AFRC Institute of ENGINEERING RESEARCH

OECD Approval No. 1164

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

Report on Test of Zetor 12245 Tractor with 4 Wheel-Drive



Manufacturered by	Zavody Tazkeho Strojarstva, Narodny Podnik, Box 03657 Martin, Czechoslovakia.
Test No.	R88/70642/OECD
Report No.	734
Date	September 1988

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

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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:	70 hours
Location of tests:	AFRC Institute of Engineering Research

SPECIFICATION OF TRACTOR

TRACTOR

Make:	Z.T.S. N.P. Martin
Trade name:	Zetor
Model:	Z 12245
Type:	4 wheel-drive, unit construction
Serial No:	12245 0001
1st Serial No:	12245 0001

ENGINE

Make:	Z.T.S. N.P. Martin
Model:	Z 8701.12
Type:	4 stroke, direct injection diesel
Serial No:	000 001
Cylinders	
Number/disposition:	6, vertical in-line
Bore/stroke:	110 mm x 120 mm
Capacity:	6842 cm^3
Compression ratio:	17:1 nominal
Arrangement of valves:	Overhead
Cylinder liners:	Replaceable, wet

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
Make, type and model of injection pump:	Motorpal, in line, 6M 3139
Serial No:	Zs 0001
Manufacturer's production setting of injection pump:	
Flow rate:	24.4-25.6 l/h at 2200 rev/min engine speed at full load and 20°C pump inlet temperature
Timing:	24° + 2° before T.D.C.
Make, type and model of injectors:	Motorpal, DOP 150S 430-1439, 4 hole
Injection pressure:	16.8-17.6 MPa
Governor	
Make:	Motorpal
Type:	Mechanical incorporated in the injection pump
Model:	RV 3M 300/1100 - 3301
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 500
Location:	Above bonnet forward of radiator
Main	
Make:	Sandrik
Type:	Oilbath
Model:	9450.11
Oil capacity:	2.2 l
Location:	Under bonnet forward of radiator
Maintenance indicator	Warning light on instrument panel
Lubrication system	
Type of feed pump:	Gear
Type of filter(s):	Centrifugal, replaceable element RDP 3/A
Number:	1

Cooling system	
Type of coolant:	Water and anti-freeze 1.5:1 solution
Type of pump:	Centrifugal, belt driven
Description of fan:	Belt driven
Number of fan blades:	8
Fan diameter:	460 mm
Coolant capacity:	23.0 l
Type of temperature control:	Thermostat
Superpressure system:	41 kPa
Starting system	
Starter motor	
Make:	Polmo-Elmot
Type:	Electrical, solenoid engaged
Model:	R20e, 24V
Power rating:	5.5 kW
Cold starting aid:	None
Safety device:	Gear selector lever to be in neutral position
Electrical system	
Voltage:	12 (negative earth)
Generator:	
Make:	Pal-Magneton
Model:	443 113 516 184 (14V)
Type:	Belt driven, alternator
Power:	55 A at 9000 rev/min
Batteries	2, Prazska, Akumulatorka
Rating:	2 x 100 Ah at 20-hour rating
Exhaust system	
Make:	Z.T.S.
Type:	Oval, baffle
Model:	87 014 500
Location:	Left-hand side of engine, vertical

TRANSMISSION TO WHEELS

Clutch	
Make:	Z.T.S.
Model:	87021
Type: Dry, for transmission only	
Number of plates:	1
Diameter of plate:	380 mm
Method of operation:	Hydraulic by pedal
Gear box	
Make:	Z.V.L. Povazske Strojarne
Model:	84 000 761
Type: Mechanical	
Arrangement:	4 gears, synchromesh, with manually operated high, low or reverse selector and manually operated, hydraulically actuated torque multiplier on all gears
Number of speeds:	16 forward and 8 reverse
Available options:	1 creep gear, less torque multiplier
Rear axle and final drives	
Make:	ZPC Ursus
Model:	89 000 243
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:	U T B
Model:	89 000 650
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	
Type:	Mechanical
Method of engagement:	Automatic
Method of disengagement:	Automatic

Gear	Group No.	Number of engine revolutions for one revolution of the driving wheels	*Nominal travelling speed at rated engine speed: 2200 rev/min, km/h
Forward			
1	LM	320.612	2.12
1	L	239.620	2.84
2	LM	203.401	3.34
2	L	152.019	4.47
3	LM	111.583	6.09
1	HM	96.238	7.07
4	LM	89.943	7.56
3	L	83.395	8.16
1	H	71.928	9.46
4	L	67.222	10.12
2	HM	61.063	11.14
2	H	45.641	14.90
3	HM	33.498	20.30
4	HM	26.989	25.20
3	H	25.036	27.16
4	H	20.179	33.70
Reverse			
1	M	205.277	3.31
1		153.421	4.43
2	M	130.274	5.22
2		97.365	6.98
3	M	71.452	9.52
4	M	57.584	11.81
3		53.402	12.74
4		43.037	15.80

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

Rear tyre size: 18.4-38

*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: 1.32

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

Clutch

Make: Ursus

Type: Independent, multi-plate, wet

Number of plates: 6

Model: 89 153 610

Power take-off proportional to engine speed

540 rev/min

Location:	At rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	6 to ISO standard 500-1979
Height above ground:	667 mm
Distance from the median plane of the tractor:	Central
Distance behind rear axle:	510 mm
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 and maximum torque:	45.0 kW (Manufacturers recommendation)
Direction of rotation (viewed facing driving end):	Clockwise

1000 rev/min

Location:	At rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	21 to ISO standard 500-1979
Height above ground:	667 mm
Distance from the median plane of the tractor:	Central
Distance behind rear axle:	510 mm
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

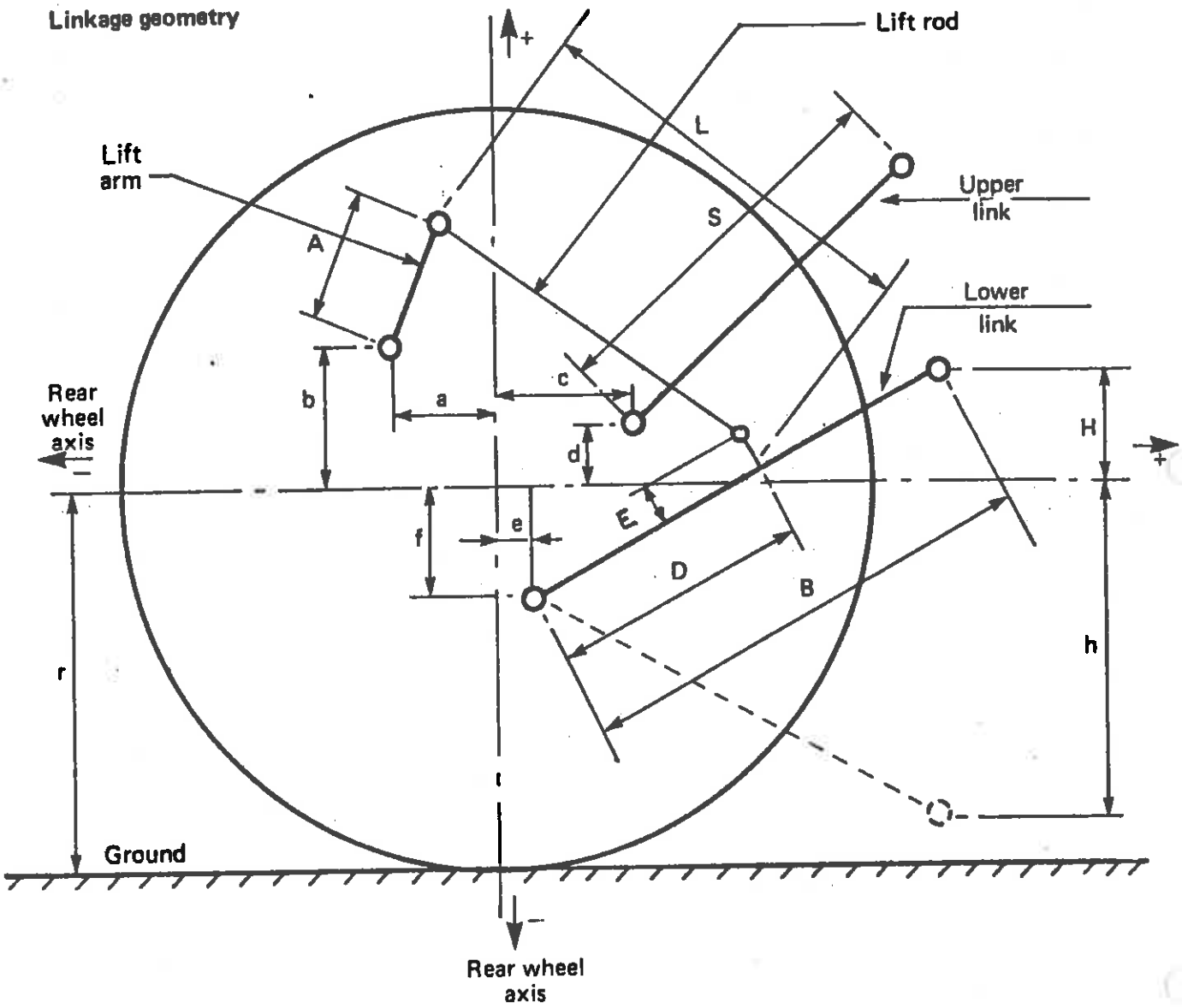
Speed of shaft:	1000 rev/min
Travelling distance for one revolution of power take-off shaft:	188 mm
Number of pto shaft revolutions for one revolution rear wheels:	27.4
Direction of rotation with forward gear engaged:	Clockwise

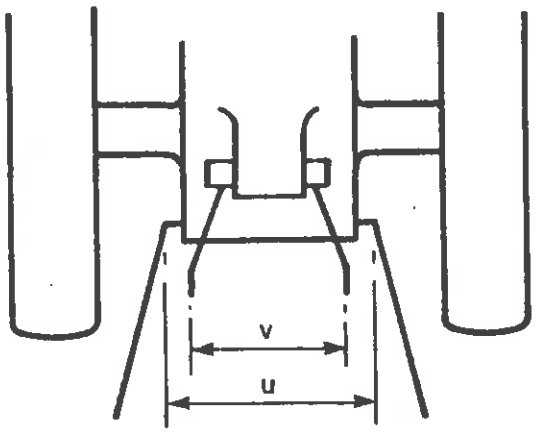
POWER LIFT

Make:	PZL Hydral Wroclaw
Type:	88 400 000
Type and number of cylinders:	One internal single acting, two external single acting
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	18.0 - 20.5 MPa
Opening pressure of cylinder safety valve:	20.5 - 21.5 MPa
Lift pump type:	Gear, PZ 2-18KS
Transmission between pump and engine:	Gear driven from gearbox
Make and number of filters:	ZPC, 2
Site of oil reservoir	Transmission housing
Type and number of tapping points:	4 pressure or return spool valve controlled, 1 pressure only and 1 return only, quick release at rear of tractor
Maximum volume of oil available to external cylinders:	15.0 l

Three-point linkage

Category:	3 to ISO standard 730/1 1977
Category adapter:	At end of lower links to category 2
Controls	Draught and position control, or combined plus pressure control for semi-mounted implements, lower link sensing, adjustable speed on drop.


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


v
u

Dimensions of linkage when attached to the standard frame (ISO 730/3-1982 CAT 3)

			Dimensions or range	Setting used in test
Length of lift arms:		(A)	330 mm	330 mm
Length of lower links:		(B)	942 mm	942 mm
Distance of lift arm pivot point from rear wheel centre line	horizontally:	(a)	130 mm	130 mm
	vertically:	(b)	286 mm	286 mm
Horizontal distance between the two lower link points:		(u)	520 mm	520 mm
Horizontal distance between the two lift arm end points:		(v)	640 mm	640 mm
Length of upper link:		(S)	620-810 mm	694 mm
Distance of upper link pivot point from rear wheel centre line	horizontally:	(c)	385 mm	385 mm
	vertically:	(d)	100,160,210 mm	210 mm
Distance of lower link pivot point from rear wheel centre	horizontally:	(e)	130 mm to rear	130 mm to rear
	vertically:	(f)	255 mm	255 mm
Distance of lower link points to lift rod pivot points on lower link centre line:	horizontal:	(D)	459,499 mm	499 mm
	vertical:	(E)	0	0
Length of lift rods:		(L)	515-610 mm	595 mm
Height of lower hitch points relative to the rear wheel axis				
- in low position:		(h)	412-677 mm	585 mm
- in high position:		(H)	92-298 mm	125 mm
Height of lower hitch points when locked in transport position:			Any height within lift range	

SWINGING DRAWBAR	
Height above ground, maximum:	392 mm
minimum:	307 mm
Type of adjustment:	Inverting drawbar
Distance of hitch point from rear axle centre:	1010 and 910 mm to rear
Distance of hitch point from power take-off shaft ends:	
vertically:	347 and 262 mm
horizontally:	500 and 400 mm
Distance of pivot point from rear axle horizontally:	365 mm to rear
Lateral adjustment:	372 and 320 mm
Diameter of drawbar pin holes:	32 mm
Maximum vertical permissible load:	7 kN (Drawbar out) 9 kN (Drawbar in)
TRAILER HITCH	
Height above ground, maximum:	842 mm
minimum:	692 mm
Distance of hitch point from rear axle centre:	841 mm
Distance of hitch point from power take-off shaft end:	
vertically above maximum:	188 mm
minimum:	38 mm
horizontally:	331 mm
Pin diameter:	35 mm
Maximum vertical permissible load:	10 kN
LINKAGE DRAWBAR	
Height above ground, maximum:	1118 mm
minimum:	143 mm
Horizontal distance to power take-off shaft end:	562 mm
Number of holes:	9
Distance between holes:	82 mm
Hole diameter:	32 mm
Thickness and width of drawbar:	70 mm x 95 mm with 32 mm lateral slot

FRONT TOWING HITCH

Vertical height to centre of clevis:	975 mm
Width of clevis	68 mm
Diameter of pin hole:	32 mm

STEERING

Method of operation:	Hydrostatic system with hand operated steering motor powered from gear box mounted gear pump
Pump:	Pilmet, gear type, ZCT-16L
Motor:	Danfoss OSPB 160 - ON
Oil cooler:	None
Ram	Pilmet, double acting
Working pressure:	14 MPa
Filter	
Make:	Ursus
Model:	PP8-4
Type:	Replaceable canister and metal strainer

BRAKES

Service brake

Make:	Zetor
Model:	89 227 000
Type:	Dry disc, multiplate
Number of plates:	4
Method of operation:	Hydraulically by pedals, coupled or independent
Trailer brakes:	Air brake operated by tractor pedals

Parking brake

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

WHEELS

Number:	4
Front:	2, driving/steering
Rear:	2, driving
Wheelbase:	2700 mm

Track width adjustment

	Minimum, mm	Maximum, mm	Adjustment method
Front	1600	1800	By changing wheel discs to either side of wheel centre
Rear	1500	1875	Reversing wheels and off-set lug rims

PROTECTIVE STRUCTURE

OECD approval number:	CSS 0116/3, CSD 1211/3
Make:	Vlad, Presov
Model:	UR II M87
Type:	Six post R.O.P.S.
Protective device:	Safety cab

DRIVER'S SEAT

Make:	Mars Svratka
Model:	Zetor 59115400
Type:	Suspension seat
Type of suspension:	Parallelogram linkage
Type of damping:	Hydraulic
Range of adjustment, longitudinal:	150 mm
vertical:	90 mm

LIGHTING

	Height above ground of centre, mm	Size, mm	Distance from outside edge of tractor to centre, at 1725 mm track width, *mm
Headlights	1275	120 dia	923
Sidelights	1730	65 x 60	360
Rear lights	1755	105 x 75	264
Reflectors	* 1158	80 dia	142

*Mudguards: 2216 mm being outside edge

TEST CONDITIONS

Overall dimensions (unballasted tractor)

Length: 4370 mm

Width

Minimum: 2.22 m limited by mudguards
Maximum: 2.34 m

Height

Top of protective structure: 2.77 m
Top of exhaust: 2.97 m

Ground clearance (unballasted tractor): 255 mm

Clearance - limiting part: Drawbar clevis in lowest position

Tractor mass (with cab)

		Without driver kg	With driver kg
Unballasted	Front	2055	2068
	Rear	3036	3099
	Total	5091	5167
Ballasted	Front	2443	2456
	Rear	3897	3960
	Total	6340	6416

Ballast

	Number of weights	Mass (total) kg	Water kg
Front	Nil	Nil	Nil
Rear	4 + 2 adaptors	182	740
Additional front frame and weights	11	327	-

Tyres and track width specification

	Front wheels	Rear wheels
Tyres		
Dimensions	14.9-28	18.4-38
Ply rating	8	8
Type	Cross ply	Radial
Maximum load (tyre manufacturer's), kg	1880	2715
Maximum load above 30 km/n (tractor manufacturer's), kg	1692	2443
Inflation pressure (tyre manufacturer's), kPa	170	140
Dynamic radius index, mm	640	820
Chosen track width, mm	1700	1725

Oils and lubrication

Capacity and change interval

	Capacity l	Oil change h	Filter change h
Engine	19.0	200	200
Air cleaner	2.2	100	-
Gearbox	52.0	1200	600
Front axle	3.5	1200	-
Final drive (front)	1.5 x 2	1200	-
Rear axle	Common with gearbox		
Final drive (rear)	4.0 x 2	1200	-
Hydraulic system	Common with gearbox		
Steering	8.0	1200	1200

Specifications

Oils	Recommended	Used during test
Engine + Air Cleaner		
Type:	S.A.E. 10W/30	
Viscosity:	71.5 cSt at 50°C	As recommended
Classification:	M.I.L. L-451993	
Transmission		
Gearbox, rear axle and powerlift		
Type:	S.A.E. 80	
Viscosity:	44.2 cSt at 50°C	As recommended
Classification:	API GL-4	
Rear final drives		
Type:	S.A.E. 80	
Viscosity:	44.2 cSt at 50°C	As recommended
Classification:	API GL-4	
Front differential and final drives		
Type:	S.A.E. 80	
Viscosity:	44.2 cSt at 50°C	As recommended
Classification:	API GL-4	
Hydraulic brakes		
Type:	HD-205P (S.A.E. J1703F)	
Viscosity:	4.2 cSt at 50°C	As recommended
Classification	ISO 4925	
Steering		
Type:	OL-N2	
Viscosity:	15-2 cSt at 50°C	As recommended
Classification:	I.S.O. WG-22	
Recommended grease:	Mobilgrease MP	As recommended
Number of grease points:	18	
Fuel		
Type:	Diesel oil	
Viscosity:	3.30 cSt at 40°C (to British Standard 2869:1983, Class A)	
Density at 15°C:	0.8345 For PTO tests 0.8327 For Drawbar	

TEST RESULTS

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date of tests: 1st October 1987

Type of dynamometer: Water brake, Heenan & Froude

Power, kW	Speed, rev/min		Fuel consumption, Hourly,		Specific, kg/kWh	Specific energy, kWh/l
	Engine	P.t.o.	l/h	kg/h		
MAXIMUM POWER - 2 HOUR TEST						
76.4	2200	1146	23.81	19.87	0.260	3.21
POWER AT RATED ENGINE SPEED						
76.4	2200	1146	23.81	19.87	0.260	3.21
POWER AT STANDARD POWER TAKE-OFF SPEED						
70.1	1920	1000	21.08	17.59	0.251	3.33
PART LOADS						
(i) The torque corresponding to maximum power at rated engine speed						
76.4	2200	1146	23.81	19.87	0.260	3.21
(ii) 85% of the torque obtained in (i)						
66.3	2251	1172	21.08	17.59	0.265	3.15
(iii) 75% of the torque defined in (ii)						
50.5	2296	1196	16.99	14.18	0.281	2.97
(iv) 50% of the torque defined in (ii)						
34.3	2330	1213	13.47	11.24	0.328	2.55
(v) 25% of the torque defined in (ii)						
17.2	2366	1232	10.15	8.47	0.493	1.69
(vi) Unloaded						
0	2390	1245	7.17	5.98	-	-

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	Speed, rev/min		Fuel consumption, Hourly,		Specific,	Specific energy,
	Engine	P.t.o.	l/h	kg/h	kg/kWh	kWh/l
(i) The torque corresponding to maximum power at standard p.t.o. speed						
70.1	1920	1000	21.08	17.59	0.251	3.33
(ii) 85% of the torque obtained in (i)						
60.6	1957	1019	18.17	15.16	0.250	3.33
(iii) 75% of the torque defined in (ii)						
46.7	2012	1048	14.73	12.29	0.263	3.17
(iv) 50% of the torque defined in (ii)						
31.7	2057	1071	11.65	9.75	0.307	2.72
(v) 25% of the torque defined in (ii)						
16.0	2096	1092	8.53	7.12	0.444	1.88
(vi) Unloaded						
0	2131	1110	5.74	4.79	-	-

Standard specific fuel consumption, kg/kWh

a) 0.265 c) 0.250

b) 0.328 d) 0.307

No load, maximum engine speed		2390 rev/min
Equivalent crankshaft torque at maximum power		330.8 Nm
Maximum equivalent crankshaft torque		386.1 Nm at 1400 rev/min engine speed
Mean atmospheric conditions	temperature	23°C
	pressure	1021 m bar
	relative humidity	33%
Maximum temperature	coolant	94°C
	engine oil	89°C
	fuel	45°C
	air intake	26°C

2. HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 9th October 1987

2.1 Hydraulic power test

Sustained pressure with relief valve open 20.2 MPa

Pump delivery rate at minimum pressure 47.0 l/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	42.5 l/min
Pressure	18.2 MPa
Power	12.9 kW

Flow rate and hydraulic pressure corresponding to maximum hydraulic power

Flow rate	46.1 l/min
Pressure	18.0 MPa
Power	13.8 kW

Tapping point used for test: External spool valve connection

Temperature of hydraulic fluid, if different from 60° ±5°C: Not applicable

Opening pressure of the unloading valve: Not applicable

Closing pressure of the unloading valve: Not applicable

2.2 Power lift test (with two assister rams)

	Height of lower hitch point above ground in down position, mm	Vertical movement, mm	Maximum force exerted through full range, kN	Corresponding pressure of hydraulic fluid, MPa	Moment about rear axle, kNm	Maximum tilt angle of mast over range of lift, degrees
At the hitch point	230	724	50.2	18.0	53.8	-
On the frame	230	857	35.6	18.0	59.9	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	-340	-330	-200	-100	0	150	380	495

Lifting forces at hitch points
(corresponding pressure 18.0 MPa)

kN	-	50.2	52.0	52.5	52.9	52.9	52.7	-

Lifting forces at test frame
(corresponding pressure 18.0 MPa)

kN	50.9	49.6	47.1	46.0	44.6	42.0	37.5	35.6

3. DRAWBAR PERFORMANCE

Date of tests: 2nd November 1987 and 9th March 1988

Type of track: Concrete

	Height of drawbar above ground, mm	Inflation pressure, kPa Front	Rear
Unballasted	260	83	83
Ballasted	265	97	90

Gear	Group No.	Speed, km/h	Power, kW	Drawbar pull, kN	Engine speed, rev/min	Wheel-slip, %	Specific fuel consumption, kg/kWh	kWh/l	Temperature, °C Fuel	Coolant	Engine oil	Atmospheric conditions Temperature, °C	Relative humidity,%	Pressure, m bar
(i) MAXIMUM POWER (unballasted)														
*2	LM	2.92	44.9	55.3	2257	15.0	0.337	2.47	34	77	76	10	49.9	1024
*2	L	3.82	58.7	55.3	2200	15.0	0.341	2.44	32	79	75	11	46.4	1022
3	LM	5.87	65.7	40.3	2202	4.2	0.295	2.82	35	80	77	11	45.9	1022
1	HM	6.85	66.5	34.9	2199	3.3	0.289	2.88	37	79	76	11	45.0	1021
4	LM	7.38	63.1	30.8	2200	2.7	0.310	2.69	38	80	76	12	35.5	1016
(ii) MAXIMUM POWER (ballasted)														
+1	LM	1.99	33.2	60.0	2292	11.2	0.406	2.06	43	82	76	12	78	1027
*1	L	2.48	42.7	62.0	2260	15.0	0.375	2.23	45	83	79	13	81	1027
+2	LM	3.03	50.9	60.5	2232	12.0	0.346	2.41	46	83	80	13	79	1027
2	L	4.21	61.9	52.9	2199	6.4	0.321	2.60	45	83	82	12	81	1027
3	LM	5.91	62.8	38.3	2204	3.2	0.319	2.62	46	83	81	12	81	1027
1	HM	6.89	62.3	32.5	2200	2.6	0.326	2.56	46	83	80	11	83	1027
4	LM	7.41	61.5	29.9	2202	2.4	0.328	2.55	44	83	79	10	89	1027
3	L	7.99	63.7	28.7	2201	2.2	0.316	2.64	45	83	80	10	88	1027
1	H	9.31	63.0	24.4	2199	1.9	0.322	2.59	42	83	79	8	64	985
(iii) FIVE HOUR TEST AT 75% of PULL AT MAXIMUM POWER														
1	HM	7.14	48.4	24.4	2254	1.9	0.334	2.50	44	83	73	12	65	1004
(iv) FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (ii)														
1	L	2.75	-	62.0	2260	-	-	-	44	83	77	12	69	1025

Total oil consumption during ten hours duration of tests (iii) and (iv) 60.0 g/h
*Maximum power available at 15% wheelslip
Test (iv) was carried out with additional ballast and the results for power, slip and fuel consumption have no practical significance
+Maximum pull during the ballasted test was limited by wheelslip and bounce

4. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment:

	Tyre size	Track
front	14.9-28	1700 mm
rear	18.4-38	1725 mm

		With brakes		Without brakes	
		Left-hand	Right-hand	Left-hand	Right-hand
2 WD	Radius of turning space, m	6.01	5.19	7.31	6.17
	Radius of turning circle, m	5.79	4.97	7.09	5.95
4 WD	Radius of turning space, m	5.30	4.98	7.29	6.93
	Radius of turning circle, m	5.08	4.76	7.07	6.71

5. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm	952
Distance forward from the vertical plane containing the axis of the rear wheels, mm	1088
Distance from the median plane of the tractor, mm	0

6. BRAKING

Date of tests: 29th February and 29th March 1988

Type of track: Concrete

Masses during brake tests

	Front, kg	Rear, kg	Total, kg
Ballasted	3386	4886	8272
Unballasted	2068	3099	5167

6.1 Cold service braking device test

Speed before application of brakes, 35.5 km/h unballasted

33.4 km/h ballasted

Ballasted tractor	Braking device control force, N	100	200	300	400	500	600
	Mean deceleration, m/s^2	-	1.3	1.7	2.1	2.4	2.6
Unballasted tractor	Braking device control force, N	100	200	300	400	500	600
	Mean deceleration, m/s^2	1.3	1.6	2.0	2.3	2.6	2.9

6.2 Fade test

Speed before application of brakes, 33.4 km/h

Ballasted tractor	Braking device control force, N	100	200	300	400	500	600
	Mean deceleration, m/s^2	0.8	1.1	1.4	1.8	2.1	2.3

Brakes were heated by: Driving

Comments on deviation and vibration: None

6.3 Parking brake device test

	Force applied on slope of 18%	
	Up	Down
Braking device control force, N	264	275

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	March 18th 1988
Type of sound level meter:	Bruel and Kjaer 2209
Type of track:	Concrete
Results of test	(2 wheel drive only in top gear)
Gear:	4 Group No: H
Travelling speed before acceleration:	26.6 km/h
Sound level:	88 dBA

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Test carried out by: A.D. Stockton, F. Thistlethwaite

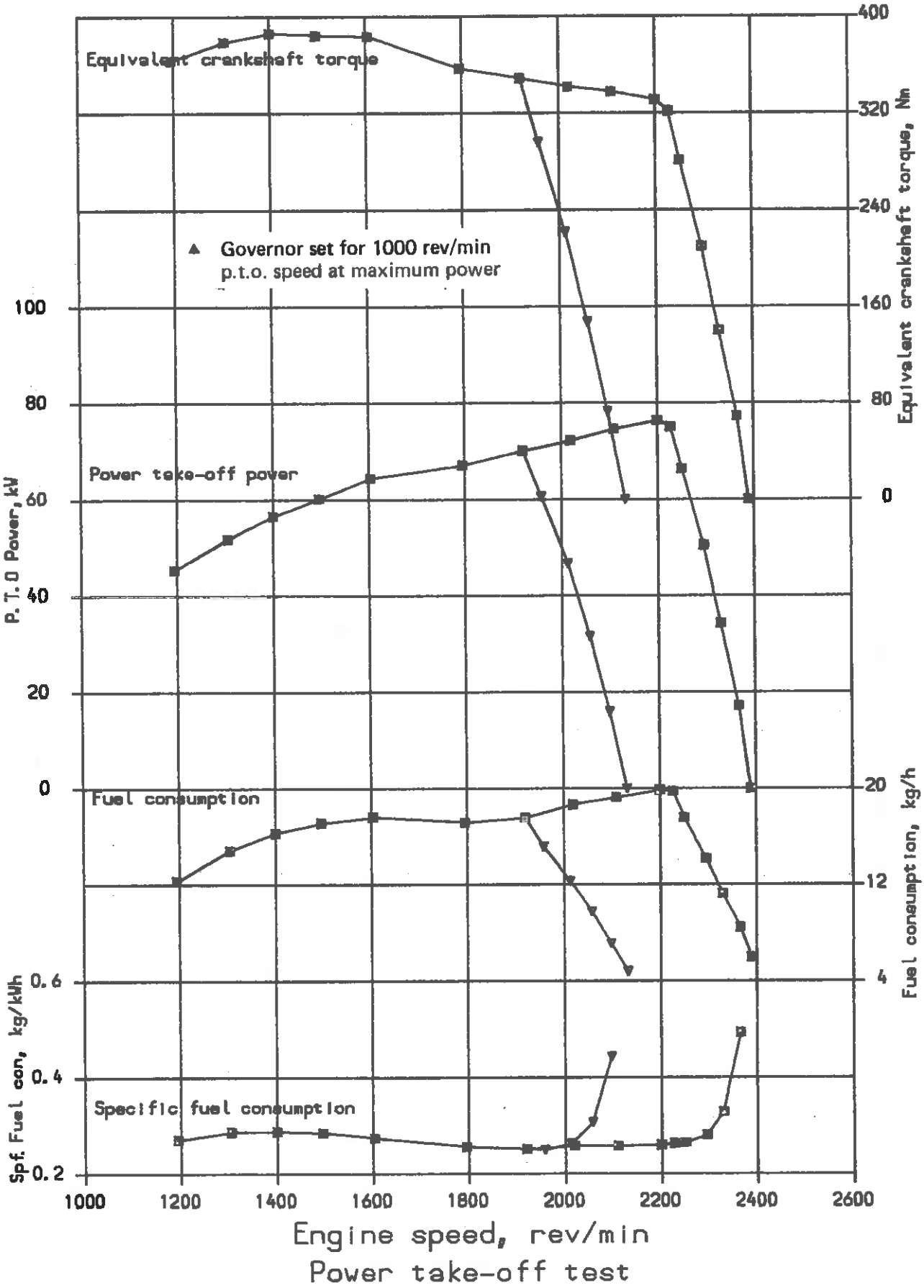
Officer in charge: P.C. Seward

Signed: Head of Testing Group

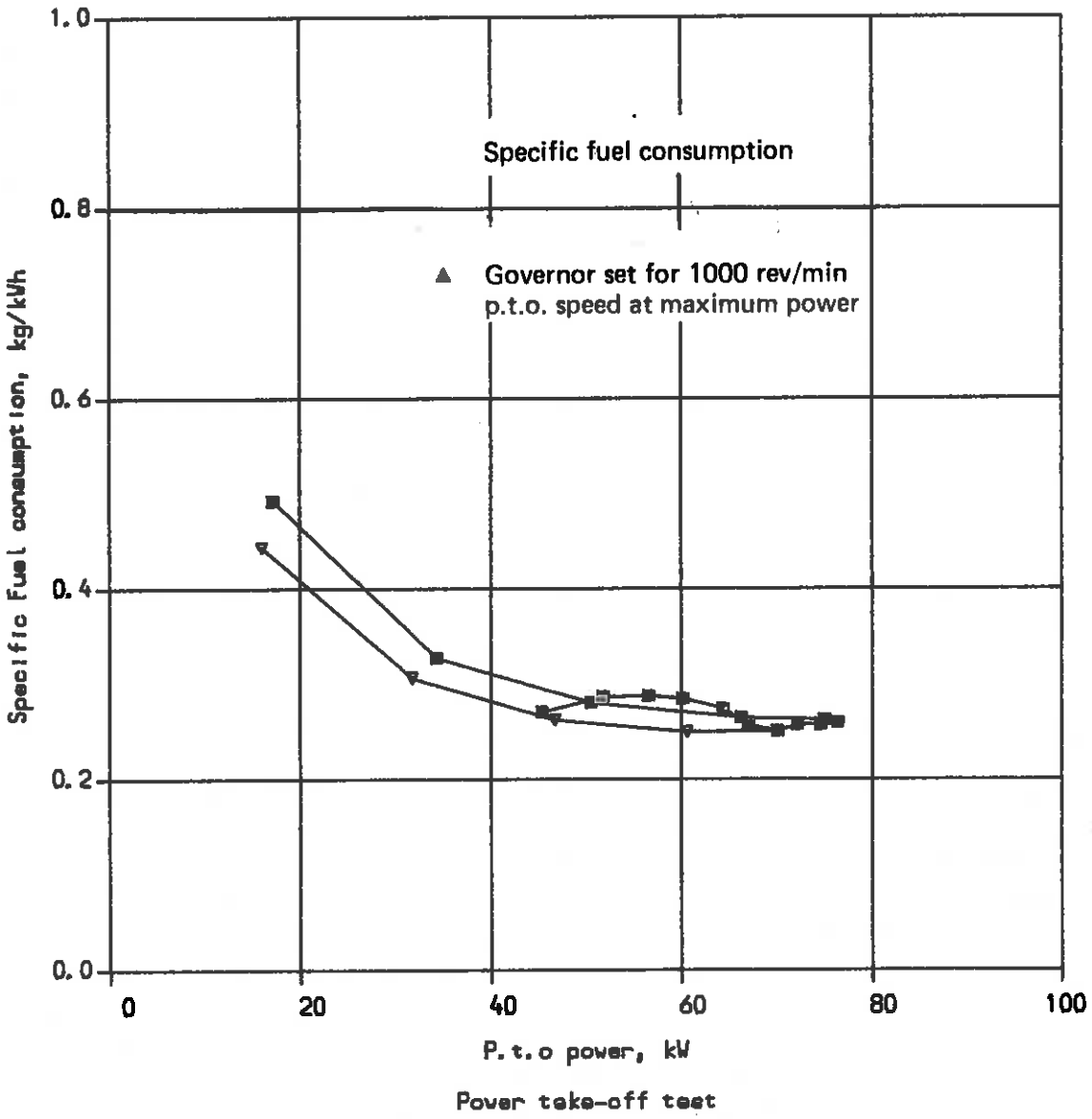
for the Director

Date: 6.12.88

Annex: Main Power Take-off Curves



Power take-off test



Power take-off test