SILSOE RESEARCH INSTITUTE
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Report No: OECD/7231/0196
OECD Approval No: 1706 Restricted Code
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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 4270 Four-Wheel Drive Tractor (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: 782

Date: 17 April 1997

OECD/7231/0196

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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

I. SPECIFICATION OF TRACTOR

TRACTOR

Make:	Massey Ferguson
Model:	MF 4270 (30 Km/h)
Type:	Four wheel drive, unit construction
Serial No:	BCBD14AA X AE14999
1st Serial No:	BCBD14AA X AE14999
tractor type code:	BCBD14AA X A

ENGINE

Make:	Perkins
Model:	1006-6
Type:	4 stroke, direct injection, naturally aspirated diesel
Serial No:	RP40940PL00 YAU629101B (prototype engine number)
Type number:	1989/2200
Ist serial No:	YA31301******* (production number)

Cylinders

Number/disposition:	6 vertical In-line
Bore/stroke:	100 mm/127 mm
Capacity:	5985 cm^3
Compression ratio:	16.5 :1
Arrangement of valves:	Overhead
Cylinder liners:	Dry

Supercharging

Make:	None

Fuel system

Fuel feed system:	CAV
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:	200 litres
Make, type and model of injection pump:	CAV, rotary, type DSA 977
Serial No:	42255 LOG
Manufacturer's production setting of injection pump:	22.70 to 24.00 l/hr
Flow rate:	59.0 +/- 3% mm^3/stroke at 2200 rev/min engine speed at full load on 55°C pump inlet temperature
Timing:	Static timing; 17 +/- 2 degrees before TDC
Make, type and model of injectors:	Lucas CAV, code JU

	Complete injector	Nozzle
CAV number:-	LRB6701422	JB6801106
Perkins number:-	2645A032	2645A617

Injection pressure:	223 +/-5 bars

Governor

Make:	CAV
Model:	Not applicable
Type:	Mechanical, all speed, incorporated in injection pump
Governed range of engine speed:	750 to 2310 rev/min
Rated engine speed:	2200 rev/min

Air cleaner

Make:	Mann and Hummel
Type:	3 stage, 2 stages are paper elements
Model:	44 411 92 921
Location of air intake:	Behind radiator grill, in front of radiator
Maintenance indicator:	Warning light on instrument panel

Lubrication system

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

Cooling system

Type of coolant:	Water or water and antifreeze solution
Type of pump:	Centrifugal
Specification of fan:	Belt driven puller
Number of fan blades:	7
Fan diameter:	500 mm
Coolant capacity:	28 litres
Type of temperature control:	Thermostat
System pressure:	75 kPa

Starting system

Make:	Magneti Marelli
Model:	M127
Type:	Electrical, pre-engaged, solenoid operated
Starter motor power rating:	2.8 kW
Cold starting aid:	ISKRA induction heater 12V
Safety device:	Starting operable only when shuttle and PTO levers are in neutral

Electrical system

Voltage:	12
Generator:	Alternator
Make:	Magneti Marrelli
Model:	A 127-70
Type:	Belt driven
Power:	0.84 kW
Batteries:	2 M-F Power Part, type 372 lead acid, maintenance free
Rating:	IEC 390 amp. Equivalent to 70 AH at 20 hour rating

Exhaust system

Make:	Technov
Model:	Massey Ferguson type 129
Type:	Horizontal silencer
Location:	Under bonnet, right hand side
Height of outlet above ground:	2770 mm

TRANSMISSION TO WHEELS

Clutch

Make:	LUK
Model:	None
Type:	Dry for transmission only
Number of plates:	1
Diameter of plates:	330 mm
Method of operation:	Mechanical by pedal

Gear box

Make:	Massey Ferguson
Model:	None
Type:	Mechanical manual synchromesh operation, 4 speeds and 3 ranges, selected with single side mounted lever. Console mounted hand lever selects forward and reverse for each combination.
Number of gears:	12 forward 12 reverse
Available options:	12x4, 12x4 with creep, 12x12 with creep, 18 x 6

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:	Hydraulically operated in response to right hand side console mounted electrical switch
Method of disengagement:	Reverse of above switch

Front axle and final drives

Make:	Dana Spicer Europe
Model:	AG 105
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:	Hydraulically actuated in unison with rear differential in response to electrical signal from rear differential lock switch on side console
Method of disengagement:	Reverse of above switch

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	369.031	1.843
2	L	282.422	2.408
3	L	215.183	3.161
4	L	164.317	4.139
1	M	130.857	5.197
2	M	100.146	6.791
3	M	76.303	8.913
4	M	58.266	11.672
1	H	48.466	14.032
2	H	37.091	18.336
3	H	28.260	24.066
4	H	21.580	31.515
Reverse			
1	L	362.844	1.874
2	L	277.687	2.449
3	L	211.575	3.214
4	L	161.562	4.209
1	M	128.663	5.286
2	M	98.467	6.907
3	M	75.024	9.065
4	M	57.289	11.871
1	H	47.653	14.272
2	H	36.469	18.648
3	H	27.787	24.476
4	H	21.218	32.052

Range selection, (main gear lever): L = low M = Medium H =High

(*) Calculated with a tyre dynamic radius index of 820 mm (ISO 4251/1-1992)

Number of revolutions of front wheels for one revolution of rear wheels: 1.3351.1

POWER TAKE-OFF

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 in cab

Clutch

Make:	Own make
Model:	None
Type:	Hydraulically actuated wet multiplate
Number of plates:	7
Diameter of plates:	128 mm

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:	685 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:	3.5226:1
Power restriction and maximum torque:	None
Direction of rotation (viewed from behind tractor):	Clockwise

1000 rev/min

Location:	Rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	21 to ISO 500/1991
Height above ground:	685 mm
Distance from the median plane of the tractor:	Central
Distance behind rear-wheel axis:	333 mm
PTO speed at rated engine speed:	1100 rev/min
Engine speed at standard power take-off speed:	2000 rev/min
Ratio of rotation speeds:	2:1
Direction of rotation (viewed from behind tractor):	Clockwise

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 and two 40 mm dia external assist
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

POWER LIFT (option with electro-hydraulic control)

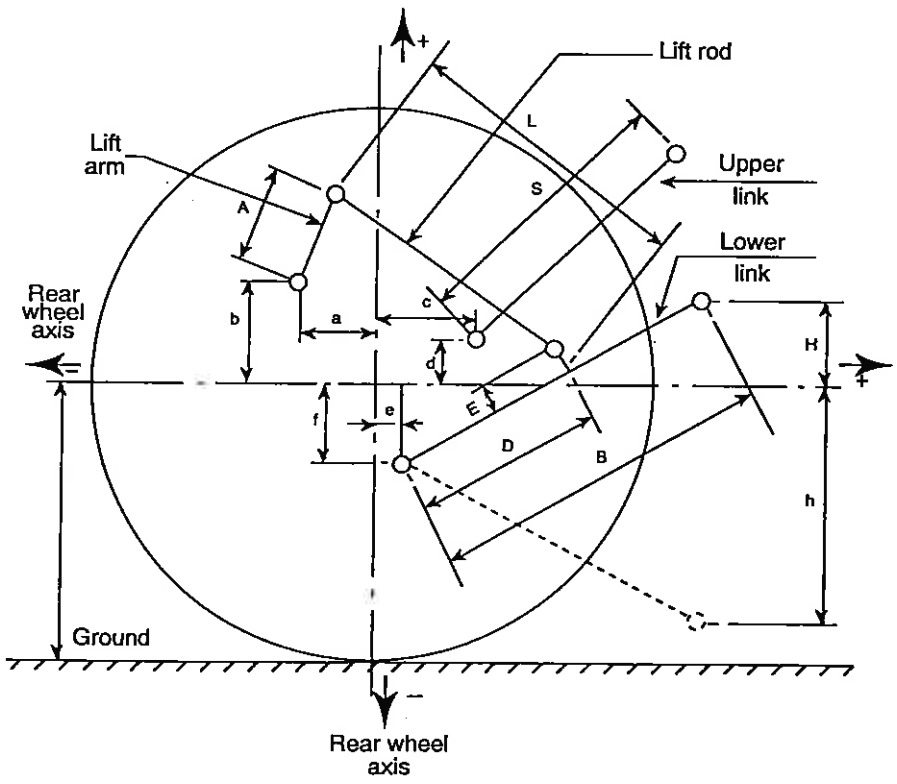
Make:	Massey Ferguson/Bosch
Model:	None
Type:	Electro-hydraulic with proportional solenoid valves, open centre, for both lift and drop
Type and number of cylinders:	1 single acting, internal and two 40 mm dia external assist
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	21.4 - 24.0 MPa
Opening pressure of cylinder safety valve:	26.2 - 27.6 MPa
Lift pump type:	Gear, Bosch or Sauer-Sundstrand
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

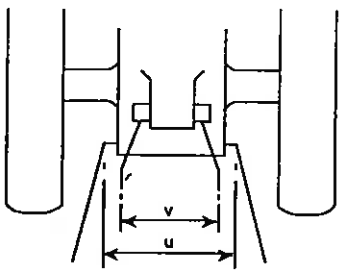
AUXILIARY HYDRAULIC SYSTEM

Make:	Bosch/Sundstrand
Model:	SP250
Type:	Gear
Relief valve pressure setting:	19.0 - 21.6 MPa
Transmission between pump and engine:	Driven by chain from PTO shaft which is independent of the main clutch
Type and number of filters:	One off metal mesh full flow strainer; and one off by-pass centrifugal filter
Site of oil reservoir:	Main transmission housing
Type and number of tapping points:	2 spool valves, each with quick release coupling and separate return, to ISO5675. Note 2 further spool valves may be fitted if required. A valve allows combination with main system up to the auxiliary relief valve pressure
Maximum volume of oil available to external cylinders:	20.0 litres

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

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	Test 2 (Test 3)
Length of lift arms:		(A)	310 mm	310 mm	310 mm
Length of lower links:		(B)	1100 mm	1100 mm	1100 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)	775 - 1015 mm	860 mm	860 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)	615 mm -8 mm (below c/l)	615 mm -8 mm	615 mm -8 mm
Length of lift rods:		(L)	685 - 805 mm	756 mm	745 mm (685 mm)
Height of lower hitch points (*) relative to the rear wheel centre line, situated 820 mm above the ground level:					
- in low position		(h)	710 - 385 mm	623 mm	584 mm (420 mm)
- in high position		(H)	70 - 275 mm	100 mm	129 mm (228 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 820 mm ISO 4251/1-1992

SWINGING DRAWBAR

Type:	Clevis
Height above ground: maximum	610 mm
minimum:	410 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:	75 mm, 175 mm, 170 mm, 275 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

TRAILER HITCH

Type:	None fitted

LINKAGE DRAWBAR

Type:	None fitted

FRONT TOWING HITCH

Type:	Clevis in front weight frame
Vertical height to centre of clevis:	879 mm
Width of clevis:	50 mm
Diameter of pin hole:	33 mm

STEERING

Make:	Own make
Model:	None
Type:	Hydrostatic
Method of operation:	
Pump:	Bosch/Sundstrand, gear type mounted on transmission case in tandem with auxiliary hydraulic system pump
Motor:	Danfoss OSPC-100-ON
Ram:	1 double acting operating both track rods
Filter:	None

BRAKES

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

Parking brake

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

WHEELS

Number: 4

Front: 2 steering and driving

Rear: 2 driving

Wheelbase: 2609 mm

Track width adjustment:

	Minimum, mm	Maximum, mm	Adjustment method
Front	1750*	2055	By reversing wheels and offset lug rims
Rear	1525	2235	By reversing wheels and offset lug rims

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

PROTECTIVE STRUCTURE

Make: GKN Sankey Industrial Products

Model: 5001

Type: Safety cab

Manufacturer's name and address: GKN Sankey Industrial Products, Hadley Castle Works, P O Box 86, Telford TF1 4RE

Protective device: Safety cab

Tiltable/Not tiltable: Non tiltable

OECD approval number: CSS/0416/1, 19 February 1997

DRIVERS SEAT

Make/Model/Type: KAB 816

Type of suspension: Spring

Type of damping: Hydraulic

Range of adjustment:

Longitudinal: 160 mm

Vertical: 75 mm

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	1212	160 x 100	196
Sidelights	1803	110 x 35	777
Rear lights	1763	145 x 52	755
Axle reflectors	780	80 dia	485
Cab reflectors	1763	43 x 52	805

II TEST CONDITIONS

Overall dimensions

Length mm	Width		Height at top of	
	Minimum mm	Maximum mm	Protective structure mm	Exhaust pipe mm
4390	1990	2690	2713	2770

Ground clearance (unballasted tractor) 350 mm

Clearance-limiting part: Drawbar clevis in lowest position

Tractor mass (with safety cab)

	Unballasted		Ballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	1704	1715	–	–
Rear	2414	2478	–	–
Total	4118	4193	–	–

Tyres and track width specification

	Front	Rear
Tyres dimensions ply rating type	420/70R 24 Radial	18.4 x 38 Radial
Maximum load (tyre manufacturer's), kg	2220	2800
Maximum load (tractor manufacturer's), kg	2220	2722
Inflation pressure (tyre manufacturer's), Bar	1.6	1.1
Dynamic radius index	640	820
Chosen track width (manufacturer's nominal)	1750	1735

Oils and lubrication

Capacity and change interval

	Capacity litre	Oil change hours	Filter change hours
Engine	13.5	250	250
Front axle differential	7.8	1000	None
Front axle hub (each)	1	1000	None
Gearbox	50	1000	1000
Rear axle Hydraulic system Final drives (rear) Steering	Integral with rear axle		
Brakes	- -	Top-up	None

Fuels and lubricants used in tests

Fuel

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

Oils	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	
Recommended grease:	Consistency 2 lithium	As recommended
Number of lubrication points:	19	

III. TEST RESULTS

A. COMPULSORY TESTS

1. MAIN POWER TAKE-OFF (1000)

Date and location of tests: 20 February 1997
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	
1.1 MAXIMUM POWER - TWO HOUR TEST						
77.6	2060	1030	19.97	23.80	257	3.26
1.2 POWER AT RATED ENGINE SPEED						
73.5	2199	1100	19.17	22.84	261	3.22
1.3 STANDARD POWER TAKE-OFF SPEED (1000 ± 25 rev/min)						
77.1	2001	1000	19.68	23.46	255	3.29
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
73.5	2199	1100	19.17	22.84	261	3.22
1.4.2 85% of the torque defined in 1.4.1						
63.3	2227	1113	16.84	20.07	266	3.15
1.4.3 75% of the torque defined in 1.4.2						
47.8	2246	1123	13.86	16.52	290	2.89
1.4.4 50% of the torque defined in 1.4.2						
32.2	2260	1130	11.14	13.27	346	2.42
1.4.5 25% of the torque defined in 1.4.2						
16.1	2275	1137	8.32	9.92	516	1.63
1.4.6 Unloaded						
0	2290	1145	5.87	6.99	--	--

Power kW	Speed		Fuel consumption			Specific energy kWh/l
	Engine rev/min	P.T.O.	Hourly kg/h	l/h	Specific g/kWh	
1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEEDS (1000 ± 25 rev/min)						
1.5.1 The torque corresponding to maximum power						
77.1	2001	1000	19.68	23.46	255	3.29
1.5.2 85% of the torque obtained in 1.5.1						
66.7	2039	1019	16.69	19.89	250	3.35
1.5.3 75% of the torque obtained in 1.5.2						
50.5	2061	1030	13.38	15.95	265	3.17
1.5.4 50% of the torque obtained in 1.5.2						
34.1	2080	1040	10.43	12.43	306	2.74
1.5.5 25% of the torque obtained in 1.5.2						
17.2	2100	1050	7.59	9.05	443	1.90
1.5.6 Unloaded						
0	2120	1060	4.90	5.85	--	--

No load, maximum engine speed:	2290 rev/min
Torque (equivalent crankshaft) at maximum power:	359.5 Nm
Torque (equivalent crankshaft) at rated speed:	319.1 Nm
Maximum torque (equivalent crankshaft): (engine speed 1201 rev/min)	414.3 Nm
Mean atmospheric conditions:	
• Temperature	21 °C
• Pressure	1010 m bar
• Relative humidity	36%
Maximum temperatures:	
• Coolant	86°C
• Engine oil	110°C
• Fuel	59C
• Engine air intake	28°C

2. HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 9 October 1996

2.1 Hydraulic power test

	1 Lift system only	2 Auxiliary only	3 Auxiliary combination
Sustained pressure with relief valve open:	23.9 MPa	21.4 MPa	21.2 MPa
Pump delivery rate at minimum pressure:	29.3 l/min	39.0 l/min	67.0 l/min

	Test	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	1	22.8	21.5	8.17
	2	36.7	19.3	11.80
	3	60.5	19.1	19.26
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	1	25.5	20.5	8.71
	2	37.5	19.0	11.86
	3	61.9	18.7	19.29

Tapping point used for test: 1 — Tapping into assister ram circuit (for test only)
2 and 3 — Auxiliary service connection

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

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	197 mm	197 mm
Vertical movement	723 mm	875 mm
Maximum corrected force exerted through full range	36.4 kN	32.2 kN
Corresponding pressure of hydraulic fluid	21.5 MPa	21.5 MPa
Moment about rear-wheel axis	38.9 kNm	54.0 kNm
Maximum tilt angle of mast from vertical	--	13 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	-463	-411	-300	-200	-100	0	100	200	250	312	412
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	--	36.4	38.9	41.0	42.5	44.0	45.0	45.7	46.0	46.0	--
Corresponding pressure: 21.5 MPa											
at the frame kN	32.2	33.0	34.0	34.8	35.3	35.6	35.4	35.1	34.7	34.3	33.4
Corresponding pressure: 21.5 MPa											

3. DRAWBAR POWER AND FUEL CONSUMPTION TEST (UNBALLASTED TRACTOR), 4 WHEEL DRIVE

Date and Location of tests: 16 April 1997
Silsoe Research Institute
Wrest Park
Silsoe
Bedford MK45 4HS

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pre (kPa) Front	R
385 mm	103	

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	Pre
	kW	kN	km/h	rev/min	%	g/kwh	kWh/l	Deg C	Deg C	Deg C	Deg C	%	k
3.1 MAXIMUM POWER IN TESTED GEARS													
1L*	19.3	41.8	1.66	2269	15.0	531	1.58	36	82	99	14	39	10
2L	25.5	40.9	2.25	2264	11.4	446	1.88	36	82	101	14	39	10
3L	33.4	41.5	2.90	2254	12.6	398	2.11	37	82	100	14	38	10
4L	44.0	41.4	3.82	2240	11.6	352	2.38	40	82	102	14	38	10
1M	54.4	39.9	4.91	2226	8.9	322	2.61	41	82	102	13	38	10
2M	65.3	39.3	5.98	2060	8.3	315	2.66	42	83	93	13	36	10
3M	66.5	29.5	8.11	2059	5.2	309	2.72	40	83	86	10	46	10
4M	65.5	21.8	10.79	2063	3.9	310	2.70	40	83	87	10	49	10
1H	66.5	18.4	13.03	2062	3.4	324	2.59	39	82	97	13	38	10
2H	64.1	13.5	17.11	2056	2.6	315	2.66	42	83	94	10	48	10
3.2 FUEL CONSUMPTION													
3.2.1 In selected gear, at maximum power at rated speed													
1H	60.8	15.7	13.94	2196	3.0	314	2.67	40	82	99	10	47	10
3.2.1.1 75% of pull at maximum power at rated speed													
1H	47.3	11.9	14.29	2236	2.2	345	2.43	39	82	103	11	47	10
3.2.1.2 50% of pull at maximum power at rated speed													
1H	32.2	8.0	14.50	2255	1.6	404	2.08	38	82	106	11	49	10
3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
2H	46.8	11.8	14.26	1710	2.5	296	2.84	42	82	78	14	39	10
3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
2H	32.1	8.0	14.44	1721	1.9	337	2.49	41	82	78	14	38	10
3.2.2 In selected gear nearest to 7.5 km/h, at maximum power at rated engine speed													
2M	61.9	34.0	6.55	2206	6.2	311	2.70	42	83	100	13	37	10
3.2.2.1 75% of pull at maximum power at rated speed													
2M	48.0	25.5	6.77	2240	4.6	328	2.56	44	82	103	13	39	10
3.2.2.2 50% of pull at maximum power at rated speed													
2M	32.8	17.0	6.93	2260	3.1	385	2.18	40	82	101	13	36	10
3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1													
3M	47.6	25.3	6.76	1707	4.6	284	2.95	44	82	80	15	39	10
3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2													
3M	32.6	17.0	6.91	1720	3.3	308	2.73	43	81	80	15	35	10

* Maximum power limited by wheelslip

TEST RESULTS

B. SUPPLEMENTARY TEST

2. POWER LIFT TESTS

I Power lift test - (To manufacturers lift rod setting of 745 mm)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	236 mm	236 mm
Vertical movement	713 mm	878 mm
Maximum corrected force exerted through full range	36.8 kN	32.5 kN
Corresponding pressure of hydraulic fluid	21.5 MPa	21.5 MPa
Moment about rear-wheel axis	39.3 kNm	54.5 kNm
Maximum tilt angle of mast from vertical	--	14 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	-431	-372	-300	-200	-100	0	100	200	300	341	447
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	--	36.8	38.5	40.5	42.7	44.2	45.1	45.7	46.1	45.6	--
Corresponding pressure: 21.5 MPa											
at the frame kN	32.5	33.8	34.5	35.4	36.1	36.1	36.1	35.5	34.8	34.3	33.6
Corresponding pressure: 21.5 MPa											

II Power lift test - (To manufacturers lift rod setting of 685 mm)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	400 mm	400 mm
Vertical movement	648 mm	828 mm
Maximum corrected force exerted through full range	40.9 kN	33.6 kN
Corresponding pressure of hydraulic fluid	21.5 MPa	21.5 MPa
Moment about rear-wheel axis	43.7 kNm	56.4 kNm
Maximum tilt angle of mast from vertical	--	18 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	-242	-208	-100	0	100	200	300	370	440	560	580
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	--	40.9	44.0	46.2	47.6	48.5	49.0	48.8	48.3	--	--
Corresponding pressure: 21.5 MPa											
at the frame kN	34.7	35.3	36.7	36.9	37.0	36.9	36.3	35.9	35.1	33.8	33.6
Corresponding pressure: 21.5 MPa											

DRAWBAR POWER AND FUEL CONSUMPTION TEST (UNBALLASTED TRACTOR), 2 WHEEL DRIVE

Date and Location of tests: 17 April 1997
Silsoe Research Institute
Wrest Park
Silsoe
Bedford MK45 4HS

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pressure (kPa) Front	Rear
575 mm	103	83

	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
MAXIMUM POWER IN TESTED GEARS													
	14.0	30.9	1.63	2276	15.1	649	1.29	31	81	95	11	67	102.0
	18.3	31.1	2.12	2270	15.0	554	1.51	31	81	98	10	72	102.0
	24.5	30.4	2.90	2264	11.3	461	1.82	31	81	98	10	70	102.0
	31.7	30.5	3.74	2255	12.4	413	2.03	31	82	97	9	73	102.0
	39.1	29.4	4.79	2247	10.3	372	2.25	35	82	99	9	75	102.0
	49.3	29.3	6.07	2228	12.2	347	2.41	39	82	101	9	75	102.0
	61.9	27.8	8.01	2143	8.3	327	2.56	38	82	96	9	75	102.0
	64.6	22.2	10.46	2061	4.9	314	2.68	39	83	94	9	73	102.0
	64.9	18.4	12.67	2057	3.8	316	2.66	40	83	88	9	73	102.0
	62.9	13.5	16.82	2068	2.8	319	2.63	40	82	99	9	72	102.0
FUEL CONSUMPTION													
1 In selected gear, at maximum power at rated speed													
	60.6	16.0	13.61	2198	3.4	324	2.59	38	82	99	9	73	102.0
1.1 75% of pull at maximum power at rated speed													
	47.0	12.1	13.95	2236	2.6	339	2.47	37	82	102	9	72	102.0
1.2 50% of pull at maximum power at rated speed													
	31.0	7.9	14.16	2254	2.1	418	2.01	36	82	101	9	72	102.0
1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
	46.5	12.0	13.95	1711	2.7	300	2.80	42	82	80	9	74	102.0
1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
	31.1	7.9	14.18	1727	2.0	330	2.54	34	81	81	9	74	102.0

imum power limited by wheelslip
r nearest 7.5 Km/h is also slip gear

C. OPTIONAL TESTS

C1. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm	974
Distance forward from the vertical plane containing the axis of the rear wheels, mm	1068
Distance from the median plane of the tractor, mm (to left viewed from rear)	2

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Test carried out by: S J Devonshire

Signed: Officer in charge of tests

P C Seward

Signed: for the Director

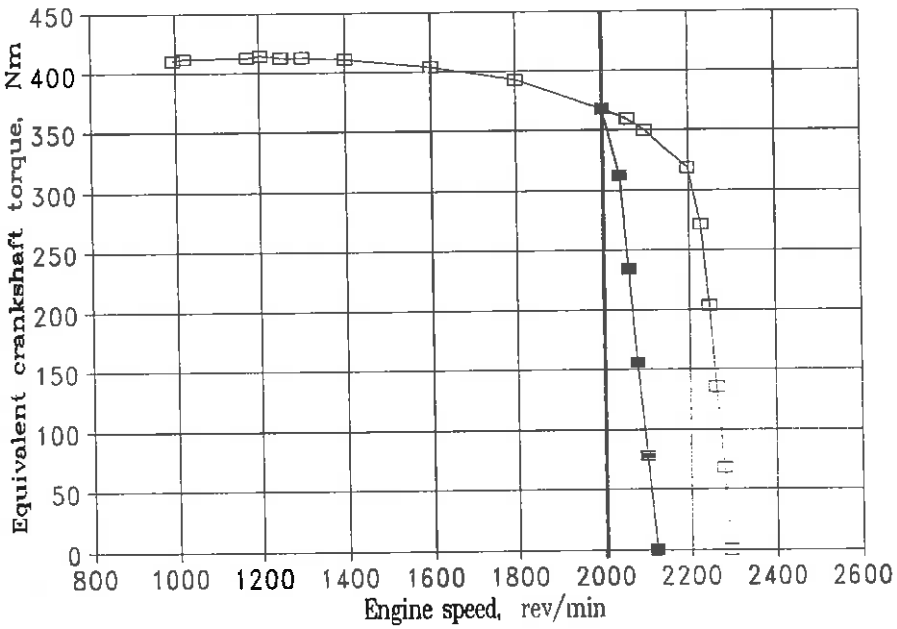
P C Seward
Head of Test Engineering Group

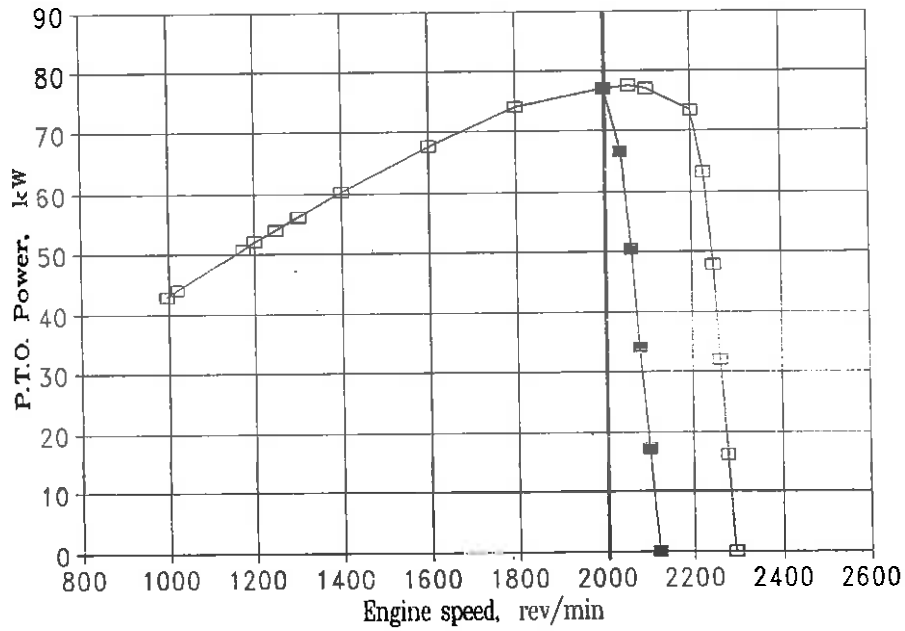
Date: 27/1/98

ANNEX 1 MAIN POWER TAKE-OFF CURVES

P.T.O. POWER TEST - MASSEY FERGUSON 4270 FOUR-WHEEL DRIVE (1000 rev/min)

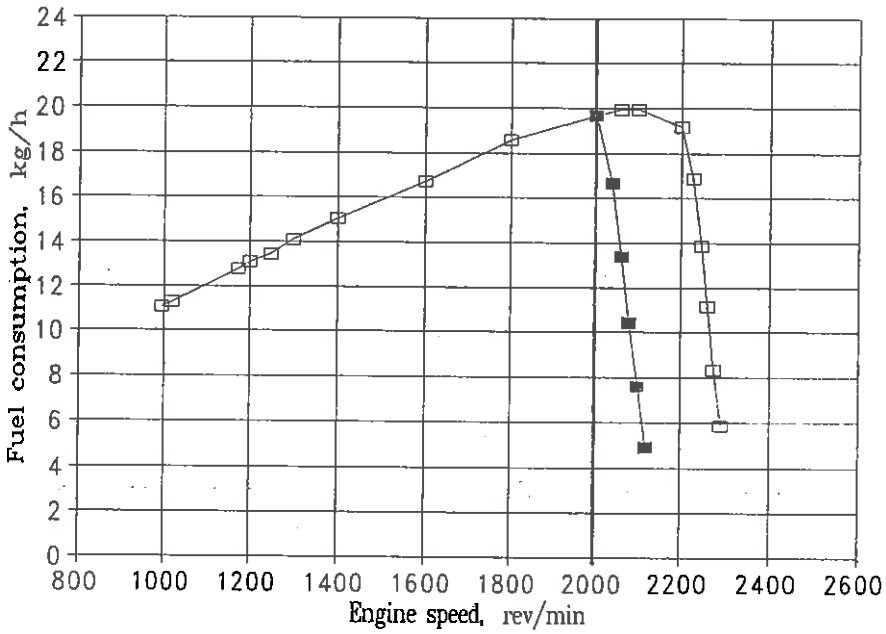
Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■
Standard power take-off speed (1000 rev/min) |

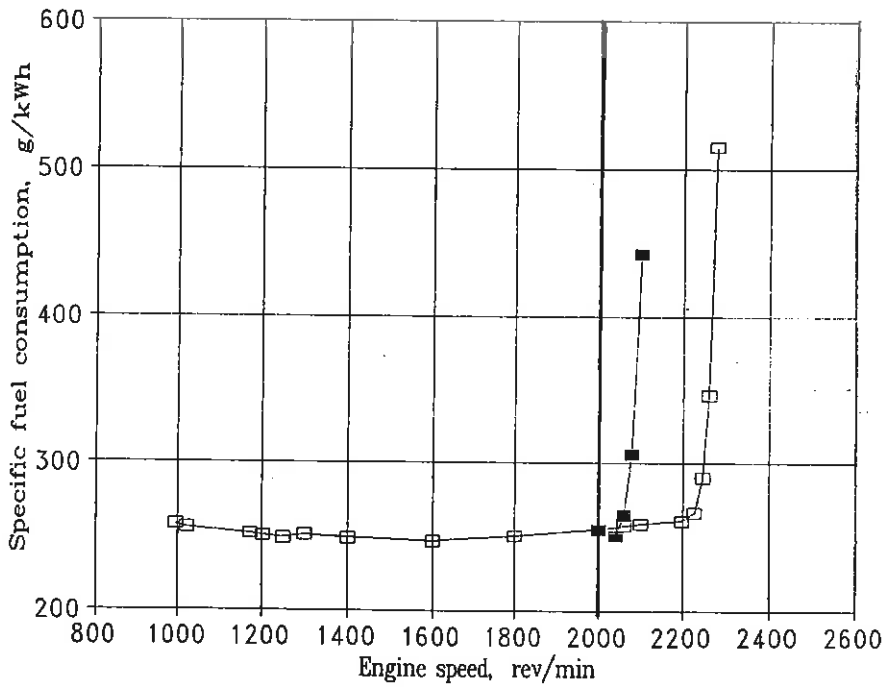




P.T.O. POWER TEST - MASSEY FERGUSON 4270 FOUR-WHEEL DRIVE (1000 rev/min)

Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■
Standard power take-off speed (1000 rev/min) |





P.T.O. POWER TEST - MASSEY FERGUSON 4270 FOUR-WHEEL DRIVE (1000 rev/min)

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

