SILSOE RESEARCH INSTITUTE

OECD Report

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CODE 2

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

Case IH PAR7BB2 (MXU 100) Four-Wheel Drive Tractor with 24-speed Hi-Lo Transmission (40 km/h)



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

Reference No: 847

Date: April 2005

File: 6678/2003

Rev: 12 May 2005

ENGINEERING for Life

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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:	72 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 100
[C]	Type:	Four- wheel drive, unit construction

1.1.2 *Numbers*

[D]	1st Serial No or prototype:	ACP207661/EKP001001
[C]	Serial No:	216198

1.1.3 *Other specifications (if applicable)*

[D]	Model(s) for other countries:	None
[C]	Transmission type or gears x ranges:	24-Speed Hi-Lo
[C]	Speed version:	40 km/h
[C]	Manufacturer identification or Technical type number:	PAR7BB2

1.2 Engine

[C]	Make:	CNH
[C]	Model:	F4CE0484B*D
[C]	Type:	4 stroke turbocharged direct injection and after cooled diesel
[C]	Serial No:	00076630

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/HX25W
[C]	Type:	Exhaust driven
[D]	Pressure:	0.085 MPa at rated speed/load

1.2.3 *Fuel system*

[D]	Fuel feed system:	Mechanical Diaphragm pump
[C]	Make, type and model of fuel filter:	None, one disposable canister filter 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, VE Rotary 0460424304
[D]	Serial No:	422042
	Manufacturer's production setting of injection pump	
[C]	Flow rate (rated engine speed and full load):	76.1 mm^3 ±5% per stroke at 2200 min^{-1} (rev/min) 19.09 – 21.09 dm^3/h
[D]	Timing:	TDC
[D]	Make, type and model of injectors:	Bosch, Differential Needle DSLA145 P1253
[D]	Injection pressure:	26 MPa

1.2.4 *Governor*

[C]	Make:	Bosch
[D]	Model:	None
[C]	Type:	Mechanical incorporated in fuel Injection pump
[C]	Governed range of engine speed:	700 to 2450 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:	Hi-Lo
[C]	Description:	Mechanical, synchromesh operation, (except for low range selection). 2 powershift speeds, button selected for each of the 4 gear positions on the main lever and the 3 positions on the range lever. Levers mounted on 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	3/2	3/2
[C]	Total of arrangements	24	24

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	I lo	414.48	1.64
[C]	1	I hi	338.89	2.01
[C]	2	I lo	282.92	2.40
[C]	2	I hi	231.31	2.94
[C]	3	I lo	198.12	3.43
[C]	3	I hi	161.98	4.20
[C]	4	I lo	136.15	5.00
[C]	4	I hi	111.32	6.11
[C]	1	II lo	165.00	4.12
[C]	1	II hi	134.90	5.04
[C]	2	II lo	112.63	6.04
[C]	2	II hi	92.08	7.39
[C]	3	II lo	78.87	8.62
[C]	3	II hi	64.48	10.55
[C]	4	II lo	54.20	12.55
[C]	4	II hi	44.31	15.35
[C]	1	III lo	68.15	9.98
[C]	1	III hi	55.72	12.21
[C]	2	III lo	46.52	14.62
[C]	2	III hi	38.03	17.88
[C]	3	III lo	32.58	20.88
[C]	3	III hi	26.63	25.54
[C]	4	III lo	22.39	30.38
[C]	4	III hi	18.30	37.16
	Reverse			
[C]	1	I lo	400.81	1.70
[C]	1	I hi	327.70	2.08
[C]	2	I lo	273.59	2.49
[C]	2	I hi	223.69	3.04
[C]	3	I lo	191.59	3.55
[C]	3	I hi	156.64	4.34
[C]	4	I lo	131.68	5.17
[C]	4	I hi	107.64	6.32
[C]	1	II lo	159.59	4.26
[C]	1	II hi	130.45	5.21
[C]	2	II lo	108.92	6.24
[C]	2	II hi	89.05	7.64
[C]	3	II lo	76.27	8.92
[C]	3	II hi	62.36	10.91
[C]	4	II lo	52.42	12.98
[C]	4	II hi	42.85	15.87
[C]	1	III lo	65.90	10.32
[C]	1	III hi	53.88	12.62
[C]	2	III lo	44.99	15.12
[C]	2	III hi	36.78	18.49
[C]	3	III lo	31.50	21.59
[C]	3	III hi	25.76	26.41
[C]	4	III lo	21.65	31.41
[C]	4	III hi	17.70	38.42

I = Low range II = Medium range III = High range
lo = Under drive hi = Direct drive

(*) 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

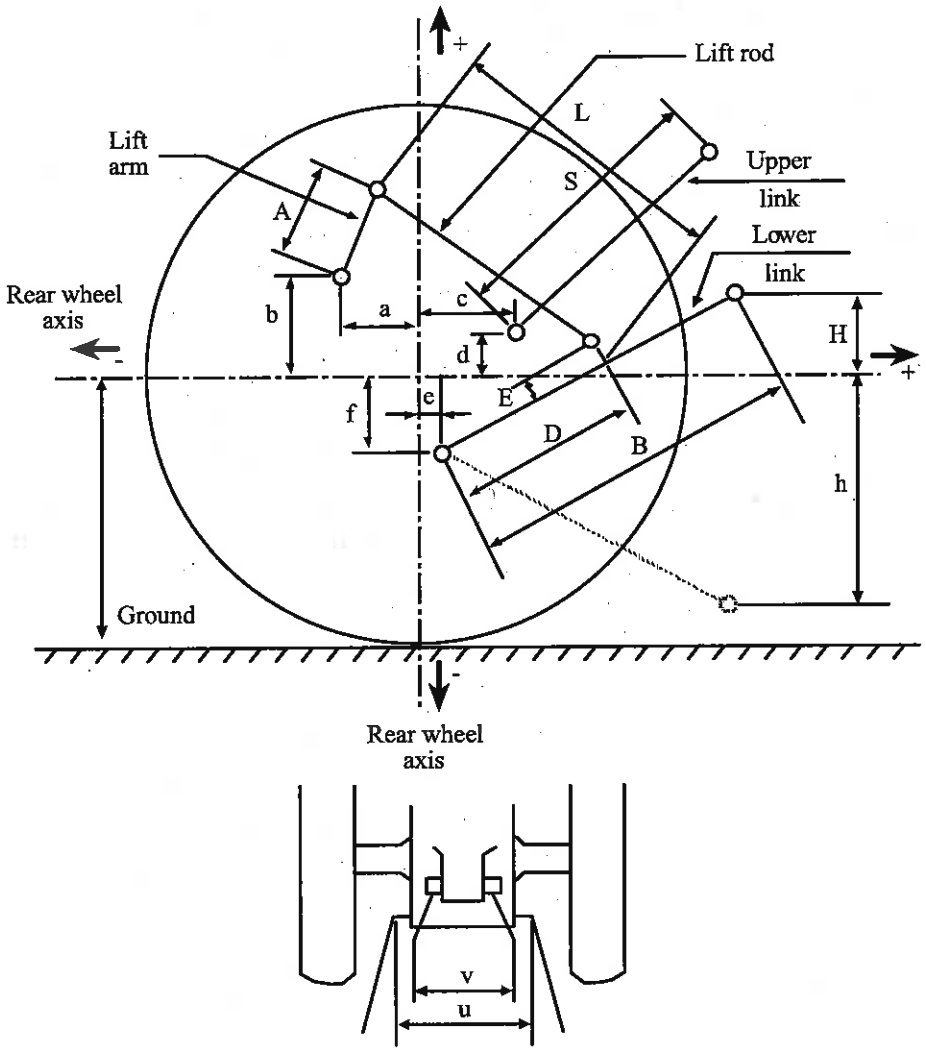
1.4.1.2 Power take-off proportional to ground speed — Not applicable

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 2 single acting externally mounted rams
[C]	Type of linkage lock for transport:	Hydraulic
[D]	Pump maximum pressure / Relief valve pressure setting:	19.5 – 20.5 MPa
[D]	Opening pressure of cylinder safety valve:	22.0 – 23.0 MPa
[D]	Lift pump type:	Fixed displacement gear pump
[D]	Transmission between pump and engine:	Gear driven from PTO shaft, independent of main and PTO clutches
[C]	Type and number filters:	2 disposable canister filters
[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	697	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	593	485	523/405
[C]	- in high position		(H)	0 – 225	0	0	0/55
[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	1310	170 x 170	190
[C]	Sidelights	—	—	—
[C]	Rear lights	1835	125 x 80	863
[C]	Rear fender reflectors	1835	125 x 80	820
[C]	Rear fender strip reflectors	1820	230 x 50	720

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	1835	1855
Rear	2839	2894
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:	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: 7 January 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							
66.4	1958	924	1759	17.14	20.27	258	3.27
3.1.2 POWER AT RATED ENGINE SPEED							
65.1	2200	1038	1922	17.88	21.15	275	3.08
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000 ± 25 min^{-1} (rev/min)]							
66.1	2121	1000	1865	17.80	21.05	269	3.14
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed							
65.1	2200	1038	1922	17.88	21.15	275	3.08
3.1.4.2 85% of torque obtained in 3.1.4.1							
57.2	2269	1070	1906	16.46	19.47	288	2.94
3.1.4.3 75% of torque defined in 3.1.4.2							
43.0	2278	1074	1987	13.30	15.73	309	2.74
3.1.4.4 50% of torque defined in 3.1.4.2							
28.9	2298	1084	1899	10.53	12.46	364	2.32
3.1.4.5 25% of torque defined in 3.1.4.2							
14.7	2331	1100	1797	7.79	9.21	530	1.59
3.1.4.6 unloaded							
0	2362	1114	1377	5.26	6.22	-	-
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							
66.1	2121	1000	1865	17.80	21.05	269	3.14
3.1.5.2 85% of torque obtained in 3.1.5.1							
57.3	2169	1023	1877	16.08	19.03	281	3.01
3.1.5.3 75% of torque defined in 3.1.5.2							
43.4	2185	1031	1903	12.93	15.30	298	2.83
3.1.5.4 50% of torque defined in 3.1.5.2							
29.4	2218	1046	1778	10.13	11.98	345	2.45
3.1.5.5 25% of torque defined in 3.1.5.2							
14.9	2255	1063	1240	7.23	8.55	487	1.74
3.1.5.6 unloaded							
0	2291	1080	1256	4.86	5.75	-	-

3.1.6 PART LOADS AT DIFFERENT ENGINE SPEEDS							
3.1.6.1 maximum power at rated engine speed							
65.1	2200	1038	1922	17.88	21.15	275	3.08
3.1.6.2 80% of power obtained in 3.1.6.1 at max speed setting							
52.0	2270	1071	1958	15.35	18.15	295	2.87
3.1.6.3 80% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
52.0	1980	934	1812	14.03	16.60	270	3.13
3.1.6.4 40% of power obtained in 3.1.6.1 with governor set to 90% of rated engine speed							
26.1	1981	934	1232	8.05	9.52	308	2.74
3.1.6.5 60% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
39.1	1318	622	1326	9.46	11.19	242	3.50
3.1.6.6 40% of power obtained in 3.1.6.1 with governor set to 60% of rated engine speed							
26.0	1319	622	1252	6.64	7.85	256	3.31

No load maximum engine speed: 2362 min^{-1} (rev/min)

Torque (equivalent crankshaft) at maximum power

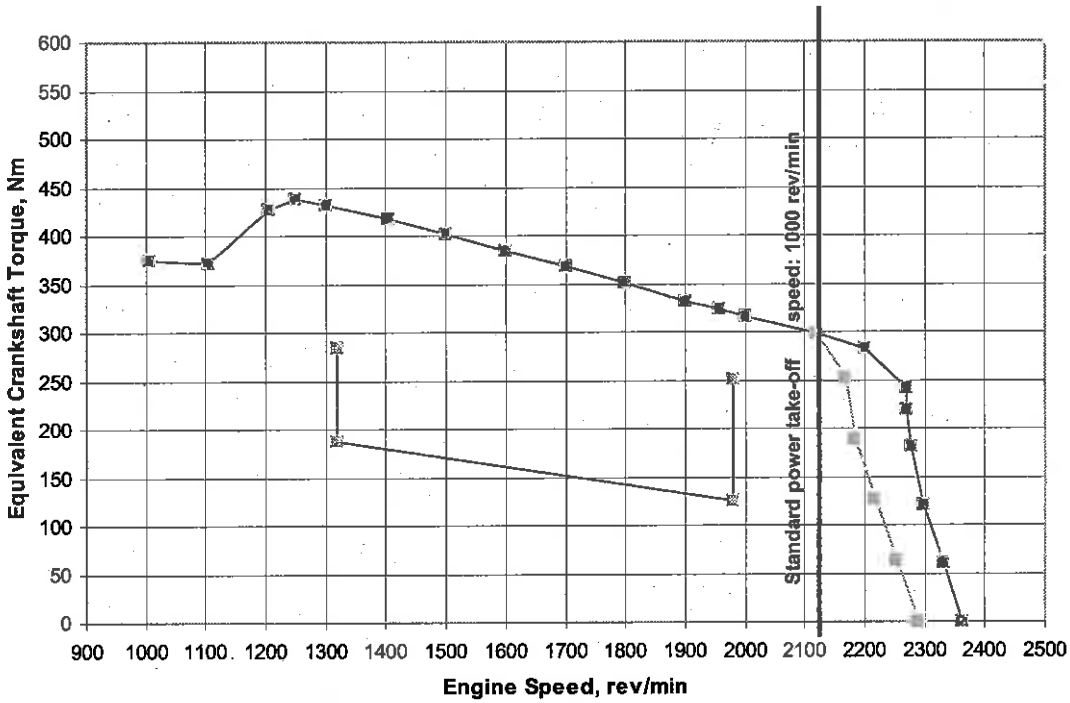
At rated engine speed: 282.6 Nm

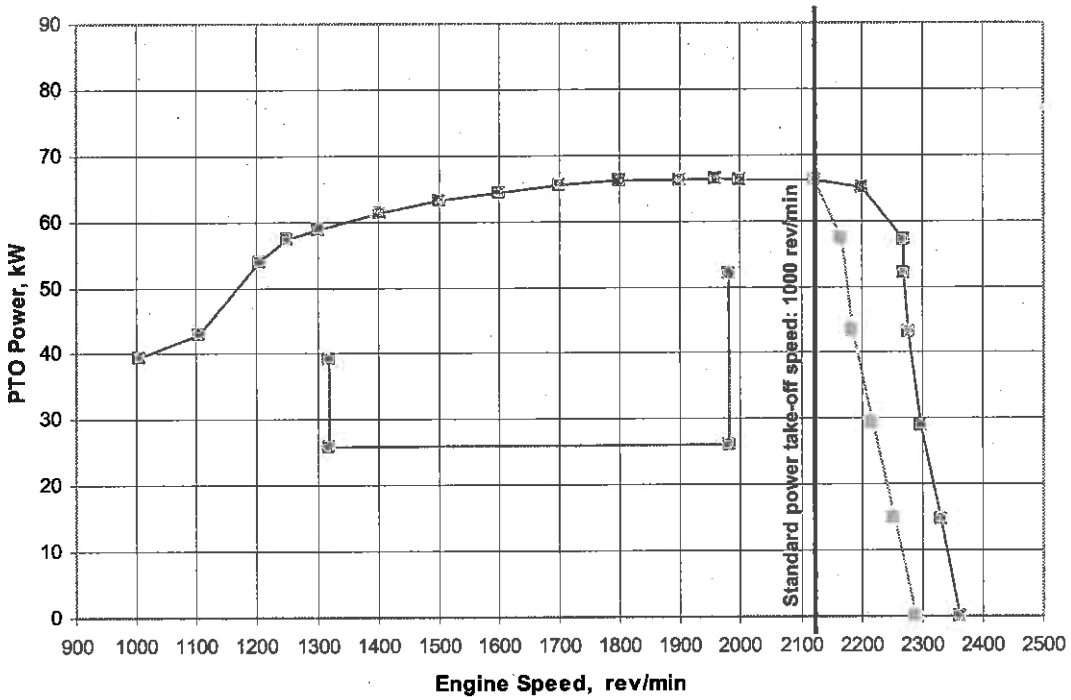
At 2-hour test: 323.6 Nm

Maximum torque (equivalent crankshaft): 438.0 Nm
(engine speed: 1250 min^{-1} (rev/min)

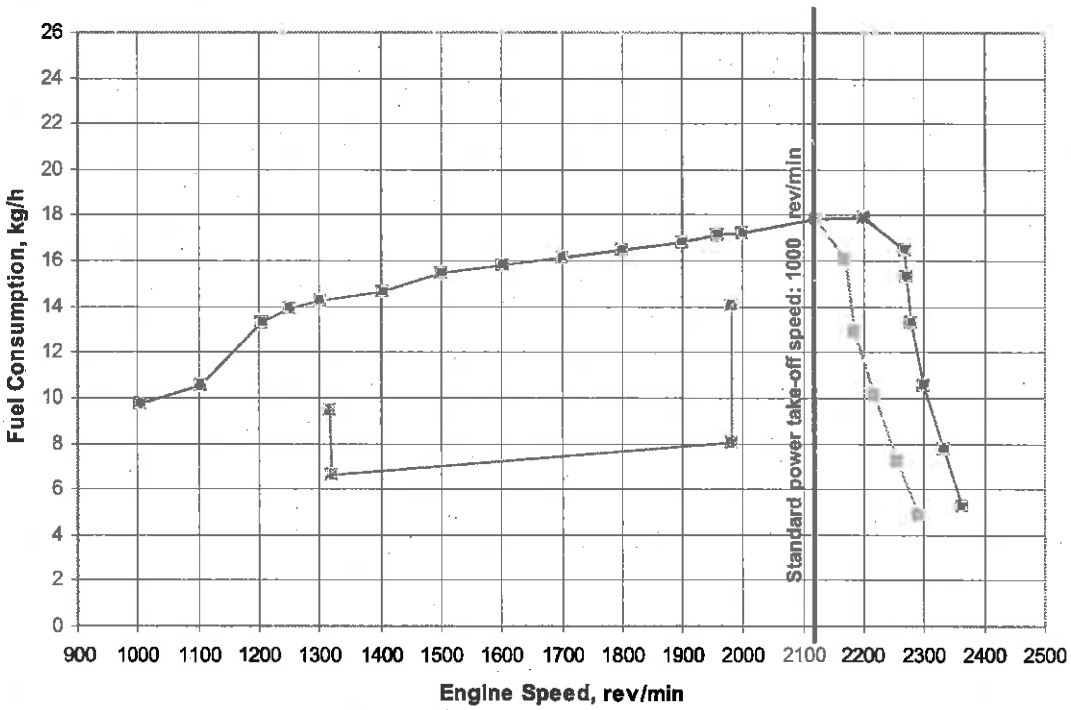
Mean atmospheric conditions:	
Temperature	23 °C
Pressure	101.4 kPa
Relative humidity	42 %
Maximum temperatures:	
Coolant	81 °C
Engine oil	104 °C
Fuel	48 °C
Engine air intake	29 °C

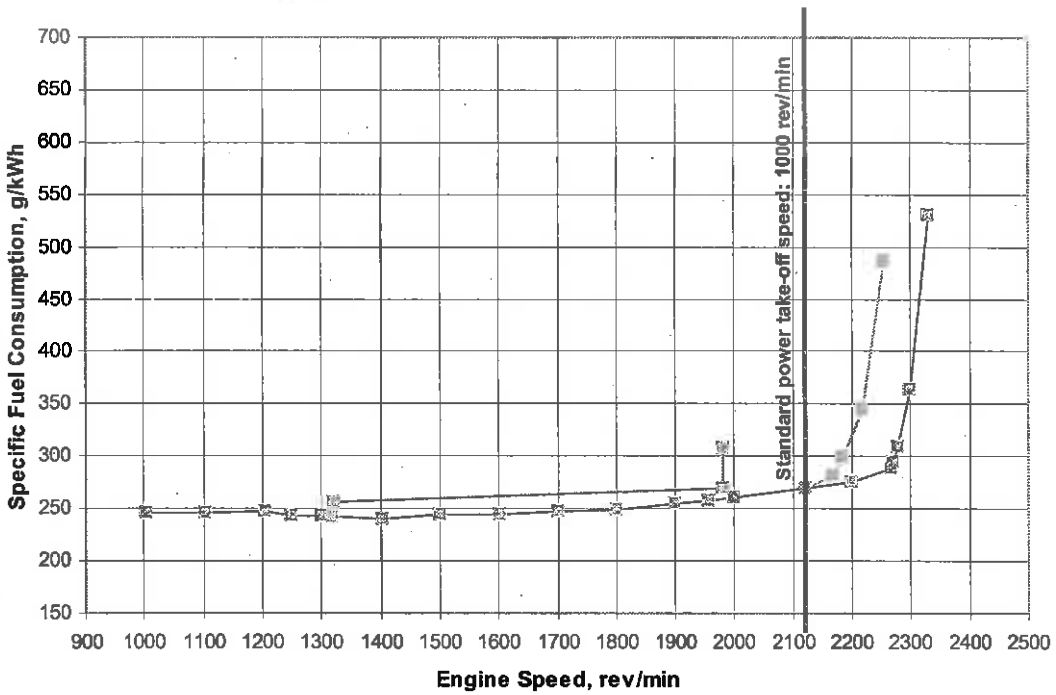
Power take-off curves



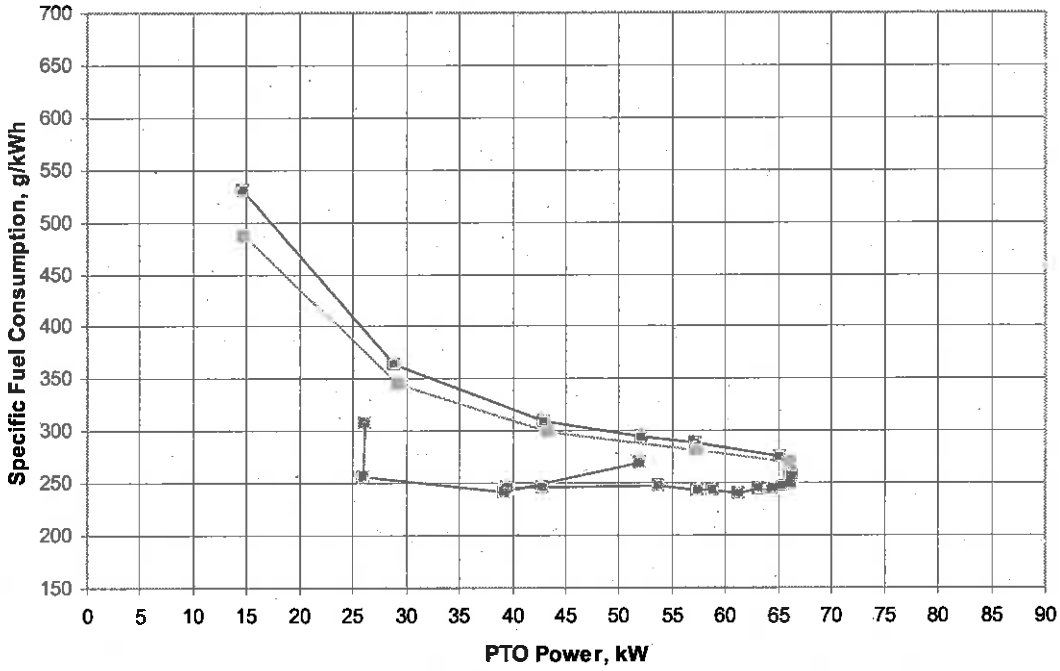


Power take-off curves





Power take-off curve



3.2 Hydraulic power and lifting force

Date of tests: 29 and 31 March 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	20.5	63	67	2342		
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:	18.5 18.5*	65 66*		2328 2329*	41.2 43.7	12.70 13.47*
3.2.1.2.3 Maximum available flow and maximum power from one coupler pair:	15.5	64		2330	74.5	19.25
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):	16.5	65		2332	74.8	20.57

* From 2 couplers

Maximum flow from 1 pair of couplers: 81.8 l/m

Maximum flow from 2 pairs of couplers: 82.4 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	197 mm	197 mm
Vertical movement	593 mm	725 mm
Maximum corrected force exerted through full range	44.2 kN	32.6 kN
Corresponding pressure of hydraulic fluid	18.5 MPa	18.5 MPa
Moment about rear-wheel axis	49.4 kNm	56.3 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	- 388	- 285	- 190	- 85	0	+ 95	+ 165	+ 185	+ 205	+ 255
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	--	44.2	45.5	46.4	46.8	46.6	45.7	45.4	45.2	45.2	--
Corresponding pressure: 18.5 MPa											
at the frame kN	38.4	--	40.1	39.2	38.5	37.0	35.0	33.2	32.6	--	32.6
Corresponding pressure: 18.5 MPa											

3.3 Drawbar power test (unballasted tractor)

Date and Location of tests: 15 and 17 March 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	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)													
1 I lo	22.3	52.6	1.53	2282	13.0	1535	472	1.79	52	81	103	15	66	100.8
1 I hi	27.0	52.0	1.87	2277	12.8	1370	474	1.78	50	81	103	14	68	100.8
2 I lo	32.4	51.6	2.26	2270	11.6	1350	397	2.13	48	81	103	13	68	100.8
2 I hi	38.9	50.5	2.77	2266	11.2	1697	373	2.27	49	81	104	11	75	100.8
3 I lo	45.8	50.1	3.29	2257	9.4	1890	362	2.34	49	81	103	14	69	100.8
1 II lo	52.3	49.0	3.84	2170	8.5	1884	336	2.51	48	80	104	14	69	100.8
3 I hi	53.5	48.6	3.96	2188	8.1	1745	331	2.56	47	80	103	13	71	100.8
4 I lo	55.4	43.1	4.62	2102	6.1	1723	316	2.67	47	80	103	13	72	100.8
1 II hi	54.6	40.0	4.91	2201	5.5	1827	324	2.61	45	80	101	12	73	100.8
2 II lo	55.5	38.1	5.25	1950	5.0	1383	304	2.78	46	80	103	11	76	100.8
4 I hi	56.6	37.9	5.38	1974	5.0	1400	299	2.82	47	80	104	10	77	100.8
2 II hi	55.9	30.9	6.52	1961	4.0	1450	307	2.75	44	79	101	10	74	100.8
3 II lo	55.8	26.4	7.60	1949	3.6	1250	307	2.75	43	79	100	11	74	100.8
1 III lo	55.0	22.2	8.89	1962	3.1	1785	309	2.74	47	81	102	11	75	100.8
3 II hi	55.0	21.4	9.26	1931	3.0	1588	307	2.75	45	80	103	10	76	100.8
1 III hi	54.8	18.3	10.76	1932	2.7	1771	308	2.74	46	81	103	10	78	100.8
4 II lo	53.9	17.5	11.11	1939	2.7	1460	314	2.69	45	80	103	10	78	100.9
2 III lo	52.2	14.5	12.97	1935	2.2	1583	323	2.61	46	81	103	10	78	100.4
4 II hi	51.3	13.6	13.62	1934	2.2	1770	329	2.57	46	80	102	11	74	100.8

3.3.2 FUEL CONSUMPTION														
3.3.2.1 In selected gear, at maximum power at rated speed														
4 I hi	55.3	33.0	6.03	2199	4.3	1550	321	2.63	49	81	104	10	77	100.8
3.3.2.1.1 75% of pull corresponding to maximum power at rated engine speed														
4 I hi	43.1	24.7	6.28	2267	3.5	1687	355	2.38	46	81	104	10	77	100.8
3.3.2.1.2 50% of pull corresponding to maximum power at rated engine speed														
4 I hi	29.2	16.5	6.37	2282	2.5	1315	410	2.06	48	80	104	10	78	100.8
3.3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1														
2 II hi	43.2	24.8	6.26	1875	3.7	1475	314	2.69	48	80	102	14	68	100.8
3.3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2														
2 II hi	29.2	16.5	6.35	1883	2.7	1250	336	2.52	48	80	101	14	69	100.8
3.3.2.2 In selected gear nearest to 7.5 km/h at rated engine speed														
2 II hi	54.5	26.7	7.34	2199	3.6	1950	326	2.59	46	81	102	11	75	100.8
3.3.2.2.1 75% of pull corresponding to maximum power at rated engine speed														
2 II hi	42.6	20.1	7.64	2270	3.0	1850	357	2.37	45	81	103	11	75	100.8
3.3.2.2.2 50% of pull corresponding to maximum power at rated engine speed														
2 II hi	28.8	13.4	7.75	2286	2.2	1315	416	2.03	46	80	103	11	75	100.8
3.3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1														
3 II lo	42.7	20.1	7.64	1949	3.1	1510	329	2.57	50	80	101	14	68	100.8
3.3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2														
3 II lo	28.7	13.4	7.72	1953	2.3	1370	362	2.34	48	80	101	14	68	100.8

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)														
I I lo	16.8	39.9	1.52	2313	13.2	1505	551	1.53	48	81	100	12	75	101.5
I I hi	20.5	39.9	1.85	2296	13.1	1545	505	1.67	51	81	100	13	74	101.5
2 I lo	24.2	39.3	2.22	2284	12.4	1450	465	1.82	51	81	100	13	73	101.5
2 I hi	30.0	39.5	2.74	2276	11.3	1723	411	2.06	50	81	103	12	75	101.5
3 I lo	34.7	39.0	3.20	2270	10.8	1857	397	2.13	49	81	103	12	75	101.5
1 II lo	41.7	39.0	3.85	2259	10.4	1799	374	2.26	50	81	103	12	76	101.5
3 I hi	42.4	38.8	3.93	2261	10.2	1821	373	2.27	51	81	103	13	73	101.5
4 I lo	50.5	38.5	4.72	2250	8.9	1700	346	2.44	52	81	104	17	64	101.7
1 II hi	50.8	38.6	4.74	2239	8.8	1787	346	2.45	50	81	104	16	66	101.7
2 II lo	54.2	35.1	5.55	2126	6.1	1478	323	2.62	48	80	103	15	69	101.7
4 I hi	55.2	35.6	5.58	2112	6.1	1427	319	2.65	48	80	101	16	67	101.7
2 II hi	55.1	31.1	6.39	1969	4.7	1380	309	2.74	46	80	100	14	73	101.5
3 II lo	54.9	26.4	7.48	1953	3.7	1400	308	2.75	46	81	103	14	73	101.5
1 III lo	55.9	23.0	8.75	1967	3.3	1752	304	2.78	46	79	102	14	72	101.6
3 II hi	56.0	21.8	9.25	1963	3.1	1580	304	2.78	48	80	103	15	69	101.6
1 III hi	56.4	19.0	10.70	1956	2.7	1702	300	2.82	47	80	103	15	70	101.6
4 II lo	55.4	18.1	11.01	1954	2.6	1632	305	2.77	48	80	103	15	69	101.6
2 III lo	54.3	15.4	12.67	1924	2.3	1545	310	2.73	48	80	103	15	66	101.6
4 II hi	55.1	14.6	13.63	1970	2.2	1698	309	2.74	48	80	103	15	68	101.7

3.3.2 FUEL CONSUMPTION														
3.3.2.1 In selected gear, at maximum power at rated speed														
1 III hi	53.6	16.0	12.09	2200	2.4	1610	328	2.58	48	81	104	15	68	101.6
3.3.2.1.1 75% of pull corresponding to maximum power at rated engine speed														
1 III hi	41.5	12.0	12.46	2259	1.9	1550	364	2.32	50	80	104	17	64	101.8
3.3.2.1.2 50% of pull corresponding to maximum power at rated engine speed														
1 III hi	27.9	8.0	12.60	2274	1.6	1410	437	1.93	50	81	104	17	62	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														
2 III lo	41.5	12.0	12.41	1880	2.0	1388	329	2.57	51	80	103	17	62	101.8
3.3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2														
2 III lo	27.9	8.0	12.63	1902	1.5	1297	365	2.32	49	80	100	17	64	101.8
3.3.2.2 In selected gear nearest to 7.5 km/h at rated engine speed														
2 II hi	53.0	26.5	7.19	2197	3.8	1827	335	2.52	47	81	101	15	71	101.5
3.3.2.2.1 75% of pull corresponding to maximum power at rated engine speed														
2 II hi	41.4	19.9	7.51	2270	2.8	1754	370	2.28	46	80	101	14	72	101.5
3.3.2.2.2 50% of pull corresponding to maximum power at rated engine speed														
2 II hi	28.2	13.3	7.63	2287	2.0	1677	430	1.96	47	81	102	14	71	101.5
3.3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1														
3 II lo	41.7	19.9	7.52	1951	3.0	1462	323	2.62	47	79	98	18	60	101.8
3.3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2														
3 II lo	28.2	13.3	7.61	1957	2.1	1340	354	2.39	50	79	98	18	62	101.8

5.	**REPAIRS**	None
6.	**REMARKS**	None

Test carried out by: S J Devonshire

Signed: Officer in charge



J P Evans
Senior Test Engineer
Field Machinery Centre

Date: 2 June 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	485 mm	555 mm
Maximum corrected force exerted through full range	51.4 kN	40.2 kN
Corresponding pressure of hydraulic fluid	18.5 MPa	18.5 MPa
Moment about rear-wheel axis	57.5 kNm	69.5 kNm
Maximum tilt angle of mast from vertical	----	7 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	- 310	- 270	- 200	- 140	- 75	0	+ 105	+ 165	+ 195	+ 215	+ 245
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	--	58.9	59.5	59.1	58.8	57.1	54.4	52.2	51.4	51.4	--
Corresponding pressure: 18.5 MPa											
at the frame kN	53.0	--	51.3	50.5	49.7	47.7	44.2	42.0	40.5	--	40.2
Corresponding pressure: 18.5 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	- 75	0	+75	+ 115	+ 138	---	---
*mm	---	---	- 170	- 140	- 70	0	+ 75	+ 115	+ 135	+ 210	+ 290
SAE J283											
kN	59.3	54.0	52.5	50.9	49.2	46.8	44.3	42.2	41.0	---	---
*kN	---	---	55.9	55.9	52.0	50.5	48.8	46.4	45.3	43.0	39.8
Corresponding pressure: 17.6 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: 13 April 2005

Four wheel drive engaged

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
2 II hi	Light Load	8.1	85

Four wheel drive dis-engaged

Gear	Test Condition	Measured travelling speed km/h	Sound level dB(A)
2 II hi	Light Load	8.0	85