OECD APPROVAL NO. 2/2 039
CODE 2
DATE OF APPROVAL: 5 February 2003

NEBRASKA TRACTOR TEST LABORATORY
DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF NEBRASKA - EAST CAMPUS
LINCOLN, NEBRASKA 68583-0832, USA

REPORT ON TEST IN ACCORDANCE WITH OECD STANDARD CODE 2 FOR THE OFFICIAL TESTING OF AGRICULTURAL TRACTORS



JOHN DEERE 9320
Powershift
Articulated 4 Wheel Drive with Dual Wheels

MANUFACTURED BY:	John Deere Tractor Works 3500 East Donald Street P.O. Box 270 Waterloo, Iowa 50704-0270
NEBRASKA TEST NO.	1803
TEST DATES:	April 9 – May 31, 2002

TABLE OF CONTENTS

Page

1. **SPECIFICATIONS** 1

2. **TEST CONDITIONS** 16

3. **COMPULSORY TESTS**
   - **3.1** Main Power Take-Off Performance 19
   - **3.2** Hydraulic Power and Lifting Forces 20
   - **3.3** Drawbar Performance 22

4. **OPTIONAL TESTS**
   - **4.1** Drawbar Power (Unballasted – 2100 rev/min) 23
   - **4.2** Power Lift Test (Category IV) 24
   - **4.3** Measurement of External Noise Level 25
   - **4.4** Measurement of Noise Level at Operator's Ear 25

5. **REPAIRS** 25

6. **REMARKS** 25

7. **PTO PERFORMANCE CURVES** 26

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, Code 2.

This report has been approved by the OECD Coordinating Centre in Paris on 5 February 2003 for the John Deere 9320 Powershift, articulated four-wheel drive tractor with OECD Number 2/2 039.

No reproduction of this report or any part of it can be made without prior approval by the Nebraska Tractor Test Laboratory, Lincoln, Nebraska USA.

Dr. Leonard L. Bashford, Director
Nebraska Tractor Test Laboratory and
Chair, Nebraska Tractor Test Board

David L. Morgan, Assistant Director
Nebraska Tractor Test Laboratory

Brent T. Sampson, Test Engineer
Nebraska Tractor Test Laboratory

Date: MAR 2 1 2003

SPECIMEN TEST REPORT

Note: Units shown below, which appear in ISO 1000:1992, shall be stated and followed by national units in parentheses, if necessary.

- Tractor manufacturer's name and address:	John Deere Tractor Works 3500 East Donald St. P.O. Box 270 Waterloo, IA 50704-0270
- Location of tractor assembly:	Same
- Submitted for test by:	The Manufacturer
- Selected for test by:	The Manufacturer in agreement with the Nebraska Tractor Test Laboratory
- Place of running-in:	John Deere Product Engineering Center, Waterloo, Iowa
- Duration of running-in:	138 hours
- Location of test:	Nebraska Tractor Test Laboratory, Lincoln, Nebraska U.S.A.

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

1.1.1 Make of the tractor:	John Deere
- Model:	9320
- Type:	Articulated frame, four-wheel drive
- Number of driving wheels:	4; 8; 12
1.1.2 *Numbers*	
- 1st Serial N :	CONFIDENTIAL
- Serial N :	RW9320P001054
1.1.3 *Other specifications:*	
- Transmission type	Powershift

1.2 Engine

- Make:	John Deere
- Model:	6125HRW13
- Type:	4-stroke diesel; direct injection; turbocharged; air-to-air aftercooled
- Serial N:	RG6125H031928
1.2.1 *Cylinders*	
- Number/disposition:	6, in-line, vertical
- Bore/stroke:	127 mm/ 165 mm
- Capacity:	12536 cm^3
- Compression ratio:	17.0:1
- Arrangement of valves:	Overhead
- Cylinder liners (wet or dry):	Wet; replaceable

1.2.2 *Supercharging*

-Make:	Borg Warner
- Model:	RE506332
- Type:	Exhaust Driven
-Pressure:	147 kPa at rated engine speed and full load

1.2.3 *Fuel system*

-Fuel feed system:	Engine Driven Transfer pump
-Type of fuel filter(s):	Multi-layer-water-separating
-Make:	Haldex - Barnes
-Model:	RE508282
-Capacity of fuel tank:	1022 dm^3
-Type of injection pump:	Unit Injector (with John Deere Focus controller); EUI, electronic
-Make:	Parker
-Model:	Delphi EUI 200
-Serial N:	NA
-Manufacturer's production setting of injection pump	
· Flow rate (rated engine speed and full load):	71.15 ± 3.50 dm^3/h
· Timing:	Variable
-Type of injectors:	Unit Injector
-Make:	EUI Delphi
-Model:	RE505430
-Injection pressure:	170 Mpa
-Type of carburetor:	NA
-Make:	NA
-Model:	NA

1.2.4 *Governor*

- Make:	John Deere
- Model:	Focus
- Type:	Electronic Control
- Governed range of engine speed	900 rpm to 2255 rpm
- Rated engine speed:	2100 min^{-1}(rev/min)

1.2.5 *Air cleaner*

-Pre-cleaner	
· Make:	Donaldson
· Model:	RE63932
· Type:	Strato-tube pre-cleaner with aspirator
·Location of air intake:	Top of Air Stack, right front corner of cab
-Main cleaner	
· Make:	Donaldson
· Model:	RE63931
· Type:	Pleated Paper

·Location of air intake (in case of no pre cleaner):	Right Front
-Maintenance indicator:	Dash mounted warning light and audible signal

1.2.6 *Lubrication system*

- Type of feed pump:	Full pressure; positive displacement
- Type of filter(s):	Full flow
- Number of filters:	One; top load
- Oil Cooler:	Heat exchanger with engine coolant

1.2.7 *Cooling system*

- Type of coolant:	Liquid
- Type of pump:	Centrifugal, Gear-driven
- Specification of fan or blower	Belt driven; suction type; variable speed
· Number of fan blades:	8
· Fan diameter:	711 mm
- Coolant capacity:	60 dm^3
- Type of temperature control:	2 thermostats and variable speed fan
- Superpressure system:	69 ± 5 kPa

1.2.8 *Starting system*

- Make:	Delco-Remy
- Model:	RE61547
- Type:	Solenoid engaged
- Starter motor power rating:	6.9 kW
- Cold starting aid:	Ether spray in intake manifold
- Safety device:	Electrical lockout on gearshift lever

1.2.9 *Electrical system*

- Voltage:	12 V DC; neg ground
- Generator	
· Make:	Nippondenso
· Model	RE46608
· Type:	Belt-driven
· Power:	1.9 kW
- Battery of accumulators	
· Number:	Three; 12-volt batteries in parallel
· Rating	925 cold crank amp/battery, 175 Ah/battery at 20 hour rating

1.2.10 *Exhaust system*

- Make:	Nelson (muffler)
- Model:	RE71295
- Type:	Expansion Chamber
- Location:	Vertical muffler, right front corner of cab

1.3 Transmission

1.3.1 *Clutch (travel and power take-off/travel alone)*

- Make:	John Deere
- Model:	Multiple Plate
- Type:	Oil Cooled
- Number of plates:	7
- Diameter of plates:	279 mm
- Method of operation:	Hydraulic, pedal actuated

1.3.2 *Gear box*

- Make:	John Deere
- Model:	Full Powershift
- Type:	Mechanical
- Description:	Countershaft design consisting of 8 multi-disk hydraulically cooled clutches and multi-disk hydraulically cooled planetary brake.

	Forward	Reverse
Number of gears	18	6
Number of ranges/groups	NA	NA
Total of arrangements	18	6

Available Options

- Make: John Deere
- Model: 24 spd PowrSync
- Type: Mechanical
- Description: Countershaft design consisting of one 3-speed gearbox with 4 synchronized ranges and one two-speed planetary gearset with multiple wet discs.

	Forward	Reverse
Number of gears	3	1
Number of ranges/groups	4/2 (Lo & Hi)	3/2 (Lo & Hi)
Total of arrangements	24	6

- Make: John Deere
- Model: 12-speed Syncro
- Type: Mechanical
- Description: Countershaft design consisting of one 3-speed gearbox with 4 synchronized ranges.

	Forward	Reverse
Number of gears	3	1
Number of ranges/groups	4	3
Total of arrangements	12	3

1.3.3 *Rear axle and final drives*

- Make: John Deere
- Model: NA
- Type: Spiral bevel gear and pinion, differential and inboard planetary reduction

- Differential lock
  - Type: Electro/Hydraulic
  - Method of engagement: Foot operated switch
  - Method of disengagement: Self-disengaging w/ brake operation;

1.3.4 *Front axle and final drives*

- Make: John Deere
- Model: NA
- Type: Spiral bevel gear and pinion, differential and inboard planetary reduction

- Differential lock
  - Type: Limited slip
  - Method of engagement: Self-engaging
  - Method of disengagement: Self-disengaging

1.3.5 *Total ratios and traveling speeds*

GearNo.	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed (*) at rated engine speed of 2100 min-1 (rev/min) km/h
1	192.5600	3.92
2	156.4343	4.83
3	141.2714	5.35
4	126.5228	5.98
5	114.7985	6.59
6	102.7842	7.36
7	92.8414	8.15
8	83.1471	9.09
9	75.4414	10.02
10	67.5700	11.19
11	61.0242	12.39
12	55.2242	13.69
13	49.5900	15.24
14	44.8671	16.85
15	36.2914	20.83
16	29.4971	25.63
17	23.8628	31.69
18	19.3885	39.00
1R	192.5600	3.92
2R	141.2714	5.35
3R	126.5228	5.98
4R	92.8414	8.15
5R	83.1471	9.09
6R	61.0242	12.39
	Tire Rolling Radius	955 mm

- Number of revolutions of front wheels for one revolution of rear-wheels: 1.000

1.4 Power take-off (Optional; Installed on tested machine)

1.4.1 *Main power take-off*

-Type (independent, semi-independent or not independent):	Independent
-Method of engagement (if necessary describe the type of clutch):	Electro-Hydraulically actuated multi-plate wet clutch operated by single hand control switch
-Number of shafts:	One, 1000RPM only
-Method of changing power take-off shaft ends and speeds:	None

1.4.1.1 Power take-off proportional to engine speed

Power take-off at 1000 min^{-1} (rev/min)

-Location:	Rear of tractor, center plane
-Diameter of power take-off shaft end:	44.5 mm
-Number of splines:	20; in conformity with ISO 500:1991
-Height above ground:	817 mm
-Distance from the median plane of the tractor:	0 mm
-Distance behind rear-wheel axis:	760 mm
-PTO speed at rated engine speed (2100 rev/min):	1108 min^{-1} (rev/min)
-Engine speed at standard power take-off speed:	1895 min^{-1} (rev/min)
-Ratio of rotation speeds (engine speed/p.t.o. speed):	1.895:1
-Power restriction:	Maximum power available
-Maximum torque transmissible:	Maximum torque available
-Direction of rotation (viewed from behind tractor):	Clockwise

1.4.1.2 Power take-off proportional to ground speed — Not Available

1.5 Hydraulic power lift

- Make:	John Deere
- Model:	NA
- Type:	Electro-Hydraulic lower link sensing; variable mix of draft and position control; adjustable rate of drop
-Type of hydraulic system:	Closed center, pressure and flow compensated
-Type and number of cylinders (single or double-acting):	2 external/ single acting Category III: Two; 90 x 276 Category IV: One 90 x 276 mm and one 100 x 276 mm
-Type of linkage lock for transport:	Electro-hydraulic
-Relief valve pressure setting (tolerance):	20.20 ± 0.40 Mpa
-Opening pressure of cylinder safety valve (if fitted):	23.25 ± 0.50 Mpa
-Lift pump type:	Axial piston, variable pressure and flow; Pressure and flow compensated
-Transmission between pump and engine:	Direct drive from transmission
-Type and number of filters:	Spin-on canister/ one
-Site of oil reservoir:	Under hood; engine compartment
-Type, number and location of tapping points:	4 pairs of ISO standard couplings at rear of tractor; 5th coupler optional. Additional inlet/outlet pair for externally controlled implements
-Maximum volume of oil available to external cylinders:	31.81 dm^3

1.6 Three point linkage

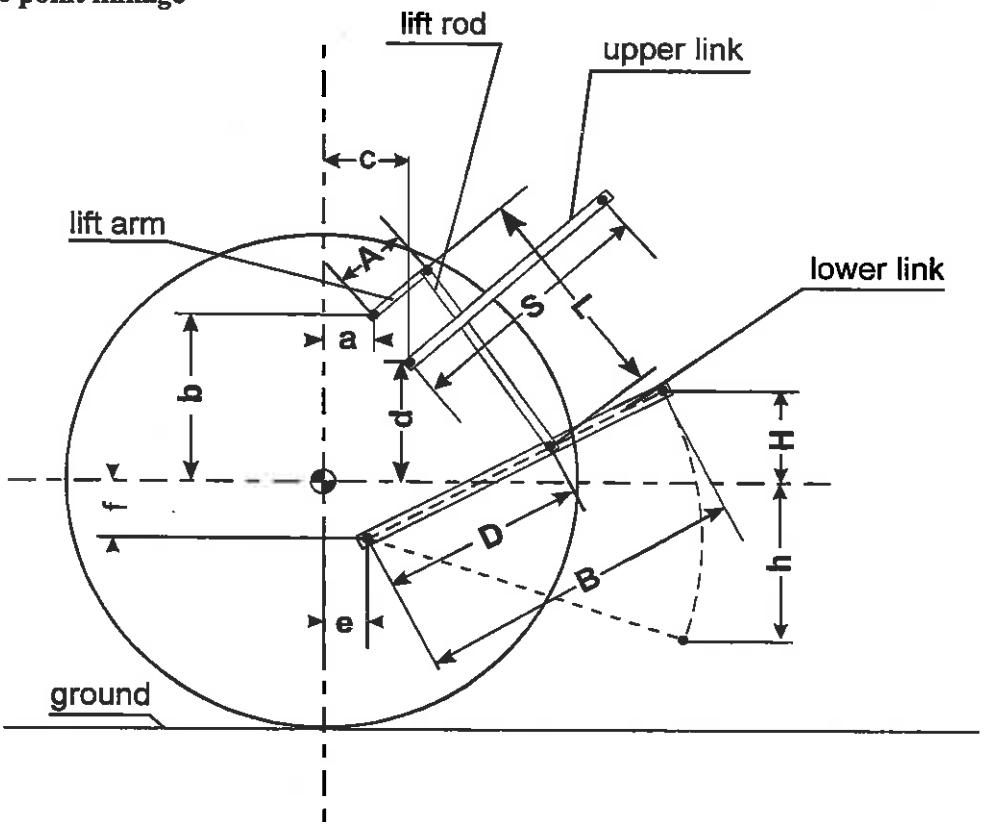


Figure 2.1
Lift test - Linkage Geometry

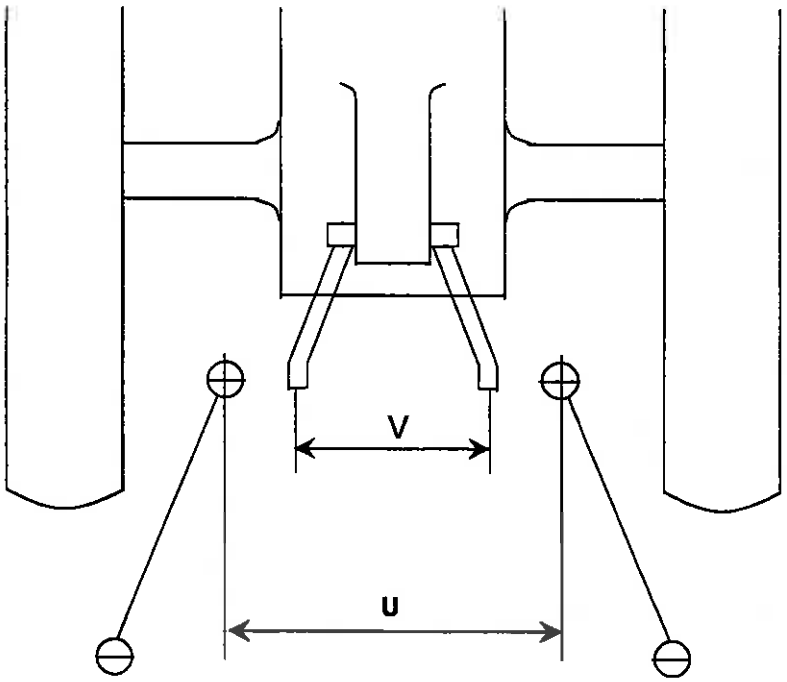


Figure 2.2
Lift test - Linkage Geometry

1.6.1 Three point linkage (Optional – not fitted on the tested tractor)

- Category: 3, in conformity with ISO 730-1:1994 +Cor. 1:1995 and ISO 730-2:1979.
- Category adapter: -Quick attaching coupler

		Dimension or range	Settings used in test
		mm	mm
Lift category:		3	3
Rear Tire – Radius Index:	(r)	955	905
Front Tire – Radius Index:	(r')	955	905
Length of lift arms:	(A)	472	same
Length of lower links:	(B)	1117	same
Distance of lift arm pivot point from rear-wheel axis:			
- horizontally	(a)	244	same
- vertically	(b)	620	same
Horizontal distance between the 2 lower link points:	(u)	640	same
Horizontal distance between the 2 lift arm end points:	(v)	750	same
Length of upper link:	(S)	705 to 825	781
Distance of upper link pivot point from rear wheel axis:			
- horizontally	(c)	577	same
- vertically	(d)	288	same
Distance of lower link pivot point from rear wheel axis:			
- horizontally	(e)	288	same
- vertically	(f)	350	same
Distance of lower link pivot points to lift rod pivot points on lower links:	(D)	731	same
Length of lift rods:	(L)	1030 to 1150	1121
Height of lower hitch points relative to the rear-wheel axis:			
- in low position	(h)	521 to 724	676
- in high position	(H)	89 to 284	118
Height above ground of lower hitch points when locked in transport position (*)		1005 to 1201	1022
(*) Assuming r = 905 mm tyre dynamic radius index (pneumatic tyred tractors only)			

1.6.2 Three point linkage (Optional – not fitted on the tested tractor)

- Category: 4, in conformity with ISO 730-1:1994 +Cor. 1:1995 and ISO 730-2:1979.
- Category adapter: -Quick attaching coupler

		Dimension or range	Settings used in test
		mm	mm
Lift category:		4	4
Rear Tire – Radius Index:	(r)	955	905
Front Tire – Radius Index:	(r')	955	905
Length of lift arms:	(A)	472	same
Length of lower links:	(B)	1097	same
Distance of lift arm pivot point from rear-wheel axis:			
- horizontally	(a)	244	same
- vertically	(b)	620	same
Horizontal distance between the 2 lower link points:	(u)	640	same
Horizontal distance between the 2 lift arm end points:	(v)	750	same
Length of upper link:	(S)	705 to 825	770
Distance of upper link pivot point from rear wheel axis:			
- horizontally	(c)	577	same
- vertically	(d)	288	same
Distance of lower link pivot point from rear wheel axis:			
- horizontally	(e)	288	same
- vertically	(f)	350	same
Distance of lower link pivot points to lift rod pivot points on lower links:	(D)	718	same
Length of lift rods:	(L)	1030 to 1150	1124
Height of lower hitch points relative to the rear-wheel axis:			
- in low position	(h)	521 to 724	669
- in high position	(H)	89 to 284	118
Height above ground of lower hitch points when locked in transport position (*)		1005 to 1201	1023
(*) Assuming r = 905 mm tyre dynamic radius index (pneumatic tyred tractors only)			

1.7 Swinging drawbar

-Type:	Oscillating
-Height above ground	
· Maximum:	489 mm
· Minimum:	464 mm
-Type of adjustment:	Invert drawbar; removable clevis
-Distance of hitch point from rear-wheel axis, horizontally:	1268 mm
-Distance of hitch point from power take-off shaft end	
· Vertically:	300 mm
· Horizontally:	508 mm
-Lateral adjustment (centre of clevis)	
· Right hand	200 mm
· Left hand	200 mm
-Distance of pivot point from rear-wheel axis, horizontally:	585 mm
-Diameter of drawbar pin hole:	52.5 mm
-Maximum vertical permissible load:	20 kN

1.8 Trailer hitch

Not available

1.9 Holed drawbar

Not available

1.10 Steering

- Make: Eaton
- Model: RE61112
- Type: Hydrostatic
- Method of operation: Steering wheel
  - Pump(s): Same as main hydraulic pump
  - Ram(s): Two external; double acting
- Working pressure: 18.4 ± 0.4 Mpa

1.11 Brakes

1.11.1 *Service brake*

- Make: Vickers-John Deere
- Model: RE175393
- Type: Load sensing power with manual backup
- Method of operation: Hydraulic oil immersed disc operated by one pedal
- Trailer braking take-off (hydraulic or air brake): Not available

1.11.2 *Parking brake*

- Type: PST--Spring applied, Hydraulic release; MST—Transmission Lock
- Method of operation: Gear selector lever

1.12 Wheels

- Number
  - Front: 2; 4; 6 driving and steering
  - Rear: 2; 4; 6 driving and steering
- Wheelbase: 3500 mm

- Track width adjustment:

	Minimum	Maximum	Adjustment
	mm	mm	method
Inner wheels	1690	2060	Rack axle, reversing wheels and offset rims
Outer wheels	3240	3615	Same as inner wheels

1.13 Protective structure

- Make:	John Deere
- Model:	SG-079
- Type:	Sound-Gard body
- Manufacturer's name and address:	John Deere Tractor Works Waterloo, Iowa, USA
- Protective device	
· Cab/frame/ rollguard/ other:	Cab
· Tiltable/not tiltable:	Not tiltable
- OECD approval	
· Approval number:	4/0 717
· Date of approval:	4 April 2002
· Nos. of minor modification certificates, if any:	None

1.14 Seat

1.14.1 *Driver's seat*

- Make:	John Deere
- Model:	Comfort Command
- Type:	Air Cushion Suspension
- Seat and steering wheel reversible: Yes/No	No
- Type of suspension:	Air
- Type of damping:	Adjustable, viscous damping
- Range of adjustment	
· Longitudinally:	178 mm
· Vertically	172 mm
- Safety belt Yes/No	Yes

1.14.2 *Optional driver's seat(s)*

- Make:	John Deere
- Model:	John Deere Active Seat ™
- Type of suspension:	Air/Hydraulic
- Type of damping:	Active Position Control
- Range of adjustment	
· Longitudinally:	178 mm
· Vertically:	172 mm travel; 92 mm adjustment range

1.14.3 *Instructional seat*

- Location:	Optional Instructional Seat located left of drivers seat
- Capacity (number):	One

1.15 Lighting

	Height above ground of centre	Size	Distance from outside edge of lights to median plane of tractor
	mm	mm	mm
Headlights			
Outside	2185	135 x 90	445
Inside	2185	155 x 115	270
Center	2185	130 x 85	65
Sidelights			
Front	3480	160 x 110	955
Rear	3480	160 x 110	955
Rear lights			
Outside	2050	160 x 110	980
Inside	2050	160 x 110	785
Hazard Lights			
Roof Front	3380	82 x 240(*)	715
Roof Rear	3340	82 x 240(*)	715
Extremity Lights		110 dia	
Tail lights	1855	210 x 95	900

(*) Wrap-around lights

2. TEST CONDITIONS

Separate tables may be added to report other test conditions or equipments.

2.1 Overall dimensions

	Length	Width		Height at top of	
		minimum	maximum	protective structure	exhaust pipe
	mm	mm	mm	mm	mm
Unballasted	7315	3860	4235	3530	3896
Ballasted	NA	NA	NA	NA	NA

2.2 Ground clearance (unballasted tractor): 315 mm

- Clearance-limiting part: Drawbar rear support

2.3 Tractor mass

Mass (with cab, full fuel tank):

	Without driver	With driver
	kg	kg
Unballasted		
Front	9730	9775
Rear	6858	6888
Total	16588	16663

2.5 Tyres and track width specifications

	Front	Rear
Tyres:	Goodyear	Goodyear
- dimensions	620/70R46	620/70R46
- load index	162	162
- type	Radial DT – 820	Radial DT - 820
- maximum load (tyre manufacturer's)	4750 kg/tire	4750 kg/tire
- maximum load (tractor manufacturer's)	4750 kg/tire	4750 kg/tire
- inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
- dynamic radius index	955 mm	955 mm
Chosen track width with dual wheels: inner	2020 mm	2020 mm
outer	3580 mm	3580 mm

2.6 Fuel

-Type: No. 2 diesel in conformity with national standard
-Density at 15°C: 0.844 g/cm^3

2.7 Oils and lubricants

2.7.1 *Capacity and change interval*

	Capacity	Oil change	Filter change
	dm3	h	h
Engine	42	250 (375 with John Deere PLUS-50 oil and John Deere filter)	250
Transmission with front axle and rear axle	174 (PST) 134 (12/24spd)	1500	750
Hydraulic system combined and steering system	102	1500	750

2.7.2 *Specifications (SAE, API, CCMC, ACEA, Mil.L, ISO)*

	Recommended	Used during test
Engine oil · Type: · Viscosity: · Classification:	John Deere; Torq-Gard Supreme, PLUS-50 SAE 15W40 or 10W-40 12.5 - 16.3 cSt @ 100 C API CF-4; CH-4; ACEA E2	SAE 15W40
Transmission oils · Type: · Viscosity: · Classification:	John Deere HY-GARD; J20C SAE 10W-30 58 cSt at 43 C NA	same
Hydraulic fluid	Same as Transmission	same
Steering oil	Same as Transmission	same
Grease	John Deere Moly High Temperature EP Grease	same

2.7.3 *Grease*

- Number of lubrication points: 20

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

- Date and location of tests: 09-Apr-02 Nebraska Tractor Test Laboratory, Lincoln, NE, USA
- Type of dynamometer bench: Eaton

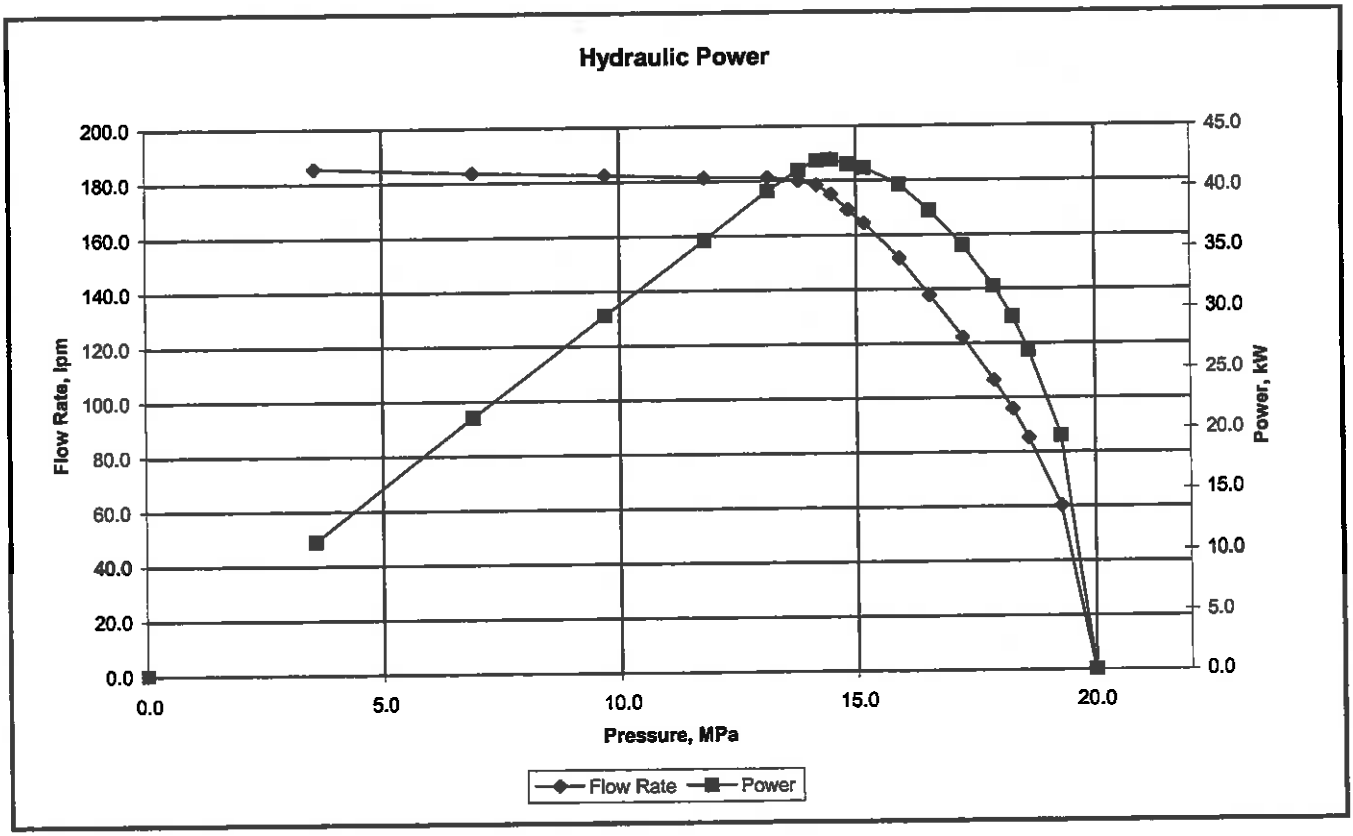
	Speed		Fuel consumption			Specific
Power	Engine	PTO	Hourly		Specific	energy
kW	rev/min		kg/h	l/h	g/kWh	kW-h/l
3.1 MAXIMUM POWER - TWO HOUR TEST						
281.54	1799	949	66.80	79.16	237	3.56
3.1.2 POWER AT RATED ENGINE SPEED						
248.64	2100	1108	60.60	71.81	244	3.46
3.1.3 STANDARD POWER TAKE-OFF SPEED (1000 +/- 25 rev/min)						
272.14	1895	1000	63.80	75.61	234	3.60
3.1.4 PART LOADS						
3.1.4.1 the torque corresponding to maximum power at rated engine speed						
248.64	2100	1108	60.60	71.81	244	3.46
3.1.4.2 85% of torque obtained in 3.1.4.1						
216.95	2156	1138	55.25	65.47	255	3.31
3.1.4.3 75% of torque defined in 3.1.4.2						
164.07	2173	1147	46.27	54.83	282	2.99
3.1.4.4 50% of torque defined in 3.1.4.2						
109.46	2189	1155	38.37	45.48	351	2.41
3.1.4.5 25% of torque defined in 3.1.4.2						
56.13	2213	1168	27.08	32.09	482	1.75
3.1.4.6 unloaded						
0.88	2233	1179	16.33	19.35	18581	0.05
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 +/- 25 rev/min)						
3.1.5.1 the torque corresponding to maximum power						
272.14	1895	1000	63.80	75.61	234	3.60
3.1.5.2 85% of torque obtained in 3.1.5.1						
236.33	1935	1021	55.25	65.47	234	3.61
3.1.5.3 75% of torque defined in 3.1.5.2						
179.30	1958	1033	45.72	54.18	255	3.31
3.1.5.4 50% of torque defined in 3.1.5.2						
120.92	1980	1045	35.38	41.93	293	2.88
3.1.5.5 25% of torque defined in 3.1.5.2						
61.33	2004	1058	24.63	29.19	402	2.10
3.1.5.6 unloaded						
0.76	2031	1072	12.93	15.32	16987	0.05

- No load maximum engine speed: 2233 rev/min
- Torque (equivalent crankshaft) at rated speed:
  - At rated engine speed 1131 Nm
  - At 2-hour test 1494 Nm
- Maximum torque (equivalent crankshaft): 1711 Nm
  (engine speed: 1200 rev/min)

Mean atmospheric conditions:		
Dry bulb	23	°C
Pressure	98.6	kPa
Relative Humidity	29	%
Maximum temperatures:		
Coolant	91	°C
Engine oil	116	°C
Fuel	63	°C
Engine air intake	35	°C

3.2.1 Hydraulic Power (two outlets)

Date of Test:	11-Apr-02	John Deere 9320	
Location of Test-City-State:		Tractor Test Lab, Lincoln, NE, USA	
Tapping point used for test:		Remote hydraulic outlets	
I.	Sustained pressure with pump stalled:		
	19.99 MPa		
	2900 psig		
II.	Pump delivery rate at minimum pressure:		
	185.5 l/min		
	49.0 gpm		
III.	Flow rate, pressure, power:		
	90% of relief valve setting		
	106.4 l/min	17.89 MPa	31.7 kW
	28.1 gpm	*2595 psig*	*42.5 hp*
	Maximum hydraulic power:		
	174.9 l/min	14.48 MPa	42.2 kW
	46.2 gpm	*2100 psig*	*56.6 hp*
IV.	Hydraulic fluid temperature at flow meter:		
	81 °C		
	178 °F		
	This hydraulic system does not use an accumulator. Opening and closing pressures of the unloading valve could not be measured.		



3.2.2 POWER LIFT TEST Category III, Quick attach linkage, 90 mm cylinders
Date of test: 23 June 1997. Test conducted on John Deere 9400 which is technically equivalent.

	Hitch points	Frame
Lower hitch points above ground - down position:	229 mm	231 mm
Vertical movement - without load:	793 mm	861 mm
with load:	774 mm	841 mm
Maximum corrected force exerted through full range:	62.2 kN	58.3 kN
Corresponding pressure:	18.3 MPa	18.3 MPa
Moment about rear axle:	97.6 kNm	127.0 kNm
Maximum mast tilt angle	--	6.7 degrees

Lifting height relative to horizontal position of lower links.

mm		-318	-300	-201	-99	0	99	201	300	401	455	526
Corrected lift forces												
At the Hitch point	kN	63.6	62.2	64.6	66.6	68.6	70.2	71.5	72.6	73.6	73.7	--
at the frame	kN	63.8	63.0	63.3	63.9	63.9	63.6	62.9	61.6	--	59.8	58.3
Corresponding pressure	18.3 MPa											

OECD Drawbar Data (SI)

Date of tests: 24,25-Apr-02							Fuel density:	0.844 kg/l						
Type of track: Concrete							Test number:	1803						
3.3.1 Maximum power in tested gears (unballasted, 4wd)							Tire pressure:	48 kPa, rear		76 kPa, front		Drawbar Height:	521 mm	
Gear	Gear Designation	Power	Drawbar pull	Speed	Engine speed	Slip	Fuel		Temperature			Atmospheric conditions		
							SFC	SFE	Fuel	Coolant	Oil	Temperature	Relative humidity	Pressure
		kW	kN	km/h	rev/min	%	kg/kW.h	kW.h/l	°C	°C	°C	°C	%	kPa
*1	1	175.53	170.80	3.70	2164	9	0.306	2.76	64	79	108	9	43	99.0
*2	2	211.41	169.81	4.48	2113	8	0.284	2.97	63	81	109	8	41	99.0
3	3	224.65	165.71	4.88	2071	8	0.274	3.09	64	83	112	9	39	99.0
4	4	234.92	160.65	5.26	1980	7	0.268	3.14	65	84	112	11	43	98.9
5	5	242.15	159.86	5.45	1860	7	0.265	3.18	64	84	113	12	40	98.9
6	6	249.35	150.15	5.98	1803	5	0.265	3.19	63	84	113	15	37	98.0
7	7	254.52	136.61	6.71	1805	4	0.259	3.26	64	85	113	14	44	98.0
8	8	255.79	122.05	7.54	1802	3	0.260	3.25	64	85	113	13	52	98.0
9	9	254.93	109.90	8.35	1802	3	0.260	3.24	63	86	114	14	48	98.0
10	10	252.46	97.12	9.36	1802	3	0.264	3.20	63	85	113	11	65	98.0
11	11	251.83	87.24	10.39	1802	2	0.263	3.21	63	85	113	11	65	98.0
12	12	253.12	79.20	11.51	1803	2	0.263	3.21	63	86	114	12	60	98.0
13	13	247.87	69.39	12.86	1806	2	0.266	3.18	63	86	114	14	44	98.0
14	14	249.86	63.41	14.19	1801	2	0.268	3.15	63	86	114	15	37	98.0
* Note: Pull limited to avoid excessive bouncing.														
3.3.2 Fuel consumption														
3.3.2.1			In selected gear at maximum power at rated engine speed.											
6	6	226.97	114.93	7.11	2097	3	0.268	3.15	64	81	109	15	37	98.0
3.3.2.1.1			75% of pull at maximum power at rated engine speed											
6	6	176.75	85.92	7.41	2167	3	0.295	2.86	63	81	106	12	40	98.9
3.3.2.1.2			50% of pull at maximum power at rated engine speed											
6	6	120.22	57.47	7.53	2188	2	0.338	2.49	63	79	105	13	37	98.9
3.3.2.1.3			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.1											
7	7	176.63	86.09	7.39	1952	3	0.270	3.13	63	80	107	13	36	98.9
3.3.2.1.4			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.2											
7	7	120.36	57.57	7.53	1976	2	0.307	2.75	61	77	101	13	37	98.9
3.3.2.1.5			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.1											
8	8	176.95	85.94	7.41	1755	3	0.270	3.13	61	80	105	13	36	98.9
3.3.2.1.6			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.2											
8	8	120.31	57.53	7.53	1770	2	0.297	2.84	59	76	98	13	37	98.9
3.3.2.2			In selected gear nearest to 7.5 km/h at rated engine speed.											
8	8	227.36	92.25	8.87	2099	3	0.268	3.15	64	85	111	12	60	98.0
3.3.2.2.1			75% of pull at maximum power at rated engine speed											
8	8	176.77	69.18	9.20	2167	2	0.297	2.85	64	82	107	14	34	98.9
3.3.2.2.2			50% of pull at maximum power at rated engine speed											
8	8	119.55	46.08	9.34	2188	1	0.344	2.45	63	78	106	14	39	98.9
3.3.2.2.3			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.1											
9	9	176.77	69.10	9.21	1968	2	0.273	3.09	64	81	108	14	39	98.9
3.3.2.2.4			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.2											
9	9	119.66	46.12	9.34	1986	2	0.316	2.67	63	79	105	14	35	98.8
3.3.2.2.5			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.1											
10	10	177.21	69.17	9.22	1766	2	0.273	3.09	63	81	106	14	39	98.9
3.3.2.2.6			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.2											
10	10	119.42	46.13	9.32	1775	1	0.304	2.77	60	76	100	14	35	98.8

4.1 Drawbar Power (Unballasted - 2100 rev/min)

OECD Drawbar Data (SI)

Date of tests: 24,25-Apr-02 — Fuel density: 0.844 kg/l

Type of track: Concrete — Test number: 1803

4.1.1 Maximum power in tested gears (unballasted, 4wd) — Tire pressure: 48 kPa, rear 76 kPa, front — Drawbar Height: 521 mm

Gear	Gear Designation	Power	Drawbar pull	Speed	Engine speed	Slip	Fuel		Temperature			Atmospheric conditions		
							SFC	SFE	Fuel	Coolant	Oil	Temperature	Relative humidity	Pressure
		kW	kN	km/h	rev/min	%	kg/kW.h	kW.h/l	°C	°C	°C	°C	%	kPa
*1	1	174.86	170.39	3.69	2163	9	0.307	2.75	63	79	108	9	43	99.0
*2	2	211.98	169.25	4.51	2113	7	0.281	3.00	61	79	103	8	41	99.0
3	3	221.90	159.35	5.01	2101	6	0.274	3.08	64	83	113	10	40	98.9
4	4	226.01	142.67	5.70	2100	5	0.268	3.15	64	81	109	11	41	98.9
5	5	226.10	128.33	6.34	2099	4	0.268	3.14	65	83	112	15	37	98.0
6	6	226.97	114.93	7.11	2097	3	0.268	3.15	64	81	109	15	37	98.0
7	7	228.69	103.89	7.92	2101	3	0.265	3.19	63	83	106	13	56	98.0
8	8	227.36	92.25	8.87	2099	3	0.268	3.15	64	85	111	12	60	98.0
9	9	225.95	83.04	9.80	2098	2	0.268	3.15	63	84	109	11	65	98.0
10	10	221.99	72.73	10.99	2100	2	0.273	3.10	59	85	111	12	56	98.0
11	11	223.60	66.32	12.14	2096	2	0.271	3.11	64	85	111	12	60	98.0
12	12	221.27	59.27	13.44	2097	2	0.275	3.07	65	84	113	14	44	98.0

* Note: Pull limited to avoid excessive bouncing.

4.2 POWER LIFT TEST Category IV, Quick attach linkage, 90 & 100 mm cylinders
Date of test: 22 June 1997. Test conducted on John Deere 9400 which is technically equivalent.

	Hitch points	Frame
Lower hitch points above ground - down position:	236 mm	216 mm
Vertical movement - without load:	787 mm	861 mm
with load:	765 mm	831 mm
Maximum corrected force exerted through full range:	68.6 kN	64.0 kN
Corresponding pressure:	18.3 MPa	18.3 MPa
Moment about rear axle:	105.4 kNm	137.3 kNm
Maximum mast tilt angle	--	5.3 degrees

Lifting height relative to horizontal position of lower links.

mm		-330	-310	-300	-201	-99	0	99	201	300	401	455	511
Corrected lift forces													
At the Hitch point	kN	--	69.5	68.6	70.8	73.6	75.8	77.6	79.0	80.3	81.2	81.4	--
at the frame	kN	70.1	69.0	--	69.4	70.3	70.4	70.0	69.2	67.8	--	65.7	64.0
Corresponding pressure	18.3 MPa												

4.3 Measurement of External Noise Level – John Deere 9320

-- Date of Test	April 17, 2002
-- Location of Test	Nebraska Tractor Test Laboratory
-- Sound Level Meter	Bruel and Kjaer 2236
-- Type of Track	Concrete Oval
-- Gear Number	18
-- Speed Prior to Acceleration	29.25 km/h
-- Noise Level	90.6 dB(A)

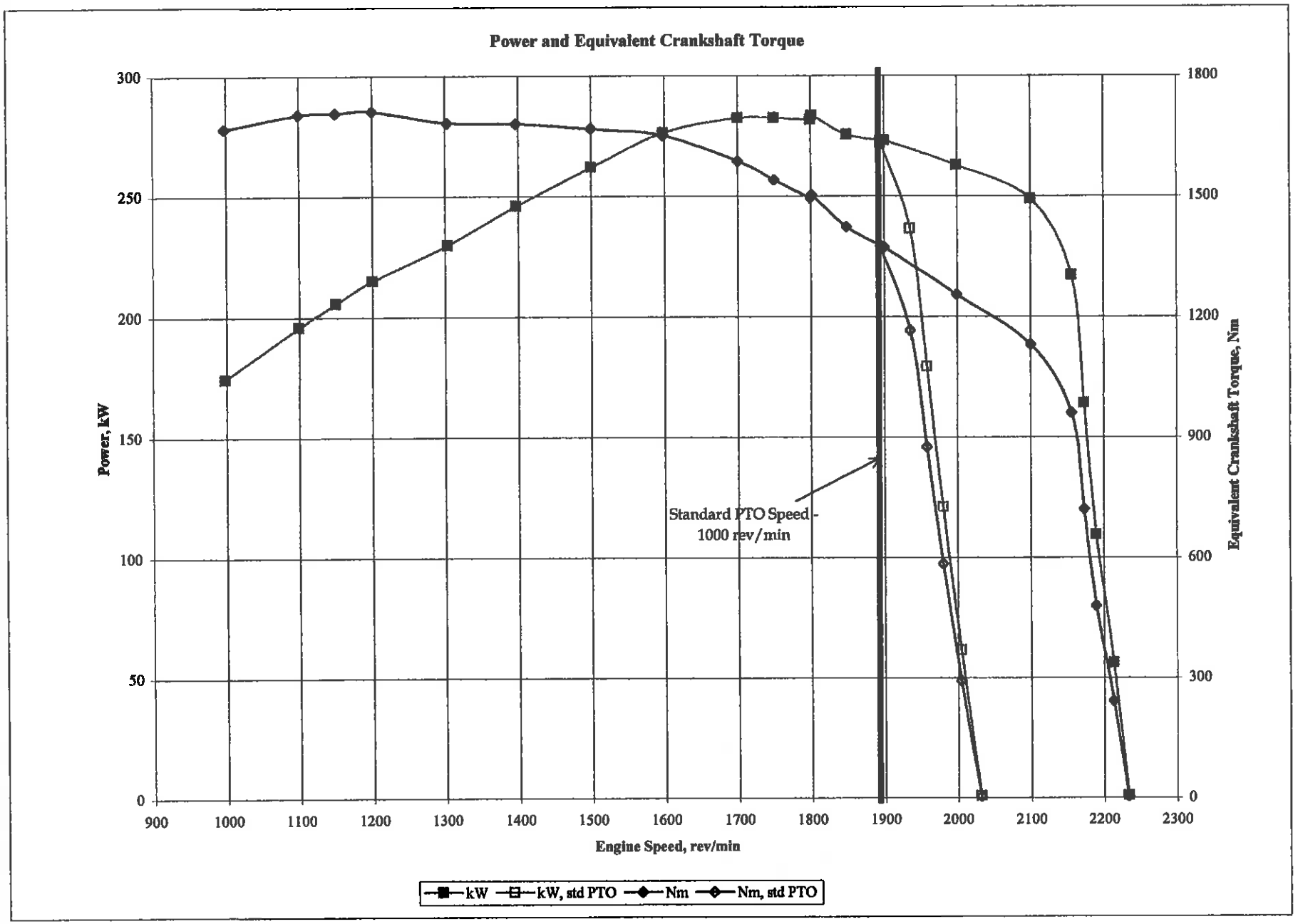
4.4 Measurement of Noise Level at Operator's Ear*

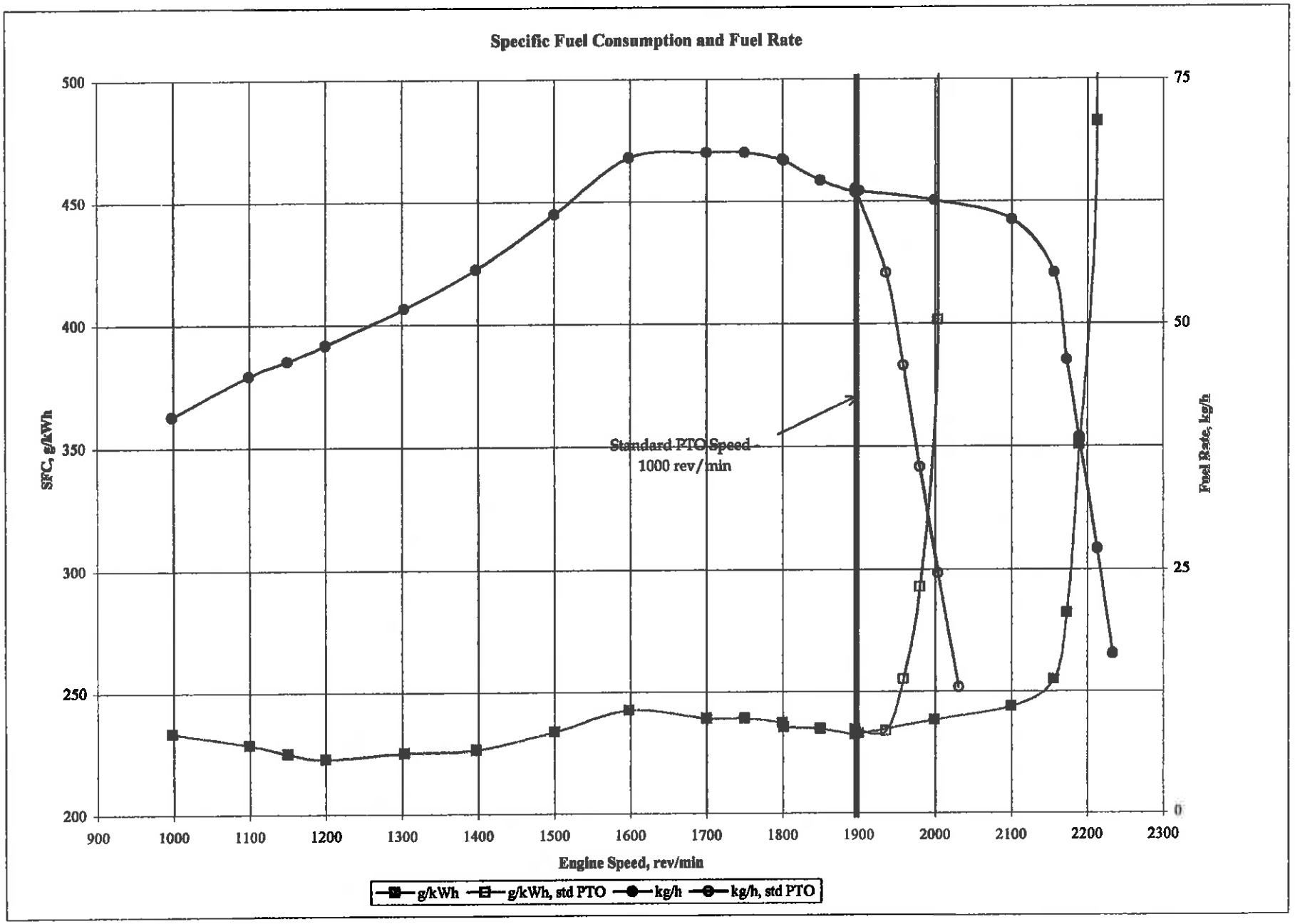
-- Date of Test	April 15, 2002
-- Location of Test	Nebraska Tractor Test Laboratory
-- Sound Level Meter	Bruel and Kjaer 2236
-- Type of Track	Concrete Oval
-- Gear Number	6
-- Drawbar Load	None
-- Noise at Operator Ear	74.3 dB(A)

* Note: Nebraska tractor test station guidelines.

5. Repairs and Adjustments: None

6. Remarks: None


Power and Equivalent Crankshaft Torque
Power, kW
Equivalent Crankshaft Torque, Nm
Engine Speed, rev/min
Standard PTO Speed - 1000 rev/min
kW
kW, std PTO
Nm
Nm, std PTO
300
250
200
150
100
50
0
1800
1500
1200
900
600
300
0
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300


Specific Fuel Consumption and Fuel Rate
SFC, g/kWh
Fuel Rate, kg/h
Engine Speed, rev/min
Standard PTO Speed
1000 rev/min
500
450
400
350
300
250
200
75
50
25
0
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
g/kWh
g/kWh, std PTO
kg/h
kg/h, std PTO

John Deere 9320

