Institut za mehanizaciju poljoprivrede - Zemun

O.E.C.D. Report N° 703
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Report on Test in Accordance with O.E.C.D. STANDARD CODE for the Official Testing of Agricultural Tractors



Agricultural tractor RAKOVICA 120

Manufactured by: Industrija Motora Rakovica
Beograd, Yugoslavia

Date of test: February till May 1980

This Bulletin is based on engineering tests in accordance with the O.E.C.D. STANDARD—CODE for the Official Testing of Agricultural Tractors.

It does not contain an evaluation of the performance of the tractor on practical work.

This Report has been aporoved by the O.E.C.D. Co-ordinating Centre (C.N.E.E.M.A., France) as being in accordance with the O.E.C.D. STANDARD-CODE.

Date of Approval: October 23rd 1981

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Tractor manufacturer:	IMR - Industrija Motora Rakovica Beograd, Yugoslavia
Submited for test by:	The manufacturer
Selected by:	Representatives of IMP
Place of running-in:	Laboratory of IMR
Duration of running-in:	cca 60 hours

SPECIFICATION OF TRACTOR

TRACTOR

Make:	IMR
Model:	RAKOVICA 120
Type:	Standard - unit construction, four wheels, all - wheel drive
Serial N°:	001

ENGINE

Make:	IMR
Model:	TS 46/T
Type:	Four stroke, water cooled diesel, direct injection and turbocharging
Serial N°:	6113
Cylinders:	6, vertical, in-line, bore 98,4 mm stroke 127 mm displacement 5800 cm^3, compression ratio 16:1, overhead valves, replaceable dry cylinder liners
Fuel system:	A.C. Delco mechanical fuel feed pump with hand primer, DONIT Medvode paper element filter with sediment bowl on pressure side of feed pump; fuel tank capacity 250 l; C.A.V. - I.P.M. distributor type DPA 3268 F971 injection pump, Serial N° 20244 YT, manufacturer's production setting 71 mm^3 at 2250 rev/min engine speed and full load and 79 mm^3 at 1500 rev/min engine speed and full load, injection timing 28° before T.D.C.; C.A.V. - I.M.P. multi - hole injector nozzles, injection pressure 210 bar

Governor:	C.A.V. - I.P.M. mechanical, all range, incorporated in fuel injection pump, governed range of engine speed 5oo to 24lo rev/min, rated engine speed 225o rev/min
Air cleaner:	Main TPR - Rogatica, dry with paper element, type FWA 12-oo3; centrifugal pre-cleaner DONALDSON
Lubrication system:	Forced feed from gear pump with strainer in sump, full flow replaceable paper element filter; total oil capacity 12,8 l, recomended oil quality MIL-L-46152; recomended oil viscosity SAE 2o; oil and filter shange period 2oo hours
Cooling system:	Water cooling with impeller pump; pressurized system set to o,2 bar overpressure fan with 6 blades, 559 mm diameter; water capacity 25,5 l
Starting system:	Electrical, ISKRA solenoid - engaged starter motor SNVN - 12/4/1o 3,7 kW; heating plug in intake manifold
Exhaust:	Vertical, above bannet, on right hand side of the engine; silencer 71o mm long with elyptic cross-section 29o/21o mm; height of exhaust pipe 3o8o mm above ground
Electrical system:	12 Volt, negative earth; ISKRA alternator AAG 13o2 14 V 28A; 1 lead acid battery 18o Ah at 2o-hour reating

TRANSMISSION

Clutch:	RUEN - Kočani dry single disc type clutch 350 GR hydraulically pedal operated
Gearbox:	ZAHNRADFABRIK FRIEDRICHSHAFEN A.G. T 3445; Speed change gear with 6 speeds; 1 st and 2 nd gear collar shifted; 3 rd to 6 th gear synchronized; synchromesh group gear with 2 forward groups and 1 reverse group; the 6 th gear of speed change gear is locked if reverse group is shifted; creep speed group for the 1 st and 2 nd gear of speed change gear; creep speeds shall not be used for drawbar work; N° of speeds (totally): 12 + 4 forward 5 + 2 reverse
Rear axle and final drive:	ZAHNRADFABRIK FRIEDRICHSHAFEN A.G. Bevel gear drive with crown wheel and pinion; bevel gear type differential with lock, pedal operated, self disengaging; planetary final drives
Driven front axle:	ZAHNRADFABRIK FRIEDRICHSHAFEN A.G. APL-3052; driven by universal joint shaft; joint shaft situated on the left hand side of gearbox; under load engageable and disegageable by a particular wet disc type clutch, hand lever operated; bevel gear drive with crown wheel and pinion; bevel gear type differential; planetary final drives in front axle

Oil capacity:	gearbox (with hydraulic power lift) . 39,o l final drives in the rear axle 2 x 8,o l front axle differential 8;2 l final drives in the front axle 2 x 4,2 l
Oil filter:	on the suction side of power lift pump; full flow with replaceable paper element and magnetic separator; paper element changing period looo h
Oil changing period:	looo h for all gears
Recommended oil qualities:	gearbox and differentials: engine oil HD SAE 2o W/2o according to MIL-L-21o4 C front and rear final drives: hypoid oil SAE 9o according to MIL-L-21o4 C

Power take-off

Main p.t.o.

Independent p.t.o.;
at rear of tractor in the median plane;
driven through a separate dry multiplate clutch;
operated by hand lever situated on the left side of driver`s seat;
height above ground 725 mm;
distance from rear axle center line:
horizontal 327 mm behind
vertical 125 mm below
29 x 34,9 x 8,7 mm (1 3/8"), 6 splines
according to DIN 9611 Form 1;
ASAE S.2o3.7; JUS M.Ll.6o1;
two speeds are preselectable by hand leverm
540 rev/min at 2118 rev/min engine speed
(574 rev/min at rated engine speed)
looo rev/min at rated engine speed
(225o rev/min)
p.t.o. speeds may be set by aid of tractor meter;
direction of rotation clockwise, viewed from tractor rear

Total ratios and speeds

Group		Gear	Toral ratio engine: driving wheel	Nominal travelling speed at rated engine speed km/h	Nominal travelling speed at standard p.t.o. speed 54o rev/min km/h
Forward speed					
Creep group	slow	1	693,71	1,o7	1,o1
		2	44o,24	1,69	1,59
	fast	1	57o,37	1,3o	1,22
		2	361,97	2,o6	1,94
Normal group	slow	1	282,57	2,63	2,48
		2	179,32	4,15	3,91
		3	114,77	6,48	6,1o
		4	75,4o	9,87	9,29
		5	48,53	15,33	14,43
		6	29,89	24,89	23,43
	fast	1	232,33	3,2o	3,o1
		2	147,44	5,o5	4,75
		3	94,36	7,88	7,42
		4	61,99	12,oo	11,3o
		5	39,91	18,64	17,55
		6	24,57	3o,28	28,5o
Reverse speeds					
Creep group	slow	1	484,58	1,53	1,44
		2	3o7,52	2,42	2,28
Normal group	fast	1	197,38	3,77	3,55
		2	125,26	5,94	5,59
		3	8o,17	9,27	8,73
		4	52,67	13,86	13,o5
		5	33,9o	21,94	2o,65

Calculated with the rolling radius 877 mm,
given in the tyre manufacturer's specification

Power lift

Hydraulic system:	ZAHNRADFABRIK FRIEDRICHSHAFEN A.G. KR 25, open system; BOSCH gear pump with 19 cm^3/rev delivery, directly driven by the engine and by the transmission, without clutches (constant drive), located on the right hand side of gearbox; ram, lift shaft and control valve in unit construction; BOSCH control valve for lifting and sinking, power control, position control, both stepless mixable, floating position; maximum oil pressure 175 bar; single acting ram with 12o mm bore, 126 mm stroke and 2 single acting additional external rams with 5o mm bore and 25o mm stroke (make PPT 3 oil tappings, single or double acting at rear of tractor; hydraulic oil tank in common with gearbox, oil capacity 39,o l, max.5 l may be taken off trough oil tappings when tractor is mooving, 12,5 l when tractor is stationary.
Implement linkage:	Three point linkage category II; lift rods adjustable from 65o to 87o mm; lifting range above ground: with short lift rods from 425 to 11oo mm with long lift rods from 12o to 87o mm

Pull attachment

Swinging drawbar:	Height above ground 485 and 58o mm; adjustable by turning drawbar; diameter of clevis hole 33 mm; horizontal distance of clevis hole centre to: rear axle centre 7oo mm behind p.t.o. shaft end 373 mm behind swingable about 24o mm to either side with fixing points in the median position and 11o and 23o mm to either side; pivot point 3oo mm behind rear axle
Towing hitch:	655,745 and 835 mm above ground; clevis hole 41 mm

Steering

ZAHNRADFABRIK FRIEDRICHSHAFEN A.G.
hydrostatic steering model 8452 with own oil circuit;
BOSCH gear pump with 16 cm^3/rev delivery;
directly driven by the engine and by the transmission, without clutches (constant drive), located on the right hand side of the gearbox.
oil capacity 8,o l;
recommended oil: ATF Type S.A.
oil changing period looo hours;
2 single acting rams 45 mm bore 195 mm stroke with direct acting on the front axle

Brakes

Parking brake: Mechanically acting shoe type brake with 2 drums 249 mm diameter on the rear differential half shafts;
operated by hand lever with ratchet

Service brake: Hydraulically acting shoe type brake with 2 drums 27o mm diameter on the rear differential half shafts, self adjusting;
additional disc brake with 274 mm disc diameter on the gearbox outlet for the front wheel drive; pedal operated;

Steering brakes: Divided pedals of service brake, for normal use locked together; disc brake on the gearbox outlet disangaged (disc brake is angaged through a separate hydraulic valve only when both pedals of service brake are actuated)

Wheels

Front wheels: Steering and driving;
two pneumatics 14,9-28 AS 6 pla;
maximum permissible load per tyre 151o kg at 1,3 bar inflation pressure and maximum speed 3o km/h
track width 17oo or 22oo mm adjustable by turning wheels;
rims W 12x28, cast iron discs

Rear wheels: driving;
two pneumatics 2o,8-38 AS 8 ply, diagonal type casing;
maximum permissible load per tyre 3o9o kg at 1,3 bar inflation pressure and maximum speed 3o km/h;
track width 17oo or 22oo mm adjustable by turning wheels;
rims W 16L x 38, steel discs

Wheel base: 275o mm

Seat: DERBY Gi 5ooo;
upholstered seat adjustable for and aft about 9o mm and possible adjustance of height and inclination;
back rest adjustable in inclination;
spring and shock absorber with possible adjustance from 6o to 13o kg

Cab: MEHANIKA - Orašje
cab with four post safety frame;
doors on both sides of cab;
the inner surfaces and cab's floor and fenders upholstered

Weights: Tractor with cab and all tanks full

		without driver kg	with driver kg
without ballast:	front	211o	212o
	rear	32o5	327o
	total	5315	539o
with ballast:	front	3o8o	3o9o
	rear	4485	455o
	total	7565	764o

ballast: front: weights in front of front axle
8 x 6o = 48o kg
water in tyres
2 x 2oo = 4oo kg

rear: weights on wheels
8 x 6o = 48o kg
water in tyres
2 x 445 = 89o kg

Number of grease points

Dimensions

Total length:	457o mm with 3 point linkage without ballast 48oo mm with 3 point linkage with ballast
Total width:	221o mm with track width 17oo mm 271o mm with track width 22oo mm
Total height:	3o8o mm to top of exhaust pipe
Ground clearance:	485 mm below front axle differential 45o mm below suports of lower links

Lighting equipment: Electrically, 12 Volt

	Dimensions of area mm	Height above ground to centre mm	Distance from autside eage of tractor to centre mm 1)
Head lights 2)	Ø 135	1475	555
Side lights	1oo x 6o	1325	555
Rear lights	11o x 9o	19oo	38o
Reflector	Ø 1o5	2o15	51o

1) with track width 17oo mm, both front and rear axle
2) beam angle in plane view 32 ± 3°

FUELS AND LUBRICANTS USED IN TESTS

Fuel

Power take-off test:	INA-Diesel D_2-fuel JUS B.H.2.411 Specific gravity at 15°C: o,828 kg/l; Viscosity at 15°C: 5,1 mm^2/S (5,1 cSt) Cetane number: 58
Drawbar test:	INA-Diesel D_2-fuel JUS B.H.2.411 Specific gravity at 15°C: o,824 kg/l; Viscosity at 15°C: 4,9 mm^2/S (4,9 cSt) Cetane number: 56
Engine oil:	GALAX - SUPER SAE 2o
Transmission oil:	Gearbox and differentials (front and rear) GALAX SUPER SAE 2o Final drives (front and rear) HYPOL SAE 9o
Hydraulic oil:	The oil from gearbox

COMPULSORY TESTS

(1) MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 17. June 1981
Institut for agricultural Mechanization - Zemun

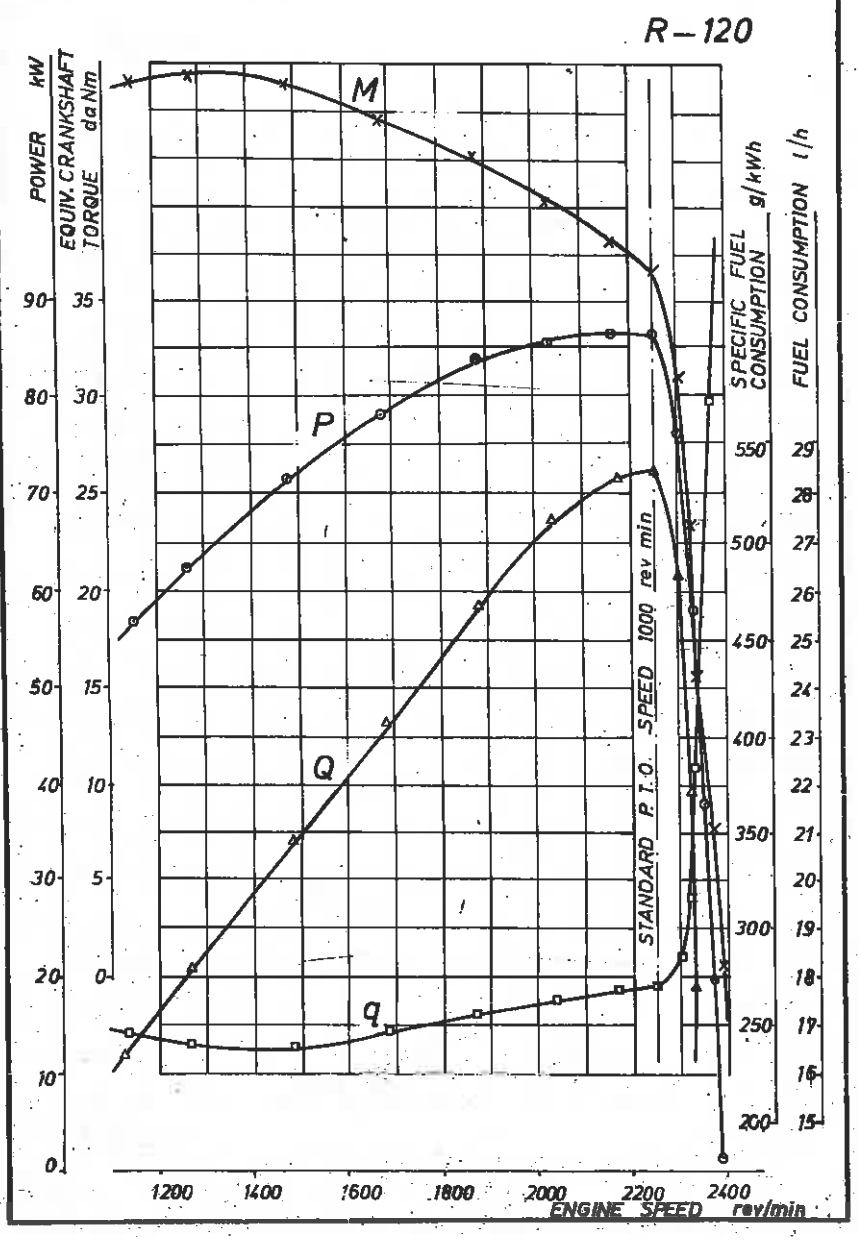
Type of dynamometer: Hydraulic brake SCHENCK U1-3o

Power kW (hp)	Speed engine rev/min	Speed p.t.o. rev/min	Fuel consumption total l/h	Fuel consumption total kg/h	Fuel consumption specific g/kWh (g/hph)	Specific energy kWh/l hph/l
	MAXIMUM POWER					
	At 2-jour test					
86,6 (117,7)	225o	1ooo	28,62	23,54	272 (2oo)	3,o3 (4,11)
	At standard p.t.o. speed (1ooo rev/min) and speed recommended by the manufacturer for drawbar work					
86,6 (117,7)	225o	1ooo	28,62	23,54	272 (2oo)	3,o3 (4,11)
	PART LOADS					
	Governer hand lever in position giving maximum power and standard p.t.o. speed at full load					
	(i) 85 % of torque at maximum power					
75,3 (1o2,3)	23o1	1o22	26,38	21,7o	288 (212)	2,85 (3,88)
	(ii) unloaded					
1,35 (1,83)	2396	1o65	1o,o4	8,26	-	-
	(iii) 5o % of loaded defined in (i)					
38,2 (51,9)	2335	1o38	17,79	14,63	383 (282)	2,15 (2,92)

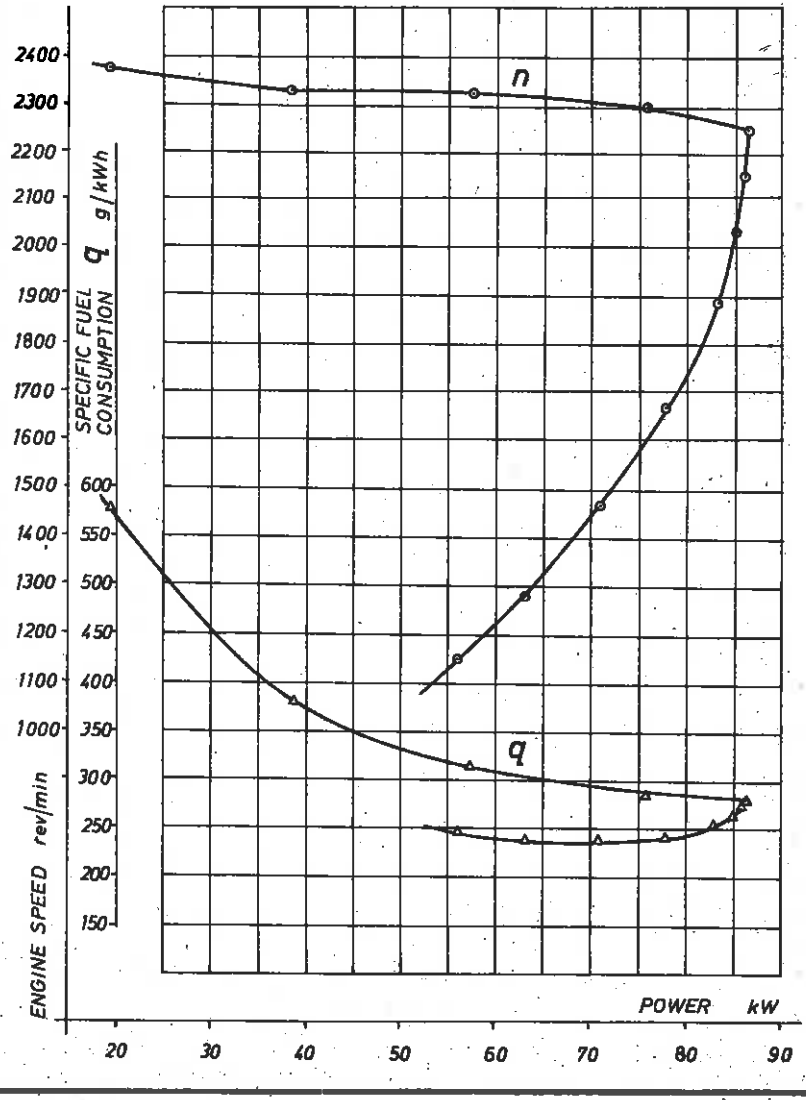
(iv) maximum power						
86,6 (117,7)	2250	1000	28,62	23,54	272 (200)	3,03 (4,11)
(v) 25 % of the load defined in (i)						
19,50 (26,5)	2374	1055	13,69	11,26	577 (425)	1,42 (1,94)
(vi) 75 % of the load defined in (i)						
57,2 (77,7)	2332	1036	21,93	18,04	315 (232)	2,61 (3,55)

STANDARD SPECIFIC FUEL CONSUMPTION:
288 (212); 383 (282) g/kWh (g/hph)

No load, maximum engine speed:	2406 rev/min
Equivalent crankshaft torque at maximum power:	36,73 daNm
Maximum equivalent crankshaft torque:	46,88 daNm at 1273 rev/min of the engine
Mean atmospheric conditions:	temperature: 21°C pressure: 1007 mbar humidity: 54 %
Maximum temperatures:	coolant: 82°C engine oil: 87°C fuel: 22°C air intake: 24°C


R – 120
POWER kW
EQUIV. CRANKSHAFT TORQUE da Nm
SPECIFIC FUEL CONSUMPTION g/kWh
FUEL CONSUMPTION l/h
M
P
Q
q
STANDARD P.T.O. SPEED 1000 rev min
ENGINE SPEED rev/min
0
10
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30
35
200
250
300
350
400
450
500
550
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
1200
1400
1600
1800
2000
2200
2400

R-120


n
q
q
ENGINE SPEED rev/min
SPECIFIC FUEL CONSUMPTION g/kWh
POWER kW
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
600
550
500
450
400
350
300
250
200
150
20
30
40
50
60
70
80
90

(2) DRAWBAR PERFORMANCE

Date of tests: 15 - 24 April 1980

Type of track: Asphalt

Height of drawbar above ground: 565 mm ballasted and unballasted

Gear No.	Speed	Power	Drawbar pull	Engine speed	Slip of wheels	Specific energy	Specific fuel cons.	Temperatures Fuel	Coolant	Engine oil	Atmosph. conditions Temperature	Rel.humidity	Pressure
	km/h	kW (hp)	daN (kp)	rev/min	%	kWh/l (hph/l)	g/kWh (g/hph)	°C	°C	°C	°C	%	mbar
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	(i) Maximum power - ballasted					tyre inflation pressure		front: 1,3 bar rear: 1,2 bar					
1 S	2,29	44,9 (61,1)	7060 (7200)	2328	15,0	2,09 (2,77)	405 (298)	12	65	75	14	67	1006
1 F	2,76	54,2 (73,6)	7060 (7200)	2310	15,0	2,15 (2,92)	384 (283)	13	70	78	14	67	1006
2 S	3,46	67,9 (92,3)	7060 (7200)	2260	15,0	2,39 (3,24)	345 (254)	13	70	80	15	62	1006
2 F	4,45	72,9 (99,1)	5895 (6010)	2250	10,2	2,52 (3,42)	328 (241)	13	75	80	15	62	1006
3 S	5,91	74,3 (100,9)	4525 (4610)	2250	7,4	2,58 (3,51)	319 (235)	13	75	83	15	62	1006
3 F	7,35	75,7 (102,9)	3705 (3780)	2250	5,0	2,63 (3,58)	313 (230)	13	75	85	15	62	1006

1	2	3	4	5	6	7	8	9	1o	11	12	13	14
4 S	9,44	76,2 (1o3,2)	29o5 (297o)	225o	3,9	2,65 (3,6o)	312 (229)	14	78	85	16	58	1oo6
4 F	11,56	76,1 (1o3,4)	237o (2415)	225o	2,8	2,62 (3,56)	313 (23o)	14	75	82	16	58	1oo6
5 S	14,87	74,4 (1o1,1)	18oo (1835)	225o	2,2	2,58 (3,51)	319 (235)	14	74	8o	16	58	1oo6
5 F	18,2o	73,4 (99,8)	145o (148o)	225o	1,5	2,55 (3,46)	325 (238)	14	74	8o	16	58	1oo6
(ii) Five-hour test at 75 % of pull at maximum power													
3 F	7,66	63,3 (86,o)	297o (3o3o)	2314	3,8	2,55 (3,46)	323 (238)	15	7o	82	17	53	1oo3
(iii) Five-hour test at pull corresponding to 15 % wheelslip in test (i)													
2 S	-	-	7o6o (72oo)	2256	-	-	-	15	72	84	16	61	1oo9

1	2	3	4	5	6	7	8	9	10	11	12	13	14
			(iv) Maximum power - unballasted tyre inflation pressure								front: 0,8 bar rear: 1,0 bar		
2 S	3,57	49,6 (67,4)	5005 (5100)	2320	15,0	2,13 (2,89)	387 (285)	15	68	76	16	69	1007
2 F	4,34	60,3 (82,0)	5005 (5100)	2296	15,0	2,27 (3,08)	363 (267)	15	70	80	16	69	1007
3 S	5,68	71,4 (97,1)	4530 (4615)	2250	11,6	2,48 (3,37)	332 (244)	15	70	80	16	69	1007
3 F	7,22	74,8 (101,6)	3730 (3800)	2250	7,6	2,58 (3,51)	319 (235)	15	74	84	17	63	1007
4 S	9,41	76,7 (104,2)	2935 (2990)	2250	5,0	2,66 (3,62)	310 (228)	15	75	85	17	63	1007
4 F	11,53	77,0 (104,6)	2405 (2450)	2250	4,0	2,68 (3,64)	307 (226)	16	75	85	16	68	1007
5 S	14,90	76,3 (103,7)	1845 (1880)	2250	2,7	2,65 (3,60)	311 (229)	16	75	84	16	68	1007
5 F	18,25	76,1 (103,4)	1500 (1530)	2250	2,1	2,64 (3,59)	312 (230)	15	73	83	16	68	1007

Total oil consumption during 10 hours duration of tests (ii) and (iii): 53 g/h

(3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 14,9 - 28 AS
rear: 2o,8 - 38 AS

Track of wheels front: 17oo mm
rear: 17oo mm

Front wheel drive disenganed

	With brakes		Without brakes	
	left hand	right hand	left hand	right hand
	m	m	m	m
Radius of turning space (m)	5,77	5,8o	6,63	6,66
Radius of turning circle (m)	5,56	5,6o	6,43	6,47

(4) LOCATION OF CENTRE OF GRAVITY

Height above ground 1o42 mm

Distance forward from rear axle centre 1o82 mm

Distance from tractor's median plane 8 mm to the left

(5) BRAKING PERFORMANCE

A) SERVICE BRAKE

Date of tests: 24th March 1980

Type of track: asphalt

Type of decelerometer: Siemens B4

Weight of tractor

- with maximum ballast for road work (with driver) 6.350 kg
- without ballast (with driver) 5.390 kg

Remark:

Front wheel drive disenganed

Cold brakes

		With ballast	Without ballast
Travelling speed	km/h	25,0	25,0
Deceleration	m/s^2	5,0	5,4
Stopping distance	m	6,0	5,5
Force on pedal	N(kp)	490 (50)	370 (38)
Force on pedal for 2,5 m/s^2 deceleration	N(kp)	245 (25)	195 (20)

Brake fade characteristics (hot tests)

Deceleration	hot/cold %	100	98
Stopping distance	cold/hot %	98	97
Force on pedal	cold/hot %	100	99

B) PARKING BRAKE

Tractor facing up 16 % slope
Pull on hand brake 115 N (12 kp), tractor does not roll

Tractor facing down 16 % slope
Pull on hand brake 115 N (12 kp), tractor does not roll

(6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: 27th March 1980

Type of sound level meter: BRUEL & KJAER mod.2209

Type of track: asphalt

Results of test

Gear 6th fast

Travelling speed before acceleration 23,4 km/h

Sound level 90,4 dB(A)

(7) NOISE AT THE DRIVER'S EAR LEVEL

Date of test: 27th March 1980

Type of sound level meter: BRUEL & KJAER mod.2209

Type of track: asphalt

The test was caried out on the tractor with a cab

Results of test

Gear	Drawbar pull at which the tractor developes the maximum sound level N	(kp)	Travelling speed nominal km/h	effective km/h	Sound level dB(A)
1 slow	49050	(5000)	2,63	2,4	85,5
1 fast	49050	(5000)	3,20	2,9	85,9
2 slow	49050	(5000)	4,15	3,6	86,1
2 fast	49050	(5000)	5,05	4,4	86,3
3 slow	41200	(4200)	6,48	5,8	85,6
3 fast+)	37280	(3800)	7,88	7,3	86,0
4 slow	28450	(2900)	9,87	9,6	85,9
4 fast	23050	(2350)	12,00	11,7	86,2
5 slow	17660	(1800)	15,33	15,0	85,8
5 fast	14720	(1500)	18,64	18,3	86,8
6 slow	light load		24,89	24,7	82,8
6 fast	light load		30,28	30,3	83,1

+) The 3rd fast gear corresponds to the travelling speed nearest to 7,5 km/h

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

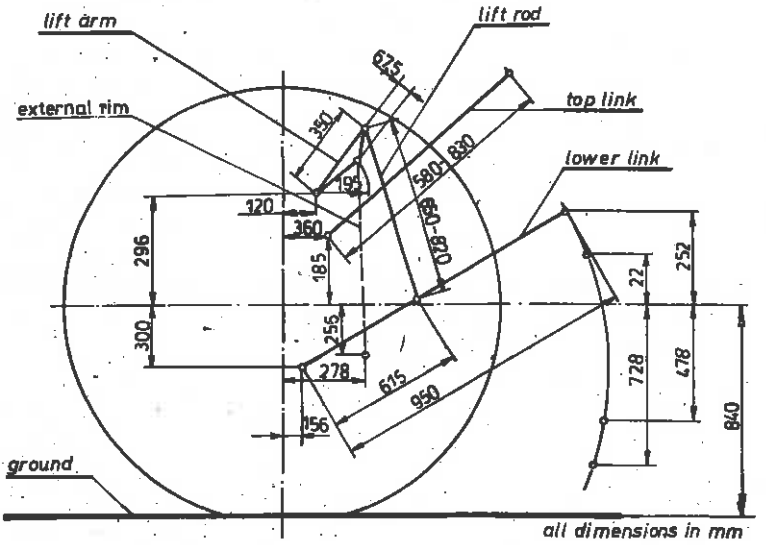
Date of tests: 24th April 198o

HYDRAULIC PUMP

(1) Opening pressure of relief valve	159 bar
Sustained pressure by open relief valve	175 bar
(2) Pump delivery rate at minimum pressure and rated engine speed	42,5 l/min
(3) Pump delivery rate at maximum hydraulic power	39,8 l/min
Delivery pressure	159 bar
Hydraulic power	1o,6 kW(14,3 hp)

POWER LIFT

Dimensions of linkage geometry for the table on page 23



LIFTING FORCES

Lifting heights relative to horizontal lower links

mm	-425	-400	-335	-300	-200	-175	-140	-100	0
	At hitch points					maximum mechanical advantage			
daN						4450		4580	4720
(kp)						(4540)		(4670)	(4810)
						minimum mechanical advantage			
daN	4020	4040		4160	4270			4330	4380
(kp)	(4100)	(4120)		(4240)	(4350)			(4410)	(4460)

Maximum force exerted throughout the whole range 4456 daN (4540 kp)

Front of tractor does not lift front ballast when fitted with

	At test frame					maximum mechanical advantage			
daN							4340	4290	4250
(kp)							(4420)	(4370)	(4330)
						minimum mechanical advantage			
daN			4270	4170	4080			3910	3820
(kp)			(4350)	(4250)	(4160)			(3980)	(3890)

Maximum force exerted throughout the whole range 3770 daN (3840 kp)

Front of tractor does not lift when fitted with maximum allowable front ballast

+100	+200	+300	+320	+350	+400	+500	+550	+595
	lift rods 650 mm long							
4800 (4890)	4860 (4950)	4840 (4930)			4810 (4900)	4800 (4890)	4790 (4880)	
	lift rods 820 mm long							
4380 (4460)	4380 (4460)	4380 (4460)	4370 (4450)					
	lift rods 650 mm long							
4200 (4280)	4150 (4230)	4090 (4170)			4000 (4080)	3900 (3975)		3770 (3840)
	lift rods 820 mm long							
3790 (3860)	3770 (3840)	3650 (3720)		3600 (3670)				

All values of forces are given for pressure at max. hydraulic power (159 bar), see page 20, calculated from measurements at maximum hydraulic pressure (175 bar)

LINKAGE GEOMETRY

when connected to the standard frame	Maximum mechanical advantage	Minimum mechanical advantage
Projected length in side view:		
Lower links	95o mm	95o mm
Lift arms	35o mm	35o mm
Lift rods	65o mm	82o mm
Top link	748 mm	748 mm
Distance of lift rod connection point from pivot point of lover link	615 mm	615 mm
The following dimensions are given relative to rear axle centre line 84o mm above ground		
Lower link pivot point	156 mm behind, 3oo mm below	156 mm behind, 3oo mm below
Top link pivot point	36o mm behind, 185 mm above	36o mm behind, 185 mm above
Lift arm pivot point	12o mm behind, 296 mm above	12o mm behind, 296 mm above
Maximum and minimum height of lower link hitch points	22 mm above, 728 mm below	252 mm above, 478 mm below
Height of lower link hitch points above ground when locked in highest transport position	862 mm	1o92 mm