O. E. C. D. approval 801
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REPORT ON TEST IN ACCORDANCE WITH O. E. C. D. TEST CODE FOR AGRICULTURAL TRACTORS



URSUS C-362
Manufacturer: ZPC "Ursus", Warszawa, Poland

NATIONAL AGRICULTURAL ENGINEERING INSTITUTE
Bygholm 8700 Horsens Denmark

This Bulletin is based on engineering tests in accordance with the O.E.C.D. standard Code for Official Testing of Agricultural Tractors. It does not contain an evaluation of the performance of the tractor on practical work.

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SPECIFICATION OF TRACTOR

Manufacturer:	ZPC "Ursus", Warsczawa, Poland
Submitted for test by:	Foreign Trade Enterprise "Agromet-Motoimport", Poland
Selected for test by:	The manufacturer with the agreement of the testing station
Place of running-in:	At Testing Station (Bygholm)
Duration of running-in:	5o hours appr.

Tractor

Make:	Ursus
Model:	C-362
Type:	Four-wheel, rear wheel driven, unit construction
Serial No.:	341o28/ooo2

Engine

Make:	Ursus
Model:	S-4oo3 A
Type:	4-stroke diesel engine, direct injection, water cooled
Serial No.:	399968
Cylinders:	4 cylinders, vertical in-line, bore 95 mm, stroke 11o mm, capacity 312o cm^3, compression ratio 17:1, replaceable wet cylinder liners
Valves:	Overhead valves
Fuel system:	Capacity of fuel tank: 75 l Fuel feed by piston pump V2HFo1A Fuel filter: Make: Zaklady Sprzetu Motortza-cymego, Poland Type: Two step filter, felt and paper element Model: FVD 1o RP 1,8

Injection pump:
Make: W2M/PZL Mielec
Type: in line fuel injection pump
Model: P24T8-3a 71 B1FVR
Manufactures production setting:
55 mm^3/stroke at 1000 pumps rpm,
which is a test bench figure.
Injection timing: 24° before TDC
Fuel injectors:
Make: WZM-2
Type: Injector with nozzle insert
Model: Injector: WJ1 - S 8,7
Insert: D1LMK 150/WZ
Injection pressure: 157 bar

Governor:

WZM/PZL-MIELEC mechanical govenor type R8V25-1150/74D1, incorporated in fuel injection pump
Range of speed: 550 to 2450 rev/min
Rated speed: 2200 rev/min

Air Cleaner:

ZSM oil bath
Oil capacity: 1,5 l
Pre-cleaner: cyclone type

Exhaust silencer:

Own make.
Single chamber absorption silencer. 80x140 mm oval, 1140 mm long, on the left hand side above bonnet mouth showing upwards, mouth 2605 mm above ground.

Lubrication system:

Forced feed from gear pump, strainer in sump. Fiaam FT 4653 oil filter PP-8,4 in fuel flow
Oil capacity: 9 l
Changing interval: 200 hours
Recommended oil quality MIL-L-2104B
Recommended oil viscosities:
Winther SAE 20 W
Summer SAE 30

Cooling system:

Pressurized water cooling system with centrifugal pump and 5-blade belt driven fan
Water capacity: 11 l
Means of temperature control:
Thermostat 85-95°C
Pressure details: 1,1 bar

Starting system:

Electrically: solenoid engaged type
Model: Zelmot-Swidnica
Type: R-11a, 12/4-2,94 kW

Electrical system:	Voltage: 12 Volt, negative earth Generator make: Zelmot-Swidnica type: 3-phase alternator P2od - 14V - 12 A Battery make: ZAP-Piasow type: 12 Volt capacity: 125 Ah at 2o hour rating

Transmission

Clutch:	Make: Ursus Type: Dry dual disc, two stage. The first stage for driving wheels and the second stage for PTO shaft. Diameter of discs: 18o/165 mm Method of operation: by hanging pedal
Gear box:	Make: Ursus Type: Mechanical gear type with 2 different mechanismes a 5 forward and 1 reverse gear box associated to a reduction gear box (2 ranges H and L) No. of speeds: lo forward and 2 reverse
Rear axle and final drive:	Make: Ursus Type: Crown wheel and pinion, differential gear with lock, pedal operated, self disengaging, planetaru final drives
Oil capacity:	Gear box in common with rear axle: 25 Final drive: 3 l (1,5 l in each side) Change period: 8oo hours

Gear	Number of engine rev. for one rev. of driving wheel	Norminal travelling speed[x] for rated speed of engine km/h
Forward		
L 1	471,88	1,21
L 2	317,44	1,8o
L 3	227,55	2,51
L 4	148,23	3,86
L 5	88,75	6,45
H 1	11o,33	5,19
H 2	74,16	7,72
H 3	53,22	1o,75
H 4	34,66	16,51
H 5	2o,75	27,58
Reverse		
L R	361,55	1,58
H R	84,54	6,77

x) Calculated with a tyre dynamic radius endex of 69o mm

Power take off

At rear of tractor, in median plane, 693 mm above ground, 3oo mm to the rear axle line.
Dimensions: 34,9 x 27,8 x 8,6 mm
6 splines, ISO standard
Proportional to engine speed p.t.o.:
Semi-independent, selecting by hand lever, "proportional to engine speed", "neutral" or proportional to tractor travelling speed".

Speed: 595,8 rev/min at 22oo rev/min engine speed
54o rev/min at 1994 rev/min engine speed

Direction of rotation clockwise viewed facing driving end.
Proportional ground speed p.t.o.:
Travelling distance for one revolution of p.t.o. shaft: o,34o m
Number of p.t.o. shaft revolutions for 1 revolution of rear wheels: 12,75
Direction of rotation: clockwise in forward gears, anticlockwise in reverse gears (viewed from driving end).

Power lift:	Make: ARCHIMEDES-WROCLAW Type: C-355 Oil capacity: common with gearbox
Implement linkage:	Category II in accordance with ISO standard. Single acting ram, with draft, mixed and position control
Drawbar:	Type: swinging Height above ground: 425 mm Distance from rear axle: 670 mm Position relative to p.t.o.: 335 mm rear rd Lateral adjustment: 160 mm Distance of pivot point frontward from rear axle: 180 mm
Steering:	Make: PILMET- WROCLAW Recirculating ball gear steering, hydraulic power assisted. Own oil circuit, gear pump directly driven by engine. Capacity of oil case: 3 l Recommended oil: SAE 10 W
Brakes:	Make: URSUS Type: hydraulic Operated by foot pedals Parking brake: band type operated by hand lever
Wheels:	Steering wheels: two at front Type of tyres: leading track Size: 7,50-16, 6 ply rating. Maximum permissible weight on each tyre 745 kg, at 2,25 bar pressure. Track widths: 1420 or 1720 mm Changeable by telescopic front axle Driving wheels: two at rear Type of tyres: agricultural grip Size: 12,4/11-36, 6 ply rating, diagonal Rim size: W 11-36 Maximum permissible weight on each tyre 1440 kg at 1,0 bar pressure Track width: 1350 to 1800 mm in 6 steps of 75 mm. Method of changing obtained by changing position of wheel rims relative to the wheel disc.
Wheelbase:	2160 mm

Lighting:

	Dimensions mm	Height above ground to centre mm	Distance from outside edge of tractor to centre mm
Head light	18o x 11o	88o	675
Side lights	5o dia	153o	11o
Rear lights	285 x 1oo	145o	22o
Reflectors	75 dia	1o55	6o

Number of grease points: 19 (whole tractor)

Overall dimensions:

	Length	Width		Heights x)	
		max	min	with exaust	without exhaust
	m	m	m	m	m
With ballast	363o	212o	167o	269o	2575
Without ballast	363o	212o	167o	269o	2575

x) Measured to top of the roof and top of exhaust

Ground clearance: 395 below swinging drawbar.

Seat: Make: AGROMET FMR KUNOW
Upholstered seat with back rest, parallogram linkage.
Spring with hydraulic shock absorber.
Adjustable to drivers weight.
Longitudiual adjustment 15o mm

CONDITIONS DURING TEST

Masses:

Tractor without driver, but with tanks full

	Front kg	Rear kg	Total kg
Without ballast	934	169o	2624
With ballast x)	1ooo	169o	269o

	No. of weights	Total mass	Water kg
Front	3 x 22	66	-
Rear	-	-	-

x) The manufacturer did not recommend further ballasting of the tractor.

Track setting during test: Front: 142o mm
Rear 135o mm

FUEL AND LUBRICANTS USED IN TEST

Fuel: Type: Esso
Specific gravity at 15°C: o,836 kg/l
Viscosity at 5o°C: 2,6 Cst
Cetana number: 55
Conforms to ASTM standard

Engine oil: Type: Esso, D-3 2oW/3o
Viscosity: 75 Cst (4o°C)

Transmission oil: Type: Esso, Nuto HP 68
Viscosity: 4o Cst (at 5o°C)

COMPULSORY TESTS

(1) MAIN POWER TAKE-OFF PERFORMANCE

Date and locations of tests: 25/9-1980, Bygholm, Horsens

Type of dynamometer: Schenck U2-30

Power	Speed		Fuel consumption		Specific
	Engine	p.t.o.	hourly	specific	Energy
kW	rev/min	rev/min	l/h	kg/kWh	kWh/L
Maximum power - 2 hours test					
35,4	2200	596	11,52	0,272	3,07
The speed recommended by the manufacturer for drawbar work					
35,4	2200	596	11,52	0,272	3,07
Part loads - at rated engine speed					
(1) 85 % of the torque obtained at manufacturer power					
30,5	2230	604	10,05	0,275	3,03
(2) unloaded					
0	2308	625	3,70	-	-
(3) half the torque defined in (1)					
15,6	2280	617	6,58	0,353	2,37
(4) the torque corresponding to maximum power					
35,4	2200	596	11,52	0,272	3,07
(5) one-quarter of the torque defines in (1)					
7,9	2294	621	5,40	0,571	1,46
(6) three-quarter of the torque defined in (1)					
23,2	2260	612	8,35	0,301	2,78

Power	Speed		Fuel consumption		Specific
	Engine	p.t.o.	hourly	specific	Energy
kW	rev/min	rev/min	l/h	kg/kWh	kWh/L
Part Loads - Standard speed of the p.t.o.					
(1) 85 % of the torque obtained at maximum power					
3o,2	2o37	552	1o,o5	o,278	3,oo
(2) unloaded					
o	211o	571	3,19	-	-
(3) half the torque defined in (1)					
15,5	2o88	565	6,5o	o,351	2,38
(4) the torque corresponding to maximum power available					
34,8	1994	54o	11,32	o,272	3,o7
(5) one-quarter of the torque defined in (1)					
7,8	21oo	569	5,o9	o,546	1,53
(6) three-quarter of the torque defined in (1)					
23,o	2o7o	561	7,9o	o,287	2,91

Standard specific fuel consumption, kg/kWh

(a) o,275 (b) o,353 (c) o,278 (d) o,351

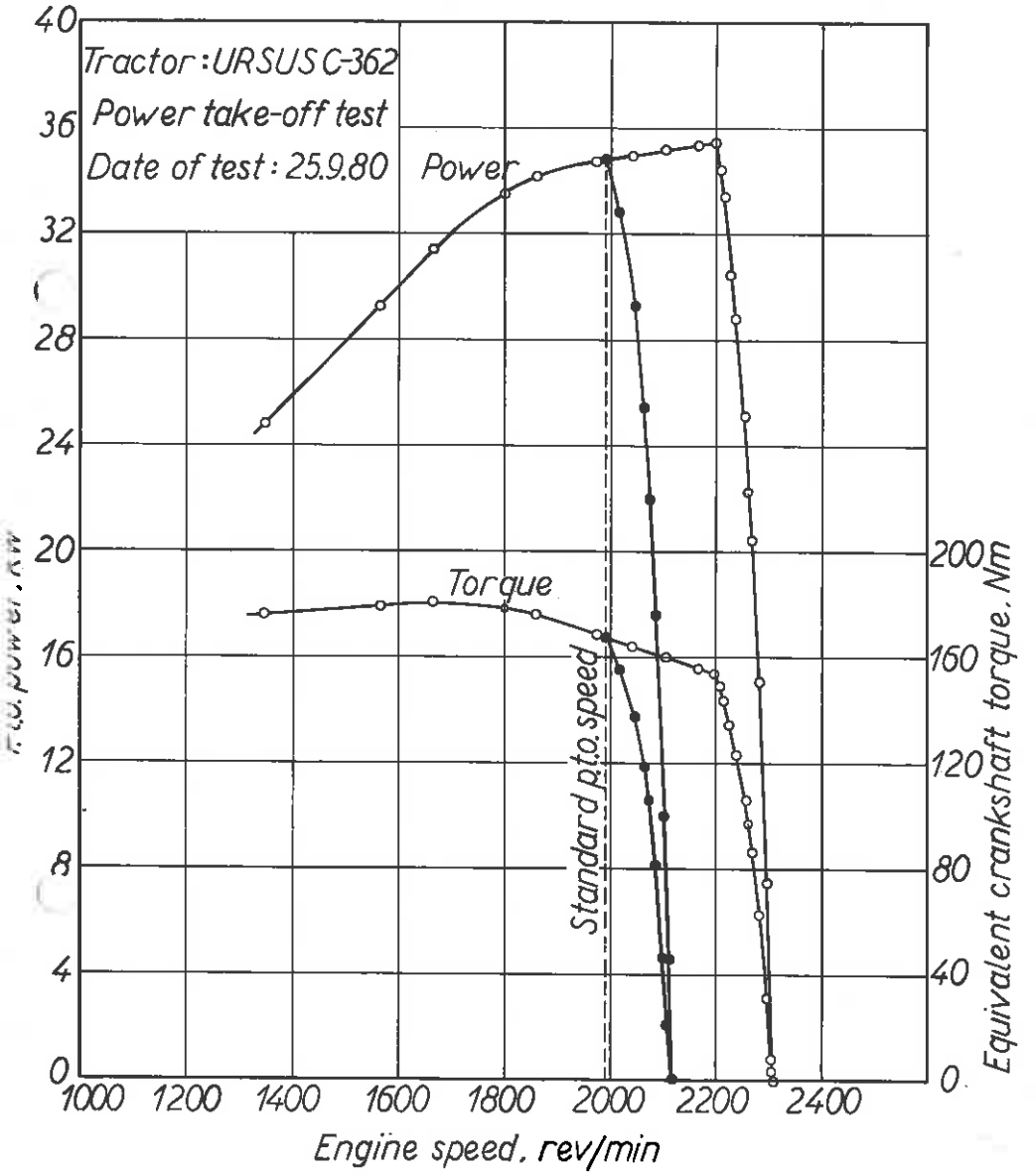
No load maximum engine speed: 238o rev/min

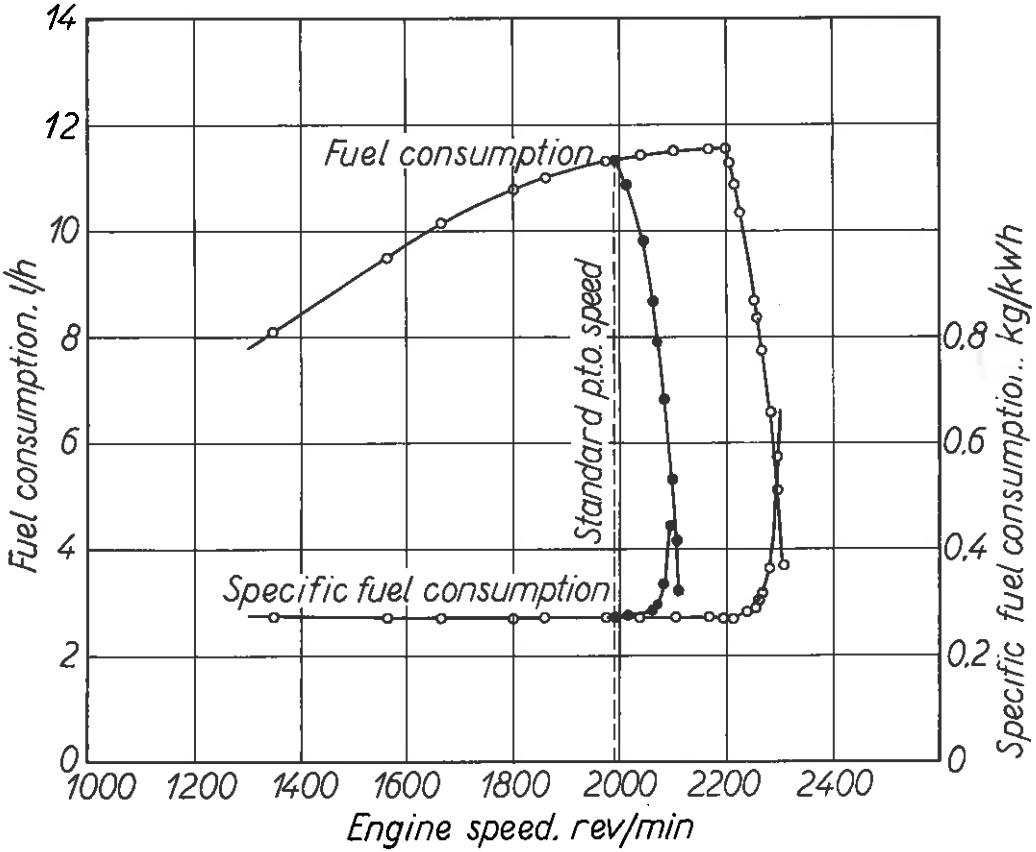
Equivalent crankshaft torque at maximum power: 153,7 Nm

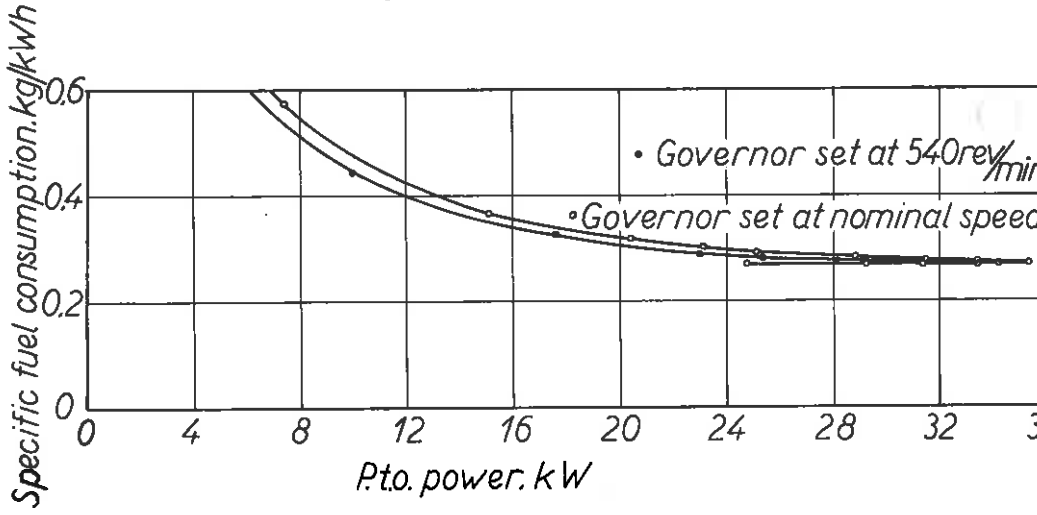
Maximum equivalent crankshaft torque: 18o,o Nm at 165o rev/min of the engine

Mean atmospheric conditions: temperature 21°C
pressure 1o21 m bar
relative humidity: 68 %

Maximum temperatures: coolant 87°C
engine oil 1o6 °C
fuel 49°C
engine air intake 28°C


Tractor: URSUS C-362
Power take-off test
Date of test: 25.9.80
Power
Torque
Standard p.t.o. speed
P.t.o. power, kW
Equivalent crankshaft torque, Nm
Engine speed, rev/min
0
4
8
12
16
20
24
28
32
36
40
0
40
80
120
160
200
1000
1200
1400
1600
1800
2000
2200
2400


Fuel consumption
Standard p.t.o. speed
Specific fuel consumption
Fuel consumption. l/h
Specific fuel consumption. kg/kW/h
Engine speed. rev/min
0
2
4
6
8
10
12
14
0.2
0.4
0.6
0.8
1000
1200
1400
1600
1800
2000
2200
2400


• Governor set at 540rev/min
◦ Governor set at nominal speed
Specific fuel consumption. kg/kW/h
P.t.o. power. kW
0
0.2
0.4
0.6
0
4
8
12
16
20
24
28
32

(2) DRAWBAR PERFORMANCE

Date of tests: October 1980

Type of track: Tarmacadam

Height of drawbar above ground unballasted 420 mm, ballasted 450 mm

Gear	Speed	Power	Drawbar pull	Engine speed	Slip of wheels	Specific fuel	Specific energy	Temperatures			Atmospheric conditions		
								Fuel	Coolant	Engine oil	Temp.	Relative humidity	Pressure
	km/h	kW	N	rev/min	%	kg/kWh	kWh/L	°C	°C	°C	°C	%	mbar
(1) MAXIMUM POWER (unballasted)													
2L	1,57	7,8	17952	2283	15,0	-	-	24	85	94	13	82	1018
3L	2,19	11,0	18099	2277	15,0	-	-	29	84	94	13	78	1018
4L	3,32	16,6	17952	2255	15,0	-	-	21	85	90	14	76	1018
1H	4,41	22,0	17952	2220	15,0	-	-	23	87	93	15	76	1018
5L	5,73	23,1	14519	2200	10,1	-	-	25	87	92	14	75	1016
2H	7,02	25,3	12949	2200	8,8	-	-	22	88	90	14	75	1016
3H	10,02	26,8	9614	2200	6,8	-	-	24	85	85	14	75	1016
4H	15,80	26,3	5984	2200	4,2	-	-	24	85	86	14	75	1016
(2) MAXIMUM POWER (ballasted)													
1L	1,06	5,4	18296	2287	15,0	0,808	1,04	24	87	92	13	70	1020
2L	1,57	8,0	18345	2285	15,0	0,611	1,37	24	87	92	13	70	1020
3L	2.20	11,3	18541	2281	15,0	0,499	1,68	22	84	91	14	55	1020
4L	3,33	17,1	18443	2261	15,0	0,414	2,02	22	86	92	15	55	1020
1H	4,56	23,4	18443	2246	15,0	0,379	2,21	19	82	91	15	55	1020
5L	5,74	23,9	15009	2200	10,0	0,359	2,33	20	81	90	12	65	1018
2H	7,02	25,4	13047	2200	8,8	0,346	2,49	20	80	85	13	65	1018
3H	10,04	26,8	9614	2200	6,6	0,353	2,37	19	83	86	13	65	1018
4H	15,85	26,3	5984	2200	3,8	0,359	2,33	23	81	92	14	74	1016
(3) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
5L	6,15	18,8	11257	2278	7,0	0,370	2,26	15	89	100	14	70	1016
(4) FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (2)													
1H	4,56	-	18443	-	-	-	-	25	89	100	12	75	1009

Oil consumption during ten hours duration of tests (3) and (4) 93 g/h

(3) TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: as in specification, without ballast

Track of wheels: front - 142o mm
rear - 135o mm

	With brakes		Without brakes	
	Right-hand m	Left-hand m	Right-hand m	Left-hand m
Radius of turning space	3,37	3,95	3,66	4,81
Radius of turning circle	3,27	3,85	3,56	4,71

(4) LOCATION OF CENTRE OF GRAVITY

Height above ground	843 mm
Distance forward from the vertical plane, containing the axis of the rear wheels	748 mm
Distance from the median plane	o mm

(5) BRAKING

Date of tests: 4th and 5th November 198o

Mass of ballasted tractor during brake tests

Front kg	Rear kg	Total kg
149o	288o	437o

Type O (ordinary cold service braking device performance) test

Speed before application of brakes: 28,6 km/h

	Braking device control force, N	1oo	2oo	3oo	4oo	5oo	Blocked 59c
Ballasted	Mean deceleration, m/s²	1,73	2,32	3,o1	4,oo	5,64	-

	Braking device control force, N	1oo	15o	2oo	25o	Blocked 275
Unballasted	Mean deceleration, m/s²	2,21	2,48	2,84	3,25	-

Type I (fade) test (by towing the tractor)

Braking device control force, N	1oo	2oo	3oo	4oo	5oo	Blocked 6o8
Mean deceleration, m/s^2	1,95	3,16	4,15	5,26	6,71	-

Maximum deviation of tractor from its original course: o m

Abnormal vibration: No vibration

The brakes were heated by: The first method

Parking braking device test

	18 per cent slope		12 per cent slope with trailer of 2,6 tonnes	
	Up	Down	Up	Down
Braking device control force, N	88	88	98	98

(6) MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests: 13/11- 198o

Type of sound level meter: Brüel & Kjær type 22o9

Type of track: Tarmacadam

Gear: 5. H

Travelling speed before acceleration: 21,4 km/h

Sound level: 87,o dB(A)

(7) NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests: 13/11- 198o

Type of sound level meter: Brüel & Kjær type 22o9

Type of track: Tarmacadam

The tractor was fitted with Ursus safety cab.

Gear	Drawbar pull at which the tractor develops the max. sound level KN	Measured travelling speed km/h	Sound level dB(A)
All openings closed			
2.H x)	13,7	7,2	87,o
2.H x)	Light load	8,o	83,o
5.H	Light load	28,5	85,o

x) The 2.H gear corresponds to the nominal travelling speed nearest to 7,5 km/h

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of tests: 13/5-198o

Hydraulic fluid

Make and type: Esso, Nuto HP 68

Viscosity: 64 cST at 4o°C

Viscosity index: 1o1

Type of linkage lock for transport: Hydraulic

Power Lift

	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	Max.till angle of mast over range of lift degr.
At hitch points	2o7	68o	1o,47	1o,6	-	-
On the frame	2o7	651	5,96	1o,6	18,86	46

Temperature of hydraulic fluid at start of test: 63°C

Linkage geometry when connected to the standard frame

Projected length in side view

Lower links:	8oo mm
Lift arms:	33o mm
Lift rods:	534 mm
Top links:	63o mm
Distance of lift rod connection point from pivot point of lower link:	4oo mm

The following dimensions are given relative to the rear wheel centre line, situated 69o mm above the ground level:

Lower link pivot point:	8o mm behind,	132 mm below
Top link pivot point:	29o mm behind,	328 mm above
Lift arm pivot point:	4o mm forward,	1o5o mm above
Max. and min. height of lower link hitch poits:	168 mm above,	483 mm below
Height of lower link hitch points, when locked in transport position:	32o mm above	

Hydraulic pump performance

Opening pressure of the relief valve (manufacturer's setting)	11,8 MPa
Sustained pressure with the relief valve opened	15,7 MPa
Pump delivery rate at minimum pressure	26,3 l/min
Hydraulic power at 9o% of the relief valve opening pressure (1o,6 MPa)	4,o kW
Corresponding pump delivery rate	22,8 l/min
Temperature of hydraulic fluid	66°C
Tapping point: 2 with Archimedes-Wroclaw control until for 2 single acting cylinders or 1 double acting cylinder	

REPAIRS ADJUSTMENTS AND REMARKS

During the test period the entrant introduced some minor modifications to the engine and the hydraulic pump in manufacture.
These modifications were applied also to the test tractor in order to bring it in accordance with the running manufacture.

Date: November 1980