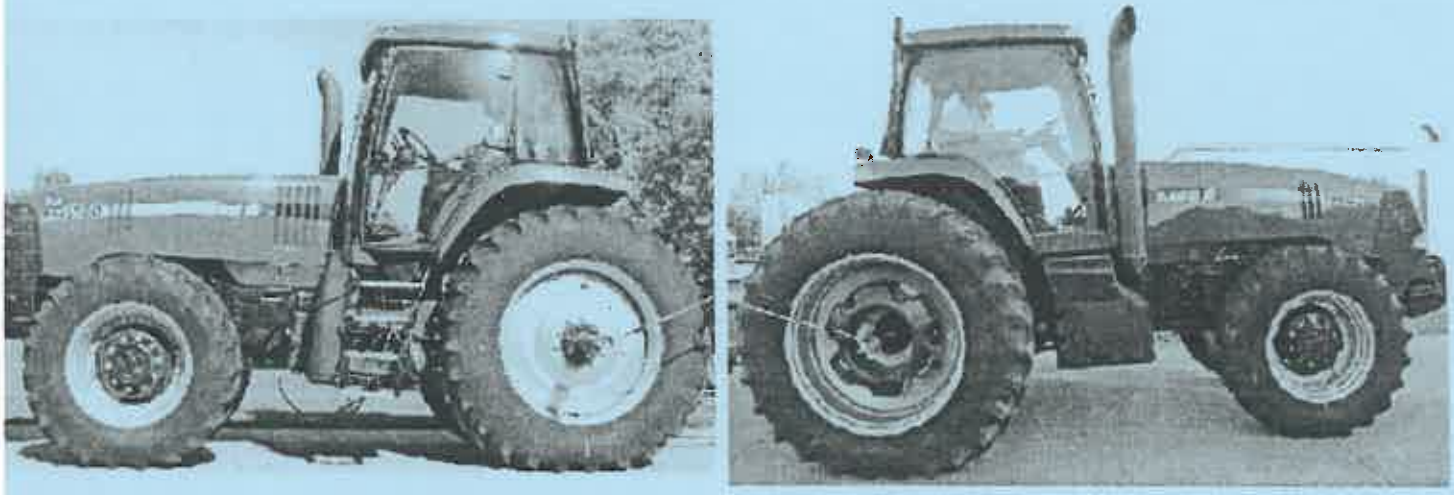
OECD APPROVAL NO. 2/2 186
CODE 2
DATE OF APPROVAL: 25 October 2004

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



Case IH MX230
Mechanical Front Wheel Drive (MFWD)

MANUFACTURED BY:	**CNH America LLC** **700 State Street** **Racine, WI 53404 USA**
NEBRASKA TEST NO.	**1826**
TEST DATES:	**August- December, 2003**

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 25 October 2004 for the Case IH MX230, mechanical front wheel drive (MFWD) tractor with OECD Number 2/2 186.

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: JAN 1 2 2005

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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.

C	- Tractor manufacturer's name and address:	CNH America LLC 700 State Street Racine, WI 53404 USA
C	- Location of tractor assembly:	CNH America LLC 7000 Durand Avenue Racine, WI 53406 USA
D	- Submitted for test by:	The Manufacturer
C	- Selected for test by:	The Manufacturer in agreement with the Nebraska Tractor Test Laboratory
D	- Place of running-in:	CNH America LLC Product Engineering Burr Ridge, Illinois
C	- Duration of running-in:	147 hours
C	- Location of test:	Nebraska Tractor Test Laboratory, Lincoln, Nebraska U.S.A.

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

C	1.1.1 Make of the tractor:	Case IH
C	- Model:	MX230
C	- Type:	Unit Construction, mechanical front wheel drive (MFWD)
C	- Number of driving wheels:	4
	1.1.2 *Numbers*	
D	- 1st Serial No.:	JAZ125101
C	- Serial No.:	JAZ126436
	1.1.3 *Other specifications*	
C	- Optional gears:	Creeper speed option with 6 forward and 2 reverse additional speeds

1.2 Engine

C	- Make:	Consolidated Diesel
C	- Model:	6TAA-830
C	- Type:	4-stroke diesel; direct injection; turbocharged; air-to-air aftercooled
C	- Serial No.:	46274093

1.2.1 *Cylinders*

C	- Number/disposition:	6 in-line, vertical
D	- Bore/stroke:	114 mm/ 135 mm
D	- Capacity:	8268 cm^3
D	- Compression ratio:	17:1
D	- Arrangement of valves:	Overhead
D	- Cylinder liners (wet or dry):	Wet; replaceable

1.2.2 *Supercharging*

C	- Make:	Holset
C	- Model:	HX40W
C	- Type:	Exhaust gas driven with wastegate control
D	- Pressure:	190 ± 15 kPa at rated engine speed and full load

1.2.3 *Fuel system*

C	- Fuel feed system:	Engine driven transfer pump
C	- Make:	Fleetgard
C	- Model:	FS0505200
C	- Type of fuel filter(s):	Spin-on cartridge
D	- Capacity of fuel tank:	492 dm^3
C	- Make:	Bosch
C	- Model:	P3000
C	- Type of injection pump:	HPCR; electronic
C	- Serial No:	3938378
	- Manufacturer's production setting of injection pump	
C	. Flow rate (rated engine speed and full load):	49.8 ± 3 dm^3/h
D	. Timing:	Static
D	- Make:	Bosch
D	- Model:	4063526
D	- Type of injectors:	Inline
D	- Injection pressure:	300 MPa
D	- Make:	NA
D	- Model:	NA
D	- Type of carburetor:	NA

1.2.4 *Governor*

C	- Make:	Bosch
C	- Model:	P3000
C	- Type:	Rsv
C	- Governed range of engine speed:	From 900 ± 50 to 2240 ± 45 min^{-1}(rev/min)
C	- Rated engine speed:	2000 min^{-1} (rev/min)

1.2.5 *Air cleaner*

	- Pre-cleaner	
C	. Make:	Fleetgard Nelson
C	. Model:	Integrated with air cleaner
C	. Type:	Vane with aspirated body
C	. Location of air intake:	Under hood, ahead of radiator
	- Main cleaner	
C	. Make:	Fleetgard Nelson
C	. Model:	291903A
C	. Type:	Dry type – two stage
C	- Maintenance indicator:	Service indicator on digital instrument cluster

1.2.6 *Lubrication system*

D	- Type of feed pump:	Full pressure; positive displacement
C	- Type of filter(s):	Full flow, turn on type dual filter
C	- Number of filters:	One

1.2.7 *Cooling system*

C	- Type of coolant:	Liquid
C	- Type of pump:	Centrifugal, Belt-driven
C	- Specification of fan or blower:	Viscous-drive fan
C	. Number of fan blades:	9
C	. Fan diameter:	700 mm
D	- Coolant capacity:	25 dm^3
C	- Type of temperature control:	2 thermostats
D	- Superpressure system:	103 kPa

1.2.8 *Starting system*

C	- Make:	Nippondenso
C	- Model:	228000-5601
C	- Type:	Electric motor
D	- Starter motor power rating:	4.0 kW
C	- Cold starting aid:	Ether spray in intake manifold
C	- Safety device:	Electrical lockout on transmission controls

1.2.9 *Electrical system*

C	- Voltage:	12 V
	- Generator	
C	. Make:	Bosch
C	. Model:	N1
C	. Type:	Alternator, belt-driven
D	. Power:	2.2 kW, 135 Amps
	- Battery of accumulators	
C	. Number:	Two 12-volt batteries in parallel
D	. Rating:	950 cold crank amp/battery, 180 Ah/battery at 20 hour rating

1.2.10 *Exhaust system*

C	- Make:	Nelson (muffler)
C	- Model:	255270A
C	- Type:	Vertical
C	- Location:	External muffler, integrated with vertical exhaust pipe near right front corner of cab

1.3 Transmission

1.3.1 *Clutch (/travel alone)*

D	- Make:	Case IH
D	- Model:	Multi-plate
D	- Type:	Oil-cooled
D	- Number of plates:	9 friction
D	- Diameter of plates:	228.5 mm
C	- Method of operation:	Hydraulic, pedal actuated

1.3.2 *Gear box*

D	- Make:	Case IH
D	- Model:	NA
D	- Type:	Full powershift
D	- Description:	Countershaft with one 2-speed and two 3-speed powershift modules

		Forward	Reverse
C	Number of gears	18	4
C	Number of ranges/groups	NA	NA
C	Total of arrangements	18	4

D	- Available options:	Creeper speed option with 6 forward and 2 reverse additional speeds

1.3.3 *Rear axle and final drives*

D	- Make:	Case IH
D	- Model:	NA
D	- Type:	Crown wheel and pinion differential and planetary reduction
	- Differential lock	
D	. Type:	Hydraulic
C	. Method of engagement:	Electrical switch on control console
C	. Method of disengagement:	Electrical switch on control console or actuation of either brake pedal

1.3.4 *Front axle and final drives*

Standard 10 bolt (optional –on tested tractor)

D	- Make:	Dana
D	- Model:	070BP248-1
D	- Type:	Crown wheel and pinion differential and planetary reduction
	- Differential lock	
D	. Type:	Limited slip
C	. Method of engagement:	Self-locking
C	. Method of disengagement:	Self-disengaging

Suspended 10 bolt (optional – not on tested tractor)

D	- Make:	Dana
D	- Model:	070BP246-1
D	- Type:	Crown wheel and pinion differential and planetary reduction
	- Differential lock	
D	. Type:	Limited slip
C	. Method of engagement:	Self-locking
C	. Method of disengagement:	Self-disengaging

1.3.5 Total ratios and traveling speeds (Standard 18-speed transmission)

	Gear No.	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed (*) at rated engine speed of 2000 min^{-1} (rev/min) km/h
C	Forward		
C	1	221.62	3.15
C	2	**193.21**	**3.61**
C	3	167.55	**4.16**
C	4	146.07	4.77
C	5	127.34	5.48
C	6	111.02	6.28
C	7	95.17	7.33
C	8	82.97	8.41
C	9	71.95	9.69
C	10	**62.73**	11.12
C	11	54.68	12.75
C	12	47.67	14.63
C	13	**38.26**	18.23
C	14	33.35	20.91
C	15	28.92	24.11
C	16	25.22	27.66
C	17	21.98	31.73
C	18	19.19	36.39
	Reverse		
D	R1	153.16	4.53
D	R2	134.23	5.20
D	R3	66.12	10.55
D	R4	57.64	12.10
(*) Calculated with a tire dynamic radius index of 925 mm (not in conformity with the ISO 4251-1:1998)			

D - Number of revolutions of front wheels for one revolution of rear-wheels: 1.3228

1.3.5 Total ratios and traveling speeds (18-speed transmission with optional 6 forward/2 reverse speed creeper)

	Gear No.	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed (*) at rated engine speed of 2000 min^{-1} (rev/min) km/h
C	Creeper		
C	1	761.47	0.92
C	2	575.68	1.21
C	3	437.53	1.59
C	4	327.00	2.13
C	5	247.22	2.82
C	6	187.89	3.71
C	Forward		
C	1	221.62	3.15
C	2	193.21	3.61
C	3	167.55	4.16
C	4	146.07	4.77
C	5	127.34	5.48
C	6	111.02	6.28
C	7	95.17	7.33
C	8	82.97	8.41
C	9	71.95	9.69
C	10	62.73	11.12
C	11	54.68	12.75
C	12	47.67	14.63
C	13	38.26	18.23
C	14	33.35	20.91
C	15	28.92	24.11
C	16	25.22	27.66
C	17	21.98	31.73
C	18	19.19	36.39
	Creeper Reverse		
D	R1	529.01	1.32
D	R2	227.17	3.07
	Reverse		
D	R1	153.16	4.53
D	R2	134.23	5.20
D	R3	66.12	10.55
D	R4	57.64	12.10
(*) Calculated with a tire dynamic radius index of 925 mm (not in conformity with the ISO 4251-1:1998)			

D - Number of revolutions of front wheels for one revolution of rear-wheels: 1.3228

1.4 Power take-off

1.4.1 *Main power take-off*

C	- Type (independent, semi-independent or not independent):	Independent
C	- Method of engagement (if necessary describe the type of clutch):	Hydraulic clutch operated by electrical switch and electrohydraulic valve independent of main clutch
C	- Number of shafts:	One
C	- Method of changing power take-off shaft ends and speeds:	None; optional removable shaft and reversible shaft

1.4.1.1 Power take-off proportional to engine speed

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

C	- Location:	At rear of tractor in vertical center plane
C	- Diameter of power take-off shaft end:	44 mm
D	- Number of splines:	20 (ISO 500:1991)
C	- Height above ground:	835 mm
C	- Distance from the median plane of the tractor:	0 mm
C	- Distance behind rear-wheel axis:	659 mm
C	- PTO speed at rated engine speed (2000 rev/min):	1003 min^{-1} (rev/min)
C	- Engine speed at standard power take-off speed:	1994 min^{-1} (rev/min)
C	- Ratio of rotation speeds (engine speed/p.t.o. speed):	1.994:1
C	- Power restriction:	None
D	- Maximum torque transmissible:	No restrictions
C	- Direction of rotation (viewed from behind tractor):	Clockwise

1.4.1.2 Power take-off proportional to ground speed

Not Available

1.4.2 *Optional power take-off*

Power take-off at 540 min^{-1} (rev/min)

C	- Location:	At rear of tractor in vertical center plane
C	- Diameter of power take-off shaft end:	35 mm
D	- Number of splines:	6 (ISO 500:1991)
C	- Height above ground:	835 mm
C	- Distance from the median plane of the tractor:	0 mm
C	- Distance behind rear-wheel axis:	710 mm
C	- PTO speed at rated engine speed (2000 rev/min):	540 rev/min
C	- Engine speed at standard power take-off speed:	2000 rev/min
C	- Ratio of rotation speeds (engine speed/p.t.o. speed):	3.702 to 1
C	- Power restriction:	63 kW
D	- Maximum torque transmissible:	63 kW
C	- Direction of rotation (viewed from behind tractor):	Clockwise

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

C	- Location:	At rear of tractor in vertical center plane
D	- Diameter of power take-off shaft end:	35 mm
D	- Number of splines:	21 (ISO 500:1991)
C	- Height above ground:	835 mm
C	- Distance from the median plane of the tractor:	0 mm
C	- Distance behind rear-wheel axis:	659 mm
C	- PTO speed at rated engine speed (2000 rev/min):	1003 min^{-1} (rev/min)
C	- Engine speed at standard power take-off speed:	1994 min^{-1} (rev/min)
C	- Ratio of rotation speeds (engine speed/p.t.o. speed):	1.994:1
C	- Power restriction:	None
D	- Maximum torque transmissible:	No restrictions
C	- Direction of rotation (viewed from behind tractor):	Clockwise

1.5 Hydraulic power lift

C	- Make:	Case IH
C	- Model:	NA
C	- Type:	NA
C	- Type of hydraulic system:	Closed center, load sensing
C	- Type and number of cylinders (single or double-acting):	2 external/ single acting
D	- Type of linkage lock for transport:	Hydraulic, with locking notch for hand lever in control console
C	- Relief valve pressure setting (tolerance):	22.0 – 22.8 MPa
D	- Opening pressure of cylinder safety valve (if fitted):	24.1 – 24.8 MPa
D	- Lift pump type:	Axial piston, pressure and flow compensated
D	- Transmission between pump and engine:	Geared drive on transmission
C	- Type and number of filters:	Two turn-on replaceable cartridges, cleanable suction screen inside reservoir
C	- Site of oil reservoir:	Transmission housing
C	- Type, number and location of tapping points:	3 pairs of ISO standard couplings at rear of tractor
D	- Maximum volume of oil available to external cylinders:	8.5 dm^3

1.6 Three point linkage

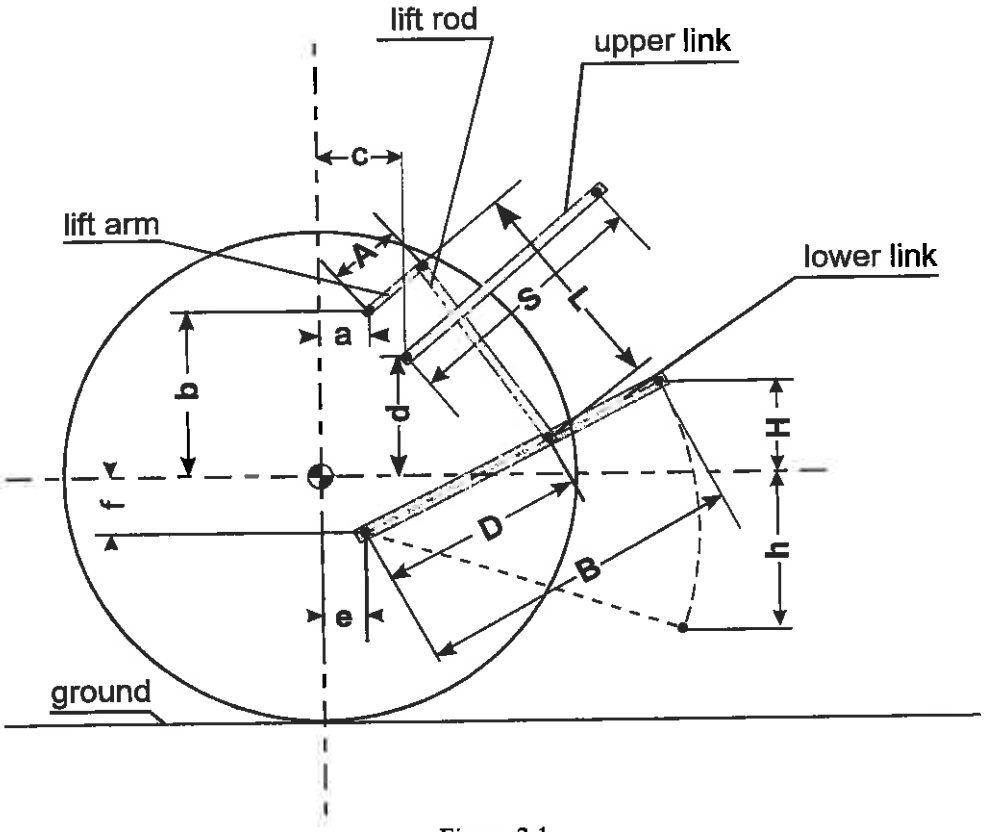


Figure 2.1
Lift test - Linkage Geometry

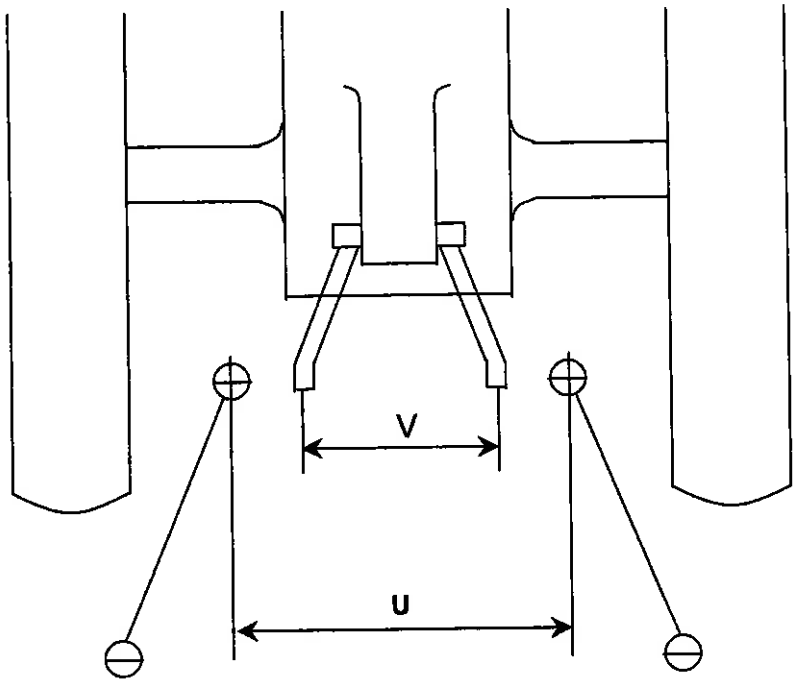


Figure 2.2
Lift test - Linkage Geometry

1.6.1 Three point linkage dimensions

C - Category: 3 in conformity with categories 3 of ISO 730/1 – 1990, ISO 730/2 – 1979, ISO 730/3 – 1982.
C - Category adapter: Category III quick coupler standard

			Dimension or range	Settings used in test	
				3.2.2	4.3 & 4.4
			mm	mm	mm
C	Rear tire radius:	**r**	925	925	925
C	Front tire radius:	**r'**	715	715	715
C	Length of lift arms:	**(A)**	520	520	520
C	Length of lower links:	**(B)**	1205	1205	1205
	Distance of lift arm pivot point from rear-wheel axis				
C	- horizontally:	**(a)**	250	250	250
C	- vertically:	**(b)**	525	525	525
C	Horizontal distance between the 2 lower link points:	**(u)**	579	579	579
	Horizontal distance between the 2 lift arm end points:	**(v)**	580	580	580
C	Length of upper link:	**(S)**	627 to 795	775	643
	Distance of upper link pivot point from rear wheel axis				
C	- horizontally:	**(c)**	530	530	530
C	- vertically:	**(d)**	140, 220, 266	266	266
	Distance of lower link pivot point from rear wheel axis				
C	- horizontally:	**(e)**	200	200	200
C	- vertically:	**(f)**	400	400	400
C	Distance of lower link pivot points to lift rod pivot points on lower links:	**(D)**	768	768	768
C	Length of lift rods:	**(L)**	947 to 1074	1003	1038
	Height of lower hitch points relative to the rear-wheel axis				
C	- in low position:	**(h)**	590 to 780	696	696
C	- in high position:	**(H)**	-20 to 150	116	24
C	Height above ground of lower hitch points when locked in transport position (*)		920 to 1060	1041	949

(*) Assuming r = 925 tyre dynamic radius index

1.7 Swinging drawbar

C	- Type:	5 lateral positions
	- Height above ground	
C	. Maximum:	542 mm
C	. Minimum:	329 mm
C	- Type of adjustment:	Adjustable 5 laterally and 6 positions fore-aft
C	- Distance of hitch point from rear-wheel axis, horizontally:	1012, 1064, 1116, 1168, 1259, 1313 mm
	- Distance of hitch point from power take-off shaft end	
C	. Vertically:	314 mm
C	. Horizontally:	353, 405, 457, 509, 600, 654 mm
	- Lateral adjustment (centre of clevis)	
C	. Right hand:	234 mm
C	. Left hand:	234 mm
C	- Distance of pivot point from rear-wheel axis, horizontally:	50 mm (forward)
C	- Diameter of drawbar pin hole:	42 mm
D	- Maximum vertical permissible load	
	. Two forward positions:	18.4 kN
	. Rear-most position:	17.2 kN

1.8 Trailer hitch

Not available

1.9 Holed drawbar

Not available

1.10 Steering

Standard 10 bolt (optional – on tested tractor)

D	- Make:	Eaton
D	- Model:	445303A
D	- Type:	Hydrostatic steering control unit
C	- Method of operation	
D	. Pump(s):	Main axial piston pump thru steering priority valve
D	. Ram(s):	2 double-acting cylinders
D	- Working pressure:	20.15 – 20.85 MPa

Suspended 10 bolt (optional – not on tested tractor)

D	- Make:	Eaton
D	- Model:	445303A
D	- Type:	Hydrostatic steering control unit
C	- Method of operation	
D	. Pump(s):	Main axial piston pump thru steering priority valve
D	. Ram(s):	2 double-acting cylinders
D	- Working pressure:	20.15 – 20.85 MPa

1.11 Brakes

1.11.1 *Service brake*

D	- Make:	Case IH
D	- Model:	NA
D	- Type:	Oil immersed disc
C	- Method of operation:	Hydraulically actuated from main system
D	- Trailer braking take-off (hydraulic or air brake):	None

1.11.2 *Parking brake*

C	- Type:	Transmission brake clutch
C	- Method of operation:	Spring applied/electro hydraulic disengagement

1.12 Wheels

	- Number	
C	. Front:	2 driving / 2 steering
C	. Rear:	2 driving / none steering
C	- Wheelbase	
	. Standard and Suspended axle:	3005 mm

		Minimum	Maximum	Adjustment method
		mm	mm	
D	Front	1524	2235	Reversing wheel and offset lug rims
D	Rear	1626	3277	Adjustable clamping wedges on bar axle and off-set lug rims

1.13 Protective structure

C	- Make:	Case IH
C	- Model:	MU8
C	- Type:	Cab
C	- Manufacturer's name and address:	CNH America LLC 700 State Street Racine, WI 53404 USA
	- Protective device	
C	. Cab/frame/ rollguard/ other:	Cab
C	. Tiltable/not tiltable:	Not tiltable
	- OECD approval	
D	. Approval number:	4/0 548/2
D	. Date of approval:	17 February 2004
D	. Nos. of minor modification certificates, if any:	none

1.14 Seat

1.14.1 *Driver's seat*

C	- Make:	Sears
C	- Model:	SA19435
C	- Type:	Air suspension - STD
C	- Seat and steering wheel reversible: Yes/No	No
C	- Type of suspension:	Air Ride, fore-aft isolator, weight adjustment
C	- Type of damping:	Hydraulic damping
	- Range of adjustment	
C	. Longitudinally:	200.0 mm
C	. Vertically	76.0 mm
C	- Safety belt Yes/No	Yes

1.14.3 *Instructional seat*

C	- Location:	Optional Instructional Seat located left of drivers seat
C	- 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
C	Headlights			
	Hood Center	1430	108 x 265	0
	Outer	1430	108 x 395*	240
C	Headlights			
	ROPS Front	3085	135 x 90	510
C	Reflectors			
	Front	3085	90 x 255	685
	Rear	3050	90 x 240	725
C	Rearlights			
	fender	2135	135 x 76	915
C	Taillights	2175	152 x 95	959
C	Hazard Lights			
	Roof Front	3048	67 x 178	654
	Roof Rear	3048	70 x 171	762
C	Extremity Lights	2160	95 x 137	1854 – 2261

***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	5690	3048	3810	3200	3175
Ballasted	5944	3048	3810	3200	3175

2.2 Ground clearance (unballasted tractor): 350 mm

- Clearance-limiting part: Sway blocks

2.3 Tractor mass

Mass (with cab, full fuel tank):

	Without driver	With driver
	kg	kg
Unballasted		
Front	3441	3466
Rear	5681	5731
Total	9122	9197
Ballasted		
Front	3903	3928
Rear	7375	7425
Total	11278	11353

Ballast Added	Number of Weights	Total Mass	Liquid
		kg	kg
Front (weights)	4	181	-
Front (weight support)	1	136	-
Rear (wheel weights)	2	954	-
Rear (duals)	2	885	-

2.4 Track specifications

Not Applicable

2.5 Tyres and track width specifications

	Front	Rear
Tyres:	Goodyear	Goodyear
- dimensions	420/90R30	520/85R42
- ply rating	Two Star	Two Star
- type	Radial	Radial
- maximum load (tyre manufacturer's)	2650 kg	4125 kg
- maximum load (tractor manufacturer's)	2650 kg	4125 kg
- inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
- dynamic radius index	715 mm	925 mm
Chosen track width: Ballasted	1675 mm	1640 mm (inner) 3215 mm (outer)
Unballasted	1675 mm	1640 mm

2.6 Fuel

- Type: No. 2 diesel in conformity with national standard
- Density at 15°C: 0.843 g/cm^3

2.7 Oils and lubricants

2.7.1 *Capacity and change interval*

	Capacity	Oil change	Filter change
	dm^3	h	h
Engine	19	300	300
Front axle	12.3	1500	Not Applicable
Rear axle	Not Applicable	Not Applicable	Not Applicable
Final drive (front)	1.3	1200	Not Applicable
Final drive (rear)	Not Applicable	Not Applicable	Not Applicable
Hydraulic system (*)	172	1500	1500
(*) Common with gear box			

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

	Recommended	Used during test
Engine oil · Type: · Viscosity: · Classification:	Case IH No. 1 SAE 15W-40 14.9 cSt at 100° C API SF/CD/CE	Same
Transmission oils · Type: · Viscosity: · Classification:	Case IH Hy-Tran Ultra 6.3 cSt at 100° C None	Same
Final Drive Oil (front) · Type: · Viscosity: · Classification	Case IH 135 HEP Gear Lube SAE 85W-140 27cSt at 100° C	Same
Hydraulic fluid · Type: · Viscosity: · Classification:	Same as Transmission	Same
Steering oil · Type: · Viscosity: · Classification:	Same as Transmission	Same

2.7.3 *Grease*

Number of Lubrication points: 30

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

- Date and location of tests: 9-Oct-03 Nebraska Tractor Test Laboratory, Lincoln, NE, USA
- Type of dynamometer bench: Eaton

	Speed			Fuel consumption			Specific
Power	Engine	PTO	Fan	Hourly		Specific	energy
kW	rev/min			kg/h	l/h	g/kWh	kW-h/l
3.1 MAXIMUM POWER - TWO HOUR TEST							
161.48	1700	852	1593	40.12	47.61	248	3.39
3.1.2 POWER AT RATED ENGINE SPEED							
143.19	2001	1003	1593	39.63	47.03	277	3.04
3.1.3 STANDARD POWER TAKE-OFF SPEED (1000 +/- 25 rev/min)							
143.19	2001	1003	1593	39.63	47.03	277	3.04
3.1.4 PART LOADS							
3.1.4.1 the torque corresponding to maximum power at rated engine speed							
143.19	2001	1003	1593	39.63	47.03	277	3.04
3.1.4.2 85% of torque obtained in 3.1.4.1							
126.37	2075	1041	1657	35.92	42.63	284	2.96
3.1.4.3 75% of torque defined in 3.1.4.2							
96.08	2111	1059	1657	28.71	34.07	299	2.82
3.1.4.4 50% of torque defined in 3.1.4.2							
65.39	2149	1078	1657	22.59	26.80	345	2.44
3.1.4.5 25% of torque defined in 3.1.4.2							
33.04	2184	1095	1341	16.19	19.22	490	1.72
3.1.4.6 unloaded							
1.18	2213	1110	1245	10.61	12.59	8980	0.09
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							
143.19	2001	1003	1593	39.63	47.03	277	3.04
3.1.5.2 85% of torque obtained in 3.1.5.1							
126.37	2075	1041	1657	35.92	42.63	284	2.96
3.1.5.3 75% of torque defined in 3.1.5.2							
96.08	2111	1059	1509	28.71	34.07	299	2.82
3.1.5.4 50% of torque defined in 3.1.5.2							
65.39	2149	1078	1516	22.59	26.80	345	2.44
3.1.5.5 25% of torque defined in 3.1.5.2							
33.04	2184	1095	1341	16.19	19.22	490	1.72
3.1.5.6 unloaded							
1.18	2213	1110	1245	10.61	12.59	8980	0.09

- No load maximum engine speed: 2213 rev/min
- Torque (equivalent crankshaft) at rated speed:
  - At rated engine speed 683 Nm
  - At 2-hour test 907 Nm
- Maximum torque (equivalent crankshaft): 1055 Nm
  (engine speed: 1301 rev/min)

Mean atmospheric conditions:		
Dry bulb	27	°C
Pressure	97.4	kPa
Relative Humidity	50	%
Maximum temperatures:		
Coolant	94	°C
Engine oil	116	°C
Fuel	46	°C
Engine air intake	38	°C

3.2 HYDRAULIC POWER AND LIFTING FORCE

3.2.1 Hydraulic Power Test

Date of Test: 16-Oct-03 Location of Test-City-State: Tractor Test Lab, Lincoln, NE, USA
Tractor Model: Case IH MX 230 Tapping point used for test: Remote hydraulic outlets

3.2.1.1 Hydraulic Fluid Characteristics

Found in: **2.7.2 Specifications**

3.2.1.2 Compulsory Report(Test Results):

	Pressure	Reservoir oil Temperature	Engine Speed	Flow Rate	Power
	MPa	°C	rev/min^{-1}	l/min	kW
Rated Engine Speed: (Manufactures Specification)			2000		
Maximum (sustained) pressure with relief valve open as measured at the coupler Pump stalled: Yes	22.33	70	2218		
Flow rate corresponding to a hydraulic pressure equivalent to 90 percent of the actual relief valve pressure setting and corresponding hydraulic power through two coupler pairs:	20.01	76	2176	131.4	43.8
Maximum available flow and maximum power from one coupler pair:	*	*	*	*	*
Maximum available flow from coupler pairs operating simultaneously (flow through two or more coupler pairs if required):	3.40	56	2217	160.9	9.0
Maximum power from coupler pairs operating simultaneously (flow through two or more coupler pairs if required):	19.30	75	2173	144.6	46.6

* Tractor was tested according to a version of OECD Code 2 which did not require explicitly measuring the maximum available hydraulic power with flow through one coupler pair.

3.2.2 POWER LIFT TEST Category III, Euro lower links, cylinders - 2 x 95 mm
Date of test: 5 August 2003

		Hitch points	Frame
Lower hitch points above ground - down position:	mm	228	228
Vertical movement - without load:	mm	815	898
with load:	mm	759	804
Maximum corrected force exerted through full range:	kN	71.9	66.9
Corresponding pressure:	MPa	20.2	20.2
Moment about rear axle:	kNm	100.9	134.7
Maximum mast tilt angle:	degrees	--	4.3

Lifting height relative to horizontal position of lower links.

mm		-283	-275	-192	-99	0	100	196	295	396	476	529
Corrected lift forces												
At the Hitch point	kN	71.9	--	75.1	77.7	79.8	81.6	83.3	85.0	86.8	88.3	--
at the frame	kN	--	78.4	78.1	77.7	77.0	75.9	74.2	72.2	69.6	68.7	66.9
Corresponding pressure	Mpa	20.2										

OECD Drawbar Data (SI)

Date of tests: 17,27-Oct-03 | Fuel density: 0.843 kg/l
Type of track: Concrete | Test number: 1826
3.3.1 Maximum power in tested gears (unballasted, 4wd) | Tire pressure: 103 kPa, rear 90 kPa, front | Drawbar Height: 432 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
*3	3	89.60	86.54	3.73	2088	14.2	0.380	2.22	41	86	108	8	73	97.4
4	4	105.07	87.31	4.33	2063	12.0	0.366	2.30	40	87	108	8	73	97.4
5	5	116.72	81.24	5.17	2037	7.3	0.341	2.47	40	87	106	9	68	98.4
6	6	124.52	79.57	5.63	1926	6.8	0.328	2.57	43	87	109	9	68	98.4
7	7	134.98	78.02	6.23	1814	6.3	0.304	2.78	43	88	109	11	70	98.4
8	8	138.64	73.60	6.78	1704	5.3	0.292	2.89	45	90	111	12	66	98.4
9	9	139.03	63.19	7.92	1702	3.9	0.289	2.92	45	90	111	13	62	98.3
10	10	138.32	54.51	9.14	1693	2.9	0.294	2.87	47	91	111	14	59	98.3
11	11	135.84	46.46	10.53	1694	2.6	0.298	2.83	44	91	112	15	55	98.3
12	12	135.47	40.12	12.16	1698	2.1	0.297	2.84	46	92	112	15	59	98.3
13	13	134.24	31.90	15.15	1689	1.6	0.305	2.78	46	92	113	15	59	98.3
* Note: Slip within operating procedures of testing station.														
3.3.2 Fuel consumption														
3.3.2.1			In selected gear at maximum power at rated engine speed.											
9	9	121.53	46.42	9.43	1997	2.6	0.327	2.58	46	90	112	14	58	98.3
3.3.2.1.1			75% of pull at maximum power at rated engine speed											
9	9	95.60	34.64	9.93	2088	1.8	0.354	2.38	45	88	109	17	57	98.1
3.3.2.1.2			50% of pull at maximum power at rated engine speed											
9	9	65.37	23.17	10.16	2121	1.2	0.407	2.07	46	86	107	17	57	98.1
3.3.2.1.3			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.1											
10	10	95.47	34.67	9.91	1816	1.8	0.316	2.67	47	86	107	17	57	98.1
3.3.2.1.4			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.2											
10	10	65.21	23.06	10.18	1853	1.2	0.372	2.27	46	85	105	17	57	98.1
3.3.2.1.5			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.1											
11	11	94.98	34.61	9.88	1574	1.6	0.294	2.86	44	86	106	17	57	98.1
3.3.2.1.6			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.1.2											
11	11	65.11	23.05	10.17	1610	1.0	0.335	2.52	45	85	103	17	57	98.1
3.3.2.2			In selected gear nearest to 7.5 km/h at rated engine speed.											
7	7	123.17	63.00	7.04	2001	4.0	0.322	2.62	44	89	111	12	65	98.4
3.3.2.2.1			75% of pull at maximum power at rated engine speed											
7	7	97.64	47.36	7.42	2079	2.6	0.349	2.42	47	88	110	16	55	98.3
3.3.2.2.2			50% of pull at maximum power at rated engine speed											
7	7	66.84	31.55	7.63	2116	1.6	0.389	2.17	46	86	107	16	56	98.2
3.3.2.2.3			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.1											
8	8	97.46	47.34	7.41	1810	2.6	0.307	2.75	45	86	106	16	56	98.2
3.3.2.2.4			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.2											
8	8	67.11	31.57	7.65	1851	1.6	0.342	2.47	46	85	105	16	56	98.2
3.3.2.2.5			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.1											
9	9	97.73	47.37	7.43	1573	2.6	0.284	2.97	45	86	105	16	56	98.2
3.3.2.2.6			Higher gear at reduced engine speed, same pull and travel speed as 3.3.2.2.2											
9	9	67.14	31.53	7.67	1608	1.6	0.310	2.72	45	85	102	17	57	98.2

OECD Drawbar Data (SI)

Date of tests: 20-Oct-03 **Fuel density:** 0.843 kg/l

Type of track: Concrete **Test number:** 1826

3.3.1 Maximum power in tested gears (ballasted, 4wd) **Tire pressure:** 69 kPa, rear 117 kPa, front **Drawbar Height:** 445 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
*3	3	116.01	108.58	3.85	2020	7.8	0.347	2.43	44	88	109	16	69	97.3
4	4	124.10	104.94	4.26	1922	6.5	0.327	2.57	45	88	109	17	61	97.4
5	5	131.19	102.25	4.62	1807	6.0	0.315	2.68	46	89	109	18	58	97.4
6	6	134.29	95.80	5.05	1699	4.7	0.304	2.77	46	90	109	18	58	97.4
7	7	137.56	83.26	5.95	1696	3.6	0.296	2.85	47	91	111	19	59	97.5
8	8	138.12	72.33	6.87	1696	2.8	0.294	2.86	48	91	110	19	60	97.5
9	9	137.15	61.93	7.97	1699	2.5	0.296	2.85	47	91	112	20	56	97.5
10	10	135.30	53.05	9.18	1698	2.0	0.301	2.80	47	92	113	21	53	97.5
11	11	132.28	45.06	10.57	1698	1.7	0.302	2.79	48	92	114	21	53	97.5
12	12	130.78	38.66	12.18	1699	1.0	0.305	2.76	49	92	113	23	45	97.5
13	13	129.21	30.68	15.16	1691	0.5	0.310	2.72	49	92	114	24	43	97.5

* Note: Slip limited to avoid excessive bouncing.

4.2 HYDRAULIC POWER (High Flow Pump-Test Data From Case IH MX255)

4.2.1 Hydraulic Power Test

Date of Test: 4-Dec-03 Location of Test-City-State: Tractor Test Lab, Lincoln, NE, USA

Tractor Model: Case IH MX 230 Tapping point used for test: Remote hydraulic outlets

4.2.1.1 Hydraulic Fluid Characteristics

Found in: **2.7.2 Specifications**

4.2.1.2 Compulsory Report(Test Results):

	Pressure	Reservoir oil Temperature	Engine Speed	Flow Rate	Power
	MPa	°C	rev/min^{-1}	l/min	kW
Rated Engine Speed: (Manufactures Specification)			2000		
Maximum (sustained) pressure with relief valve open as measured at the coupler Pump stalled: Yes	22.12	93	2226		
Flow rate corresponding to a hydraulic pressure equivalent to 90 percent of the actual relief valve pressure setting and corresponding hydraulic power through two coupler pairs:	20.01	98	2177	152.0	50.7
Maximum available flow and maximum power from one coupler pair:	*	*	*	*	*
Maximum available flow from coupler pairs operating simultaneously (flow through two or more coupler pairs if required):	6.80	69	2197	206.7	23.5
Maximum power from coupler pairs operating simultaneously (flow through two or more coupler pairs if required):	19.00	97	2159	176.5	56.0

* Tractor was tested according to a version of OECD Code 2 which did not require explicitly measuring the maximum available hydraulic power with flow through one coupler pair.

4.3 POWER LIFT TEST Category III, with Quick coupler, cylinders - 2 x 89 mm
Date of test: 5 August 2003

		Hitch points	Frame
Lower hitch points above ground - down position:	mm	227	233
Vertical movement - without load:	mm	720	784
with load:	mm	674	718
Maximum corrected force exerted through full range:	kN	73.5	62.6
Corresponding pressure:	MPa	20.2	20.2
Moment about rear axle:	kNm	93.9	118.1
Maximum mast tilt angle:	degrees	--	4.4

Lifting height relative to horizontal position of lower links.

mm		-285	-281	-200	-99	-1	98	195	295	389	437
Corrected lift forces											
At the Hitch point	kN	73.5	--	76.1	78.4	80.0	81.0	81.7	82.2	82.7	--
at the frame	kN	--	81.0	79.6	78.2	76.5	74.4	71.3	67.5	64.7	62.6
Corresponding pressure	Mpa	20.2									

4.4 POWER LIFT TEST Category III, with Quick coupler, cylinders - 2 x 95 mm
Date of test: 5 August 2003

		Hitch points	Frame
Lower hitch points above ground - down position:	mm	229	233
Vertical movement - without load:	mm	720	784
with load:	mm	675	712
Maximum corrected force exerted through full range:	kN	85.0	72.8
Corresponding pressure:	MPa	20.2	20.2
Moment about rear axle:	kNm	119.3	146.7
Maximum mast tilt angle:	degrees	--	4.1

Lifting height relative to horizontal position of lower links.

mm		-286	-281	-194	-101	3	100	197	295	389	431
Corrected lift forces											
At the Hitch point	kN	85.0	--	88.5	90.7	92.6	93.7	94.6	95.2	95.3	--
at the frame	kN	--	95.5	92.1	90.3	88.2	85.5	82.3	77.9	74.5	72.8
Corresponding pressure	Mpa	20.2									

4.5 Measurement of External Noise Level – Case IH MX230

-- Date of Test	October 15, 2003
-- 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	30.0 km/h
-- Noise Level	85.2 dB(A)

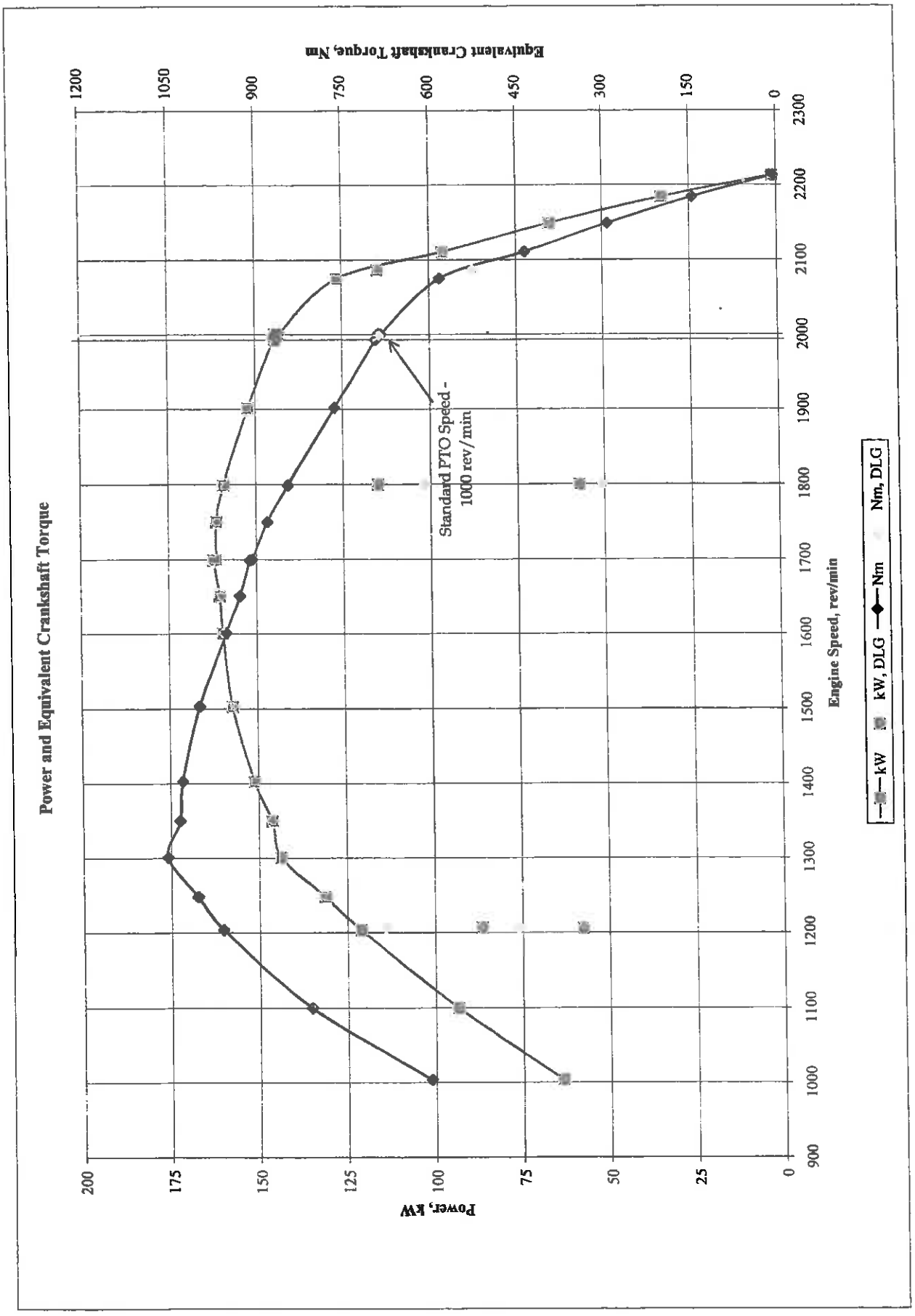
4.6 Measurement of Noise Level at Operator's Ear*

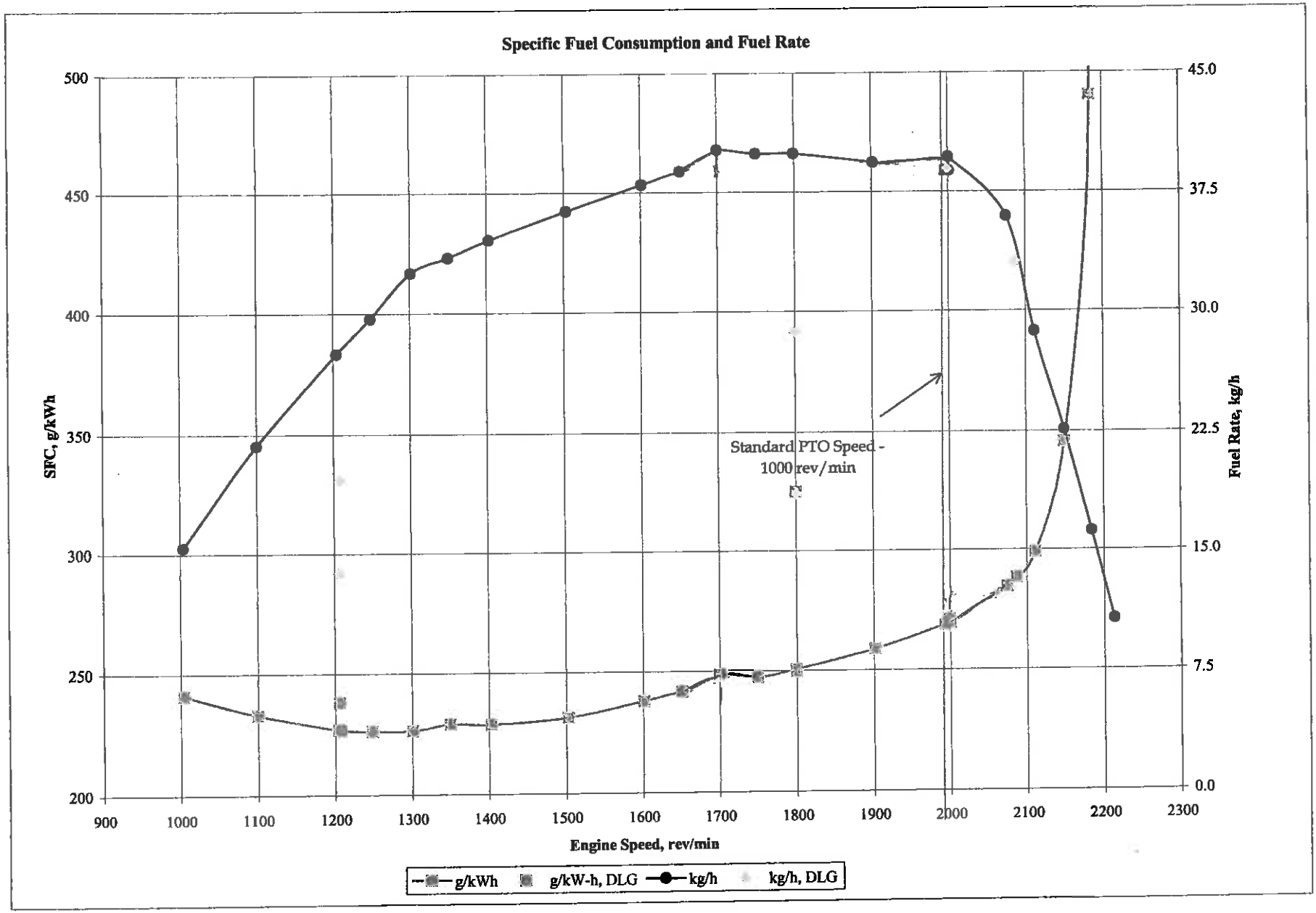
-- Date of Test	October 17, 2003
-- Location of Test	Nebraska Tractor Test Laboratory
-- Sound Level Meter	Bruel and Kjaer 2236
-- Type of Track	Concrete Oval
-- Gear Number	9
-- Drawbar Load	34.6 kN
-- Noise at Operator Ear	71.3 dB(A) – front wheel drive engaged

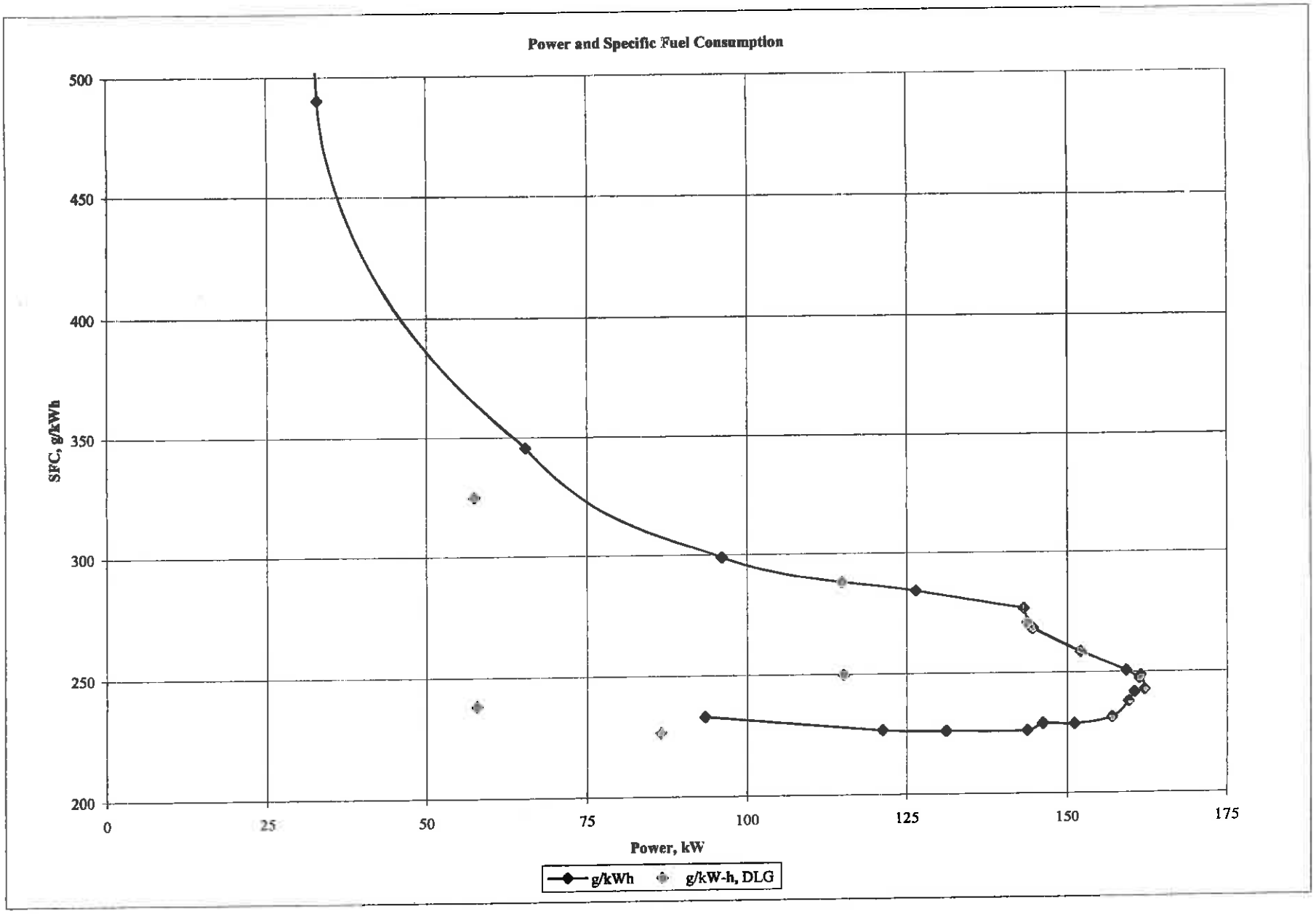
* Note: Nebraska tractor test station guidelines.

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, DLG
Nm
Nm, DLG
200
175
150
125
100
75
50
25
0
1200
1050
900
750
600
450
300
150
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
500
450
400
350
300
250
200
45.0
37.5
30.0
22.5
15.0
7.5
0.0
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
Standard PTO Speed - 1000 rev/min
g/kWh
g/kW-h, DLG
kg/h
kg/h, DLG


Power and Specific Fuel Consumption
SFC, g/kWh
500
450
400
350
300
250
200
0
25
50
75
100
125
150
175
Power, kW
g/kWh
g/kW-h, DLG