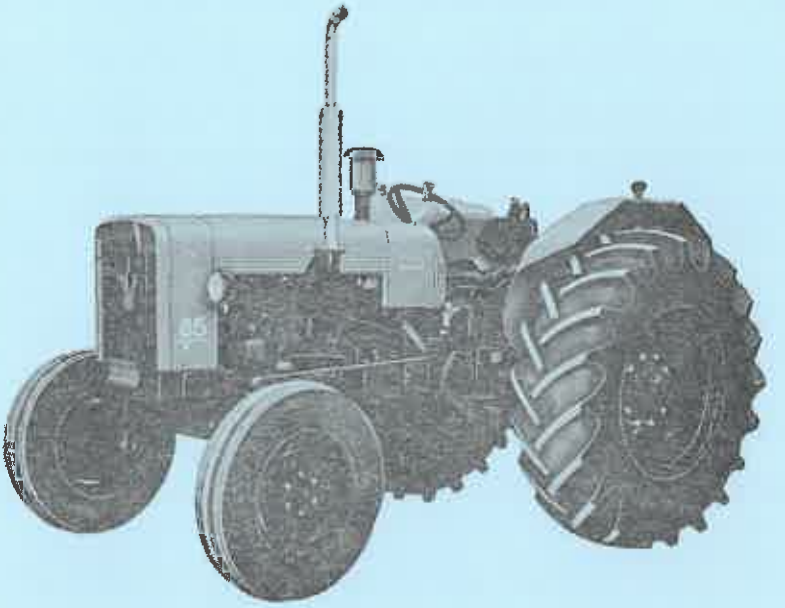
FINNISH RESEARCH INSTITUTE OF ENGINEERING IN AGRICULTURE AND FORESTRY
(VAKOLA)

Testing, research and development of the machines used in agriculture, gardening, forestry, dairy, household work and home industries

Address: SF-03450 Olkkala, Finland

TEST BULLETIN: O.E.C.D. No. 803

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



VALMET 85 Id DIESEL TRACTOR

Manufactured by: Valmet DO Brasil, Magi das Cruzes (SP), Brazil

This report has been approved by the O.E.C.D. Coordinating Centre (CEMAGREF France) as being in accordance with the O.E.C.D. Standard Code for the Official Testing of Agricultural Tractors

Date of approval: 1981-03-12 **Serial No. 803**

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

Tractor manufacturer:	Valmet Do Brasil Mogi das Cruzes-SP Brasil
Submitted for the test by:	Valmet Oy Jyväskylä Finland
Selected by:	The manufacturer with the agreement of the institute
Place of running-in:	Helsinki
Duration of running-in:	35 h

SPECIFICATION OF TRACTOR

Tractor

Make:	Valmet Do Brasil
Model:	85 id
Type:	Wheeled tractor, rear wheel driven, unit construction
Serial No:	085.3.6341

Engine

Make:	MWM Motores Diesel Ltda
Model:	D 225-4 TV
Type:	4-stroke direct injection diesel engine, water cooled
Serial No:	D 225.04.33057
Cylinders:	4 cylinders, vertical, in line, bore 100 mm, stroke 120 mm, displacement 3770 cm^3, compression ratio 18:1, wet replaceable cylinder liners
Valves	overhead

Fuel system

Bosch type FP/KS-22 AD 6/4 piston type fuel feed pump, one paper prefilter CAV type SSV-5836 A 120 A; one double paper filter Bosch type FJ/DF 5F5/306, Bosch in-line injection pump type PES 4A80D 320/RS serial no 92 10.15, manufacturer's production setting 13,0 kg/h at 2300 rpm rated engine speed and at specific gravity 0,830 g/cm^3 at 20 °C, DLL 150 S 393 multihole injector nozzles, injector setting 17,7 + 0,4 MPa (nominal), injection timing 27 °C before T.D.C., capacity of fuel tank 41 l.

Governor	Bosch type RSV mechanical governed range of engine speed 600...2480 rpm, rated engine speed 2300 rpm.
Air cleaner	MANN oil bath type with centrifugal pre-cleaner, oil capacity 1 litres.
Lubrication system	Forced feed from gear type pump with metal strainer in sump, full flow replaceable element filter MANN W 940/18 total oil capacity 9,5 l, recommended oil change period 120 h, recommended type of oil SAE 30 (MIL-L-2104 C), API-CD

Cooling system — Water cooling, pressurized at 39-49 kPa, impeller assisted with a 415 mm diameter belt driven 6-blade fan, thermostat for temperature control
cooling water capacity 13,5 l.

Starting system — Electrical
Bosch type JD 12 V-1, 8 CV solenoid engaged starter motor

Electrical sytem — 12 V
negative earth
two 6 V battery units connected in series with capacity of 100 Ah (SAE 20 hours)
alternator Bosch type K1 14 V 23 A 20 (320 W)

Transmission

Clutch: — Amortex dry single plate 310 mm diameter, pedal operated

Gearbox: — Own make
3 forward and 1 reverse speed gear box + a reduction gear box; total 6 forward and 2 reverse speeds, group gear and 2nd and 3rd gear synchronized

Total ratios and speeds:

Group	Gear	Number of engine revolution for one revolution of driving wheel	Nominal travelling speed at 2300 rpm rated speed of engine km/h
Slow	Forward		
	1	199,48	3,1
	2	122,54	5,1
	3	58,53	10,7
	Reverse		
	R	139,64	4,5
Fast	Forward		
	1	78,08	8,0
	2	47,96	13,0
	3	22,91	27,3
	Reverse		
	R	54,66	11,4

Rear axle and final drive: — Own make
level gear drive with crown wheel and pinion
pedal operated differential lock with automatic unlocking device to avoid overloading
final drive with spur gears located at the end of the differen half shafts

Oil capacities: — Gearbox and differential 15 l
final drives 7,0 l each
recommended type of oil SAE 140 (MIL-L-2105)
recommended oil change period 720 h.

Power take-off:	At rear of tractor in vertical centre plane 746 mm above ground, distance from rear axle 239 mm, 6 splines 35 mm diameter (ISO) speed 540 rpm at 1720 rpm engine speed 722 rpm at 2300 rpm engine speed operated with transmission clutch rotation clockwise viewed from the rear
Belt pulley:	Optional not fitted for test p.t.o. driven giving 14,72 m/s (1444 rpm) linear speed at 2300 rpm rated engine speed direction of rotation optional

Power lift

Hydraulic system:	Own make with gear type pump driven by the cam shaft oil supply to ram cylinder and two external tapings draught and position controls and adjustable draught response and speed to drop implement, oil capacity 11,5 l recommended type of oil SAE 30, API SD-CC
Implement linkage:	Category 2 three point linkage (ISO 730/1)

Pull attachment

Drawbar:	Swinging drawbar height above ground 485 mm distance from rear axle 477, 578, 685 and 792 mm 261 mm under pto and 321, 428, 535 and 642 mm behind it lateral adjustment 435 mm distance of pivot point 20 mm rear of the rear axle coupling pindia 32 mm
Steering:	Own make worm and nut type with double drag links

Brakes

Service brake:	Own make mechanically operated dry disc brakes acting on differential half shafts two pedals independent operated for steering braking or combined operated for service braking
Parking brake:	Hand level with ratchet operating both service brakes for parking

Wheels

Steering wheels:	Two 7.50 - 18 6 pr types in front maximum permissible load on each tyre 8 kN at 270 kPa pressure track width from 1435 mm to 1735 mm in 100 mm steps and from 1585 mm to 1885 mm in 100 mm steps changed by extending telescopic front axle and by reversing wheel centres

Driving wheels: Two 18.4 - 30 6 pr tyres
maximum permissible load on each tyre 21 kN at 110 kPa pressure;track width 1595 - 1705 - 1805 mm changed by offset lug type rims and reversing wheel centres.

Wheel base: 2130 mm

Lighting

	Height above ground of centre mm	Diameter mm	Distance from outside edge of tractor to centre mm
Head lights	1170	120	688
Rear light	1600	50	310
Reflectiors	1240	53	620

Unrestricted beam angle of headlight in plan view 108 °C

Number of grease points 13

Overall dimensions

	Lenght m	Width m		Heights m	
		max .	min.	With exhaust	Without exhaust
With ballast	3,69	2,31	2,10	2,26	1,82
Without ballast	3,48	2,29	2,08	2,27	1,83

Seat Grammer Rigi- Flex DS 201B3
upholstered cushion and backrest, spring with hydraulic damber, adjustable for 38...85 kg driver's weight, range of adjustment 66 mm fore and after

CONDITIONS DURING TEST

Masses

Tractor without driver but with tanks full

	Front kg	Rear kg	Total kg
Without ballast	810	1730	2540
With ballast	1160	2580	3740

Ballast

	No of weights	Total mass kg	Water kg
Front	6	280	-
Rear	4	280	640

Track setting — During test rear 1595 mm and front 1535 mm

Fuels and lubricants used in tests

Fuel: Diesel oil 0,830 specific gravity at 15 °C

Engine oil: Castrol CRD 10W/30

Transmission oil: Castrol 80-90 EP

Hydraulic oil: Castrol CRB 5W/20

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 1980-01-23, Helsinki

Type of dynamometer: Schenk U1-30

Power	Speed		Fuel consumption		Specific energy
kW	Engine rev/min	p.t.o. rev/min	hourly l/h	specific g/kWh	kWh/l
Maximum power - 2 hour test					
49,3	2267	712	15,5	263	3,2
The speed recommended by the manufacturer for drawbar work					
49,3	2267	712	15,5	263	3,2
Part loads - at rated engine speed					
(i) 85 per cent of the torque obtained at maximum power					
42,8	2316	727	13,1	255	3,3
(ii) unloaded					
-	2432	764	3,8	-	-
(iii) half the torque defined in (i)					
21,9	2370	744	7,9	299	2,8
(iv) the torque corresponding to maximum power					
49,3	2267	712	15,5	263	3,2
(v) one-quarter of the torque defined in (i)					
11,1	2402	754	5,5	413	2,0
(vi) three-quarters of the torque defined in (i)					
32,2	2326	730	10,1	261	3,2

Power	Speed		Fuel consumption		Specific energy
kW	Engine rev/min	p.t.o. rev/min	hourly l/h	specific g/kWh	kWh/l
Part loads - standard speed of the p.t.o.					
(i) 85 per cent of the torque obtained at maximum power					
37,9	1771	556	10,5	232	3,6
(ii) unloaded					
-	1886	592	2,4	-	-
(iii) half the torque defined in (i)					
19,6	1831	575	6,0	256	3,3
(iv) the torque corresponding to maximum power available					
43,5	1720	540	13,4	257	3,2
(v) one-quarter of the torque defined in (i)					
9,9	1841	578	4,1	351	2,4
(vi) three-quarters of the torque defined in (i)					
28,6	1777	558	8,0	233	3,6

Standard specific fuel consumption

255/299/232/256

No load maximum engine speed:	2432 rev/min	
Torque at maximum power[1)]	208 Nm	
Maximum torque[1)]	247 Nm	
at	1348 rev/min of the engine	
Mean atmospheric conditions	temperature	21°C
	pressure	1009 mbar
	relative humidity	58 per cent
Maximum temperatures	coolant	86°C
	engine oil	114°C
	fuel	45°C
	engine air intake	29°C

1) The torque is the equivalent crankshaft torque.

2. DRAWBAR PERFORMANCE

Date of tests: 1979-10-22, 1980-06-10...12
Type of track: tarmacadam
Height of drawbar above ground: 480 mm

Gear	Speed	Power	Drawbar pull	Engine speed	Slip	Specific consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
	km/h	kW	kN	r/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	mbar
(i) Maximum power (unballasted)													
1 (L1)	2,8	12,9	16,5	2408	14,9	-	-	15	84	83	2	51	1010
2 (L2)	4,5	21,2	16,8	2384	14,2	-	-	16	84	83	2	51	1010
3 (H1)	7,2	32,5	16,2	2341	11,5	-	-	16	84	83	2	51	1010
4 (L3)	9,6	41,7	15,6	2269	9,5	-	-	15	83	82	2	51	1010
5 (H2)	12,3	42,4	12,4	2304	6,3	-	-	15	83	83	2	51	1010
(ii) Maximum power (ballasted)													
1 (L1)	2,7	18,9	25,0	2367	14,6	385	2,14	33	84	89	26	38	980
2 (L2)	4,3	30,2	25,0	2327	15,0	333	2,48	33	84	88	26	38	980
3 (H1)	6,9	38,2	20,0	2217	9,9	327	2,53	33	85	89	26	38	980
4 (L3)	9,0	38,9	15,5	2084	5,1	318	2,59	34	83	88	26	38	980
5 (H2)	11,9	39,7	12,0	2228	4,5	322	2,56	34	85	90	26	38	980
(iii) Five hour test at 75 per cent pull at maximum power													
3 (H1)	7,6	31,5	15,0	2313	4,9	317	2,60	35	85	111	26	40	970
(iv) Five hour test at pull corresponding to 15 per cent wheelslip in test (ii) (additional ballast)													
2 (L2)	4,6	31,9	25,0	-	-	-	-	32	85	108	14	34	960

Oil consumption during ten hours duration of tests (iii) and (iv) 25 g/h.

3. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: As in specification without ballast
Track - front: 1435 mm
rear: 1595 mm

	With brakes		Without brakes	
	Left-hand m	Right-hand m	Left-hand m	Right-hand m
Radius of turning space	3,45	3,44	3,95	3,99
Radius of turning circle	3,29	3,29	3,79	3,85

4. LOCATION OF CENTRE OF GRAVITY

	mm
Height above ground	900
Distance forward from the vertical plane containing the axis of the rear wheels	690
Distance from the median plane	0

5. BRAKING

Date of tests: 1980-08-04
Tractor masses during brake tests: as in spesification

Type 0 (ordinary cold service braking device performance) test

Speed before application of brakes 28,6 km/h

Ballasted	Braking device control force, N	350	420	480	560		
	Mean deceleration, m/s^2	2,0	2,7	3,0	3,1		
Unballasted	Braking device control force, N	290	340	370	440	510	
	Mean deceleration, m/s^2	2,2	2,7	3,1	3,5	3,7	

Type I (fade) test

Braking device control force, N	370	460	510	600		
Mean deceleration, m/s^2	2,7	3,2	3,4	3,5		

Maximum deviation of tractor from its original course 0 m

Abnormal vibration none

The brakes were heated by towing

Parking braking device test

	18 per cent slope		12 per cent slope with trailer of 2,5 tonnes	
	Up	Down	Up	Down
Braking device control force, N	450	400	300	300

6. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	1979-10-08	
Type of sound level meter:	Brüel & Kjaer 2209	
Type of track:	tarmacadam	
Results of tests:	Gear	6 (H3)
	Travelling speed before acceleration	22 km/h
	Sound level	92 dB(A)

7. NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests:	1979-10-08
Type of sound level meter:	Brüel & Kjaer 2209
Type of track:	tarmacadam
Cab fitted:	Safety frame
Results of tests:	

Gear	Drawbar pull at which the tractor develops the maximum sound level kN	Measured travelling speed km/h	Sound level dB(A)
3 (H1) *	8,8	2,9	100
3 (H1) *	light load	3,2	98
4 (L3)	5,8	10,3	101
5 (H2)	6,0	12,3	101
6 (H3)	2,0	25,9	101
top gear	light load	27,6	98,5

* The 3. 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: Vihti 1980-11-26

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. tilt angle of mast over range of lift degrees
At hitch points	210	680	11,1	12,8	9,7	-
On the frame	210	680	8,7	12,8	11,7	7

Temperature of hydraulic fluid at start of test 40°C.

Hydraulic pump performance

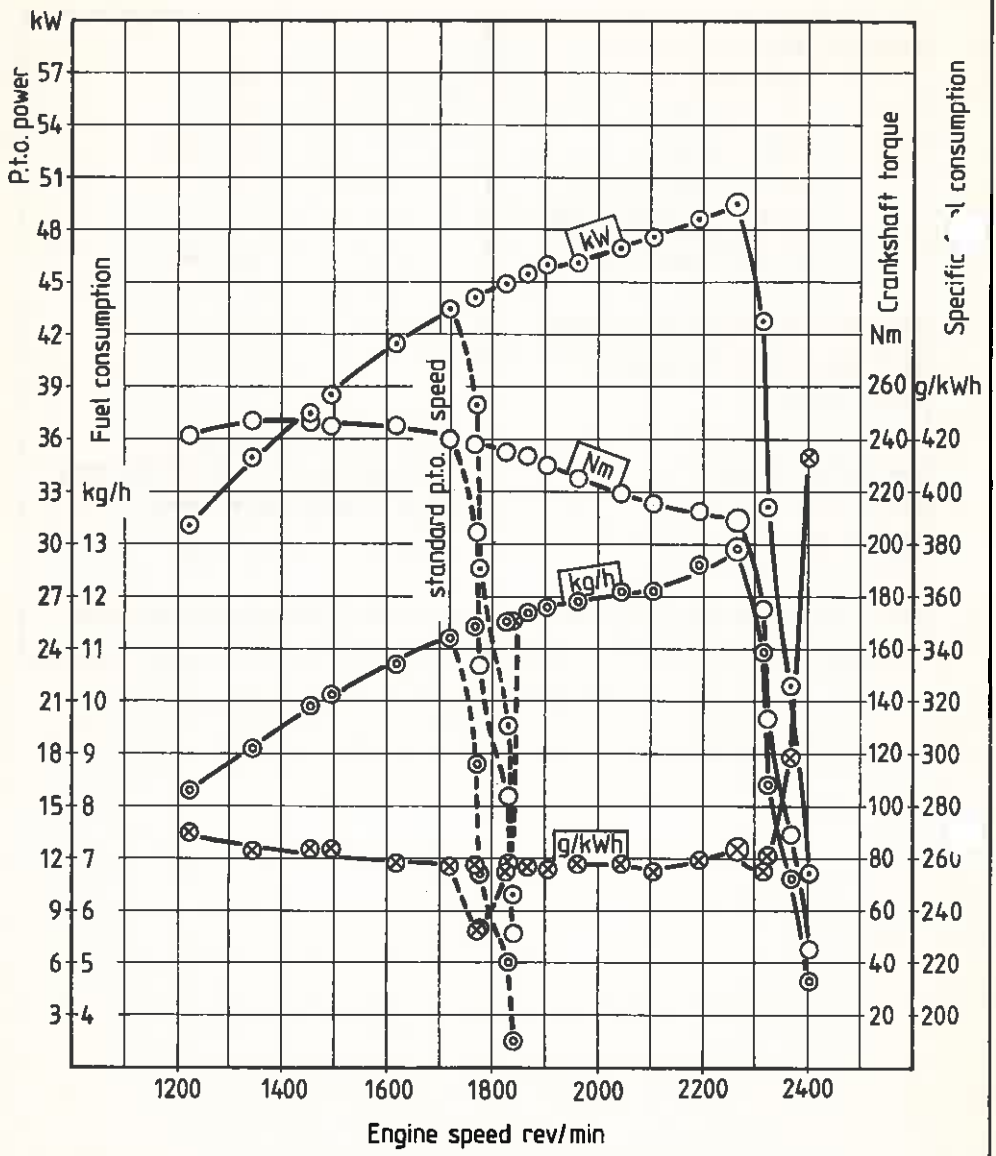
Opening pressure of the relief valve	14,2 MPa
Sustained pressure with relief valve open	14,7 MPa
Pump delivery rate at minimum pressure	28 l/min
Maximum hydraulic power	5,8 kW
Pressure at maximum power	13,2 MPa
Temperature of hydraulic fluid	50°C

Linkage geometry when connected to the standard frame

Projected length in side view	
lower links, mm	900
lift arms, mm	235
lift rods, mm	702...810
top link, mm	688...1022
Distance of lift rod connection point from pivot point of lower link, mm	420, 465 [1]
The following dimensions are given relative to the rear wheel centre line, situated 774 mm above the ground level:	
Lower link pivot point	24 mm behind, 211 mm below
Top link pivot point	91 mm behind, 151, 193, 235 [1] mm above
Lift arm pivot point	190 mm forward, 236 mm above
Maximum and minimum heights of lower link hitch points	151 mm above, 729 mm below
Heights of lower link hitch points when locked in transport position	Any height within limits given above

1) During power lift test

Finnish Research Institute of Engineering in Agriculture and Forestry	Power take-off test	Valmet 85 id diesel tractor



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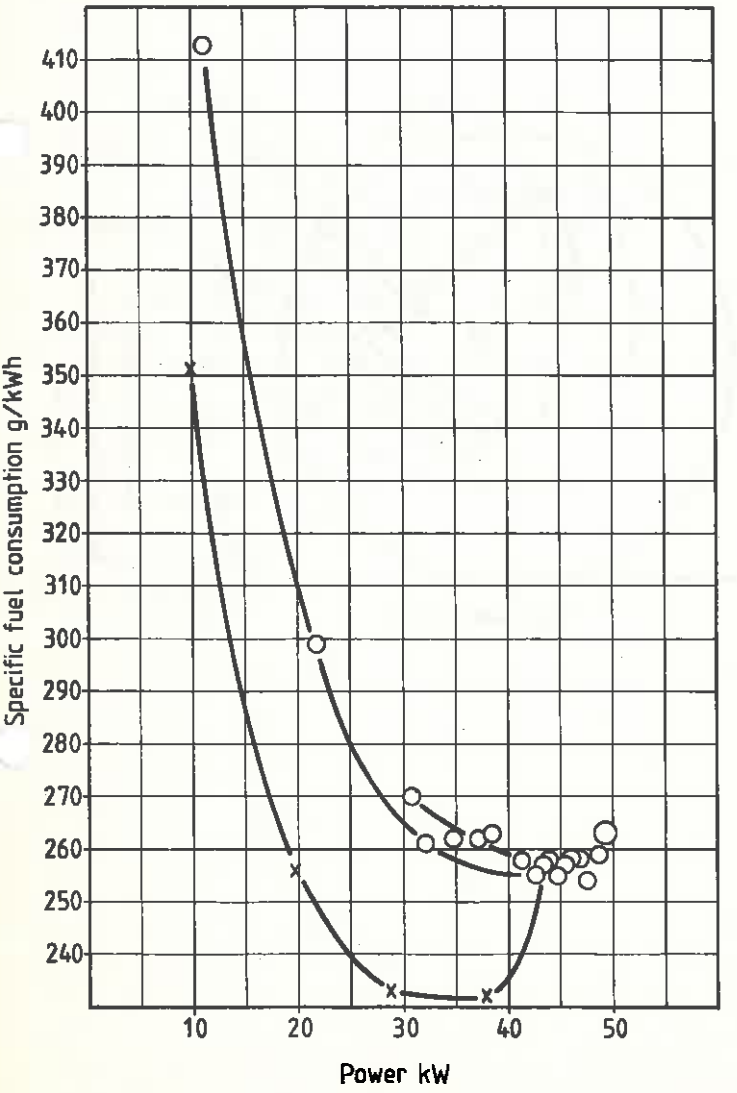

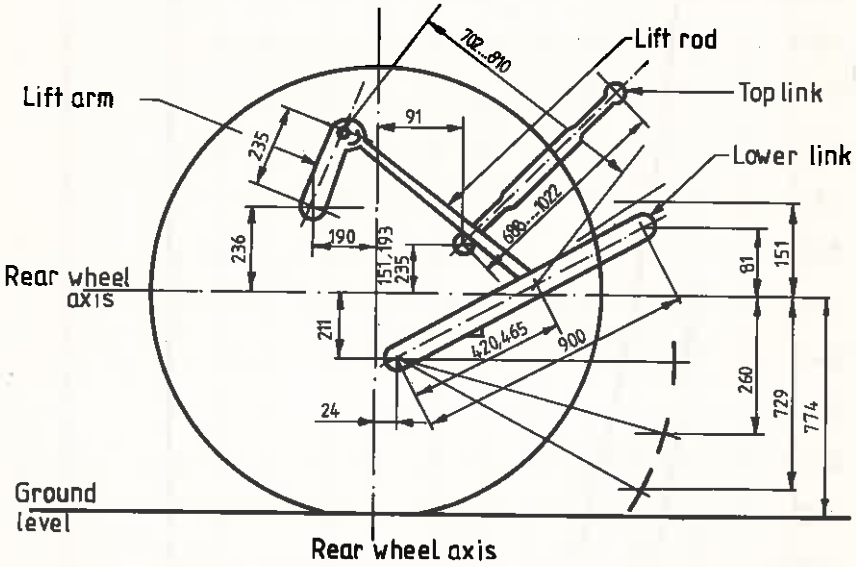
Lift arm
Lift rod
Top link
Lower link
Rear wheel axis
Ground level
Rear wheel axis
702...810
91
235
236
190
151...193
235
698...1022
81
151
211
420...465
900
260
729
774
24

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