Institut za mehanizaciju poljoprivrede - Zemun

O.E.C.D. Report Nº 723
Printed: November 1981

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



**Agricultural tractor RAKOVICA 76**

**Manufactured by: Industrija Motora Rakovica**
**Beograd, Yugoslavia**

**Date of test: October–December 1979**

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 Centr (C.E.M.A.G.R.E.F., France) as being in accordance with the O.E.C.D. STANDARD – CODE.

Date of Approval: November 3rd, 1981

All rights (including the right of translation, reprint and photomehanical copying — also of excerpts) reserved by: Institut za mehanizaciju poljoprivrede, 11080 Zemun, Post box 41

Printed in Yugoslavia

## TABLE OF CONTENTS


| | |
|---|---|
| Specification of tractor | 1 to 9 |
| Conditions during tests | 1o |
| Fuel and lubricants used in tests | 11 |
| **COMPULSORY TESTS** | |
| 1. Main power take-off performance | 12 to 15 |
| 2. Drawbar performance on a tarmacadam track | 16 and 17 |
| 3. Turning space and turning circle | 18 |
| 4. Location of centre of gravity | 18 |
| 5. Braking performance | 19 |
| 6. Ambient noise, emitted by the tractor | 2o |
| 7. Noise at the driver's ear level | 2o |
| 8. Power lift and hydraulic pump performance | 21 to 24 |
| **OPTIONAL TESTS** | |
| 9. Drawbar performance with 16,9-3o tyres | 25 |
| 1o. Power lift and hydraulic pump performance - (optional version) | 26 to 29 |

| | |
|---|---|
| Tractor manufacturer: | IMR-Industrija Motora Rakovica 11090 Rakovica-Beograd, Yugoslavia |
| Submited for test by: | The manufacturer |
| Selected by: | Representatives of IMP |
| Place of running-in: | Laboratory of IMP |
| Duration of running-in: | cca 60 hours |

## SPECIFICATION OF TRACTOR

**TRACTOR**

| | |
|---|---|
| Make: | IMR |
| Model: | RAKOVICA 76 |
| Type: | Standard-unit construction, four wheels, rear wheels driven |
| Serial N°: | 6025908/8/79 |

**ENGINE**

| | |
|---|---|
| Make: | IMR |
| Model: | S 44A/T |
| Type: | Four stroke, water cooled diesel, direct injection |
| Serial N°: | 01829 |
| Cylinders: | 4, vertical, in-line, bore 101 mm, stroke 127 mm, displacement 4068 $cm^3$, compression ratio 16:1, overhead valves, replaceable dry cylinder liners |
| Fuel system: | IPM membrane type feed pump with hand primer; CAV-DONIT two paper element fuel filters on pressure side of feed pump, first filter with sediment bowl; fuel tank capacity 60 l; CAV-IPM distributor type DPA 3248 F 850 injection pump, Serial N° 31768 RP, manufacturer's production setting 67 $mm^3$ at 1700 rev/min engine speed (cca 60 $mm^3$ at 2250 rev/min engine speed), injection timing 24° before T.D.C.; CAV-IPM injector nozzles of multi hole type (four holes), model 803465 BU, injection pressure setting 170 ± 2,5 bar, (working pressure cca 165 bar) |

| | |
|---|---|
| Governor: | CAV-IPM, mechanical, all range, incorporated in fuel injection pump, governed range of engine speed 500±30 to 2400±30 rev/min, rated engine speed 2250 rev/min |
| Air cleaner: | Main TPR-Rogatica, dry with replaceable cartridge; centrifugal pre-cleaner KRON |
| Lubrication system: | Forced feed from gear pump with strainer in sump, full flow replaceable paper element filter; total oil capacity minimum 8 l, maximum 10 l; recommended oil quality MIL-L-2104C;<br>recommended oil viscosities:<br>winter SAE 20<br>summer SAE 30<br>tropics SAE 40<br>oil and filter change interval 200 h |
| Cooling system: | Water cooling with impeller pump;<br>pressurized system set to 0,4bar overpressure;<br>fan with 6 blades, 432 mm diameter;<br>pump delivery 132 l/min of water, fan delivery 2,18 $m^3$/S of air, both at 2250 engine rev/min;<br>water capacity 23,6 l; temperature control by membrane type thermostat |
| Starting system: | Electrical ISKRA solenoid-engaged starter motor AZJ 0405 12V 3kW C10;<br>heating plug in intake manifold as aid for cold starting |
| Exhaust: | Vertical, above bannet, on right hand side of engine, mouth 2300 mm above ground;<br>silencer dimensions:<br>dia 100 mm; length 595 mm |
| Electrical system: | 12 Volt, negative earth;<br>ISKRA alternator AAG 0603 14V 28A;<br>two 12V lead acid batteries, each with 56 Ah capacity at 20-hour rating |

TRANSMISSION

| | |
|---|---|
| Clutch: | KRON - Novi Beograd, KS 213;<br>dry, dual friction disc type double acting clutch, tractor and p.t.o. shaft drive<br>disc dia 27o mm; mechanically pedal operated |
| Gearbox: | Own make;<br>mechanical with sliding gears, 3 forward and 1 reverse gear and low and high speed selector with two paars of cylindrical gears;<br>N° of speeds (totally):<br>6 forward<br>2 reverse |
| Rear axle and final drive: | Own make;<br>Bevel gear drive with crown wheel and pinion;<br>bevel gear type differential with lock, pedal operated, self disengaging;<br>final drives with cylindrical gears; |
| Oil capacities: | Gearbox, rear axle and final drives 2o l |
| Oil changing period: | 8oo - looo hours |
| Recommended oil qualities: | Winter hypoid oil SAE 9o<br>Summer hypoid oil SAE 14o<br>according to MIL-L-21o5B |

Total ratios and speeds

| Gear | Total ratio engine: driving wheel | Nominal travelling speed (km/h) at rated engine speed | | at standard p.t.o. speed 54o rev/min | |
|---|---|---|---|---|---|
| | | With tyres | | | |
| | | 14,9-28 | 16,9-3o | 14,9-28 | 16,9-3o |
| Forward speeds | | | | | |
| 1 low | 2o6,18 | 2,63 | 2,84 | 2,33 | 2,52 |
| 2 low | 13o,44 | 4,16 | 4,49 | 3,69 | 3,98 |
| 3 low | 74,91 | 7,24 | 7,81 | 6,42 | 6,92 |
| 1 high | 55,1o | 9,85 | 1o,62 | 8,73 | 9,41 |
| 2 high | 34,88 | 15,56 | 16,78 | 13,79 | 14,87 |
| 3 high | 2o,o4 | 27,o9 | 29,21 | 24,o1 | 25,89 |
| Reverse speeds | | | | | |
| low | 136,98 | 3,96 | 4,27 | 3,51 | 3,78 |
| high | 36,69 | 14,79 | 15,95 | 13,11 | 14,14 |

Calculated with driving wheel rolling radius 64o mm (tyres 14,9-28) and 69o mm (tyres 16,9-3o) given in the tyre manufacturer's specification

Power take-off

| | |
|---|---|
| Main p.t.o. | Semi-independent p.t.o.; at rear of tractor in the median plane; driven through the first disc of the double acting clutch, mechanically pedal operated; height above ground 64o mm (tyres 14,9-28) dimensions 29x34,9x8,7 mm, 6 splines acc. to JUS M.L1.6o1; DIN 9611 form A; BS1495 dimensions and location acc. ISO 5oo |
| Proportional to engine speed p.t.o. | Speed at rated engine speed (225o rev/min) 6o9 rev/min; standard p.t.o. speed 54o rev/min at 1994 engine rev/min; direction of rotation clockwise, viewed from tractor rear |

| | |
|---|---|
| Ground p.t.o. | Distance travelled for one revolution of p.t.o. 0,338 m (calculated with rolling radius of 14,9-28 tyres 640 mm); number of p.t.o. revolutions for one revolution of driving wheel 11,89; direction of rotation clockwise, facing driving end of p.t.o. and with tractor in forward gear |
| Fast p.t.o. | Located at rear of tractor in the median plane, normally covered with a plate; height above ground 760 mm (with 14,9-28 tyres) dimensions 29x34,9x8,7 mm, 6 splines acc. to JUS M.L1.601<br>Speed equal to engine speed;<br>direction of rotation contra clockwise, wiewed from tractor rear |
| Belt pulley | Available optionally;<br>located at rear of tractor, connected to fast p.t.o. shaft;<br>width 170 mm; diameter 240 mm;<br>speeds at rated engine speed (2250 rev/min)<br>linear 28.27 m/s<br>rotational 2250 rev/min<br>engine speed at standard belt pulley speed (945 m/min) 1253 rev/min;<br>direction of rotation clockwise viewed face of pulley |
| Power lift: | Own make; block construction; |
| Hydraulic system: | |
| Standard: | Hydraulic gear pump PPT with 26,6 l/min delivery at rated engine speed (2250 rev/min), driven by the engine, with control valve at suction side;<br>control valve for lifting and sinking, draught control, position control, both stepless mixable; |

opening pressure of relief valve 165 bar, the working pressure up to 160 bar;
single acting ram with 110 mm bore, 90 mm stroke; oil capacity 14 l, max 2,5 l may be taken off trough oil tappings;
recommended oil quality acc.to MIL-L-2105;
viscosity SAE 90-SAE 140;
change period 1000 h (2 times yearly);
strainer on suction side of gear pump maintained each 1000 h by washing

Optinual: Hydraulic gear pump PPT with 23,6 l/min delivery at rated engine speed (2250 rev/min), driven by the p.t.o. shaft, with control valve at suction side;
control valve for lifting and sinking, draught and position control with one hand lever;
opening pressure of relief valve 210 bar, the working pressure up to 205 bar;
single acting ram with 90 mm bore, 90 mm stroke; oil capacity 7 l
Note: oil quality and viscosity, oil changing period and strainer maintenance period the same as for standard hydraulic system

Implement linkage: Three point linkage category I and II (alternativlly) in acc.with ISO Recomendation
lift rods adjustable from 440 to 580 mm,
Lifting range above ground
Standard:
with short lift rods from 510 to 860 mm
with long lift rods from 195 to 570 mm
Optional:
with short lift rods from 485 to 970 mm
with long lift rods from 270 to 720 mm
(rear wheels static radius 645 mm)

Pull attachment

Swinging drawbar: Height above ground (mm): 335 445 790
455 545 690
adjustable by using diferent holes for fixing drawbar to the rear axle housing and by turning drawbar;

diameter of coupling pin 32,5 mm, horizontal distance of clevis hole centre to:
rear axle centre 664 mm
p.t.o. shaft end 380 mm
Swingable about 130 mm to either side with fixing points in the median position and 42, 84 and 126 mm to both sides;
pivot point 174 mm behind the rear axle.

Steering:

"SOKO" - Mostar
globoid worm gear;
manual control with arm and connecting rod.

**Brakes**

Service brake:

Own make;
mechanically acting band type brake with drums located in the rear axle housing before final drive;
operated with 2 pedals coupled by a latch.

Steering brake:

Divided pedals of service brake, for normal use locked together;

Parking brake:

Own make;
the same drums as for service brake, but manually operated by a hand lever.

Trailer brake:

Optional equipment, fitted on the tested tractor;
make PPT;
single line air brake, operated by pedal monted valve;
air compressor with 75 mm bore, 28 mm stroke, driven by the engine at 2340 rev/min speed by rated engine speed (2250 rev/min);
compressor delivery 0,29 $m^3$/min at atmospheric pressure and rated engine speed;
pressure control valve with filter and coupling for tyre pressurizing, operating within 4,8-5,3 bar;
compressed air tank with 20 l capacity;
maximum air pressure 7 bar;
standardized coupling head;

Wheels

Steering wheels: 2 wheels in front with pneumatics 6,00-19 5 ply, diagonal type tyre casing; maximum permissible load per tyre 600 kg at 2,0 bar inflation pressure and 30 km/h; rims 4,5E x 19

Optional: pneumatics 6,50-20 6 ply, diagonal type tyre casing; maximum permissible load per tyre 730 kg at 2,5 bar inflation pressure and 30 km/h; rims 5,0E x 20

track width adjustable from 1370 to 1870 mm in 100 mm steps

Driving wheels: 2 wheels at rear with pneumatics 14,9-28 6 ply, diagonal type tyre casing; maximum permissible load per tyre 1510 kg at 1,3 bar inflation pressure and 30 km/h; rims W12 x 28

Optional: pneumaties 16,9-30 6 ply, diagonal type tyre casing; maximum permissible load per tyre 1760 kg at 1,1 bar inflation pressure and 30 km/h; rims W14L x 30
track width 1280; 1450; 1510; 1690; 1710; 1750 and 1960 mm adjustable by turning wheels and dises

Wheel base: 2120 mm

Seat: POLIESTER /- Priboj, Derby G 3000 upholstered seat with back rest; adjustable spring with shock absorber; range of adjustments:
- vertically: 50 mm
- horizontally: 50 mm

Number of grease points: 8 with grease

Lighting equipment: Electrical, 12 Volt, negative earth

| | Dimensions mm | Height above ground to centre mm | Distance from outside edge of tractor to centre mm |
|---|---|---|---|
| Head lights | Ø 13o | 131o | 55o |
| Position lights | Ø 5o | 11oo | 58o |
| Rear lights | Ø 5o | 125o | 27o |
| Reflector | Ø 1oo | 137o | 42o |

unrestricted beam angle of Head lights in plan view 32°;
all heights and distances are given for the tractor fitted with standard pneumatics (front 6,oo-19; rear 14.9-28) and with the rear wheels track width 145o mm

## CONDITIONS DURING TEST

**Weights** Ready for use as tested

| | with pneumatics 6,oo-19 and 14,9-28 | | with pneumatics 6,5o-2o and 16,9-3o | |
|---|---|---|---|---|
| | without driver | with driver | without driver | with driver |
| Without ballast: | | | | |
| front | 86o kg | 87o kg | 925 kg | 935 kg |
| rear | 14o5 kg | 147o kg | 1645 kg | 171o kg |
| total | 2265 kg | 234o kg | 257o kg | 2645 kg |
| With ballast: | | | | |
| front | 1125 kg | 1135 kg | 1215 kg | 1225 kg |
| rear | 2o4o kg | 21o5 kg | 2315 kg | 238o kg |
| total | 3165 kg | 324o kg | 353o kg | 36o5 kg |

Ballast:

| | | |
|---|---|---|
| front: | 8 weights 3o kg each and weight carrier 2o kg | 26o kg |
| rear: | 4 weights 6o kg each | 24o kg |
| | water in tyres | |
| | with standard tyres | 4oo kg |
| | with optional tyres | 46b kg |

**Track setting**

| | |
|---|---|
| Front axle | 137o mm |
| Rear axle | 151o mm |

**Dimensions**

Total length: 342o mm without ballast
355o mm with front ballast

Total width: 19oo mm with rear wheels track width 151o mm and without rear ballast; 193o mm with rear ballast

| | |
|---|---|
| Total height: | 1685 mm to the top of steering wheel<br>2300 mm to the top of exhoust pipe |
| Ground clearance: | 450 mm in tractor's median plane, bellow the gearbox housing |

Note: all dimensions are measured on the tractor fitted with the set of standard tyres

## FUELS AND LUBRICANTS USED IN TESTS

| | |
|---|---|
| Fuel: | INA Diesel - fuel $D_2$ in oil tests<br>specific gravity at 15°C 0,825 kg/l<br>cetane number 56<br>viscosity 5,1 $mm^2/S$ at 15°C |
| Engine oil: | Galax Super (S 3) SAE 30 (11 cSt at 98,9 °C) |
| Transmission and final drive oil: | Hypol SAE 90 (17 cSt at 98,9 °C) |
| Power lift oil: | Hydraulic oil HD 70 |

## COMPULSORY TESTS

### (1) MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 14.September 1979
Institut for Agricultural Mechanization - Zemun

Type of dynamometer: Hydraulic brake SCHENCK U1-3o

| Power | Speed engine | Speed p.t.o. | Fuel consumption hourly | Fuel consumption hourly | Fuel consumption specific | Specific energy |
|---|---|---|---|---|---|---|
| kW | rev/min | rev/min | l/h | kg/h | kg/kWh | kWh/l |
| **MAXIMUM POWER** | | | | | | |
| At 2-hour test | | | | | | |
| 51,76 | 225o | 6o9 | 17,12 | 14,12 | o,273 | 3,o2 |
| At standard p.t.o. speed (54o rev/min) | | | | | | |
| 47,85 | 1994 | 54o | 15,61 | 12,94 | o,27o | 3,o7 |
| At speed recommended by the manufacturer for drawbar work | | | | | | |
| 51,76 | 225o | 6o9 | 17,12 | 14,12 | o,273 | 3,o2 |
| **PART LOADS** | | | | | | |
| Governor hand lever in position giving maximum power | | | | | | |
| (i) 85 % of torque at maximum power | | | | | | |
| 45,25 | 2318 | 628 | 14,95 | 12,34 | o,273 | 3,o2 |
| (ii) unloaded | | | | | | |
| o,57 | 24oo | 65o | 5,41 | 4,46 | - | - |
| (iii) 5o % of the load defined in (i) | | | | | | |
| 23,16 | 2366 | 641 | 9,64 | 7,95 | o,343 | 2,4o |
| (iv) maximum power | | | | | | |
| 51,76 | 225o | 6o9 | 17,12 | 14,12 | o,273 | 3,o2 |
| (v) 25 % of the load defined in (i) | | | | | | |
| 11,63 | 2381 | 645 | 7,29 | 6,o1 | o,517 | 1,6o |
| (vi) 75 % of the load defined in (i) | | | | | | |
| 34,23 | 233o | 631 | 12,o8 | 9,96 | o,291 | 2,83 |

| Power | Speed engine | Speed p.t.o. | Fuel consumption hourly | Fuel consumption hourly | Fuel consumption specific | Specific energy |
|---|---|---|---|---|---|---|
| kW | rev/min | rev/min | l/h | kg/h | kg/kWh | kWh/l |
| Governor hand lever in position giving standard p.t.o. speed at full load | | | | | | |
| (i) 85 % of the torque at full load | | | | | | |
| 41,94 | 2o57 | 557 | 13,62 | 11,23 | o,268 | 3,o8 |
| (ii) unloaded | | | | | | |
| o,34 | 216o | 585 | 2,67 | 2,2o | - | - |
| (iii) 5o % of the load defined in (i) | | | | | | |
| 21,48 | 21o5 | 57o | 8,3o | 6,86 | o,319 | 2,59 |
| (iv) full load | | | | | | |
| 47,85 | 1994 | 54o | 15,61 | 12,94 | o,27o | 3,o7 |
| (v) 25 % of the load defined in (i) | | | | | | |
| 1o,91 | 2138 | 579 | 6,21 | 5,13 | o,47o | 1,76 |
| (vi) 75 % of the load defined in (i) | | | | | | |
| 31,84 | 2o82 | 564 | 1o,82 | 8,95 | o,281 | 2,94 |

STANDARD SPECIFIC FUEL CONSUMPTION:
o,273; o,343; o,268; o,319 kg/kWh

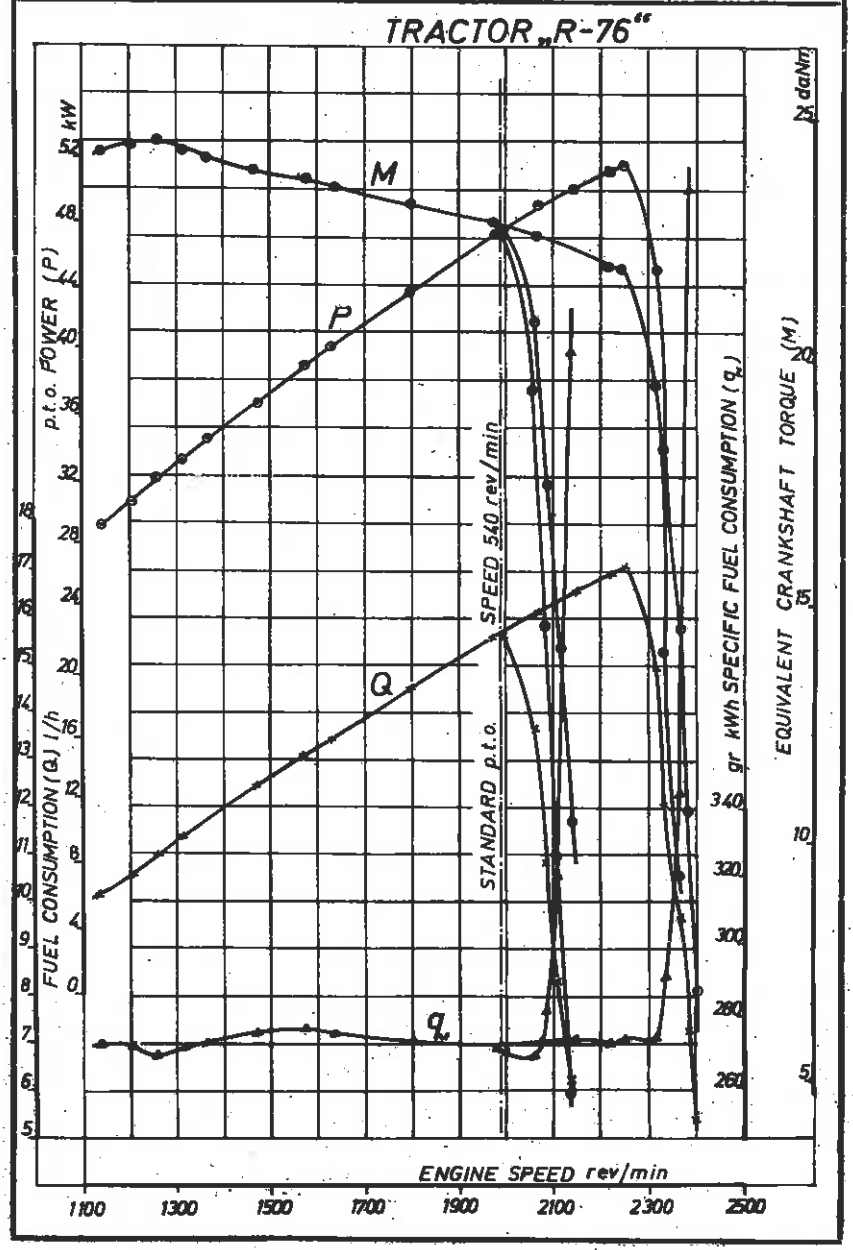
No load, maximum engine speed: 24o6 rev/min

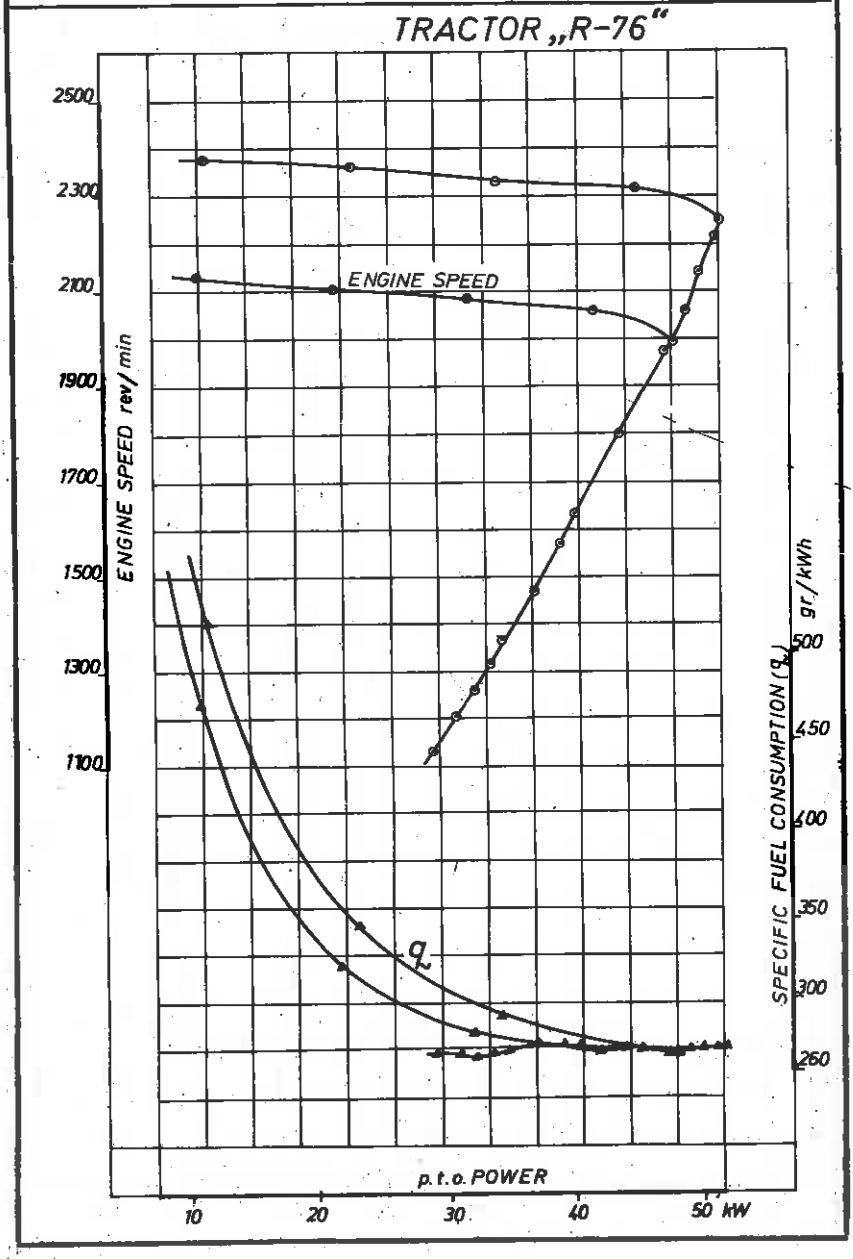
Equivalent crankshaft torque at maximum power: 21,96 daNm

Maximum equivalent crankshaft torque: 24,53 daNm at 1259 engine rev/min

Mean atmospheric conditions:
- temperature: 22 °C
- pressure: 1oo9 mbar
- humidity: 59 %

Maximum temperatures:
- coolant: 92 °C
- engine oil: 1o2 °C
- fuel: 24 °C
- air intake: 26 °C


TRACTOR „R-76"
p.t.o. POWER (P) kW
FUEL CONSUMPTION (Q) l/h
EQUIVALENT CRANKSHAFT TORQUE (M) daNm
gr kWh SPECIFIC FUEL CONSUMPTION (q)
STANDARD p.t.o. SPEED 540 rev/min
ENGINE SPEED rev/min
M
P
Q
q
1100
1300
1500
1700
1900
2100
2300
2500


TRACTOR „R-76"
ENGINE SPEED rev/min
2500
2300
2100
1900
1700
1500
1300
1100
ENGINE SPEED
q
SPECIFIC FUEL CONSUMPTION (q) gr./kWh
500
450
400
350
300
260
p.t.o. POWER
10
20
30
40
50 kW

(2) DRAWBAR PERFORMANCE

(I) Standard tyres: front 6,00-19; rear 14,9-28

Date of tests: 12th and 13th November 1979

Type of track: Tarmacadam

Note: The test was started with new, run-inn tyres

| Gear | Driving speed | Power | Drawbar pull | Engine speed | Slip of wheels | Specific energy | Specific fuel consumpt. | Temperatures Fuel | Co-olant | Engine oil | Atmospheric conditions Tempe-rature | Relative humidity | Pres-sure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | km/h | kW | daN | rev/min | % | kWh/l | kg/kWh | °C | °C | °C | °C | % | mbar |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| (i) MAXIMUM POWER with ballast height of drawbar above ground 550 mm driving wheels inflation pressure 1,0 bar | | | | | | | | | | | | | |
| 1 L | 2,35 | 16,3 | 2490 | 2360 | 14,9 | 1,72 | 0,480 | 17 | 80 | 82 | 18 | 49 | 1003 |
| 2 L | 3,68 | 25,5 | 2490 | 2320 | 15,1 | 2,13 | 0,387 | 17 | 80 | 84 | 18 | 49 | 1003 |
| 3 L | 6,35 | 40,4 | 2290 | 2250 | 13,1 | 2,34 | 0,352 | 17 | 82 | 87 | 18 | 49 | 1003 |
| 1 H | 9,05 | 41,7 | 1660 | 2250 | 8,5 | 2,42 | 0,340 | 18 | 83 | 87 | 18 | 49 | 1003 |
| 2 H | 15,10 | 40,7 | 970 | 2250 | 4,3 | 2,37 | 0,347 | 18 | 83 | 85 | 18 | 49 | 1003 |
| 3 H | 26,56 | 39,8 | 540 | 2250 | 2,6 | 2,30 | 0,357 | 17 | 82 | 84 | 18 | 49 | 1003 |
| (ii) FIVE-HOUR-TEST at 75 % of drawbar pull at maximum power in 3rd low gear | | | | | | | | | | | | | |
| 3 L | 6,90 | 32,7 | 1710 | 2325 | 8,4 | 2,35 | 0,351 | 17 | 81 | 83 | 18 | 49 | 1003 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1o | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (iii) FIVE-HOUR-TEST at drawbar pull corresponding to 15 % wheel slip in test (i) | | | | | | | | | |
| 2 L | - | - | 248o | 2315 | - | - | - | 17 | 82 | 82 | 17 | 52 | 1oo3 |
| | | | | (iv) MAXIMUM POWER without ballast height of drawbar above ground 695mm driving wheels inflation pressure 0,9 bar | | | | | | | | | |
| 1 L | 2,35 | 12,9 | 197o | 237o | 15,o | 1,57 | o,526 | 16 | 81 | 8o | 17 | 63 | 1oo6 |
| 2 L | 3,7o | 2o,2 | 196o | 235o | 15,2 | 2,o3 | o,4o6 | 16 | 81 | 82 | 17 | 63 | 1oo6 |
| 3 L | 6,4o | 34,5 | 194o | 2315 | 15,o | 2,29 | o,359 | 16 | 82 | 84 | 17 | 63 | 1oo6 |
| 1 H | 8,8o | 41,1 | 169o | 225o | 11,3 | 2,41 | o,342 | 16 | 82 | 85 | 17 | 63 | 1oo6 |
| 2 H | 14,9o | 4o,8 | 99o | 225o | 5,7 | 2,37 | o,347 | 17 | 83 | 86 | 17 | 63 | 1oo6 |
| 3 H | 26,45 | 4o,4 | 55o | 225o | 3,o | 2,34 | o,351 | 17 | 83 | 85 | 17 | 63 | 1oo6 |

Remark: Five hour test at pull corresponding to 15 % wheelslip (test iii) was carried out with additional ballast. Therefore results of test for power, wheelslip, driving speed and fuel consumption would not have any practical value.

Total engine oil consumption during ten hours duration of tests (ii) and (iii) was 47 gr/h

## (3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 6,00-19 6 ply
rear: 14,9 -28 6 ply

Track of wheels front: 1370 mm
rear: 1510 mm

| | With brakes | | Without brakes | |
|---|---|---|---|---|
| | left-hand m | right-hand m | left-hand m | right-hand m |
| Radius of turning space | 3,36 | 3,62 | 3,83 | 4,06 |
| Radius of turning circle | 3,28 | 3,54 | 3,75 | 3,98 |

## (4) LOCATION OF CENTRE OF GRAVITY

Height above ground 721 mm

Distance forward from rear axle centre 786 mm

Distance from tractor's median plane 10 mm to the right

(5) BRAKING PERFORMANCE

(i) SERVICE BRAKE

Date of test: 16th November 1979
Type of track: Tarmacadam
Type of decelerometer: Siemens B4

Mass of tractor with driver:
ballasted: 284o kg
unballasted: 234o kg

Note: Manufacturer does not recommend water ballast for road work

Cold brakes

| | | With ballast | Without ballast |
|---|---|---|---|
| Travelling speed | km/h | 27,5 | 27,5 |
| Deceleration | $m/s^2$ | 4,4 | 4,3 |
| Stopping distance | m | 7,6o | 7,7o |
| Force on pedal | daN | 64 | 52 |
| Force on pedal to achieve a deceleration of 2,5 $m/s^2$ | daN | 44 | 36 |

Brake fade characteristics (hot test)

| | | | |
|---|---|---|---|
| Deceleration | hot/cold % | 99 | loo |
| Stopping distance | cold/hot % | loo | 99 |
| Force on pedal | cold/hot % | lo2 | lo4 |

(ii) PARKING BRAKE

Tractor with ballast
Tractor facing up 16 % slope
Pull on handbrake 49 daN, tractor does not roll
Tractor facing down 16 % slope
Pull on handbrake 49 daN, tractor does not roll

(6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: 14th November 1979
Type of track: Tarmacadam
Type of sound lever meter: BRUEL & KJAER mod. 2209

Results of test

Gear: 3rd high
Travelling speed
before acceleration: 20,2 km/h
Sound level: 89,7 dB(A)

(7) NOISE AT THE DRIVER'S EAR LEVEL

Date of test: 14th November 1979
Type of track: Tarmacadam
Type of sound lever meter: BRUEL & KJAER mod. 2209

Results of test

+) Tractor without cab or frame

| Gear | Drawbar pull at which the tractor develops the maximum sound level | Travelling speed nominal | Travelling speed effective | Sound level |
|---|---|---|---|---|
| | daN | km/h | km/h | dB(A) |
| 1 L | 1960 | 2,63 | 2,4 | 101,4 |
| 2 L | 1960 | 4,16 | 3,8 | 101,9 |
| 3 L | +) 1815 | 7,24 | 6,5 | 102,1 |
| 1 H | 1620 | 9,85 | 9,0 | 102,0 |
| 2 H | 860 | 15,92 | 15,2 | 101,8 |
| 3 H | light load | 27,8 | 26,5 | 101,4 |

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

## (8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

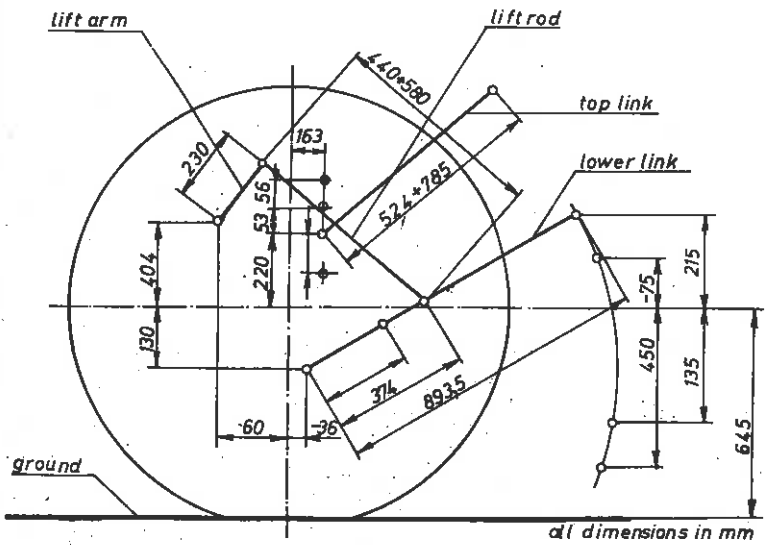
Date of tests: 29th September 1979

### HYDRAULIC PUMP

| | |
|---|---|
| (1) Opening pressure of relief valve | 165 bar |
| Sustained pressure by open relief valve | 160 bar |
| (2) Pump delivery rate at minimum pressure at rated engine speed | 29,9 l/min |
| (3) Pump delivery rate at max.hydraulic power | 26,7 l/min |
| corresponding delivery pressure | 154 bar |
| hydraulic power | 6,9 kW |

### POWER LIFT

Dimensions of linkage geometry for the table on page 22



**LINKAGE GEOMETRY**

| when connected to the standard frame | Maximum mechanical advantage | Minimum mechanical advantage |
|---|---|---|
| Projected length in side view: | | |
| Lower links | 893,5 mm | 893,5 mm |
| Lift arms | 230 mm | 230 mm |
| Lift rods | 440 mm | 580 mm |
| Top link | 690 mm | 700 mm |
| Distance of lift rod connection point from pivot point of lower link | 374 mm | 374 mm |
| **The following dimensions are given relative to rear axle centre line 645 mm above ground** | | |
| Lower link pivot point | 36 mm forward, 130 mm below | 36 mm forward, 130 mm below |
| Top link pivot point | 163 mm behind, 329 mm above | 163 mm behind, 220 mm above |
| Lift arm pivot point | 60 mm forward, 404 mm above | 60 mm forward, 404 mm above |
| Maximum and minimum height of lower link hitch points | 215 mm above, 135 mm below | 75 mm blow 450 mm below |
| Height of lower link hitch points above ground when locked in highest transport position | 860 mm | 570 mm |

LIFTING FORCES

Lifting heights relative to horizontal lower links

| mm | -350 | -320 | -300 | -200 | -100 | -40 | 0 |
|---|---|---|---|---|---|---|---|
| At hitch points | | | | maximum mechanical advantage | | | |
| daN | - | - | - | - | - | - | 2270 |
| | | | | minimum mechanical advantage | | | |
| daN | - | 1940 | 1915 | 1740 | 1535 | - | 1350 |

Max.force exerted throughout the whole range 1255 daN

Front of tractor does not lift when tractor is fitted with front ballast

| At test frame | | | | maximum mechanical advantage | | | |
|---|---|---|---|---|---|---|---|
| daN | - | - | - | - | - | 1995 | 1925 |
| | | | | minimum mechanical advantage | | | |
| daN | 1775 | - | 1730 | 1415 | 1210 | - | 1055 |

Max.force exerted throughout the whole range 1000 daN

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

| +45 | +55 | +100 | +200 | +280 | +300 | +350 |
|---|---|---|---|---|---|---|
| length of lift rods 440 mm | | | | | | |
| - | - | 2015 | 1660 | - | 1425 | 1255 |
| length of lift rods 580 mm | | | | | | |
| 1190 | - | - | - | - | - | - |
| length of lift rods 440 mm | | | | | | |
| - | - | 1595 | 1345 | 1000 | - | - |
| length of lift rods 580 mm | | | | | | |
| - | 875 | - | - | - | - | - |

All values of forces are given for pressure at maximum hydraulic power (154 bar), calculated from measurements at maximum oil pressure (160 bar)

OPTIONAL TEST

(II) Optional tyres: front 6,5o-2o; rear 16,9-3o

Date of tests: 13th and 16th June 198o

Type of track: Tarmacadam

Note: This test was started with new, run-inn tyres

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1o | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) MAXIMUM POWER with ballast, height of drawbar above ground 61o mm driving wheels inflation pressure 1,o bar | | | | | | | | | | | | | |
| 1 L | 2,51 | 2o,4 | 2925 | 2345 | 15,o | 1,94 | o,423 | 22 | 85 | 86 | 23 | 58 | 1oo9 |
| 2 L | 3,9o | 31,7 | 292o | 231o | 15,o | 2,27 | o,362 | 23 | 86 | 86 | 23 | 58 | 1oo9 |
| 3 L | 7,35 | 43,9 | 215o | 225o | 5,8 | 2,56 | o,323 | 24 | 86 | 88 | 24 | 56 | 1oo9 |
| 1 H | 1o,22 | 44,3 | 156o | 225o | 3,9 | 2,59 | o,321 | 25 | 87 | 89 | 24 | 56 | 1oo9 |
| 2 H | 16,45 | 43,5 | 95o | 225o | 2,1 | 2,54 | o,325 | 26 | 89 | 9o | 24 | 56 | 1oo9 |
| 3 H | 28,9o | 4o,6 | 5o5 | 225o | 1,2 | 2,37 | o,35o | 26 | 87 | 89 | 25 | 51 | 1oo9 |
| (iv) MAXIMUM POWER without ballast, height of drawbar above ground 61o mm driving wheels inflation pressure o,9 bar | | | | | | | | | | | | | |
| 2 L | 3,97 | 23,5 | 213o | 2325 | 15,o | 2,o5 | o,4oo | 25 | 81 | 85 | 24 | 63 | 1oo7 |
| 3 L | 6,65 | 39,2 | 213o | 2265 | 15,o | 2,31 | o,355 | 26 | 82 | 85 | 24 | 63 | 1oo7 |
| 1 H | 9,93 | 43,8 | 158o | 225o | 6,3 | 2,55 | o,323 | 26 | 83 | 88 | 25 | 59 | 1oo7 |
| 2 H | 16,25 | 44,3 | 98o | 225o | 3,1 | 2,57 | o,32o | 27 | 86 | 9o | 25 | 59 | 1oo7 |
| 3 H | 28,7o | 42,2 | 53o | 225o | 1,6 | 2,46 | o,336 | 27 | 85 | 9o | 25 | 59 | 1oo7 |

OPTIONALLY

## (8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

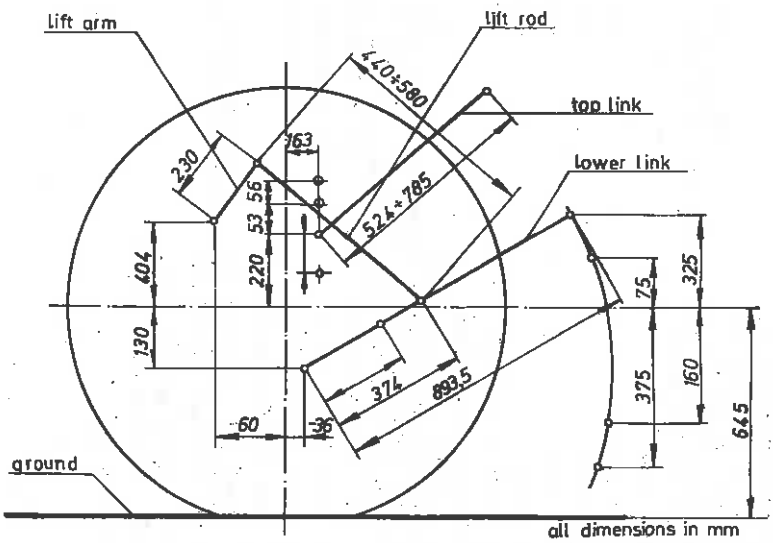
Date of tests: 28th May 1980

### HYDRAULIC PUMP

| | | |
|---|---|---|
| (1) | Opening pressure of relief valve | 215 bar |
| | Sustained pressure by open relief valve | 2e5 bar |
| (2) | Pump delivery rate at minimum pressure at rated engine speed | 23,5 l/min |
| (3) | Pump delivery rate at max.hydraulic power | 22,2 l/min |
| | coresponding delivery pressure | 165 bar |
| | hydraulic power | 6,1 kW |

### POWER LIFT

Dimensions of linkage geometry for the table on page 27



**LINKAGE GEOMETRY**

| when connected to the standard frame | Maximum mechanical advantage | Minimum mechanical advantage |
|---|---|---|
| Projected length in side view: | | |
| Lower links | 893,5 mm | 893,5 mm |
| Lift arms | 23o mm | 23o mm |
| Lift rods | 44o mm | 58o mm |
| Top link | 69o mm | 7oo mm |
| Distance of lift rod connection point from pivot point of lower link | 374 mm | 374 mm |
| The following dimensions are given relative to rear axle centre line 645 mm above ground | | |
| Lower link pivot point | 36 mm forward, 13o mm below | 36 mm forward, 13o mm below |
| Top link pivot point | 163 mm behind, 329 mm above | 163 mm behind, 22o mm above |
| Lift arm pivot point | 6o mm forward, 4o4 mm above | 6o mm forward, 4o4 mm above |
| Maximum and minimum height of lower link hitch points | 325 mm above, 16o mm below | 75 mm above, 375 mm below |
| Height of lower link hitch points above ground when locked in highest transport position | 72o mm | 97o mm |

LIFTING FORCES

Lifting heights relative to horizontal lower links

| mm | -275 | -245 | -2oo | -1oo | -75 | -3o | 0 | +1oo |
|---|---|---|---|---|---|---|---|---|
| At hitch points | | | | maximum mechanical advantage | | | | |
| daN | - | - | - | - | - | 169o | 1615 | 1415 |
| | | | | minimum mechanical advantage | | | | |
| daN | - | 1475 | 136o | 1185 | - | - | 1o8o | 1o1o |

Max.force exerted throughout the whole range 98o daN

Front of tractor does not lift when
tractor is fitted with front ballast

| At test frame | | | | maximum mechanical advantage | | | | |
|---|---|---|---|---|---|---|---|---|
| daN | 146o | - | 1245 | 1o4o | - | - | 92o | 775 |
| | | | | minimum mechanical advantage | | | | |
| daN | - | - | - | - | 1665 | - | 142o | 119o |

Max.force exerted throughout the whole range 63o daN

Front of tractor lifts when fitted with maximum front
ballast at lifting force 2o4o dan

| | | | | | | |
|---|---|---|---|---|---|---|
| +155 | +2oo | +2o5 | +3oo | +4oo | +415 | +45o |
| length of lift rods 44o mm | | | | | | |
| - | 128o | - | 117o | 1o3o | - | 95o |
| length of lift rods 58o mm | | | | | | |
| - | 93o | 92o | - | - | - | - |
| length of lift rods 44o mm | | | | | | |
| 63o | - | - | - | - | - | - |
| length of lift rods 58o mm | | | | | | |
| - | 114o | - | 895 | 675 | 58o | - |

All values of forces are given for pressure at maximum hydraulic power (165 bar), calculated from measurements at maximum oil pressure (2o5 bar)