OECD Approval No. 608

Report No. 655

Test in accordance with the OECD standard code for the official testing of agricultural tractors

Report on test of MASSEY-FERGUSON 265 TRACTOR



Manufactured by

Massey-Ferguson Manufacturing Company
Banner Lane
Coventry
Warwickshire

Test No. R78/7991/OECD

Date August 1978

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

National Institute of Agricultural Engineering
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SPECIFICATION OF TRACTOR

Manufacturer:	Massey-Ferguson Manufacturing Company, Banner Lane, Coventry, Warwickshire.
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:	50 hours

Tractor

Make:	Massey-Ferguson
Model:	M.F. 265
Type:	Four-wheel, rear wheel driven, unit construction
Serial No:	G 298002

Engine

Make:	Perkins
Model:	A4 236 UA
Type:	4-stroke, direct injection diesel
Serial No:	119377 L
Cylinders:	4 cylinders, vertical, in-line, 98.4 mm (3.9 in) dia bore x 127 mm (5.0 in) stroke, capacity 3863 cm^3 (236 in^3), compression ratio 16:1 (nominal), replaceable dry cylinder liners, overhead valves
Fuel system:	A.C. Delco mechanical fuel feed pump with hand-primer, C.A.V. type 796 paper element filter with sediment bowl between feed and injection pumps; fuel tank capacity 79.6 l (17.5 U.K. gal); C.A.V. distributor type DPA 3241 F 350 injection pump, Serial No. R2219 RU, manufacturer's production setting 12.84-13.52 l/h (22.6-23.8 pt/h) at 2000 rev/min engine speed and 63 °C (145 °F) cambox temperature; C.A.V. type BDLL 150 6561 injector nozzles, injection pressure

Fuel system continued	17.73 MPa (175 atm), pump delivery starts 23° before T.D.C.
Governor:	C.A.V. mechanical, incorporated in fuel injection pump, governed range of engine speed 700 to 2200 rev/min, rated engine speed 2000 rev/min
Air cleaner:	Lautrette, oil bath, situated forward of radiator, oil capacity 0.8 l (1.4 pt), centrifugal pre-cleaner above bonnet
Lubrication system:	Forced feed from gear pump with metal strainer in sump; full flow replaceable element filter; total oil capacity 7.1 l (12.5 pt), recommended oil S.A.E. 20W/30, viscosity 54 cSt at 50 °C (122 °F), change period 250 hours
Cooling system:	Water cooled, pressurised at 50 kPa (7 lb/in^2), thermosyphon assisted by centrifugal pump, 406 mm (16.0 in) dia, 4-blade belt driven fan, thermostat for temperature control, cooling water capacity 14.2 l (25.0 pt)
Starting system:	Electrical, Lucas M45G solenoid engaged starter motor, operable only when high-low gear selector lever is in neutral position; C.A.V. MK IIIC Thermostart manifold flame type cold starting aid
Exhaust:	Silencer vertical above bonnet on right-hand side.

Electrical system

Voltage:	12, negative earth
Generator:	Lucas type 16 ACR alternator
Battery:	Lucas Aqualok, lead-acid, 96 Ah at 20-hour rating

Transmission

Clutch:	Laycock, dual, dry, pedal-operated, 305 mm (12 in) dia plate for gearbox drive, 254 mm (10 in) dia plate for p.t.o. drive
Gearbox:	Own make, sliding gear, 8 forward and 2 reverse speeds, comprising 4 forward and 1 reverse speed gearbox with high-low range epicyclic gear
Rear axle and final drives:	Own make, crown wheel and pinion with differential and epicyclic reduction gear final drives; pedal-operated differential lock

Oil capacities:

Transmission 28.1 l (49.5 pt), recommended oil S.A.E. 20W/30, viscosity 54 cSt at 50 °C (122 °F); final drives 1.7 l (3.0 pt) each, recommended oil S.A.E. 90, viscosity 115 cSt at 50 °C (122 °F), change period 500 hours

Gear		Number of engine revolutions for one revolution of driving wheel	Nominal travelling speed for 2000 rev/min rated engine speed,* km/h	(mile/h)
Forward				
Low	1	238.86	2.19	(1.36)
	2	162.86	3.22	(2.00)
	3	119.23	4.40	(2.73)
	4	88.83	5.90	(3.67)
High	1	59.71	8.78	(5.46)
	2	40.71	12.87	(8.00)
	3	29.81	17.58	(10.93)
	4	22.21	23.59	(14.66)
Reverse				
	1	175.38	2.99	(1.86)
	2	43.85	11.95	(7.43)

*Calculated with a tyre rolling radius of 695 mm (27.4 in)

Power take-off

At rear of tractor in vertical centre plane, height above ground 557 mm (21.9 in), distance behind rear axle centre 296 mm (11.7 in) 6-spline, 34.9 mm (1.$\frac{3}{8}$ in) dia, to ISO standard, engaged by hand lever and second plate of clutch, proportional engine speed giving 641 rev/min at 2000 rev/min rated engine speed, 540 rev/min (standard p.t.o. speed) at 1684 rev/min engine speed, direction of rotation clockwise viewed facing driving end

Belt pulley

Attachable to rear of tractor in two alternative horizontal positions, p.t.o.-driven, 260 mm (10.2 in) dia x 165 mm (6.5 in) face width, 1191 rev/min giving 973 m/min (3191 ft/min) at 2000 rev/min rated engine speed, 1157 rev/min giving 945 m/min (3100 ft/min) standard belt speed at 1942 rev/min engine speed, direction of rotation related to position of unit

Power lift	Own make, live, hydraulic, 4 cylinder piston pump driven through second plate of clutch, oil supplied from transmission to ram cylinder and external tapping; Category 1 or 2 implement linkage with interchangeable ball ends; top link sensing, draught, position and pressure control, selective response on drop
Drawbar	Swinging drawbar, vertical height to centre of clevis 326 mm (12.8 in) to 478 mm (18.8 in), changed by inverting drawbar and clevis, distance behind rear axle centre 537 mm (21.1 in) and 651 mm (25.6 in), distance behind p.t.o. 241 mm (9.5 in) and 356 mm (14.0 in), lateral adjustment 222 mm (8.7 in) and 393 mm (15.5 in), pivot position 130 mm (5.1 in) forward of rear wheel centre, drawbar pin hole 26 mm (1.0 in) dia.
Steering	Worm and peg type with single drop arm and drag link
Brakes	Oil immersed multi-disc on inner high speed axle shafts, independent or combined pedal-operated, hand lever with ratchet operating both brakes for parking
Wheels	
Steering wheels:	Two at front, Dunlop Tractor T81 7.50-16 cross-ply tyres, 8-ply rating, maximum permissible mass on each tyre 870 kg (1918 lb) at 370 kPa (54 lb/in^2), track width 1371 mm (54.0 in) by 102 mm (4.0 in) steps to 1779 mm (70.0 in), changed by extending axle
Driving wheels:	Two at rear, Goodyear Traction Sure Grip 16.9/14-30 cross-ply tyres, 6-ply rating, maximum permissible mass on each tyre 1900 kg (4190 lb) at 130 kPa (19 lb/in^2), track width 1421 mm (56.0 in) by 102 mm (4.0 in) steps to 2135 mm (84.0 in), changed by reversing wheels and offset lug rims
Wheelbase:	2070 mm (81.5 in)
Seat	Sankey, upholstered pan type with cushion and back rest, range of adjustment 160 mm (6.3 in) forwards and backwards

Lighting

Unrestricted beam angle of headlight in plan view 131°

	Height above ground of centre, mm (in)	Size, mm (in)	Distance from outside edge of tractor at 1421 mm (56.0 in) wheel track, to centre, mm (in)
Headlights	785 (30.9)	124 (4.9) dia	548 (21.6)
Side lights	1470 (57.9)	100 (3.9) x 32 (1.3)	165 (6.5)
Rear lights	1468 (57.8)	76 (3.0) x 40 (1.6)	255 (10.0)
Reflectors	1400 (55.1)	70 (2.8) x 32 (1.3)	217 (8.5)

Number of grease points

Whole tractor: 10

CONDITIONS DURING TEST

Masses

Tractor (without driver but with tanks full)

	Front, kg (lb)	Rear, kg (lb)	Total, kg (lb)
Without ballast	943 (2079)	1328 (2928)	2271 (5007)
With ballast	1317 (2903)	3653 (8053)	4970 (10956)

Ballast

	Number of weights	Total mass, kg (lb)	Water, kg (lb)
Front wheels	Nil	Nil	Nil
Rear wheels	34	1750 (3858)	647 (1426)
Additional	8	302 (665)	Front frame and weights

Track setting during tests

Front - 1575 mm (62.0 in)
Rear - 1421 mm (56.0 in)

Overall dimensions

	Length, m (in)	Width, m (in)	Height, m (in)
With ballast	3.86 (152.0)	3.26 (128.3)	2.41 (94.9)
Without ballast	3.58 (140.9)	1.84 (72.4)	2.42 (95.3)

Overall height measured to top of exhaust pipe

Minimum ground clearance to underside of drawbar frame 330 mm (13.0 in)

FUELS AND LUBRICANTS USED IN TESTS

Fuel:	Laboratory tests:	Diesel oil to Class A2 British Standard 2869:1970, specific gravity 0.837 at 15 °C (59 °F), viscosity 2.34 cSt at 50 °C (122 °F), Cetane No. 52.7
	Track tests:	Diesel oil to Class A2 British Standard 2869:1970, specific gravity 0.845 at 15 °C (59 °F), viscosity 2.31 cSt at 50 °C (122 °F), Cetane No. 52.1
Engine oil:		Agricastrol M.P., S.A.E. 20W/30, viscosity 54 cSt at 50 °C (122 °F)
Transmission oil:		Agricastrol M.P., S.A.E. 20W/30, viscosity 54 cSt at 50 °C (122 °F)
Final drives:		Mobilube GX, S.A.E. 90, viscosity 115 cSt at 50 °C (122 °F)

COMPULSORY TESTS

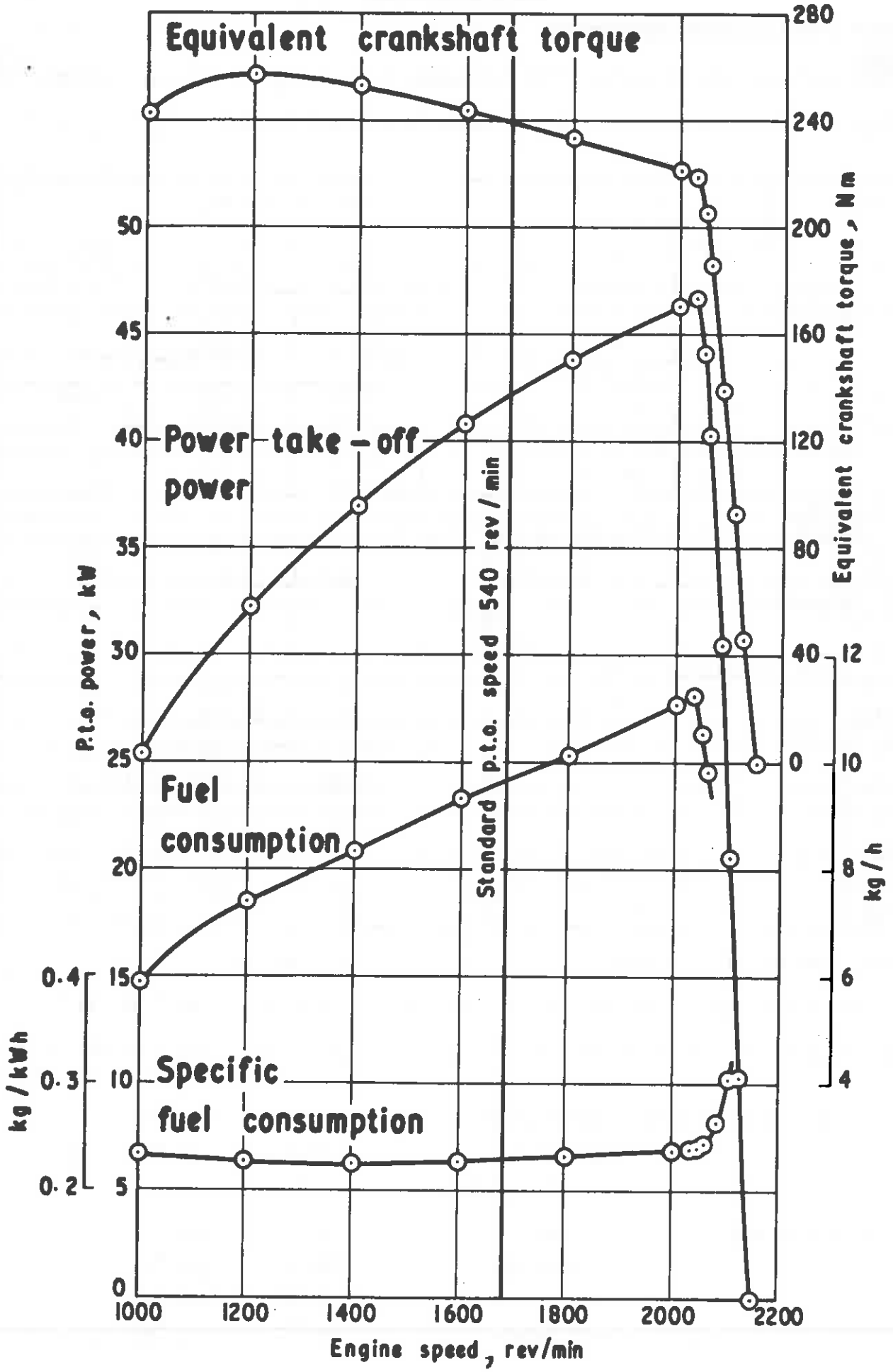
1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 13th September 1977, N.I.A.E., Silsoe, Bedford, U.K.

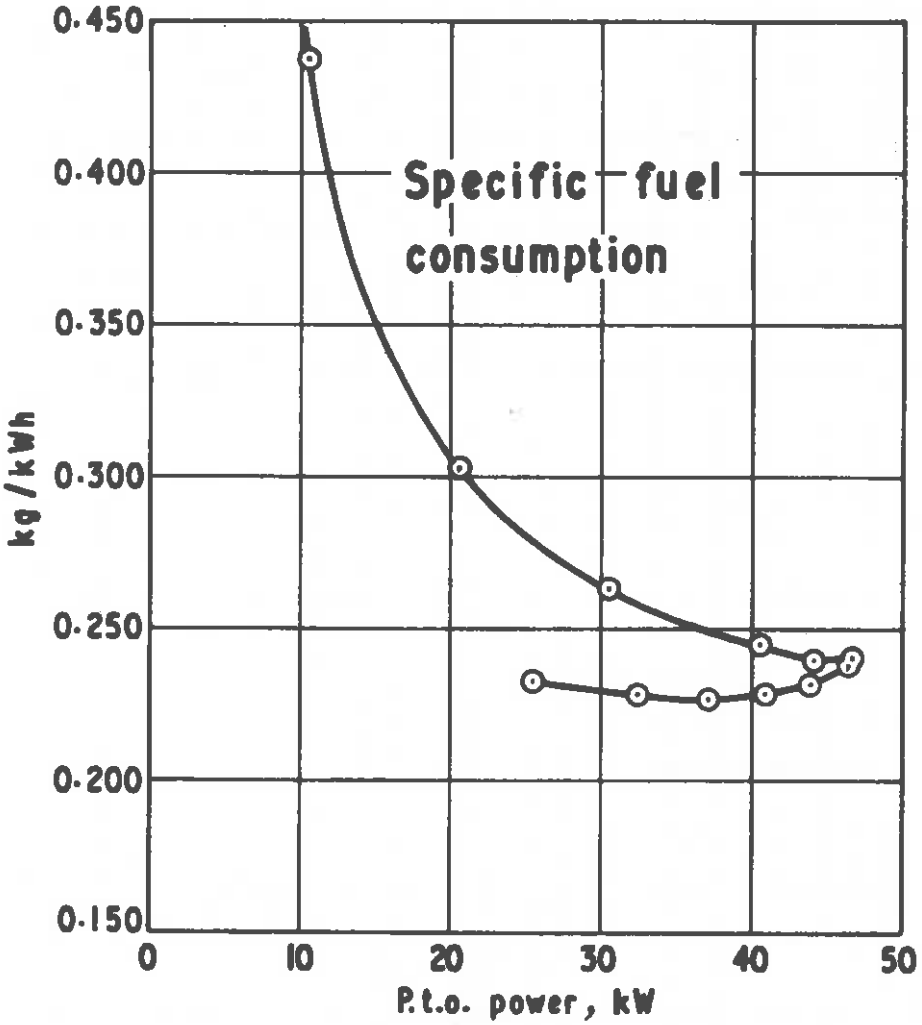
Type of dynamometer: Water brake, Heenan and Froude

Power, kW (hp)	Speed, rev/min		Fuel consumption,			
	Engine	P.t.o.	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Maximum power - 2 hour test						
46.7 (62.6)	2034	652	13.40 (2.95)	11.21 (24.71)	0.240 (0.395)	3.49 (21.3)
Standard p.t.o. speed (540 rev/min)						
42.2 (56.6)	1684	540	11.60 (2.55)	9.71 (21.41)	0.230 (0.378)	3.64 (22.2)
The speed recommended by the manufacturer for drawbar work						
46.4 (62.2)	2000	641	13.26 (2.92)	11.09 (24.45)	0.239 (0.393)	3.50 (21.3)
Part loads						
(1) 85% of the torque obtained at maximum power						
40.3 (54.0)	2060	661	11.80 (2.59)	9.87 (21.76)	0.245 (0.403)	3.42 (20.8)
(2) Unloaded						
0	2151	690	3.54 (0.78)	2.96 (6.53)	-	-
(3) 50% of the torque obtained in (1)						
20.6 (27.6)	2104	675	7.46 (1.64)	6.24 (13.76)	0.303 (0.498)	2.76 (16.8)
(4) Maximum power						
46.7 (62.6)	2034	652	13.40 (2.95)	11.21 (24.71)	0.240 (0.395)	3.49 (21.3)
(5) 25% of the torque defined in (1)						
10.4 (13.9)	2123	681	5.44 (1.20)	4.56 (10.05)	0.438 (0.720)	1.91 (11.6)
(6) 75% of the torque defined in (1)						
30.5 (40.9)	2083	668	9.62 (2.12)	8.05 (17.75)	0.264 (0.434)	3.17 (19.3)

No load, maximum engine speed		2151 rev/min	
Equivalent crankshaft torque at maximum power		219.6 Nm	(162.0 lb ft)
Maximum equivalent crankshaft torque		256.8 Nm	(189.4 lb ft) at 1210 rev/min engine speed
Mean atmospheric conditions	temperature	18 °C	(64 °F)
	pressure	1031 m bar	(30.45 in Hg)
	relative humidity	56 %	
Maximum temperature	coolant	95 °C	(203 °F)
	engine oil	110 °C	(230 °F)
	fuel	42 °C	(108 °F)
	air intake	29 °C	(84 °F)



Power take — off test



Power take – off test

2. DRAWBAR PERFORMANCE Date of tests: 10th March-26th April, 1978 Type of track: Tarmacadam Height of drawbar above ground: 432 mm (17.0 in)

Gear	Power, kW (hp)	Drawbar pull, kN (lb)	Speed, km/h (mile/h)	Engine speed, rev/min	Wheel-slip, %	Specific fuel consumption, kg/kWh (lb/hph)	Specific fuel consumption, kWh/l (hph/UKgal)	Temperature, °C(°F) Coolant	Fuel	Engine oil	Atmospheric conditicns Temperature, °C (°F)	Relative humidity, %	Pressure, millibar (in Hg)
(i) MAXIMUM POWER (ballasted)													
L1	*21.2 (28.4)	39.2 (8810)	1.95 (1.21)	2104	15.0	0.353 (0.580)	2.40 (14.6)	79 (174)	28 (82)	85 (185)	12 (54)	85	1017 (30.04)
L2	*30.5 (40.9)	39.2 (8810)	2.80 (1.74)	2088	15.0	0.323 (0.531)	2.62 (16.0)	82 (180)	29 (84)	93 (199)	13 (55)	82	1017 (30.04)
L3	38.5 (51.6)	36.4 (8180)	3.81 (2.37)	2035	12.7	0.303 (0.498)	2.79 (17.0)	86 (187)	31 (88)	97 (207)	15 (59)	80	1016 (30.00)
L4	39.2 (52.6)	26.6 (5980)	5.31 (3.30)	2035	7.7	0.293 (0.482)	2.89 (17.6)	84 (183)	34 (93)	101 (214)	16 (61)	64	1016 (30.00)
H1	40.8 (54.7)	17.8 (4000)	8.25 (5.13)	2030	5.0	0.283 (0.465)	2.99 (18.2)	86 (187)	37 (99)	103 (217)	17 (63)	61	1016 (30.00
H2	38.0 (51.0)	11.5 (2590)	11.90 (7.40)	2025	3.5	0.303 (0.498)	2.79 (17.0)	85 (185)	36 (97)	104 (219)	17 (63)	59	1017 (30.04)
(ii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
L4	31.7 (42.5)	20.0 (4500)	5.71 (3.55)	2120	4.7	0.292 (0.480)	2.89 (17.6)	80 (176)	29 (84)	100 (212)	7 (45)	65	1015 (29.96)
(iii)† FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (i)													
L2	-	39.2 (8810)	2.80 (1.74)	-	-	-	-	83 (181)	39 (102)	108 (226)	13 (55)	50	1009 (29.80)
(iv) MAXIMUM POWER (unballasted)													
L2	* 15.1 (20.2)	20.0 (4500)	2.72 (1.69)	2107	15.0	-	-	76 (169)	17 (63)	79 (174)	6 (43)	70	993 (29.33)
L3	* 20.6 (27.6)	20.0 (4500)	3.71 (2.31)	2092	15.0	-	-	78 (172)	18 (64)	87 (189)	6 (43)	70	993 (29.33)
L4	* 28.6 (38.4)	20.0 (4500)	5.15 (3.20)	2100	15.0	-	-	79 (174)	19 (66)	82 (180)	7 (45)	72	993 (29.33)
H1	38.3 (51.4)	17.8 (4000)	7.75 (4.82)	2043	9.8	-	-	85 (185)	21 (70)	87 (189)	7 (45)	68	992 (29.29)
H2	39.8 (53.4)	12.0 (2700)	11.94 (7.42)	2026	5.3	-	-	83 (181)	23 (73)	93 (199)	7 (45)	78	992 (29.29)
H3	39.1 (52.4)	8.4 (1890)	16.76 (10.42)	2041	3.4	-	-	81 (178)	26 (79)	89 (192)	6 (43)	85	992 (29.29)

Total oil consumption during ten hours duration of tests (ii) and (iii) 10.5 g/h (0.023 lb/h)

*Maximum power available at 15% wheelslip

†Test (iii) was carried out with additional ballast and the results for power, slip and fuel consumption have no practical significance

3. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: As in specification, without ballast

Track of wheels: front - 1575 mm (62.0 in)
rear - 1421 mm (56.0 in)

	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
Radius of turning space, m (in)	3.70 (146)	3.70 (146)	4.05 (159)	4.08 (161)
Radius of turning circle, m (in)	3.60 (142)	3.60 (142)	3.95 (156)	3.98 (157)

4. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm (in)	660 (26.0)
Distance forward from the vertical plane containing the axis of the rear wheels, mm (in)	841 (33.1)
Distance from the median plane of the tractor, mm (in)	0

5. BRAKING

Date of tests: 20th-25th April, 1978

Type of track: Tarmacadam

Type of decelerometer: Moto Meter, recording type

Mass of ballasted tractor: 4970 kg (10956 lb)

Cold brakes

	Tractor without ballast	Tractor ballasted
Travelling speed of tractor, km/h (mile/h)	24.0 (14.9)	24.0 (14.9)
Maximum deceleration, m/s^2 (ft/s^2)	4.3 (14.1)	5.4 (17.7)
Stopping distance, m (ft)	7.0 (23.0)	5.5 (18.0)
Force on brake pedal, N (lb)	348 (78)	637 (143)
Force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2 (8.2 ft/s^2), N (lb)	186 (42)	284 (64)

Brake fade characteristics

Maximum deceleration hot/cold, %	100	100
Stopping distance cold/hot, %	100	100
Force on pedal cold/hot, %	100	100

Parking brake

Efficacy of handbrake: Satisfactory facing up and down 16% slope

Pull on handbrake: 275 N (62 lb)

6. MEASUREMENT OF AMBIENT NOISE EMITTED BY THE TRACTOR

Date of tests:	28th April, 1978
Type of sound level meter:	Bruel and Kjaer 2206
Type of track:	Tarmacadam
Results of tests:	
Gear:	H4
Travelling speed before acceleration:	18.0 km/h (11.2 mile/h)
Sound level:	86 dBA

7. NOISE MEASUREMENT AT THE DRIVER'S EAR LEVEL

Date of tests:	3rd May, 1978
Type of sound level meter:	Bruel and Kjaer 2206
Type of track:	Tarmacadam

Gear	Travelling speed, km/h (mile/h)	dBA
H1	7.9 (4.9)	99

8. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date of tests:	23 May, 1978
Hydraulic fluid	
Make and type:	Agricastrol M.P. S.A.E. 20W/30
Viscosity:	54 cSt at 50 °C (122 °F)
Type of linkage lock for transport:	Hydraulic
Opening pressure of the cylinder over pressure relief valve (manufacturer's figures):	22.4 MPa (3250 lb/in^2)
Pump characteristics	
i) Opening pressure of relief valve:	17.8 MPa (2580 lb/in^2)
Sustained pressure of the open relief valve:	22.1 MPa (3210 lb/in^2)
ii) Pump delivery rate at minimum pressure and rated engine speed:	18.2 l/min (4.0 gal/min)
iii) Pump delivery rate at maximum hydraulic power:	18.2 l/min (4.0 gal/min)
Delivery pressure:	17.8 MPa (2508 lb/in^2)
Power:	5.4 kW (7.2 hp)

Linkage geometry when connected to the standard frame, mm (in)

	Maximum mechanical advantage	Minimum mechanical advantage
Projected length in side view		
Lower links	953 (37.5)	953 (37.5)
Lift arms	267 (10.5)	267 (10.5)
Lift rods	612 (24.1)	612 (24.1)
Top link	736 (29.0)	715 (28.1)
Distance of lift rod connection point from pivot point of lower link	427 (16.8)	427 (16.8)
The following dimensions are given relative to the rear wheel centre line, situated 695 mm (27.4 in) above the ground level		
Lower pivot point	32 (1.3) forward, 212 (8.3) below	32 (1.3) forward, 212 (8.3) below
Top link pivot point	186 (7.3) behind, 205 (8.1) above	216 (8.5) behind, 132 (5.2) above
Lift arm pivot point	196 (7.7) forward, 233 (9.2) above	196 (7.7) forward, 233 (9.2) above
Maximum and minimum height of lower link hitch points	270 (10.6) above, 480 (18.9) below	270 (10.6) above, 480 (18.9) below
Height of lower link hitch points when locked in transport position	Any height within lift range	Any height within lift range

Power lift performance

Lifting height in relation to a horizontal line through the lower link pivoting point		mm (in)	-280 (-11.0)	-240 (-9.4)	-160 (-6.3)	-80 (-3.1)	0	+80 (+3.1)	+160 (+6.3)	+240 (+9.4)	+320 (+12.6)	+400 (+15.7)	+460 (+18.1)	+560 (+22.0)	+640 (+25.2)
Lifting force with the pressure at maximum hydraulic power (17.8 MPa(2580 lb/in^2)), calculated from measurements made at maximum pressure, kN (lb)	At the hitch points			*11.7 (2630)	12.5 (2810)	13.2 (2970)	13.7 (3080)	14.2 (3190)	14.6 (3280)	14.8 (3330)	15.1 (3390)	15.4 (3460)	15.6 (3510)		
	On the frame	max. mech. advantage		11.8 (2650)	12.2 (2740)	12.5 (2810)	12.7 (2860)	12.7 (2860)	12.6 (2830)	12.4 (2790)	12.1 (2720)	11.8 (2650)	11.6 (2610)	11.*1 (2500)	
		min. mech. advantage	10.3 (2320)	10.5 (2360)	10.9 (2450)	11.1 (2500)	11.2 (2520)	11.2 (2520)	11.1 (2500)	10.9 (2450)	10.7 (2410)	10.4 (2340)	10.2 (2290)	9.9 (2230)	9.6* (2160)

*Maximum force exerted throughout whole range

Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of measured values

OPTIONAL TESTS

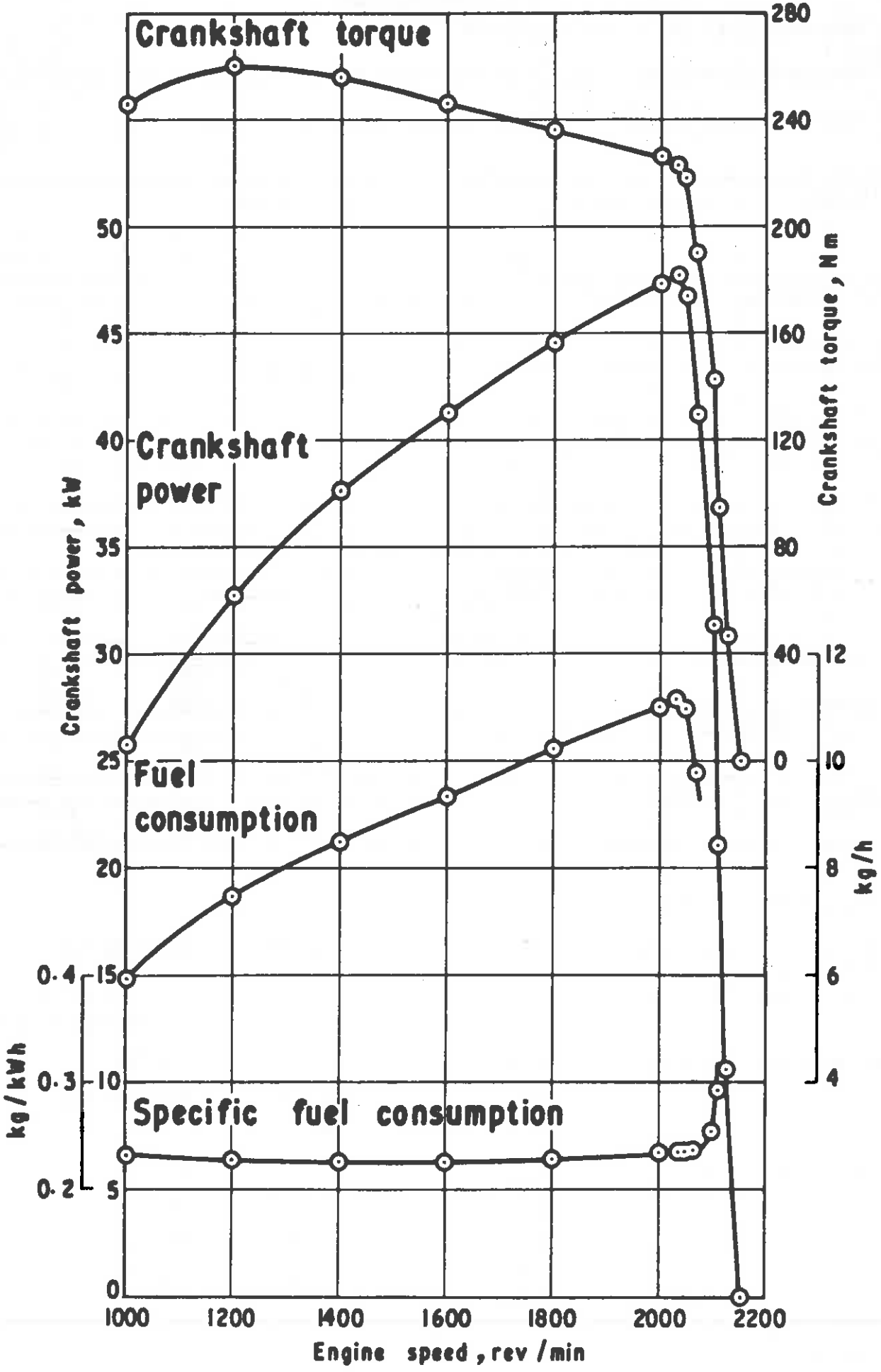
9. PERFORMANCE AT THE ENGINE CRANKSHAFT

Date and location of tests: 15th September 1977, N.I.A.E., Silsoe, Bedford, U.K.

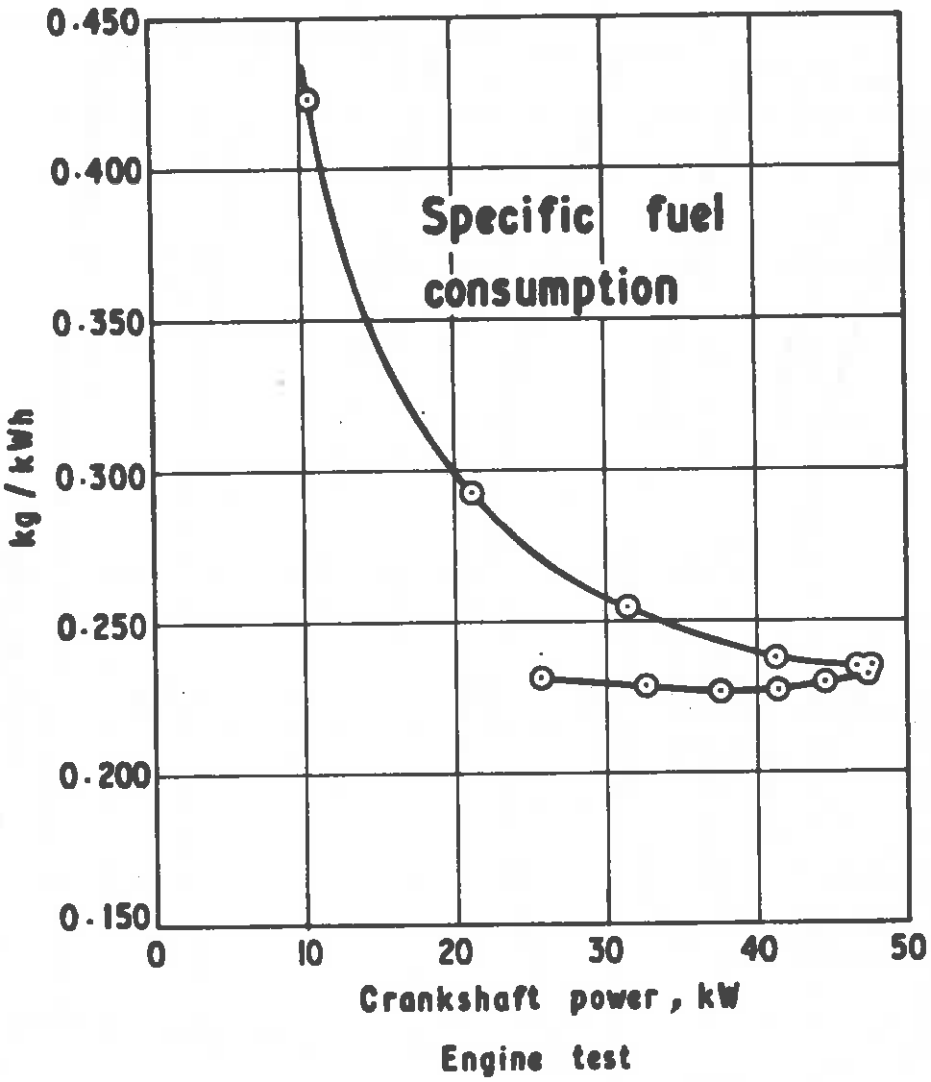
Type of dynamometer: Water brake, Heenan and Froude

Power, kW (hp)	Engine speed, rev/min	Fuel consumption, l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Maximum power - 2 hour test					
47.6 (63.8)	2035	13.37 (2.94)	11.19 (24.67)	0.235 (0.386)	3.56 (21.7)
The speed recommended by the manufacturer for drawbar work					
47.4 (63.6)	2000	13.20 (2.90)	11.04 (24.34)	0.233 (0.383)	3.59 (21.9)
Part loads					
(1) 85% of the torque obtained at maximum power					
41.1 (55.1)	2066	11.69 (2.57)	9.78 (21.56)	0.238 (0.391)	3.52 (21.5)
(2) Unloaded					
0	2153	3.54 (0.78)	2.96 (6.53)	-	-
(3) 50% of the torque obtained in (1)					
21.0 (28.2)	2108	7.38 (1.62)	6.17 (13.60)	0.294 (0.483)	2.85 (17.4)
(4) Maximum power					
47.6 (63.8)	2035	13.37 (2.94)	11.19 (24.67)	0.235 (0.386)	3.56 (21.7)
(5) 25% of the torque defined in (1)					
10.6 (14.2)	2125	5.37 (1.18)	4.49 (9.90)	0.424 (0.697)	1.97 (12.0)
(6) 75% of the torque define in (1)					
31.3 (42.0)	2100	9.54 (2.10)	7.98 (17.59)	0.255 (0.419)	3.28 (20.0)

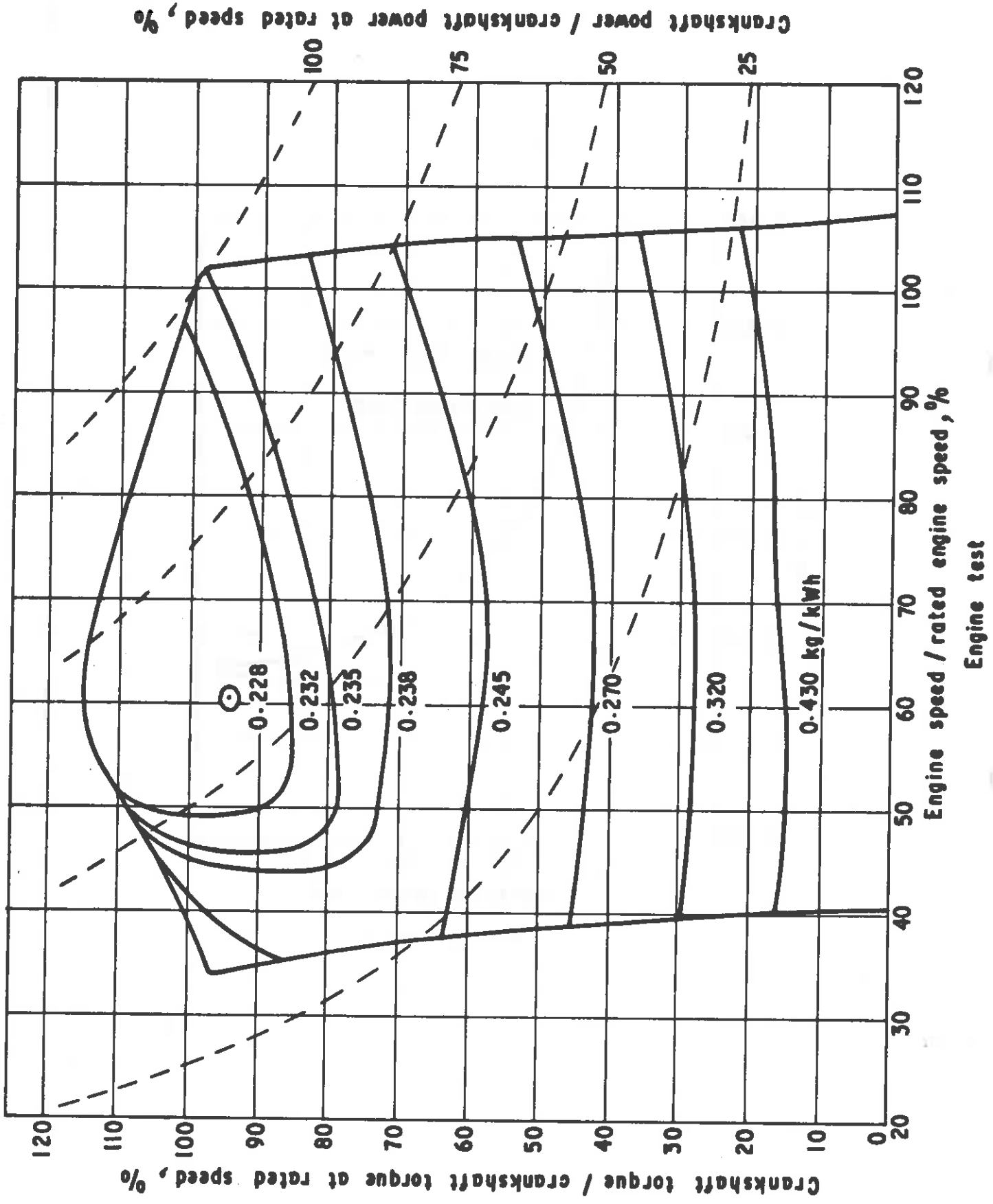
No load, maximum engine speed		2153 rev/min	
Crankshaft torque at maximum power		223.5 Nm	(164.8 lb ft)
Maximum crankshaft torque		260.1 Nm	(191.8 lb ft) at 1210 rev/min engine speed
Mean atmospheric conditions	temperature	18 °C	(64 °F)
	pressure	1023 m bar	(30.21 in Hg)
	relative humidity	51%	
Maximum temperature	coolant	91 °C	(196 °F)
	engine oil	110 °C	(230 °F)
	fuel	37 °C	(99 °F)
	air intake	23 °C	(73 °F)


Crankshaft torque
Crankshaft power
Fuel consumption
Specific fuel consumption
Crankshaft power, kW
Crankshaft torque, Nm
kg/h
kg/kWh
Engine speed, rev/min
1000
1200
1400
1600
1800
2000
2200
0
5
10
15
20
25
30
35
40
45
50
80
120
160
200
240
280
4
6
8
10
12
0.2
0.3
0.4

Engine test


0·450
0·400
0·350
0·300
0·250
0·200
0·150
kg / kWh
Specific fuel consumption
0
10
20
30
40
50
Crankshaft power , kW

Engine test


Crankshaft power / crankshaft power at rated speed, %
100
75
50
25
120
110
100
90
80
70
60
50
40
30
20
0.228
0.232
0.235
0.238
0.245
0.270
0.320
0.430 kg/kWh
Engine speed / rated engine speed, %
Engine test
Crankshaft torque / crankshaft torque at rated speed, %
120
110
100
90
80
70
60
50
40
30
20
10
0

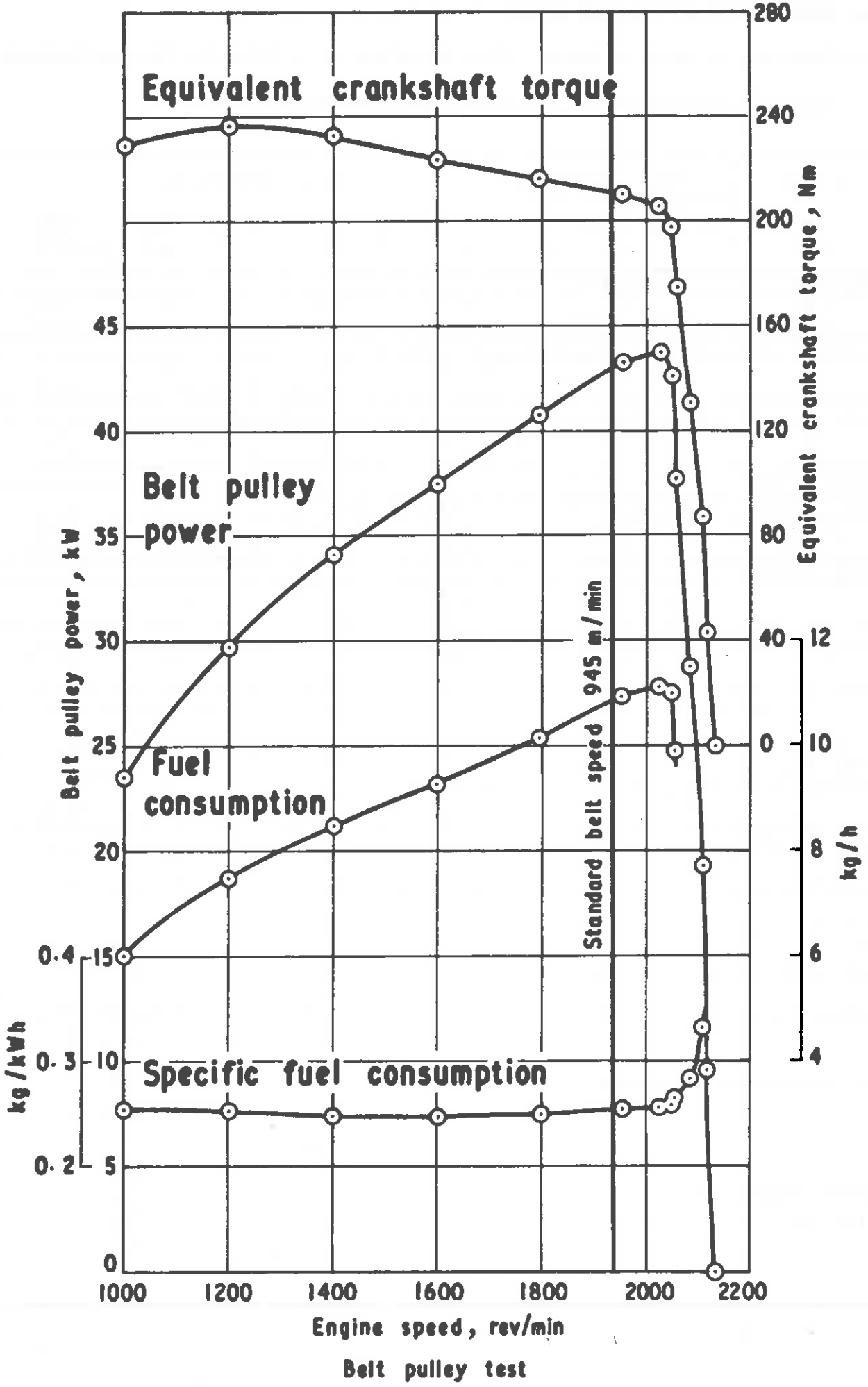
10. PERFORMANCE AT THE BELT PULLEY

Date and location of tests: 21st September 1977, N.I.A.E., Silsoe, Bedford, U.K.

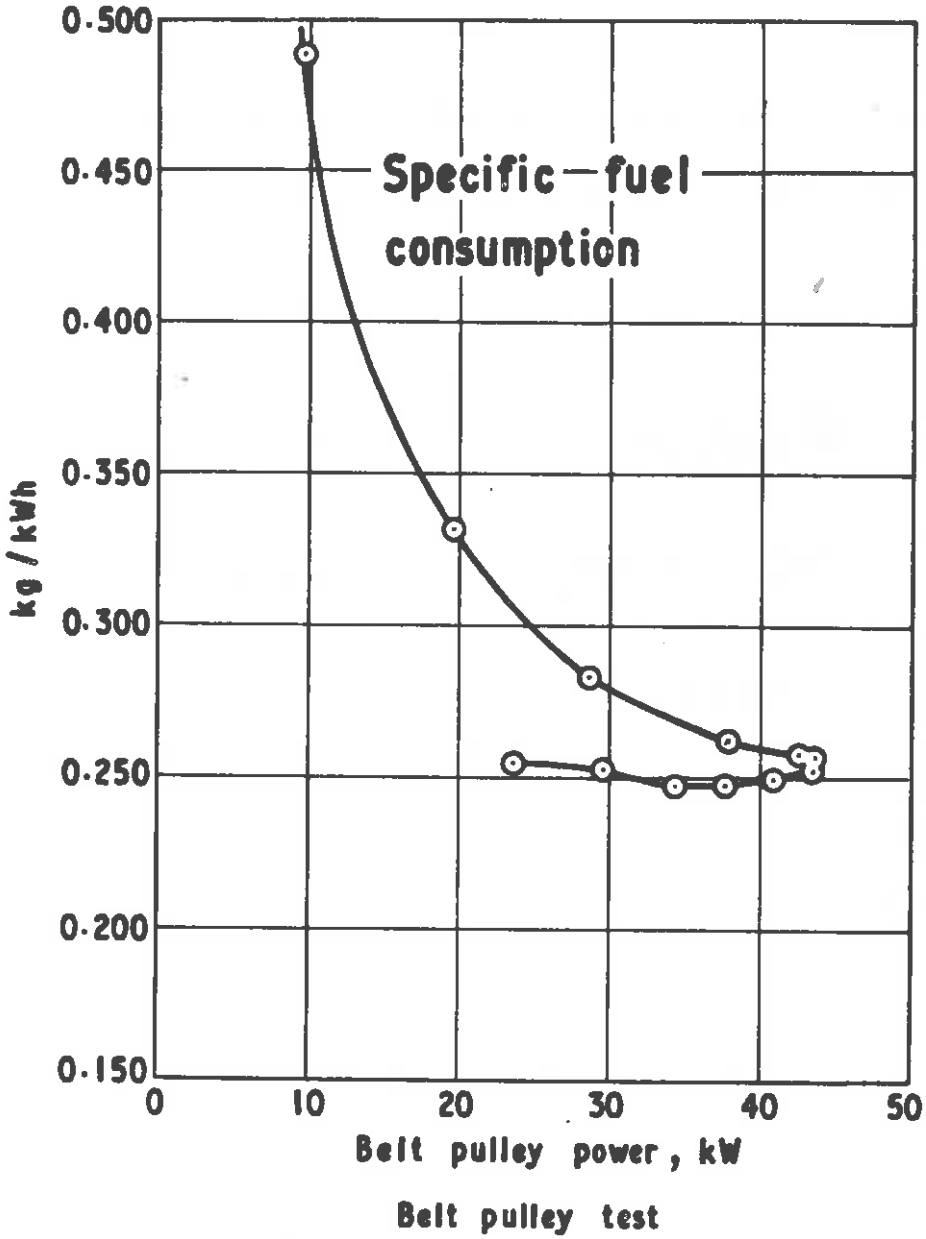
Type of dynamometer: Water brake, Heenan and Froude

Power, kW (hp)	Speed, rev/min		Fuel consumption,			
	Engine	Belt pulley	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Maximum power - 2 hour test						
43.6 (58.5)	2023	1205	13.34 (2.93)	11.16 (24.60)	0.256 (0.421)	3.27 (19.9)
Standard belt speed of 945 m/min (3100 ft/min)						
43.1 (57.8)	1940	1155	13.09 (2.88)	10.95 (24.14)	0.254 (0.418)	3.29 (20.1)
The speed recommended by the manufacturer for drawbar work						
43.5 (58.3)	2000	1191	13.31 (2.93)	11.14 (24.56)	0.256 (0.421)	3.27 (19.9)
Part loads						
(1) 85% of the torque obtained at maximum power						
37.8 (50.7)	2057	1225	11.88 (2.61)	9.94 (21.91)	0.263 (0.432)	3.18 (19.4)
(2) Unloaded						
0	2132	1270	3.64 (0.80)	3.05 (6.72)	-	-
(3) 50% of the torque obtained in (1)						
19.6 (26.3)	2107	1256	7.80 (1.72)	6.53 (14.40)	0.333 (0.547)	2.51 (15.3)
(4) Maximum power						
43.6 (58.5)	2023	1205	13.34 (2.93)	11.16 (24.60)	0.256 (0.421)	3.27 (19.9)
(5) 25% of the torque defined in (1)						
9.8 (13.1)	2116	1260	5.71 (1.26)	4.78 (10.54)	0.488 (0.802)	1.72 (10.5)
(6) 75% of the torque defined in (1)						
28.9 (38.8)	2082	1240	9.81 (2.16)	8.21 (18.10)	0.284 (0.467)	2.95 (18.0)

No load, maximum engine speed		2132 rev/min	
Equivalent crankshaft torque at maximum power		205.9 Nm	(151.9 lb ft)
Maximum equivalent crankshaft torque		236.5 Nm	(174.4 lb ft) at 1210 rev/min engine speed
Mean atmospheric conditions	temperature	16 °C	(61 °F)
	pressure	1018 m bar	(30.06 in Hg)
	relative humidity	68%	
Maximum temperature	coolant	92 °C	(198 °F)
	engine oil	110 °C	(230 °F)
	fuel	38 °C	(100 °F)
	air intake	23 °C	(73 °F)



Belt pulley test



Belt pulley test

REPAIRS AND ADJUSTMENTS DURING TESTS — None

REMARKS — None

Test carried out by: F. Thistlethwaite, F.W. Brown

Officer in charge: D.W. Smith

Signed: [signature] Head of Tractor Department

[signature] for the Director

Date: 9/8/78