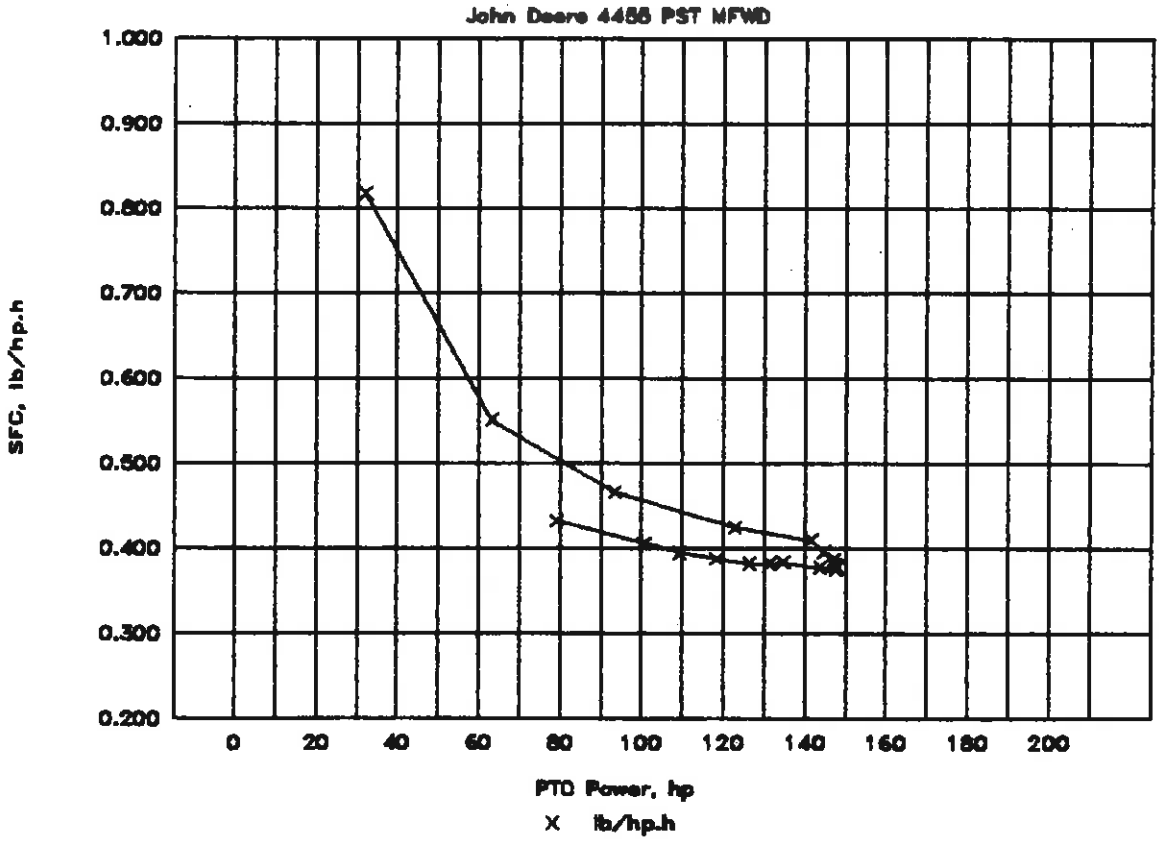
PTO Specific Fuel Consumption



SFC vs PTO Power



SFC vs PTO Power



5. OPTIONAL TESTS.

5.1 MEASUREMENT OF EXTERNAL NOISE LEVEL.

Date of test	:	19 April 1989
Location of test	:	CAE/UNL, Lincoln, Ne.
Sound level meter	:	B & K 2203
Type of track	:	Concrete oval
Gear number	:	15th
Speed prior to acceleration	:	24.9 km/h (15.5 mph)
Sound level	:	87.0 dB(A)

5.2 MAXIMUM POWER AT 1850 REV/MIN (BALLASTED TRACTOR)

OECD Drawbar Data (SI)

Date of tests: 24-Apr-89 25-Apr-89 Fuel density: 0.828 kg/l
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg C				Rel hum	Pressure
	kW	kN	km/h	rev/min	%	kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	%	kPa
Ib. Maximum Power (ballasted, fwa @ 1850) Drawbar height: 470 mm								Tire pressure:			83 kPa, rear (inner) 83 kPa, rear (outer)		207 kPa, front	
2nd	61.82	76.40	2.91	2262	14.73%	0.344	2.41	43	85	102	23	19	59%	96.75
3rd	74.69	77.25	3.48	2233	14.73%	0.334	2.48	47	86	103	22	18	68%	96.75
4th	88.14	68.75	4.62	2176	7.70%	0.297	2.79	47	85	103	22	18	68%	96.75
5th	91.28	67.01	4.90	2001	7.15%	0.282	2.93	48	87	104	22	16	54%	97.26
6th	92.42	63.94	5.20	1851	6.28%	0.276	3.00	47	86	102	20	15	59%	97.26
7th	94.03	55.49	6.10	1854	4.90%	0.269	3.07	47	86	102	18	14	65%	97.26
8th	90.26	45.97	7.07	1851	3.98%	0.281	2.95	47	88	104	23	17	55%	97.26
9th	90.62	39.85	8.19	1851	3.30%	0.281	2.95	47	88	103	24	17	49%	97.26
10th	91.31	35.22	9.33	1852	2.96%	0.277	2.99	47	88	103	24	17	49%	97.26
11th	90.10	30.04	10.80	1850	2.62%	0.280	2.96	47	88	104	26	19	51%	97.29
12th	93.17	27.66	12.13	1854	2.36%	0.273	3.03	47	87	103	27	19	47%	97.29
13th	90.21	21.55	15.07	1852	1.83%	0.278	2.98	47	87	103	29	21	49%	97.29

OECD Drawbar Data (US)

Date of tests: 24-Apr-89 25-Apr-89 Fuel density: 6.912 lb/gal
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg F				Rel hum	Pressure
	hp	lb	mph	rpm	%	lb/hp-hr	hp-hr/gal	Fuel	Coolant	Oil	Dry	Wet	%	in Hg
Ib. Maximum Power (ballasted, fwa @ 1850) Drawbar height: 18.5 in								Tire pressure:			12 psi, rear (inner) 12 psi, rear (outer)		30 psi, front	
2nd	82.90	17176	1.81	2262	14.73%	0.565	12.24	110	185	215	73	66	59%	28.57
3rd	100.17	17366	2.16	2233	14.73%	0.548	12.60	116	186	217	72	65	68%	28.57
4th	118.19	15455	2.87	2176	7.70%	0.488	14.16	116	186	217	71	65	68%	28.57
5th	122.40	15064	3.05	2001	7.15%	0.464	14.90	118	189	219	72	61	54%	28.72
6th	123.94	14374	3.23	1851	6.28%	0.453	15.25	117	187	216	68	59	59%	28.72
7th	126.10	12474	3.79	1854	4.90%	0.443	15.61	116	187	216	65	57	65%	28.72
8th	121.04	10335	4.39	1851	3.98%	0.462	14.97	117	190	219	74	62	55%	28.72
9th	121.52	8959	5.09	1851	3.30%	0.462	14.96	116	190	218	76	63	49%	28.72
10th	122.44	7918	5.80	1852	2.96%	0.455	15.19	117	190	218	76	63	49%	28.72
11th	120.82	6753	6.71	1850	2.62%	0.460	15.02	117	190	219	79	66	51%	28.73
12th	124.94	6219	7.53	1854	2.36%	0.449	15.40	117	189	218	80	67	47%	28.73
13th	120.97	4846	9.36	1852	1.83%	0.458	15.10	117	189	218	85	69	49%	28.73

MAXIMUM POWER AT 2200 REV/MIN (BALLASTED TRACTOR)

OECD Drawbar Data (SI)

Date of tests: 24-Apr-89 25-Apr-89 Fuel density: 0.828 kg/l
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg C					Rel hum	Pressure
	kW	kN	km/h	rev/min	%	kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	%	kPa
Ic. Maximum Power (ballasted, fwa @ 2200) Drawbar height: 470 mm								Tire pressure: 83 kPa, rear (inner) 83 kPa, rear (outer)			207 kPa, front			
3rd	75.19	77.60	3.49	2233	14.53%	0.333	2.48	47	86	102	22	18	68%	96.75
4th	88.06	67.69	4.68	2198	7.31%	0.297	2.79	47	85	103	22	18	68%	96.75
5th	90.24	59.10	5.50	2200	5.47%	0.291	2.85	47	86	103	21	16	60%	97.26
6th	91.56	52.31	6.30	2200	4.56%	0.287	2.89	48	86	103	19	14	58%	97.26
7th	92.26	45.36	7.32	2200	3.81%	0.285	2.91	47	85	103	18	14	65%	97.26
8th	88.43	37.60	8.47	2200	3.13%	0.298	2.78	47	87	104	24	17	49%	97.26
9th	88.32	32.47	9.79	2200	2.70%	0.297	2.79	47	88	104	24	17	49%	97.26
10th	88.09	28.44	11.15	2200	2.44%	0.296	2.80	47	87	104	24	17	49%	97.26
11th	87.06	24.31	12.89	2199	2.09%	0.297	2.78	47	88	104	26	19	51%	97.29
12th	89.23	22.26	14.43	2196	1.83%	0.291	2.84	47	88	104	28	20	48%	97.29

OECD Drawbar Data (US)

Date of tests: 24-Apr-89 25-Apr-89 Fuel density: 6.912 lb/gal
Type of track: Concrete Test # 1619

Gear	Power	Pull	Speed	Engine Speed	Slip	SFC		Temperature, deg F					Rel hum	Pressure
	hp	lb	mph	rpm	%	lb/hp-hr	hp-hr/gal	Fuel	Coolant	Oil	Dry	Wet	%	in Hg
Ic. Maximum Power (ballasted, fwa @ 2200) Drawbar height: 18.5 in								Tire pressure: 12 psi, rear (inner) 12 psi, rear (outer)			30 psi, front			
3rd	100.83	17446	2.17	2233	14.53%	0.548	12.61	116	186	216	71	65	68%	28.57
4th	118.09	15218	2.91	2198	7.31%	0.488	14.17	117	186	217	71	65	68%	28.57
5th	121.02	13287	3.42	2200	5.47%	0.478	14.45	117	187	218	70	60	60%	28.72
6th	122.79	11759	3.92	2200	4.56%	0.471	14.66	118	187	217	66	58	58%	28.72
7th	123.72	10198	4.55	2200	3.81%	0.468	14.77	116	186	217	65	57	65%	28.72
8th	118.59	8454	5.26	2200	3.13%	0.490	14.12	117	189	219	76	63	49%	28.72
9th	118.44	7299	6.09	2200	2.70%	0.488	14.15	117	190	220	76	63	49%	28.72
10th	118.12	6394	6.93	2200	2.44%	0.486	14.22	117	189	220	76	63	49%	28.72
11th	116.75	5466	8.01	2199	2.09%	0.489	14.13	117	190	220	79	66	51%	28.73
12th	119.65	5005	8.97	2196	1.83%	0.479	14.44	117	190	219	82	68	48%	28.73

5.3 POWER LIFT TEST

*Linkage geometry dimensions.
(Tractor equipped with Walterscheid lower link ends)

		Dimension or range [mm]	Dimension or range [in]	Settings used on test [mm]	Settings used on test [in]
Lift category		II			
Rear Tire - Radius Index	(r)	892	35.1		
Front Tire - Radius Index	(r')	684	26.9		
Length of lift arms	(A)	292	11.5	same	
Length of lower links	(B)	1022	40.2	same	
Distance of lift arm pivot from: horizontal	(a)	70	2.8	same	
rear wheel axis: vertical	(b)	278	10.9	same	
Horizontal distance between the 2 lower link points	(u)	427	16.8	same	
Horizontal distance between the 2 lift arm end points	(v)	583	23.0	same	
Length of upper link	(S)	665 to 850	26.2 to 33.5	752	29.6
Distance of upper link pivot from: horizontal	(c)	380 367	15.0 14.4	 367	 14.4
rear wheel axis: vertical top	(d)	380	15.0		
middle		216	8.5		
bottom		155	6.1	155	6.1
Distance of lower link pivot from: horizontal	(e)	144	4.5	same	
rear wheel axis: vertical	(f)	259	10.2	same	
Distance of lower link pivot points to lift rod pivot pts on lower links	(D)	587	23.1	same	
Length of lift rods	(L)	775 to 845	30.5 to 33.3	814	32.1
Height of lower hitch points relative to rear wheel axis In low position	(h)	638 to 478	25.1 to 18.8	621	24.5
In high position	(H)	48 to 165	1.9 to 6.5	116	4.6
Height above ground of lower hitch points when locked in transport position.		937 to 1057	36.9 to 41.6	1007	39.7

*Assuming (r) with a dynamic tire index of 892 mm (35.1 in)
ISO 4251/1-1984

THREE POINT LIFT PERFORMANCE
(Upper link in bottom hole on tractor)
(Tractor equipped with 2 lift assist cylinders)

		Hitch point	Frame
Lower hitch points above ground - down position.	[mm/in]	331/13.0	238/9.4
Vertical movement			
without load	[mm/in]	737/29.0	866/34.1
with load	[mm/in]	683/26.9	783/30.8
Maximum corrected force through full range	[kN/lbf]	45.9/10325	37.8/8498
Corresponding pressure	[kPa/psi]	14479/2100	
Moment about rear axle	[kN.m/ft.lb]	52.1/38459	66.0/48652
Maximum mast tilt angle	[degrees]	--	7.7

Lifting height relative to the horizontal position of lower links

[mm]		-395	-302	-201	-99	0
[in]		-15.6	-11.9	-7.9	-3.9	0
Corrected lift forces.						
hitch points	[kN]	--	45.9	47.5	49.8	51.2
	[lb]	--	10325	10686	11197	11517
at frame	[kN]	43.1	43.2	43.8	43.8	42.9
	[lb]	9691	9708	9856	9839	9650

Lifting height relative to the horizontal position of lower links

[mm]		102	203	305	381	387
[in]		4.0	8.0	12.0	15.0	15.3
Corrected lift forces.						
hitch points	[kN]	51.9	52.5	53.0	53.4	--
	[lb]	11665	11797	11904	12011	--
at frame	[kN]	41.4	39.8	--	--	37.8
	[lb]	9313	8951	--	--	8498

THREE POINT LIFT PERFORMANCE
(Upper link in top hole on tractor)
(Tractor equipped with 2 lift assist cylinders)
(for settings used see p.28)

		Hitch point	Frame
Lower hitch points above ground - down position.	[mm/in]	331/13.0	401/15.8
Vertical movement without load	[mm/in]	735/28.9	610/24.0
Vertical movement with load	[mm/in]	683/26.9	419/16.5
Maximum corrected force through full range	[kN/lbf]	45.9/10325	53.5/12027
Corresponding pressure	[kPa/psi]	14479/2100	
Moment about rear axle	[kN.m/ft.lb]	52.1/38459	93.4/68857
Maximum mast tilt angle	[degrees]	--	5.3*

*Tilt angle of mast from vertical position to uppermost position - 1.7°negative

Lifting height relative to the horizontal position of lower links

[mm]	-302	-232	-99	0	
[in]	-11.9	-9.2	-3.9	0	
Corrected lift forces.					
hitch points [kN]	45.9	47.5	49.8	51.2	
hitch points [lb]	10325	10686	11197	11517	
at frame [kN]	--	65.8	58.6	56.5	
at frame [lb]	--	14783	13179	12694	

Lifting height relative to the horizontal position of lower links

[mm]	102	187	203	305	381
[in]	4.0	7.4	8.0	12.0	15.0
Corrected lift forces.					
hitch points [kN]	51.9	--	52.5	53.0	53.4
hitch points [lb]	11665	--	11797	11904	12011
at frame [kN]	54.2	53.5	--	--	--
at frame [lb]	12192	12027	--	--	--

Repairs: None
Remarks: None