OECD Report

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CODE 2

OECD RESTRICTED STANDARD CODE FOR THE OFFICIAL TESTING OF AGRICULTURAL AND FORESTRY TRACTOR PERFORMANCE

New Holland PBR7BC1 (TS 110A) Four-Wheel Drive Tractor with 16-speed Semi Powered Shift Transmission (40 km/h)



Manufactured by: CNH UK Limited
Basildon
Essex SS14 3AD
United Kingdom

Reference No: 840

Date: December 2004

File: 6645/2003

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Statement

The information opposite each item has been validated by the Testing Station. An item marked [C] indicates to the test report user that the information declared by the manufacturer has been checked; an item marked [D] indicates that the manufacturer's declaration has been endorsed.

[C]	Tractor manufacturer's name and address:	CNH UK Limited Basildon, Essex, SS14 3AD United Kingdom
[C]	Location of tractor assembly:	Basildon, Essex / St Valentin, Austria
[D]	Submitted for test by:	The manufacturer
[C]	Selected for test by:	The manufacturer with the agreement of the testing station
[D]	Place of running in:	Basildon. Essex
[D]	Duration of running in:	50 hours
[C]	Location of test:	Silsoe Research Institute Wrest Park, Silsoe, MK45 4HS United Kingdom

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

1.1.1

[C]	Make of tractor:	New Holland
[C]	Model (trade name):	TS 110A
[C]	Type:	Four- wheel drive, unit construction

1.1.2 *Numbers*

[D]	1st Serial No or prototype:	ACP207661/EKP001001
[C]	Serial No:	216189

1.1.3 *Other specifications (if applicable)*

[D]	Model(s) for other countries:	None
[C]	Transmission type or gears x ranges:	16-Speed Semi-Power Shift
[C]	Speed version:	40 km/h
[C]	Manufacturer identification or Technical type number:	PBR7BC1

1.2 Engine

[C]	Make:	CNH
[C]	Model:	F4DE0484A*D
[C]	Type:	4 stroke turbocharged direct injection and after cooled diesel
[C]	Serial No:	00073305

1.2.1 *Cylinders*

[C]	Number/disposition:	4 vertical in-line
[D]	Bore/stroke:	104.0mm/132.0mm
[D]	Capacity:	4485 cm^3
[D]	Compression ratio:	17.0 : 1
[D]	Arrangement of valves:	Overhead
[D]	Cylinder liners:	None, monobloc construction

1.2.2	*Supercharging*	
[D]	Make/Model:	Holset/HX27W
[C]	Type:	Exhaust driven
[D]	Pressure:	0.116 MPa at rated speed/load
1.2.3	*Fuel system*	
[D]	Fuel feed system:	Gear pump
[C]	Make, type and model of fuel filter:	None, two disposable canister filters incorporating sediment and water separation plus plastic strainer in tank
[D]	Capacity of fuel tank:	180 dm^3
[D]	Make, type and model of injection pump:	Bosch, high pressure pump – common rail/CR/CP3 S3
[D]	Serial No:	489 8921
	Manufacturer's production setting of injection pump	
[C]	Flow rate (rated engine speed and full load):	102.4 mm^3 ±5% per stroke at 2200 min^{-1} (rev/min) 25.68 – 28.38 dm^3/h
[D]	Timing:	Variable
[D]	Make, type and model of injectors:	Bosch, managed by electronic control unit DSLA143 P970
[D]	Injection pressure:	125 MPa
1.2.4	*Governor*	
[C]	Make:	Bosch
[D]	Model:	None
[C]	Type:	Managed by electronic control unit
[C]	Governed range of engine speed:	700 to 2375 min^{-1} (rev/min)
[C]	Rated engine speed:	2200 min^{-1} (rev/min)
1.2.5	*Air cleaner*	
[C]	Pre-cleaner	Not fitted
[C]	Type:	----
[C]	Location:	----
	Main cleaner Make:	Donaldson
[C]	Type:	3 stage dry paper element with replaceable cartridge
[D]	Model:	None
[C]	Location of air intake:	Under engine bonnet at front and above radiator.
[C]	Maintenance indicator:	Warning light on instrument panel

1.2.6 *Lubrication system*

[D]	Type of feed pump:	Forced feed from concentric rotor pump
[D]	Type of filter:	Mesh strainer in sump on suction line and full flow disposable canister on pressure line to engine
[C]	Number:	1

1.2.7 *Cooling system*

[C]	Type of coolant:	Water and antifreeze (50% solution)
[D]	Type of pump:	Belt driven centrifugal impeller
	Specification of fan	
[C]	Number of fan blades:	5
[C]	Fan diameter:	510 mm
[D]	Coolant capacity:	21 dm^3
[D]	Type of temperature control:	Thermostat with full flow bypass
[D]	System pressure:	100 kPa

1.2.8 *Starting system*

[D]	Make:	Bosch
[D]	Model:	EV3
[C]	Type:	Electrical, positive engagement, solenoid operated
[D]	Starter motor power rating:	3.1/3.6 kW 3.0 kW (Reduction geared)
[D]	Cold starting aid:	Phillips and Temro, injection management thermostarter
[C]	Safety device:	Starting inoperable unless shuttle lever in neutral, clutch pedal depressed and operator seat presence switch is activated

1.2.9 *Electrical system*

[C]	Voltage:	12 V
	Generator:	Alternator
[C]	Make:	Denso
[C]	Model:	A 127
[C]	Type:	Belt driven
[C]	Power:	70 amps at 6000 min^{-1} (rev/min)
	Batteries	
[C]	Number:	1 Exide lead acid, mounted behind right hand steps
[D]	Rating:	176 Ah at 20 hours

1.2.10 *Exhaust system*

[C]	Make:	COR.TUBI
[D]	Model:	None
[C]	Type:	Vertical stack pipe with intergral silencer
[C]	Location:	Engine rear on right hand side
[C]	Height of outlet above ground:	2930 mm

1.3 Transmission

1.3.1 *Clutch (Travel alone)*

[D]	Make:	CNH
[D]	Model:	None
[D]	Type:	Wet multiplate in gearbox, for travel only
[D]	Number of plates:	9
[D]	Diameter of plates:	160 mm
[C]	Method of operation:	Electro-hydraulic with pedal override

1.3.2 *Gear box*

[D]	Make:	CNH
[C]	Model:	Semi power shift
[C]	Description:	Electro/Hydraulic, synchromesh operation. 4 powershift gears with 4 ranges (total 16 speeds) selected by a combination of mechanical lever and electrical buttons located within the right-hand console Forward/reverse is actuated by a steering column mounted shuttle lever.

		Forward	Reverse
[C]	Number of gears	4	4
[C]	Number of ranges/groups	4	4
[C]	Total of arrangements	16	16

Available options:

12 x12 with or without creep (30/40 km/h)
16 x 16 with or without creep (30/40 km/h)
24 x 24 with or without creep (30/40 km/h)
17 x 16 less creep only (50km/h)

1.3.3 *Rear axle and final drives*

[D]	Make:	CNH
[D]	Model:	None
[D]	Type:	Crown wheel pinion with differential and inboard epicyclic reduction gear final drive
	Differential lock:	
[D]	Type:	Mechanical or multiplate
[C]	Method of engagement:	Electro-hydraulic actuation in response to signal from switch on right-hand control panel or auto diff lock actuation
[C]	Method of disengagement:	Via panel switch or in response to signal from brakes on application, or auto diff lock disengagement

1.3.4 *Front axle and final drives*

[D]	Make:	CNH
[D]	Model:	None
[D]	Type:	Crown wheel and pinion with differential and outboard epicyclic reduction gear final drives
	Drive engagement:	
[D]	Type:	Mechanical or multiplate clutch – located within the gearbox
[C]	Method of operation:	Electro-hydraulic actuation in response to signal from switch on right-hand control panel or auto 4wd engagement
	Differential lock:	
[D]	Type:	Mechanical or multiplate clutch
[C]	Method of engagement:	Electro-hydraulic actuation in response to signal from switch on right-hand control panel or auto diff lock actuation
[C]	Method of disengagement:	Via panel switch or in response to signal from brakes on application, or auto diff lock disengagement

1.3.5 *Total ratios and travelling speeds*

	Gear	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at rated engine speed:* 2200 rev/min km/h
	Forward			
[C]	1	A	300.12	2.27
[C]	2	A	244.86	2.78
[C]	3	A	200.93	3.39
[C]	4	A	163.80	4.15
[C]	5	B	127.76	5.32
[C]	6	B	104.15	6.53
[C]	7	B	85.53	7.95
[C]	8	B	69.73	9.75
[C]	9	C	76.75	8.86
[C]	10	C	62.57	10.87
[C]	11	C	51.38	13.24
[C]	12	C	41.89	16.24
[C]	13	D	32.57	20.82
[C]	14	D	26.63	25.54
[C]	15	D	21.87	31.09
[C]	16	D	17.83	38.14
	Reverse			
[C]	1	A	303.57	2.24
[C]	2	A	247.56	2.75
[C]	3	A	203.30	3.35
[C]	4	A	165.73	4.10
[C]	5	B	129.29	5.26
[C]	6	B	105.38	6.45
[C]	7	B	86.54	7.86
[C]	8	B	70.55	9.64
[C]	9	C	77.66	8.76
[C]	10	C	63.31	10.74
[C]	11	C	51.99	13.08
[C]	12	C	42.38	16.05
[C]	13	D	33.06	20.57
[C]	14	D	26.95	25.24
[C]	15	D	22.13	30.73
[C]	16	D	18.04	37.70

(*) Calculated with a tyre dynamic radius index of 820 mm

[C] Number of revolutions of front wheels for one revolution of rear wheels: 1.353

1.4 Power take-off

1.4.1 *Main power take-off*

[C]	Type:	Independent
[C]	Method of engagement:	Electro-hydraulic operated multi-plate clutch in response to a signal from switch on the right-hand control panel
[C]	Number of shafts:	1 interchangeable shaft, 6 or 21 splines to ISO 500/1991
[C]	Method of changing power take-off speeds:	Two speed shiftable, 540 or 1000 min^{-1} (rev/min) by lever on right-hand console or by changing shafts
	Clutch	
[D]	Make:	CNH
[D]	Model:	None
[D]	Type:	Multiplate, wet
[D]	Number of plates:	6
[D]	Diameter of plates:	140.0 mm

1.4.1.1 Power take-off proportional to engine speed

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

[C]	Location:	Rear of tractor
[C]	Diameter of power take-off shaft:	34.9 mm
[C]	Number of splines:	6 in conformity with ISO 500/1991 (available option 21)
[C]	Height above ground:	772 mm
[C]	Distance from the median plane of the tractor:	Central
[C]	Distance behind rear wheel axis:	555 mm
[C]	PTO speed at rated engine speed:	603 min^{-1} (rev/min)
[C]	Engine speed at standard power take-off speed:	1969 min^{-1} (rev/min)
[C]	Ratio of rotation speeds:	3.65
[D]	Power restriction:	None
[D]	Maximum torque transmissible:	None
[C]	Direction of rotation (viewed from behind tractor):	Clockwise

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

[C]	Location:	Rear of tractor
[C]	Diameter of power take-off shaft:	34.9 mm
[C]	Number of splines:	21 in conformity with ISO 500/1991 (available option 6)
[C]	Height above ground:	772 mm
[C]	Distance from the median plane of the tractor:	Central
[C]	Distance behind rear wheel axis:	555 mm
[C]	PTO speed at rated engine speed:	1038 min^{-1} (rev/min)
[C]	Engine speed at standard power take-off speed:	2120 min^{-1} (rev/min)
[C]	Ratio of rotation speeds:	2.12
[D]	Power restriction	None
[D]	Maximum torque transmissible:	None
[C]	Direction of rotation (viewed from behind tractor):	Clockwise

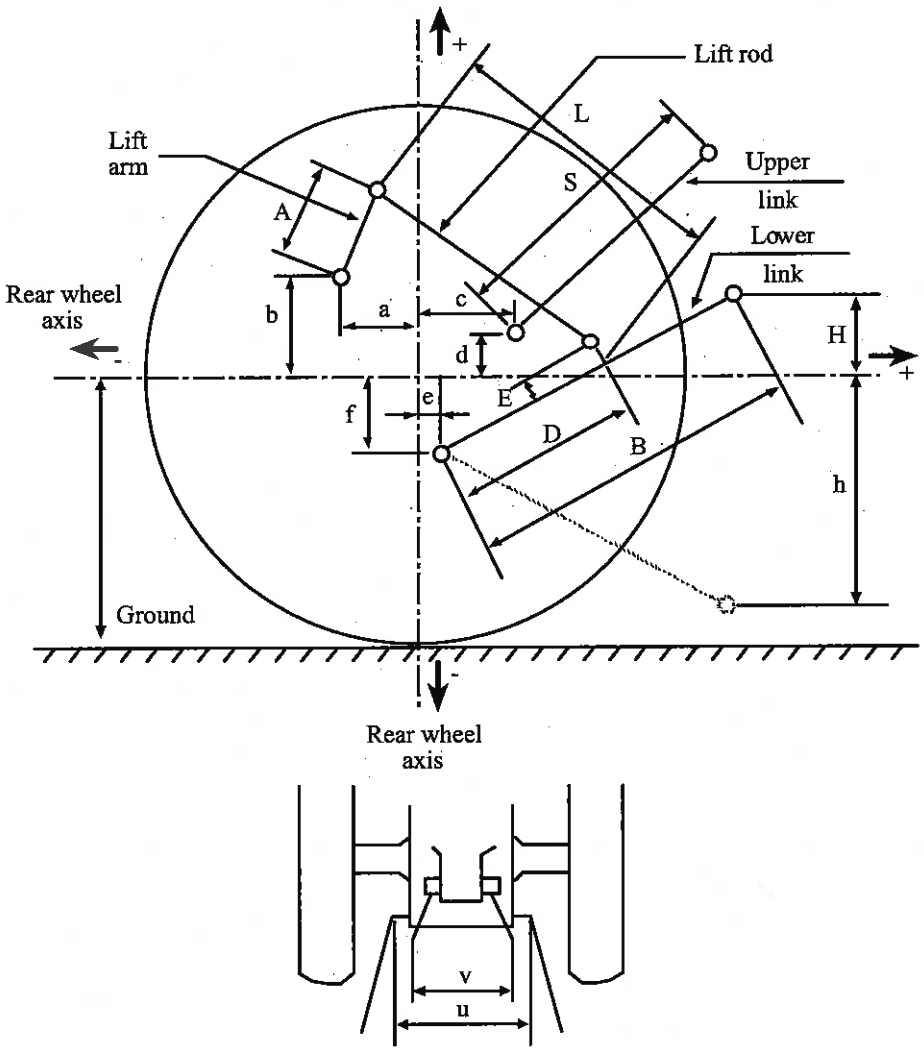
1.4.1.2 Power take-off proportional to ground speed — Not applicable

1.5 Hydraulic power lift

[C]	Make:	CNH
[D]	Model:	None
[D]	Type:	Mechanical closed centre
[C]	Type and number of cylinders:	1 internal plus 1 single acting externally mounted ram.
[C]	Type of linkage lock for transport:	Hydraulic
[D]	Pump maximum pressure / Relief valve pressure setting:	20.5 – 21.5 MPa
[D]	Opening pressure of cylinder safety valve:	22.0 – 23.0 MPa
[D]	Lift pump type:	Variable displacement piston pump
[D]	Transmission between pump and engine:	Gear driven from PTO shaft, independent of main and PTO clutches
[C]	Type and number filters:	1 disposable canister filter and 1 cartridge filter
[C]	Site of oil reservoir:	Rear axle housing
[C]	Type, number and location of tapping points:	2 remote couplers at rear of tractor
[D]	Maximum volume of oil available to external cylinders:	19 litres under normal conditions (flat fields) 27 litres when operating stationary on level ground

1.6 Three-point linkage

[C]	Category:	2 in conformity with ISO 730-1:1994 + Cor.1:1995
[C]	Category adapter:	None
[C]	Controls:	Mechanical draught/ position control with lower link sensing



LIFT TEST
Linkage geometry

Fig 1.1 and Fig 1.2

Table 1.1
Dimensions of linkage when attached to the standard frame (ISO 730-1-1994 CAT 2)

				Dimensions or ranges	Settings used in tests		
					3.2.2	7.1	7.2
				mm	mm	mm	mm
[C]	Length of lift arms:		(A)	310	310	310	310
[C]	Length of lower links:		(B)	950	950	950	950
[C]	Distance of lift arm pivot point from rear wheel centre line:	horizontally: vertically:	(a) (b)	138 370	138 370	138 370	138 370
[C]	Horizontal distance between the two lower link points:		(u)	460	460	460	460
[C]	Horizontal distance between the two lift arm end points:		(v)	550	550	550	550
[C]	Length of upper link:		(S)	650 – 913	700	723	710
[C]	Distance of upper link pivot point from rear wheel centre line:	horizontally: vertically:	(c) (d)	430 – 455 208 – 275	455 208	430 275	430 275
[C]	Distance of lower link pivot point from rear wheel centre line:	horizontally: vertically:	(e) (f)	168 235	168 235	168 235	168 235
[C]	Distance of lower link points to lift rod pivot points on lower link centre line:		(D)	505,585,665	505	665	585
[C]	Length of lift rods:		(L)	680 – 815	767	815	815/705
	Height of lower hitch points (*) Relative to the rear wheel centre line, situated 820 mm above the ground level:						
[C]	- in low position		(h)	80 – 740	604	480	520/405
[C]	- in high position		(H)	0 – 225	0	0	0/65
[C]	Height of lower hitch points when locked in transport position (*)			Any height within lift range (hydraulic transport lock)			

*Assuming r = tyre dynamic radius index of 820 mm

1.7 Swinging drawbar

[C]	Type:		Clevis		
[C]	Height above ground:	Unballasted Maximum:	562 mm		
		Minimum:	452 mm		
[C]	Type of adjustment:		Inverting drawbar		
[C]	Distance of hitch point from rear-wheel axis, horizontally:		805 mm	905 mm	955 mm
[C]	Distance of hitch point from power take-off shaft end:				
		Vertically:	210 mm	320 mm	
		Horizontally:	250 mm	350 mm	400 mm
[C]	Lateral adjustment (centre of clevis):				
		Right-hand:	173 mm	210 mm	220 mm
		Left-hand:	173 mm	210 mm	220 mm
[C]	Distance of pivot point from rear axles	horizontally:	243 mm	behind rear axle	
[C]	Width of clevis:		70 mm		
[C]	Diameter of drawbar pin hole:		33 mm		
[D]	Maximum vertical permissible load:	Clevis uppermost:	2040 kg	1330 kg	1140 kg
		Clevis underneath:	1305 kg	1225 kg	1045 kg

1.8 Trailer hitch None fitted

1.9 Holed drawbar

Type: None fitted

1.10 Steering

[D]	Make:	CNH
[D]	Model:	None
[D]	Type:	Hydrostatic
	Method of operation	
[C]	Pump:	Bosch
[C]	Motor:	Sauer Danfoss OSPC-160-OR
[C]	Ram:	2, balanced system with double acting cylinders one operating each steering arm
[D]	Filter:	Integral with hydraulic power lift system
[D]	Working pressure:	17 MPa

1.11 Brakes

1.11.1 *Service brake*

[D]	Make:	CNH
[D]	Model:	None
[D]	Type:	Oil-immersed single plate disc
[C]	Method of operation:	Hydraulic, independent on rear wheels (On 4 WD models. When the service brakes are activated the front wheel drive is automatically engaged providing 4-wheel braking)
[C]	Trailer braking take-off:	Hydraulic connector fitted to ISO 5676-1983

1.11.2 *Parking brake*

[D]	Type:	Fully independent four plate disc operating on bevel pinion shaft
[C]	Method of operation:	Hand lever with ratchet

1.12 Wheels

Number

[C] Front: 2 driving/steering

[C] Rear: 2 driving

[C] Wheelbase: 2412 mm

Track width adjustment:

		Minimum mm	Maximum mm	Adjustment method
[C]	Front*	1630	2080	Reversing wheels and offset lug rims
[C]	Rear	1730	2130	Reversing wheels and offset lug rims

*55° steering angle available only on 1860 mm and larger track settings

1.13 Protective structure

[C] Make: CNH

[C] Model: APH02

[C] Type: Rear mounted 2 post folding ROPS

[C] Manufacturer's name and address: CNH UK Ltd
Cranes Farm Road
Basildon
Essex
SS14 3AD

Protective device

[C] Cab/frame/rollguard/ other: ROPS

[C] Tiltable/Not tiltable: Tiltable

OECD approval

[C] Approval number: 4/0739

[C] Date of approval: 19 September 2002

Nos. minor modification certificates, if any: 2

The certificates for minor modifications established by Danish testing station

1.14 Seat

1.14.1 *Driver's seat*

[C]	Make/model/Type:	Grammer MSG 44/520, 85/731 EEC approved to 78/764/EEC – e1*0008*01, e1*10009*04
[C]	Seat and steering wheel reversible:	No
[C]	Type of suspension:	Parallelogram – mechanical spring
[C]	Type of damping:	None
	Range of adjustment -	
[C]	Longitudinal:	+ 90 mm / -120 mm
[C]	Vertical:	± 75 mm
[C]	Safety belt:	Yes

1.14.2 *Optional driver's seat(s)*

1.14.3 *Passenger seat*

[C]	Make:	Not fitted

1.15 Lighting

		Height above ground to centre	Size	Distance from outside edge of lights to medium plane of tractor
		mm	mm	mm
[C]	Headlights	1360	145 x 145	280
[C]	Sidelights	---	—	---
[C]	Rear lights	1795	265 x 53	893
[C]	Rear fender reflectors	1795	265 x 53	893
[C]	Rear fender strip reflectors	1635	230 x 50	890

2 TEST CONDITIONS

2.1 Overall dimensions

	length	Width		Height at top of	
		minimum	maximum	Protective structure	Exhaust pipe
	mm	mm	mm	mm	mm
Unballasted	4265	2430	2430	2960	2930

2.2 Ground clearance (unballasted tractor) 362 mm

Clearance-limiting part: Drawbar clevis in lowest position

2.3 Tractor mass

Mass (with or without frame/roll guard/cab/other): With ROPS

	Unballasted	
	Without driver	With driver
	kg	kg
Front	1819	1838
Rear	2855	2911
Total	4674	4749

2.4 Ballast Not applicable

2.5 Track specifications Not applicable

2.6 Tyres and track width specification

	Front	Rear
Tyres Dimensions ply rating type	 480/65R28 136 A8 Radial	 600/65R 38 153 A8 Radial
Maximum load (tyre manufacturer's) 30/40/50 km/h	15.4/14.4/13.1 kN	25.3/23.6/21.4 kN
Maximum load (tractor manufacturer's) 30/40/50	15.4/14.4/13.1 kN	25.3/23.6/21.4 kN
Inflation pressure (tyre manufacturer's)	62 kPa	62 kPa
Dynamic radius index	640 mm	820 mm
Chosen track width (manufacturer's nominal)	1830 mm	1830 mm

2.7 Fuel

Type: Diesel oil to Class D, 1.5 to 5.5 cSt.

Density at 15° C: 0.8453 g/cm^3

2.8 Oils and lubrication

2.8.1 *Capacity and change interval*

	Capacity	Oil change	Filter change
	dm^3	h	h
Engine	10.0	600	600
Front axle differential	9.0	1200	None
Front axle hub (each)	1.7	1200	None
Gearbox	62.0	1200	600/1200
Rear axle Hydraulic system Final drives (rear) Steering	Integral with gearbox		
Brakes	0.5	Top-up	None

2.8.2 *Specifications (SAE, APL, CCMC, ACEA, MILL, ISO)*

	spec	Recommended	Used during test
Engine oil Type: Viscosity Classification:	NH 324H	Ambra Super Gold HSP 11.5 cSt at 100° C API CH – 4	As recommended
Transmission oils Type: Viscosity Classification:	NH 410B	Ambra Multi G 9 cSt at 100° C API GL – 4	As recommended
Rear final drives Type: Viscosity: Classification:	NH 410B	Ambra Multi G 9 cSt at 100° C API GL – 4	As recommended
Front differential and final drives Type: Viscosity: Classification:	NH 410B	Ambra Multi G 9 cSt at 100° C API GL – 4	As recommended
Hydraulic brakes Type: Viscosity: Classification:	NH 610A	Ambra LHM Brake 6 cSt at 100° C ISO 7308	As recommended
Hydraulic fluid Type: Viscosity: Classification:	NH 410B	Ambra Multi G 9 cSt at 100° C API GL – 4	As recommended
Steering oil Type: Viscosity: Classification:	NH 410B	Ambra Multi G 9 cSt at 100° C API GL – 4	As recommended

2.8.3 *Grease*

Type:	NH 710A	Ambra GR 9 NLGI 2 Lithium Based	As recommended

Number of lubrication points: 14

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

Date and location of tests: 18 and 22 November 2004
Silsoe Research Institute
Wrest Park, Silsoe, Bedford

Type of dynamometer bench: Eddy Current, Borghi and Saveri

Power	Speed			Fuel consumption			Specific Energy
	Engine	P.T.O.	Fan	Hourly		Specific	
kW	min^{-1} (rev/min)			kg/h	l/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER – TWO - HOUR TEST							
85.3	1893	893	2203	20.26	23.96	238	3.56
3.1.2 POWER AT RATED ENGINE SPEED							
76.2	2198	1037	2329	19.47	23.04	256	3.31
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000 ± 25 min^{-1} (rev/min)]							
80.0	2119	1000	2280	19.98	23.64	250	3.39
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed							
76.2	2198	1037	2329	19.47	23.04	256	3.31
3.1.4.2 85% of torque obtained in 3.1.4.1							
66.6	2258	1065	2251	17.89	21.16	268	3.15
3.1.4.3 75% of torque defined in 3.1.4.2							
50.6	2286	1078	2305	14.98	17.73	296	2.86
3.1.4.4 50% of torque defined in 3.1.4.2							
34.2	2314	1092	2220	11.98	14.18	351	2.41
3.1.4.5 25% of torque defined in 3.1.4.2							
17.3	2344	1106	1970	9.01	10.65	521	1.62
3.1.4.6 unloaded							
0	2367	1117	1360	5.50	6.50	-	-
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED [1000± 25 min^{-1} (rev/min)] 3.1.5.1 the torque corresponding to maximum power							
80.0	2119	1000	2280	19.98	23.64	250	3.39
3.1.5.2 85% of torque obtained in 3.1.5.1							
70.4	2192	1034	2344	18.62	22.02	264	3.20
3.1.5.3 75% of torque defined in 3.1.5.2							
53.2	2207	1041	2414	14.88	17.60	280	3.02
3.1.5.4 50% of torque defined in 3.1.5.2							
35.7	2225	1050	2257	11.91	14.09	333	2.54
3.1.5.5 25% of torque defined in 3.1.5.2							
18.0	2243	1058	1337	8.15	9.64	452	1.87
3.1.5.6 unloaded							
0	2256	1064	1364	4.89	5.78	-	-

3.1.6 PART LOADS AT DIFFERENT ENGINE SPEEDS							
3.1.6.1 maximum power at rated engine speed							
76.2	2198	1037	2329	19.47	23.04	256	3.31
3.1.6.2 80% of power obtained in 3.1.6.1 at max speed setting							
61.0	2266	1069	2340	16.97	20.08	278	3.04
3.1.6.3 80% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
61.0	1980	934	2220	15.46	18.29	253	3.34
3.1.6.4 40% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
30.5	1979	933	1330	9.16	10.84	301	2.81
3.1.6.5 60% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
45.7	1318	622	1800	10.58	12.52	232	3.65
3.1.6.6 40% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
30.6	1319	622	1500	7.79	9.21	255	3.32

No load maximum engine speed: 2367 min^{-1} (rev/min)

Torque (equivalent crankshaft) at maximum power

At rated engine speed: 330.9 Nm

At 2-hour test: 430.0 Nm

Maximum torque (equivalent crankshaft): 482.9 Nm
(engine speed: 1400 min^{-1} (rev/min)

Mean atmospheric conditions:	
Temperature	21 °C
Pressure	101.0 kPa
Relative humidity	41 %
Maximum temperatures:	
Coolant	87 °C
Engine oil	107 °C
Fuel	48 °C
Engine air intake	25 °C

Optional power take-off test

Boosted power

Power	Speed			Fuel consumption			Specific Energy
	Engine	P.T.O.	Fan	Hourly		Specific	
kW	min^{-1} (rev/min)			kg/h	l/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER							
98.2	1902	897	2286	23.58	27.89	240	3.52
3.1.2 POWER AT RATED ENGINE SPEED							
91.5	2197	1036	2543	22.99	27.19	251	3.36
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000 ± 25 min^{-1} (rev/min)]							
94.3	2119	999	2522	23.28	27.54	247	3.43
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed							
91.5	2197	1036	2543	22.99	27.19	251	3.36
3.1.4.2 85% of torque obtained in 3.1.4.1							
79.2	2236	1055	2308	20.11	23.79	254	3.33
3.1.4.3 75% of torque defined in 3.1.4.2							
60.1	2268	1070	2365	16.73	19.79	278	3.04
3.1.4.4 50% of torque defined in 3.1.4.2							
40.7	2302	1086	2310	13.08	15.47	322	2.63
3.1.4.5 25% of torque defined in 3.1.4.2							
20.7	2338	1103	2067	9.67	11.43	468	1.81
3.1.4.6 unloaded							
0	2366	1116	1350	5.43	6.42	-	-
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED [1000± 25 min^{-1} (rev/min)] 3.1.5.1 the torque corresponding to maximum power							
94.3	2119	999	2522	23.28	27.54	247	3.43
3.1.5.2 85% of torque obtained in 3.1.5.1							
82.3	2173	1025	2555	21.19	25.06	258	3.28
3.1.5.3 75% of torque defined in 3.1.5.2							
62.3	2191	1033	2430	17.50	20.70	281	3.01
3.1.5.4 50% of torque defined in 3.1.5.2							
41.8	2211	1043	2321	13.37	15.82	320	2.64
3.1.5.5 25% of torque defined in 3.1.5.2							
21.2	2231	1053	1372	8.54	10.10	403	2.10
3.1.5.6 unloaded							
0	2246	1060	1470	4.85	5.74	-	-

3.1.6 PART LOADS AT DIFFERENT ENGINE SPEEDS 3.1.6.1 maximum power at rated engine speed							
91.5	2197	1036	2543	22.99	27.19	251	3.36
3.1.6.2 80% of power obtained in 3.1.6.1 at max speed setting							
73.2	2246	1060	2354	19.26	22.78	263	3.21
3.1.6.3 80% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
73.2	1980	934	2265	17.92	21.20	245	3.45
3.1.6.4 40% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
36.6	1983	934	1870	10.63	12.57	290	2.91
3.1.6.5 60% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
54.9	1318	622	1423	12.51	14.80	228	3.71
3.1.6.6 40% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
36.6	1320	623	1588	8.99	10.64	246	3.44

No load maximum engine speed: 2366 min^{-1} (rev/min)

Torque (equivalent crankshaft) at maximum power

At rated engine speed: 397.5 Nm

At maximum power: 492.9 Nm

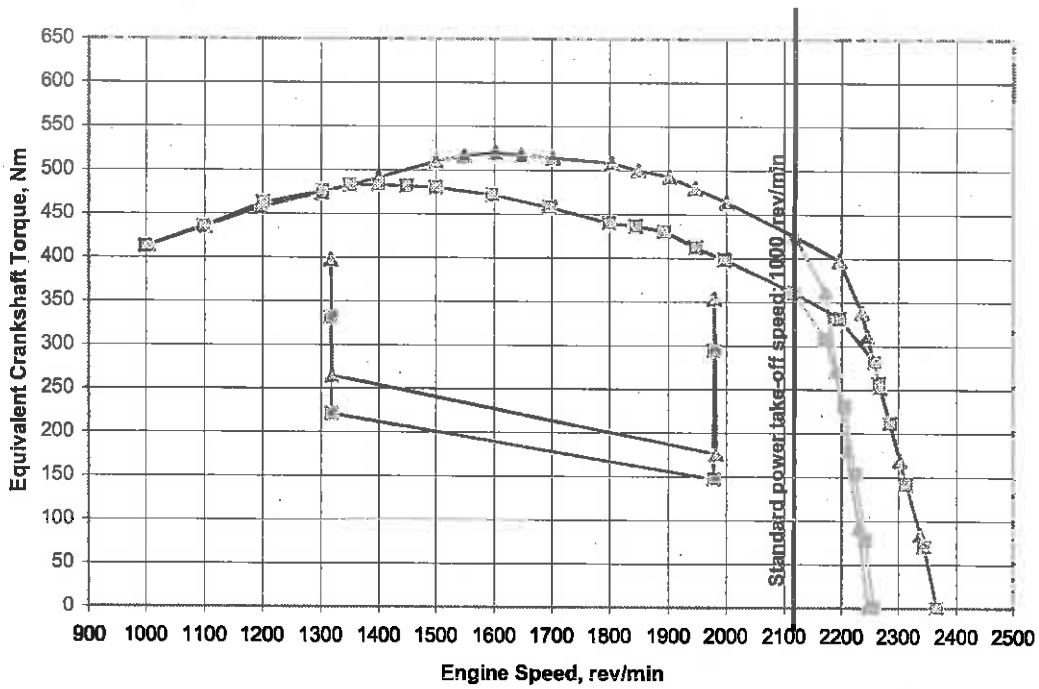
Maximum torque (equivalent crankshaft): 519.9 Nm
(engine speed: 1602 min^{-1} (rev/min)

Mean atmospheric conditions:	
Temperature	20 °C
Pressure	101.2 kPa
Relative humidity	51 %
Maximum temperatures:	
Coolant	88 °C
Engine oil	108 °C
Fuel	48 °C
Engine air intake	27 °C

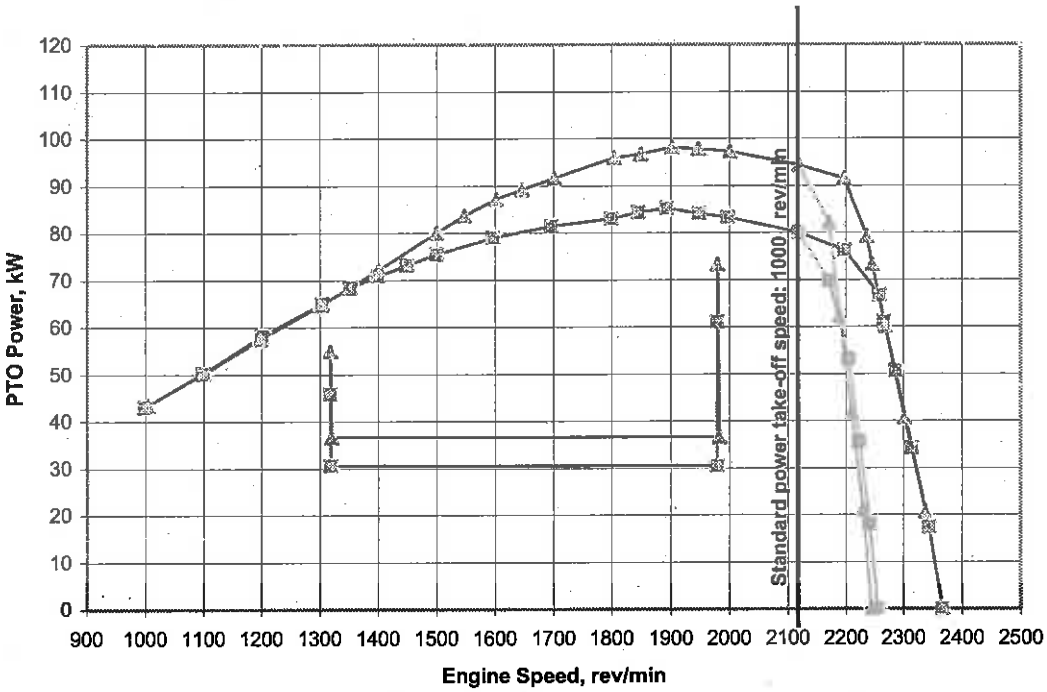
■ Main power take-off curve

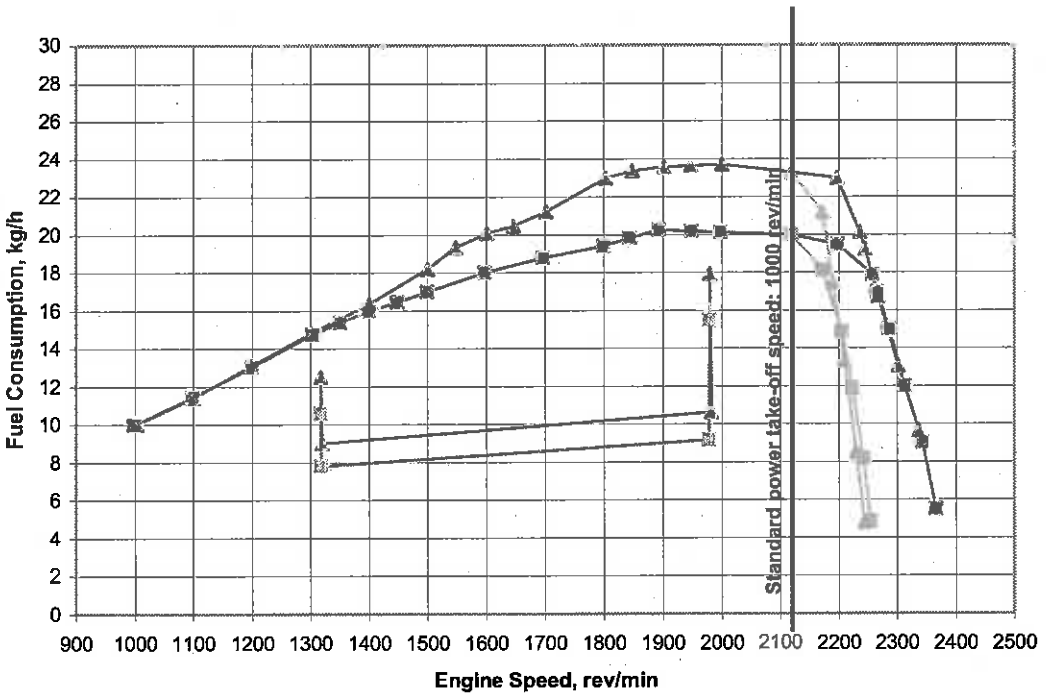
▲ Boosted power take-off curve

Power take-off curves

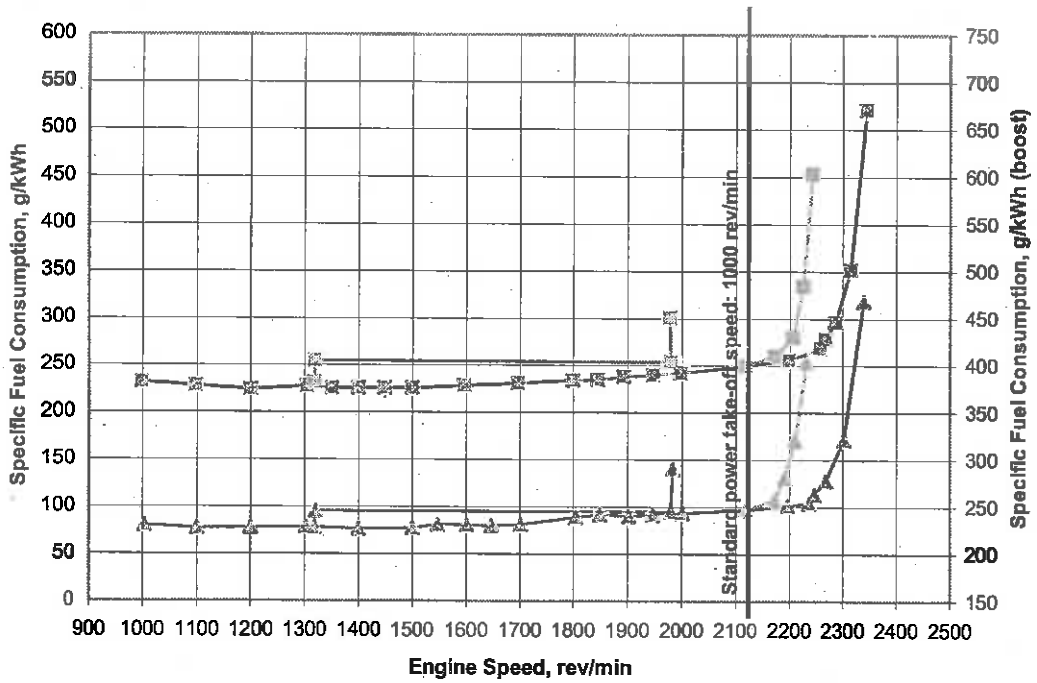


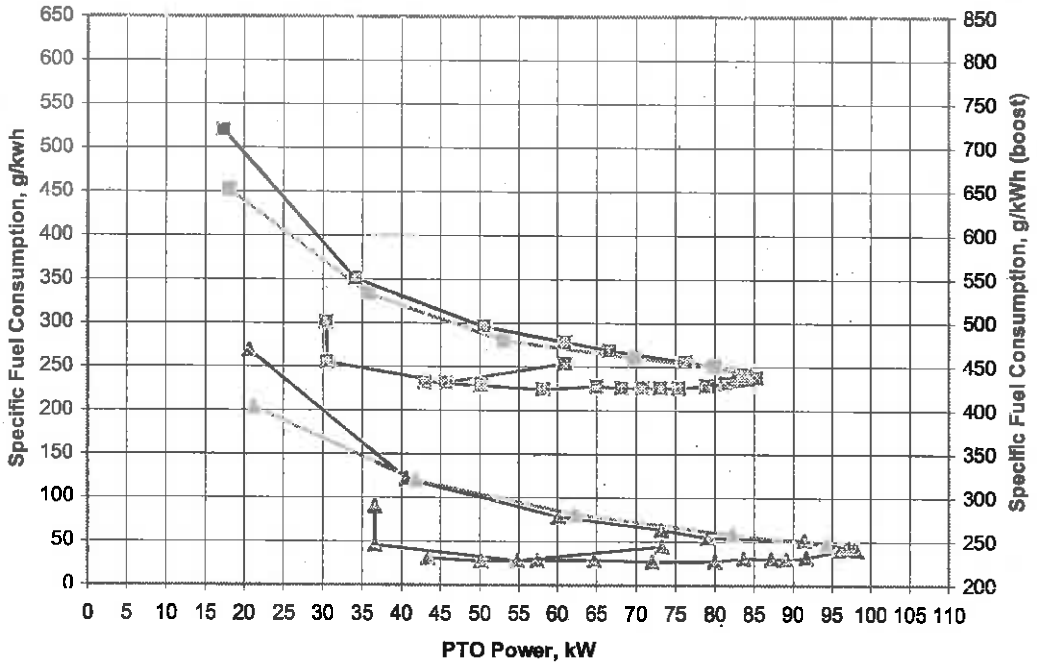
Power take-off curves





Power take-off curves





3.2 Hydraulic power and lifting force

Date of tests: 7 and 16 December 2004

3.2.1 *Hydraulic power test*

3.2.1.1 Hydraulic fluid data

Hydraulic fluid type: NH 410B

Viscosity index (ISO 3448+Corr 1:1993): 130

Viscosity at 65° C: 36.5 mm^2/s

3.2.1.2 Compulsory Reporting (Test Results):

	Pressure	Reservoir oil Temperature °C (65 °C target)		Engine Speed	Flow rate	Power
	MPa	Min.	Max.	Rev/min	l/min	kW
Rated Engine Speed				2200		
3.2.1.2.1 Maximum (sustained) pressure with relief valve open as measured at the coupler Pump stalled: Yes	21.1	63	67	2361		
3.2.1.2.2 Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power from one coupler pair:	19.0 19.0*	65 67*		2327 2305*	68.3 90.0*	21.63 28.50*
3.2.1.2.3 Maximum available flow and maximum power from one coupler pair:	17.5	64		2305	94.0	27.42
3.2.1.2.4 Maximum available flow and maximum power from coupler pairs operating simultaneously (flow through two or more coupler pairs if required):	18.5	66		2306	95.7	29.51

* From 2 couplers

Maximum flow from 1 pair of couplers: 99.0 l/m

Maximum flow from 2 pairs of couplers: 109.4 l/m

3.2.2 Compulsory Power lift test

Power lift test – (To ISO 730-1:1994)

Linkage settings for test – see Table 1.1 and Figures 1.1 and 1.2.

	At the hitch point	on the frame
Height of lower hitch points above ground in down position	196 mm	196 mm
Vertical movement	604 mm	735 mm
Maximum corrected force exerted through full range	35.4 kN	27.6 kN
Corresponding pressure of hydraulic fluid	19.0 MPa	19.0 MPa
Moment about rear-wheel axis	39.6 kNm	47.7 kNm
Maximum tilt angle of mast from vertical	—	10 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	- 470	- 389	- 275	- 175	- 65	0	+ 80	+ 145	+ 165	+ 215	+ 265
Lifting forces (the values of force measured shall be corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting of the hydraulic lift system):											
at the hitch points kN	--	35.4	36.9	38.1	38.8	38.8	38.5	38.4	38.0	37.8	--
Corresponding pressure: 19.0 MPa											
at the frame kN	31.4	--	32.2	32.4	31.7	31.0	29.7	28.7	28.4	--	27.6
Corresponding pressure: 19.0 MPa											

3.3 Drawbar power test (unballasted tractor)

Date and Location of tests: 2 and 14 December 2004
Silsoe Research Institute
Wrest Park
Silsoe
Bedford MK45 4HS

Type of track: Concrete

	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
	mm	kPa	kPa
Unballasted 4WD	420	70	70
Unballasted 4WD disengaged	530	70	70

Gear number and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels or track	Fan speed	Specific fuel cons	Specific Energy	Temperature			Atmospheric condition		
									Fuel	Coolant	Engine oil	Temp	Relative humidity	Pressure
	kW	kN	km/h	min^{-1}	%	min^{-1}	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.3.1	MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
1A	29.1	48.4	2.16	2314	12.2	1346	401	2.11	53	88	107	9	73	100.7
2A	35.6	48.0	2.67	2300	11.3	1320	366	2.31	53	88	107	10	68	100.7
3A	42.9	47.6	3.25	2283	10.6	1300	308	2.75	53	88	108	10	65	100.7
4A	51.5	47.0	3.95	2265	10.7	1800	337	2.51	53	88	108	10	64	100.7
5B	64.3	46.9	4.93	2171	9.2	2068	309	2.74	52	86	109	9	67	100.7
6B	71.8	45.1	5.74	2023	7.6	1824	278	3.04	50	85	108	9	71	100.7
7B	71.1	37.7	6.79	1917	5.6	1726	286	2.96	49	84	107	8	71	100.7
9C	72.8	34.4	7.63	1924	4.6	1736	278	3.04	47	84	107	5	80	100.7
8B	71.7	30.6	8.44	1924	3.9	1726	287	2.95	47	84	106	5	79	100.7
10C	73.0	27.8	9.47	1918	3.7	1718	279	3.03	47	84	106	6	79	100.7
11C	70.8	22.0	11.59	1921	3.0	1750	287	2.95	47	84	106	6	78	100.7
12C	69.8	17.7	14.21	1910	2.5	1747	284	2.98	47	84	106	6	79	100.7

3.3.2 FUEL CONSUMPTION													
3.3.2.1 In selected gear, at maximum power at rated speed													
10C	64.7	21.4	10.89	2196	3.0	1745	304	2.78	47	86	107	6	79	100.7
3.3.2.1.1 75% of pull corresponding to maximum power at rated engine speed													
10C	50.4	16.0	11.30	2267	2.5	1750	350	2.42	45	86	103	7	76	100.7
3.3.2.1.2 50% of pull corresponding to maximum power at rated engine speed													
10C	34.4	10.7	11.53	2298	1.8	1364	395	2.14	46	87	104	7	74	100.7
3.3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1													
11C	50.3	16.0	11.31	1864	2.5	1864	282	2.99	49	84	105	8	75	100.7
3.3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2													
11C	34.2	10.7	11.51	1883	1.8	1883	350	2.42	50	85	105	8	75	100.7
3.3.2.2 In selected gear nearest to 7.5 km/h at rated engine speed													
7B	61.9	28.2	7.91	2198	3.8	1394	311	2.72	44	86	102	6	79	100.7
3.3.2.2.1 75% of pull corresponding to maximum power at rated engine speed													
7B	48.3	21.1	8.22	2267	2.9	1396	338	2.50	45	87	104	6	78	100.7
3.3.2.2.2 50% of pull corresponding to maximum power at rated engine speed													
7B	32.9	14.1	8.41	2299	2.2	1318	400	2.11	47	87	106	6	77	100.7
3.3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1													
9C	47.9	21.1	8.20	2029	3.0	1447	299	2.82	51	86	106	8	73	100.7
3.3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2													
9C	32.9	14.1	8.41	2063	2.2	1228	340	2.48	49	86	106	8	73	100.7

Drawbar power test (unballasted tractor)

Optional Test

(Four-Wheel Drive disengaged)

Gear number and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels or track	Fan speed	Specific fuel cons	Specific Energy	Temperature			Atmospheric condition		
									Fuel	Coolant	Engine oil	Temp	Relative humidity	Pressure
	kW	kN	km/h	min^{-1}	%	min^{-1}	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)														
1A	23.1	39.3	2.12	2326	12.9	1402	458	1.85	50	89	107	10	73	101.7
2A	28.2	39.0	2.61	2314	12.3	1355	407	2.08	53	88	107	10	72	101.7
3A	34.3	38.7	3.19	2300	11.3	1342	353	2.39	54	88	108	10	72	101.7
4A	41.7	38.6	3.88	2282	11.3	1855	380	2.23	53	88	108	11	73	101.7
5B	52.9	38.0	5.02	2262	9.8	1908	341	2.48	51	87	108	10	76	101.7
6B	63.1	37.7	6.02	2195	9.1	2198	303	2.79	51	87	108	10	77	101.7
7B	68.3	37.1	6.63	1955	7.6	2000	295	2.87	48	84	106	10	73	101.7
9C	71.1	34.7	7.38	1919	6.1	2142	285	2.97	49	84	106	10	74	101.7
8B	70.6	30.7	8.27	1919	4.4	1920	292	2.89	46	85	103	9	76	101.8
10C	72.4	28.2	9.24	1917	4.0	1916	280	3.02	46	84	104	9	77	101.8
11C	71.0	22.4	11.41	1923	3.0	1932	283	2.98	48	84	106	9	77	101.8
12C	70.1	18.1	13.96	1908	2.4	1925	282	2.99	47	84	105	9	77	101.8

3.3.2	FUEL CONSUMPTION													
3.3.2.1	In selected gear, at maximum power at rated speed													
10C	64.8	21.8	10.72	2200	3.0	1900	293	2.89	46	87	105	9	76	101.8
3.3.2.1.1	75% of pull corresponding to maximum power at rated engine speed													
10C	50.5	16.3	11.14	2269	2.2	1865	319	2.65	47	87	106	9	76	101.8
3.3.2.1.2	50% of pull corresponding to maximum power at rated engine speed													
10C	34.4	10.9	11.36	2300	1.8	1872	385	2.19	47	87	106	9	77	101.8
3.3.2.1.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1													
11C	50.1	16.3	11.10	1862	2.5	1252	304	2.78	49	85	104	10	79	101.6
3.3.2.1.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2													
11C	34.2	10.9	11.34	1888	1.8	1160	322	2.62	49	85	103	10	78	101.6
3.3.2.2	In selected gear nearest to 7.5 km/h at rated engine speed													
7B	62.2	28.9	7.75	2199	4.0	1985	317	2.67	46	86	101	10	73	101.7
3.3.2.2.1	75% of pull corresponding to maximum power at rated engine speed													
7B	48.7	21.7	8.09	2269	3.0	1974	354	2.39	46	86	103	10	73	101.7
3.3.2.2.2	50% of pull corresponding to maximum power at rated engine speed													
7B	33.2	14.4	8.28	2301	2.0	1920	392	2.15	47	87	105	11	73	101.7
3.3.2.2.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1													
9C	48.8	21.7	8.09	2041	3.2	1723	305	2.77	49	86	106	10	79	101.6
3.3.2.2.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2													
9C	32.9	14.4	8.24	2059	2.2	1262	329	2.57	49	86	105	10	79	101.6

5. REPAIRS None

6. REMARKS Boosted Engine Power Operation

This vehicle is equipped with an electronically – controlled engine Power Management™ system that monitors and boosts engine power output in certain circumstances, as engine load increases. This is achieved by electronically changing the characteristics of the engine power-speed curve.

The engine Power Management function ("boosted" power level) becomes active in higher transmission gears (16th gear and above with 24 x 24 transmissions and 13th gear and above with 16 x 16 transmissions), for road transport applications. With the 24 x 24 transmission, the system is also activated once power transfer through the rear P.T.O. exceeds a pre-set level (and forward speed exceeds 0.5 km/h), for mobile P.T.O. – driven implement applications.

An over-ride system is provided to enable P.T.O. operation at the "boosted" power level whilst the vehicle is stationary, for test purposes. The results of such a P.T.O. power output test are presented in this report.

The test results for this report were obtained from a test carried out on a Case IH MXU 110 which is identical to the New Holland TS 110A in all practical aspects relating to the tests.

Test carried out by: S J Devonshire

Signed: Officer in charge



J P Evans
Senior Test Engineer
Field Machinery Centre

Date: 16 May 2005

APPENDIX 1 ADDITIONAL TESTS

7.1 *Power lift tests – (To Manufacturers lift rod setting)*

"Not covered by the approval"

Linkage settings for test – see Table 1.1 and Figures 1.1 and 1.2.

	At the hitch point	on the frame
Height of lower hitch points above ground in down position	315 mm	315 mm
Vertical movement	480 mm	553 mm
Maximum corrected force exerted through full range	43.7 kN	33.2 kN
Corresponding pressure of hydraulic fluid	19.0 MPa	19.0 MPa
Moment about rear-wheel axis	48.9 kNm	57.4 kNm
Maximum tilt angle of mast from vertical	—	7 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	- 305	- 270	- 175	- 70	0	+ 85	+ 130	+ 165	+ 190	+ 210	+ 248
Lifting forces (the values of force measured shall be corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting of the hydraulic lift system):											
at the hitch points kN	--	47.0	48.1	48.5	47.9	46.0	45.1	45.1	44.6	43.7	–
Corresponding pressure: 19.0 MPa											
at the frame kN	42.2	–	43.0	41.9	40.6	38.3	36.4	35.5	34.0	--	33.2
Corresponding pressure: 19.0 MPa											

7.2 *Power lift tests – (To SAE J283)*

Linkage settings for test – see Table 1.1

* Lift rods readjusted to 705 mm to allow for lift force to be measured throughout the total lift range

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	- 385	- 240	- 170	-140	- 70	0	+75	+ 115	+ 135	—	---
*mm	---	—	- 170	- 140	- 70	0	+ 75	+ 115	+ 135	+ 210	+ 300
SAE J283											
kN	47.5	45.4	44.4	43.4	42.0	40.0	38.3	36.2	35.0	—	---
*kN	---	—	44.5	44.5	44.5	44.0	42.7	41.8	41.4	38.7	36.2
Corresponding pressure: 18.5 MPa											

HYDRAULIC LIFT COMBINATION / REPORT REFERENCE TABLE

NEW HOLLAND TS100A / TS110A / TS115A / TS125A / TS135A

OECD Report Numbers	Hydraulic Lift Force (OECD, SAE and Manufacturers Settings)							
	Mechanical Draft Control with internal lift ram				Electronic Draft Control with external rams			
	Plus 1 x 50mm assist ram		Plus 2 x 50mm assist rams		2 x 80mm rams		2 x 90mm rams	
	Pump Displacement		Pump Displacement		Pump Displacement		Pump Displacement	
	Fixed	Variable	Fixed	Variable	Fixed	Variable	Fixed	Variable
6642/2003	x							
6643/2003			x					
6644/2003						x		
6645/2003		x						
6646/2003					x			
6647/2003				x				
6648/2003							x	
6649/2003				x				
6650/2003								x

X Denotes hydraulic lift combination test report number

TEST RESULTS (OECD Code 5)

"Not covered by the approval"

Make and type of sound level meter: Bruel and Kjaer 2260

Type of test track: Concrete

Date of tests: 15 December 2004

Four wheel drive engaged

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
7B	Light Load	8.7	85

Four wheel drive dis-engaged

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
7B	Light Load	8.7	85