OECD Approval No. 874

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

Report on test of John Deere 4650 Tractor with Mechanical Front Wheel Drive



Manufactured by	John Deere, Tractor Works, P.O. Box 3500, Waterloo, IA 50704, USA.
Test No.	R83/70120/OECD
Report No.	692
Date	February 1983

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

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Manufacturer's name and address:	John Deere, Tractor Works, P.O. Box 3500, Waterloo, IA 50704, USA
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with the agreement of the testing station
Place of running-in:	John Deere Product Engineering Centre
Duration of running-in:	100 hours

Tractor

Make:	John Deere
Model:	4650
Type:	4-wheel drive, unit construction
Serial No.:	RW4650P001381

Engine

Make:	John Deere
Model:	6466AR20
Type:	Diesel turbocharged
Serial No.:	RG6466A 231043
Cylinders:	
Number and disposition:	6 in-line, vertical
Bore:	115.9 mm (4.563 in)
Stroke:	120.6 mm (4.748 in)
Capacity:	7634 cm^3 (466 in^3)
Compression ratio:	15.8:1 nominal
Arrangement of valves:	Overhead
Liners:	Replaceable, wet
Fuel system:	
Feed system:	BOSCH fuel feed pump is incorporated in injection pump
Make, type and model of filter:	Stanadyne, dual replaceable element, model 22072
Tank capacity:	386 l (85 UK gal)
Make, type and model of injection pump:	Robert Bosch, in-line, US-PES6A 1000 D410 RS 3028
Injection pump Serial No.:	24613994
Manufacturer's production setting of injection pump:	111-117 mm^3 per stroke at 1100 rev/min pump speed, bench test figures, using fuel of 0.824 specific gravity at 15.6°C (60°F) and pump inlet temperature of 40°C (104°F)

Fuel system (Cont'd)	
Make, type and model of injectors:	Robert Bosch, KDEL 65 S1/13, .4 hole
Injection pressure:	26.2-27.0 MPa (258-266 atm)
Injection pump delivery starts:	31° before T.D.C.
Governor:	
Make and type:	Robert Bosch, US-RSV400-1100 A2 B2 159L, mechanical
Governed range of engine speed:	800 rev/min to 2400 rev/min
Rated engine speed:	2200 rev/min
Air cleaner:	
Make and type:	Donaldson air maze, dry type with safety element
Model:	FTG 11-0018, 3 stage
Oil capacity:	None
Position:	Under the hood, on right-hand side of engine
Pre-cleaner:	
Make and type:	Donaldson with plastic mesh chaff screen
Position:	Top of air cleaner
Turbocharger:	
Make and type:	Air Research, T04B-87 LC0899, exhaust driven
Lubrication system:	
Type of feed and pump:	Full pressure positive displacement
Type of filter:	Bypass and full flow primary
Total oil capacity including filter:	19.9 l (35.0 UK pt)
Recommended oil:	S.A.E. 15W40, viscosity 65 cSt at 50°C (122°F)
M.I.L. standard:	L2104C
Oil change period:	200 hours
Filter change period:	200 hours
Cooling system:	
Coolant:	Water and anti-freeze, 50% solution
Type of pump:	Centrifugal
Fan diameter:	696 mm (27.4 in)
Number of fan blades:	8
Type of temperature control:	2 thermostats and variable speed fan drive
Coolant capacity:	30.3 l (53.3 UK pt)
System pressure:	48 kPa (7 lb/in^2)
Starting system:	
Make, type and model:	Nippondenso, electric motor, 5B 1705
Starter motor power rating:	4.0 kW (5.4 hp)
Safety features:	Electrical lockout on gearshift
Cold starting aid:	Ether spray in intake manifold

Exhaust system

Make and construction:	Donaldson MOM08-0108
Dimensions of expansion chamber:	156 mm (6.1 in) x 257 mm (10.1 in) x 762 mm (30.0 in) long
Position:	Left-side over engine, outlet 3-31m above grou

Electrical system

Voltage:	12
Earth polarity:	Negative
Make and type of alternator:	Nippondenso, 100211-0290
Output:	90 A at 2200 rev/min
Make and type of battery:	John Deere, lead-acid, dual 6-volt
Rating:	178 Ah at 100 hour rating

Transmission

Clutch:	
Make and type:	John Deere, multi-plate, oil cooled
Diameter of plates:	278 mm (10.9 in)
Method of operation:	Hydraulic, by foot pedal
Gearbox:	
Make and type:	John Deere, power shift transmission
Number of speeds:	15 forward and 4 reverse
Arrangement:	2 speed hydraulic shifted planetary in front of compound planetary with multiple wet disc clutches and brakes, shifting on the move, under load
Rear axle and final drive:	
Make and type:	John Deere, crown wheel and pinion, differential and planetary reduction
Type of differential lock and method of engagement:	Hydraulic, self disengaging
Front axle and final drive:	
Make and type:	ZF, crown wheel and pinion differential and planetary reduction
Driven from:	Rear of gearbox
Type of differential lock and method of engagement:	Limited slip, self locking

Transmission oils

	Gearbox and transmission housing	Front axle	Front wheel hubs
Recommended oil: John Deere	JDM J20A	JDM J11E	JDM J11E
Capacity:	98.0 l (172.5 UK pt)	9.0 l (15.8 UK pt)	4.5 l each (7.9 UK pt)
Viscosity at 50°C (122°F)	38 cSt	250 cSt	250 cSt
M.I.L. standard	-	L-2105C	L2105C
Oil change period	1200 hours	1200 hours	1200 hours
Filter change period	600 hours	N.A.	N.A.

Gear	Number of engine revolutions for one revolution of driving wheel	Nominal travelling speed for 2200 rev/min rated engine speed,* km/h	(mile/h)
Forward			
1	333.8	2.12	(1.32)
2	233.1	3.04	(1.89)
3	192.8	3.68	(2.29)
4	153.5	4.62	(2.87)
5	133.3	5.32	(3.31)
6	117.4	6.04	(3.75)
7	101.6	6.98	(4.34)
8	88.7	7.99	(4.96)
9	77.0	9.21	(5.72)
10	67.8	10.46	(6.50)
11	58.9	12.04	(7.48)
12	52.6	13.48	(8.38)
13	42.5	16.69	(10.37)
14	30.4	23.33	(14.50)
15	24.6	28.83	(17.91)
Reverse			
1	240.9	2.94	(1.83)
2	168.3	4.21	(2.62)
3	110.9	6.39	(3.97)
4	73.6	9.63	(5.98)

*Calculated with a tyre radius index of 855 mm (33.7 in)

Power take-off

Position:	At rear of tractor in vertical centre plane
Height above ground:	678 mm (26.7 in)
Distance behind rear axle:	559 mm (22.0 in)
Diameter:	45 mm (1.77 in)
Number of splines:	20 to I.S.O. 500
Proportional engine speed pto 1000 rev/min:	
Method of engagement:	Hydraulically actuated multi-plate clutch, selected by hand lever, independent of main clutch
Diameter of clutch plates:	196 mm (7.7 in)
Speed at rated engine speed:	998 rev/min
Engine speed at standard pto speed 1000 rev/min:	2205 rev/min
Direction of rotation viewed facing driving end:	Clockwise

Power lift

Make and type of pump:	John Deere, radial piston, variable delivery, constant pressure
Nominal working pressure:	13.8 MPa (2000 lb/in^2)
Pump drive:	From front of engine crankshaft
Oil supplied from:	Transmission housing via charge pump
Oil capacity:	98.0 l (172.5 UK pt), common with transmissio
Oil capacity available for external use:	6.0 l (10.6 UK pt)
Permissible additional fill for external use:	7.0 l (12.3 UK pt)
Number of rams:	One internal, two external
Type, number and position of external tapping:	Two at rear of tractor, controls in cab with separate levers
Linkage category:	3 and 3 narrow, to I.S.O. 730/1 and ASAE S34 ~~for dimensions~~ see pages 17 & 18
Controls:	Draught or position control with intermediat steps, lower link sensing, adjustable speed drop.

Drawbar

Type:	Swinging
Vertical height to centre of clevis:	max. 576 mm (22.7 in), min. 464 mm (18.3 in)
Changed by:	Inverting drawbar and repositioning clevis
Distance behind rear axle centre:	1067 mm (42.0 in) and 997 mm (39.3 in)
Distance behind pto:	508 mm (20.0 in) and 438 mm (17.2 in)
Lateral adjustment:	390 mm (15.4 in) and 375 mm (14.8 in)
Pivot position relative to rear axle:	511 mm (20.1 in) forward
Drawbar pin hole diameter:	37 mm (1.5 in)

Hitch

Make and type:	None

Steering

Make and type:	John Deere, hydraulic, incorporating manual control for emergency
Make and type of pump:	John Deere, main hydraulic pump
Oil supplied from:	Transmission

Brakes

Make and type:	John Deere, oil immersed disc
Position:	On rear axle differential shafts
Method of operation:	Hydraulically actuated from main system, operated by two pedals, independently or combined
Type of parking brake:	Transmission lock
Method of operation:	Gear selection lever
Emergency brake:	Oil supplied from accumulator through hand lever actuated valve, to multi plate transmission brake

Wheels

Steering wheels:

Make and size of tyres:	BF Goodrich Power Grip 16.9-28
Type:	Radial-ply 10-ply rating
Maximum mass on each tyre and pressure:	2380 kg (5247 lb) at 200 kPa (29 lb/in^2)
Track width:	1530 mm (60.2 in) by 8 steps to 2190 mm (86.2 in)
Changed by:	Reversing wheels and off-set lug rims

Driving wheels:

Make and size of tyres:	BF Goodrich Power Saver 20.8-38
Type:	Radial-ply 10-ply rating
Maximum mass on each tyre and pressure:	3475 kg (7661 lb) at 160 kPa (23 lb/in^2)
Track width:	1600 mm (63.0 in) by infinite steps to 2980 mm (117.3 in)
Changed by:	Rack and pinion axle, reversing wheels and off-set lug rims

Wheelbase 2974 mm (117.1 in)

Cab

Description: John Deere Sound-Gard Cab has an integral four-post protective structure attached to the tractor through four anti-vibration mounts. Fitted with a door and mounting steps on the left side, air conditioning system and noise reduction padding on the inside.

Lighting

Unrestricted beam angle of headlight in plan view 120°

	Height above ground of centre, mm	(in)	Size mm	(in)	Distance from outside edge of tractor at 1600 mm (63.0 in) wheel track, to centre, mm	(in)
Headlights	1133	(44.6)	130	(5.1)dia	1157	(45.6)
Side lights	1554	(61.2)	70 (2.8) x 20 (0.8)		334	(13.1)
Rear lights	1781	(70.1)	70 (2.8) x 30 (1.2)		382	(15.0)
Reflectors						
Upper	1780	(70.1)	76 (3.0)dia		248	(9.8)
Lower	742	(29.2)	76 (3.0)dia		1124	(44.3)

Number of grease points

Whole tractor: 26

Overall dimensions

	Length, m	(in)	Width, max. m	(in)	Width, min. m	(in)	Maximum height to top of exhaust, m	(in)
Without ballast	5.05	(199)	3.51	(138)	2.74	(108)	3.31	(130)
With ballast	5.42	(213)	3.51	(138)	2.74	(108)	3.30	(130)

Minimum ground clearance 345 mm (13.6 in) to underside of drawbar frame

Seat

Make and type: John Deere Hydra Cushioned

Suspension and damping: By gas charged accumulators as spring. Power from main hydraulic system.

Range of adjustment: Longitudinal: 150 mm (5.9 in)

Vertical: 64 mm (2.5 in)

CONDITIONS DURING TEST

Masses

Tractor (without driver but with tanks full)

	Front, kg (lb)	Rear, kg (lb)	Total, kg (lb)
Without ballast	2858 (6301)	5130 (11310)	7988 (17611)
With ballast	3506 (7729)	5752 (12681)	9258 (20410)

Ballast

	Number of weights	Total mass, kg (lb)	Water, kg (lb)
Front wheels	Nil	Nil	Nil
Rear wheels (dual)	Nil	817 (1801)	Nil
Additional	Front frame plus 8 weights	453 (999)	-

Track setting during tests

Front - 2015 mm (79.3 in)

Rear - 2015 mm (79.3 in)

FUEL AND LUBRICANTS USED IN TESTS

Fuel

Laboratory tests: Pto: Diesel oil to S.A.E. J313 Grade 2-d, specific gravity 0.8280 at 15°C (59°F), viscosity 2.25 cSt at 40°C (104°F), Cetane No. 50

Engine: Diesel oil to S.A.E. J313 Grade 2-d, specific gravity 0.8265 at 15°C (59°F), viscosity 2.21 cSt at 40°C (104°F), Cetane No. 50

Drawbar tests: Diesel oil to S.A.E. J313 Grade 2-d, specific gravity 0.8290 at 15°C (59°F), viscosity 2.25 cSt at 40°C (104°F), Cetane No. 50

Oil

Engine: John Deere, Torq-Gard Supreme, S.A.E. 15W40, viscosity 65 cSt at 50°C (122°F)

Transmission and power lift: John Deere, Hy-Gard, viscosity 38 cSt at 50°C (122°F)

Front axle and front hubs: John Deere, J11E, S.A.E. 85W/140, multi purpose, viscosity 250 cSt at 50°C (122°F)

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 20th October 1982, John Deere, Tractor Works, USA

Type of dynamometer: Eaton, Dynamatic

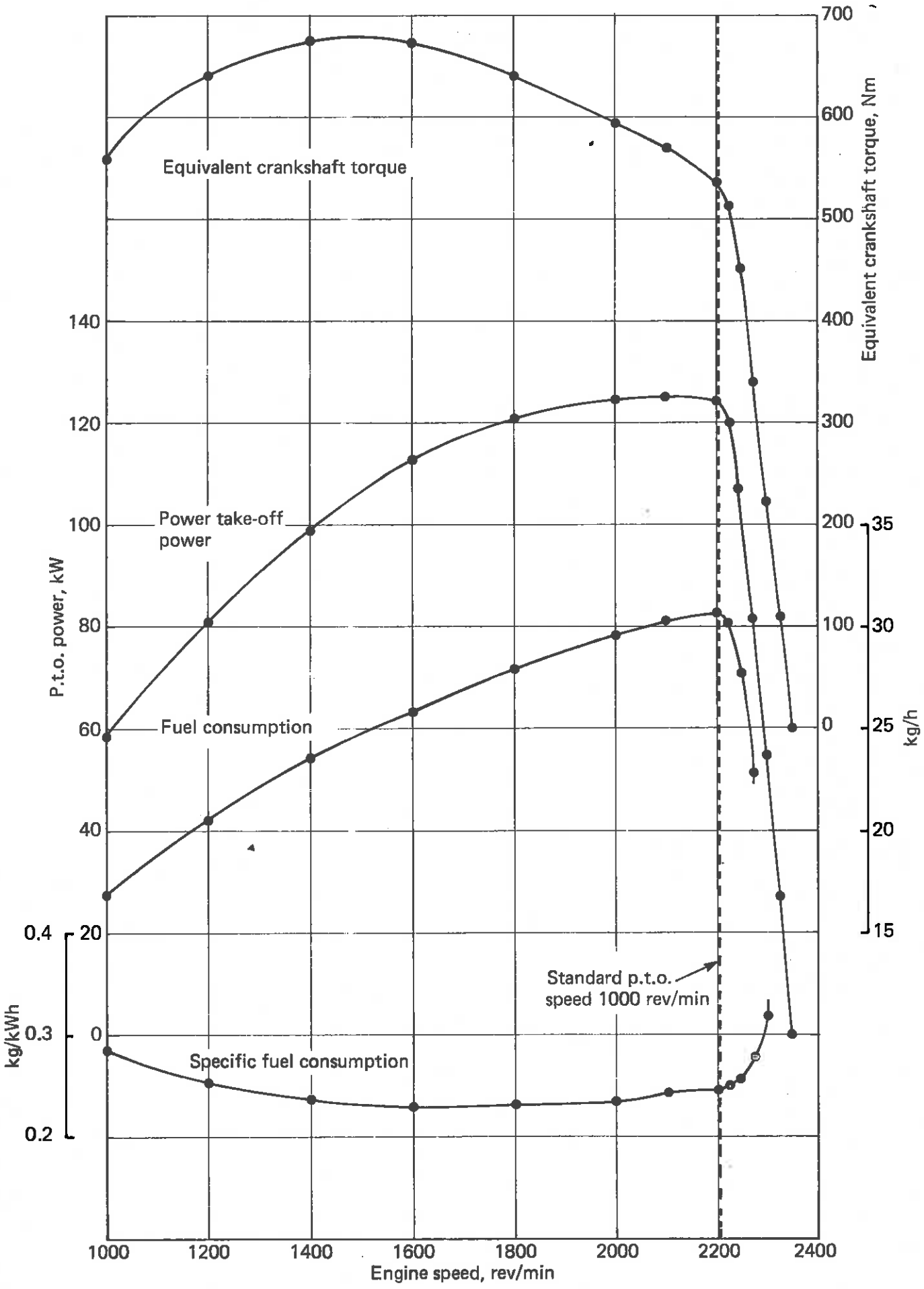
Power, kW (hp)	Speed, rev/min		Fuel consumption			
			Hourly,		Specific,	Spec. energy,
	Engine	P.t.o.	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Maximum power - 2 hour test						
125.6 (168.4)	2100	953	36.74 (8.08)	30.42 (67.06)	0.242 (0.398)	3.42 (20.8)
The speed recommended by the manufacturer for drawbar work						
124.2 (166.6)	2200	998	37.08 (8.16)	30.70 (67.68)	0.247 (0.406)	3.35 (20.4)
Part loads						
(1) 85% of the torque obtained at rated speed						
107.7 (144.4)	2244	1018	33.44 (7.36)	27.69 (61.04)	0.257 (0.422)	3.22 (19.6)
(2) Unloaded						
0	2350	1066	9.72 (2.14)	8.05 (17.75)	-	-
(3) 50% of the torque defined in (1)						
55.2 (74.0)	2301	1044	21.35 (4.70)	17.68 (38.98)	0.320 (0.526)	2.59 (15.8)
(4) Maximum power at rated speed						
124.2 (166.6)	2200	998	37.08 (8.16)	30.70 (67.68)	0.247 (0.406)	3.35 (20.4)
(5) 25% of the torque defined in (1)						
27.8 (37.3)	2323	1054	15.68 (3.45)	12.98 (28.62)	0.467 (0.768)	1.77 (10.8)
(6) 75% of the torque defined in (1)						
81.9 (109.8)	2277	1033	27.60 (6.07)	22.85 (50.37)	0.279 (0.459)	2.97 (18.1)

Power, kW (hp)	Speed, rev/min		Fuel consumption, Hourly, l/h (UKgal/h)	Hourly, kg/h (lb/h)	Specific, kg/kWh (lb/hph)	Spec. Energy, kWh/l (hph/UKgal)
	Engine	P.t.o.				
Part loads, the governor hand lever in the position corresponding to the standard p.t.o. speed at full load (1000 rev/min)						
(1) 85% of the torque obtained at maximum power						
107.7 (144.4)	2244	1018	33.44 (7.36)	27.69 (61.04)	0.257 (0.422)	3.22 (19.6)
(2) Unloaded						
0	2350	1066	9.72 (2.14)	8.05 (17.75)	-	-
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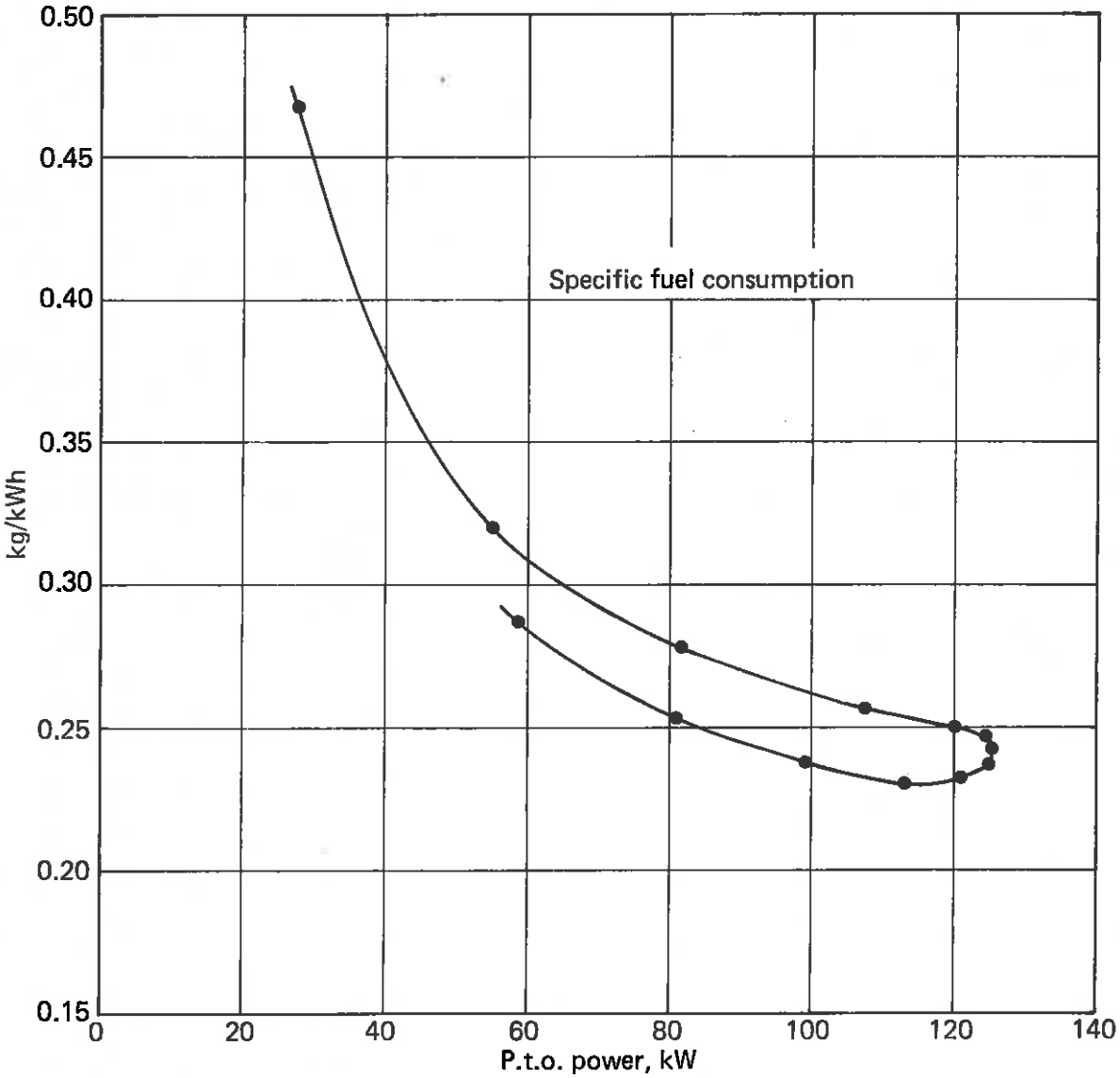
Standard specific fuel consumption, kg/kWh (lb/hph)

(a) 0.257 (0.422) (b) 0.320 (0.526) (c) 0.257 (0.422) (d) 0.320 (0.526)

No load, maximum engine speed		2350 rev/min
Equivalent crankshaft torque at maximum power		571.0 Nm (421.1 lb ft)
Maximum equivalent crankshaft torque		680.0 Nm (501.5 lb ft) at 1480 rev/min engine speed
Mean atmospheric conditions	temperature	17°C (63°F)
	pressure	990 m bar (29.23 in Hg)
	relative humidity	39%
Maximum temperature	coolant	85°C (185°F)
	engine oil	98°C (208°F)
	fuel	41°C (106°F)
	air intake	23°C (73°F)



Power take-off test



Power take-off test

2 DRAWBAR PERFORMANCE

Date of tests: October 1982
Type of track: Concrete

Height of drawbar above ground: Unballasted: 420 mm (16.5 in)
Ballasted: 450 mm (17.7 in)

Gear	Speed, km/h (mile/h)	Power, kW (hp)	Drawbar pull, kN (lb)	Engine speed, rev/min	Wheel-slip, %	Specific fuel consumption, kg/kWh (lb/hph)	Specific fuel consumption, kWh/l (hph/lKgal)	Temperature, °C (°F) Fuel	Coolant	Engine oil	Atmospheric conditions: Temperature, °C (°F)	Relative humidity, %	Pressure, m bar (in Hg)
(i) MAXIMUM POWER (unballasted) Tyre inflation pressure: front 110 kPa (16 lb/in^2), rear 110 kPa (16 lb/in^2)													
3	3.47 (2.16)	73.3 (98.3)	76.0 (17090)	2274	10.4	-	-	39 (102)	82 (180)	92 (198)	10 (50)	66	986 (29.12)
4	4.28 (2.66)	91.7 (123.0)	77.1 (17330)	2246	11.5	-	-	40 (104)	81 (178)	92 (198)	10 (50)	66	986 (29.12)
5	4.81 (2.99)	101.9 (136.6)	76.2 (17130)	2159	10.5	-	-	39 (102)	84 (183)	93 (199)	10 (50)	66	986 (29.12)
6	5.50 (3.42)	104.7 (140.4)	68.5 (15400)	2106	7.0	-	-	40 (104)	83 (181)	93 (199)	10 (50)	66	986 (29.12)
7	6.45 (4.01)	105.6 (141.6)	58.9 (13240)	2100	4.9	-	-	40 (104)	83 (181)	93 (199)	11 (52)	55	986 (29.12)
8	7.49 (4.65)	103.8 (139.2)	49.9 (11220)	2096	3.9	-	-	38 (100)	84 (183)	94 (201)	11 (52)	55	986 (29.12)
(ii) MAXIMUM POWER (ballasted) Tyre inflation pressure: front 120 kPa (18 lb/in^2), rear 80 kPa (12 lb/in^2)													
1	2.08 (1.29)	51.6 (69.2)	89.2 (20050)	2314	10.7	0.387 (0.637)	2.14 (13.0)	39 (102)	80 (176)	94 (201)	8 (46)	62	998 (29.47)
2	2.90 (1.80)	72.1 (96.7)	89.4 (20100)	2272	10.8	0.343 (0.564)	2.41 (14.7)	40 (104)	83 (181)	93 (199)	9 (48)	63	998 (29.47)
3	3.55 (2.21)	87.2 (116.9)	88.5 (19900)	2270	10.0	0.330 (0.543)	2.51 (15.3)	39 (102)	84 (183)	95 (203)	8 (46)	62	998 (29.47)
4	4.18 (2.60)	102.6 (137.6)	88.4 (19870)	2127	9.9	0.304 (0.500)	2.73 (16.6)	40 (104)	85 (185)	93 (199)	10 (50)	54	998 (29.47)
5	4.93 (3.06)	105.8 (141.9)	77.2 (17360)	2104	5.8	0.293 (0.481)	2.83 (17.3)	40 (104)	84 (183)	93 (199)	10 (50)	54	998 (29.47)
6	5.66 (3.52)	106.4 (142.7)	67.6 (15200)	2099	4.4	0.291 (0.479)	2.85 (17.4)	40 (104)	85 (185)	94 (201)	11 (52)	77	998 (29.47)
7	6.58 (4.09)	106.9 (143.4)	58.5 (13150)	2097	3.4	0.288 (0.474)	2.87 (17.5)	40 (104)	85 (185)	95 (203)	12 (54)	48	998 (29.47)
8	7.63 (4.74)	104.3 (139.9)	49.2 (11060)	2102	2.8	0.296 (0.487)	2.80 (17.1)	41 (106)	84 (183)	94 (201)	12 (54)	48	998 (29.47)
(iii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
7	7.18 (4.46)	87.5 (117.3)	43.9 (9870)	2261	2.4	0.318 (0.523)	2.61 (15.9)	44 (111)	84 (183)	97 (207)	10 (50)	65	995 (29.38)
(iv) + FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (ii)													
3	3.57 (2.22)	-	90.5 (20350)	2239	-	-	-	44 (111)	83 (181)	97 (207)	14 (57)	50	995 (29.38)

Total oil consumption during ten hours duration of tests (iii) and (iv) Negligible

+Test (iv) 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 (Front wheel drive engaged)

Details of wheel equipment: As in specification, without ballast

Track of wheels: front - 2015 mm (79.3 in)
rear - 2015 mm (79.3 in)

	With brakes		Without brakes	
	Left-hand	Right-hand	Left-hand	Right-hand
Radius of turning space, m (in)	4.69 (185)	4.69 (185)	6.48 (255)	6.32 (249)
Radius of turning circle, m (in)	4.43 (174)	4.43 (174)	6.22 (245)	6.06 (239)

4. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm (in)	1030 (40.6)
Distance forward from the vertical plane containing the axis of the rear wheels, mm (in)	1057 (41.6)
Distance from the median plane of the tractor, mm (in)	0

5. BRAKING (Front wheel drive disengaged)

Date of tests: 2nd and 3rd November 1982

Type of track: Concrete

Masses during brake tests

	Front, kg (lb)	Rear, kg (lb)	Total, kg (lb)
Ballasted	4078 (8990)	5710 (12588)	9788 (21578)
Unballasted	2858 (6301)	5130 (11310)	7988 (17611)

Tyres:

Front: 16.9-28, 10-ply rating

Rear: 20.8-38, 10-ply rating

Type 0 Service brakes (cold)

Travelling speed before application of brakes, 31.0 km/h (19.3 mile/h)

Ballasted	Force on brake pedal	N (lb)	160 (36)	220 (49)	280 (63)	340 (76)	400 (90)	460 (103)	490 (110)
	Mean deceleration	m/s^2 (ft/s^2)	0.8 (2.6)	1.3 (4.3)	1.8 (5.9)	2.3 (7.5)	2.8 (9.2)	3.3 (10.8)	3.5 (11.5)
Unballasted	Force on brake pedal	N (lb)	150 (34)	200 (45)	250 (56)	300 (67)	350 (79)	400 (90)	440 (99)
	Mean deceleration	m/s^2 (ft/s^2)	0.9 (3.0)	1.4 (4.6)	1.9 (6.2)	2.3 (7.5)	2.8 (9.2)	3.2 (10.5)	3.6 (11.8)

Type 1 Service brakes (hot)

Ballasted	Force on brake pedal	N (lb)	120 (27)	180 (40)	240 (54)	300 (67)	360 (81)	420 (94)	480 (108)
	Mean deceleration	m/s^2 (ft/s^2)	0.5 (1.6)	1.0 (3.3)	1.6 (5.2)	2.1 (6.9)	2.6 (8.5)	3.1 (10.2)	3.6 (11.8)

Brakes were heated by: Towing

Comments on deviation and vibration: None

Parking brake: Transmission lock engaged by gear selector lever

6. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests: 8th November 1982
Type of sound level meter: Bruel and Kjaer 2204
Type of track: Concrete
Results of tests:
Gear: 15th
Travelling speed before acceleration: 23.3 km/h (14.5 mile/h)
Sound level: 90 dBA

7. NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests: 8th November 1982
Type of sound level meter: Bruel and Kjaer 2204
Type of track: Concrete
Cab fitted: Yes

Results of tests

Gear	Drawbar pull at which the tractor develops maximum sound level, kN (lb)	Measured travelling speed, km/h (mile/h)	Sound level, dBA
All openings closed with cab fitted			
*8	45.0 (10120)	8.0 (5.0)	79
*8	Light load	8.7 (5.4)	75
15	Light load	31.0 (19.3)	77

*The 8th gear corresponds to the nominal travelling speed nearest to 7.5 km/h (4.7 mile/h).

8. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date of tests: 28th October 1982
Hydraulic fluid:
Make and type: John Deere Hy-Gard
Viscosity: 38 cSt at 50°C (122°F)

Type of linkage lock for transport: Hydraulic

Power lift

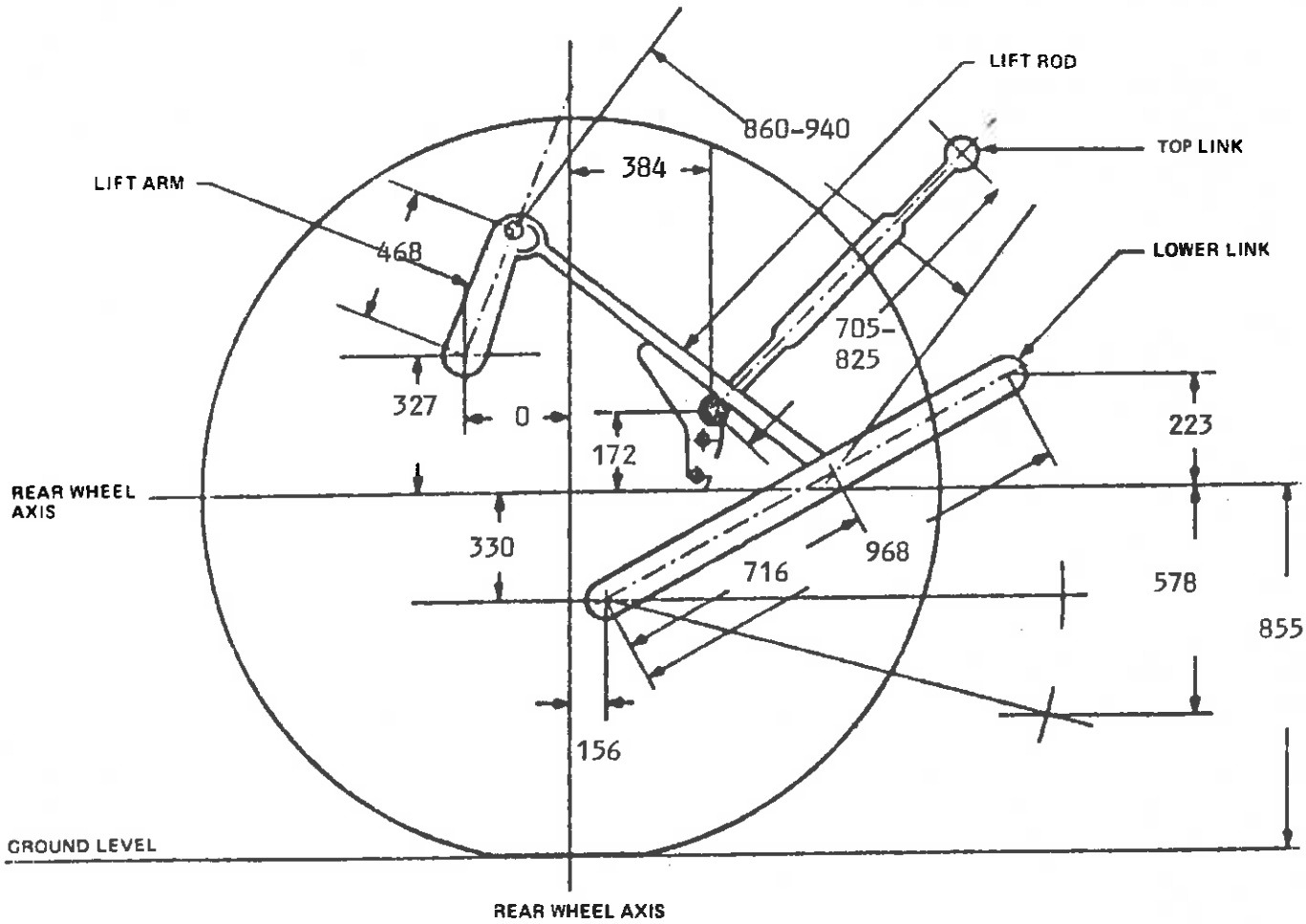
	Height of lower hitch point above ground in down position, mm (in)	Vertical movement, mm (in)	Maximum force exerted through full range, kN (lb)	Corresponding pressure of hydraulic fluid, MPa (lb/in^2)	Moment about rear axle, kNm (lb ft)	Maximum tilt angle of mast over range of lift, degrees
At the hitch points	277 (10.9)	801 (31.5)	40.2 (9040)	14.1 (2040)	45.2 (33340)	-
On the frame	277 (10.9)	920 (36.2)	39.2 (8810)	14.1 (2040)	68.0 (50150)	13

Hydraulic pump performance

Opening pressure of the relief valve:	12.0 MPa (1740 lb/in^2)
Sustained pressure with relief valve open:	16.0 MPa (2320 lb/in^2)
Opening pressure of the unloading valve:	Not applicable
Closing pressure of the unloading valve:	Not applicable
Pump delivery rate at minimum pressure, the governor control lever set for maximum power:	124.2 l/min (27.3 gal/min)
Pressure specified by the manufacturer for an external hydraulic motor:	12.0 MPa (1740 lb/in^2)
Hydraulic power at 12.0 MPa (1740 lb/in^2):	23.7 kW (31.8 hp)
Pump delivery rate at stated power:	118.2 l/min (26.0 gal/min)
Tapping point:	
Temperature of hydraulic fluid:	67°C (153°F)

Power lift

Dimensions of linkage geometry, mm (lift rod length 900 mm



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

Projected length in side view		
Lower links	968	(38.1)
Lift arms	468	(18.4)
Lift rods	897	(35.3)
Top link	742	(29.2)
Distance of lift rod connection point from pivot point of lower link	716	(28.2)
The following dimensions are given relative to the rear wheel centre line, situated 855 mm (33.7 in) above the ground level		
Lower link pivot point	156 (6.1) behind,	330 (13.0) below
Top link pivot point	384 (15.1) behind,	172 (6.8) above
Lift arm pivot point	On centreline	327 (12.9) above
Maximum and minimum height of lower link hitch points	223 (8.8) above,	578 (22.8) below
Height of lower link hitch points when locked in transport position	Any height within lift range	

OPTIONAL TESTS

9. PERFORMANCE AT ENGINE CRANKSHAFT

Date and location of tests: 11th November 1982, John Deere, Tractor Works, USA

Type of dynamometer: Eaton Dynamatic

Power, kW (hp)	Speed, rev/min	Fuel consumption, Hourly, l/h (UKgal/h)	Hourly, kg/h (lb/h)	Specific, kg/kWh (lb/hph)	Spec. energy, kWh/l (hph/UKgal)
Maximum power - 2 hour test					
136.2 (182.6)	2140	36.69 (8.07)	30.36 (66.93)	0.223 (0.367)	3.71 (22.6)
The speed recommended by the manufacturer for drawbar work					
134.3 (180.1)	2200	36.77 (8.09)	30.43 (67.09)	0.227 (0.373)	3.65 (22.3)
Part loads					
(1) 85% of the torque obtained at maximum power					
116.3 (156.0)	2238	32.76 (7.21)	27.11 (59.77)	0.233 (0.383)	3.55 (21.6)
(2) Unloaded					
-	2352	7.52 (1.65)	6.22 (13.71)	-	-
(3) 50% of the torque defined in (1)					
59.6 (79.9)	2295	20.16 (4.44)	16.68 (36.77)	0.280 (0.461)	2.96 (18.0)
(4) Maximum power at rated speed					
134.3 (180.1)	2200	36.77 (8.09)	30.43 (67.09)	0.227 (0.373)	3.65 (22.3)
(5) 25% of the torque defined in (1)					
30.1 (40.4)	2316	13.85 (3.05)	11.46 (25.26)	0.381 (0.627)	2.17 (13.2)
(6) 75% of the torque defined in (1)					
88.3 (118.4)	2267	26.36 (5.80)	21.81 (48.08)	0.247 (0.406)	3.35 (20.4)

No load, maximum engine speed — 2352 rev/min

Crankshaft torque at maximum power — 607.7 Nm (448.2 lb ft)

Maximum crankshaft torque — 714.9 Nm (527.3 lb ft) at 1460 rev/min engine speed

Mean atmospheric conditions — temperature: 16°C (61°F)

pressure: 978 m bar (28.88 in Hg)

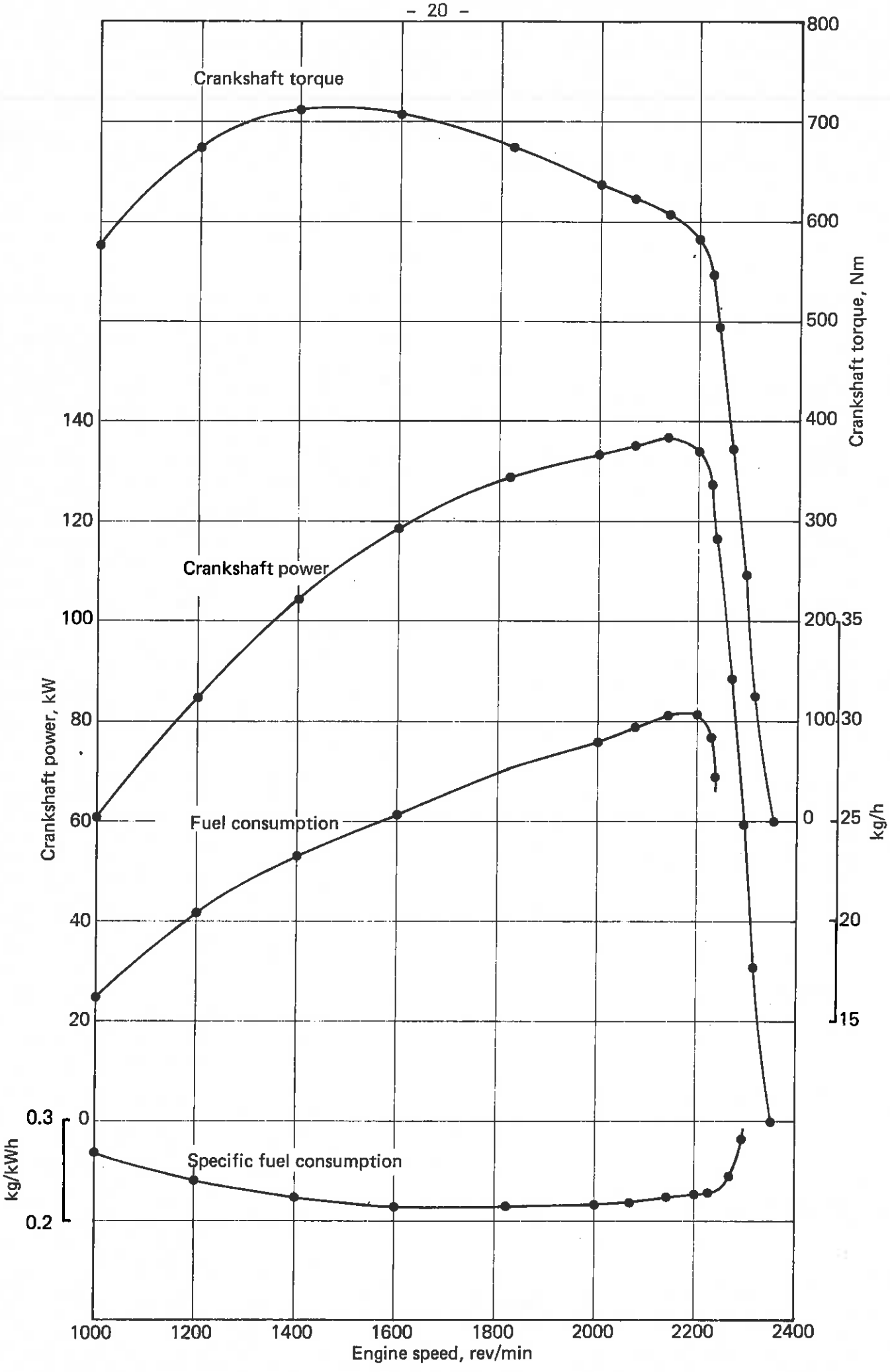
relative humidity: 54%

Maximum temperature — coolant: 85°C (185°F)

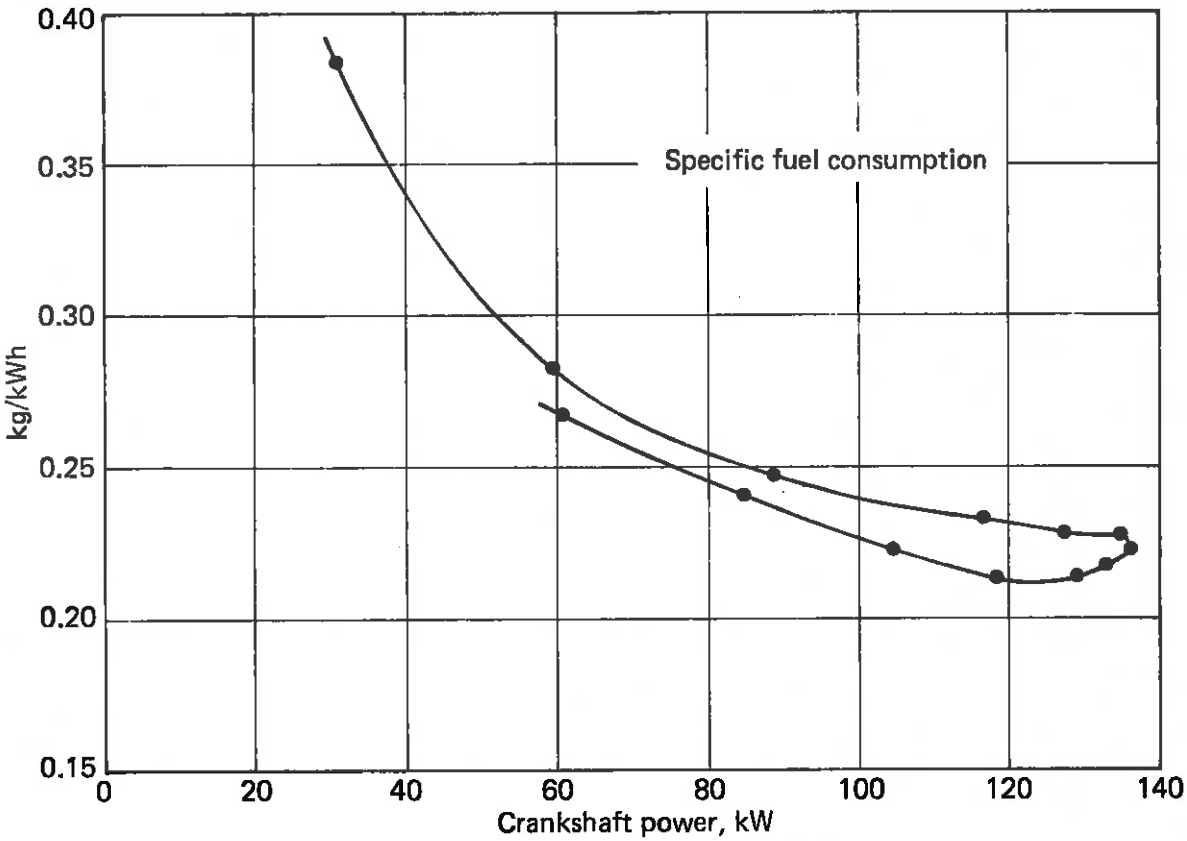
engine oil: 97°C (207°F)

fuel: 42°C (108°F)

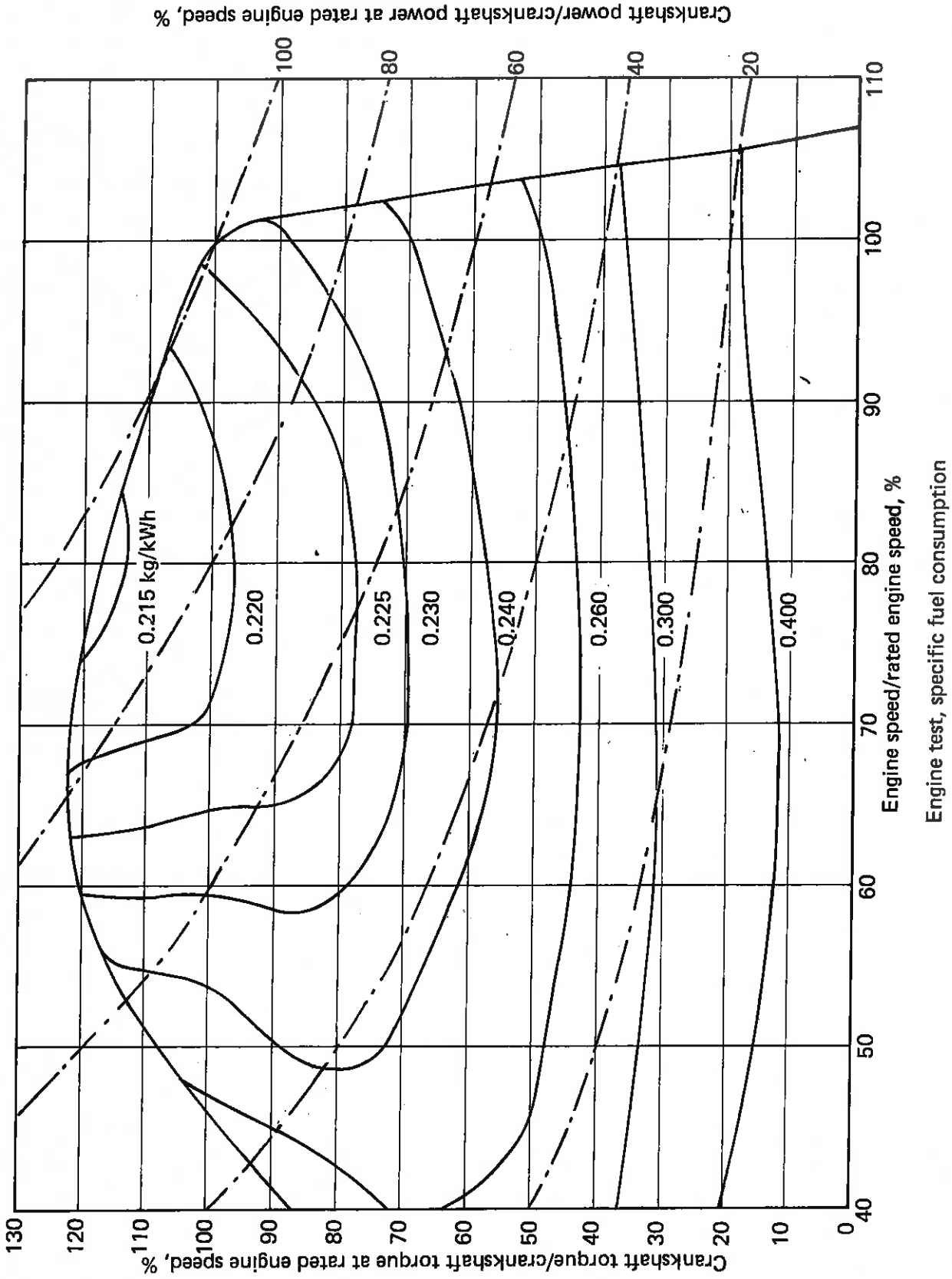
air intake: 22°C (72°F)


Crankshaft torque
Crankshaft power
Fuel consumption
Specific fuel consumption
Crankshaft power, kW
Crankshaft torque, Nm
kg/h
kg/kWh
Engine speed, rev/min
800
700
600
500
400
300
200
100
0
140
120
100
80
60
40
20
0
35
30
25
20
15
0.3
0.2
1000
1200
1400
1600
1800
2000
2200
2400

Engine test


0.40
0.35
0.30
0.25
0.20
0.15
kg/kWh
Specific fuel consumption
0
20
40
60
80
100
120
140
Crankshaft power, kW

Engine test


Crankshaft power/crankshaft power at rated engine speed, %
100
80
60
40
20
110
100
90
80
70
60
50
40
0.215 kg/kWh
0.220
0.225
0.230
0.240
0.260
0.300
0.400
Engine speed/rated engine speed, %
Engine test, specific fuel consumption
Crankshaft torque/crankshaft torque at rated engine speed, %
130
120
110
100
90
80
70
60
50
40
30
20
10
0

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS:

Dual rear wheels are recommended by the manufacturer for field work where tyre carrying capacity allows added ballast to control wheel slip and were fitted during the 'Ballasted' tests. The tractor was fitted with single wheels for the 'Unballasted' tests.

Test carried out by: F. Thistlethwaite, J.P. Evans

Signed: D.W. Smith Tractor Test Section

for the Director

Date: 10th February 1983