SILSOE RESEARCH INSTITUTE

OECD Report

Report No: OECD/6679/2003
OECD Approval No: 2/2 245
Approval Date: 17 May 2005

CODE 2

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

Case IH PBC7BC2 (MXU 110) 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: 848

Date: March 2005

File: 6679/2003

Rev: 18 May 2005

ENGINEERING for Life

TABLE OF CONTENTS

1.	SPECIFICATIONS OF TRACTOR		1
2.	TEST CONDITIONS		16
3.	TEST RESULTS		18
	Compulsory tests		
	1	Main power take-off (1000 rev/min)	18
		Optional power take-off boosted power (1000 rev/min)	20
		Power take-off curves (1000 rev/min)	21
	2	Hydraulic power and lifting force	24
	3	Drawbar power and fuel consumption test (unballasted tractor, four-wheel drive)	25
		Optional Drawbar power and fuel consumption test (unballasted tractor, four-wheel drive with front axle disengaged)	28
5.	Repairs and adjustments during tests		30
6.	Remarks		30
7.	Appendix 1 Additional tests (not covered by approval)		31

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:	34 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:	Case IH
[C]	Model (trade name):	MXU 110
[C]	Type:	Four- wheel drive, unit construction

1.1.2 *Numbers*

[D]	1st Serial No or prototype:	ACP207661/EKP001001
[C]	Serial No:	221131

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:	PBC7BC2

1.2 Engine

[C]	Make:	CNH
[C]	Model:	F4DE0484A*D
[C]	Type:	4 stroke turbocharged direct injection and after cooled diesel
[C]	Serial No:	00093019

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	Optional
[C]	Type:	Spin tube
[C]	Location:	Air cleaner canister inlet
	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:	23 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:	120 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:	2940 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:	792 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:	792 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

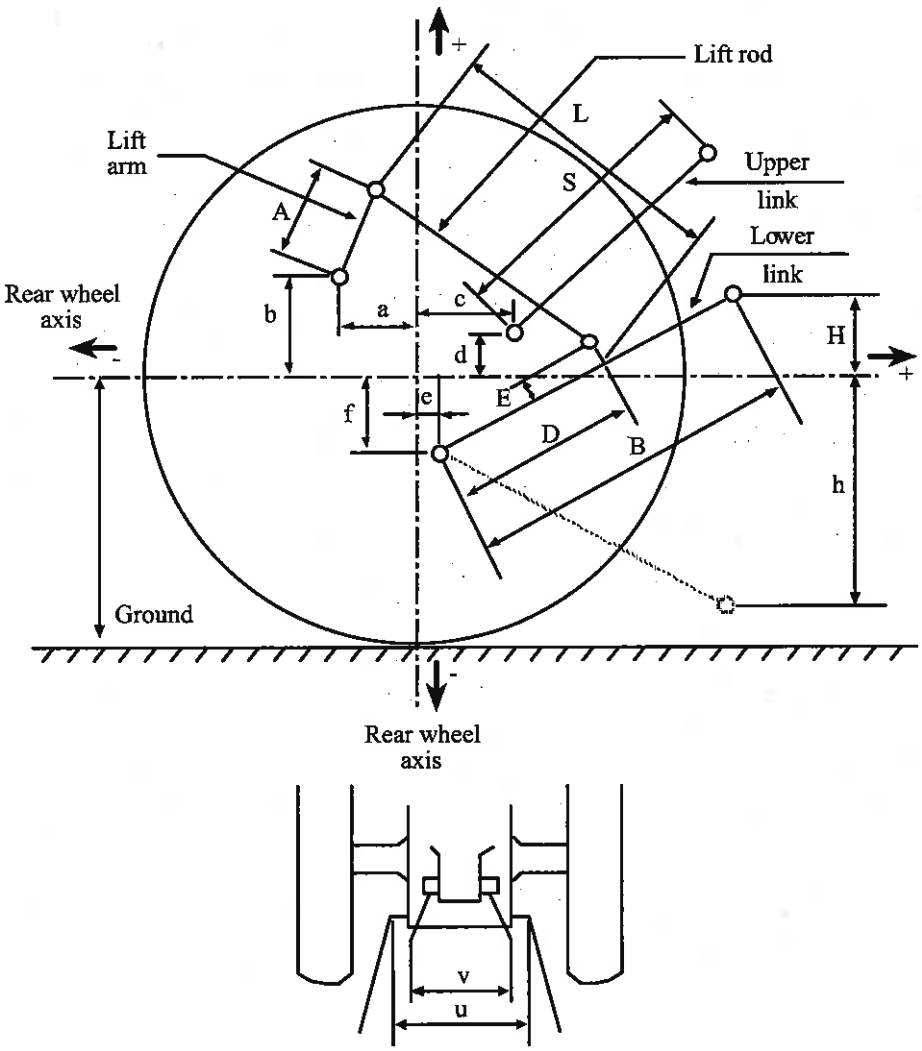
1.4.1.2 Power take-off proportional to ground speed — Not applicable

1.5 Hydraulic power lift

[C]	Make:	CNH
[D]	Model:	None
[D]	Type:	Electro-hydraulic closed centre load sensing
[C]	Type and number of cylinders:	2 single acting externally mounted rams
[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:	4 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:	Electronic 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)	585 – 780	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	505	585	585
[C]	Length of lift rods:		(L)	700 – 888	830	878	878/810
	Height of lower hitch points (*) Relative to the rear wheel centre line, situated 820 mm above the ground level:						
[C]	- in low position		(h)	290 – 730	625	605	600/480
[C]	- in high position		(H)	0 – 260	45	0	0/90
[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
(Incorporating Italian slider hitch and swinging drawbar CUNA)

[C]	Type:		Clevis		
[C]	Height above ground:	Unballasted Maximum:	565 mm		
		Minimum:	450 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:	227 mm	342 mm	
		Horizontally:	250 mm	350 mm	400 mm
[C]	Lateral adjustment (centre of clevis):				
		Right-hand:	145 mm	175 mm	190 mm
		Left-hand:	145 mm	175 mm	190 mm
[C]	Distance of pivot point from rear axles	horizontally:	255 mm	behind rear axle	
[C]	Width of clevis:		70 mm		
[C]	Diameter of drawbar pin hole:		29 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

[C]	Type:	Coupling	
[C]	Holed diameter:	29 mm	
[C]	Height above ground:	560 mm to 980 mm	
[C]	Distance of hitch point from rear wheel axis, horizontally:	715 mm	
[C]	Distance of hitch point from power take-off shaft end:		
	Vertically:	-232 mm to + 148 mm	
	Horizontally:	160 mm	
[D]	Maximum vertical permissible load:	1500 kg	

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 4WD 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: SLTV 11

[C] Type: Cab safety frame

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

Protective device

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

[C] Tiltable/Not tiltable: Not tiltable

OECD approval

[C] Approval number: 4/0740

[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 93/731, 95A/741 EEC approved to 78/764/EEC – e1*0006*03, e1*100514*07
[C]	Seat and steering wheel reversible:	No
[C]	Type of suspension:	Parallelogram, suspension air spring
[C]	Type of damping:	Double acting, hydraulic
	Range of adjustment -	
[C]	Longitudinal:	+ 90 mm / -120 mm
[C]	Vertical:	± 40 mm
[C]	Safety belt:	Yes

1.14.2 *Optional driver's seat(s)*

1.14.3 *Passenger seat* — 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
[D]	Headlights	1315	170 x 170	190
[C]	Sidelights	1805	75 x 70	1008
[C]	Rear lights	1865	90 x 90	950
[C]	Rear fender reflectors	1865	35 x 90	950
[C]	Rear axle reflectors	795	100 x 35	581

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	2550	2550	2860	2940

2.2 Ground clearance (unballasted tractor) 356 mm

Clearance-limiting part: Drawbar clevis in lowest position

2.3 Tractor mass

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

	Unballasted	
	Without driver	With driver
	kg	kg
Front	1985	2005
Rear	3203	3258
Total	5188	5263

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)	1760 mm	1740 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:	MS 1121	SAE 10W/30 11.5 cSt at 100° C API CH – 4	As recommended
Transmission oils Type: Viscosity Classification:	MAT 3525	SAE 10W/30 9 cSt at 100° C API GL – 4	As recommended
Rear final drives Type: Viscosity: Classification:	MAT 3525	SAE 10W/30 9 cSt at 100° C API GL – 4	As recommended
Front differential and final drives Type: Viscosity: Classification:	MAT 3525	SAE 10W/30 9 cSt at 100° C API GL – 4	As recommended
Hydraulic brakes Type: Viscosity: Classification:	LHM fluid	No equivalent 6 cSt at 100° C ISO 7308	As recommended
Hydraulic fluid Type: Viscosity: Classification:	MAT 3525	SAE 10W/30 9 cSt at 100° C API GL – 4	As recommended
Steering oil Type: Viscosity: Classification:	MAT 3525	SAE 10W/30 9 cSt at 100° C API GL – 4	As recommended

2.8.3 *Grease*

Type:	251 HEP	Lithium Based	As recommended

Number of lubrication points: 14

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

Date and location of tests: 3 and 4 February 2005
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							
85.5	1899	896	2199	20.52	24.28	240	3.52
3.1.2 POWER AT RATED ENGINE SPEED							
76.7	2201	1038	2379	19.82	23.45	258	3.27
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000 ± 25 min^{-1} (rev/min)]							
80.0	2119	1000	2336	20.16	23.85	252	3.36
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed							
76.7	2201	1038	2379	19.82	23.45	258	3.27
3.1.4.2 85% of torque obtained in 3.1.4.1							
66.9	2258	1065	2250	18.22	21.55	272	3.10
3.1.4.3 75% of torque defined in 3.1.4.2							
50.8	2286	1078	2261	15.11	17.88	297	2.84
3.1.4.4 50% of torque defined in 3.1.4.2							
34.3	2314	1092	2120	12.08	14.29	352	2.40
3.1.4.5 25% of torque defined in 3.1.4.2							
17.3	2344	1106	1916	8.97	10.61	518	1.63
3.1.4.6 unloaded							
0	2364	1115	1490	5.82	6.88	-	-
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	2336	20.16	23.85	252	3.36
3.1.5.2 85% of torque obtained in 3.1.5.1							
69.7	2173	1025	2286	18.32	21.67	263	3.22
3.1.5.3 75% of torque defined in 3.1.5.2							
52.5	2190	1033	2242	14.94	17.67	285	2.97
3.1.5.4 50% of torque defined in 3.1.5.2							
35.3	2206	1041	1740	11.51	13.62	326	2.59
3.1.5.5 25% of torque defined in 3.1.5.2							
17.9	2223	1049	1739	8.41	9.95	470	1.80
3.1.5.6 unloaded							
0	2234	1054	1314	4.93	5.83	-	-

3.1.6 PART LOADS AT DIFFERENT ENGINE SPEEDS							
3.1.6.1 maximum power at rated engine speed							
76.7	2201	1038	2379	19.82	23.45	258	3.27
3.1.6.2 80% of power obtained in 3.1.6.1 at max speed setting							
61.4	2268	1070	2050	16.90	19.99	275	3.07
3.1.6.3 80% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
61.4	1982	935	2094	15.61	18.47	254	3.32
3.1.6.4 40% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
30.6	1978	933	1474	9.32	11.03	304	2.78
3.1.6.5 60% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
46.0	1320	623	1490	10.72	12.68	233	3.63
3.1.6.6 40% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
30.7	1323	624	1294	7.77	9.19	253	3.35

No load maximum engine speed: 2364 min^{-1} (rev/min)

Torque (equivalent crankshaft) at maximum power

At rated engine speed: 333.0 Nm

At 2-hour test: 429.8 Nm

Maximum torque (equivalent crankshaft): 496.1 Nm
(engine speed:1406 min^{-1} (rev/min)

Mean atmospheric conditions:	
Temperature	22 °C
Pressure	103.2 kPa
Relative humidity	44 %
Maximum temperatures:	
Coolant	85 °C
Engine oil	106 °C
Fuel	50 °C
Engine air intake	30 °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							
99.3	1902	897	2332	23.89	28.26	241	3.51
3.1.2 POWER AT RATED ENGINE SPEED							
91.9	2201	1038	2438	23.28	27.54	253	3.34
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000 ± 25 min^{-1} (rev/min)]							
94.4	2120	1000	2492	23.52	27.83	249	3.39
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed							
91.9	2201	1038	2438	23.28	27.54	253	3.34
3.1.4.2 85% of torque obtained in 3.1.4.1							
79.5	2236	1055	2325	20.64	24.42	260	3.26
3.1.4.3 75% of torque defined in 3.1.4.2							
60.4	2268	1070	2345	16.91	20.00	280	3.02
3.1.4.4 50% of torque defined in 3.1.4.2							
40.9	2304	1087	2175	13.20	15.61	323	2.62
3.1.4.5 25% of torque defined in 3.1.4.2							
20.8	2338	1103	1855	9.53	11.28	458	1.85
3.1.4.6 unloaded							
0	2366	1116	1301	5.63	6.66	-	-
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							
94.4	2120	1000	2492	23.52	27.83	249	3.39
3.1.5.2 85% of torque obtained in 3.1.5.1							
81.3	2146	1012	2443	20.59	24.36	253	3.34
3.1.5.3 75% of torque defined in 3.1.5.2							
61.6	2166	1022	2215	16.49	19.51	268	3.16
3.1.5.4 50% of torque defined in 3.1.5.2							
41.4	2185	1031	2126	12.48	14.76	301	2.81
3.1.5.5 25% of torque defined in 3.1.5.2							
20.9	2204	1040	1778	8.66	10.24	414	2.04
3.1.5.6 unloaded							
0	2218	1046	1307	4.77	5.65	-	-

3.1.6 PART LOADS AT DIFFERENT ENGINE SPEEDS 3.1.6.1 maximum power at rated engine speed							
91.9	2201	1038	2438	23.28	27.54	253	3.34
3.1.6.2 80% of power obtained in 3.1.6.1 at max speed setting							
73.5	2246	1060	2305	19.49	23.06	265	3.19
3.1.6.3 80% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
73.5	1982	935	2153	18.13	21.45	247	3.42
3.1.6.4 40% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
36.8	1980	934	1480	10.45	12.36	284	2.98
3.1.6.5 60% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
55.1	1322	624	1447	12.54	14.83	227	3.72
3.1.6.6 40% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
36.8	1320	623	1385	8.74	10.34	238	3.56

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

Torque (equivalent crankshaft) at maximum power

At rated engine speed: 398.9 Nm

At maximum power: 498.5 Nm

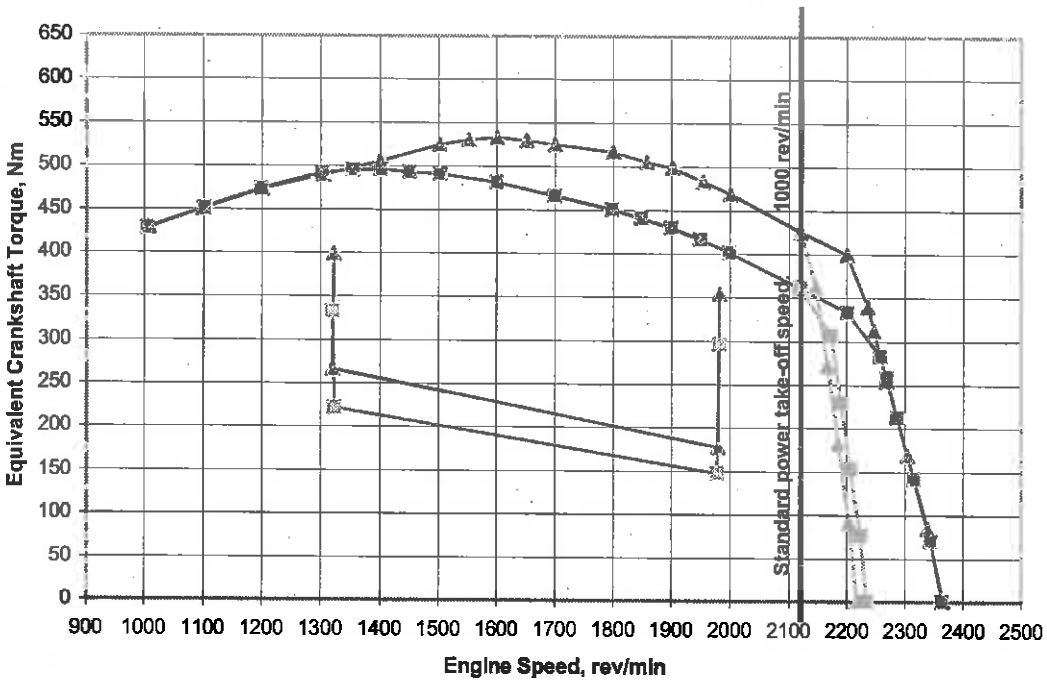
Maximum torque (equivalent crankshaft): 533.0 Nm
(engine speed:1601 min^{-1} (rev/min)

Mean atmospheric conditions:	
Temperature	22 °C
Pressure	102.7 kPa
Relative humidity	36 %
Maximum temperatures:	
Coolant	85 °C
Engine oil	107 °C
Fuel	52 °C
Engine air intake	30 °C

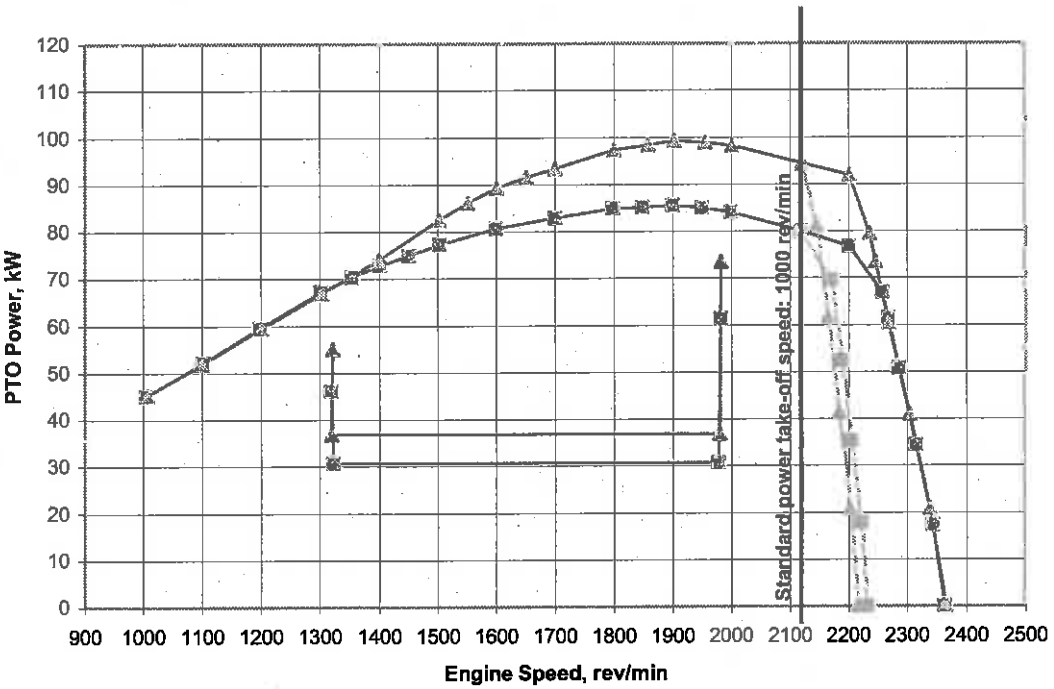
■ Main power take-off curve

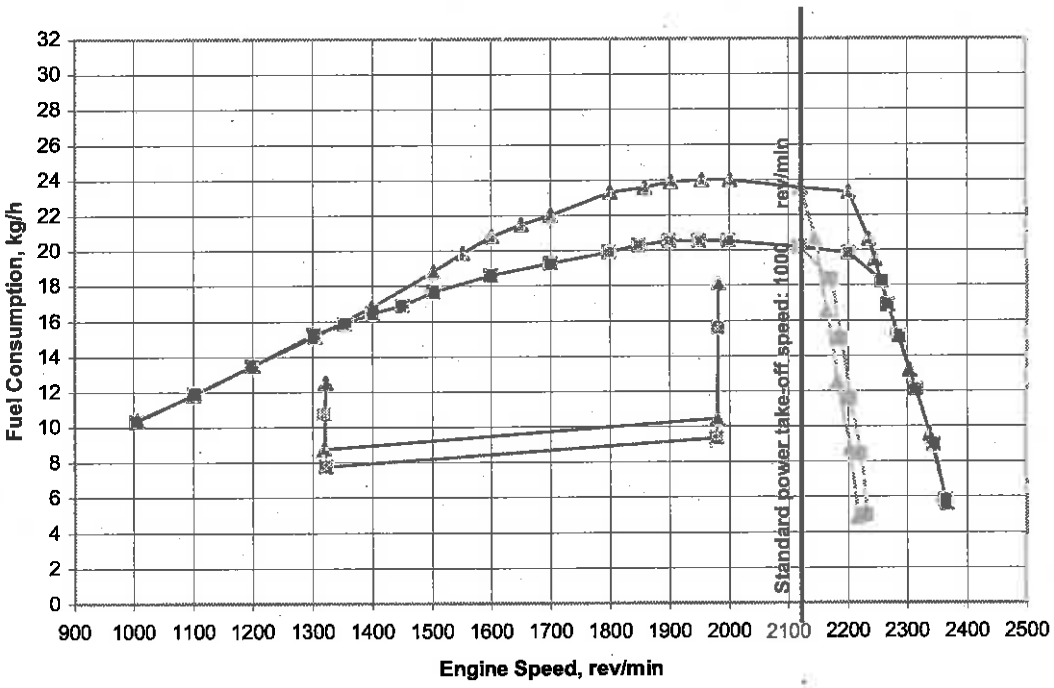
▲ Boosted power take-off curve

Power take-off curves

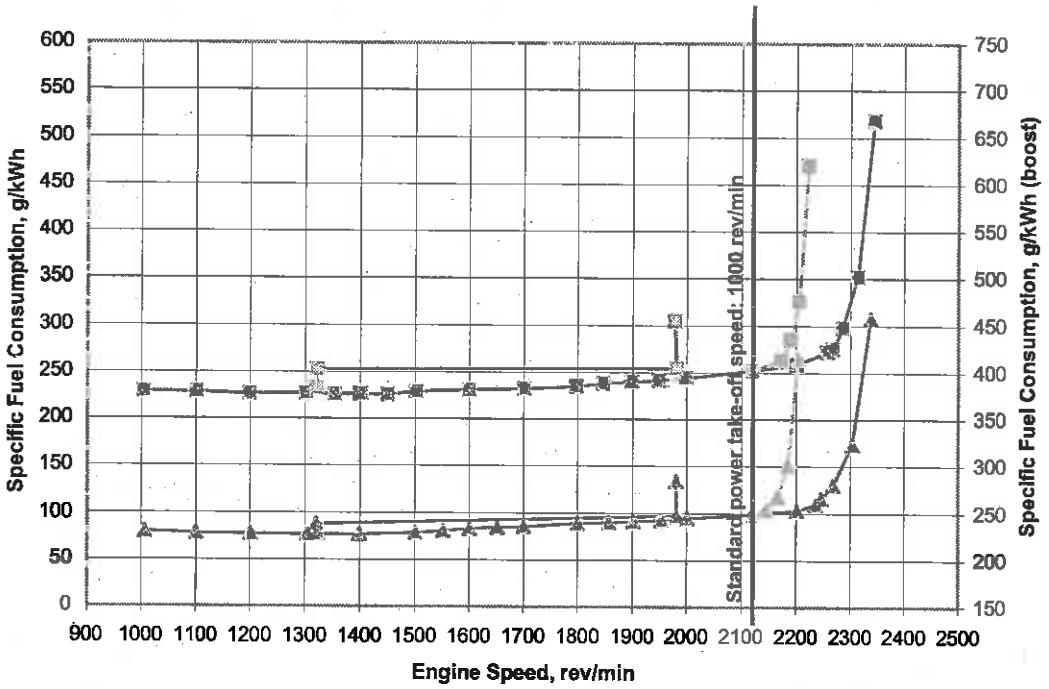


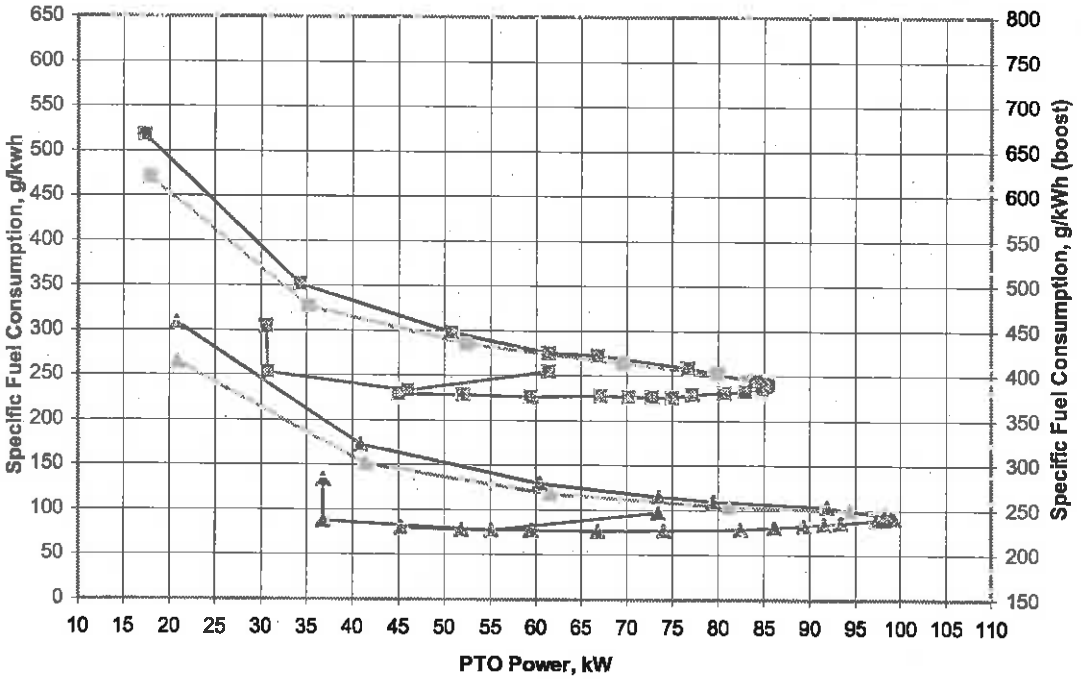
Power take-off curves





Power take-off curves





3.2 Hydraulic power and lifting force

Date of tests: 24 and 25 February 2005

3.2.1 *Hydraulic power test*

3.2.1.1 Hydraulic fluid data

Hydraulic fluid type: MAT 3525

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	21.5	64	68	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 (one coupler pair)	19.4 19.4*	64 66*		2319 2316*	74.9 80.6*	24.22 26.06*
3.2.1.2.3 Maximum available flow and maximum power from one coupler pair:	18.0	66		2310	93.4	28.02
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):	18.0	66		2305	97.9	29.37

* From 2 couplers

Maximum flow from 1 pair of couplers: 93.9 l/m

Maximum flow from 2 pairs of couplers: 99.6 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	195 mm	195 mm
Vertical movement	670 mm	814 mm
Maximum corrected force exerted through full range	42.1 kN	34.8 kN
Corresponding pressure of hydraulic fluid	19.4 MPa	19.4 MPa
Moment about rear-wheel axis	47.1 kNm	60.1 kNm
Maximum tilt angle of mast from vertical	---	10 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	- 464	- 390	- 275	- 190	- 100	0	+115	+185	+245	+280	+350
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	--	42.1	43.5	44.9	46.3	47.6	48.7	49.4	49.7	49.7	--
Corresponding pressure: 19.4 MPa											
at the frame kN	37.3	--	37.6	38.0	38.0	37.6	36.9	35.9	34.8	--	34.8
Corresponding pressure: 19.4 MPa											

3.3 Drawbar power test (unballasted tractor)

Date and Location of tests: 14 and 16 February 2005
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	415	70	70
Unballasted 4WD disengaged	520	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	31.8	54.8	2.09	2301	13.8	1884	399	2.12	56	85	106	7	50	101.2
2A	38.9	54.3	2.58	2289	12.1	1836	379	2.23	58	84	106	7	51	101.2
3A	46.9	53.7	3.15	2267	11.1	2142	368	2.30	57	84	106	8	51	101.2
4A	56.8	53.0	3.85	2226	9.6	1700	324	2.61	56	84	106	7	51	101.2
5B	66.8	52.0	4.63	2058	8.5	2089	312	2.71	55	83	106	7	50	101.2
6B	72.4	48.9	5.34	1901	6.8	1997	287	2.94	54	82	106	8	50	101.2
7B	70.8	38.2	6.67	1900	4.3	1859	288	2.94	54	81	105	8	47	101.1
9C	71.9	34.6	7.48	1903	3.8	1949	281	3.01	52	81	104	7	50	101.3
8B	70.4	30.7	8.25	1899	3.4	1812	292	2.89	51	81	103	6	51	101.3
10C	71.6	28.0	9.20	1896	3.1	1807	282	3.00	50	81	100	7	50	101.2
11C	68.8	21.9	11.30	1901	2.6	1817	302	2.80	50	81	100	7	51	101.2
12C	67.6	17.5	13.94	1903	2.1	1864	311	2.72	52	81	103	7	50	101.2

3.3.2	FUEL CONSUMPTION													
3.3.2.1	In selected gear, at maximum power at rated speed													
6B	64.4	36.5	6.36	2202	4.1	1968	303	2.79	54	83	106	7	51	101.2
3.3.2.1.1	75% of pull corresponding to maximum power at rated engine speed													
6B	50.2	27.3	6.61	2266	3.1	1804	336	2.51	55	84	107	8	49	101.2
3.3.2.1.2	50% of pull corresponding to maximum power at rated engine speed													
6B	34.3	18.2	6.77	2299	2.2	1746	390	2.17	55	84	106	7	49	101.2
3.3.2.1.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1													
7B	49.9	27.3	6.59	1855	3.1	1684	297	2.84	54	81	103	7	48	101.1
3.3.2.1.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2													
7B	34.4	18.2	6.78	1893	2.2	1401	335	2.52	54	82	102	8	48	101.1
3.3.2.2	In selected gear nearest to 7.5 km/h at rated engine speed													
7B	61.2	28.2	7.81	2200	3.3	1959	321	2.64	53	83	104	8	49	101.1
3.3.2.2.1	75% of pull corresponding to maximum power at rated engine speed													
7B	47.7	21.2	8.10	2268	2.6	1735	349	2.42	53	84	105	8	48	101.1
3.3.2.2.2	50% of pull corresponding to maximum power at rated engine speed													
7B	32.4	14.1	8.27	2298	1.8	1677	401	2.11	53	84	105	8	47	101.1
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	47.8	21.3	8.08	2030	2.5	1673	306	2.76	55	83	103	7	49	101.1
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	32.4	14.1	8.28	2065	1.8	1608	353	2.40	54	83	103	7	49	101.1

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	24.1	41.8	2.08	2323	13.2	1322	450	1.88	54	85	106	6	57	102.3
2A	29.4	41.1	2.57	2312	12.1	1494	409	2.07	55	85	107	6	54	102.3
3A	35.5	41.1	3.11	2293	12.0	1523	381	2.22	53	85	107	6	52	102.3
4A	43.6	40.8	3.85	2281	10.8	1402	313	2.70	52	85	107	6	53	102.3
5B	55.6	40.5	4.93	2252	9.7	1782	331	2.55	51	84	107	5	58	102.3
6B	65.2	39.8	5.90	2162	8.3	1783	302	2.80	50	83	106	5	57	102.3
7B	68.8	38.0	6.52	1936	7.0	1782	300	2.82	48	81	103	5	64	102.3
9C	71.8	35.6	7.26	1907	5.8	1709	286	2.96	49	81	105	5	62	102.3
8B	71.0	31.5	8.12	1911	4.4	1673	292	2.89	49	81	104	5	64	102.3
10C	72.6	28.8	9.08	1904	3.8	1708	279	3.03	49	81	106	5	62	102.3
11C	70.8	22.8	11.17	1909	2.9	1774	293	2.88	49	81	105	4	62	102.3
12C	69.5	18.3	13.68	1896	2.5	1758	297	2.85	49	81	106	4	63	102.3

3.3.2 FUEL CONSUMPTION														
3.3.2.1 In selected gear, at maximum power at rated speed														
10C	63.8	21.7	10.60	2202	2.9	1710	305	2.77	49	83	106	5	63	102.3
3.3.2.1.1 75% of pull corresponding to maximum power at rated engine speed														
10C	49.7	16.3	10.98	2268	2.3	1713	337	2.51	47	84	103	5	60	102.3
3.3.2.1.2 50% of pull corresponding to maximum power at rated engine speed														
10C	33.5	10.8	11.18	2299	1.8	1361	409	2.07	47	84	104	5	57	102.3
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	49.9	16.3	10.99	1868	2.4	1409	304	2.78	51	81	104	5	54	102.2
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	33.7	10.8	11.17	1898	1.8	1304	350	2.41	51	82	104	5	55	102.2
3.3.2.2 In selected gear nearest to 7.5 km/h at rated engine speed														
7B	61.2	28.8	7.65	2195	3.8	1698	319	2.65	46	83	101	5	60	102.3
3.3.2.2.1 75% of pull corresponding to maximum power at rated engine speed														
7B	47.9	21.6	7.99	2269	2.8	1638	351	2.41	47	84	103	5	63	102.3
3.3.2.2.2 50% of pull corresponding to maximum power at rated engine speed														
7B	32.6	14.4	8.16	2299	2.2	1492	409	2.07	47	84	103	5	62	102.3
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	47.8	21.6	7.97	2036	3.0	1368	308	2.75	53	82	107	6	53	102.3
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	32.7	14.4	8.14	2062	2.2	1282	347	2.43	52	83	105	6	53	102.2

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 New Holland TS110A which is identical to the Case IH MXU 110 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: 19 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	200 mm	200 mm
Vertical movement	605 mm	687 mm
Maximum corrected force exerted through full range	47.7 kN	39.5 kN
Corresponding pressure of hydraulic fluid	19.4 MPa	19.4 MPa
Moment about rear-wheel axis	53.3 kNm	68.3 kNm
Maximum tilt angle of mast from vertical	---	5 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	-427	- 385	-285	-185	-85	0	+85	+140	+185	+220	+260
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	--	47.7	48.3	49.8	50.9	51.8	52.4	52.6	52.5	52.5	--
Corresponding pressure: 19.4 MPa											
at the frame kN	44.4	--	44.5	44.5	44.2	43.7	42.7	41.8	40.9	--	39.5
Corresponding pressure: 19.4 MPa											

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

Linkage settings for test – see Table 1.1

* Lift rods readjusted to 810 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	- 332	- 245	-185	- 85	0	+100	+ 185	+ 215	---	---
*mm	---	---	- 245	- 185	- 85	0	+ 100	+ 185	+ 215	+ 255	+ 325
SAE J283											
kN	56.5	56.5	53.0	51.5	50.0	48.7	46.9	45.0	44.9	---	---
*kN	---	---	51.5	51.4	50.5	49.4	48.2	46.8	46.0	45.2	43.4
Corresponding pressure: 18.5 MPa											

HYDRAULIC LIFT COMBINATION / REPORT REFERENCE TABLE

CASE IH MXU100 / MXU110 / MXU115/ MXU125 / MXU135

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
6676/2003	x							
6678/2003			x					
6679/2003						x		
6667/2003		x						
6668/2003					x			
6670/2003				x				
6671/2003							x	
6673/2003				x				
6674/2003								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: 14 March 2005

Four wheel drive engaged Windows closed

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
7B	Light Load	9.0	73

Four wheel drive engaged Windows open

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
7B	Light Load	9.0	77

Four wheel drive dis-engaged Windows closed

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
7B	Light Load	8.8	73

Four wheel drive dis-engaged Windows open

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
7B	Light Load	8.8	77