SILSOE RESEARCH INSTITUTE
Wrest Park, Silsoe,
Bedford MK45 4HS

Report No: R92/71567/OECD
OECD Approval No: 1404 Restricted Code
Approval Date: 26 October 1992

Test in accordance with the OECD Restricted Standard Code for the Official Testing of Agricultural Tractors

Massey-Ferguson 382 Four-Wheel Drive Tractor with 12-speed Shuttle and 4 Forward Creep Gear Transmission



Manufactured by: Massey-Ferguson Tractors Limited
Banner Lane
Coventry
Warwicks CV4 9GF
England

Submitted for test by: The manufacturer

Report No: 751

Date: August 1992

R92/71567/OECD

TABLE OF CONTENTS

			Page No.
I.	SPECIFICATION OF TRACTOR		1
II.	TEST CONDITIONS		16
III.	TEST RESULTS		20
A.	Compulsory tests		20
	1	Main power take-off (540)	20
	2	Hydraulic power and lifting force	22
	3	Drawbar power and fuel consumption test (Unballasted tractor, 4 Wheel Drive)	24
B.	Supplementary tests		25
	1	Main Power Take-off (540 "Economy")	25
	2	Power lift test - (To manufacturers lift rod setting)	27
	3	Drawbar Power and Fuel Consumption Test (Unballasted Tractor, 2 Wheel Drive)	28
C.	Optional tests		29
	1	Centre of gravity	29
Repairs and adjustments			29
Remarks			29
Annex 1	Main power take-off curves (540)		30
Annex 2	Main power take-off curves (540 "Economy")		33

Tractor manufacturer's name and address:	Massey-Ferguson Tractors Limited Banner Lane, Coventry, Warwicks, 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:	55 hours
Location of test:	Silsoe Research Institute Wrest Park, Silsoe, England

I. SPECIFICATION OF TRACTOR

TRACTOR

Make:	Massey-Ferguson
Model:	MF-382 with 12-speed shuttle and 4 forward creep gear transmission
Type:	Four wheel drive, unit construction
Serial No:	9140 A16235
1st Serial No:	9140 A16235

ENGINE

Make:	Perkins
Model:	A4.248
Type:	4 stroke, direct injection naturally aspirated diesel
Serial No:	LF31258 US12240W
Ist Serial No:	LF31258 US12240W

Cylinders

Number/disposition:	4 vertical In-line
Bore/stroke:	101.1 mm/127 mm
Capacity:	4078 cm^3
Compression ratio:	16:1
Arrangement of valves:	Overhead
Cylinder liners:	Dry

Supercharging

Make:	None

Fuel system

Fuel feed system:	Superpar mechanical feed pump
Make, type and model of fuel filter:	CAV paper, dual element filter with transparent sediment bowl
Capacity of fuel tank:	75 litres
Make, type and model of injection pump:	CAV distributor, DPA3340F010, Perkins 2643C279XS/6/2310
Serial No:	06508MJG
Manufacturer's production setting of injection pump:	18.0 to 19.1 l/hr
. Flow rate	68.1-72.3 mm^3/stroke at 2200 rev/min engine speed at full load on 45°C pump inlet temperature
. Timing	Delivery starts 24° before T.D.C. static
Make, type and model of injectors:	CAV 4-hole, BDLL 150S6600
Injection pressure:	17.1 MPa

Governor

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

Air cleaner

Pre-cleaner:	None
Main cleaner:	
. Make	Donaldson
. Type	2 stage, dry paper element
. Model	FL6-06
. Location of air intake	Under bonnet in front of radiator
Maintenance indicator:	Warning light on instrument panel

Lubrication system	
Type of feed pump:	Forced feed from gear pump
Type of filter:	Full flow replaceable element
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:	8
Fan diameter:	432 mm
Coolant capacity:	15 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:	Operable only when console mounted gear lever and pto selector are in neutral position
Electrical system	
Voltage:	12
Generator: . Make . Model . Type . Power	Alternator Massey-Ferguson Powerpart A 127-70 Belt driven 0.84 kW
Batteries: . Rating	2 M-F Powerpart, type 372 lead acid maintenance free 420 CCA rating each or equivalent 70 Ah at 20 hour rating

Exhaust system

Make:	Nelson Burgess
Model:	MF70
Type:	Round baffle silencer
Location:	Vertical on right hand side
Height of outlet above ground:	2510 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:	M-F
Model:	None
Type:	Mechanical manual synchromesh operation, 4 speeds and 3 ranges selected with single side mounted lever. Console mounted hand lever selects forward or reverse for each combination. 4 forward creep gears engaged by push-pull knob on seat deck in combination with low range selection.
Number of gears:	16 forward, 12 reverse
Available options:	12 forward, 12 reverse (without creep gears)

Rear axle final drives

Make:	Own make
Model:	None
Type:	Crown wheel and pinion with outboard epicyclic reduction gear final drives

Differential lock:	
. Type	Mechanical dog clutch on differential gears
. Method of engagement	Hydraulically operated in response to panel mounted electrical switch
. Method of disengagement	Reverse of above

Front axle and final drives

Make:	M-F
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 actuated in unison with rear differential in response to electrical signal from switch on side console
. Method of disengagement	Reverse of above

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 Creep Gears			
1C	L	1675.63	0.356
2C	L	1282.37	0.467
3C	L	977.04	0.611
4C	L	746.11	0.800
Forward			
1	L	353.87	1.69
2	L	270.82	2.20
3	L	206.34	2.89
4	L	157.57	3.79
1	M	125.48	4.76
2	M	96.03	6.22
3	M	73.17	8.16
4	M	55.87	10.69
1	H	46.47	12.85
2	H	35.57	16.79
3	H	27.10	22.04
4	H	20.69	28.86
Reverse			
1	L	345.24	1.73
2	L	264.21	2.26
3	L	201.31	2.97
4	L	153.72	3.88
1	M	122.42	4.88
2	M	93.69	6.37
3	M	71.38	8.37
4	M	54.51	10.95
1	H	45.34	13.17
2	H	34.70	17.21
3	H	26.44	22.59
4	H	20.19	29.58

Reverse with creep engaged is as low range reverse above.

C = Creep L = Low range M = Medium range H = High range

(*) Calculated with a tyre dynamic radius index of 720 mm (ISO 4251/1-1984)
Number of revolutions of front wheels for one revolution of rear wheels: 1.3578

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
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
(Main Test)

540 rev/min

Location:	Rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	6 to ISO 500
Height above ground:	590 mm
Distance from the median plane of the tractor:	Central
Distance behind rear wheel axis:	296 mm
Pto speed at rated engine speed:	600 rev/min
Engine speed at standard power take-off speed:	1979 rev/min
Ratio of rotation speeds:	3.6654:1
Power restriction and maximum torque:	ISO recommendation 48 kW
Direction of rotation (viewed from behind tractor):	Clockwise

540 rev/min (Economy)
(Supplementary Test)

Location:	Rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	6, to ISO 500
Height above ground:	590 mm
Distance from the median plane of the tractor:	Central
Distance behind rear-wheel axis:	296 mm
PTO speed at rated engine speed:	836 rev/min
Engine speed at standard power take-off speed:	1421 rev/min
Ratio of rotation speeds:	2.632:1
Direction of rotation (viewed from behind tractor):	Clockwise

POWER LIFT

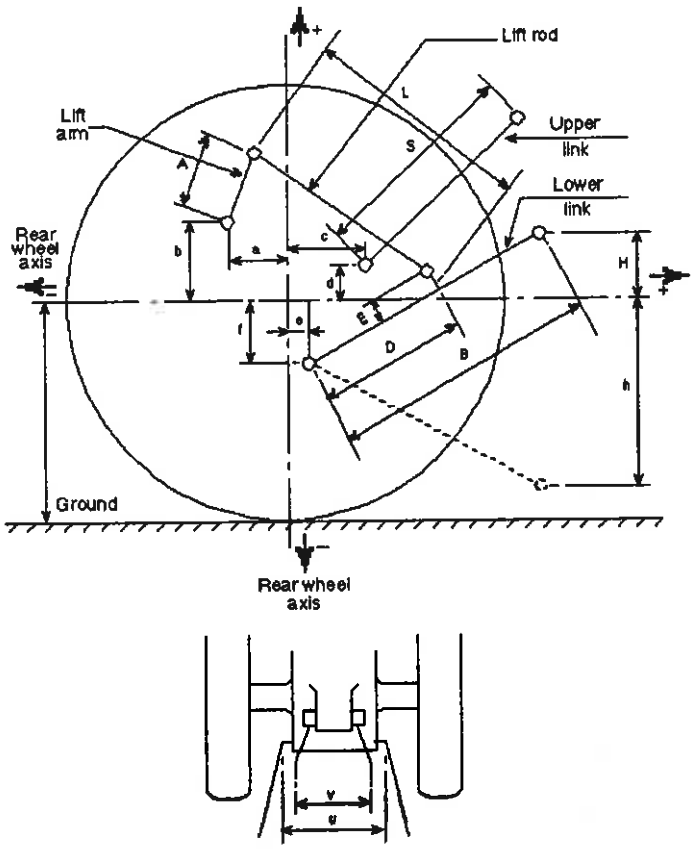
Make:	Massey-Ferguson
Model:	None
Type:	Hydraulic, with inlet suction control closed system
Type and number of cylinders:	1 single acting, internal
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	21.4 - 24.0 MPa
Opening pressure of cylinder safety valve:	None fitted
Lift 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:	One on centre housing top cover, a valve allows flow to spool valves and quick release couplings
Maximum volume of oil available to external cylinders:	23.0 litres

AUXILIARY HYDRAULIC SYSTEM

Make:	Sundstrand
Model:	None
Type:	Gear
Relief valve pressure setting:	17.0 - 20.6 MPa
Lift pump type:	Gear
Transmission between pump and engine:	Engine mounted in tandem with steering pump
Type and number of filters:	Metal mesh strainer and Parker Hannifin replaceable canister in shared circuit with steering system
Site of oil reservoir:	Main transmission housing
Type and number of tapping points:	2 quick release couplings with own spool valves and separate returns to ISO. A valve allows combination with main system up to auxiliary relief valve pressure
Maximum volume of oil available to external cylinders:	23.0 litres

THREE-POINT LINKAGE

Category:	2 to ISO standard 730-1:1990
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 730-1:1990 CAT 2)

			Dimensions or range	Setting used in	
				Main Test	Test B2
Length of lift arms:		(A)	267 mm	267 mm	267 mm
Length of lower links:		(B)	959 mm	959 mm	959 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)	534 mm	534 mm	534 mm
Length of upper link:		(S)	681 - 831 mm	766 mm	766 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)	428 mm on centre line	428 mm 0 mm	428 mm 0 mm
Length of lift rods:		(L)	600 - 635 mm	635 mm	620 mm
Height of lower hitch points (*) relative to the rear wheel centre line, situated 720 mm above the ground level:					
- in low position		(h)	430 mm 523 mm	523 mm	495 mm
- in high position		(H)	208 mm 270 mm	208 mm	227 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 4251/1-1984

SWINGING DRAWBAR

Type:	Clevis
Height above ground, maximum:	522 mm
minimum:	372 mm
Type of adjustment:	Inverting drawbar and clevis
Distance of hitch point from rear-wheel axis, horizontally:	545 - 660 mm
Distance of hitch point form power take-off shaft ends:	
. Vertically:	68 - 218 mm
. Horizontally:	249 - 364 mm
Lateral adjustment (centre of clevis):	
. Right-hand:	215 mm drawbar in 250 mm out
. Left-hand:	215 mm drawbar in 250 mm out
Distance of pivot point from rear axles horizontally:	130 mm forward
Width of clevis:	65 mm
Diameter of drawbar pin hole:	26 mm
Maximum vertical permissible load:	7.6 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:	617 mm
Width of clevis:	63 mm
Diameter of pin hole:	33 mm

STEERING

Make:	Own make
Model:	None
Type:	Hydrostatic
Method of operation:	
. Pump	Sundstrand gear type mounted on engine in tandem with auxiliary hydraulic system pump
. Motor	Danfoss OSPC-100-ON
. Ram	1 double acting operating both track rods
. Filter	1 replaceable canister in shared circuit with auxiliary hydraulics
Working pressure:	17.0 MPa

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:	None fitted

Parking brake

Type:	Mechanical via cable
Method of operation:	Hand lever with ratchet

WHEELS

Number:	4
. Front	2 steering and driving
. Rear	2 driving
Wheelbase:	2217 mm

Track width adjustment:

	Minimum, mm	Maximum, mm	Adjustment method
Front	1524	1618	By reversing wheels and offset lug rims
Rear	1520	1820	By reversing wheels and offset lug rims

PROTECTIVE STRUCTURE

Make:	GKN Sankey Industrial Products
Model:	Lo-Line
Type:	Safety cab
Manufacturer's name and address:	GKN Sankey Industrial Productions, Hadley Castle Works, P O Box 86, Telford TF1 4RE
Protective device:	
. Rollguard	Safety cab
. Tiltable/Not tiltable	Non tiltable
OECD approval number:	CSS 0211/1

DRIVER'S SEAT

Make/Model/Type:	KAB303 LB
Type of suspension:	Spring
Type of damping:	Hydraulic
Range of adjustment:	
. Longitudinal	140 mm
. Vertical	60 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	1155	90 x 150	220
Sidelights	1595	30 x 110	710
Rear lights	1520	85 x 65	752
Axle reflectors	725	80 dia	475
Cab reflectors	1520	42 x 50	780

II. TEST CONDITIONS

Overall dimensions (overall width at 1524 measured front track)

Length mm	Width		Height at top of	
	Minimum mm	Maximum mm	Protective structure mm	Exhaust pipe mm
3770	2040	2340	2545	2510

Ground clearance (unballasted tractor) 315 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	1283	1298	--	--
Rear	1873	1933	--	--
Total	3156	3231	--	--

Tyres and track width specification

	Front	Rear
Tyres . dimensions . ply rating . type	 12.4 x 24 8 Radial	 18.4 x 30 8 Radial
Maximum load (tyre manufacturer's), kg	1455	2836
Maximum load (tractor manufacturer's), kg	1200	2415
Inflation pressure (tyre manufacturer's), Bar	1.7	1.4
Dynamic radius index, mm	540	720
Chosen track width (manufacturer's nominal), mm	1524	1520

Oils and lubrication

Capacity and change interval

	Capacity l	Oil change h	Filter change h
Engine	7.7	250	250
Front axle	9	1000	None
Final drive (front)	0.6 per side	1000	None
Gearbox	47.4	1000	250
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 54.5 and kinematic viscosity of 2.9 cSt at 40°C within the specification limits of Class A2 British Standard 2869/1983.

Specific gravity: 0.8380 kg/l at 15°C

Oils	Recommended	Used during test
Engine oil		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-C	
Transmission oils		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-C	
Rear final drives		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-C	
Front differential and final drives		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-C	
Hydraulic brakes		
Type:	Mineral	As recommended
Viscosity:	7.2 cSt at 50°C	
Classification:	M-F CMS 1151A	
Hydraulic fluid		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-C	
Steering oil		
Type:	SAE 15W/30	As recommended
Viscosity:	54 cSt at 50°C	
Classification:	MIL-L-2104-C	
Recommended grease:	Consistency 2 lithium	As recommended
Number of lubrication points:	13	

III. TEST RESULTS

A. COMPULSORY TEST RESULTS

1. MAIN POWER TAKE-OFF (540)

Date and location of tests: 17 June 1992
Silsoe Research Institute,
Wrest Park, Silsoe, Bedford

Type of dynamometer: Water brake, Heenan & Froude

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						
53.9	2202	601	15.30	18.26	284	2.95
1.2 POWER AT RATED ENGINE SPEED						
53.9	2202	601	15.30	18.26	284	2.95
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
51.5	1978	539	14.02	16.73	272	3.08
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
53.9	2202	601	15.30	18.26	284	2.95
1.4.2 85% of the torque defined in 1.4.1						
46.0	2217	604	12.73	15.19	277	3.03
1.4.3 75% of the torque defined in 1.4.2						
35.0	2232	609	10.12	12.08	290	2.89
1.4.4 50% of the torque defined in 1.4.2						
23.2	2236	610	7.96	9.50	343	2.44
1.4.5 25% of the torque defined in 1.4.2						
11.7	2248	613	5.92	7.06	506	1.66
1.4.6 Unloaded						
0	2279	622	4.14	4.94	--	--

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 1.5.1	PART LOADS AT STANDARD POWER TAKE-OFF SPEEDS (540 ± 10 rev/min) The torque corresponding to maximum power					
51.5	1978	539	14.02	16.73	272	3.08
1.5.2	85% of the torque obtained in 1.5.1					
44.0	1994	544	11.39	13.59	259	3.24
1.5.3	75% of the torque obtained in 1.5.2					
33.1	2004	546	9.06	10.81	274	3.06
1.5.4	50% of the torque obtained in 1.5.2					
22.3	2017	550	6.97	8.32	312	2.68
1.5.5	25% of the torque obtained in 1.5.2					
11.1	2028	553	5.04	6.02	455	1.84
1.5.6	Unloaded					
0	2053	560	3.36	4.01	–	–

No load, maximum engine speed: 2279 rev/min

Torque (equivalent crankshaft) at maximum power: 234.0 Nm

Maximum torque (equivalent crankshaft)
(engine speed 1300 rev/min): 276.0 Nm*

Mean atmospheric conditions:

- Temperature 24°C
- Pressure 1030 m bar
- Relative humidity 37%

Maximum temperatures:

- Coolant 88°C
- Engine oil 110°C
- Fuel 51°C
- Engine air intake 25°C

* Maximum torque was obtained but unable to go 15% below due to limits of test equipment.

2. HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 6 July 1992

2.1 Hydraulic power test

Sustained pressure with relief valve open: 23.8 MPa

Pump delivery rate at minimum pressure: 23.7 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	19.4	21.4	6.91
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	20.5	20.8	7.11

Tapping point used for test: 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	200 mm	200 mm
Vertical movement	731 mm	953 mm
Maximum corrected force exerted through full range	17.4 kN	14.4 kN
Corresponding pressure of hydraulic fluid	21.4 MPa	21.4 MPa
Moment about rear-wheel axis	16.1 kNm	22.1 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	-371	-311	-200	-100	0	80	140	220	300	420	582
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	--	17.4	19.0	20.5	21.6	22.2	22.8	23.5	24.2	25.2	--
Corresponding pressure: 21.4 MPa											
at the frame kN	14.4	15.0	16.0	16.5	16.8	17.0	17.0	17.0	16.8	16.5	15.8
Corresponding pressure: 21.4 MPa											

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

Date and location of tests: 24 June 1992
Silsoe Research Institute
Wrest Park
Silsoe

Type of track: Concrete

	Tyre inflation pressure (kPa)	
Height of drawbar above ground	Front	Rear
365 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
3.1 MAXIMUM POWER IN TESTED GEARS													
4L*	31.0	32.3	3.45	2234	12.8	369	2.27	38	80	101	21	59	101
1M*	38.3	32.3	4.27	2228	12.8	355	2.36	42	74	103	21	50	101
2M	45.0	27.5	5.88	2204	7.1	349	2.40	41	75	104	20	50	101
3M	45.6	20.8	7.90	2200	4.7	343	2.44	40	76	101	22	47	101
4M	45.7	15.7	10.50	2206	3.5	340	2.47	42	82	105	19	57	101
1H†	45.9	13.0	12.70	2208	3.0	339	2.47	43	82	105	20	57	101
3.2 FUEL CONSUMPTION 3.2.1 In selected gear, at maximum power at rated speed													
1H	45.9	13.0	12.70	2208	3.0	339	2.47	43	82	105	20	57	101
3.2.1.1 75% of pull at maximum power at rated speed													
1H	34.9	9.7	12.97	2240	2.4	332	2.52	42	75	105	20	55	101
3.2.1.2 50% of pull at maximum power at rated speed													
1H	23.4	6.4	13.13	2252	1.7	386	2.17	40	74	104	20	52	101
3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
2H	35.1	9.7	12.96	1715	2.5	305	2.75	41	78	100	20	63	101
3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
2H	23.4	6.4	13.13	1726	1.9	330	2.54	39	78	98	19	64	101
3.2.2 In selected gear nearest to 7.5 km/h, at maximum power at rated engine speed													
3M	45.6	20.8	7.90	2200	4.7	343	2.44	40	76	101	22	47	101
3.2.2.1 75% of pull at maximum power at rated speed													
3M	35.4	15.7	8.12	2236	3.6	331	2.53	44	75	103	22	46	101
3.2.2.2 50% of pull at maximum power at rated speed													
3M	23.9	10.4	8.26	2248	2.4	375	2.22	44	76	103	22	45	101
3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1													
4M	35.3	15.7	8.12	1706	3.6	298	2.80	41	75	97	20	61	101
3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2													
4M	24.1	10.5	8.25	1716	2.6	314	2.66	40	75	98	20	60	101

* Maximum power limited by wheelslip and bounce

† Highest gear measurable within speed limits of testing equipment

B. SUPPLEMENTARY TEST RESULTS

B1. MAIN POWER TAKE-OFF (540 "Economy")

Date and location of tests: 17 June 1992
Silsoe Research Institute,
Wrest Park, Silsoe, Bedford

Type of dynamometer: Water brake, Heenan & Froude

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						
55.4	2202	837	15.21	18.15	275	3.05
1.2 POWER AT RATED ENGINE SPEED						
55.4	2202	837	15.21	18.15	275	3.05
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
42.2	1419	539	10.84	12.94	257	3.26
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
55.4	2202	837	15.21	18.15	275	3.05
1.4.2 85% of the torque defined in 1.4.1						
47.5	2217	842	12.64	15.08	266	3.15
1.4.3 75% of the torque defined in 1.4.2						
35.6	2223	844	10.03	11.97	282	2.98
1.4.4 50% of the torque defined in 1.4.2						
24.0	2231	847	7.94	9.48	331	2.53
1.4.5 25% of the torque defined in 1.4.2						
11.6	2243	852	5.85	6.98	506	1.66
1.4.6 Unloaded						
0	2279	865	4.12	4.92	--	--

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	
1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEEDS (540 ± 10 rev/min)						
1.5.1 The torque corresponding to maximum power						
42.2	1419	539	10.84	12.94	257	3.26
1.5.2 85% of the torque obtained in 1.5.1						
36.8	1450	551	8.59	10.25	234	3.59
1.5.3 75% of the torque obtained in 1.5.2						
28.2	1476	561	6.67	7.96	236	3.54
1.5.4 50% of the torque obtained in 1.5.2						
19.0	1498	569	5.04	6.02	265	3.16
1.5.5 25% of the torque obtained in 1.5.2						
9.5	1518	576	3.46	4.13	363	2.31
1.5.6 Unloaded						
0	1553	590	2.04	2.43	--	--

No load, maximum engine speed: 2279 rev/min

Torque (equivalent crankshaft) at maximum power: 240.3 Nm

Maximum torque (equivalent crankshaft)
(engine speed 1300 rev/min): 285.0 Nm

Mean atmospheric conditions:

- Temperature 24°C
- Pressure 1029 m bar
- Relative humidity 37%

Maximum temperatures:

- Coolant 90°C
- Engine oil 110°C
- Fuel 54°C
- Engine air intake 26°C

B2. Power lift test - (To manufacturers lift rod setting)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	225 mm	225 mm
Vertical movement	722 mm	945 mm
Maximum corrected force exerted through full range	17.6 kN	14.9 kN
Corresponding pressure of hydraulic fluid	21.4 MPa	21.4 MPa
Moment about rear-wheel axis	16.3 kNm	22.9 kNm
Maximum tilt angle of mast from vertical	--	19 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	-335	-283	-200	-100	0	50	100	200	300	439	610
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	--	17.6	19.0	20.6	21.7	22.3	22.8	23.6	24.2	25.2	--
Corresponding pressure: 21.4 MPa											
at the frame kN	14.9	15.5	16.2	16.8	16.9	17.0	17.0	17.0	17.0	16.6	15.7
Corresponding pressure: 21.4 MPa											

B3. DRAWBAR POWER AND FUEL CONSUMPTION TEST (UNBALLASTED TRACTOR, 2 WHEEL DRIVE)

Date and location of tests: 29 June 1992
Silsoe Research Institute
Wrest Park
Silsoe

Type of track: Concrete

Height of drawbar above ground	Tyre inflation pressure (kPa)	
	Front	Rear
515 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
3.1 MAXIMUM POWER IN TESTED GEARS													
1M*	30.1	25.7	4.21	2234	15.0	373	2.25	41	81	102	25	35	101
2M*	39.6	25.8	5.52	2229	15.0	359	2.33	42	81	103	22	50	101
3M	45.4	21.0	7.79	2209	8.0	342	2.45	44	81	103	22	52	101
4M	45.8	15.9	10.39	2206	6.2	348	2.41	43	81	103	22	52	101
1H†	46.0	13.2	12.56	2202	5.5	341	2.46	46	81	104	22	52	101
3.2 FUEL CONSUMPTION 3.2.1 In selected gear, at maximum power at rated speed													
1H	46.0	13.2	12.56	2202	5.5	341	2.46	46	81	104	22	52	101
3.2.1.1 75% of pull at maximum power at rated speed													
1H	34.8	9.7	12.88	2237	4.6	336	2.49	46	81	104	23	48	101
3.2.1.2 50% of pull at maximum power at rated speed													
1H	23.9	6.6	13.05	2248	3.8	383	2.19	44	81	104	23	49	101
3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
2H	34.6	9.7	12.89	1713	4.5	294	2.85	42	81	95	23	44	101
3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
2H	23.7	6.5	13.06	1720	3.7	318	2.64	42	81	94	23	42	101
3.2.2 In selected gear nearest to 7.5 km/h, at maximum power at rated engine speed													
3M	45.4	21.0	7.79	2209	8.0	342	2.45	44	81	103	22	52	101
3.2.2.1 75% of pull at maximum power at rated speed													
3M	34.8	15.6	8.05	2236	6.2	335	2.50	44	81	104	22	50	101
3.2.2.2 50% of pull at maximum power at rated speed													
3M	23.9	10.5	8.20	2247	4.7	382	2.20	42	81	104	22	51	101
3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1													
4M	35.1	15.7	8.05	1709	6.1	291	2.88	46	81	98	23	40	101
3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2													
4M	23.3	10.2	8.20	1713	4.7	315	2.66	41	81	95	23	40	101

* Maximum power limited by wheelslip and bounce

† Highest gear measurable within speed limits of testing equipment

C. OPTIONAL TESTS

C1. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm	857
Distance forward from the vertical plane containing the axis of the rear wheels, mm	873
Distance from the median plane of the tractor, mm (to left viewed from rear)	9

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Test carried out by: S J Devonshire

Officer in charge: P C Seward

Signed: H M R Proctor — Head of Test Engineering Group

H M R Proctor — for the Director

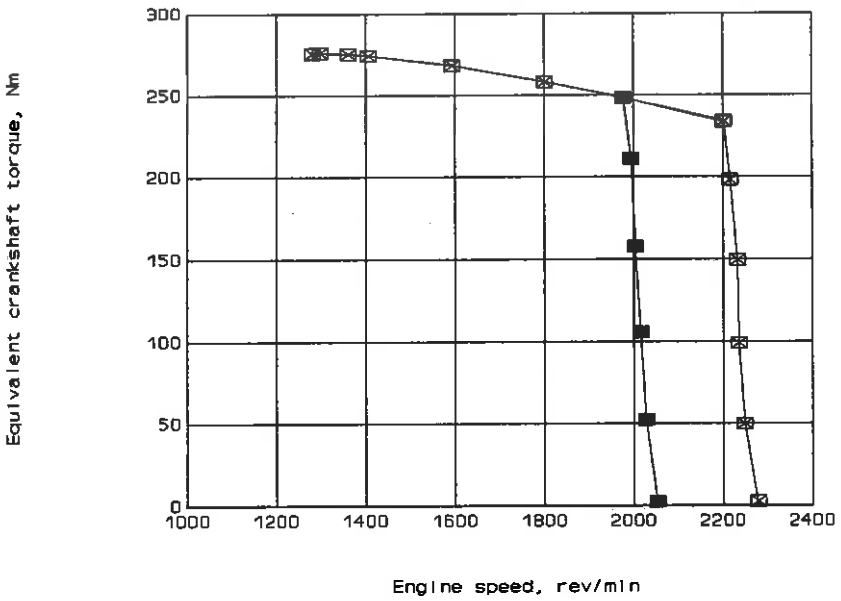
Date: 8/9/92

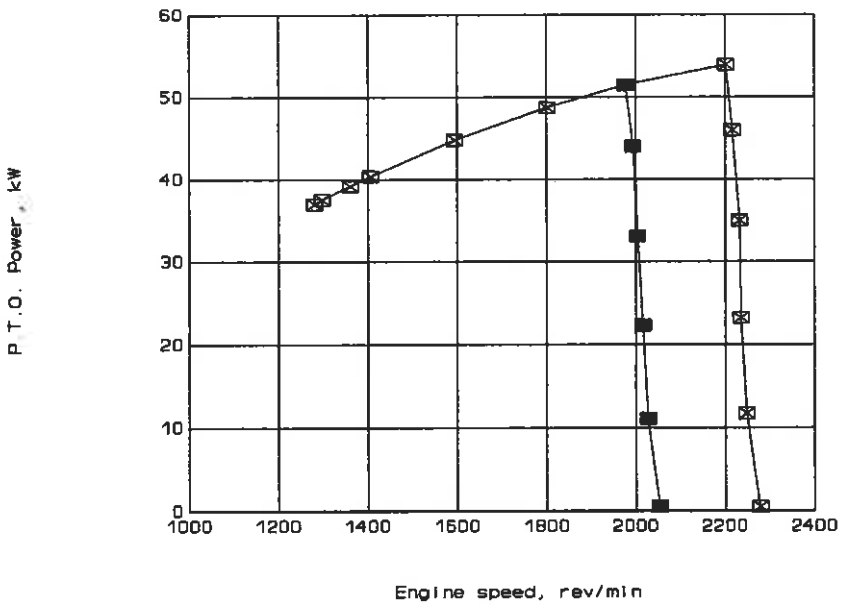
ANNEX 1 MAIN POWER TAKE-OFF CURVES (540)

P.T.O. POWER TEST - MASSEY FERGUSON 382, 4 WHEEL DRIVE (540)

Governor set for maximum power at rated speed ■

Governor set for maximum power at pto speed ■



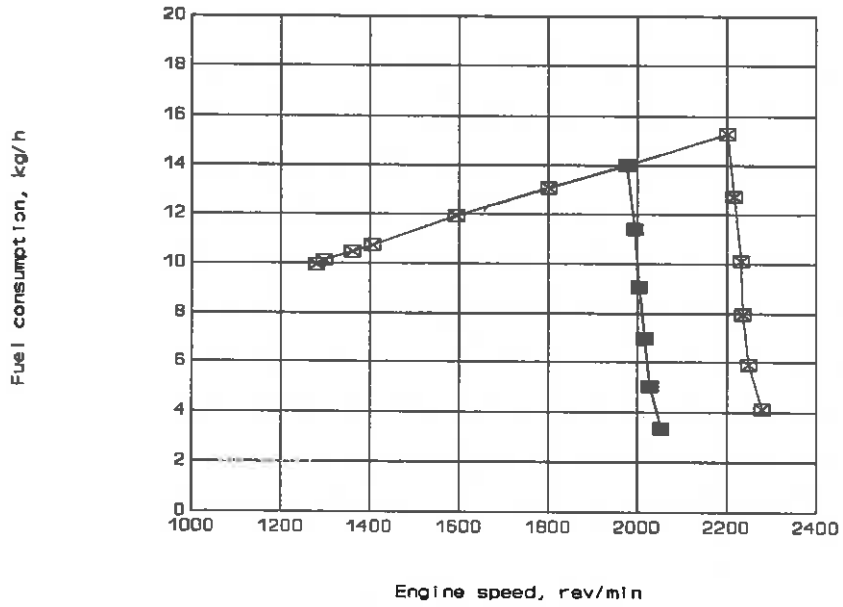


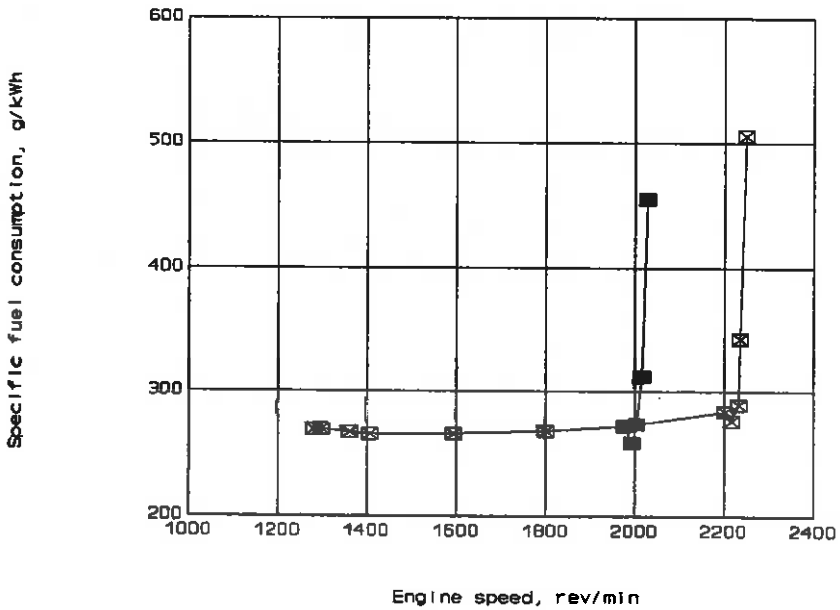
ANNEX 1 MAIN POWER TAKE-OFF CURVES (540)

P.T.O. POWER TEST - MASSEY FERGUSON 382, 4 WHEEL DRIVE (540)

Governor set for maximum power at rated speed ■

Governor set for maximum power at pto speed ■



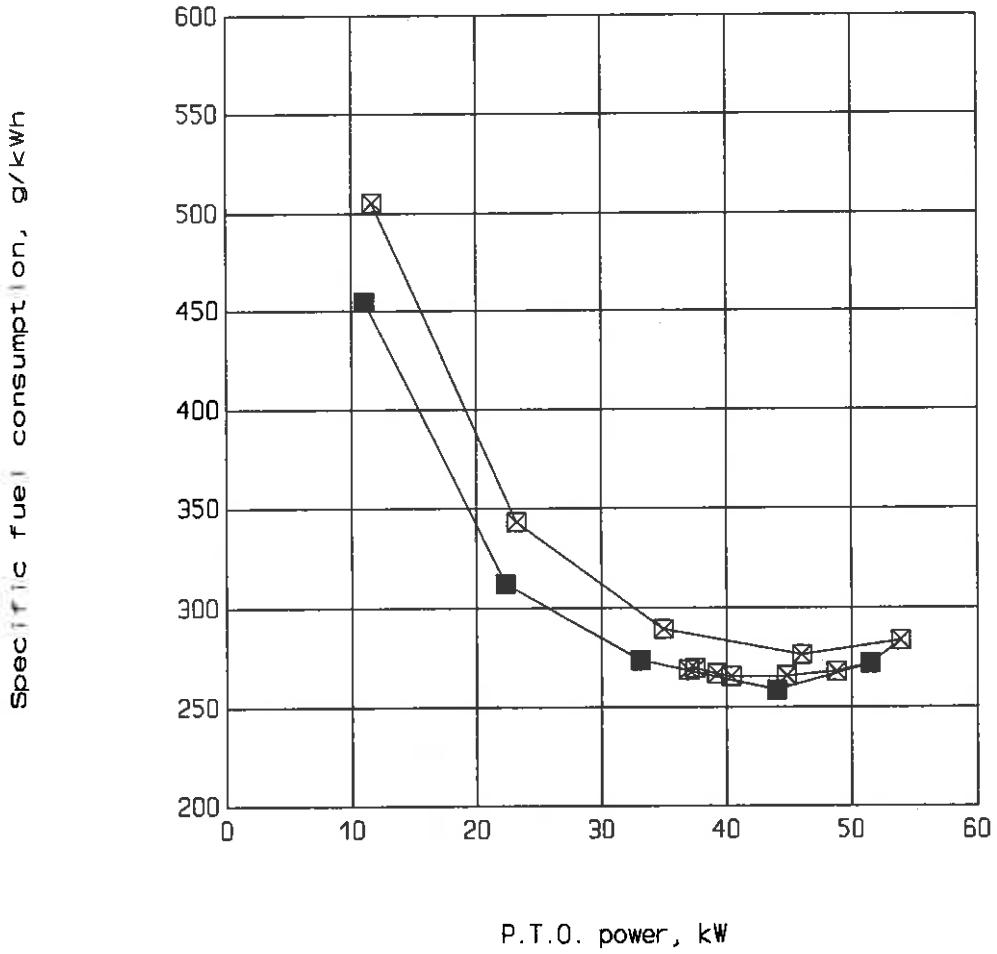


ANNEX 1 MAIN POWER TAKE-OFF CURVES (540)

P.T.O. POWER TEST - MASSEY FERGUSON 382, 4 WHEEL DRIVE (540)

Governor set for maximum power at rated speed ⊠

Governor set for maximum power at pto speed ■

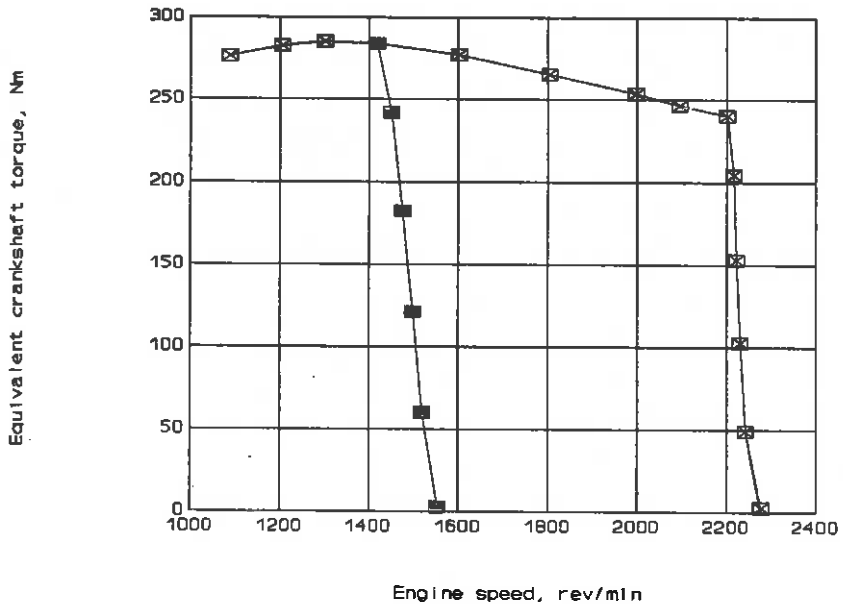


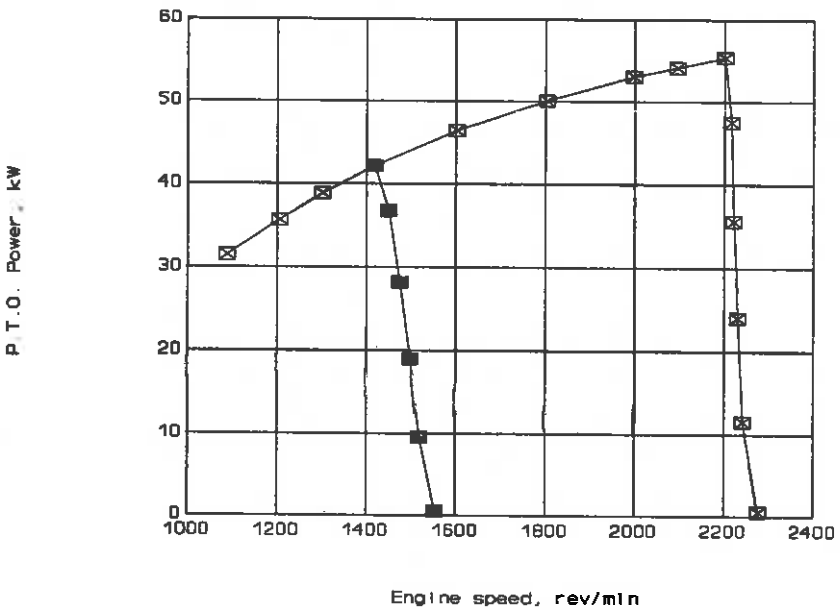
ANNEX 2 MAIN POWER TAKE-OFF CURVES (540 "ECONOMY")

P.T.O. POWER TEST - MASSEY FERGUSON 382, 4 WHEEL DRIVE (540 "ECONOMY")

Governor set for maximum power at rated speed ■

Governor set for maximum power at pto speed ■



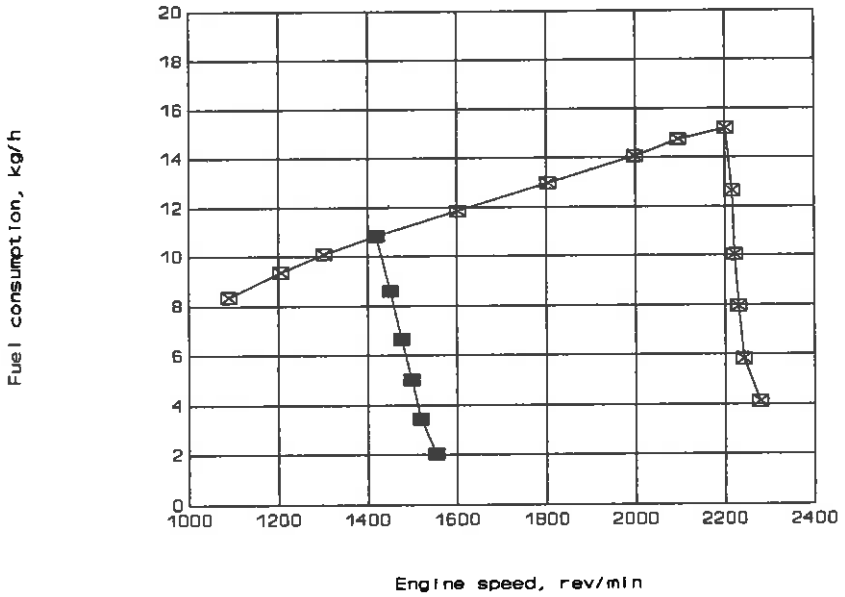


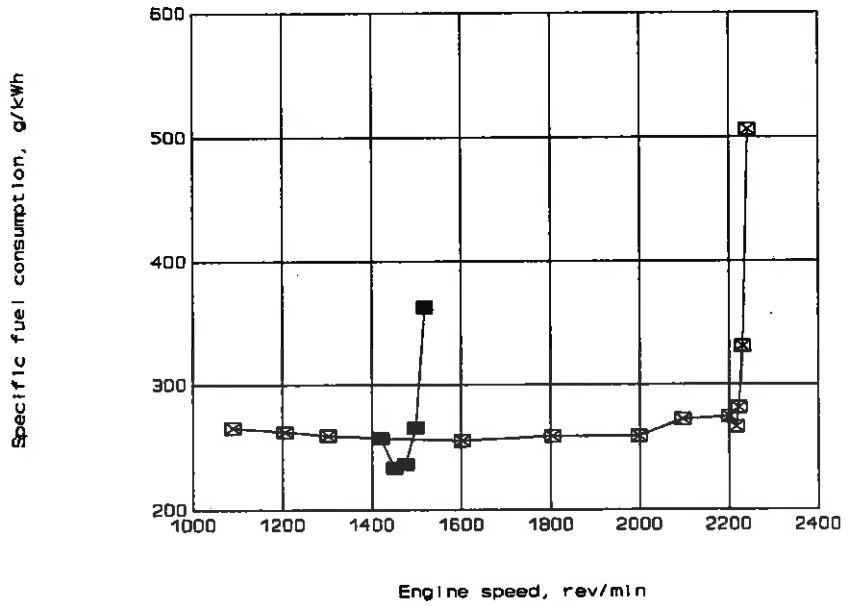
ANNEX 2 MAIN POWER TAKE-OFF CURVES (540 "ECONOMY")

P.T.O. POWER TEST - MASSEY FERGUSON 382, 4 WHEEL DRIVE (540 "ECONOMY")

Governor set for maximum power at rated speed ■

Governor set for maximum power at pto speed ■





ANNEX 2 MAIN POWER TAKE-OFF CURVES (540 "ECONOMY")

P.T.O. POWER TEST - MASSEY FERGUSON 382, 4 WHEEL DRIVE (540 "ECONOMY")

Governor set for maximum power at rated speed ■

Governor set for maximum power at pto speed ■

