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STATE RESEARCH INSTITUTE OF ENGINEERING IN AGRICULTURE AND FORESTRY

TEST BULLETIN: O.E.C.D. No. 1351 FULL CODE

Report on Test in Accordance with O.E.C.D. Standard Code for the Official Testing of Agricultural Tractors



URSUS 4514 (4WD)

Manufactured by:	Zrzeszenie Przemyslu Ciagnikowego, Warszawa, Poland
Date of approval:	24th January 1992 Serial No. 1351 FULL CODE

This bulletin is based on engineering tests in accordance with the OECD Standard Code for the Official Testing of Agricultural Tractors Performance. It does not contain an evaluation of the performance of the tractor on practical farm work.

This report has been approved by the OECD Co-ordinating Centre (CEMAGREF France) as being in accordance with the OECD Standard Code for the Official Testing of Agricultural Tractors.

TABLE OF CONTENTS

I SPECIFICATION OF THE TRACTOR 2
TRACTOR 2
ENGINE 2
TRANSMISSION 3
POWER TAKE-OFF 4
POWER LIFT 5
TRAILER HITCH I 6
TRAILER HITCH II 7
SWINGING DRAWBAR 7
HOLED DRAWBAR 7
STEERING 8
BRAKES 8
WHEELS 8
PROTECTIVE STRUCTURE 8
DRIVER'S SEAT 8
MISCELLANEOUS 8
LIGHTNING 9
II TEST CONDITIONS 9
III TEST RESULTS 11
1. MAIN POWER TAKE-OFF 11
2. HYDRAULIC POWER AND LIFTING FORCE 12
3. DRAWBAR PERFORMANCE 16
4. TURNING AREA AND TURNING CIRCLE 18
5. LOCATION OF CENTRE OF GRAVITY 18
6. BRAKING 18
7. MEASUREMENT OF EXTERNAL NOISE LEVEL 19

Tractor manufacturer's name and address	Zrzeszenie Przemyslu Ciagnikowego zm URSUS ul. Traktorzysttow 10 02-495 Warszawa Poland
Submitted for test by	The manufacturer
Selected for test by	The manufacturer
Place of running-in	ZM URSUS, Poland
Duration of running-in	50 h
Location of test	VAKOLA, Finland

I. SPECIFICATIONS OF THE TRACTOR

TRACTOR

Make/Model/Type	URSUS/4514/Four wheel drive
Number of driving wheels	4
Serial number	0048481
1st Serial number	000001

ENGINE

Make/Model/Type	URSUS/4390/4-stroke, direct injection, water cooled
Serial number	LD22590 P 000787 T

Cylinders

Number/disposition	4/vertical, in line
Bore/stroke	98,43 mm /127 mm
Capacity	3865 cm^3
Compression ratio	16
Arrangement of valves	Overhead
Cylinder liners	Dry, replaceable

Supercharging	Not applicable

Fuel system

Fuel feed system	47 PM 04 mechanical feed pump
Make/Model/Type of	WF PZL Sedziszow/FPW 5.8/replaceable cartridge filter with sediment bowl
Capacity of fuel tank	80 dm^3
Make/Model/Type of injection pump	WSK Poznan, distributor pump, type DPA 3241 F350
Serial number	258866

Manufacturer's production setting of injection pump	61 ± 1.2 mm^3/stroke at 900 RPM (at rated engine speed and full load)
Timing	23° before TDC
Make/Model/Type of injectors	WSK PZL II/NK 4567.10A
Injection pressure	16,6 MPa
Governor	
Make/Model/Type	WSK Poznan, mechanical type
Governed range of engine speed	From 750 to 2280 rev/min
Rated engine speed	2000 rev/min
Air cleaner	
Pre-cleaner	
Make/Model/Type	ZSM BRODNICA, cyclon type
Location of air intake	Under the bonnet, front of the tractor
Main-cleaner	
Make/Model/Type	ZSM BRODNICA, oil bath type
Maintenance indicator	None
Lubrication system	
Type of feed pump	Gear pump
Type of filter(s)	Full flow replaceable paper cartridge
Number	1
Cooling system	
Type of coolant	Anti-freeze
Type of pump	Centrifugal
Number of fan blades	4
Fan diameter	412 mm
Coolant capacity	15,5 dm^3 (including cab heating)
Type of temperature control	Thermostat
Superpressure system	70 kPa
Starting system	
Make/Model/Type	ELMOT/R11g.12V, solenoid engaged
Starter motor power rating	2,9 kW
Cold starting aid	Thermostart
Safety device	Only operable when Hi-Low gear lever is in neutral position
Electrical system	
Voltage	12 V

Generator	
Make/Model/Type	ELMOT/A 124 F/alternative 44A
Power	0,5 kW
Battery (Number of accumulators)	1
Rating	100 Ah at 20 hours
Exhaust system	
Make/Model/Type	URSUS
Location	At the right hand side of the tractor, 2670 mm above ground
TRANSMISSION	
Clutch	
Make/Model/Type	URSUS, dual clutch, dry
Number of plates	2
Diameter of plates	driving clutch 305 mm PTO clutch 254 mm
Method of operation	Mechanical pedal operated
Gear box	
Make/Model/Type	URSUS, sliding gears and planetary reduction unit
Arrangement	Gear box with 4 forward and 1 reverse speeds, 1-4 and R lever; 2 ranges: Low and High lever
Number of gears	8 forward, 2 reverse
Available options	None
Rear axle and final drives	
Make/Model/Type	URSUS, crown wheel and pinion differential, planetary final drives
Differential lock	
Type	Mechanical, dog clutch
Method of engagement	Pedal
Method of disengagement	Self-disengaging
Front axle and final drives	
Make/Model/Type	LANDINI/NG 100/side drive, crown wheel and pinion differential, planetary final drives
Differential lock	No spin
Method of engagement and disengagement	Automatic

Total ratios and travelling speeds

Gear no	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed (*) at rated engine speed of 2000 rev/min km/h
1	Forward	209,87	2,5
2	Low	143,11	3,7
3		104,76	5,0
4		77,99	6,7
1	Forward	51,31	10,2
2	High	34,99	15,0
3		25,61	20,5
4		19,07	27,5
1	Reverse	154,13	3,4
2		37,68	13,9

(*) Calculated with a tyre dynamic radius index of 695 mm (ISO 4251/1-1984)

Number of revolutions of the front wheels for one revolution of the rear wheels	1,388

POWER TAKE-OFF

Main power take-off

Type	Independent
Method of engagement	Sliding coupler operated by two position lever
Number of shafts	2
Method of changing power take-off shaft ends and speeds	By changing pto shafts: 6 spline for 540 RPM and 21 spline shaft for 1000 RPM

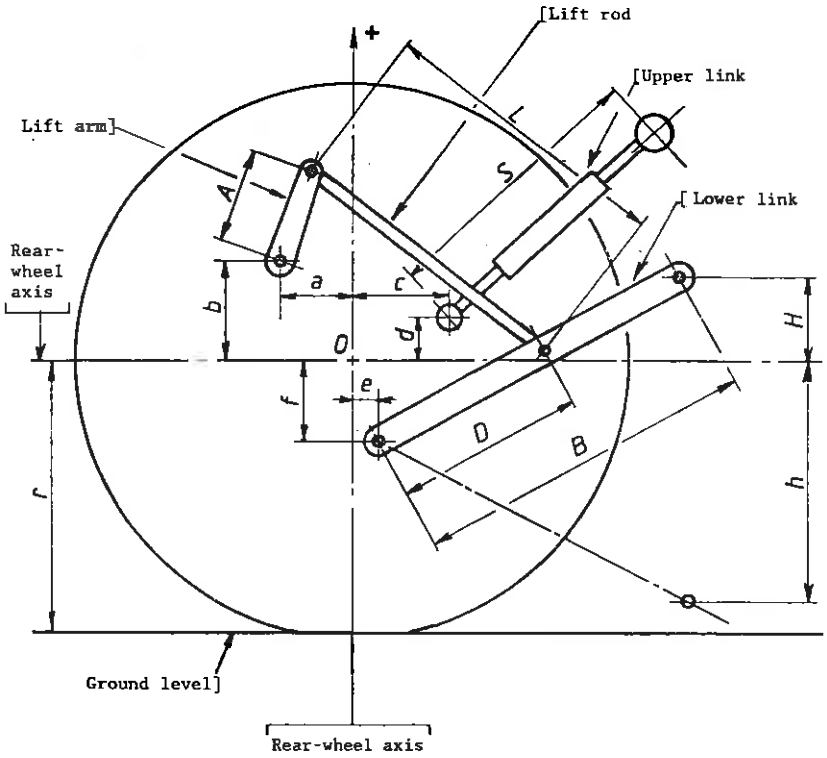
Power take-off proportional to engine speed 540 rev/min

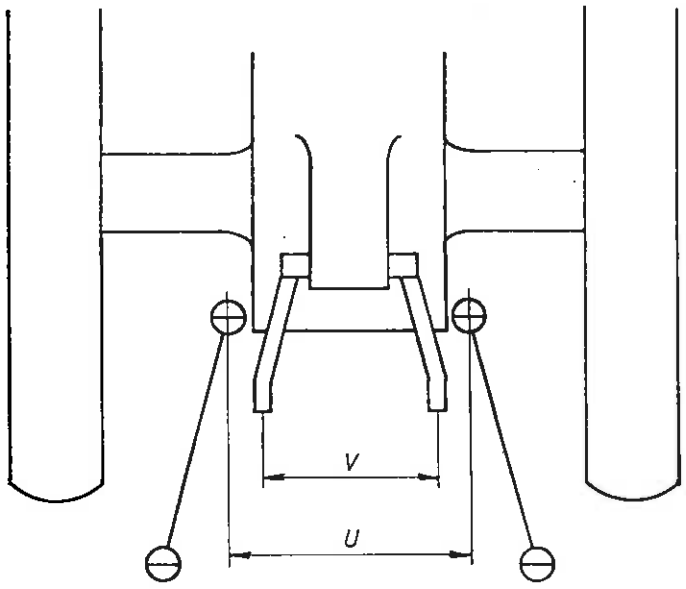
Location	At the rear of the tractor
Diameter of power take-off shaft end	35 mm
Number of splines	6, in conformity with ISO 500/1979
Height above ground	565 mm
Distance from the median plane of the tractor	0 mm
Distance behind rear-wheel axis	296 mm
PTO speed at rated engine speed (2000 rev/min)	640 rev/min
Engine speed at standard power take-off speed	1686 rev/min
Ratio of rotation speeds (engine speed/p.t.o speed)	3,125

Power restriction and maximum torque	None
Direction of rotation (viewed from behind tractor)	Clockwise
1000 rev/min	
Location	At the rear of the tractor
Diameter of power take-off shaft end	35 mm
Number of splines	21, in conformity with ISO 500/1979
Height above ground	565 mm
Distance from the median plane of the tractor	0 mm
Distance behind rear-wheel axis	296 mm
PTO speed at rated engine speed (2000 rev/min)	1182 rev/min
Engine speed at standard power take-off speed	1692 rev/min
Ratio of rotation speeds	1,692
Direction of rotation	Clockwise
Power take-off proportional to ground speed	Not available
Optional power take-off	Not available

POWER LIFT

Make/Model/Type	URSUS
Type of hydraulic system	Open centre system
Type and number of cylinders	One internal, single acting
Type of linkage lock for transport	None
Relief valve pressure setting	21.4-22.4 MPa
Lift pump type	4-cylinder piston pump
Transmission between pump and engine	From PTO transmission
Type and number of filters	One suction stainer
Site of oil reservoir	Transmission housing
Type, number and location of tapping points	Four push-pull tapping at the rear of the tractor
Maximum volume of oil available to external cylinders	16 dm^3
Maximum pressure in the external hydraulic system	17.5 + 0.5 MPa


[Lift rod
[Upper link
Lift arm]
[Lower link
Rear-wheel axis
L
S
A
a
c
b
d
O
H
e
f
D
B
r
h
Ground level]
Rear-wheel axis


V
U

Three point linkage

Category 2, according to standard ISO 730/2-1979

Category adapter None

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	267	267
Length of lower links	(B)	975	975
Distance of lift arm pivot point from rear-wheel axis : horizontally	(a)	196	196
: vertically	(b)	232	232
Horizontal distance between the 2 lower link point	(u)	492	492
Horizontal distance between the 2 lift arm end points	(v)	534	534
Length of upper link	(S)	from 685 to 870	730
Distance of upper link pivot point from rear wheel axis : horizontally	(c)	190, 202, 216	190
: vertically	(d)	205, 170, 130	205
Distance of lower link pivot point from rear wheel axis : horizontally	(e)	34 forward	34
: vertically	(f)	212	212
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	from 430 to 485	485
Length of lift rods	(L)	from 605 to 670	615
Height of lower hitch points relative to the rear-wheel axis : in low position	(h)	from 495 to 655	495
: in high position	(H)	from 135 to 265	225
Height above ground of lower hitch points when locked in transport position (*)			

(*) Assuming r = 695 mm tyre dynamic radius index of ISO 4251/1-1984.

Table 1.1 Dimensions of linkage geometry (when connected to the standard frame)

TRAILER HITCH I

Type Hitch-hook

Hook diameter 47 mm

Height above ground 315-335 mm

Distance of hitch point from rear-wheel axis, horizontally 441, 556, 606, 641, 691 mm

Distance of hitch point from power take-off shaft end:

- vertically Below 225, 230, 235, 240, 245 mm
- horizontally Behind 145, 260, 310, 345, 395 mm

Maximum vertical permissible load 13,2 kN

TRAILER HITCH II

Type	Clevis with rubber shock absorber
Hole diameter	31 mm
Height above ground	890 mm
Distance of hitch point from rear-wheel axis, horizontally	591 mm
Distance of hitch point from power take-off shaft end	
- vertically	335 mm
- horizontally	295 mm
Maximum vertical permissible load	8,8 kN

SWINGING DRAWBAR

Type	Universal hitch
Height above ground	
Maximum	300 mm
Minimum	280 mm
Distance of hitch point from rear-wheel axis, horizontally	526-826 mm
Distance of hitch point from power take-off shaft end	
- vertically	190-120 mm
- horizontally	230-530 mm
Distance of pivot point from rear-wheel axis, horizontally	314 mm
Diameter drawbar pin hole	34 mm
Maximum vertical permissible load	13,2 kN

HOLED DRAWBAR

Number of holes	6
Distance between holes	120, 80, 40, 80, 120 mm
Hole diameter	22 mm
Thickness/width of the drawbar	25 mm / 80 mm
Height above ground	
- minimum	40 mm
- maximum	960 mm
Horizontal distance to power take-off shaft end (rear)	632 mm

STEERING

Make/Model/Type	URSUS/Hydrostatic steering
Method of operation	Power steering
- pump	1
- ram	1
Working pressure	11 MPa

BRAKES

Service brake

Make/Model/Type	URSUS/oil immersed disc brakes acting on rear wheels
Method of operation	Two pedals, mechanical actuated, independent or combined operation
Trailer braking take-off	Air brakes, optional

Parking brake

Type	Mechanical, coupled to both service brakes
Method of operation	Hand lever with ratchet

WHEELS

Number	4
- front	Driving/Steering
- rear	Driving
Wheelbase	2300 mm

Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1480	1800	Offset lug rims and reversing wheel centres
Rear	1500	2060	Offset lug rims and reversing wheel centres

PROTECTIVE STRUCTURE

Make/Model/Type	URSUS/07/protective cab
Manufacturer's name and address	URSUS, Zrzeszenie Przemyslu Ciagnikowego, Warszawa, POLAND
Protective device·	Cab, not tiltable
OECD approval number	CSS 0149/3

DRIVER'S SEAT

Make/Model/Type	Agromet/MFP3/3/Grammer
Type of suspension	Spiral spring
Type of damping	Hydraulic damper
Range of adjustment:	
- longitudinal	180 mm
- vertical	60 mm

MISCELLANEOUS

None

LIGHTING

	Height above ground centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1100	ø 120	215
Sidelights	1640	55 x 65	747
Rearlights	1530	65 x 100	735
Reflector	1100	ø 75	797

II. TEST CONDITIONS

Overall dimensions

	Length mm	Width		Height at top of	
		Minimum mm	Maximum mm	Protective structure mm	Exhaust silencer mm
Ballasted	3935	1990	2500	2520	2670
Unbal-lasted	3805	1940	2500	2520	2670

Ground clearance

(unballasted tractor) 290 mm

Clearance-limiting part Hitch-hook

Tractor mass

(with cab):

	Ballasted		Unballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	1650	1660	1390	1400
Rear	2520	2585	1910	1975
Total	4170	4245	3300	3375

Ballast

	Weights		
	Number	Total mass kg	Water kg
Front	8	210	-
Rear	6	160	500

Tyres and track width specifications

	Front	Rear
Tyres:		
- dimensions	11.2-24	16.9-30
- ply rating	6PR	8PR
- type	diagonal	diagonal
- maximum load (tyre manufacturer's)	9.7 kN	23.0 kN
- maximum load (tractor manufacturer's)	9.7 kN	23.0 kN
- inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
- dynamic radius index	515 mm	695 mm
Chosen track width	1480 mm	1500 mm

Oils and lubrication

Capacity and change interval

	Capacity dm^3	Oil change h	Filter change h
Engine	7,0	250	250
Gear box*)	44	1000	500[1)]
Front axle	4.0	1000	-
Final drive (rear)	2 x 1,7	500	-
Final drive (front)	2.4	1000	-
Steering	1.2	1000	500

*) Includes rear axle and hydraulic system
1) Only filter cleaning

	Recommended	Used during test
Engine oil - Type - Viscosity - Classification	 AP, CC SAE 10W/30 below -1°C SAE 20W/40 above -1°C	Recommended
Transmission oils - Type - Viscosity - Classification	 SAE 80-90 API GL4	Recommended
Steering oil - Type - Viscosity - Classification	 ATF SAE 10W/30 API GL 4	Recommended

Grease	Universal grease
Number of lubrication points	9

Fuel

Type	Dieseloil, in conformity with national standard
Density at 15 °C	PTO test 841 g/dm^3, drawbar power test 838 g/dm^3

III. TEST RESULTS

COMPULSORY TEST RESULTS

1. MAIN POWER TAKE-OFF

Date and location of tests 2.5.1990 / VAKOLA
Type of dynamometer Schenk W 400

Power	Speed		Fuel consumption			Specific energy
	Engine	P.T.O.	Hourly		Specific	
kW	rev/min		kg/h	l/h	g/kWh	kWh/l
1.1 MAXIMUM POWER - TWO-HOUR TEST						
44,8	2000	640	11,8	14,0	263	3,20
1.2 POWER AT RATED ENGINE SPEED						
44,8	2000	640	11,8	14,0	263	3,20
1.3 STANDARD POWER TAKE-OFF SPEED (540 rev/min)						
40,9	1688	540	10,3	12,3	252	3,33
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine						
44,8	2000	640	11,8	14,0	263	3,20
1.4.2 85% of torque obtained in 1.4.1						
39,0	2047	655	10,3	12,3	265	3,17
1.4.3 75% of torque defined in 1.4.2						
29,4	2063	660	8,4	10,0	286	2,93
1.4.4 50% of torque defined in 1.4.2						
20,0	2100	672	6,8	8,1	339	2,48
1.4.5 25% of torque defined in 1.4.2						
10,1	2131	682	5,1	6,0	498	1,68
1.4.6 Unloaded						
-	2156	690	3,4	4,0	-	-
1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000/ 540 REV/MIN) 1.5.1 The torque corresponding to maximum power						
40,9	1688	540	10,3	12,3	252	3,33
1.5.2 85% of torque obtained in 1.5.1						
35,5	1722	551	8,8	10,4	247	3,40
1.5.3 75% of torque defined in 1.5.2						
27,5	1775	568	7,2	8,5	261	3,22
1.5.4 50% of torque defined in 1.5.2						
18,7	1813	580	5,6	6,7	299	2,81
1.5.5 25% of torque defined in 1.5.2						
9,5	1844	590	4,1	4,9	433	1,93
1.5.6 Unloaded						
-	1875	600	2,5	3,0	-	-

No load maximum engine speed	2156 rev/min
Torque[1] at maximum power	214 Nm
Maximum torque[1]	250 Nm
at engine speed	1313 rev/min
Mean atmospheric conditions	
Temperature	22 °C
Pressure	102,9 kPa
Relative humidity	34 %
Maximum temperatures	
Coolant	72 °C
Engine oil	128 °C
Fuel	80 °C
Engine air intake	24 °C

2. HYDRAULIC POWER AND LIFTING FORCE

2.1 Hydraulic power test

Date of tests	31.05.1990
Sustained pressure with relief valve open	18,8 MPa
Pump delivery rate at minimum pressure	33,8 l/min

	Flow rate l/min	Pressure MPa	Power kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting and corresponding hydraulic power	7,4	16,9	2,1
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	29,0	14,0	6,8

Tapping point used for test: External tapping

2.2 Power lift test

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement	702 mm	675 mm
Maximum corrected force exerted through full range	15.1 kN	13.4 kN
Corresponding pressure of hydraulic fluid [1]	19.8 MPa	19.8 MPa
Moment about rear-wheel axis	14.2 kNm	20.8 kNm
Maximum tilt angle of mast from vertical	-	16 degrees

1) 90 % of the maximum lifting force pressure. External hydraulics and power lift have different relief valves.

Lifting heights relative to the horizontal plane including the lower link pivot points										
mm	-285	-258	-200	-100	0	100	200	300	400	417
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting or to maximum power delivered by the hydraulic system, whichever is lower)										
At the hitch points kN	15.1		16.7	17.9	18.6	19.1	19.7	20.4	19.6	19.1
Corresponding pressure: 19.8 MPa										
At the frame kN		14.8	15.4	15.8	15.9	15.7	15.5	14.9		13.4
Corresponding pressure: 19.8 MPa										

3. DRAWBAR PERFORMANCE

Date of tests 31.5-6.6.1990

Type of track Tarmacadam

		Tyre inflation presssure	
	Height of drawbar above ground	Front	Rear
Unballasted	360 mm	150 kPa	100 kPa
Ballasted	360 mm	150 kPa	130 kPa

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels or track	Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine Oil	Temperature	Relative humidity	Pressure
	kW	kN	km/h	rev-/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
L1	16,0	25,2	2,3	2119	14,7	446	1,88	51	74	112	18	60	100,8
L2	23,2	25,6	3,3	2067	14,9	377	2,22	48	75	111	20	60	100,8
L3	31,6	25,7	4,4	2056	15,0	363	2,31	45	73	98	18	60	100,8
L4	35,1	20,6	6,2	1998	9,5	341	2,46	48	74	99	19	60	100,8
H1	36,0	13,2	9,8	1990	4,3	331	2,53	49	75	100	15	60	100,8
H2	34,0	8,2	14,9	2007	1,9	358	2,34	45	74	96	15	60	100,8
H3	31,8	5,6	20,4	1984	0,7	370	2,26	48	77	102	14	60	100,8

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels or track	Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine Oil	Tempera-ture	Relative humidity	Pressure
	kW	kN	km/h	rev-/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
L1	18,5	29,6	2,3	2093	14,8	416	2,01	48	75	105	20	60	100,3
L2	27,0	29,8	3,3	2064	15,0	360	2,33	46	75	104	21	60	100,3
L3	33,8	27,6	4,4	2010	13,4	345	2,43	52	79	112	22	60	100,3
L4	35,3	20,4	6,3	2005	8,3	334	2,51	52	75	112	22	60	100,3
H1	34,8	12,7	9,9	1992	3,8	336	2,49	52	76	109	22	60	100,3
H2	32,4	7,9	14,9	2003	2,0	366	2,29	52	76	113	22	60	100,3
3.3.1 FIVE-HOUR TEST at 75% of pull at maximum power on gear H1													
L4	28,0	15,3	6,6	2055	5,3	346	2.42	59	79	114	22	45	99,5
3.3.2 FIVE-HOUR TEST at pull corresponding to 15% wheelslip													
L2	26,5	29,4	3,3	2058	-	-	-	52	76	114	18	53	100,1

Oil consumption during ten hours duration of tests 3.3.1 and 3.3.2 — 33 g/h

4. TURNING AREA AND TURNING CIRCLE

Wheel equipment if several sets of tyres are tested.

	With brakes		Without brakes	
	Right-hand m	Left-hand m	Right-hand m	Left-hand m
Radius of turning area	4.6	4.7	5.4	5.5
Radius of turning circle	4.4	4.5	5.1	5.2

5. LOCATION OF CENTRE OF GRAVITY

Height above ground — 880 mm

Distance forward from the vertical plane containing the axis of the rear-wheels — 960 mm

Distance from the median plane of the tractor — 0 mm

6. BRAKING

Date of tests — 11.-12. and 26.6.1990

6.1 Cold service braking device test

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s^2
Ballasted tractor	28,0	0,30	3,4
Unballasted tractor	28,3	0,30	3,3

6.2 Fade test

Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s^2
28,4	0,38	3,1

Maximum deviation of tractor from its original course — None

Abnormal vibration — None

Brake heating method — Towing

6.3 Parking braking device test

	Uphill	Downhill
Braking device control force	0,15 kN	0,15 kN

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests	14.8.1990
Sound level meter	
Make/Model/Type	Brüel & Kjaer 2209
Type of track	Tarmacadam
Gear Number	H4
Travelling speed before acceleration	22.2 km/h
Sound level	87.0 dB(A)

8. REPAIRS

None

9. REMARKS

None

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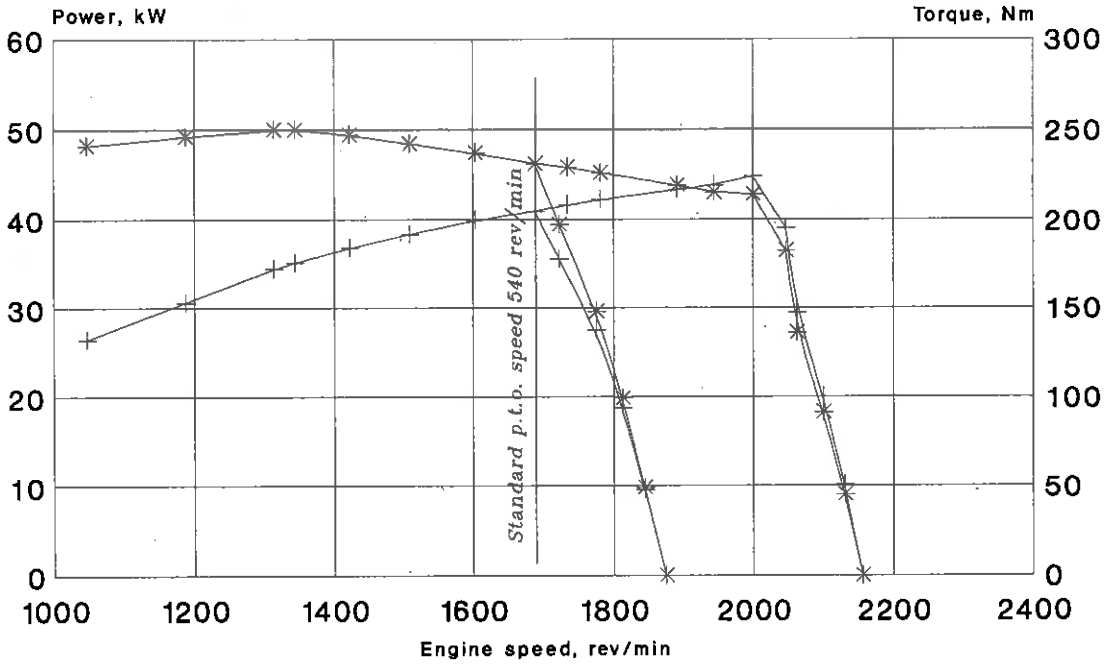
Vihti, May 14th 1992

Director Henrik Sarin

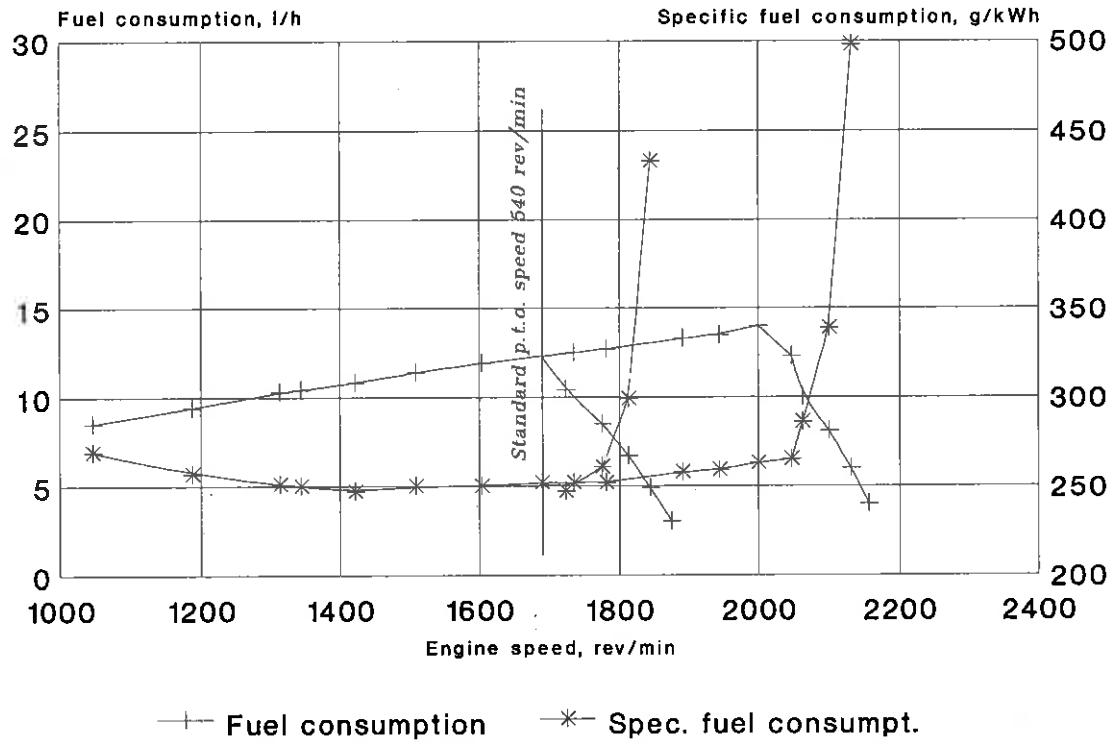
Test engineer Ari Lemminkäinen

Valtion maatalouskoneiden tutkimuslaitos

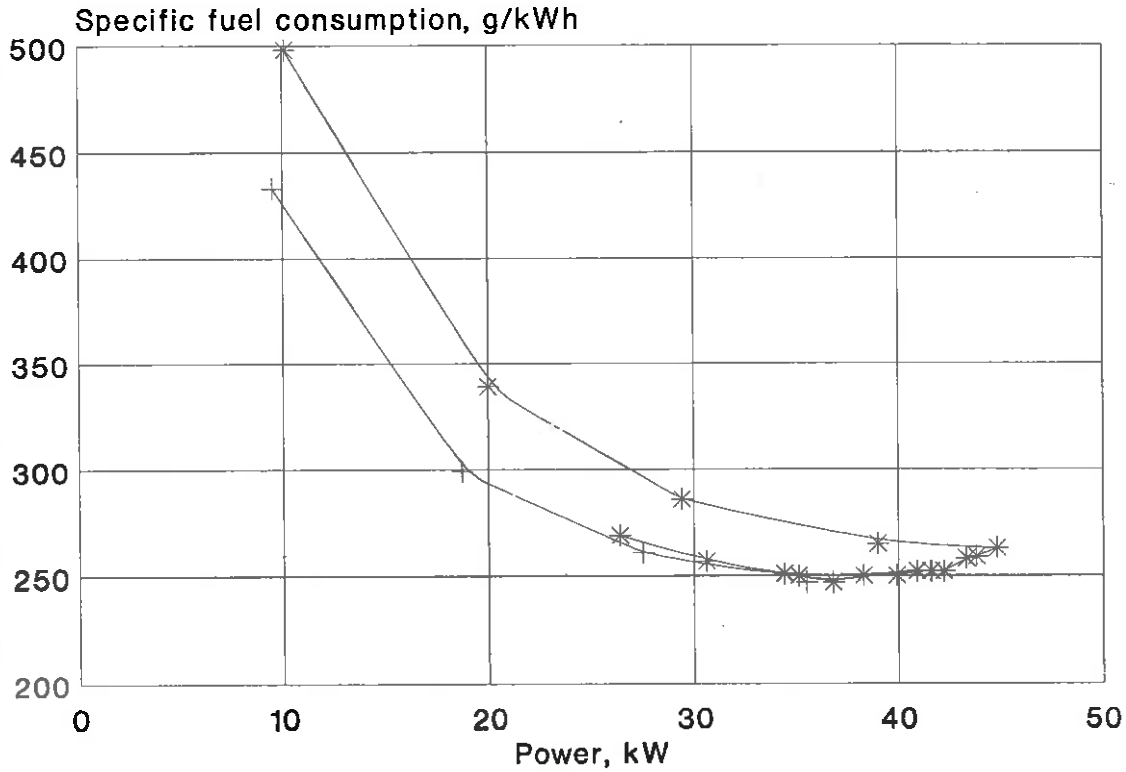
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