AFRC Institute of ENGINEERING RESEARCH

OECD Approval No. 1174

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

Report on Test of Zetor 9211 Tractor with 2 Wheel-Drive



Manufacturered by	Zavody Tazkeho Strojarstva, Narodny Podnik, Box 03657 Martin, Czechoslovakia.
Test No.	R88/70635/OECD
Report No.	727
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:	72 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 9211
Type:	2 wheel-drive, unit construction
Serial No:	9211 0001
1st Serial No:	9211 0001

ENGINE

Make:	Z.T.S. N.P. Martin
Model:	Z 8002.1334
Type:	4 stroke, direct injection, turbocharged diesel
Serial No:	000 001

Cylinders

Number/disposition:	4, vertical in-line
Bore/stroke:	110 mm x 120 mm
Capacity:	4562 cm^3
Compression ratio:	17:1 nominal
Arrangement of valves:	Overhead
Cylinder liners:	Replaceable, wet

Supercharging

Make:	CZM
Model:	K27.2960 U6.11
Type:	Exhaust driven
Pressure:	0.90 MPa

Fuel System

Fuel feed system:	Lift pump integral with fuel injection pump
Make, type and model of fuel filter(s):	Autobrzdy, dual, FD10RP1.3
Capacity of fuel tank:	125 l
Make, type and model of injection pump:	Motorpal, in line, PP4 M9Kle-3135
Serial No:	Us0028
Manufacturer's production setting of injection pump:	
Flow rate:	16.3-18.9 l/h at 2200 rev/min engine speed at full load and 20°C pump inlet temperature
Timing:	22° + 2° before T.D.C.
Make, type and model of injectors:	Motorpal, DOP 150S 5351417, 5 hole
Injection pressure:	16.8-17.6 MPa

Governor

Make:	Motorpal
Type:	Mechanical incorporated in the injection pump
Model:	RV 3M 300/1100 - 2538
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:	2.0 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:	4
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:	12V
Power rating:	2.9 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:	89014500
Location:	Left-hand side of engine, vertical

TRANSMISSION TO WHEELS

Clutch	
Make:	Z.T.S.
Model:	83021 500
Type:	Dry, for transmission only
Number of plates:	1
Diameter of plate:	350 mm
Method of operation:	Mechanically by pedal
Gear box	
Make:	Z.V.L. Povazske Strojarne
Model:	84 000 761
Type:	Mechanical
Arrangement:	4 gears 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 multiplyer
Rear axle and final drives	
Make:	ZPC Ursus
Model:	84 000 273
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	
Make:	PLR Poland
Model:	83 200 000
Type:	Telescopic with sprung extenions
Driven from:	Not driven

Total ratios and travelling speeds

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	1.93
1	L	239.620	2.58
2	LM	203.401	3.04
2	L	152.019	4.06
3	LM	111.583	5.54
1	HM	96.238	6.42
4	LM	89.943	6.87
3	L	83.395	7.41
1	H	71.928	8.59
4	L	67.222	9.19
2	HM	61.063	10.12
2	H	45.641	13.54
3	HM	33.498	18.45
4	HM	26.989	22.89
3	H	25.036	24.68
4	H	20.179	30.62
Reverse			
1	M	205.277	3.01
1		153.421	4.03
2	M	130.274	4.74
2		97.365	6.35
3	M	71.452	8.65
4	M	57.584	10.73
3		53.402	11.57
4		43.037	14.36

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

Rear tyre size: 16.9-34

*Calculated with a tyre dynamic radius index of: 745 mm (ISO 4251/1-1984)

Number of revolutions of front wheels for one revolution of rear wheels: Not applicable

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: 5

Model: 89 153 209

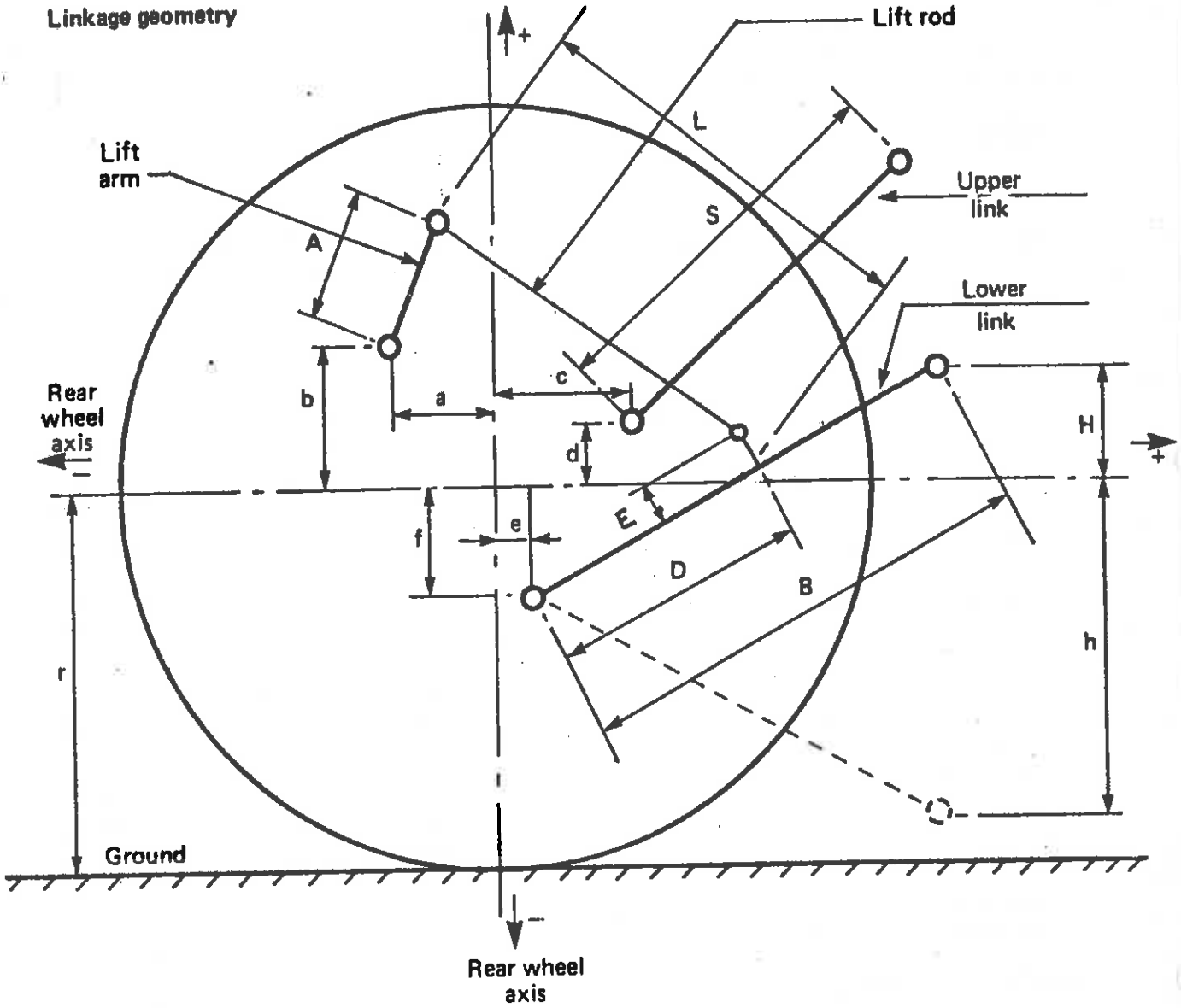
Power take-off proportional to engine speed	
540 rev/min	
Location:	At rear of tractor
Diameter of power take-off shaft:	34.9 mm
Number of splines:	6 to ISO standard 500 - 1979
Height above ground:	595 mm
Distance from the median plane of the tractor:	Central
Distance behind rear axle:	510 mm
Pto speed 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:	595 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

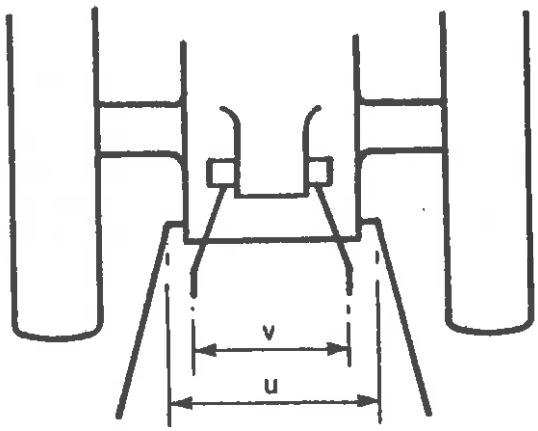
POWER LIFT

Make:	PZL Hydral Wroclaw
Type:	88 400 000
Type and number of cylinders:	One internal single acting, one external single acting on left side
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:	2 to ISO standard 730/1 - 1977
Category adapter:	Not applicable
Controls	Draught or 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 2)

			Dimensions or range	Setting used in test
Length of lift arms:		(A)	330 mm	330 mm
Length of lower links:		(B)	909 mm	909 mm
Distance of lift arm pivot point from rear wheel centre line	horizontally:	(a)	170 mm	170 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	655 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)	439,449 mm	499 mm
	vertical:	(E)	0	0
Length of lift rods:		(L)	515-610 mm	587 mm
Height of lower hitch points relative to the rear wheel centreline				
- in low position:		(h)	393-711 mm	550 mm
- in high position:		(H)	57-297 mm	95 mm
Height of lower hitch points when locked in transport position:			Any height within lift range	

SWINGING DRAWBAR

Height above ground, maximum:	298 mm
minimum:	213 mm
Type of adjustment:	Inverting drawbar
Distance of hitch point from rear axle centre:	910 and 865 mm to rear
Distance of hitch point from power take-off shaft ends:	
vertically:	382 and 297 mm
horizontally:	400 and 355 mm
Distance of pivot point from rear axle horizontally:	365 mm to rear
Lateral adjustment:	330 and 310 mm
Diameter of drawbar pin holes:	32 mm
Maximum vertical permissible load:	7 kN (Drawbar in)
	9 kN (Drawbar out)

TRAILER HITCH

Height above ground, maximum:	795 mm
minimum:	645 mm
Distance of hitch point from rear axle centre:	870 mm
Distance of hitch point from power take-off shaft end:	
vertically above maximum:	202 mm
minimum:	52 mm
horizontally:	360 mm
Pin diameter:	35 mm
Maximum vertical permissible load:	10 kN

LINKAGE DRAWBAR

Height above ground, maximum:	1043 mm
minimum:	34 mm
Horizontal distance to power take-off shaft end:	529 mm
Number of holes:	9
Distance between holes:	82 mm
Hole diameter:	32 mm
Thickness and width of drawbar:	70 mm x 105 mm with 32 mm lateral slot

FRONT TOWING HITCH

Vertical height to centre of clevis:	760 mm
Width of clevis	70 mm
Diameter of pin hole:	32 mm

STEERING

Method of operation:	Hydrostatic system with hand operated steering motor powered from gear box mount gear pump
Pump:	Pilmet, gear type
Motor:	Danfoss OSPB 160 - ON
Oil cooler:	Mounted to front of radiator
Ram	
Working pressure:	14 MPa
Make and model of filter:	Replaceable canister and metal strainer
Filter	
Make:	Ursus
Model:	PP 8-4
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 brakes

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

WHEELS

Number:	4
Front	2, steering
Rear:	2, driving
Wheelbase:	2390 mm

Track width adjustment

	Minimum, mm	Maximum, mm	Adjustment method
Front	1500	1800	Extending axle
Rear	1575	1875	Reversing wheels and off-set lug rims

PROTECTIVE STRUCTURE

OECD approval number:	CSS 0116/10, 1211/10
Make:	Vlad, Presov
Model:	UR II M87
Type:	Six post ROPS
Protective device:	Safety cab

DRIVER'S SEAT

Make:	Mars Svratka
Model:	Mars 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	1060	120 dia	801
Sidelights	1605	65 x 60	431
Rear lights	1675	105 x 75	259
Reflectors	1080	80 dia	134

*Mudguards being outside edge

TEST CONDITIONS

Overall dimensions (unballasted tractor)

Length: 4.140 mm

Width

Minimum: 1.96 m
Maximum: 2.25 m

Height

Top of protective structure: 2.62 m
Top of exhaust: 2.79 m

Ground clearance (unballasted tractor): 165 mm

Clearance - limiting part: Drawbar clevis in lowest position

Tractor mass (with cab)

		Without driver, kg	With driver, kg
Unballasted	Front	1451	1464
	Rear	2727	2789
	Total	4178	4253
Ballasted	Front	1718	1731
	Rear	3603	3665
	Total	5321	5396

Ballast

	Number of weights	Mass (total), kg	Water, kg
Front	Nil	-	-
Rear	6	302	596
Additional front frame and weights	7	245	-

Tyres and track width specification

	Front wheels	Rear wheels
Tyres:		
Dimensions	11.5-15	16.9-34
Ply rating	8	8
Type	Cross ply	Cross ply
Maximum load below 30 km/h (tyre manufacturer's), kg	1250	2380
Maximum load above 30 km/h (tractor manufacturer's), kg	1125	2142
Inflation pressure (tyre manufacturer's), kPa	225	170
Dynamic radius index, mm	370*	745
Chosen track width, mm	1720	1725

*Static on unballasted tractor

Oils and lubrication

Capacity and change interval

	Capacity l	Oil change h	Filter change h
Engine	10.0	200	200
Air cleaner	2.0	100	NA
Gearbox	52.0	1200	600
Rear axle	Common with gearbox		
Final drive	2 x 4.0	1200	600
Hydraulic system	Common with gearbox		
Steering	8.0	1200	1200
Brakes	0.8	2 years	NA

Specifications

	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 power lift		
Type:	S.A.E. 80	
Viscosity:	44.2 cSt at 50°C	As recommended
Classification:	API GL4	
Rear final drives		
Type:	S.A.E. 90	
Viscosity	125 cSt at 50°C	As recommended
Classification:	API GL-3	
Hydraulic brakes		
Type	HD-205P (S.A.E. J1703F)	
Viscosity:	4.2 cSt at 50°C	As recommended
Classification	I.S.O. 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	
Viscosities:	3.30 cSt at 40°C (to British Standard 2689, 1983, Class A)	
Density at 15°C:	0.8345 for P.T.O. tests 0.8327 for Drawbar tests	

TEST RESULTS

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date of tests: 22nd February 1988

Type of dynamometer: Water brake, Heenan & Froude

Power, kW	Speed, rev/min		Fuel consumption, Hourly,		Specific,	Specific energy,
	Engine	P.t.o.	l/h	kg/h	kg/kWh	kWh/l
MAXIMUM POWER - 2 HOUR TEST						
59.9	2200	1146	17.62	14.67	0.245	3.40
POWER AT RATED ENGINE SPEED						
59.9	2200	1146	17.62	14.67	0.245	3.40
POWER AT STANDARD POWER TAKE-OFF SPEED						
58.0	1920	1000	16.01	13.33	0.230	3.62
PART LOADS						
(i) The torque corresponding to maximum power at rated engine speed						
59.9	2200	1146	17.62	14.67	0.245	3.40
(ii) 85% of the torque obtained in (i)						
51.9	2244	1169	15.69	13.07	0.252	3.30
(iii) 75% of the torque defined in (ii)						
39.5	2283	1189	13.25	11.03	0.279	2.98
(iv) 50% of the torque defined in (ii)						
26.8	2319	1208	10.62	8.84	0.330	2.52
(v) 25% of the torque defined in (ii)						
13.5	2352	1225	8.02	6.68	0.493	1.69
(vi) Unloaded						
0	2390	1245	5.75	4.79	-	-

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						
58.0	1920	1000	16.01	13.33	0.230	3.6
(ii) 85% of the torque obtained in (i)						
50.3	1960	1021	14.29	11.90	0.236	3.53
(iii) 75% of the torque defined in (ii)						
38.7	2007	1045	11.88	9.89	0.256	3.25
(iv) 50% of the torque defined in (ii)						
26.4	2055	1070	9.39	7.82	0.296	2.81
(v) 25% of the torque defined in (ii)						
13.4	2094	1091	6.8	5.70	0.424	1.96
(vi) Unloaded						
0	2141	1115	4.69	3.91	-	-

Standard specific fuel consumption, kg/kWh

a) 0.252 e) 0.236
b) 0.330 d) 0.296

No load, maximum engine speed		2390 rev/min
Equivalent crankshaft torque at maximum power		259.9 Nm
Maximum equivalent crankshaft torque		321.82 Nm 1540 rev/min engine speed
Mean atmospheric conditions	temperature	24°C
	pressure	1028 m bar
	relative humidity	22%
Maximum temperature	coolant	80°C
	engine oil	95°C
	fuel	34°C
	air intake	23°C

2. HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 28th October 1987

2.1 Hydraulic power test

Sustained pressure with relief valve open 19.2 MPa

Pump delivery rate at minimum pressure 47.4 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	32.8 l/min
Pressure	17.3 MPa
Power	9.5 kW

Flow rate and hydraulic pressure corresponding to maximum hydraulic power

Flow rate	43.4 l/min
Pressure	16.0 MPa
Power	11.6 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

	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	200	667	34.4	16.0	35.7	-
On the frame	200	769	26.4	16.0	45.2	10

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	-295	-200	-100	0	100	250	350	415

Lifting forces at hitch points
(corresponding pressure 16.0 MPa)

kN	34.4	35.6	36.8	37.6	37.7	37.7	37.4	-

Lifting forces at test frame
(corresponding pressure 16.0 MPa)

kN	37.2	35.2	34.4	33.2	31.9	29.3	27.5	26.4

3. DRAWBAR PERFORMANCE

Date of tests: 20th July-3rd August 1988

Type of track: Concrete

	Height of drawbar above ground, mm	Inflation pressure, kPa Front	Rear
Unballasted	300	100	83
Ballasted	320	145	110

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)														
*1	HM	5.36	42.7	28.7	2245	15.0	0.334	2.49	38	84	82	21	49.0	1015
*4	LM	5.65	45.0	28.7	2222	15.0	0.338	2.46	39	85	85	21	50.9	1015
3	L	6.17	48.4	28.2	2200	13.9	0.323	2.58	35	82	85	15	77.4	1016
1	H	7.38	49.8	24.3	2200	10.2	0.312	2.67	37	84	87	16	73.5	1015
4	L	8.00	49.3	22.2	2198	9.9	0.312	2.67	37	92	87	17	70.6	1015
2	HM	8.93	51.0	20.6	2201	8.1	0.302	2.76	38	86	88	16	73.3	1015
2	H	12.29	50.9	14.9	2201	5.5	0.302	2.76	38	85	88	16	77.5	1015
+3	HM	16.99	51.7	10.9	2194	4.0	0.299	2.79	38	86	88	16	78.5	1015
(ii) MAXIMUM POWER (ballasted)														
*1	LM	1.68	16.7	35.8	2340	15.0	0.504	1.65	36	81	84	15	48.6	1008
*1	L	2.22	22.1	35.8	2316	15.0	0.437	1.90	37	81	86	15	49.5	1008
*2	LM	2.60	25.8	35.8	2301	15.0	0.407	2.05	36	81	86	15	47.5	1009
*2	L	3.42	34.1	35.8	2270	15.0	0.364	2.29	35	82	85	15	47.5	1009
3	LM	4.53	44.9	35.8	2200	15.0	0.326	2.55	36	83	88	15	46.8	1009
1	HM	5.39	48.1	32.1	2204	12.7	0.317	2.62	35	83	85	14	45.7	1009
4	LM	5.91	46.6	28.4	2202	11.1	0.326	2.55	38	82	87	15	40.2	1009
3	L	6.39	48.4	27.3	2197	10.2	0.315	2.64	37	82	88	15	39.4	1009
1	H	7.60	49.1	23.3	2211	9.0	0.310	2.68	36	83	81	15	37.5	1009
4	L	8.20	47.9	21.0	2204	7.3	0.315	2.65	40	83	88	16	34.8	1009
(iii) FIVE HOUR TEST AT 75% of PULL AT MAXIMUM POWER														
3	L	6.87	37.1	20.5	2264	7.0	0.328	2.54	39	82	89	17	38.1	1018
(iv) FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (ii)														
2	LM	2.72	-	35.8	2299	-	-	-	43	83	89	19	27.7	1018

Total oil consumption during ten hours duration of tests (iii) and (iv) 60 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
+Highest gear possible within speed limitations of test equipment

4. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment:		Tyre size	Track width
	front	11.5-15	1630
	rear	16.9-34	1720

	With brakes		Without brakes	
	Left-hand	Right-hand	Left-hand	Right-hand
Radius of turning space, m	3.88	3.89	4.37	4.41
Radius of turning circle, m	3.69	3.70	4.18	4.22

5. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm	926
Distance forward from the vertical plane containing the axis of the rear wheels, mm	820
Distance from the median plane of the tractor, mm	0

6. BRAKING

Date of tests: 4th and 8th August 1988

Type of track: Concrete

Masses during brake tests

	Front, kg	Rear, kg	Total, kg
Ballasted	2250	4284	6534
Unballasted	1451	2727	4178

6.1 Cold service braking device test

Speed before application of brakes, 31.8 km/h (unballasted)

Ballasted tractor	Braking device control force, N	100	200	300	400	500	600
	Mean deceleration, m/s^2	0.8	1.4	2.0	2.5	2.9	3.2
Unballasted tractor	Braking device control force, N	100	200	300	400	500	600
	Mean deceleration, m/s^2	-	1.5	2.4	3.2	3.8	3.8

6.2 Fade test

Speed before application of brakes, 31.3 km/h (ballasted)

Ballasted tractor	Braking device control force, N	100	200	300	400	500	600
	Mean deceleration, m/s^2	-	1.4	1.8	2.3	2.7	3.0

Brakes were heated by: Driving

Comments on deviation and vibration: None

6.3 Parking braking device test

	Force applied on slope of 18%	
	Up	Down
Braking device control force, N	353	333

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	22nd March 1988
Type of sound level meter:	Bruel and Kjaer 2209
Type of track:	Concrete
Results of test	
Gear:	4 Group No: H
Travelling speed before acceleration:	23.9 km/h
Sound level:	87 dBA

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

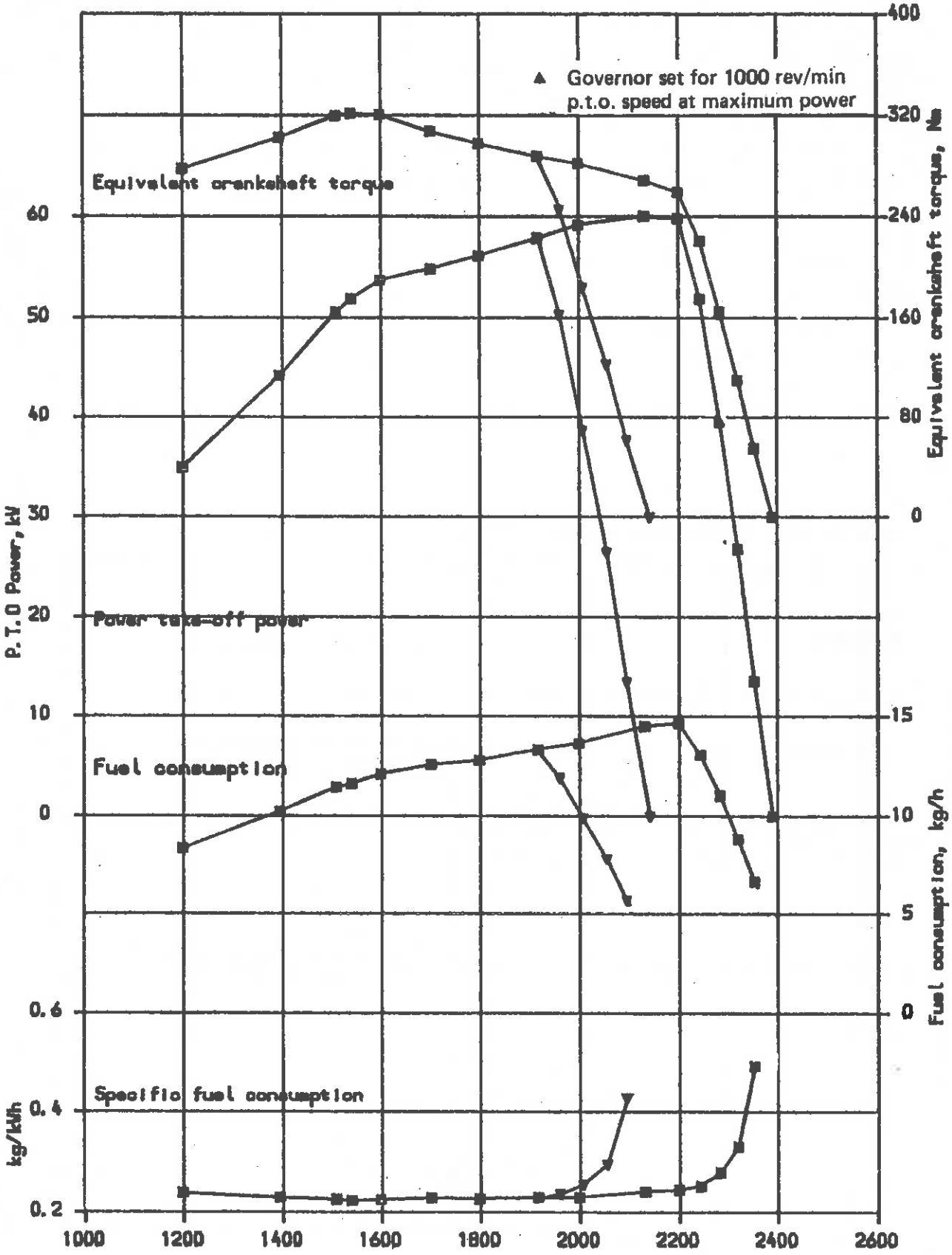
Test carried out by: A.D. Stockton; F. Thistlethwaite

Officer in charge: P.C. Seward

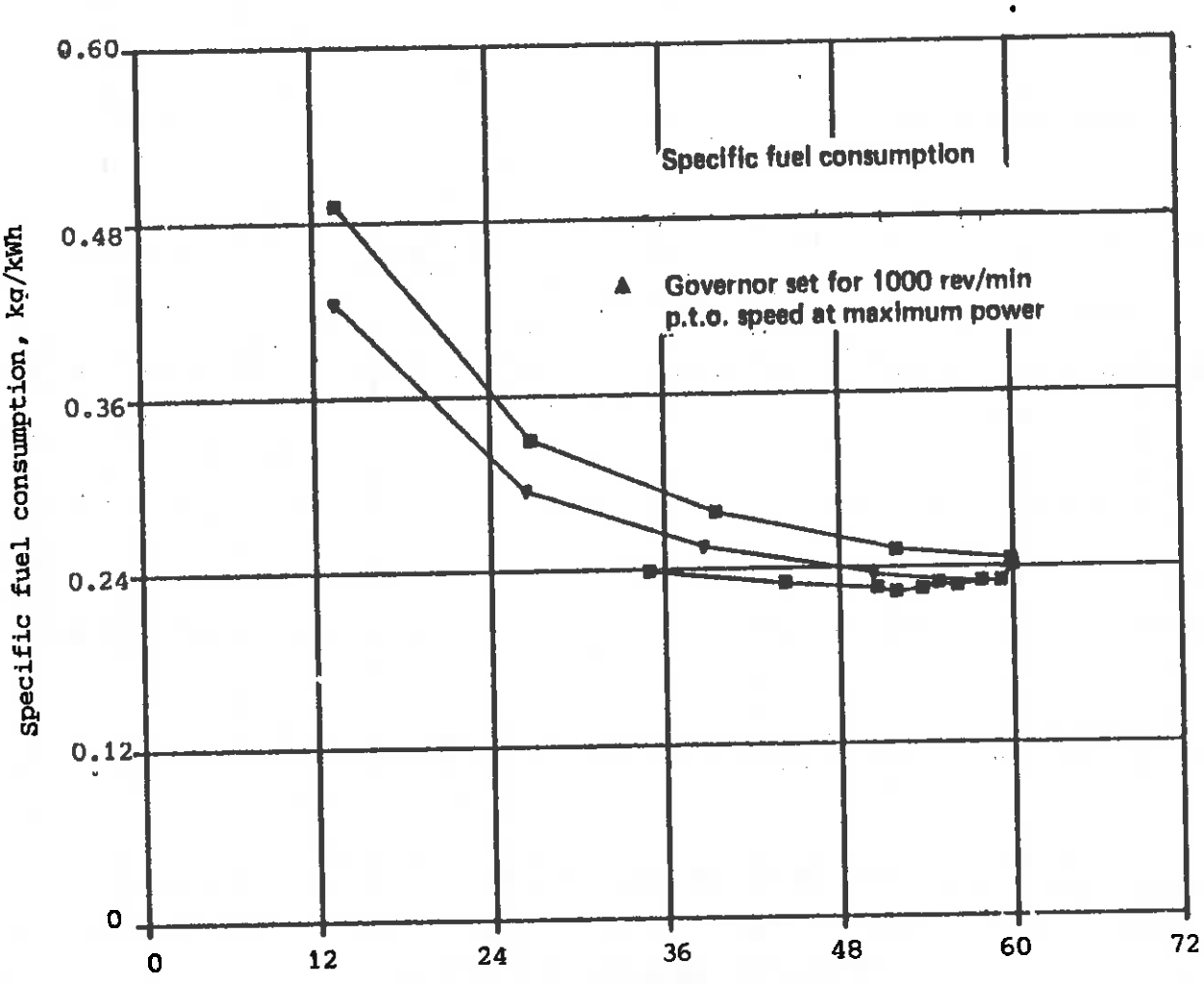
Signed: R R Balls Head of Testing Group

R. M. Stagner for the Director

Date: 19.12.88



Power take-off test



Power take-off test