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Report No: OECD/7158/0196
OECD Approval No: 1641 Restricted Code
Approval Date: 11 December 1996

Report on test in accordance with the OECD STANDARD CODE II (RESTRICTED CODE) for the Official Testing of Agricultural and Forestry Tractors

Massey Ferguson 4245 Four-Wheel Drive Tractor (30 Km/h)



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

Submitted for test by: The manufacturer

Report No: 774

Date: October 1996

OECD/7158/0196

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Tractor manufacturer's name and address:	AGCO Limited, PO 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:	100 hours
Location of test:	Silsoe Research Institute Wrest Park, Silsoe, England

I. SPECIFICATION OF TRACTOR

TRACTOR

Make:	Massey Ferguson
Model:	MF 4245 (30 Km/h)
Type:	Four wheel drive, unit construction
Serial No:	BBCD14ABXAE11999
1st Serial No:	BBCD14ABXAE11999
Tractor type code:	BBCD14ABXA

ENGINE

Make:	Perkins
Model:	1004.4TLR
Type:	4 stroke, direct injection, turbo charged diesel
Serial No:	3313PL03U739321A (prototype only with air conditioning)
Type number:	1793/2200
Ist serial No:	AH31316******* (production number with air conditioning) AH31321******* (production number without air conditioning)

Cylinders

Number/disposition:	4 vertical In-line
Bore/stroke:	100 mm/127 mm
Capacity:	3990 cm^3
Compression ratio:	16:1
Arrangement of valves:	Overhead
Cylinder liners:	Dry

Supercharging

Make:	Garrett Airesearch
Model:	452061-2 (Garrett Airesearch part number) 2674A061 (Perkins part number)
Type:	Exhaust driven
Pressure:	1.2 bar

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:	186 litres
Make, type and model of injection pump:	CAV, rotary, type 1069
Serial No:	10549MNG
Manufacturer's production setting of injection pump:	17.67 to 18.76 l/hr
Flow rate:	69 +/- 3% mm^3/stroke at 2200 rev/min engine speed at full load on 45°C pump inlet temperature
Timing:	Dynamic timing; 12° at 1000 rev/min to 7° at 2200 rev/min

Make, type and model of injectors: Lucas CAV, code JK

	Complete injector	Nozzle
CAV number:-	LRB6701421	JB6801088
Perkins number:-	2645A025	2645K613

Injection pressure:	222 +/-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, 300, 92, 931
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:	4
Fan diameter:	500 mm
Coolant capacity:	17.5 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:	CAV, SINTEROM or ISKRA induction heater
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 120
Type:	Horizontal silencer
Location:	Under bonnet, right hand side
Height of outlet above ground:	2612 mm

TRANSMISSION TO WHEELS

Clutch

Make:	LUK
Model:	None
Type:	Dry for transmission only
Number of plates:	1
Diameter of plates:	305 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 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:	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	353.797	1.805
2	L	270.763	2.359
3	L	206.299	3.096
4	L	157.533	4.054
1	M	125.455	5.090
2	M	96.011	6.652
3	M	73.153	8.730
4	M	55.861	11.432
1	H	46.465	13.744
2	H	35.560	17.959
3	H	27.094	23.571
4	H	20.689	30.868
Reverse			
1	L	345.242	1.850
2	L	264.216	2.417
3	L	201.311	3.172
4	L	153.724	4.154
1	M	122.421	5.217
2	M	93.690	6.816
3	M	71.384	8.946
4	M	54.510	11.716
1	H	45.341	14.085
2	H	34.700	18.404
3	H	26.439	24.155
4	H	20.189	31.632

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

(*) Calculated with a tyre dynamic radius index of 770 mm (ISO 4251/1-1992)

Number of revolutions of front wheels for one revolution of rear wheels: 1.3618.1

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:	5
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:	630 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:	630 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 28 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)

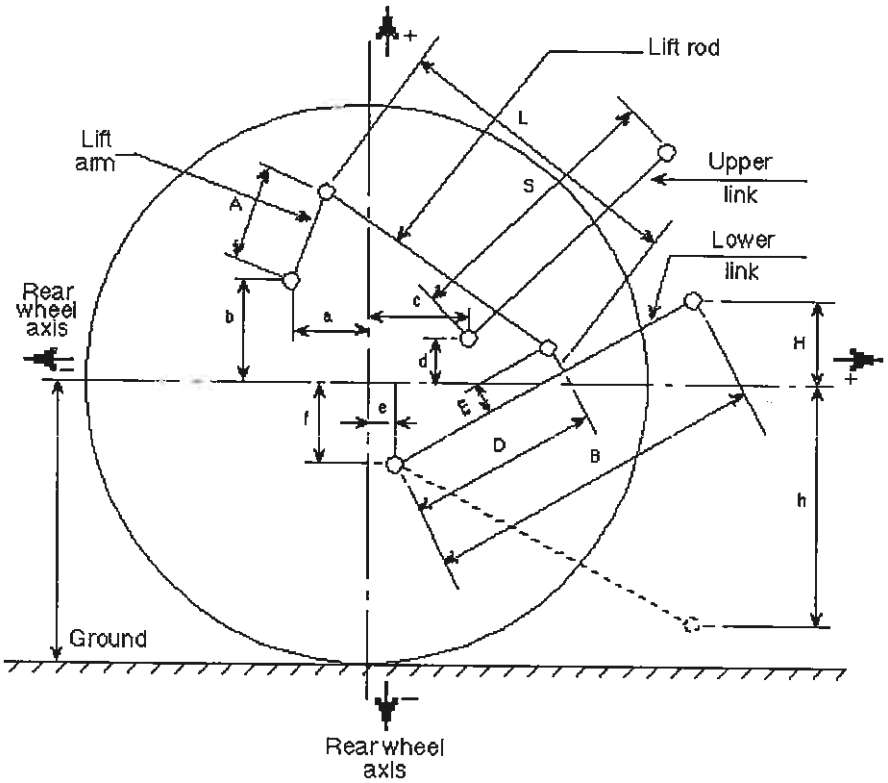
Make:	Massey Ferguson/Bosch
Model:	None
Type:	Electro-hydraulic with proportional solenoid valves, open centre, for both lift and drop
Type and number of cylinders:	1 single acting, internal and two 28 mm dia external assist
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	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

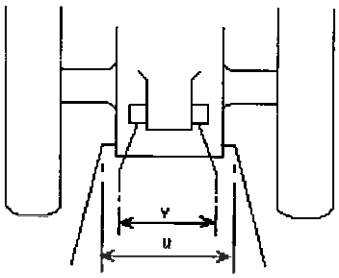
AUXILIARY HYDRAULIC SYSTEM

Make:	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 ISO. 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)	1050 mm	1050 mm	1050 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)	727 - 967 mm	815 mm	815 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)	685 - 805 mm	760 mm	745 mm (685 mm)
Height of lower hitch points (*) relative to the rear wheel centre line, situated 770 mm above the ground level:					
- in low position		(h)	710 - 385 mm	578 mm	543 mm (385 mm)
- in high position		(H)	70 - 275 mm	120 mm	148 mm (245 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 770 mm ISO 4251/1-1992

SWINGING DRAWBAR

Type:	Clevis
Height above ground: maximum minimum:	550 mm 340 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: Horizontally:	 80 mm, 185 mm, 180 mm, 290 mm 250 mm, 350 mm, 400 mm
Lateral adjustment (centre of clevis): Right-hand: Left-hand:	 169 mm drawbar in, 196 mm, 210 mm, drawbar out 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:	830 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: 2350 mm

Track width adjustment:

	Minimum, mm	Maximum, mm	Adjustment method
Front	1610*	1915	By reversing wheels and offset lug rims
Rear	1535	2130	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: Type 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:

Rollguard: Safety cab

Tiltable/Not tiltable: Non tiltable

OECD approval number: CSS 0434/3

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	1160	160 x 100	196
Sidelights	1730	110 x 35	777
Rear lights	1665	145 x 52	762
Axle reflectors	725	80 dia	485
Cab reflectors	1665	43 x 52	810

II TEST CONDITIONS

Overall dimensions

Length mm	Width		Height at top of	
	Minimum mm	Maximum mm	Protective structure mm	Exhaust pipe mm
4030	1990	2590	2630	2612

Ground clearance (unballasted tractor) 290 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	1517	1533	--	--
Rear	2213	2272	--	--
Total	3730	3805	--	--

Tyres and track width specification

	Front	Rear
Tyres dimensions ply rating type	14.9 x 24 Radial	18.4 x 34 Radial
Maximum load (tyre manufacturer's), kg	1700	2800
Maximum load (tractor manufacturer's), kg	1700	2268
Inflation pressure (tyre manufacturer's), Bar	1.6	1.1
Dynamic radius index	590	770
Chosen track width (manufacturer's nominal)	1610	1635

Oils and lubrication

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 rear axle		
Brakes	- -	Top-up	None

Fuels and lubricants used in tests

Fuel

Type: Diesel oil with cetane index of 50.0 and kinematic viscosity of 3.246 cSt at 40°C within the specification limits of Class A2 British Standard 2869/1983.

Specific gravity: 0.8571 kg/l 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 (540)

Date and location of tests: 23 May 1996
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						
55.5	2146	609	15.30	17.90	276	3.10
1.2 POWER AT RATED ENGINE SPEED						
54.7	2202	625	15.52	18.11	284	3.02
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
53.7	1901	540	13.97	16.29	260	3.30
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
54.7	2202	625	15.52	18.11	284	3.02
1.4.2 85% of the torque defined in 1.4.1						
47.1	2230	633	14.26	16.63	303	2.83
1.4.3 75% of the torque defined in 1.4.2						
35.6	2244	637	12.04	14.05	339	2.53
1.4.4 50% of the torque defined in 1.4.2						
23.8	2257	641	9.82	11.46	413	2.07
1.4.5 25% of the torque defined in 1.4.2						
11.9	2268	644	7.86	9.18	658	1.30
1.4.6 Unloaded						
0	2283	648	5.59	6.52	--	--

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 (540 ± 10 rev/min)					
1.5.1	The torque corresponding to maximum power					
53.7	1901	540	13.97	16.29	260	3.30
1.5.2	85% of the torque obtained in 1.5.1					
46.3	1930	548	12.48	14.56	270	3.18
1.5.3	75% of the torque obtained in 1.5.2					
35.0	1949	553	10.27	11.98	293	2.92
1.5.4	50% of the torque obtained in 1.5.2					
23.5	1967	558	8.15	9.51	346	2.48
1.5.5	25% of the torque obtained in 1.5.2					
11.9	1981	562	6.16	7.18	517	1.66
1.5.6	Unloaded					
0	2005	569	4.02	4.69	--	--

No load, maximum engine speed: 2283 rev/min

Torque (equivalent crankshaft) at maximum power: 247.0 Nm

Torque (equivalent crankshaft) at rated speed: 237.4 Nm

Maximum torque (equivalent crankshaft): 289.7 Nm
(engine speed 1450 rev/min)

Mean atmospheric conditions:

- Temperature 22°C
- Pressure 1010 m bar
- Relative humidity 37%

Maximum temperatures:

- Coolant 79°C
- Engine oil 111°C
- Fuel 47C
- Engine air intake 28°C

2. HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 13 June 1996

2.1 Hydraulic power test

	1 Lift system only	2 Auxiliary only	3 Auxiliary combination
Sustained pressure with relief valve open:	23.4MPa	21.6 MPa	21.6 MPa
Pump delivery rate at minimum pressure:	29.9 l/min	38.8 l/min	65.3 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	23.4	21.1	8.24
	2	35.1	19.4	11.34
	3	54.5	19.4	17.62
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	1	26.3	20.0	8.76
	2	36.3	19.0	11.51
	3	58.7	18.8	18.40

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	192 mm	192 mm
Vertical movement	698 mm	875 mm
Maximum corrected force exerted through full range	27.9 kN	25.0 kN
Corresponding pressure of hydraulic fluid	21.1 MPa	21.1 MPa
Moment about rear-wheel axis	28.4 kNm	40.7 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	-435	-366	-200	-100	0	100	200	250	300	332	440
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	–	27.9	31.0	32.5	33.6	34.8	35.2	35.2	35.3	35.5	–
Corresponding pressure: 21.1 MPa											
at the frame kN	25.0	25.5	26.7	26.9	27.3	27.1	26.7	26.5	26.3	25.8	25.3
Corresponding pressure: 21.1 MPa											

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

Date and location of tests: 6 June 1996
Silsoe Research Institute
Wrest Park
Silsoe

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pressure (kPa)	
	Front	Rear
330 mm	103	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
3.1	MAXIMUM POWER IN TESTED GEARS												
3L*	27.1	35.9	2.72	2236	15.6	441	1.94	48	78	104	29	40	101.2
4L*	35.5	36.0	3.55	2224	15.3	386	2.22	47	79	107	28	43	101.2
1M	43.3	35.5	4.39	2145	13.5	352	2.44	48	79	107	27	45	101.2
2M	46.6	26.9	6.23	2145	6.2	331	2.59	42	78	107	23	51	101.3
3M	47.1	20.4	8.31	2146	4.6	326	2.63	44	78	109	23	53	101.3
4M	45.7	14.9	11.01	2145	3.5	331	2.59	45	78	110	23	53	101.3
1H	45.8	12.4	13.31	2149	3.2	334	2.57	45	78	105	24	51	101.3
3.2	FUEL CONSUMPTION												
3.2.1	In selected gear, at maximum power at rated speed												
3M	46.4	19.6	8.53	2199	4.5	331	2.59	47	78	106	28	43	101.2
3.2.1.1	75% of pull at maximum power at rated speed												
3M	35.9	14.8	8.75	2229	3.4	368	2.33	47	78	108	27	45	101.2
3.2.1.2	50% of pull at maximum power at rated speed												
3M	24.3	9.8	8.90	2245	2.4	450	1.91	48	78	107	27	42	101.2
3.2.1.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1												
4M	36.0	14.8	8.74	1702	3.4	300	2.85	49	78	102	28	43	101.2
3.2.1.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2												
4M	24.3	9.8	8.91	1718	2.5	399	2.53	48	78	100	28	44	101.2
3.2.2	In selected gear nearest to 7.5 km/h, at maximum power at rated engine speed												
2M	46.0	25.8	6.41	2200	5.8	338	2.54	43	78	108	23	51	101.3
3.2.2.1	75% of pull at maximum power at rated speed												
2M	35.6	19.4	6.60	2232	4.5	369	2.32	47	78	106	28	42	101.2
3.2.2.2	50% of pull at maximum power at rated speed												
2M	24.1	12.9	6.73	2244	3.1	441	1.94	47	78	106	27	46	101.2
3.2.2.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1												
3M	35.3	19.3	6.59	1697	4.4	304	2.82	49	78	101	27	45	101.2
3.2.2.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2												
3M	24.0	12.8	6.73	1709	3.1	343	2.50	46	77	99	27	46	101.2

*Maximum power limited by wheelslip

TEST RESULTS

B. SUPPLEMENTARY TESTS

1. MAIN POWER TAKE-OFF (1000)

Date and location of tests: 23 May 1996
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						
57.1	2146	1073	15.34	17.90	269	3.19
1.2 POWER AT RATED ENGINE SPEED						
56.4	2201	1101	15.59	18.19	277	3.10
1.3 STANDARD POWER TAKE-OFF SPEED (1000 ± 25 rev/min)						
56.5	2001	1001	14.51	16.93	257	3.34
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
56.4	2201	1101	15.59	18.19	277	3.10
1.4.2 85% of the torque defined in 1.4.1						
48.5	2227	1114	14.14	16.50	292	2.94
1.4.3 75% of the torque defined in 1.4.2						
36.6	2241	1121	11.92	13.91	326	2.63
1.4.4 50% of the torque defined in 1.4.2						
24.6	2256	1128	9.78	11.41	398	2.15
1.4.5 25% of the torque defined in 1.4.2						
12.3	2265	1132	7.82	9.12	634	1.35
1.4.6 Unloaded						
0	2277	1138	5.54	6.47	--	--

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	
1.5	PART LOADS AT STANDARD POWER TAKE-OFF SPEEDS (1000 ± 25 rev/min)					
1.5.1	The torque corresponding to maximum power					
56.5	2001	1001	14.51	16.93	257	3.34
1.5.2	85% of the torque obtained in 1.5.1					
48.8	2032	1016	13.18	15.37	270	3.17
1.5.3	75% of the torque obtained in 1.5.2					
36.8	2052	1026	10.97	12.80	298	2.88
1.5.4	50% of the torque obtained in 1.5.2					
24.8	2073	1036	8.80	10.27	355	2.42
1.5.5	25% of the torque obtained in 1.5.2					
12.5	2086	1043	6.73	7.85	539	1.59
1.5.6	Unloaded					
0	2107	1053	4.49	5.23	--	--

No load, maximum engine speed: 2277 rev/min

Torque (equivalent crankshaft) at maximum power: 254.1 Nm

Torque (equivalent crankshaft) at rated speed 244.5 Nm

Maximum torque (equivalent crankshaft): 298.0 Nm
(engine speed 1451 rev/min)

Mean atmospheric conditions:

- Temperature 24°C
- Pressure 1010 m bar
- Relative humidity 37%

Maximum temperatures:

- Coolant 78°C
- Engine oil 110°C
- Fuel 48°C
- Engine air intake 31°C

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	227 mm	227 mm
Vertical movement	691 mm	870 mm
Maximum corrected force exerted through full range	29.3 kN	25.0 kN
Corresponding pressure of hydraulic fluid	21.1 MPa	21.1 MPa
Moment about rear-wheel axis	29.8 kNm	40.7 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	-393	-331	-200	-100	0	100	200	250	300	360	477
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	--	29.3	31.6	33.2	34.4	35.5	35.9	36.1	36.3	36.1	--
Corresponding pressure: 21.1 MPa											
at the frame kN	25.0	25.7	26.9	27.5	27.6	27.4	27.0	26.7	26.4	26.0	25.2
Corresponding pressure: 21.1 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	385 mm	385 mm
Vertical movement	630 mm	832 mm
Maximum corrected force exerted through full range	33.5 kN	24.7 kN
Corresponding pressure of hydraulic fluid	21.1 MPa	21.1 MPa
Moment about rear-wheel axis	34.1 kNm	40.2 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	- 205	-173	-100	0	100	200	300	400	457	560	627
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	—	33.5	34.5	36.0	37.3	37.9	38.3	38.3	38.0	-	-
Corresponding pressure: 21.1 MPa											
at the frame kN	27.2	27.7	28.4	28.7	28.7	28.4	27.7	26.9	26.0	25.3	24.7
Corresponding pressure: 21.1 MPa											

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

Date and location of tests: 10 June1996
Silsoe Research Institute
Wrest Park
Silsoe

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pressure (kPa)	
	Front	Rear
530 mm	103	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
3.1	MAXIMUM POWER IN TESTED GEARS												
1M*	32.6	26.4	4.43	2227	15.0	409	2.09	41	77	102	22	50	101.2
2M*	41.2	26.2	5.66	2204	15.3	367	2.33	44	78	106	23	50	101.2
3M	46.1	20.6	8.04	2146	6.0	333	2.57	46	78	108	23	50	101.3
4M	46.0	15.5	10.72	2144	4.3	331	2.59	44	78	109	22	50	101.3
1H	46.7	13.0	12.98	2147	3.8	331	2.59	44	78	108	22	51	101.3
2H	45.7	9.6	17.06	2143	2.9	334	2.57	45	78	109	21	49	101.3
3.2	FUEL CONSUMPTION												
3.2.1	In selected gear, at maximum power at rated speed												
1H	45.9	12.4	13.33	2202	3.6	339	2.53	45	78	109	22	53	101.3
3.2.1.1	75% of pull at maximum power at rated speed												
1H	35.0	9.3	13.61	2231	2.8	378	2.27	45	78	108	21	49	101.3
3.2.1.2	50% of pull at maximum power at rated speed												
1H	23.3	6.1	13.80	2246	2.1	464	1.85	44	78	108	21	48	101.3
3.2.1.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1												
2H	35.3	9.4	13.59	1704	2.8	309	2.77	44	78	103	21	51	101.3
3.2.1.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2												
2H	23.5	6.1	13.79	1715	2.1	351	2.44	43	77	102	21	51	101.3

* Maximum power limited by wheelslip
Gear nearest 7.5 Km/h is also slip gear

C. OPTIONAL TESTS

C1. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm	951
Distance forward from the vertical plane containing the axis of the rear wheels, mm	947
Distance from the median plane of the tractor, mm (to left viewed from rear)	4

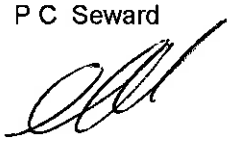
REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Test carried out by: S J Devonshire

Signed:  Officer in charge of tests

P C Seward

Signed:  for the Director

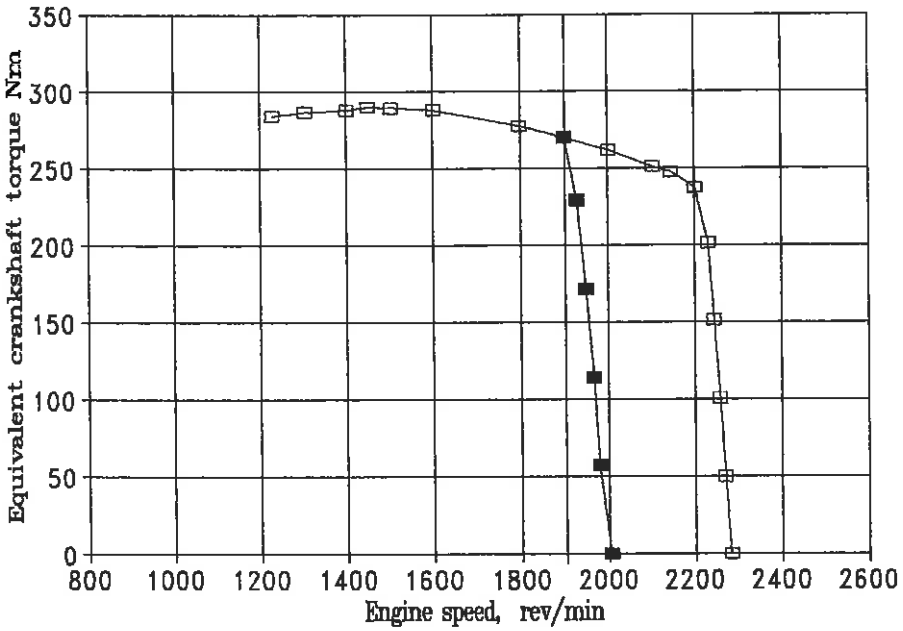
P C Seward
Head of Test Engineering Group

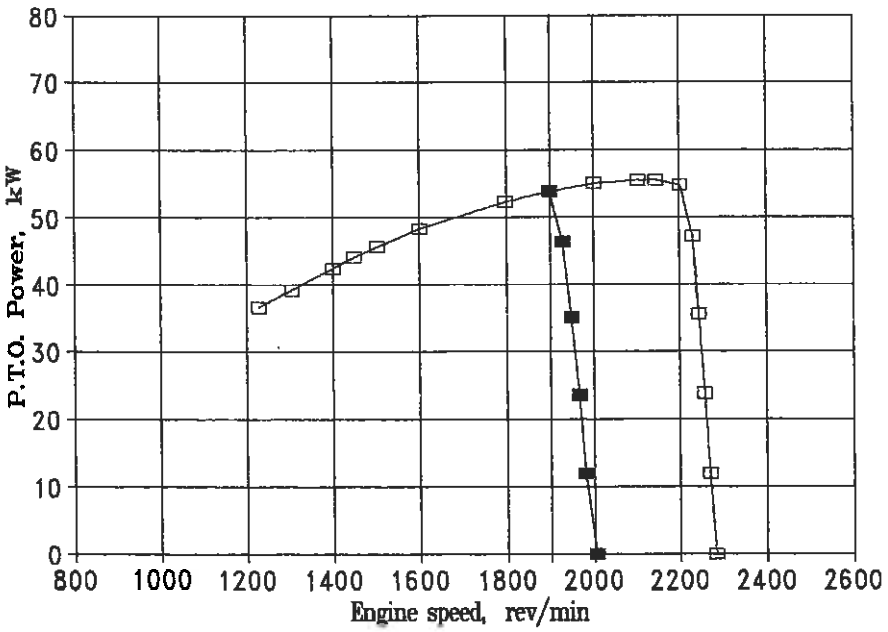
Date: 15/9/97

ANNEX 1 MAIN POWER TAKE-OFF CURVES

P.T.O. POWER TEST - MASSEY FERGUSON 4245 FOUR-WHEEL DRIVE (540 rev/min)

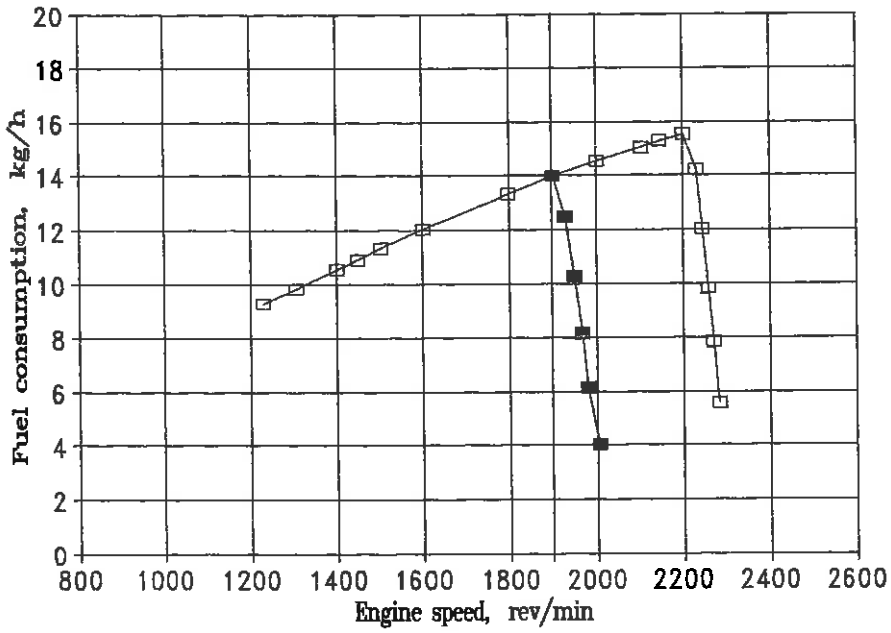
Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■

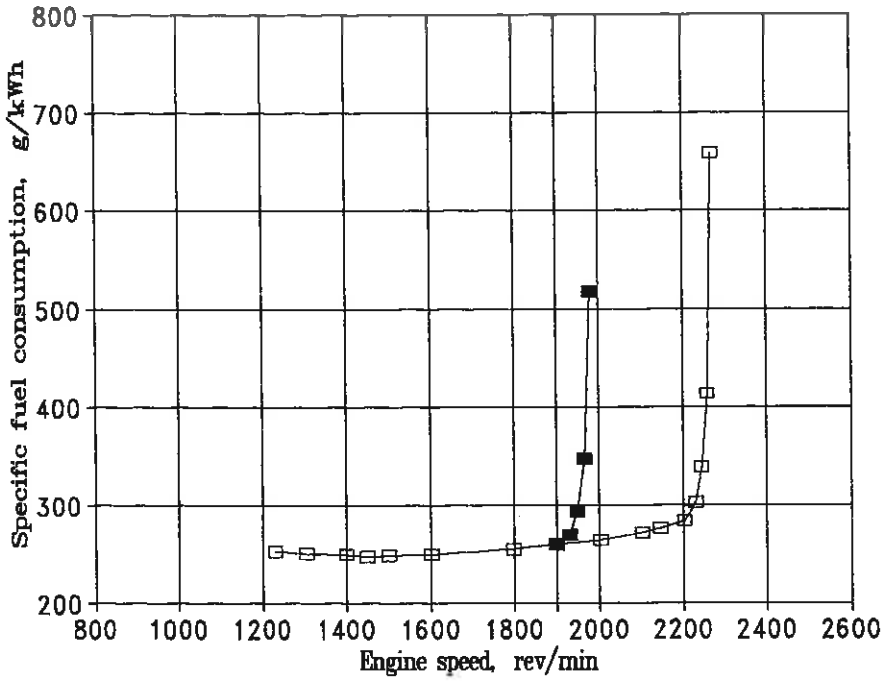




P.T.O. POWER TEST - MASSEY FERGUSON 4245 FOUR-WHEEL DRIVE (540 rev/min)

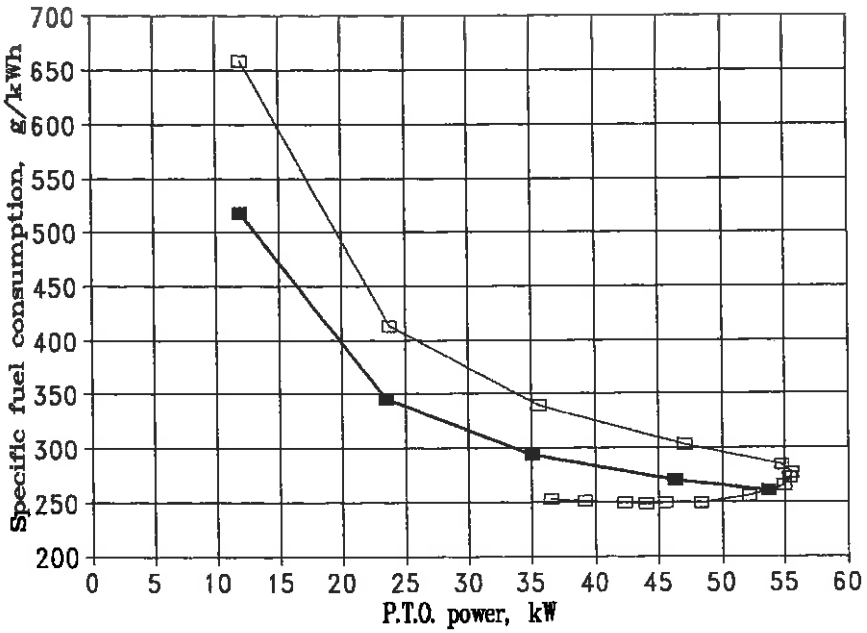
Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■





P.T.O. POWER TEST - MASSEY FERGUSON 4245 FOUR-WHEEL DRIVE (540 rev/min)

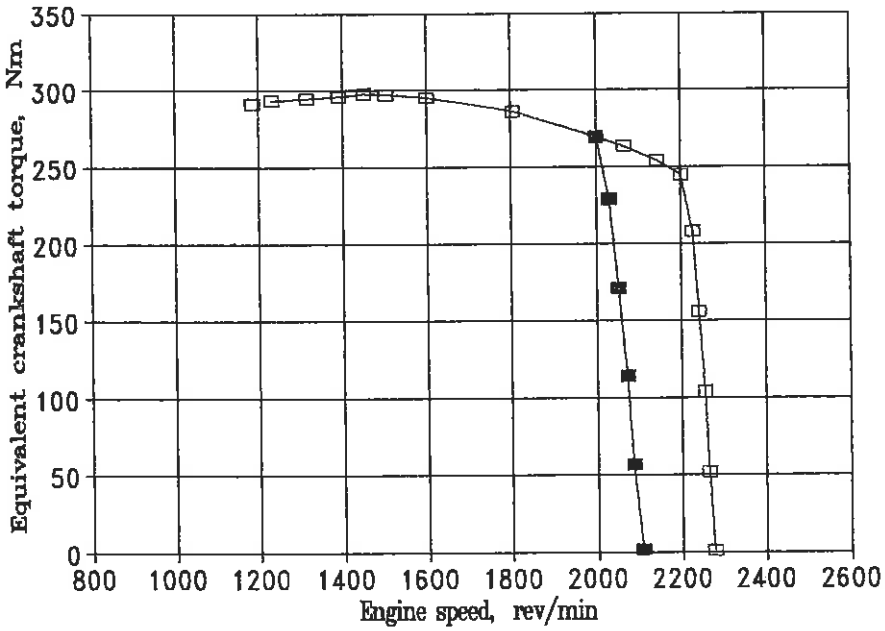
Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■

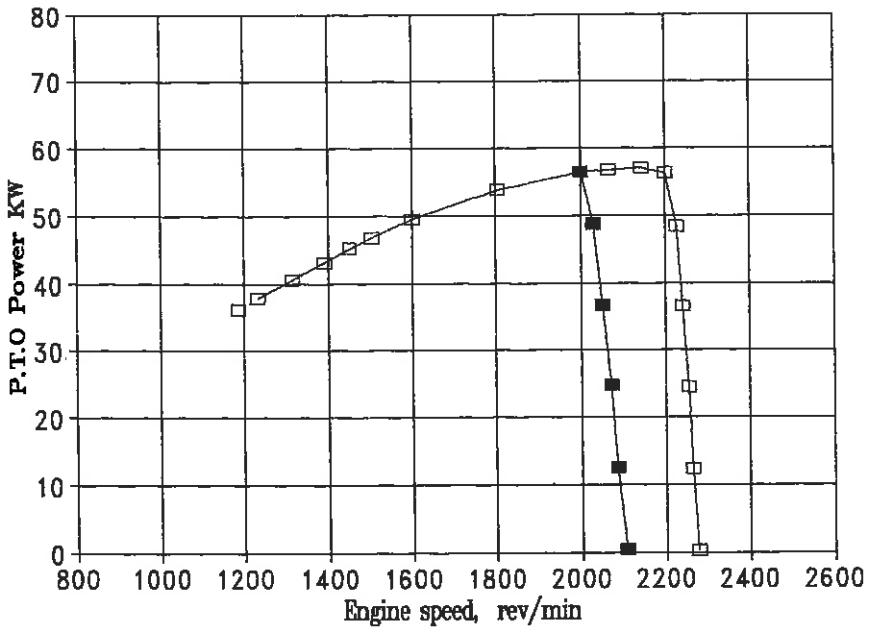


ANNEX 2 MAIN POWER TAKE-OFF CURVES

P.T.O. POWER TEST - MASSEY FERGUSON 4245 FOUR-WHEEL DRIVE (1000 rev/min)

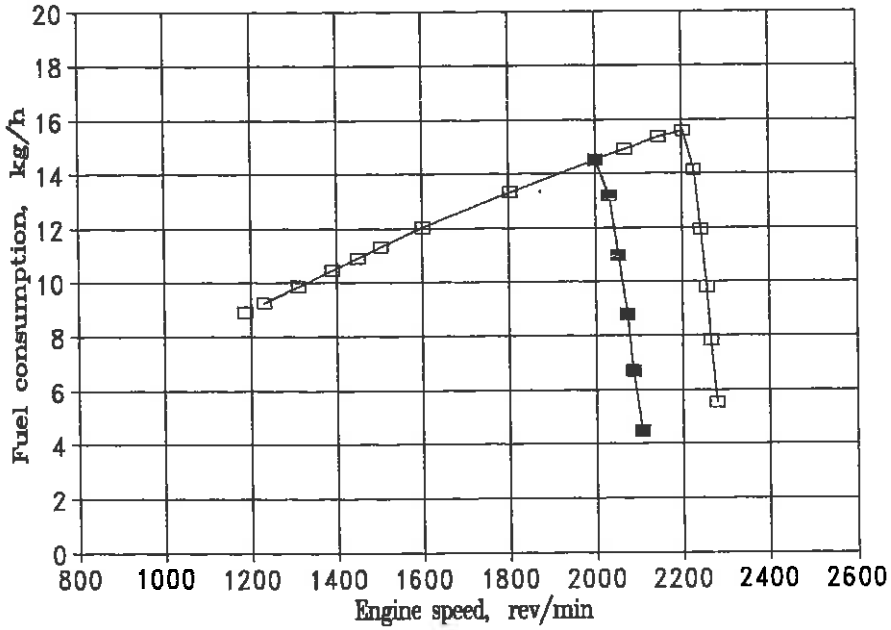
Governor set for maximum power at rated speed □
Governor set for maximum power at pto speed ■

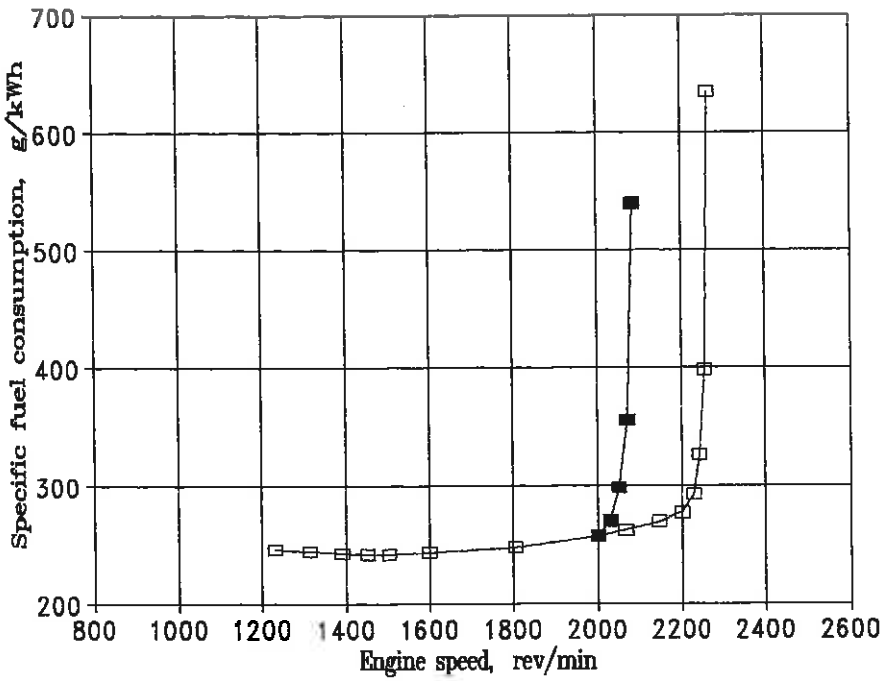




P.T.O. POWER TEST - MASSEY FERGUSON 4245 FOUR-WHEEL DRIVE (1000 rev/min)

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





P.T.O. POWER TEST - MASSEY FERGUSON 4245 FOUR-WHEEL DRIVE (1000 rev/min)

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

