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

Ford New Holland 7740 (FA51) Four-Wheel Drive Tractor with 12-speed Synchromesh Transmission



Manufactured by: Ford New Holland Ltd
Basildon
Essex
England

Submitted for test by: The manufacturer

Report No: 759

Date: September 1992

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Tractor manufacturer's name and address:	Ford New Holland Ltd Basildon, Essex, England
Location of tractor assembly:	Basildon, Essex
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer
Place of running in:	Basildon, Essex
Duration of running in:	140 hours
Location of test:	Silsoe Research Institute Wrest Park, Silsoe, Bedford, England

I. SPECIFICATION OF TRACTOR

Tractor

Make:	Ford New Holland
Model:	7740 (FA51)
Type:	Four wheel drive
Serial No:	BD05915
1st Serial No:	BC80972

Engine

Make:	Ford New Holland (PowerStar™)
Model:	PA 304 CID TC
Type:	4 stroke direct injection turbocharged diesel
Serial No:	PA335116

Cylinders

Number/disposition:	4 vertical inline
Bore/stroke:	111.8 mm/127.0 mm
Capacity:	4987 cm^3
Compression ratio:	17.5:1
Arrangement of valves:	Overhead
Cylinder liners:	None, Monobloc construction

Supercharging

Make:	Garrett Air Research
Model:	T250
Type:	Exhaust driven
Pressure:	94.8 kPa

Fuel system

Fuel feed system:	Gravity
Make, type and model of fuel filter:	Plastic strainer in tank and CAV paper element filter with sediment bowl and water trap between tank and injection pump
Capacity of fuel tank:	103.4 ℓ
Make, type and model of injection pump:	Lucas CAV DPS-DSA 996
Serial No:	07719 LJG
Manufacturer's production setting of injection pump:	
. Flow rate:	87.3 - 92.7 mm^3 per stroke at 850 rev/min pump speed and full load
. Timing:	Delivery starts 10° before T.D.C.
Make, type and model of injectors:	CAV multihole JB 6801135 nozzle
Injection pressure:	240 - 248 Bar

Governor

Make:	CAV
Model:	None
Type:	Mechanical incorporated in fuel injection pump
Governed range of engine speed:	700 rev/min to 2245 rev/min
Rated engine speed:	2100 rev/min Reduced to 2070 rev/min in EEC and EFTA countries to comply with road speed requirements

Air cleaner

Pre-cleaner:	None
Main cleaner:	
. Make:	Locker Air Maze
. Type:	Dry paper element (Exhaust Aspirated)
. Model:	3 stage
. Location of air intake:	Under bonnet above and forward of radiator
Maintenance indicator:	Warning light on instrument panel

Lubrication system

Type of feed pump:	Forced feed from eccentric rotor pump
Type of filter:	Metal mesh strainer in sump and full flow replaceable paper element filter
Number:	1

Cooling system

Type of coolant:	Water and antifreeze 50% solution
Type of pump:	Centrifugal impeller
Specification of fan:	Belt driven puller with thermally controlled viscous clutch
Number of fan blades:	5
Fan diameter:	480 mm
Coolant capacity:	16 ℓ
Type of temperature control:	Thermostat
System pressure:	90 kPa

Starting system

Make:	Bosch
Model:	JF
Type:	Electrical, positive engagement, solenoid operated
Starter motor power rating:	3.1 kW
Cold starting aid:	CAV Thermostart
Safety device:	Only operable when all gear levers are in neutral and PTO switch is in 'off' position

Electrical system

Voltage:	12 V
Generator:	
. Make:	Magnetti Marelli
. Model:	A 127 I
. Type:	Belt driven alternator
. Power:	100 amps at 6000 rev/min
Batteries:	Lucas lead acid
. Rating:	107 Ah at 20 hours rating

Exhaust system

Make:	Nelson Burgess
Model:	None
Type:	Horizontal silencer under bonnet with vertical stack pipe
Location:	Under left-hand front bonnet
Height of outlet above ground:	2891 mm

Transmission to wheels

Clutch

Make:	Transmission only
Model:	AP
Type:	None
Number of plates:	Single dry plate
Diameter of plates:	1
Method of operation:	330 mm
	Hydraulic via foot pedal

Gear box

Make:	Ford New Holland (Synchroshift™)
Model:	12 x 12 Synchromesh
Type:	Mechanical manual synchromesh operation, 4-speed and 3 ranges selected with two side mounted levers. A third side mounted lever selects forward or reverse for each combination
Number of gears:	12 forward, 12 reverse
Available options:	16 x 16 Power shift

Rear axle and final drives

Make:	Ford New Holland
Model:	None
Type:	Crown wheel and pinion with differential and epicyclic reduction gear final drive

Differential lock:

. Type:	Mechanical
. Method of engagement:	Electro-hydraulic actuation in response to signal from switch on right hand control panel
. Method of disengagement:	Via panel switch or in response to electrical signal from brakes on application

Front axle and final drives

Make:	Carraro
Model:	709/S
Type:	Crown wheel and pinion with differential and epicyclic reduction gear final drives

Differential lock:

. Type:	Limited slip
. Method of engagement:	Automatic
. Method of disengagement:	Automatic

Total ratios and travelling speeds

Gear	Group No	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at ratedengine speed:*	
			2100 rev/min km/h	2070 rev/minϕ km/h
Forward				
1	L	324.45	2.00	1.97
2	L	222.97	2.91	2.87
3	L	164.25	3.95	3.90
4	L	106.58	6.09	6.00
1	M	143.22	4.53	4.47
2	M	98.42	6.60	6.50
3	M	72.50	8.95	8.83
4	M	47.04	13.80	13.60
1	H	65.00	9.98	9.84
2	H	44.67	14.53	14.33
3	H	32.91	19.73	19.45
4	H	21.35	30.40	29.97
Reverse				
1	L	316.34	2.05	2.02
2	L	217.39	2.99	2.94
3	L	160.15	4.05	4.00
4	L	103.91	6.25	6.16
1	M	139.64	4.65	4.58
2	M	95.96	6.76	6.67
3	M	70.69	9.18	9.05
4	M	45.87	14.15	13.95
1	H	63.37	10.25	10.10
2	H	43.55	14.91	14.69
3	H	32.08	20.24	19.95
4	H	20.82	31.19	30.74

L = Low range M = Mid range H = High range

(*) Calculated with a tyre dynamic radius index of 820 mm (ISO 4251/1-1984)

Number of revolutions of front wheels for one revolution of rear wheels: 1.3442

(ϕ) Restricted to 2070 rev/min in EEC and EFTA countries.

Power take-off

Main power take-off

Type:	Independent
Method of engagement:	Electro - hydraulically operated multi-plate clutch in response to signal from switch on right hand control panel
Number of shafts:	1, (can be exchanged to give either 6 or 21 splines)
Method of changing power take-off speeds:	
Two speed Shiftable (fitted)	Manually by hand lever in cab

Clutch

Make:	Ford New Holland
Model:	None
Type:	Wet multiplate
Number of plates:	5
Diameter of plates:	148.6 mm

Two speed shiftable power take-off
(Fitted for test)

	540 rev/min	1000 rev/min
Location:	Rear of tractor	Rear of tractor
Diameter of power take-off shaft:	34.9 mm	34.9 mm
Number of splines:	6 or 21	6 or 21
Height above ground:	773 mm	773 mm
Distance from the median plane of the tractor:	Central	Central
Distance behind rear wheel axis:	457 mm	457 mm
Pto speed at rated engine speed:	600 rev/min at 2100 591 rev/min at 2070	999 rev/min at 2100 985 rev/min at 2070
Engine speed at standard power take-off speed:	1890 rev/min	2103 rev/min*
Ratio of rotation speeds:	3.50:1	2.103:1
Power restriction and maximum torque:	None	None
Direction of rotation (viewed from behind tractor):	Clockwise	Clockwise

* (also provides Economy 540 rpm pto speed at 1135 engine rpm)

Optional PTO systems available (not fitted for test)

Two speed power take-off proportional to engine speed selected by exchanging shafts

540 rev/min

Location:	Rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	6
Height above ground:	773 mm
Distance from the median plane of the tractor:	Central
Distance behind rear wheel axis:	457 mm
Pto speed at rated engine speed:	600 rev/min at 2100 591 rev/min at 2070
Engine speed at standard power take-off speed:	1890 rev/min
Ratio of rotation speeds:	3.50:1
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
Height above ground:	773 mm
Distance from the median plane of the tractor:	Central
Distance behind rear wheel axis:	457 mm
Pto speed at rated engine speed:	1025 rev/min at 2100 1010 rev/min at 2070
Engine speed at standard power take-off speed:	2049 rev/min
Ratio of rotation speeds:	2.049:1
Power restriction and maximum torque:	None
Direction of rotation (viewed from behind tractor):	Clockwise

Power lift

Make:	Sauer Sundstrand
Model:	None
Type:	Gear type, fixed displacement closed centre load sensing system
Type and number of cylinders:	1 located inside of transmission housing plus the option of an additional 1 or 2 externally mounted, single acting (2 fitted for test)
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	18.0 - 18.7 MPa
Opening pressure of cylinder safety valve:	19.7 MPa
Lift pump type:	None
Transmission between pump and engine:	Gear driven from pto shaft, independent of main and pto clutches
Type and number of filters:	1, replaceable paper element filter canister
Site of oil reservoir:	Rear axle housing
Type, number and location of tapping points:	1, Front face of hydraulic top cover
Maximum volume of oil available to external cylinders:	18.2 ℓ

Auxiliary Hydraulic System

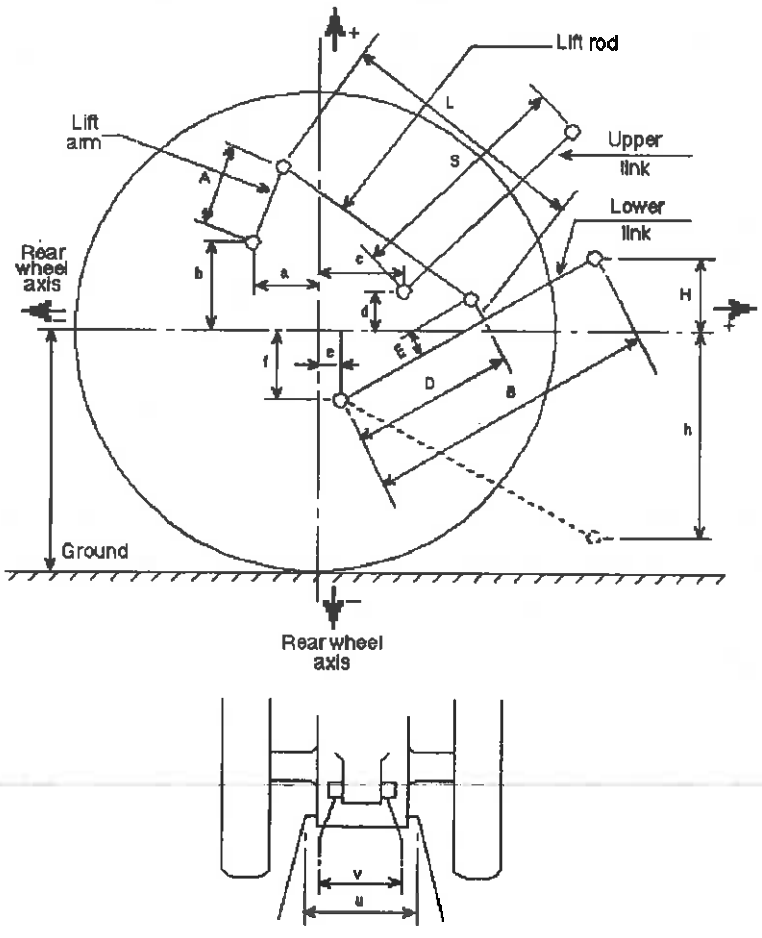
Make:	Sauer Sundstrand
Model	None
Type:	Gear type
Relief valve pressure setting:	18.0 - 18.7 MPa
Lift pump type:	None
Transmission between pump and engine:	Direct drive from camshaft gear
Type and number of filters:	1, replaceable paper element canister
Site of oil reservoir:	Rear axle housing

Alternative power lift system available (not fitted for test)

Make:	Sauer Sundstrand
Model:	None
Type:	Piston type, variable displacement closed centre load sensing system
Type and number of cylinders:	1 located inside of transmission housing plus the option of an additional 1 or 2 externally mounted, single acting
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	19.0 - 19.7 MPa
Opening pressure of cylinder safety valve:	19.7 MPa
Lift pump type:	
Transmission between pump and engine:	Gear driven from pto shaft, independent of main and pto clutches
Type and number of filters:	3, replaceable paper element filter canisters
Site of oil reservoir:	Rear axle housing
Type, number and location of tapping points:	1, Front face of hydraulic top cover
Maximum volume of oil available to external cylinders:	18.2 ℓ

Three-point linkage

Category:	2 to ISO standard 730-1:1990
Category adaptor:	None
Controls:	Draught or position control sensed through top link. Optional - Electronic draught / position control sensed through lower link.



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, 610 mast height)

(B2.3 ISO mast height from 730/3-1982 CAT 2)

			Dimensions or range	Setting used in test		
				Main test	B2.2	B2.3
Length of lift arms:		(A)	254	254	254	254
Length of lower links:		(B)	915	915	915	915
Distance of lift arm pivot point from rear wheel centre line:	horizontally: vertically:	(a) (b)	102 341	102 341	102 341	102 341
Horizontal distance between the two lower link points:		(u)	527	527	527	527
Horizontal distance between the two lift arm end points:		(v)	610	610	610	610
Length of upper link:		(S)	610 - 830	725	725	680
Distance of upper link pivot point from rear wheel centre line:	horizontally: vertically:	(c) (d)	325 149 - 205	325 149	325 149	325 205
Distance of lower link pivot point from rear wheel centre line:	horizontally: vertically:	(e) (f)	102 229	102 229	102 229	102 229
Distance of lower link points to lift rod pivot points on lower link centre line:	horizontally: vertically:	(D) (E)	412 - 520 on centre line	466 on centre line	466 on centre line	520 on centre line
Length of lift rods:		(L)	743-879	825	790	743
ISO mast height				610	610	510
Height of lower hitch points (*) relative to the rear wheel centre line, situated 820 mm(+) above the ground level:						
- in low position		(h)	308 to 794	620	540	275
- in high position		(H)	-77 to 224	40	100	215
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 to ISO 4251/1-1984

+ or 749 mm for supplementary test (B2.2)

Swinging drawbar	Drawbar as tested	Pick up hitch
(Incorporated in automatic pick-up hitch with hook on opposite end and selectable by reversing drawbar)		
Type:	Clevis	Hook
Height above ground, unballasted maximum:	543 mm	517 mm
minimum:	488 mm	—
Type of adjustment:	Inverting drawbar	None
Distance of hitch point from rear-wheel axis,horizontally:	714 mm - 865 mm	482 mm
Distance of hitch point from power take-off shaft ends:		
. Vertically:	230 mm - 285 mm	256 mm
. Horizontally:	257 mm - 408 mm	25 mm
Lateral adjustment (centre of clevis):		
. Right-hand:	130 mm - 255 mm	None
. Left-hand:	130 mm - 255 mm	None
Distance of pivot point from rear axles horizontally:	176 mm - 376 mm	—
Width of clevis:	66 mm	—
Diameter of drawbar pin hole:	27 mm	—
Maximum vertical permissible load - Drop down type:	2182 kg	2722 kg

Trailer Hitch

Type: Not fitted

Linkage Drawbar

Type: Not fitted

Front Towing Hitch

Type:	Clevis in front weight frame
Height above ground:	918 mm
Width of clevis:	60 mm
Diameter of pin hole:	34 mm

Steering

Make:	Ford New Holland
Model:	None
Type:	Hydrostatic
Method of operation:	
. Pump:	Sauer Sundstrand
. Motor:	Danfoss OSPC-150-OR
. Ram:	Double acting balanced cylinder acting on both steering arms
. Filter:	Replaceable paper element filter, integral with pump
Working pressure:	17.0 mPa - 17.8 mPa

Brakes

Service brake

. Make:	Girling
. Model:	None
. Type:	Oil-immersed multiplate discs
Method of operation:	Independent or combined pedal, hydraulically actuated
Trailer braking take-off:	Hydraulic connector to ISO 5676

Parking brake

Type:	Mechanical linkage coupled to service brakes via cables
Method of operation:	Hand lever with ratchet

Wheels

Number: 4

. Front: 2 steering and driving

. Rear: 2 driving

Wheelbase: 2362 mm

Track width adjustment:

	Minimum, mm	Maximum, mm	Adjustment method
Front	1392	2142	Reversing wheels and offset lug rims
Rear	1628	2028	Reversing wheels and offset lug rims

PROTECTIVE STRUCTURE

Make: Ford New Holland

Model: 582 Mk SK90

Type: Cab safety frame

Manufacturer's name and address: Sicurcab SRL, Torino, Italy

Protective device:

. Rollguard: Safety Cab

. Tiltable/Not tiltable: Non tiltable

OECD approval number: CSS 1329/21

DRIVER'S SEAT

Make/Model/Type: Grammer DS85H/90A

Type of suspension: Low frequency scissor, mechanical

Type of damping: Double acting, hydraulic

Range of adjustment:

. Longitudinal: ± 75 mm

. Vertical: ± 40 mm

LIGHTING

Unrestricted beam angle of headlight in plan view: 140°

	Height above ground of centre, mm	Size, mm	Distance from outside edge to median plane of tractor, mm
Headlight	1228	150 x 100	227
Sidelights	1755	115 x 30	769
Rear lights	1743	165 x 35	984
Axle reflectors	825	120 x 40	591
Cab reflectors	1643	165 x 30	984

II. TEST CONDITIONS

Overall dimensions (overall width at 1706 measured front track, 2194mm)

Length mm	Width		Height at top of	
	Minimum mm	Maximum mm	Protective structure mm	Exhaust pipe mm
4100	2095	2581	2766	2891

Ground clearance (unballasted tractor) 432 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	1794	1809	2194	2209
Rear	2594	2654	2819	2879
Total	4388	4463	5013	5088

* 3 weights per rear wheel and 8 front frame weights

Ballast

	Weights		Water, kg
	Number	Total mass, kg	
Front	8	323	None
Rear	6	302	None
Optional	None	None	None

Tyres and track width specification

	Front	Rear
Tyres		
. dimensions	14,9 R 28	18.4 R 38
. ply rating	128A8	146A8
. type	Radial	Radial
Maximum load (tyre manufacturer's), kg	1926	3210
maximum load (tractor manufacturer's), kg	1926	3210
inflation pressure (tyre manufacturer's), bar	1.6	1.6
dynamic radius index, mm	640	820
. Chosen track width (manufacturer's nominal), mm	1706	1727

Oils and lubrication

Capacity and change interval

	Capacity ℓ	Oil change h	Filter change h
Engine	11.4	300	300
Front axle	6.2	1200	None
Final drive (front)	3.0	1200	None
Rear axle	56.8	1200	300
Brakes	0.5	Top up	None
Gearbox Hydraulic system Final drives (rear) Steering	Integral with rear axle		

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 g/cm^3 at 15°C

Oils	Recommended	Used during test
Engine oil		
Type:	SAE 15W/40	As recommended
Viscosity:	11.5 cSt at 100°C	
Classification:	L-2104-C	
Transmission oils		
Type:	SAE 80W	As recommended
Viscosity:	9 cSt at 100°C	
Classification:	L-2105	
Rear final drives		
Type:	SAE 80W	As recommended
Viscosity:	9 cSt at 100°C	
Classification:	L-2105	
Front differential and final drives		
Type:	SAE 80W	As recommended
Viscosity:	9 cSt at 100°C	
Classification:	L-2105	
Hydraulic brakes		
Type:	Ford ESN-M6C59-A	As recommended
Viscosity:	6 cSt at 100°C	
Classification:	No equivalent	
Hydraulic fluid		
Type:	SAE 80W	As recommended
Viscosity:	9 cSt at 100°C	
Classification:	L-2105	
Steering oil		
Type:	SAE 80W	As recommended
Viscosity:	9 cSt at 100°C	
Classification:	L-2105	
Recommended grease:	Lithium based	As recommended
Number of lubrication points:	12	

III. TEST RESULTS

A. COMPULSORY TEST RESULTS

1. MAIN POWER TAKE-OFF

Date and location of tests: 11 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						
64.3	2071	985	15.81	18.87	246	3.41
1.2 POWER AT RATED ENGINE SPEED						
64.3	2071	985	15.81	18.87	246	3.41
1.3 STANDARD POWER TAKE-OFF SPEED (1000 ± 10 rev/min)						
--	--	--	--	--	--	--
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
64.3	2071	985	15.81	18.87	246	3.41
1.4.2 85% of the torque defined in 1.4.1						
55.8	2113	1005	14.48	17.28	259	3.23
1.4.3 75% of the torque defined in 1.4.2						
42.0	2131	1013	11.90	14.20	283	2.96
1.4.4 50% of the torque defined in 1.4.2						
28.4	2149	1022	9.57	11.42	336	2.49
1.4.5 25% of the torque defined in 1.4.2						
14.1	2155	1024	6.95	8.29	493	1.70
1.4.6 Unloaded						
0	2198	1045	4.63	5.53	--	--

No load, maximum engine speed: 2198 rev/min

Torque (equivalent crankshaft) at maximum power: 296.3 Nm

Maximum torque (equivalent crankshaft)
(engine speed 1260 rev/min): 374.2 Nm

Mean atmospheric conditions:

- Temperature 23°C
- Pressure 1012 m bar
- Relative humidity 62%

Maximum temperatures:

- Coolant 85°C
- Engine oil 111°C
- Fuel 62°C
- Engine air intake 28°C

2. HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 19 June 1992

2.1 Hydraulic power test

Sustained pressure with relief valve open: 18.2 MPa

Pump delivery rate at minimum pressure: 36.4 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	29.2	16.4	8.0
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	28.7	17.0	8.1

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	660 mm	880 mm
Maximum corrected force exerted through full range	39.8 kN	27.7 kN
Corresponding pressure of hydraulic fluid	16.4 MPa	16.4 MPa
Moment about rear-wheel axis	40.5 kNm	45.1 kNm
Maximum tilt angle of mast from vertical	--	12 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	-486	-391	-291	-141	-41	0	59	159	209	269	394
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	--	39.8	40.8	42.5	43.3	43.3	43.3	43.1	43.0	42.8	--
Corresponding pressure: 16.4 MPa											
at the frame kN	31.9	32.4	32.9	33.0	32.6	32.5	32.2	31.2	30.8	30.0	27.7
Corresponding pressure: 16.4 MPa											

3. DRAWBAR POWER AND FUEL CONSUMPTION TEST (UNBALLASTED TRACTOR, 4 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
470 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													
3L*	41.5	42.8	3.49	2115	14.5	342	2.45	24	83	107	23	62	101.0
1M*	47.7	43.0	3.99	2104	14.3	327	2.56	24	82	106	21	64	101.0
4L	54.4	34.1	5.7	2073	6.8	294	2.85	25	84	107	25	55	101.0
2M	54.0	30.8	6.32	2079	5.6	297	2.82	23	83	106	20	71	101.0
3M	54.0	22.3	8.70	2073	3.9	300	2.80	22	82	99	19	73	101.0
1H	54.9	20.4	9.69	2068	3.9	291	2.88	26	84	109	24	59	101.0
4M	53.4	14.2	13.58	2077	2.7	300	2.79	26	83	108	24	57	101.0
3.2 FUEL CONSUMPTION 3.2.1 In selected gear, at maximum power at rated speed													
1H	54.9	20.4	9.69	2068	3.9	291	2.88	26	84	109	24	59	101.0
3.2.1.1 75% of pull at maximum power at rated speed													
1H	42.5	15.3	10.01	2117	3.0	316	2.65	27	82	105	26	53	100.9
3.2.1.2 50% of pull at maximum power at rated speed													
1H	28.4	10.1	10.17	2132	2.2	386	2.17	28	83	106	26	53	100.9
3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
4M	42.5	15.2	10.03	1537	3.0	268	3.13	26	83	105	27	50	100.9
3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
4M	28.1	10.0	10.15	1541	2.1	300	2.79	29	81	102	27	50	100.9
3.2.2 In selected gear nearest to 7.5 km/h, at maximum power at rated engine speed													
2M	54.0	30.8	6.32	2079	5.6	297	2.82	23	83	106	20	71	101.0
3.2.2.1 75% of pull at maximum power at rated speed													
2M	41.7	23.0	6.52	2118	4.3	319	2.62	28	81	105	26	51	100.9
3.2.2.2 50% of pull at maximum power at rated speed													
2M	28.7	15.5	6.66	2133	3.1	379	2.21	28	82	106	27	51	100.9
3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1													
3M	41.7	23.0	6.53	1562	4.2	268	3.13	29	83	102	27	50	100.9
3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2													
3M	28.3	15.3	6.66	1570	3.0	293	2.86	29	81	101	27	50	100.9

aximum power limited by wheelslip and bounce

TEST RESULTS

B. SUPPLEMENTARY TEST RESULTS

B.1. MAIN POWER TAKE-OFF (Optional 540 rev/min shaft)

Date and location of tests: 11 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						
64.2	2075	593	15.78	18.83	246	3.41
1.2 POWER AT RATED ENGINE SPEED						
64.2	2075	593	15.78	18.83	246	3.41
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
61.9	1894	541	14.44	17.23	233	3.59
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
64.2	2075	593	15.78	18.83	246	3.41
1.4.2 85% of the torque defined in 1.4.1						
55.4	2107	602	14.41	17.20	260	3.22
1.4.3 75% of the torque defined in 1.4.2						
42.1	2135	610	11.85	14.14	282	2.97
1.4.4 50% of the torque defined in 1.4.2						
28.0	2144	612	9.54	11.38	340	2.46
1.4.5 25% of the torque defined in 1.4.2						
14.3	2172	620	6.95	8.29	486	1.72
1.4.6 Unloaded						
0	2198	627	4.60	5.49	--	--

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						
61.9	1894	541	14.44	17.23	233	3.59
1.5.2 85% of the torque obtained in 1.5.1						
52.9	1913	546	12.96	15.47	245	3.42
1.5.3 75% of the torque obtained in 1.5.2						
40.5	1939	554	10.65	12.71	263	3.18
1.5.4 50% of the torque obtained in 1.5.2						
27.3	1962	560	8.46	10.10	310	2.71
1.5.5 25% of the torque obtained in 1.5.2						
13.4	1963	560	5.92	7.07	441	1.90
1.5.6 Unloaded						
0	2015	575	3.88	4.63	--	--

No load, maximum engine speed: 2198 rev/min

Torque (equivalent crankshaft) at maximum power: 295.4 Nm

Maximum torque (equivalent crankshaft) * Nm

Mean atmospheric conditions:

- Temperature 23°C
- Pressure 1013 m bar
- Relative humidity 54%

Maximum temperatures:

- Coolant 85°C
- Engine oil 110°C
- Fuel 62°C
- Engine air intake 28°C

* Maximum torque of 374.2 Nm measurable within limits of test equipment. Speed for maximum torque measured on 1000 rev/min shaft was 1260 rev/min.

B.2. HYDRAULIC POWER TEST AND LIFTING FORCE

Date of tests: 7 August 1992

B2.1. Hydraulic power test

Sustained pressure with relief valve open: 18.2 MPa

Pump delivery rate at minimum pressure: 57.3 l/min

	Flow rate l/min	Pressure MPa	Power kW
Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power	48.9	16.4	13.4
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	47.5	17.0	13.5

Tapping point used for test: Remote hydraulic port

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

B.2.2 HYDRAULIC POWER LIFT TESTS - (To ISO 730-1:1990, alternative rear tyre size 13.6 R34)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement	640 mm	870 mm
Maximum corrected force exerted through full range	41.9 kN	27.5 kN
Corresponding pressure of hydraulic fluid	16.4 MPa	16.4 MPa
Moment about rear-wheel axis	42.6 kNm	44.7 kNm
Maximum tilt angle of mast from vertical	--	15 degrees

Linkage settings for test - see Table 2.1 and Figure 2.1

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	-396	-311	-191	-91	-41	0	59	159	259	329	474
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	--	41.9	43.0	44.0	44.5	44.7	44.8	44.7	44.7	44.2	--
Corresponding pressure: 16.4 MPa											
at the frame kN	32.9	33.3	34.0	34.0	33.8	33.7	33.3	32.3	31.1	30.2	27.5
Corresponding pressure: 16.4 MPa											

B.2.3. HYDRAULIC POWER LIFT TESTS - (To manufacturers lift rod setting and original tyres)

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	545 mm	545 mm
Vertical movement	490 mm	625 mm
Maximum corrected force exerted through full range	50.7 kN	33.1 kN
Corresponding pressure of hydraulic fluid	16.4 MPa	16.4 MPa
Moment about rear-wheel axis	51.6 kNm	53.9 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	-51	-46	0	59	109	159	209	309	359	444	574
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	--	54.2	54.3	54.6	54.5	54.3	54.0	53.1	52.5	50.7	--
Corresponding pressure: 16.4 MPa											
at the frame kN	48.8	48.5	47.7	46.4	45.6	44.7	43.4	41.2	40.0	37.8	33.1
Corresponding pressure: 16.4 MPa											

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

Date and location of tests: 7 July 1992
Silsoe Research Institute
Wrest Park
Silsoe

Type of track: Concrete

	Tyre inflation pressure (kPa)	
Height of drawbar above ground	Front	Rear
440 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													
1L*	25.4	51.1	1.79	2157	14.9	420	1.99	58	83	105	19	66	101.7
2L*	36.8	50.5	2.62	2162	14.5	364	2.30	59	83	108	18	68	101.7
3L*	49.1	50.6	3.49	2137	15.1	332	2.52	59	86	109	18	68	101.7
1M	54.8	46.8	4.21	2087	8.8	298	2.81	57	83	108	19	57	101.8
4L	55.6	34.3	5.84	2072	5.1	290	2.89	54	83	105	19	64	101.7
2M	55.3	31.2	6.38	2080	4.6	291	2.88	57	84	109	16	70	101.8
3M	54.7	22.5	8.73	2074	3.5	294	2.85	58	84	108	19	61	101.8
1H	55.2	20.3	9.77	2076	3.3	292	2.87	58	83	108	19	62	101.7
4M	53.0	14.0	13.64	2081	2.6	305	2.75	59	82	107	19	60	101.7
3.2 FUEL CONSUMPTION													
3.2.1 In selected gear, at maximum power at rated speed													
1H	55.2	20.3	9.77	2076	3.3	292	2.87	58	83	108	19	62	101.7
3.2.1.1 75% of pull at maximum power at rated speed													
1H	43.4	15.3	10.23	2158	2.7	328	2.56	58	83	108	19	60	101.7
3.2.1.2 50% of pull at maximum power at rated speed													
1H	29.2	10.1	10.38	2175	2.0	390	2.15	59	82	108	19	60	101.7
3.2.1.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.1													
4M	43.4	15.3	10.20	1556	2.5	272	3.08	58	82	107	19	62	101.7
3.2.1.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.1.2													
4M	29.6	10.2	10.40	1577	1.9	302	2.78	56	81	103	19	64	101.7
3.2.2 In selected gear nearest to 7.5 km/h, at maximum power at rated engine speed													
2M	55.3	31.2	6.38	2080	4.6	291	2.88	57	84	109	16	70	101.8
3.2.2.1 75% of pull at maximum power at rated speed													
2M	43.9	23.6	6.69	2160	3.6	320	2.61	54	82	101	19	64	101.7
3.2.2.2 50% of pull at maximum power at rated speed													
2M	29.8	15.8	6.82	2177	2.6	377	2.22	55	82	103	19	64	101.7
3.2.2.3 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.1													
3M	43.8	23.6	6.70	1592	3.6	270	3.11	54	81	101	19	65	101.7
3.2.2.4 Next higher gear at reduced engine speed; same pull and travelling speed as in 3.2.2.2													
3M	29.6	15.7	6.80	1600	2.6	296	2.83	54	80	102	19	62	101.7

* Maximum power limited by wheelslip

Repairs and adjustments during tests: None

Remarks: None

Test carried out by: E Nigro

Officer in charge: P C Seward

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

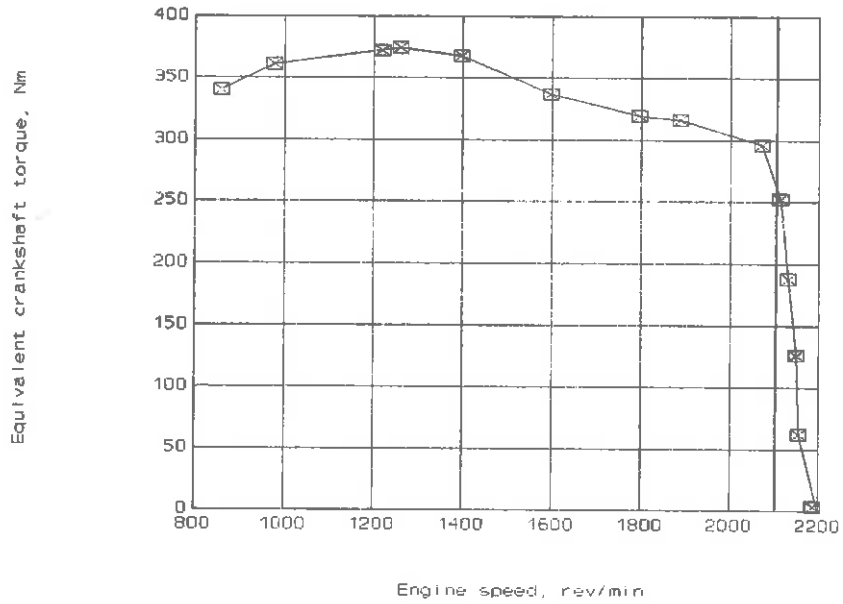
H M R Proctor — for the Director

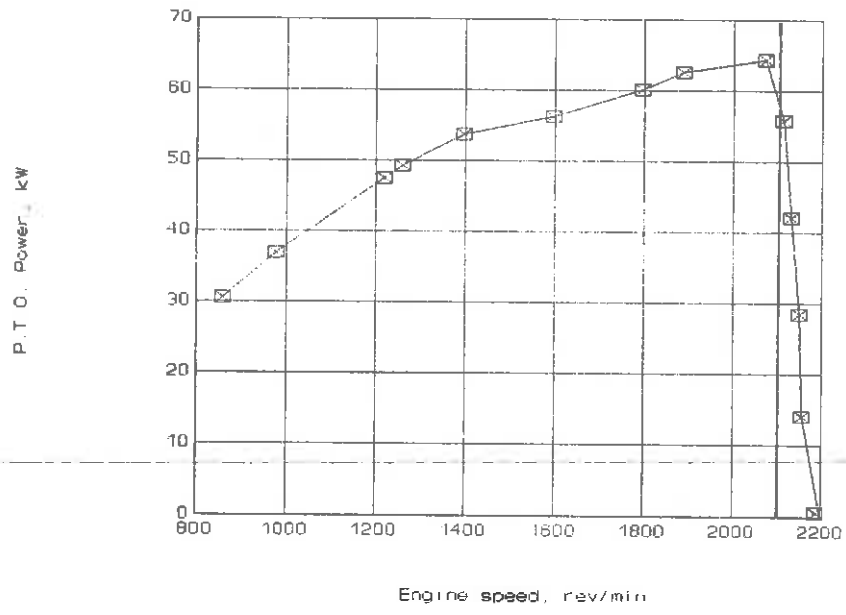
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ANNEX I MAIN POWER TAKE OFF CURVES

P.T.O. POWER TEST - FORD 7740, 4 WHEEL DRIVE (1000 REV/MIN SHAFT)

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

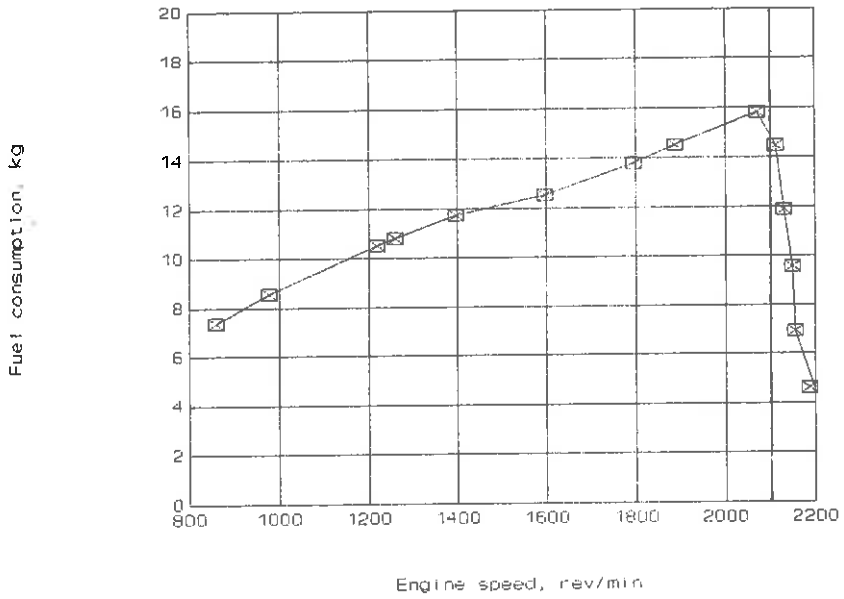


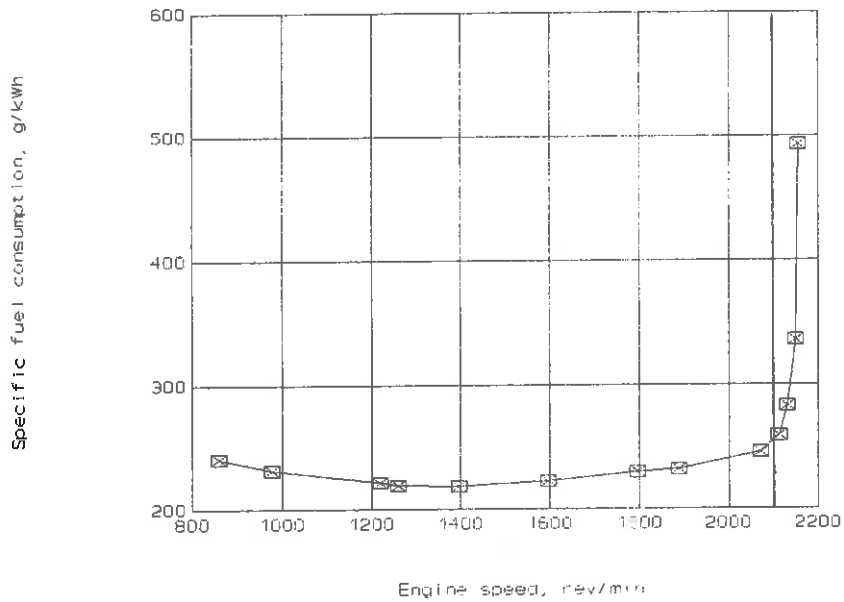


ANNEX I MAIN POWER TAKE OFF CURVES

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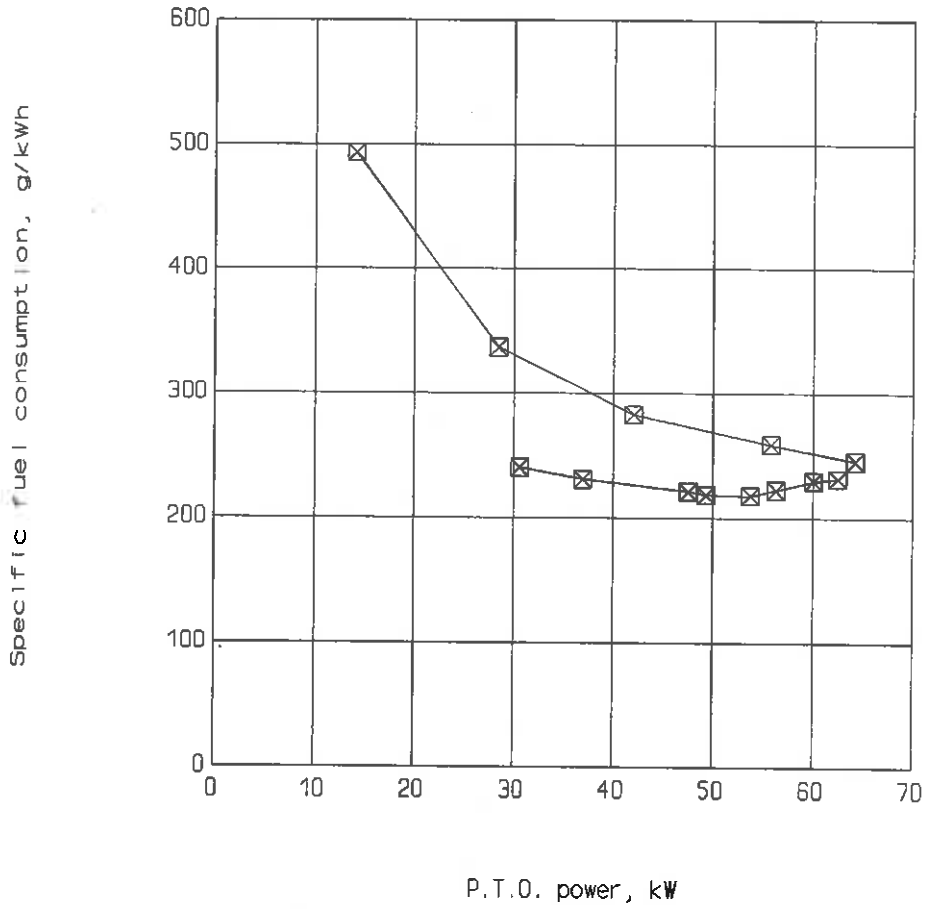




ANNEX I MAIN POWER TAKE OFF CURVES

P.T.O. POWER TEST - FORD 7740, 4 WHEEL DRIVE (1000 REV/MIN SHAFT)

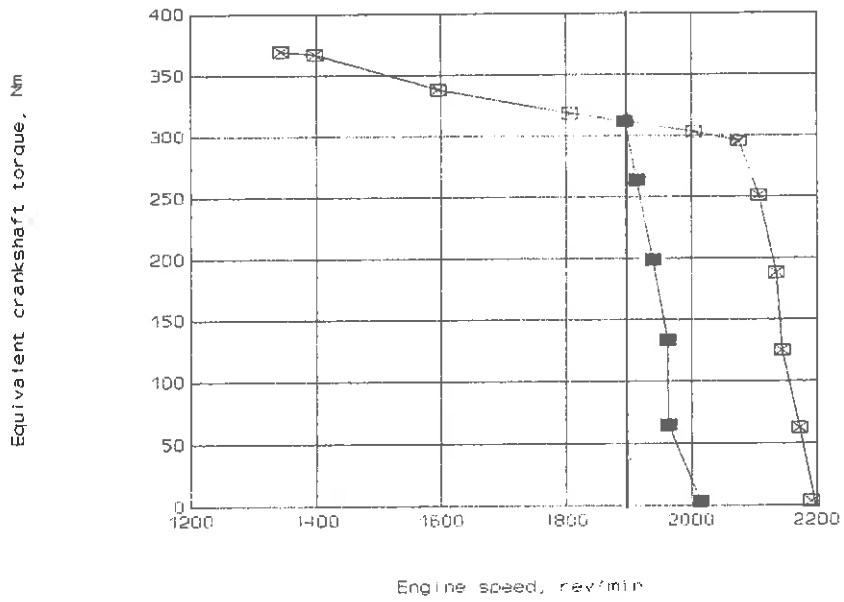
Governor set for maximum power at rated speed ⊠
Governor set for maximum power at pto speed ■

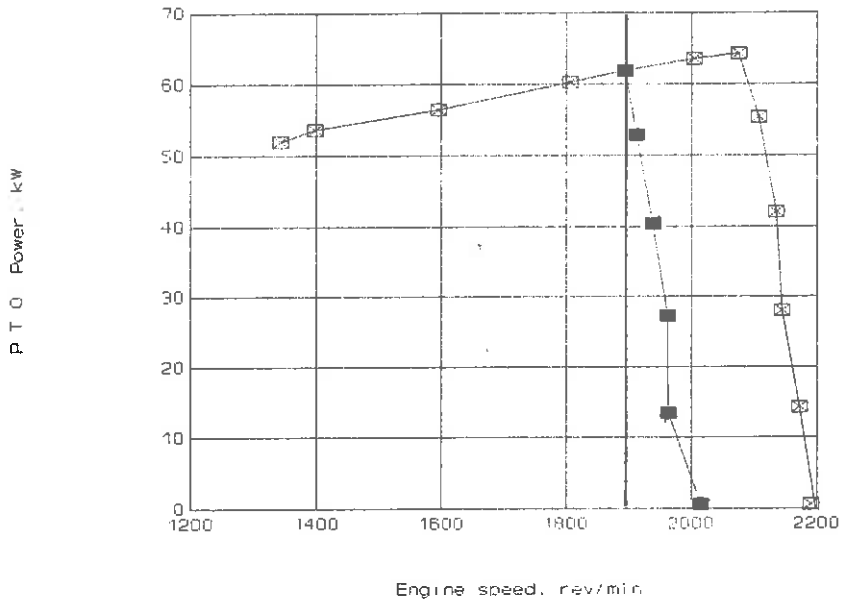


ANNEX II SUPPLEMENTARY POWER TAKE OFF CURVES

P.T.O. POWER TEST - FORD 7740, 4 WHEEL DRIVE (540 REV/MIN)

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

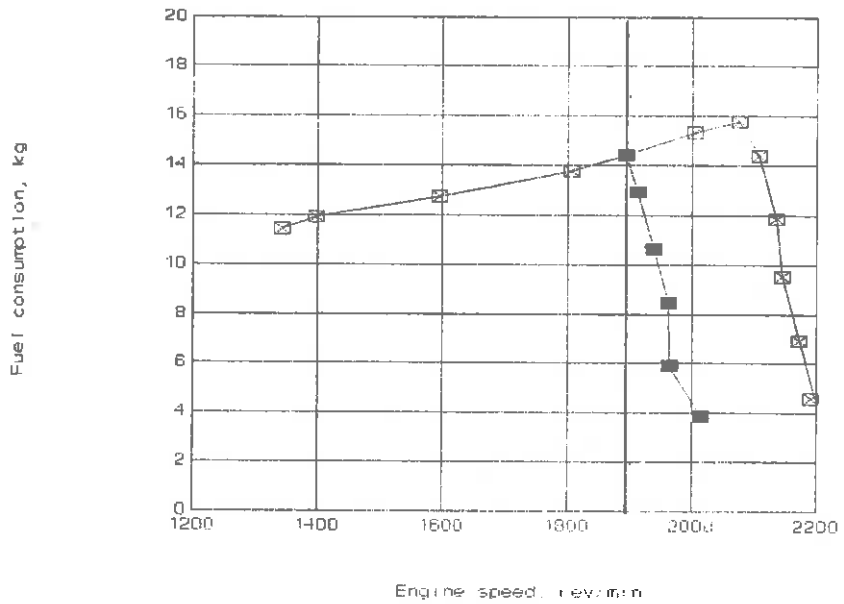


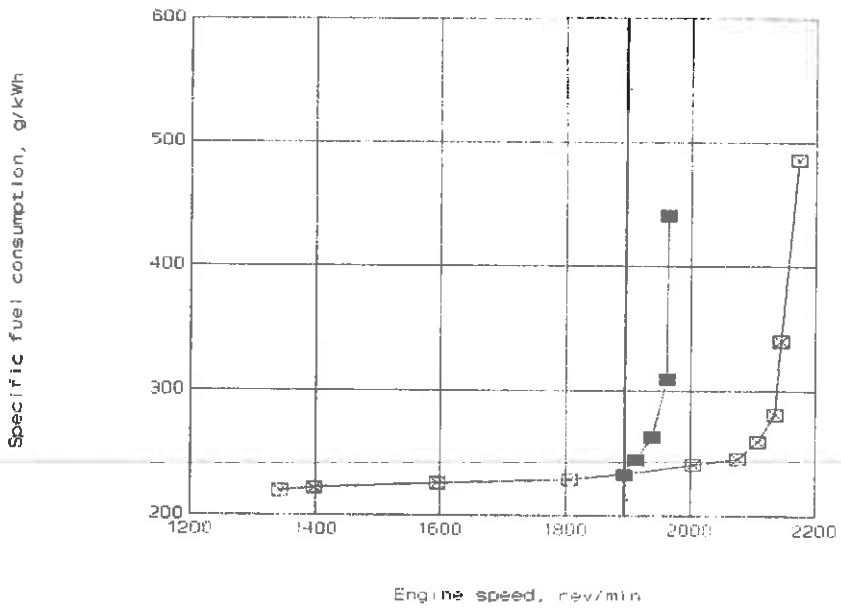


ANNEX II SUPPLEMENTARY POWER TAKE OFF CURVES

P.T.O. POWER TEST - FORD 7740, 4 WHEEL DRIVE (540 REV/MIN)

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





ANNEX II SUPPLEMENTARY POWER TAKE OFF CURVES

P.T.O. POWER TEST - FORD 7740, 4 WHEEL DRIVE (540 REV/MIN)

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

