Order complete

OECD Approval No. 980

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

Report on test of Zetor 14145 Tractor with Four-wheel Drive



Manufactured by

Zavody Tazkeho Strojarstva
Narodny Podnik
Box 03657 Martin
Czechoslovakia

Test No. R85/70477/OECD

Report No. 702

Date October 1985

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

National Institute of Agricultural Engineering
Wrest Park Silsoe Bedford MK45 4HS

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TABLE OF CONTENTS

		Page No.
I	SPECIFICATION OF TRACTOR	1
	Conditions during test	14
	Fuels and lubricants used in tests	15
II	TEST RESULTS	
A	COMPULSORY TESTS	16
	1. Main power take-off performance	16
	2. Lifting force and hydraulic power	20
	3. Drawbar performance	22
	4. Turning space and turning circle	23
	5. Location of centre of gravity	23
	6. Braking	24
	7. Measurement of external noise level	25
	8. Noise measurement at the driver's ear	25
B	SUPPLEMENTARY TESTS	26
	Hydraulic power test on independent front-mounted pump	26

Tractor manufacturer's name and address:	Zavody Tazkeho Strojarstva, Narodny Podnik, Box 03657 Martin, Czechoslovakia.
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with the agreement of the testing station
Place of running in:	Z.T.S. Martin, Czechoslovakia
Duration of running in:	198 hours

I. SPECIFICATION OF TRACTOR

TRACTOR

Make:	Z.T.S. N.P. Martin
Trade name:	Zetor
Model:	Z 14145
Type:	4-wheel drive, unit construction
Serial No:	14145 0001
1st Serial No:	14145 0001

ENGINE

Make:	Z.T.S. N.P. Martin
Model:	Z 8602.11
Type:	4-stroke, direct injection diesel, turbocharged
Serial No:	000 001
Cylinders	
Number/disposition:	6, vertical in-line
Bore/stroke:	110 mm x 120 mm (4.3 in x 4.7 in)
Capacity:	6842 cm^3 (417 in^3)
Compression ratio:	17:1 nominal
Arrangement of valves:	Overhead
Cylinder liners:	Replaceable, wet
Supercharging	
Make:	CZM
Model:	K27.2966 u/17.21
Type:	Exhaust driven
Supercharging pressure:	0.90 MPa (130 lb/in^2)

Fuel System	
Fuel feed system:	Lift pump integral with fuel injection pump
Make, type and model of fuel filter(s):	Autobrzdy, dual, 03-9800.00
Capacity of fuel tank:	195 l (42.9 UK gal)
Make, type and model of injection pump:	Motorpal, in line, PP6 M9 KLE 3136
Serial No:	6M3120 J0025
Manufacturer's production setting of injection pump:	28.1-29.5 l/h (49.5-51.9 UK pt/h) at 2200 rev/min engine speed at full load
Injection pump timing:	Delivery starts 22° + 2° before T.D.C.
Make, type and model of injectors:	Motorpal, DOP 150S5351417, 5 hole
Injection pressure:	16.8-17.6 MPa (166-174 atm)
Governor	
Make:	Motorpal
Type:	Mechanical
Model:	RV 3M 300/1100
Governed range of engine speed:	600-2450 rev/min
Rated engine speed:	2200 rev/min
Air cleaner	
Pre-cleaner	
Make:	Sandrik
Type:	Stack cap with centrifugal dust trap
Model:	PC 750
Location:	Above bonnet on centre line
Main	
Make:	Sandrik
Type:	Oil bath
Model:	9470.11
Oil capacity:	2.1 l (3.7 UK pt)
Location:	Under bonnet forward of radiator
Maintenance indicator	None
Lubrication system	
Type of feed pump:	Gear
Total oil capacity including filter(s):	19.0 l (33.4 UK pt)
Oil change period:	200 hours
Type of filter(s):	Centrifugal, replaceable element
Number:	1
Filter(s) change period:	200 hours
Recommended oil:	See "Fuels and lubricants used in tests"

Cooling system	
Type of coolant:	Water and anti-freeze 1:1
Specification of pump	
Type:	Centrifugal, belt driven
Description of fan:	Belt driven
Number of fan blades:	8
Fan diameter:	460 mm (18.1 in)
Coolant capacity:	25.0 l (44.0 UK pt)
Type of temperature control:	Thermostat
Superpressure system:	0.41 bar (5.9 lb/in^2)
Starting system	
Safety device:	Gear selector lever to be in neutral position
Make:	Polmo-Elmot
Type:	Electrical, solenoid engaged
Model and starter motor power rating:	R20E, 24V, 5.5 kW (7.4 hp)
Cold starting aid:	None
Electrical system	
Voltage:	12
Generator:	Alternator
Make:	Pal-Magneton
Model:	443 113 516 184
Type:	14v, 55A
Power:	55 A at 9000 rev/min
Batteries	2, Prazska, accumulators
Rating:	2 x 100 Ah at 20 hour rating
Exhaust system	
Make:	Z.T.S.
Type:	Oval, baffle
Model:	
Location:	Left-hand side of engine, vertical
Height of outlet above ground:	2.77 m (109 in)

TRANSMISSION

Clutch	
Make:	Z.T.S.
Type:	Dry, for transmission only
Number of plates:	1
Diameter of plate:	380 mm (15.0 in)
Method of operation:	Mechanically by pedal
Gear box	
Make:	Povazske Strojarne
Type:	Mechanical
Arrangement:	4 forward x 2 ranges x torque multiplyer 4 reverse x torque multiplyer
Number of speeds:	16 forward and 8 reverse
Available options:	1 creep gear, less torque multiplyer
Rear axle and final drives	
Make:	ZPC Ursus
Type:	Crown wheel and pinion, bevel gear and differential planetary reduction gear final drives
Differential lock	
Type:	Mechanical
Method of engagement:	Manual by pedal
Method of disengagement:	Self-disengaging
Front axle and final drives	
Make:	Z.T.S. DETVA
Type:	Crown wheel and pinion, bevel gear and differential planetary reduction gear final drives
Driven from:	Front of gearbox, through hydraulic clutch arrangement controlled by hand lever
Differential lock	None
Transmission oils	
Capacity	
Gear box and transmission housing:	53.5 l (94.2 pt) including oil for hydraulics
Change period:	1200 hours
Filter change period:	600 hours
Final drive(s):	2 x 4.01 (14.1 UK pt)
Change period:	1200 hours
Power lift:	Common with gearbox
Front axle	
Differential:	3.5 l (6.2 UK pt)
Final drives:	1.5 l x 2 (5.3 UK pt)
Change period:	1200 hours
Type of oil filter:	None
Recommended oil:	See "Fuels and lubricants used in test"

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	(mile/h)
Forward				
1	LM	348.40	1.95	(1.21)
1	L	260.40	2.61	(1.62)
2	LM	221.03	3.08	(1.91)
2	L	165.20	4.12	(2.56)
3	LM	139.10	4.89	(3.04)
1	HM	119.41	5.70	(3.54)
3	L	103.98	6.54	(4.06)
4	LM	97.71	6.96	(4.33)
1	H	89.26	7.62	(4.73)
2	HM	76.04	8.94	(5.56)
4	L	73.03	9.31	(5.79)
2	H	56.63	12.01	(7.46)
3	HM	47.68	14.26	(8.86)
3	H	35.64	19.08	(11.86)
4	HM	33.50	20.30	(12.62)
4	H	25.04	27.16	(16.88)
Reverse				
1	M	254.75	2.67	(1.66)
1		190.42	3.57	(2.22)
2	M	161.63	4.21	(2.61)
2		120.82	5.63	(3.50)
3	M	101.72	6.69	(4.15)
3		76.04	8.94	(5.56)
4	M	71.45	9.52	(5.91)
4		53.40	12.74	(7.91)

M = Torque multiplier engaged L = Low range H = High range

Rear tyre size: 18.4-38

Tyre loaded radius: 820 mm (32.3 in)

POWER TAKE-OFF

Main power take-off

Type:	Hydraulically operated, independent of main clutch
Method of engagement:	By hand lever
Number of shafts:	1
Method of changing power take-off speeds:	Manually, by exchanging shafts

Power take-off proportional to engine speed

(i) 540 rev/min

Location:	At rear of tractor
Diameter of power take-off shaft:	34.9 mm (1.375 in)
Number of splines:	6 to ISO standard
Height above ground:	667 mm (26.3 in)
Tyre sizes, Front, Rear	14.9-28, 18.4-38
Distance from the median plane of the tractor:	Central
Distance behind rear axle:	510 mm (20.1 in)
Pto speed at rated engine speed:	628 rev/min
Engine speed at standard power take-off speed:	1890 rev/min
Engine to pto ratio:	3.50:1
Power restriction:	45.0 kW (60.3 hp)
Direction of rotation (viewed facing driving end):	Clockwise

(ii) 1000 rev/min

Location:	At rear of tractor
Diameter of power take-off shaft end:	34.9 mm (1.75 in)
Number of splines:	21 to ISO standard
Height above ground:	667 mm (26.3 in)
Tyre sizes, Front, Rear	14.9-28, 18.4-38
Distance from the median plane of the tractor:	Central
Distance behind rear axle:	510 mm (20.1 in)
Pto speed at rated engine speed:	1146 rev/min
Engine speed at standard power take-off speed:	1920 rev/min
Engine to pto ratio:	1.92:1
Direction of rotation (viewed facing driving end):	Clockwise

Power take-off proportional to ground speed

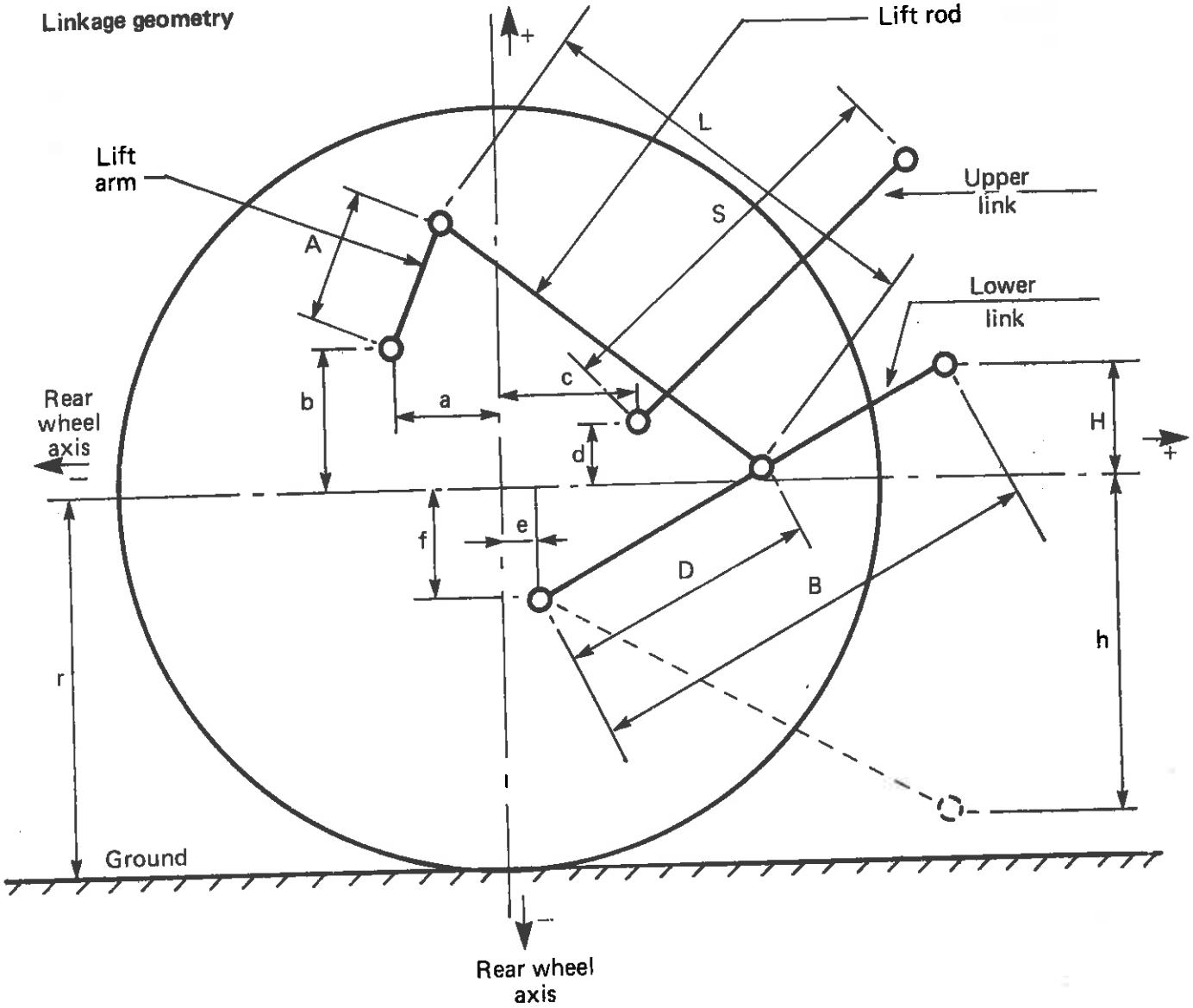
Speed of shaft:	1000 rev/min
Size of tyre:	18.4-38
Travelling distance for one revolution of power take-off shaft:	188 mm (7.4 in)
Number of pto shaft revolutions for one revolution rear wheels:	27.4
Direction of rotation with forward gear engaged:	Clockwise

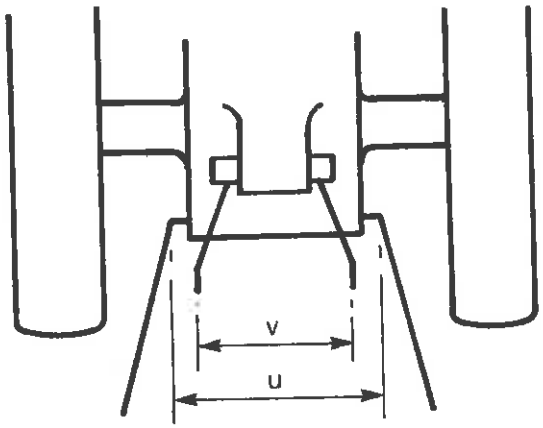
POWER LIFT

Make:	PZL Hydral Wroclaw
Type:	88 400 000
Type and number of cylinders:	One internal single acting, two external double acting
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	18.0-20.5 MPa (2610-2970 lb/in^2)
Opening pressure of cylinder safety valve:	19.0-22.0 MPa (2760-3190 lb/in^2)
Lift pump type:	Gear, PZ 2-18KS
Transmission between pump and engine:	Gear-driven
Make and number of filters:	ZPC, 2
Time between oil changes:	1200 hours
Time between filter changes:	600 hours
Oil capacity:	53.5 l (94.2 pt)
Site of oil reservoir:	Main transmission housing
Type and number of tapping points:	7, quick release at rear of tractor, 4, quick release at front right side of cab optional
Maximum volume of oil available to external cylinders:	15.0 l (26.4 pt)
Recommended oil	See "Fuels and lubricants used in test"

THREE-POINT LINKAGE

Category:	3 to ISO standard
Category adapter:	At end of lower links to category 2.
Controls	Draught or position control, lower link sensing, adjustable speed on drop.


Linkage geometry
+
Lift rod
L
Lift arm
Upper link
S
A
Lower link
c
b
a
Rear wheel axis
H
+
d
e
f
D
B
h
r
Ground
Rear wheel axis


v
u

Linkage dimensions for the lifting test

Rear tyres: (size 18.4-38) loaded radius:		(r)	820 mm (32.3 in)
Front tyres:(size 14.9-28) loaded radius:		(r')	640 mm (25.2 in)
Length of lift arms:		(A)	330 mm (9.1 in)
Length of lower links:		(B)	980 mm (38.6 in)
Distance of lift arm pivot point from rear wheel centre line:	horizontally:	(a)	170 mm (6.7 in)
	vertically:	(b)	286 mm (11.3 in)
Horizontal distance between the two lower link points:		(u)	525 mm (20.7 in)
Horizontal distance between the two lift arm end points:		(v)	555 mm (21.9 in)
Length of upper link:		(S)	330 mm (13.0 in)
Distance of upper link pivot point from rear wheel centre line	horizontally:	(c)	385 mm (15.2 in)
	vertically:	(d)	210 mm (8.3 in)
Distance of lower link pivot point from rear wheel centre	horizontally:	(e)	130 mm (5.1 in)
	vertically:	(f)	255 mm (10.0 in)
Distance of lower link points to lift rod pivot points on lower link:		(D)	498 mm (19.6 in)
Length of lift rods:		(L)	595 mm (23.4 in)
Height of lower hitch points relative to the rear wheel centre line, situated 820 mm above the ground level			
- in low position:		(h)	590 mm (23.2 in)
- in high position:		(H)	117 mm (4.6 in)
Height of lower hitch points when locked in transport position:			Any height within lift range

SWINGING DRAWBAR

Height above ground, maximum:	415 mm (16.3 in)
minimum:	332 mm (13.1 in)
Tyre sizes, Front, Rear	14.9-28, 18.4-38
Type of adjustment:	Inverting drawbar
Distance of hitch point from rear axle centre:	905 mm and 855 mm (35.6 and 33.7 in) to rear
Distance of hitch point from power take-off shaft ends:	
vertically:	335 and 252 mm (13.2 and 9.9 in)
horizontally:	370 and 320 mm (14.6 and 12.6 in) to rear
Lateral adjustment:	310 and 330 mm (12.2 and 13.0 in)
Distance of pivot point from rear axles horizontally:	330 mm (13.0 in) to rear
Diameter drawbar pin hole:	32 mm (1.3 in)

LINKAGE DRAWBAR

Height above ground, maximum:	1070 mm (42.1 in)
minimum:	170 mm (6.7 in)
Tyre sizes, Front, Rear	14.9-28, 18.4-38
Horizontal distance to power take-off shaft end:	587 mm (23.1 in), to rear
Number of holes:	9
Distance between holes:	82 mm (3.2 in)
Hole diameter:	32 mm (1.3 in)
Thickness and width of drawbar:	70 mm x 95 mm (2.8 x 3.7 in) overall with 32 mm (1.3 in) full width lateral slot

TRAILER HITCH

Height above ground, maximum:	842 mm (33.1 in)
minimum:	692 mm (27.2 in)
Tyre sizes, Front, Rear	14.9-28, 18.4-38
Distance of hitch point from rear axle centre:	890 mm (35.0 in) to rear
Distance of hitch point from power take-off shaft end:	
vertically above maximum:	180 mm (7.1 in)
minimum:	30 mm (1.2 in)
horizontally:	355 mm (14.0 in) to rear
Maximum vertical permissible load:	22.0 kN (4950 lb)
Diameter of pin hole	32 mm (1.3 in)

FRONT TOWING HITCH

Vertical height at centre of clevis:	890 mm (35.0 in)
Tyre sizes, Front, Rear	14.9-28, 18.4-38
Width of clevis:	70 mm (2.8 in)
Diameter of pin hole:	32 mm (1.3 in)

STEERING

Method of operation:	Hydrostatic power system with hand operated steering motor powered by transmission mounted gear pump operating a single, assister ram on front axle.
Make:	Pilmet
Model:	ORBITROL RB-160
Type:	Hydrostatic
Working pressure:	8.6 MPa (1250 lb/in)
Oil capacity:	8.0 l (14.1 pt)
Oil change period:	1200 hours
Make and model of filter	25M Sedzyszow, Poland; PP-8,4
Filter(s) change period:	1200 hours
Recommended oil:	See "Fuels and lubricants used in test"

BRAKES

Service brake

Make:	Zetor
Model:	89 227 000
Type:	Dry disc, multiplate, 2 per side
Method of operation:	Hydraulic by pedals coupled or independent

Parking brake

Type:	Mechanical
Method of operation:	Hand lever with ratchet operating mechanical linkage on service brakes

Trailer brakes	Air brake operated by tractor pedals

STEERING WHEELS

Number:	2
Location:	At front of tractor
Tyres:	Barum
Size:	14.9-28
Ply rating:	8
Type of casing:	Cross ply
Maximum permissible load on each tyre:	1880 kg (4145 lb)
Corresponding inflation pressure:	180 kPa (26 lb/in^2)
Track widths:	1700 and 1800 mm (67 and 71 in)
Method of adjustment:	By changing wheel discs to either side of wheel centre

DRIVING WHEELS

Number:	4
Location:	At front and rear of tractor
Rear tyres:	Taurus
Size:	18.4-38
Ply rating:	8
Type of casing:	Radial ply
Maximum permissible load on each tyre:	2715 kg (5985 lb)
Corresponding inflation pressure:	140 kPa (20.3 lb/in^2)
Track widths:	1500-1875 mm (59-74 in) by 75 mm (3.0 in) steps
Method of adjustment:	Reversing wheels and off-set lug rims

WHEELBASE 2700 mm (106.3 in)

PROTECTIVE STRUCTURE SPECIFICATIONS

OECD approval number:	None
Trade name:	Zetor BK 12145
Manufacturer's name and address:	Vlad, Presov

Description

The safety cab has an integral six-post protective structure attached to the tractor through four anti-vibration mounts, the unit does not tilt. Mounting steps and a door are fitted at each side. The structure has a steel roof, safety glass windows and noise reduction cladding.

DRIVER'S SEAT

Make:	Mars
Type of suspension:	Parallelogram linkage
Type of damping:	Hydraulic
Range of adjustment, longitudinal:	150 mm (5.9 in)
vertical:	90 mm (3.5 in)

MISCELLANEOUS

Passenger's seat:	Mars
Location:	Behind driver
Number of places:	One

LIGHTING

Tyre sizes:

Front:	14.9-28
Rear:	18.4-38

Unrestricted beam angle of head light in plan view 22°

	Height above ground of centre, mm (in)	Size, mm (in)	Distance from outside edge of tractor to centre, at 1735 mm (68.0 in) track width, mm (in)
Headlights,	1210 (47.6)	124 (4.9) dia	912 (35.9)
Sidelights,	1835 (72.2)	55 x 50 (2.2 x 2.0)	65 (2.6)
Rear lights,	1620 (63.8)	105 x 75 (4.1 x 3.0)	260 (10.2)
Reflectors,	1150 (45.3)	80 (3.1) dia	35 (1.4)

CONDITIONS DURING TEST

Overall dimensions

(front: 14.9-28 rear: 18.4-38 tyres fitted)

	Length, m (in)	Width, min. m (in)	Width, max. m (in)	Height at top of, exhaust silencer, m (in)	Height at top of, protective structure, m (in)
With ballast	4.795 (188)	2.190 (86)	2.280 (90)	2.720 (104)	2.695 (106)
Without ballast	4.665 (184)	2.190 (86)	2.280 (90)	2.77 (109)	2.680 (106)

Ground clearance

Clearance: 320mm (12.6 in) limited by drawbar bracket

Track setting

Front: 1910 mm (75.2 in)

Rear: 1735 mm (68.3 in)

Tractor mass and ballasting

Tractor mass

(without driver but with tanks full - with cab)

		Front	Rear	Total
Without ballast	kg (lb)	2007 (4424)	3093 (6818)	5100 (11243)
With ballast	kg (lb)	2540 (5600)	4064 (8960)	6604 (14560)

Ballast

	Weights		Water, kg (lb)
	Number	Total mass, kg (lb)	
Front	Nil	Nil	Nil
Rear	8	330 (728)	736 (1623)
Additional	15	438 (966)	Front frame and weights

Fuel and lubricants used in tests

Fuel

Type:	Diesel oil to Class D British Standard 2869: 1970
	Specific gravity at 15 C: 0.848

Oils	Recommended	Used during test
Engine oil		
Type:	S.A.E. 10w/30	As recommended
Viscosity:	71.5 cSt at 50 C (122 F)	
Classification:	MIL-45199B or L-2104C	
Transmission oils		
Type:	SAE 80	PP 80
Viscosity:	44.2 cSt at 50 C (122 F)	44.2 cSt at 50 C (122 F)
Classification:	API GL-4	API GL-4
Final drives		
Type:	S.A.E. 90	As recommended
Viscosity	125 cSt at 50 C (122 F)	
Classification:	API GL-3	
Hydraulic fluid		
Type:	S.A.E 80	PP 80
Viscosity:	44.2 cSt at 50 C (122 F)	44.2 cSt at 50 C (122 F)
Classification::	API GL-4	API GL-4
Front differential and final drives		
Type:	S.A.E. 80	As recommended
Viscosity:	44.2 cSt at 50 C (122 F)	
Classification:	API GL-4	
Steering oil		
Type:	OL-N2	As recommended
Viscosity:	15.2 cSt at 50 C (122 F)	
Classification:	ISO WG-22	
Recommended grease:	Mobilgrease MP	As recommended

Number of lubrication points: 24

II TEST RESULTS

A COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 4th July 1985, NIAE, Silsoe, Bedford, UK.

Type of dynamometer: Heenan & Froude

Power, kW (hp)	Speed, rev/min		Fuel consumption, Hourly,		Fuel consumption, Specific,	Specific 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						
92.0 (123.4)	1927	1003	24.88 (5.47)	20.98 (46.26)	0.228 (0.374)	3.68 (21.9)
POWER AT RATED ENGINE SPEED						
85.4 (63.7)	2200	1146	24.62 (5.42)	20.88 (46.03)	0.245 (0.403)	3.47 (21.2)
POWER AT STANDARD POWER TAKE-OFF SPEED						
91.9 (123.3)	1920	1000	24.66 (5.42)	20.91 (46.1)	0.227 (0.373)	3.72 (22.0)
PART LOADS						
(i) The torque corresponding to maximum power at rated engine speed						
85.4 (63.7)	2200	1146	24.62 (5.42)	20.88 (46.03)	0.245 (0.403)	3.47 (21.2)
(ii) 85% of the torque obtained in (i)						
75.4 (101.1)	2287	1191	22.50 (4.95)	19.08 (42.08)	0.253 (0.416)	3.34 (19.7)
(iii) 75% of the torque defined in (ii)						
57.7 (77.3)	2318	1207	19.17 (4.21)	16.25 (35.84)	0.281 (0.463)	3.00 (17.7)
(iv) 50% of the torque defined in (ii)						
40.3 (54.1)	2347	1222	15.66 (3.44)	13.28 (29.27)	0.329 (0.541)	2.57 (15.2)
(v) 25% of the torque defined in (ii)						
19.4 (26.0)	2378	1238	11.49 (2.52)	9.74 (21.49)	0.503 (0.827)	1.68 (9.9)
(vi) Unloaded						
0	2420	1260	7.7 (1.69)	6.53 (14.4)	-	-

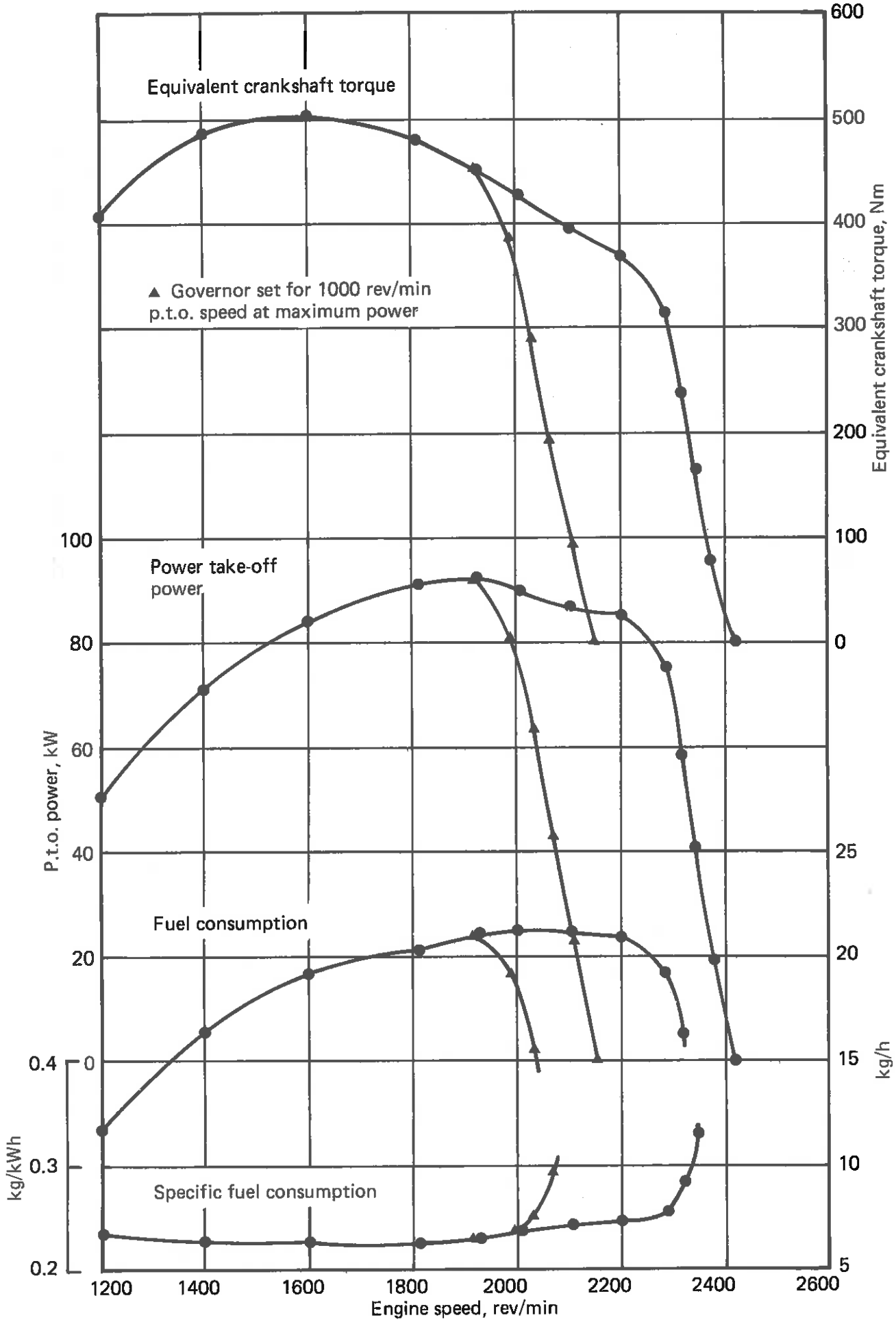
Part loads, the governor hand lever in the position corresponding to the standard p.t.o. speed at full load (1000 rev/min).

Power, kW (hp)	Speed, rev/min		Fuel consumption, Hourly,		Specific,	Specific energy,
	Engine	P.t.o.	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
(i) The torque corresponding to maximum power at standard p.t.o. speed						
91.9 (123.3)	1920	1000	24.66 (5.42)	20.91 (46.1)	0.227 (0.373)	3.72 (22.0)
(ii) 85% of the torque obtained in (i)						
80.8 (108.4))	1993	1038	22.61 (4.97)	19.17 (42.27)	0.237 (0.390)	3.57 (21.0)
(iii) 75% of the torque defined in (ii)						
61.7 (82.8)	2031	1058	18.27 (4.02)	15.5 (34.17)	0.251 (0.412)	3.37 (19.9)
(iv) 50% of the torque defined in (ii)						
41.8 (56.0)	2066	1076	14.23 (3.13)	12.07 (26.61)	0.289 (0.475)	2.39 (17.2)
(v) 25% of the torque defined in (ii)						
21.6 (29.0)	2109	1098	10.24 (2.25)	8.68 (19.15)	0.401 (0.659)	2.11 (12.4)
(vi) Unloaded						
0	2149	1119	6.25 (1.37)	5.30 (11.68)	-	-

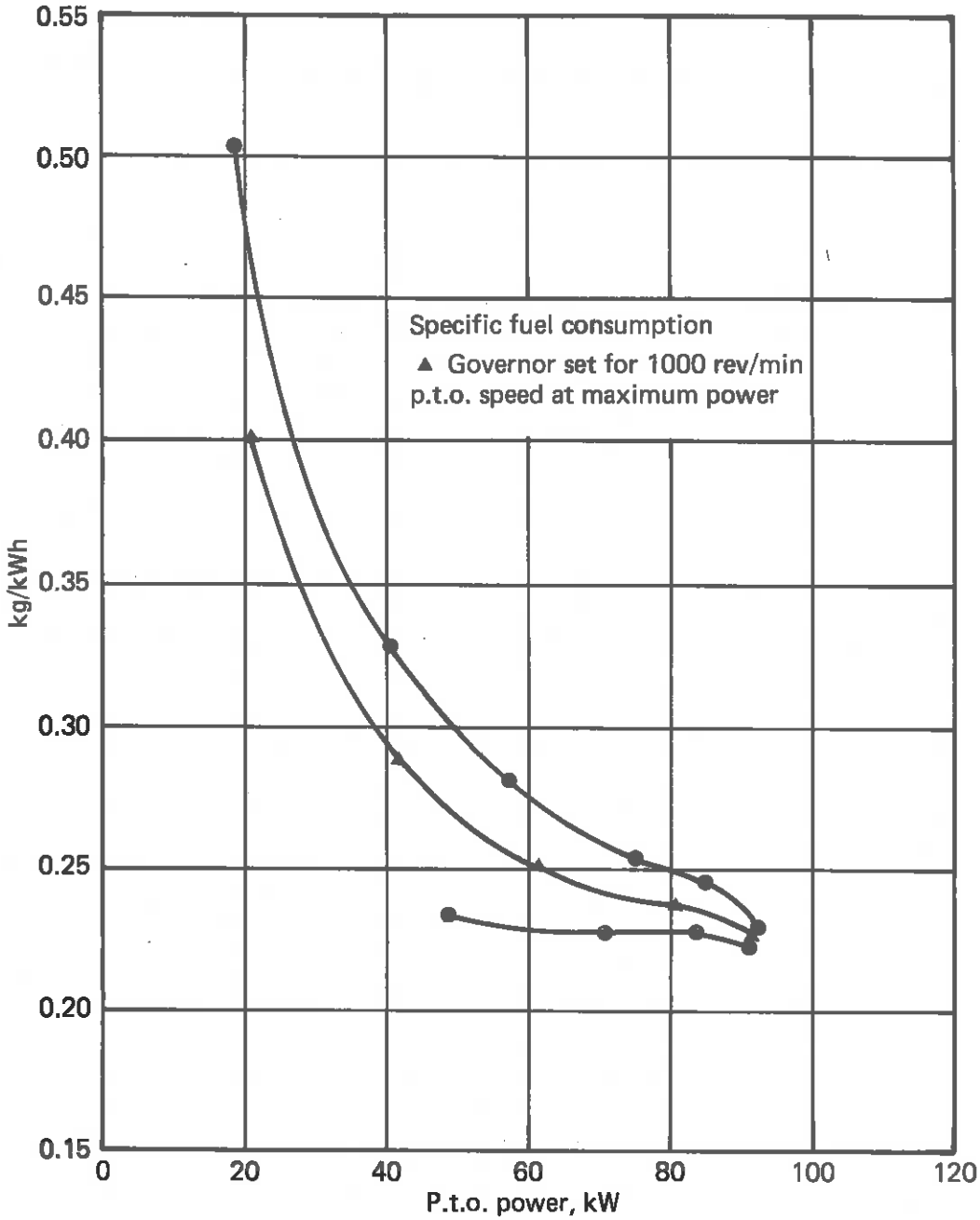
Standard specific fuel consumption, kg/kWh (lb/hph)

a) 0.253 (0.416)
b) 0.329 (0.541)
c) 0.237 (0.340)
d) 0.289 (0.475)

No load, maximum engine speed		2420 rev/min
Equivalent crankshaft torque at maximum power		456.2 Nm (336.0 lb ft)
Equivalent crankshaft torque at rated engine speed		370.1 Nm (272.6 lb ft)
Maximum equivalent crankshaft torque		507.6 Nm (374.4 lb ft) at 1580 rev/min engine speed
Mean atmospheric conditions	temperature	21°C (70°F)
	pressure	1015 m bar (30.0 in Hg)
	relative humidity	75%
Maximum temperature	coolant	83°C (181°F)
	engine oil	86°C (187°F)
	fuel	60°C (140°F)
	air intake	30°C (86°F)



Power take-off test



Power take-off test

2. LIFTING FORCE AND HYDRAULIC POWER

Date of tests: 5th and 6th August 1985

Hydraulic fluid

Make and type:) See "Fuels and lubricants used in test"
Viscosity:)

Type of hydraulic system: Closed centre

Hydraulic fluid temperature at beginning of test: 55°C (131°F)

Power lift test

	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 (lbft)	Maximum tilt angle of mast over range of lift, degrees
At the hitch point	230 (9.1)	712 (28.0)	46.4 (10430)	17.0 (2470)	51.5 (37985)	-
On the frame	230 (9.1)	847 (33.3)	33.0 (7420)	17.0 (2470)	56.4 (41600)	12

Main linkage dimensions - see drawings and table on pages 8 and 9

Lifting heights relative to the horizontal plane including the lower link pivot points

mm	-320	-300	-200	-100	0	+100	+200	+360	+440
in	12.6	11.8	7.9	3.9	0	3.9	7.9	14.2	17.3

Lifting forces at hitch points
(corresponding pressure 17.0 MPa 2470 lb/in^2)

kN	-	46.4	47.4	48.5	49.1	49.5	49.5	49.6	-
lb	-	10430	10660	10900	11040	11130	11130	11150	-

Lifting forces at test frame
(corresponding pressure 17.0 MPa 2470 lb/in^2)

kN	44.9	44.5	43.7	42.5	41.1	39.5	37.5	34.5	33.0
lb	10090	10000	9820	9550	9240	8880	8430	7760	7420

Hydraulic power test

Sustained pressure with relief valve open	20.3 MPa	(2940 lb/in^2)
Pump delivery rate at minimum pressure	46.2 l/min	(10.2 UK gal/min)

Flow rate corresponding to a hydraulic pressure equivalent to 90 per cent of the actual relief valve pressure setting and corresponding hydraulic power

Flow rate	38.8 l/min	(8.5 UK gal/min)
Pressure	18.3 MPa	(2650 lb/in^2)
Power	11.8 kW	(15.8 h.p.)

Flow rate and hydraulic pressure corresponding to maximum hydraulic power

Flow rate	44.0 l/min	(9.7 UK gal/min)
Pressure	17.0 MPa	(2470 lb/in^2)
Power	12.5 kW	(16.8 hp)

Tapping point used for test: Auxiliary service connection

Temperature of hydraulic fluid, if different from 65° ± 5°C	Not applicable
Opening pressure of the unloading valve	Not applicable
Closing pressure of the unloading valve	Not applicable

3 DRAWBAR PERFORMANCE

Date of tests: 10th and 16th July 1985
Type of track: Concrete

Height of drawbar above ground: Unballasted: 380 mm (15.0 in)
Ballasted: 375 mm (14.8 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)	kWh/l (hph/UKgal)	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 83 kPa (12 lb/in²), rear 83 kPa (12 lb/in²)													
L2	3.70 (2.30)	55.5 (74.4)	53.8 (10290)	2293	15.0	-	-	50 (122)	84 (183)	77 (171)	15 (60)	52	1020 (30.14)
L3M	4.38 (2.72)	65.3 (87.5)	53.8 (12090)	2265	15.0	-	-	51 (125)	84 (183)	77 (171)	15 (60)	52	1020 (30.14)
H1M	5.22 (3.24)	74.8 (100.3)	51.6 (11600)	1934	10.3	-	-	50 (122)	84 (183)	77 (171)	15 (60)	55	1020 (30.14)
L3	5.30 (3.29)	76.3 (102.31)	51.8 (11650)	1931	10.2	-	-	45 (114)	83 (182)	77 (171)	15 (58)	52	1020 (30.14)
L4M	5.71 (3.55)	79.0 (106.0)	49.8 (11200)	1932	8.6	-	-	51 (125)	84 (183)	78 (172)	15 (60)	50	1020 (30.14)
H1	6.33 (3.93)	80.1 (107.4)	45.6 (10240)	1935	7.1	-	-	52 (126)	84 (183)	79 (174)	15 (60)	49	1020 (30.14)
H2M	7.56 (4.70)	80.8 (108.4)	38.5 (8650)	1934	5.2	-	-	51 (125)	85 (185)	79 (174)	16 (61)	47	1020 (30.14)
L4	7.87 (4.89)	81.4 (109.21)	37.2 (8370)	1935	4.9	-	-	52 (126)	85 (185)	78 (172)	15 (60)	48	1020 (30.14)
H2	10.30 (6.40)	82.1 (110.1)	28.7 (6450)	1936	3.5	-	-	52 (126)	86 (187)	77 (171)	18 (65)	36	1020 (30.14)
H3M	12.19 (7.58)	83.0 (111.3)	24.5 (5500)	1930	3.0	-	-	51 (123)	85 (185)	78 (172)	17 (63)	38	1020 (30.14)
(ii) MAXIMUM POWER (ballasted) Tyre inflation pressure: front 83 kPa (12 lb/in²), rear 83 kPa (12 lb/in²)													
L1M	1.87 (1.16)	*32.7 (43.9)	63.0 (14160)	2341	15.0	0.400 (0.658)	2.11 (12.9)	56 (133)	83 (182)	78 (173)	16 (62)	62	1014 (29.97)
L1	2.43 (1.51)	*42.6 (57.2)	63.0 (14160)	2323	15.0	0.368 (0.606)	2.30 (14.0)	49 (121)	84 (184)	78 (173)	15 (60)	63	1014 (29.97)
L2M	2.78 (1.73)	*48.7 (65.3)	63.0 (14160)	2304	15.0	0.358 (0.589)	2.36 (14.4)	50 (122)	85 (186)	78 (173)	15 (60)	66	1015 (29.99)
L2	3.69 (2.29)	*64.6 (86.6)	63.0 (14160)	2266	15.0	0.305 (0.502)	2.77 (16.9)	51 (124)	85 (186)	78 (173)	15 (60)	67	1015 (29.99)
L3M	4.21 (2.62)	70.5 (96.4)	60.3 (13550)	2098	10.2	0.304 (0.500)	2.79 (17.0)	50 (122)	85 (186)	78 (173)	15 (60)	67	1015 (29.99)
H1M	4.81 (2.99)	76.0 (101.9)	56.9 (12790)	2011	8.2	0.281 (0.462)	3.01 (18.4)	51 (124)	85 (186)	78 (173)	15 (60)	65	1015 (29.99)
L3	5.42 (3.37)	77.5 (103.9)	51.5 (11570)	1929	6.4	0.279 (0.459)	3.03 (18.5)	50 (122)	85 (186)	76 (169)	16 (62)	59	1014 (29.97)
L4M	5.83 (3.62)	79.4 (106.5)	49.0 (11020)	1930	5.7	0.273 (0.450)	3.10 (18.9)	51 (124)	86 (187)	77 (171)	16 (62)	61	1014 (29.97)
H1	6.36 (3.95)	80.1 (107.4)	45.3 (10190)	1929	5.0	0.271 (0.445)	3.13 (19.1)	53 (128)	85 (186)	78 (173)	17 (63)	61	1014 (29.97)
H2M	7.63 (4.74)	80.5 (108.0)	38.0 (8530)	1932	3.5	0.270 (0.444)	3.13 (19.1)	51 (124)	85 (186)	76 (169)	16 (62)	60	1014 (29.97)
L4	7.91 (4.92)	80.6 (108.1)	36.7 (8240)	1930	3.3	0.270 (0.444)	3.13 (19.1)	50 (122)	85 (186)	75 (168)	16 (62)	60	1014 (29.97)
H2	10.28 (6.39)	80.5 (108.1)	28.2 (6330)	1930	2.0	0.270 (0.444)	3.13 (19.1)	51 (124)	85 (186)	77 (170)	16 (62)	62	1014 (29.97)
H3M	12.36 (7.68)	80.0 (107.3)	23.3 (5240)	1932	1.5	0.275 (0.452)	3.08 (18.8)	52 (126)	85 (186)	77 (170)	16 (62)	62	1014 (29.97)
(iii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
H1	7.60 (4.72)	71.8 (96.3)	34.0 (7640)	2261	2.8	0.274 (0.451)	3.09 (18.8)	52 (126)	85 (186)	77 (170)	17 (63)	67	1015 (29.99)
(iv) +FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (ii)													
L2	3.91 (2.43)	-	63.0 (14160)	2255	-	-	-	53 (127)	83 (181)	80 (176)	16 (61)	50	1016 (30.00)

Total oil consumption during ten hours duration of tests (iii) and (iv) 57.0 g/h (0.125 lb/h)
*Maximum power available at 15% wheelslip
+ Test (iv) was carried out with additional ballast and the results for power, slip and fuel consumption

4. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: As in specification, without ballast

Track of wheels: front - 1910 mm (75.2 in)

rear - 1735 mm (68.3 in)

	With brakes		Without brakes	
	Left-hand	Right-hand	Left-hand	Right-hand
Radius of turning space, m (in)	5.52 (217)	5.41 (213)	6.62 (261)	6.92 (272)
Radius of turning circle, m (in)	5.33 (210)	5.22 (206)	6.43 (253)	6.73 (265)

5. LOCATION OF CENTRE OF GRAVITY

Height above ground,	mm (in)	966 (38.0)
Distance forward from the vertical plane containing the axis of the rear wheels,	mm (in)	1074 (42.3)
Distance from the median plane of the tractor,	mm (in)	0

6. BRAKING

Date of tests: 23rd and 25th July 1985

Type of track: Concrete

Masses during brake test

	Front, kg	(lb)	Rear, kg	(lb)	Total, kg	(lb)
Ballasted	3760	(8290)	5430	(11970)	9190	(20260)
Unballasted	2101	(4631)	3149	(6944)	5250	(11575)

Tyres: As in specification

Type 0 Service brakes (cold)

Travelling speed before application of brakes, 29.5 km/h (18.4 mile/h)

Ballasted	Force on brake pedal	N (lb)	400 (90)	450 (101)	500 (112)	550 (124)	600 (135)	650 (145)	700 (157)
	Mean deceleration	m/s^2 (ft/s^2)	1.2 (3.9)	1.6 (5.2)	1.9 (6.2)	2.2 (7.2)	2.6 (8.5)	2.9 (9.5)	3.2 (10.5)
Unballasted	Force on brake pedal	N (lb)	300 (67)	350 (79)	400 (90)	450 (101)	500 (112)	550 (124)	600 (135)
	Mean deceleration	m/s^2 (ft/s^2)	1.0 (3.3)	1.4 (4.6)	1.9 (6.2)	2.4 (7.9)	2.9 (9.5)	3.4 (11.2)	3.8 (12.5)

Type 1 Service brakes (hot)

Ballasted	Force on brake pedal	N (lb)	400 (90)	450 (101)	500 (112)	550 (124)	600 (135)	650 (145)	700 (157)
	Mean deceleration	m/s^2 (ft/s^2)	0.8 (2.6)	1.0 (3.3)	1.2 (3.9)	1.4 (4.6)	1.6 (5.2)	1.8 (5.9)	2.0 (6.6)

Brakes were heated by: Towing

Comments on deviation and vibration: None

Parking brake:

	Force applied on slope of 18%		Force applied on slope of 12% with trailer of 3 tonnes (6614 lb)	
	Up	Down	Up	Down
Pull on handbrake N (lb)	178 (40)	178 (40)	133 (30)	133 (30)

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	7th August 1985
Type of sound level meter:	Bruel and Kjaer 2209
Type of track:	Concrete
Results of test	
Gear:	H4
Travelling speed before acceleration:	22.1 km/h (13.7 mile/h)
Sound level:	88 dBA

8. NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests:	9th July 1985
Type of sound level meter:	Bruel and Kjaer 2209
Type of track:	Concrete
Cab fitted:	

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			
H1	28 (6295)	8.0 (5.0)	85
H1	Light load	8.3 (5.2)	82
H4	Light load	29.5 (18.4)	84

* The H1 gear corresponds to the nominal travelling speed nearest to 7.5 km/h (4.7 mile/h)

B. SUPPLEMENTARY TESTS

Hydraulic power test on independent front-mounted pump

Sustained pressure with relief valve open	16.6 MPa	(2408 lb/in^2)
Pump delivery rate at minimum pressure	71.3 l/min	(15.7 UK gal/min)

Flow rate corresponding to a hydraulic pressure equivalent to 90 per cent of the actual relief valve pressure setting and corresponding hydraulic power

Flow rate	67.8 l/min	(14.9 UK gal/min)
Pressure	14.9 MPa	(2160 lb/in^2)
Power	16.9 kW	(22.7 h.p.)

Flow rate and hydraulic pressure corresponding to maximum hydraulic power

Flow rate	67.6 l/min	(14.9) UK gal/min)
Pressure	15.0 MPa	(2180 lb/in^2)
Power	16.9 kW	(22.7 h.p.)

Tapping point used for test: Auxiliary service connection

Temperature of hydraulic fluid, if different from 65° ± 5°C	Not applicable
Opening pressure of the unloading valve	Not applicable
Closing pressure of the unloading valve	Not applicable

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Test carried out by: J.P. Evans; P.A. Pope

Officer in charge: P.C Seward

Signed: D.W. Smith Head of Tractor Test Section

R.M. Stayner for the Director

Date: 1st October 1985.