SILSOE RESEARCH INSTITUTE
Wrest Park, Silsoe,
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Report on test in accordance with the OECD STANDARD CODE II (RESTRICTED CODE) for the Official Testing of Agricultural and Forestry Tractors

Massey Ferguson 4240 Four-Wheel Drive Tractor with 8-speed Transmission (30 Km/h)



Manufactured by: AGCO Limited
P O Box 62
Banner Lane
Coventry
West Midlands CV4 9GF
England

Submitted for test by: The manufacturer

Report No: 801

Date: March 1999

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Tractor manufacturer's name and address:	AGCO Limited, P O Box 62 Banner Lane, Coventry, West Midlands, CV4 9GF
Location of tractor assembly:	Coventry, England
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with the agreement of the testing station
Place of running in:	Coventry
Duration of running in:	70 hours
Location of test:	Silsoe Research Institute Wrest Park, Silsoe, England

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

Make:	Massey Ferguson
Model:	MF 4240 with 8-speed Transmission (30 Km/h)
Type:	Four wheel drive, unit construction
Serial No:	BBFA14XXXAG44071
1st Serial No:	BBFA14XXXAG44071
Tractor type code:	BBFA14XXXA

1.2 Engine

Make:	Perkins
Model:	4-41
Type:	4 stroke, direct injection, naturally aspirated diesel
Serial No:	U863685D
Type number:	1903/2200
Ist serial No:	G01001

1.2.1 Cylinders

Number/disposition:	4 vertical In-line
Bore/stroke:	100 mm/127 mm
Capacity:	3990 cm^3
Compression ratio:	17.25:1
Arrangement of valves:	Overhead
Cylinder liners:	Dry

1.2.2 Supercharging

Make:	None

1.2.3 Fuel system

Fuel feed system:	Superpar
Make, type and model of fuel filter:	2 off, Paper element filters with transparent sediment bowl (one off as standard build two off as an option)
Capacity of fuel tank:	126 litres main tank, 70 litres aux
Make, type and model of injection pump:	Lucas DSA 1144
Serial No:	40200 KRG
Manufacturer's production setting of injection pump:	16.44 to 17.46 l/h
Flow rate:	64.2 +/- 3% mm^3/stroke at 2200 rev/min engine speed at full load on 45°C pump inlet temperature
Timing:	Static timing ; TDC +/- 2 degrees
Make, type and model of injectors:	Lucas CAV, code HL Complete injector Nozzle Assembly number:- 2645K002 2645K602
Injection pressure:	29.4 +/- 0.5 MPa

1.2.4 Governor

Make:	Lucas
Model:	Not applicable
Type:	Mechanical, incorporated in injection pump
Governed range of engine speed:	750 to 2354 rev/min
Rated engine speed:	2200 rev/min

1.2.5 Air cleaner

Pre-cleaner	None
Main cleaner	
Make:	Mann and Hummel
Type:	3 stage, 2 stages are paper elements
Model:	44, 211, 93, 521
Location of air intake:	Behind radiator grill, in front of radiator
Maintenance indicator:	Warning light on instrument panel

1.2.6 Lubrication system

Type of feed pump:	Forced feed from eccentric rotor pump
Type of filter:	Full flow, replaceable canister
Number:	1

1.2.7 Cooling system

Type of coolant:	Water or water and antifreeze solution
Type of pump:	Centrifugal
Specification of fan:	Belt driven pulley
Number of fan blades:	2
Fan diameter:	500 mm
Coolant capacity:	17.5 litres
Type of temperature control:	Thermostat
System pressure:	75 kPa

1.2.8 Starting system

Make:	Magneti Marelli
Model:	M127
Type:	Electrical, pre-engaged, solenoid operated
Starter motor power rating:	2.8 kW
Cold starting aid:	CAV, SINTEROM or ISKRA induction heater
Safety device:	Starting operable only when shuttle and PTO levers are in neutral

1.2.9 Electrical system

Voltage:	12
Generator:	Alternator
Make:	Magneti Marrelli
Model:	A 127-45
Type:	Belt driven
Power:	0.84 kW
Batteries:	1 Exide,type xxx lead acid, maintenance free
Rating:	IEC 505 amp. Equivalent to 105 AH at 20 hour rating

1.2.10 Exhaust system

Make:	Tecnov
Model:	Massey Ferguson 131
Type:	Horizontal silencer
Location:	Under bonnet, right hand side
Height of outlet above ground:	2590 mm

1.3 Transmission

1.3.1 Clutch (Travel alone)

Make:	LUK
Model:	None
Type:	Dry for transmission only
Number of plates:	1
Diameter of plates:	305 mm
Method of operation:	Mechanical by pedal

1.3.2 Gear box

Make:	Massey Ferguson
Model:	None
Description:	Mechanical manual operation, 4 forward and 1 reverse speeds with high and low range selector

	Forward	Reverse
Number of gears	4	1
Number of ranges/groups	2	2
Total of arrangements	8	2

Available options: 12x4, 12x4 with creep, 12x12 with creep, 18 x 6

1.3.3 Rear axle final drives

Make:	Own make
Model:	None
Type:	Crown wheel and pinion with differential and outboard epicyclic reduction gear final drives
Differential lock:	
Type:	Mechanical dog clutch on differential gears
Method of engagement:	Twist lever and pull up
Method of disengagement:	Push lever down

1.3.4 Front axle and final drives

Make:	Dana Spicer Europe
Model:	AG 85
Type:	Crown wheel and pinion with differential and outboard epicyclic reduction gear final drives
Differential lock:	
Type:	Mechanical dog clutch on differential gears
Method of engagement:	As above
Method of disengagement:	As above

1.3.5 Total ratios and travelling speeds

Gear	Group No	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at rated engine speed:* 2200 rev/min km/h
Forward			
1	L	219.753	2.72
2	L	149.849	3.99
3	L	109.689	5.44
4	L	81.743	7.31
5	H	53.718	11.12
6	H	36.630	16.30
7	H	26.813	22.27
8	H	19.982	29.89
Reverse			
1	L	161.387	3.70
2	H	39.450	15.14

Range selection: L = low H =High

(*) Calculated with a tyre dynamic radius index of 720 mm (ISO 4251/1-1992)

Number of revolutions of front wheels for one revolution of rear wheels: 1.3833

1.4 Power take-off

1.4.1 Main power take-off

Type:	Independent
Method of engagement:	By hand lever hydraulically engaging wet multi-plate clutch
Number of shafts:	1 (interchangeable for 6 or 21 splines to ISO 500/1991)
Method of changing power take-off speeds:	Manually by hand lever LH side of seat

Clutch

Make:	Own make
Model:	None
Type:	Hydraulically actuated wet multiplate
Number of plates:	5
Diameter of plates:	128 mm

1.4.1.1 Power take-off proportional to engine speed

540 rev/min

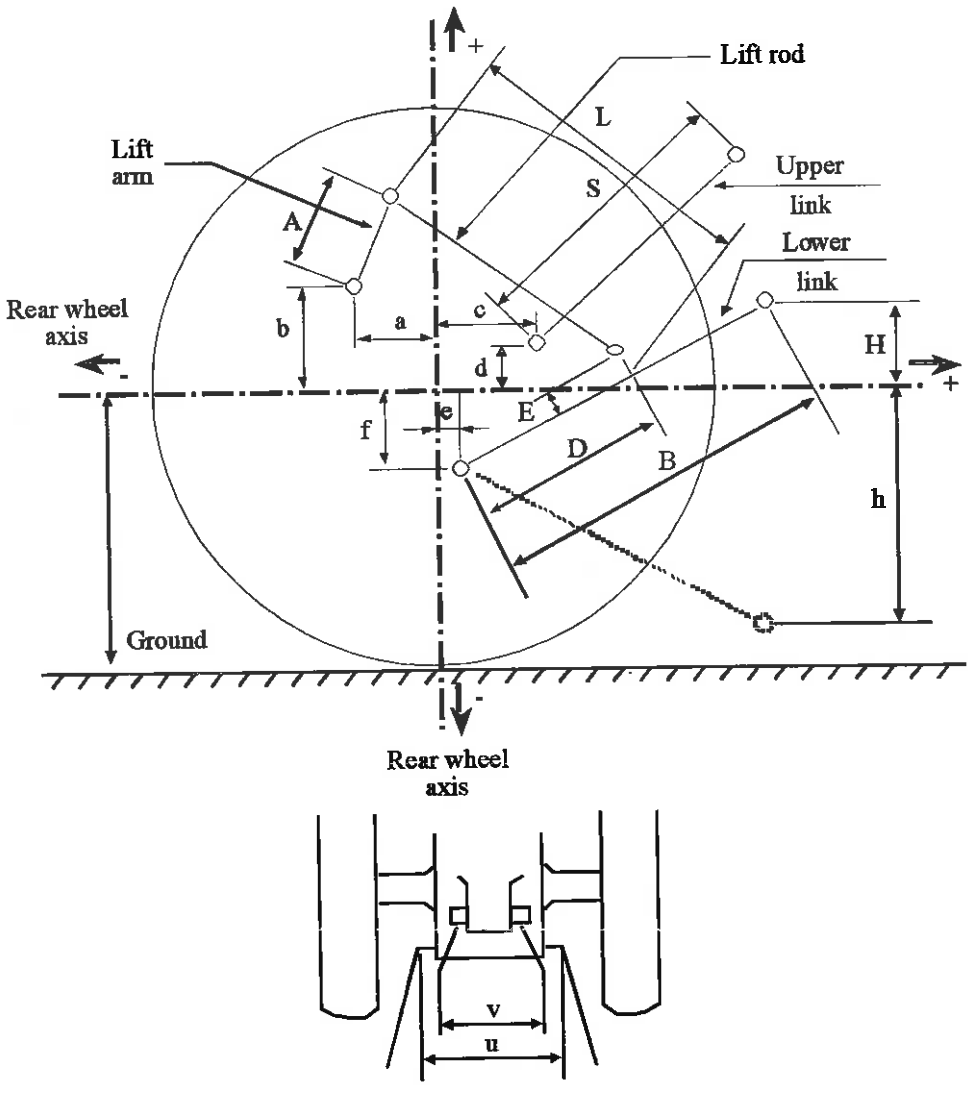
Location:	Rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	6 to ISO 500/1991
Height above ground:	585 mm
Distance from the median plane of the tractor:	Central
Distance behind rear wheel axis:	333 mm
Pto speed at rated engine speed:	625 rev/min
Engine speed at standard power take-off speed:	1902 rev/min
Ratio of rotation speeds:	3.3125:1
Power restriction and maximum torque:	None
Direction of rotation (viewed from behind tractor):	Clockwise

1.5 Hydraulic power lift (as fitted to the test tractor)

Make:	Massey Ferguson
Model:	None
Type:	Hydraulic, with inlet suction control closed system
Type and number of cylinders:	1 single acting, internal
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	21.4 - 24.0 MPa
Opening pressure of cylinder safety valve:	26.2 - 27.6 MPa
Lift pump type:	4 cylinder, piston
Transmission between pump and engine:	Driven from PTO shaft independent of main clutch
Type and number of filters:	Full flow with metal mesh strainer, 1
Site of oil reservoir:	Transmission housing
Type, number and location of tapping points:	Optional tapping port (not fitted to test tractor), a valve allows flow to spool valve and quick release couplings
Maximum volume of oil available to external cylinders:	20.0 litres

1.6 Three-point linkage

Category:	2 to ISO standard 730-1:1994
Category adaptor:	None
Controls:	Draught or position control with top link sensing



LIFT TEST
Linkage geometry

Fig 2.1

Table 2.1
Dimensions of linkage when attached to the standard frame (ISO 730-1-1994 CAT 2)

			Dimensions or range	Setting used in Main Test	Setting used in Test 2 (Test 3)
Length of lift arms:		(A)	310 mm	310 mm	310 mm
Length of lower links:		(B)	1000 mm	1000 mm	1000 mm
Distance of lift arm pivot point from rear wheel centre line:	horizontally: vertically:	(a) (b)	196 mm 233 mm	196 mm 233 mm	196 mm 233 mm
Horizontal distance between the two lower link points:		(u)	492 mm	492 mm	492 mm
Horizontal distance between the two lift arm end points:		(v)	584 mm	584 mm	584 mm
Length of upper link:		(S)	678 - 918 mm	805 mm	805 mm
Distance of upper link pivot point from rear wheel centre line:	horizontally: vertically:	(c) (d)	186, 200, 216 mm 205, 171, 132 mm	186 mm 205 mm	186 mm 205 mm
Distance of lower link pivot point from rear wheel centre line:	horizontally: vertically:	(e) (f)	32 mm forward 212 mm	32 mm 212 mm	32 mm 212 mm
Distance of lower link points to lift rod pivot points on lower link centre line:	horizontally: vertically:	(D) (E)	630 mm -8 mm (below C/l)	630 mm -8 mm	630 mm -8 mm
Length of lift rods:		(L)	RH 685 - 805 mm *LH 690 - 805 mm	805 mm	750 mm (690 mm)
Height of lower hitch points (*) relative to the rear wheel centre line, situated 720 mm above the ground level:					
- in low position		(h)	290 - 570 mm	570 mm	435 mm (290 mm)
- in high position		(H)	107 - 280 mm	75 mm	170 mm (258 mm)
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 720 mm ISO 4251/1-1992
*LH lift rod is a solid rod and can only be adjusted to 1, 2 or 3 positions

1.7 Swinging drawbar

Type:	Clevis
Height above ground: maximum	505 mm
minimum:	303 mm
Type of adjustment:	Inverting drawbar and clevis
Distance of hitch point from rear-wheel axis, horizontally:	583 mm, 683 mm, 733 mm
Distance of hitch point from power take-off shaft ends:	
Vertically:	80 mm, 180 mm, 185 mm, 282 mm
Horizontally:	250 mm, 350 mm, 400 mm
Lateral adjustment (centre of clevis):	
Right-hand:	169 mm drawbar in, 196 mm, 210 mm, drawbar out
Left-hand:	169 mm drawbar in, 196 mm, 210 mm, drawbar out
Distance of pivot point from rear axles horizontally:	30 mm forward
Width of clevis:	70 mm
Diameter of drawbar pin hole:	33 mm
Maximum vertical permissible load:	11.6 kN

1.8 Trailer hitch

Type:	None fitted

1.9 Holed drawbar

Type:	None fitted

Front towing hitch

Type:	Clevis in front weight frame
Vertical height to centre of clevis:	780 mm
Width of clevis:	50 mm
Diameter of pin hole:	33 mm

1.10 Steering

Make:	Massey Ferguson
Model:	None
Type:	Hydrostatic
Method of operation:	
Pump:	Gear type mounted on transmission case in tandem with auxiliary hydraulic system pump
Motor:	Danfoss OSPC-100-0N
Ram:	1 double acting operating both track rods
Filter:	None

1.11 Brakes

1.11.1 Service brake

Make:	Girling
Model:	None
Type:	Oil-immersed multiplate discs, 4 per side
Method of operation:	Independent on rear wheels or combined pedal giving compensated actuation and automatic engagement of 4WD providing 4-wheel braking
Trailer braking take-off:	Connection fitted to ISO 5676-1983

1.11.2 Parking brake

Type:	Mechanical via cable
Method of operation:	Hand lever with ratchet, acts on all 4 wheels due to automatic 4WD engagement

1.12 Wheels

Number: 4

Front: 2 steering and driving

Rear: 2 driving

Wheelbase: 2350 mm

Track width adjustment:

	Minimum, mm	Maximum, mm	Adjustment method
Front	1610*	1820	By reversing wheels and offset lug rims
Rear	1535	2134	By reversing wheels and offset lug rims

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

1.13 Protective structure (if fitted)

Make: GKN Sankey

Model: 1100/1101

Type: 2 Post folding/non folding

Manufacturer's name and address: GKN Sankey, Hadley Castle (Cab-Works), P O Box 86, Telford TF1 4RE

Protective device: ROPS

Tiltable/Not tiltable: Tiltable

OECD approval

Approval number: 4/0514

Date of approval: 24 March 1998

Nos. minor modification certificates, if any:

1.14 Seat

1.14.1 Driver,s seat

Make/Model/Type: Grammer / MSG 44

Seat and steering wheel reversible: No

Type of suspension: Spring suspension

Type of damping: Mechanical

Range of adjustment:

Longitudinal: 150 mm

Vertical: 80 mm

Safety belt: No

1.15 Lighting

Unrestricted beam angle of headlight in plan view: 110°

	Height above ground to centre mm	Size mm	Distance from outside edge to median plane of tractor mm
Headlight	1115	160 x 100	196
Sidelights	1592	110 x 35	800
Rear lights	1612	95 x 52	580
Axle reflectors	760	80 dia	490
Rear fender reflectors	1612	45 x 52	535

2. TEST CONDITIONS

2.1 Overall dimensions

Length mm	Width		Height at top of	
	Minimum mm	Maximum mm	Protective structure mm	Exhaust pipe mm
3935	2133	2335	----	2590

2.2 Ground clearance (unballasted tractor) 240 mm

Clearance-limiting part: Drawbar clevis in lowest position

2.3 Tractor mass (----)

	Unballasted		Ballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	1271	1285	--	--
Rear	1672	1733	--	--
Total	2943	3018	--	--

2.5 Tyres and track width specification

	Front	Rear
Tyres dimensions ply rating type	12.4 x 24 6 Radial	18.4 x 30 6 Radial
Maximum load (tyre manufacturer's), kg	1200	2120
Maximum load (tractor manufacturer's), kg	1660	2275
Inflation pressure (tyre manufacturer's),Bar	1.7	1.1
Dynamic radius index , mm	540	720
Chosen track width (manufacturer's nominal), mm	1710	1630

2.6 Fuel

Type: Diesel oil to Class D, 1.5 to 5.5 cST
Density at 15°C 0.8390 g/cm^3

2.7 Oils and lubrication

2.7.1 Capacity and change interval

	Capacity litre	Oil change hours	Filter change hours
Engine	7	250	250
Front axle differential	7	1000	None
Front axle hub (each)	1	1000	None
Gearbox	50	1000	1000
Rear axle Hydraulic system Final drives (rear) Steering	Integral with gearbox		
Brakes	- -	Top-up	None

2.7.2 Specifications

	Recommended	Used during test
Engine oil		
Type:	SAE 15W/30, 15W/50 or 10W/40	SAE 15W/30
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-2C, API. CD. Min	
Transmission oils		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MF 1139 or MF 1135	
Rear final drives		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MF 1139 or MF 1135	
Front differential and final drives		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MF 1139 or MF 1135	
Hydraulic brakes		
Type:	Mineral	As recommended
Viscosity:	7.2 cSt at 50°C	
Classification:	MF CMS 1151A	
Hydraulic fluid		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MF 1139 or MF 1135	
Steering oil		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MF 1139 or MF 1135	
2.7.3 Grease	Consistency 2 lithium	As recommended
Number of lubrication points:	19	

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off (540)

Date and location of tests: 8 February 1999
Silsoe Research Institute,
Wrest Park, Silsoe, Bedford

Type of dynamometer: Eddy Current, Borghi and Saveri

Power kW	Speed		Fuel consumption			Specific energy kWh/l
	Engine rev/min	P.T.O. rev/min	Hourly kg/h	Hourly l/h	Specific g/kWh	
3.1.1 MAXIMUM POWER - TWO HOUR TEST						
56.0	2200	664	14.66	17.47	262	3.20
3.1.2 POWER AT RATED ENGINE SPEED						
56.0	2200	664	14.66	17.47	262	3.20
3.1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
49.1	1790	540	12.26	14.61	250	3.36
3.1.4 PART LOADS 3.1.4.1 The torque corresponding to maximum power at rated engine speed						
56.0	2200	664	14.66	17.47	262	3.20
3.1.4.2 85% of the torque defined in 3.1.4.1						
48.9	2259	682	13.05	15.56	267	3.14
3.1.4.3 75% of the torque defined in 3.1.4.2						
36.9	2282	689	10.44	12.45	283	2.96
3.1.4.4 50% of the torque defined in 3.1.4.2						
24.8	2298	694	8.32	9.91	335	2.50
3.1.4.5 25% of the torque defined in 3.1.4.2						
12.5	2313	698	6.12	7.29	488	1.72
3.1.4.6 Unloaded						
0	2331	704	4.07	4.85	--	--

Power kW	Speed		Fuel consumption			Specific energy kWh/l
	Engine rev/min	P.T.O. rev/min	Hourly kg/h	l/h	Specific g/kWh	
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
3.1.5.1 The torque corresponding to maximum power						
49.1	1790	540	12.26	14.61	250	3.36
3.1.5.2 85% of the torque obtained in 3.1.5.1						
43.1	1873	565	10.85	12.93	252	3.33
3.1.5.3 75% of the torque obtained in 3.1.5.2						
32.9	1905	575	8.56	10.21	261	3.22
3.1.5.4 50% of the torque obtained in 3.1.5.2						
22.5	1930	583	6.56	7.82	291	2.88
3.1.5.5 25% of the torque obtained in 3.1.5.2						
11.4	1955	590	4.70	5.61	412	2.03
3.1.5.6 Unloaded						
0	1981	598	2.90	3.45	--	--

No load, maximum engine speed: 2331 rev/min

Torque (equivalent crankshaft) at maximum power: 242.9 Nm

Torque (equivalent crankshaft) at rated speed: 242.9 Nm

Maximum torque (equivalent crankshaft): 275.1 Nm
(engine speed 1405 rev/min)

Mean atmospheric conditions:

- Temperature 22°C
- Pressure 99.6 kPa
- Relative humidity 27%

Maximum temperatures:

- Coolant 82°C
- Engine oil 115°C
- Fuel 46°C
- Engine air intake 27°C

3.2 Hydraulic power and lifting force

Date of tests: 4 March 1999

3.2.1 Hydraulic power test

	1 Lift system only	2 Auxiliary only	3 Auxiliary combination
Sustained pressure with relief valve open:	22.6 MPa	----	----
Pump delivery rate at minimum pressure:	20.3 l/min	----	----

	Flow rate l/min	Pressure MPa	Power kW
Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power	17.7	20.3	5.99
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	17.7	20.5	6.05

Tapping point used for test: Trailer coupling

Temperature of hydraulic fluid if different from 65 ± 5°C: -- °C

Opening pressure of the unloading valve: -- MPa

Closing pressure of the unloading valve: -- MPa

3.2.2 Power lift test - (To ISO 730-1:1990)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	150 mm	150 mm
Vertical movement	645 mm	812 mm
Maximum corrected force exerted through full range	17.8 kN	15.4kN
Corresponding pressure of hydraulic fluid	20.3 MPa	20.3 MPa
Moment about rear-wheel axis	17.2 kNm	24.3 kNm
Maximum tilt angle of mast from vertical	--	11 degrees

Linkage settings for test - see Table 2.1 and Figure 2.1

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	-432	-358	-300	-200	-100	0	100	150	200	287	380
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure delivered by the hydraulic system)											
at the hitch points kN	--	17.8	19.1	21.0	22.3	23.3	24.0	24.0	24.3	24.5	--
Corresponding pressure: 20.3 MPa											
at the frame kN	15.4	16.2	16.9	17.6	18.0	18.1	18.1	17.9	17.6	17.3	16.9
Corresponding pressure: 20.3 MPa											

3.3 Drawbar power test (unballasted tractor), 4 wheel drive

Date and Location of tests: 25 February 1999
Silsoe Research Institute
Wrest Park
Silsoe
Bedford MK45 4HS

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pressure (kPa)	
	Front	Rear
280 mm	83	83

Gear and Range	Power	Drawbar Pull	Speed	Engine Speed	Slip of wheels or track	Spec Fuel cons	Spec energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Eng oil	Temp	Rel Humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kwh	kWh/l	Deg C	Deg C	Deg C	Deg C	%	kPa
3.3.1 MAXIMUM POWER IN TESTED GEARS													
1L	20.5	30.2	2.44	2305	15.0	418	2.00	22	77	101	9	62	101.1
2L	29.9	30.1	3.57	2288	15.0	360	2.33	23	78	103	8	62	101.2
3L	40.9	30.0	4.92	2261	13.7	330	2.53	27	79	105	8	62	101.2
4L	47.3	25.5	6.69	2195	9.9	313	2.67	29	79	106	8	63	101.2
1H	49.0	16.5	10.65	2193	5.5	301	2.78	30	80	107	8	64	101.2
2H	47.8	10.8	15.96	2195	3.6	306	2.74	28	78	106	8	63	101.2
3.3.2 FUEL CONSUMPTION 3.3.2.1 In selected gear, at maximum power at rated speed													
1H	49.0	16.5	10.65	2193	5.5	301	2.78	30	80	107	8	64	101.2
3.3.2.1.1 75% of pull at maximum power at rated speed													
1H	38.6	12.4	11.22	2275	4.2	319	2.62	30	79	107	8	62	101.2
3.3.2.1.2 50% of pull at maximum power at rated speed													
1H	26.5	8.3	11.48	2297	2.8	361	2.32	28	78	107	8	63	101.2
3.3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
2H	38.4	12.4	11.17	1550	4.8	287	2.91	34	80	99	8	65	101.1
3.3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
2H	26.6	8.3	11.51	1572	2.8	291	2.87	31	78	98	8	64	101.1
3.3.2.2 In selected gear nearest to 7.5 km/h, at maximum power at rated speed													
4L	47.3	25.5	6.69	2195	9.9	313	2.67	29	79	106	8	63	101.2
3.3.2.2.1 75% of pull at maximum power at rated speed													
4L	36.1	19.1	7.18	2277	6.7	319	2.62	29	79	107	8	63	101.2
3.3.2.2.2 50% of pull at maximum power at rated speed													
4L	26.2	12.7	7.43	2296	4.3	354	2.36	30	79	107	8	63	101.2
3.3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1													
1H*													
3.3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2													
1H*													

* Shutdowns from 1H onto gear nearest 7.5 km/h were not possible due to low engine speed

SUPPLEMENTARY TESTS

3.2 Hydraulic power and lifting force

1. Power lift test - (To manufacturers lift rod setting of 750 mm)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	285 mm	285 mm
Vertical movement	605 mm	783 mm
Maximum corrected force exerted through full range	19.9 kN	16.7 kN
Corresponding pressure of hydraulic fluid	20.3 MPa	20.3 MPa
Moment about rear-wheel axis	19.3 kNm	26.3 kNm
Maximum tilt angle of mast from vertical	--	15 degrees

- Linkage settings for test - see Table 2.1 and Figure 2.1

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	-271	-223	-150	-100	0	100	200	300	382	450	512
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure delivered by the hydraulic system)											
at the hitch points kN	--	19.9	21.4	22.4	23.6	24.4	25.3	25.2	25.3	--	--
Corresponding pressure: 20.3 MPa											
at the frame kN	17.0	17.3	18.0	18.4	18.6	18.6	18.5	18.0	17.5	17.2	16.7
Corresponding pressure: 20.3 MPa											

II Power lift test - (To manufacturers lift rod setting of 690 mm)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	430 mm	430 mm
Vertical movement	548 mm	752 mm
Maximum corrected force exerted through full range	23.8 kN	16.9 kN
Corresponding pressure of hydraulic fluid	20.3 MPa	20.3 MPa
Moment about rear-wheel axis	23.0 kNm	26.7 kNm
Maximum tilt angle of mast from vertical	–	20 degrees

- Linkage settings for test - see Table 2.1 and Figure 2.1

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	-100	-78	-0	100	200	300	350	400	470	550	652
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure delivered by the hydraulic system)											
at the hitch points kN	--	23.8	24.8	25.7	26.3	26.7	26.6	26.9	26.8	-	-
Corresponding pressure: 20.3 MPa											
at the frame kN	19.3	19.4	19.6	19.7	19.5	19.2	19.1	18.8	18.0	17.5	16.9
Corresponding pressure: 20.3 MPa											

3 .3 Drawbar power test (unballasted tractor), 2 wheel drive

Date and Location of tests: 25 February 1999
Silsoe Research Institute
Wrest Park
Silsoe
Bedford MK45 4HS

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pressure (kPa) Front	Rear
480 mm	83	83

Gear and Rnnge	Power	Drawbar Pull	Speed	Engine Speed	Slip of wheels or track	Spec Fuel cons	Spec energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Eng oil	Temp	Rel Humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kwh	kWh/l	Deg C	Deg C	Deg C	Deg C	%	kPa
3.3.1 MAXIMUM POWER IN TESTED GEARS													
1L	13.8	20.3	2.44	2311	15.2	517	1.62	21	77	98	9	65	101.0
2L	20.2	20.4	3.56	2300	15.1	426	1.96	22	78	98	9	64	101.0
3L	27.4	20.4	4.82	2289	15.0	374	2.24	25	78	100	9	67	101.0
4L*	36.8	20.0	6.61	2272	13.0	342	2.45	27	78	98	9	68	101.0
1H	46.2	16.4	10.13	2203	9.6	322	2.60	30	80	96	9	66	101.0
2H	45.5	10.6	15.42	2194	5.8	321	2.60	28	79	100	8	67	101.0
3.3.2 FUEL CONSUMPTION													
3.3.2.1 In selected gear, at maximum power at rated speed													
1H	46.2	16.4	10.13	2203	9.6	322	2.60	30	80	96	9	66	101.0
3.3.2.1.1 75% of pull at maximum power at rated speed													
1H	36.9	12.3	10.76	2274	7.0	333	2.51	30	79	98	9	65	101.0
3.3.2.1.2 50% of pull at maximum power at rated speed													
1H	25.3	8.2	11.15	2297	4.6	374	2.24	25	78	100	8	67	101.0
3.3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
2H	36.8	12.3	10.79	1551	6.8	297	2.82	32	80	100	8	66	101.0
3.3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
2H	25.4	8.2	11.16	1567	4.5	300	2.79	30	78	99	8	67	101.0

* Gear nearest 7.5 km/h is a slip gear

4. OPTIONAL TESTS RESULTS

Location of centre of gravity

Height above ground, mm	843
Distance forward from the vertical plane containing the axis of the rear wheels, mm	1001
Distance from the median plane of the tractor, mm (to left viewed from rear)	2

5. REPAIRS AND ADJUSTMENTS DURING TESTS: None

6. REMARKS: None

Test carried out by: S J Devonshire

Signed: J P Evans — Officer in charge of tests

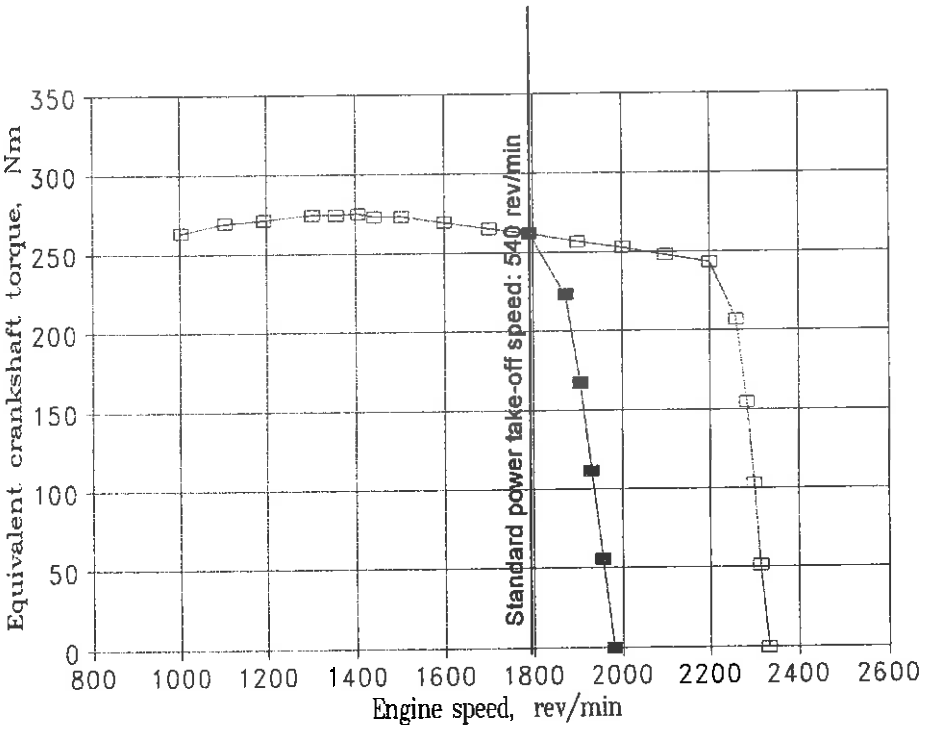
Signed: A G Douglass — for the Director
Interim Manager, Test Engineering Group

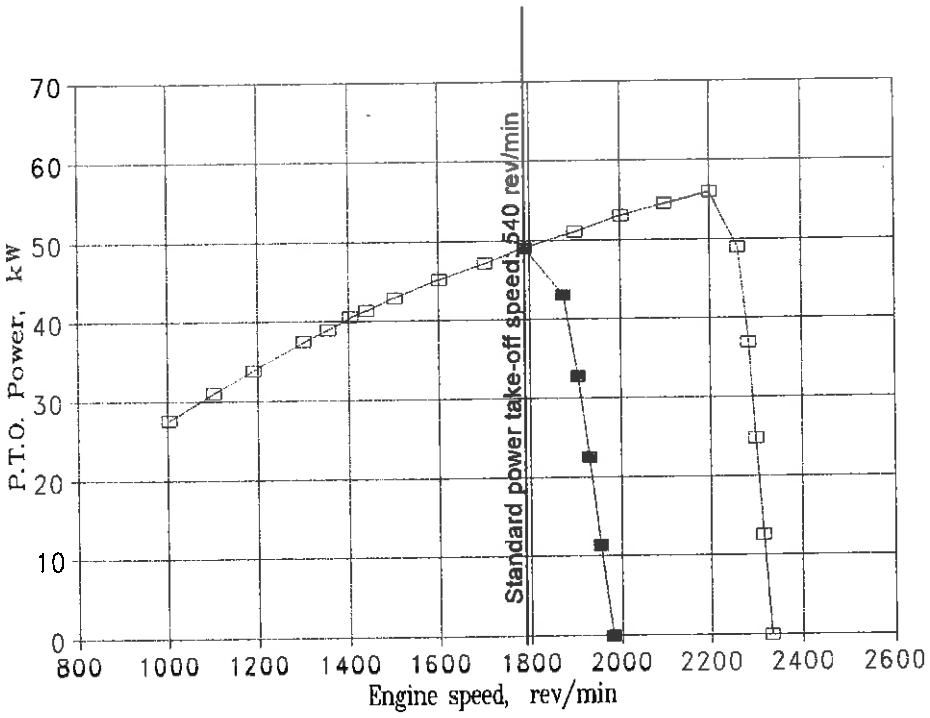
Date: 13/5/99

7. ANNEX 1 MAIN POWER TAKE-OFF CURVES

P.T.O. POWER TEST - MASSEY FERGUSON 4240 FOUR-WHEEL DRIVE (540 rev/min)

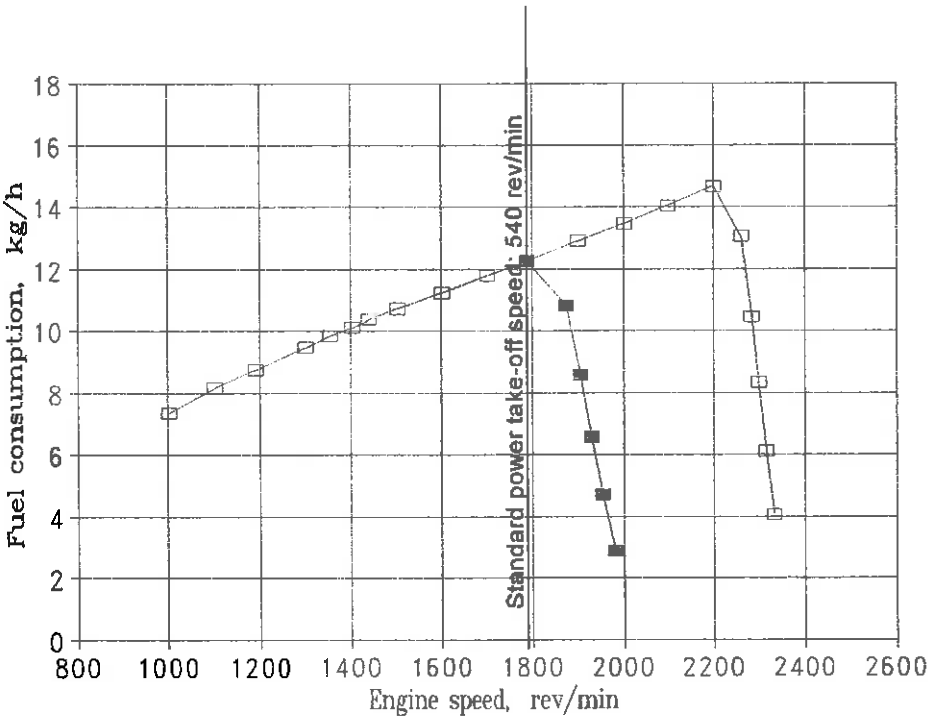
Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■

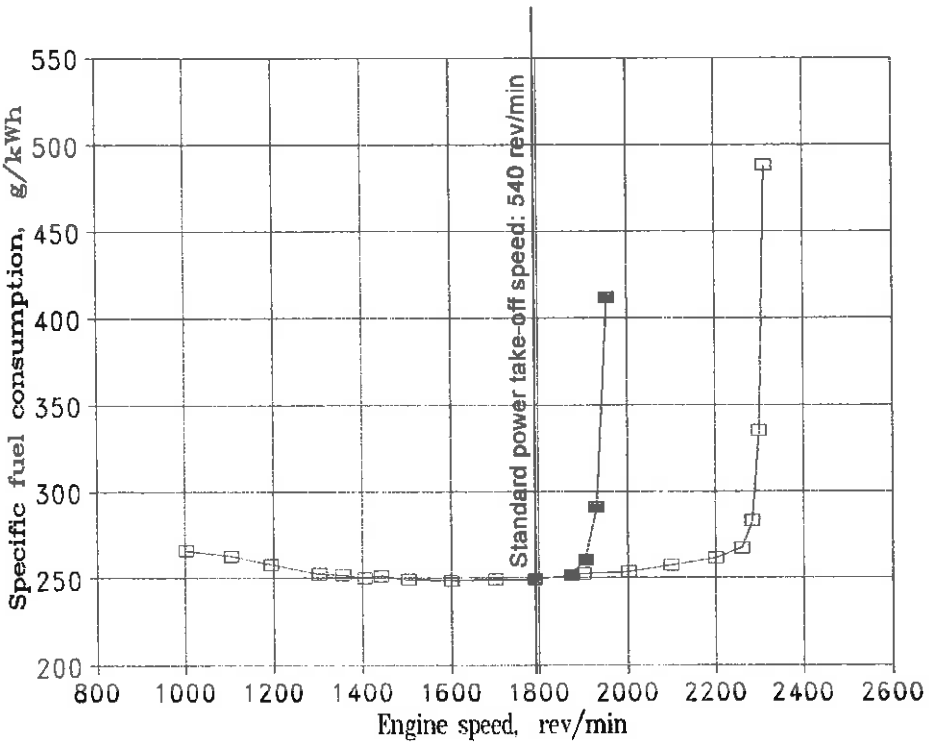




P.T.O. POWER TEST - MASSEY FERGUSON 4240 FOUR-WHEEL DRIVE (540 rev/min)

Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■





P.T.O. POWER TEST - MASSEY FERGUSON 4240 FOUR-WHEEL DRIVE (540 rev/min)

Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■

