Report on test in accordance with OECD STANDARD CODE

OECD No. **1158**

Agricultural Tractor MERCEDES-BENZ MB-TRAC 1100 (4WD)

Type denomination MB-TRAC 441, variant 163

Manufacturer
Daimler-Benz AG
D-7560 Gaggenau

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This is a report on a tractor test in accordance with OECD STANDARD CODE for the Official Testing of Agricultural Tractor Performance (C(87)53(Final), Code I).

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

Duration of tests: September 1987 till January 1988

DLG-Testing Station for Agricultural Machinery, Max-Eyth-Weg 1,
D-6114 Groß-Umstadt

This report has been approved by the OECD Co-Ordinating Centre (CEMAGREF, France) as being in accordance with the OECD STANDARD CODE.

Date of approval: 4th October 1988 OECD No. 1158

The agricultural tractor MB-TRAC 1100 described in this OECD test report belongs to the type series 441. It fundamentally differs from the tractor MB-TRAC 1100 tested in 1976 (see OECD test report no. 547) which belonged to another type series.

In this report all performance characteristics are given corresponding to the International System of Units.

The reference to the former used Technical System of Units is given by the following relations:

Forces	1 kN	=	1000 N	=	102,00 kp
Powers			1 kW	=	1,36 PS
Pressures	1 MPa	=	10 bar	=	10,20 kp/cm²
	100 kPa	=	1000 mbar	=	750,10 mm Hg

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*) All stated dimensions refer to tyre size 16.9 R 26 and track width 1650 mm each at front and rear

Tractor manufacturer:	DAIMLER-BENZ AG D-7560 Gaggenau
Location of tractor assembly:	D-7560 Gaggenau
Submitted for test by:	Manufacturer
Selected for test by:	Manufacturer with agreement by DLG
Place of running-in:	Gaggenau and Groß-Umstadt
Duration of running-in:	Engine 70 hours, tractor 50 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	MERCEDES-BENZ
Trade Name:	MB-TRAC 1100
Type denomination:	MB-TRAC 441, variant 163
Type:	Four wheel drive tractor, chassis construction with implement mounting area above rear axle, spring suspended front axle
Serial No.:	WDB 441 163 OW 139621
1st serial No.:	WDB 441 163 OW 000001

Engine

Make:	MERCEDES-BENZ
Model:	OM 366.XVI
Type:	Watercooled 4-stroke DIESEL-engine, direct injection, naturally-aspirated
Serial No.:	366.908-10-061962
Cylinders:	6, in-line, bore 97,5 mm, stroke 133 mm, displacement 5958 cm³, no separate cylinder liners; compression ratio 17,0±0,5:1
Valves:	Overhead
Fuel system:	BOSCH fuel supply pump, BOSCH 2-stage fuel filter with replaceable filter elements, capacity of fuel tank 135 dm³; BOSCH in-line injection pump EP 3901 PES 6A 90 D410 RS 2710 with timing device, serial no. 743 04388 manufacturer's production setting 55±2 mm³/stroke at rated engine speed and full load, injection timing 18°±8° before TDC; BOSCH multihole injection nozzles DLLA 142 S 791, injection pressure 20±0,8 MPa

Governor:	BOSCH, RSV 350-1200 A 1C 1154 RS 3927 centrifugal variable speed governor, governed range of engine speed from 700 to 2530 rev/min, rated engine speed 2400 rev/min
Air cleaner:	Main cleaner MANN optional KNECHT, FP 9007; dry paper element filter with safety cartridge, filter elements replaceable, maintenance pilot lamp, cyclone pre-cleaner incorporated; air intake above bonnet;
Lubrication system:	Forced feed with gear pump, MANN oil filter in full flow (with by-pass valve), replaceable
Cooling system:	Water cooling with centrifugal pump; V-belt driven fan with 9 blades, 500 mm dia; water capacity 19 dm^3, temperature control by thermostat; closed-circuit cooling, overpressure relief valve set to 70 kPa
Starting system:	Electrical, BOSCH solenoid pre-engaged-drive starting motor JD 12V 3 kW; cold starting aid STARTPILOT, safety device: disengaged travel clutch, p.t.o. selection lever in position 0
Electrical system:	12 V, BOSCH 3-phase alternator K1-14 V 23/55 A 770 W; 1 lead acid battery, 120 Ah (optional 154 Ah) at 20 hours rating
Exhaust system:	GILLET, SH 9032 multi-chamber reflexion type silencer, 228x118 mm oval, 570 mm long; on the left of tractor's median plane, below bonnet, mouth 2830 mm above ground showing upwards-forward

Transmission to wheels

Clutch:	LUK, dry dual disc clutch DT 330/310 G; travel clutch hydraulically operated by pedal, disc 330 mm dia; p.t.o. clutch pneumatically operated by control lever, disc 310 mm dia
Gear box:	MERCEDES BENZ, model UG 2/30-7/11,19 GA synchromesh gear box with 4 speeds; synchromesh range gear with 2 forward ranges (I and II) and 1 reverse range (R); close stepped range gear with pre-selecting of range H and L, by clutch operating pneumatically shifted, synchronized; total 16 forward and 8 reverse speeds in the 40 km/h version; in the 30 km/h version the 4th speed is locked when using the range II, total 14 forward and 8 reverse speeds; 2 levers and 1 preselector on speed change lever; optionally available: modified axle-drive ratio and crawler gear
Rear axle and final drives:	MERCEDES BENZ, portal axle; rigidly fitted to tractor's chassis, driven by universally-jointed propeller shaft; bevel gear drive, bevel gear differential lockable, spur gear final drives
Front axle and final drives:	MERCEDES BENZ, portal axle; linked to chassis by coil springs, shock absorbers and Panhard rod; driven by universally-jointed propeller shaft, pneumatically engageable and disengageable under load by rotary knob; bevel gear drive, bevel gear differential with lock, spur gear final drives
Both axles:	Axle drives optionally available with transmission ratios 18,117 or 14,845, tested variant 18,117; differential locks in front and rear axle in common pneumatically engageable and disengageable under load by rotary knob

Number of revolutions of front wheels for one revolution of rear wheels: 1,0000

Total ratios and speeds

Range		Gear	Total ratio engine : driving wheels 1)	Total ratio engine : driving wheels 2)	Nominal travelling speed at rated engine speed *) km/h 1)	Nominal travelling speed at rated engine speed *) km/h 2)
I	L	1	202,722	166,114	2,88	3,51
		2	120,132	98,438	4,86	5,93
		3	74,138	60,751	7,87	9,61
		4	45,013	36,884	12,96	15,82
	H	1	161,672	132,476	3,61	4,41
		2	95,806	78,504	6,09	7,43
		3	59,126	48,448	9,87	12,05
		4	35,898	29,415	16,26	19,84
II	L	1	81,593	66,858	7,15	8,73
		2	48,351	39,620	12,07	14,73
		3	29,840	24,451	19,56	23,87
		4	18,117	14,845	32,21	-
	H	1	65,074	53,320	8,97	10,94
		2	38,560	31,597	15,13	18,47
		3	23,797	19,500	24,52	29,93
		4	14,448	11,839	40,39	-
R	L	1	156,386	128,145	3,73	4,55
		2	92,673	75,938	6,30	7,69
		3	57,193	46,864	10,20	12,45
		4	34,724	28,453	16,81	20,51
	H	1	124,718	102,196	4,68	5,71
		2	73,907	60,561	7,90	9,64
		3	45,611	37,375	12,79	15,61
		4	27,693	22,692	21,07	25,72

*) calculated with the radius index 645 mm

1) tested variant with axle transmission ratio 18,117 (40 km/h), variant with engine-speed limitation to 32 km/h on request available

2) standard variant with axle transmission 14,845 (30 km/h, 4th gear locked when using range II)

Gear lubrication: Oil-sump lubrication, oil cooler, strainer in suction line before oil pump

Power take-off

Main p.t.o.: Independent, driven by second disc of dual clutch;
1 p.t.o. shaft at rear of tractor;
35 mm dia, 6 splines, in conformity with ISO 500/1979 type 1 (standard)
optionally available:
35 mm dia, 21 splines, ISO 500/1979 type 2
45 mm dia, 20 splines, ISO 500/1979 type 3
45 mm dia, 6 splines
height above ground 630 mm
distance from tractor's median plane, to the left 25 mm
distance behind rear wheel centre 448 mm

direction of rotation clockwise (viewed facing tractor's rear)
2 speeds are preselectable by hand lever

p.t.o.	p.t.o. speed rev/min	engine speed rev/min	ratio of rotation speeds (engine speed/p.t.o. speed)	power restriction kW
540	540	2165	4,0093	type 1 33 type 2 50
	599	2400		
1000	1000	2196	2,1962	-
	1093	2400		

Secondary p.t.o.: Front p.t.o., 1 shaft at front of tractor;
drive, available profiles, speeds and sense of rotation as main p.t.o.
height above ground 1160 mm
distance from tractor's median plane, to the left 205 mm
distance to front wheel centre 900 mm

Both p.t.o. shafts may be shifted to simultaneous or separate operation by selection lever

Power lift	MERCEDES BENZ/BOSCH hydraulic power lift, disintegrated construction
Hydraulic system:	Open centre system, relief valve pressure setting 18+1,0 MPa; ECKERLE internal gear pump IPF-3-16644, directly V-belt driven by engine, delivery 51 l/min at rated engine speed; oil filter in return line; separate oil tank under front end of chassis, 30 dm³ capacity
Power lift at rear:	Hydraulic power lift with mechanical control MHR (optionally available with electronic-hydraulic control); BOSCH control unit SR60, draft and position control, both infinitely mixable, floating position, lower link sensing, lowering throttle; remote control of power lift at tractor's rear on request (fitted); 2 single acting WEBER cylinders, 175 mm stroke and 80 mm dia, no cylinder safety valves; transport lock: lowering throttle, control lever fixable
Power lift at front:	Optional, installed to tested tractor only for power lift measurements and ballasting; connected to double acting additional control valve by hydraulic couplings; 2 double acting WEBER cylinders, 190 mm stroke and 63 mm dia, piston rod 25 mm dia, directly acting on laterally stabilized lower links; transport lock: stop cock in pressure line; no cylinder safety valves
Remote circuit:	3 double acting additional BOSCH control valves SRZ 60, with 3 pairs of tapping points each at front and at rear; 1 additional return line coupling each at front and at rear; up to 15 dm³ oil may be taken off if tractor is working stationary as well as travelling, 20 dm³ if tractor is standing horizontally

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MB-TRAC 1100

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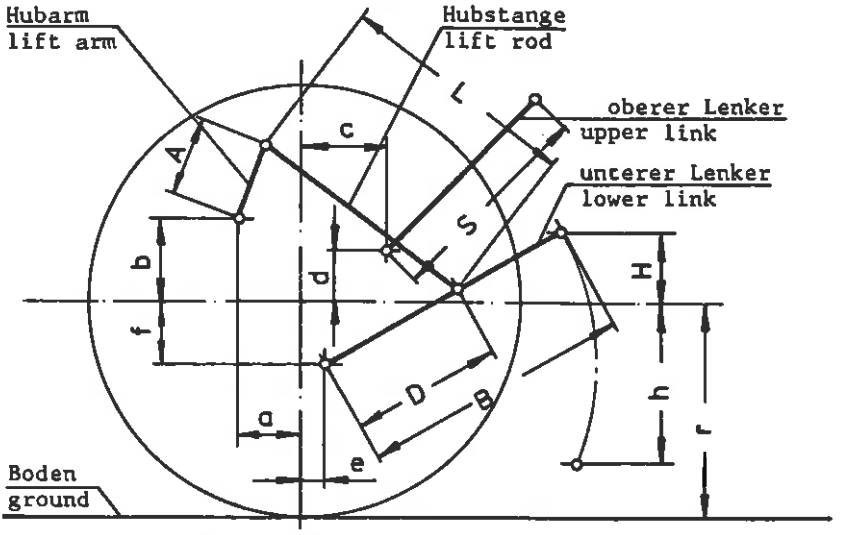
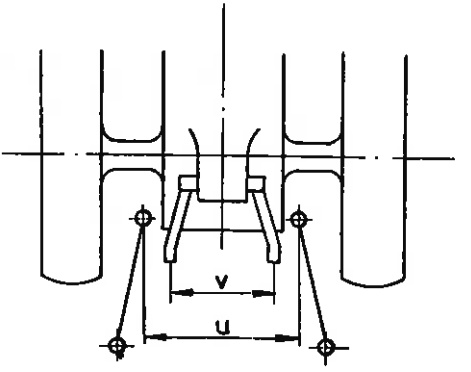
Implement linkage at rear:

Three-point linkage with WALTERSCHEID quick-couplers;
coupler points category 2 acc. to ISO 730/I-1977 resp. DIN 9674





Dimensions of rear linkage geometry when connected to the standard frame (projected lengths in mm, underlined values are valid for power lift measurements p. 25)

Rear and front tyres	radius index	(r)	645
Length of lift arms		(A)	378
Length of lower links		(B)	960
Distance of lift arm pivot points from rear wheel centre	horizontal	(a)	-222
	vertical	(b)	529
Horizontal distance between the 2 lower link pivot points		(u)	480
Horizontal distance between the 2 lift arm end points		(v)	615
Length of upper link		(S)	645 to 865, <u>764</u>
Distance of upper link pivot point from rear wheel centre	horizontal	(c)	423
	vertical	(d)	<u>376</u>, 434
Distance of lower link pivot point from rear wheel centre	horizontal	(e)	219
	vertical	(f)	121
Distance of lower link pivot points to lift rod pivot points on lower links		(D)	<u>562</u>, 625
Length of lift rods		(L)	590 to 760, <u>712</u>

Height of lower link hitch points relative to rear wheel centre line (situated 645 mm above ground), these data are valid for unloaded power lift:

Length of lift rods	(L)	<u>712</u>	590		760	
Linkage distance of lift rod	(D)	<u>562</u>	562	625	562	625
Lowest position	(h)	445	255	170	575	485
Highest position	(H)	212	375	360	125	130
Transport position	(H')	212	375	360	125	130

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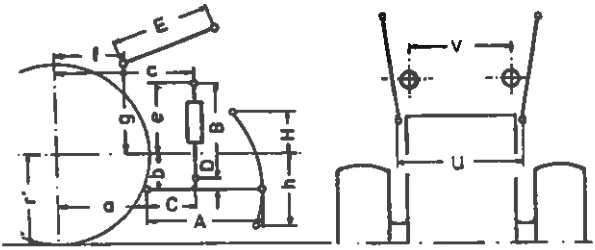
Implement linkage
at front: Three-point linkage, coupler points category 2 acc. to ISO 730/I-1977 resp. DIN 9674

Dimensions of front linkage geometry (projected lengths in mm, underlined values are valid for power lift measurements p. 24)



Rear and front tyres	radius index	(r)	645
Length of lower links		(A)	880
Length of cylinders		(B)	415 to 609
Distance of lower link pivot point to fixing point of cylinder		(C)	250
Distance of cylinder's fixing point to lower link		(D)	50
Length of upper link		(E)	645 to 865, <u>662</u>

Distance of front wheel centre to:	horizontal		vertical	
pivot point of lower link	(a)	862	(b)	40
pivot point of cylinders	(c)	890	(e)	510
pivot point of upper link	(f)	1080	(g)	450

Horizontal distance between the 2 lower link pivot points	(u)	770
Horizontal distance between the 2 cylinder pivot points	(v)	770

Height of lower link hitch points relative to front wheel centre line (situated 645 mm above ground), these data are valid for unloaded power lift)

lowest position	(h)	255
highest position	(H)	385
transport position	(H')	385

Pull attachment

Swinging drawbar:	Optional, not fitted on tractor tested; in accordance with manufacturer:	
	hitch point	
	above ground	448 mm
	behind rear wheel centre	787 mm
	distance to p.t.o. shaft end	
	vertical	182 mm
	horizontal	339 mm
	lateral adjustment to both sides	110 mm
	pivot point behind rear wheel centre	57 mm
	diameter of drawbar pin hole	31 mm
	maximum vertical permissible load not specified	
Trailer hitch:	ROCKINGER, model 248 B type B; remote control, automatical, height adjustable;	
	hitch point	
	above ground	810, 868, 926 or 984 mm
	behind rear wheel centre	576 mm
	distance to p.t.o. shaft end	
	vertical	180, 238, 296 or 354 mm
	horizontal	128 mm
	diameter of hitch pin	30 mm
	maximum vertical permissible load	1500 kg
	optionally available	
	ROCKINGER 279 B, automatical or	
	ROCKINGER 278 B, non-automatical or	
	ROCKINGER 248 BA, automatical, without remote control	
Holed drawbar:	Short bar, length between joint balls	830 mm
	number of holes	9
	distance between holes	80 mm
	hole diameter	33 mm
	thickness/width of the drawbar	25/80 mm
	height above ground (determined without load) minimum	70 mm
	maximum	1020 mm
	horizontal distance to p.t.o. shaft end (with horizontal lower links)	731 mm
Towing hitch:	At front of tractor, height above ground	850 mm

Steering	ZF, hydrostatic, model SERVOSTAT 8494; ZF-vane pump, delivery 19 l/min, V-belt driven by engine, separate oil circuit with 3,2 dm³ capacity, replaceable filter 2 double acting WEBER differential rams, 260 mm stroke, 55 mm dia, piston rod 25 mm dia, directly operating on steering levers, working pressure 12 MPa
Brakes	
Service brake:	MERCEDES-BENZ; pedal operated, single circuit, power assisted brake (assisted by compressed air), hydraulic transmission; dual circuit brake optional; per wheel 1 brake disc each with 421 mm dia, at front 2 brake calipers each, at rear 1 brake caliper each
Trailer brake:	Optional, fitted on tested tractor; combined single/dual line typ, compressed air controlled; MERCEDES-BENZ single-cylinder air compressor, directly driven by engine (standard), optionally additional WABCO air compressor, V-belt driven by engine; 2 air reservoirs with 26 dm³ and 9,5 dm³ volume, working pressure 810+20 kPa; for certain countries hydraulic brake, oil pressure supplied by hydraulic system
Parking brake:	Spring-loaded brake, pneumatically operated by hand valve, acting on rear brake discs of service brake
Steering brake:	None
Wheels	
Steering wheels:	At front, 2 pneumatics
Driving wheels:	At front and at rear
Wheelbase:	2600 mm
Track width adjustment:	None, track width at front and at rear 1650 mm (not adjustable) adjustable-gauge bowl wheels for track widths 1658, 1802 and 2002 mm optional

Rims: At front and at rear DW 14x26

Available tyres:

Tyre sizes at front	Tyre sizes at rear
14.5-24 MPT 16 ply *)	450/ R 24 149 G
16/70-24 MPT 14 ply	16.9-26 10 ply *)
16.9-24 8 ply *)	16.9-26 135 A8 *)
16.9 R 24 134 A8	500/60-26.5 12 ply
17.5 LR 24 139 A8	500/60-26.5 14 ply
	14.9 R 28 128 A8
19.5 LR 24 146 A8	9.5-36 10 ply

*) as radial ply tyres available, too

Protective structure

MERCEDES-BENZ, model 441.82;
safety cab, OECD-tested
approval-no. CSD 0568/7-a(C)

welded steel sheet structure, antivibration mounted by 3 silent blocks on chassis, tiltable to the rear;

1 door and 2 (optional 3) steps on each side, roof hatch;
steps 630 and 980 mm, driver's platform 1305 mm above ground; roof hatch tiltable, rear window divided, both parts shiftable, drop windows in the doors, optional tiltable rear window and windscreen;
combined heating/ventilation system with 2 step-blower and cooling water heat exchanger incorporated below instrument panel, air intake in front of windscreen paper element filter above engine bonnet;
on request (fitted on tested tractor): Additional ventilation system with 3-step-blower, incorporated in roof, 6 outlet jets above windscreen;
air intake by 1 paper element filter each on the left and right side along the roof;
on request available: Air conditioner (incorporated in roof)

noise reduction materials:

floor inside	laminated floor mat (plastic foil, rubber, foam and film foil)	18,5 mm
bottom side	PVC-damping material (density 9,8 kg/dm³)	4,0 mm
doors, rear wall and side walls	foil coated cardboard	2,5 mm
roof front part	adhesive damping foil	3,5 mm
other part and roof hatch	foam on cardboard with fabric coating (density 30 kg/m³)	30,0 mm
bulk head side facing to engine	PVC-damping material (density 9,8 kg/dm³)	4,0 mm
instrument panel	synthetics PPO (NORYL)	

Driver's seat

ISRINGHAUSEN, model ISRI 6500/516 (on request, fitted on tested tractor), upholstered seat with back rest and arm rests, pneumatic suspension with hydraulic shock absorber, additional horizontal suspension, lockable; automatically acting weight adjustment; range of adjustment:
longitudinal 150 mm
vertical front and rear end in 6 steps each from 420 to 480 mm
standard type: ISRI 6000/516 with mechanical suspension;

Passenger's seat

On the left of driver's seat; upholstered with back rest, folding seat, not suspended, not adjustable

Implement mounting area

Behind cab, above rear axle;
width between mudguards 970 mm
length of bottom plate 1050 mm

Lighting

Electrical, 12 Volt, as per German legislation

	Height above ground of centre mm	Size mm	Distance from outside edge to median plane of tractor mm
Headlights	960	130x120	595
Auxiliary lights	2740	130x120	590
Side lights	1550	60x30	983
Rear lights	1350	60x70	843
Reflectors 1st pair 2nd pair	 1000 700	 75 dia 75 dia	 850 583

Speed-hour meter

Digital travelling speed and distance display, analog engine and p.t.o. speed display;
electronic running-time meter, reference engine speed for 1 really counted hour 1600 rev/min

TEST CONDITIONS

Overall dimenions

Length:	4990 mm	without ballast	5730 mm	with ballast
Width:	2180 mm		2180 mm	
Height:	2860 mm	to top of cab roof,	2830 mm	to upper edge of exhaust pipe mouth
Ground clearance:	455 mm	below lower link pivot points		

Tyres and track widths specifications

Tyres:	Front and rear wheels
dimensions	16.9 R 26
type	PIRELLI TM 200 radial ply tyres
load index	135
speed index	A 8
maximum load	21,8 kN
inflation pressure	160 kPa
radius index	645 mm

Chosen track width: 1650 mm, not adjustable

Tractor mass

		without driver kg	with driver kg
Without ballast: Mass	front	2660	2700
	rear	1885	1935
	total	4545	4635

Front ballast:
- 1 weight 500 kg
- 1 front power lift 80 kg
- water in front tyres 150 kg

Rear ballast:
- weights on implement mounting area 2065 kg
- water in rear tyres 70 kg

With ballast: Mass	front	3960	4000
	rear	3450	3500
	total	7410	7500

Technically permissible axle loads: at front 4000 kg
at rear 4300 kg

Technically permissible total weight: 7500 kg

Oils and lubrication

Capacity and change interval:

	Capacity dm³	Oil change h *)	Filter change h *)
Engine	12	300	300
Gear box	8,5	1200	-
Front axle	4,5	1200	-
Rear axle	4,5	1200	-
Final drives front	0,8 +)	1200	-
Final drives rear	0,8 +)	1200	-
Hydraulic system	33	1800	1800
Steering	3,2	2400	2400

*) operating hours

+) on the left and right each

Specifications:

	Recommended	Used during test
Engine oil:		SCHLEIFENBAUM
Type	engine oil	PENAXOLINE DBU
viscosity	SAE	
winter	10W, 20W/20, 2oW/30 or 15W/40	SAE 10W
summer	30 or 15W/40	
tropics	40	
classification	API-CC or MIL-L-46152	API-CC
Transmission oils:		
Gear box and group gears		
type	gear oil	ESSO GP-D80
viscosity	SAE 80 or 80W/85	SAE 80
classification	API-GL-4 or MIL-L-2105	API-GL-4
Front axle and rear axle		
type	gear oil	ESSO HYPOID GX-D90
viscosity	SAE 90 or 85W/90	SAE 90
classification	API-GL-5 MIL-L-2105 B	API-GL-5
Final drives at front and final drives at rear		
type	gear oil	ESSO HYPOID GX-D90
viscosity	SAE 90 or 85W/90	SAE 90
classification	API-GL-5 or MIL-L-2105 B	API-GL-5
Power lift and steering		SCHLEIFENBAUM
type	engine oil	PENAXOLINE DBU
viscosity	SAE 10W	SAE 10W
classification	API-CC	API-CC

Grease: multi purpose grease
number of lubrication points: 22

Fuel

type: ARAL Diesel-fuel in conformity with DIN 51601
density: At 15°C at engine performance test 0,832 g/cm^3
at p.t.o. performance test 0,838 g/cm^3
at drawbar power test 0,829 g/cm^3

REPAIRS None

REMARKS None

PRÜFUNGS-ABTEILUNG
MB-TRAC 1100

Test No.87-192

COMPULSORY TESTS

1. MAIN POWER TAKE OFF PERFORMANCE (1000 rev/min)

Date of tests: 12th October 1987
Location of tests: DLG-Testing Station Groß-Umstadt
Type of dynamometer: SCHENCK hydraulic dynamometer U1-40

Power kW	speed engine rev/min	speed p.t.o. rev/min	fuel consumption hourly l/h	fuel consumption hourly kg/h	fuel consumption specific g/kWh	specific energy kWh/l
Maximum power						
1.1 At 2-hour test						
77,3	2350	1070	23,29	19,52	252	3,32
1.2 At rated speed						
76,4	2400	1093	23,15	19,40	254	3,30
1.3 At standard p.t.o. speed						
75,5	2196	1000	21,96	18,40	244	3,44
1.4 Part loads, the governor hand lever in the position corresponding to maximum power at full load (curve a)						
1.4.1 the torque corresponding to maximum power at rated speed						
76,4	2400	1093	23,15	19,40	254	3,30
1.4.2 85% of the torque obtained in 1.4.1						
65,2	2411	1098	20,00	16,76	257	3,26
1.4.3 75% of the torque defined in 1.4.2						
49,4	2434	1108	16,13	13,51	274	3,06
1.4.4 50% of the torque defined in 1.4.2						
33,3	2459	1120	12,62	10,58	318	2,64
1.4.5 25% of the torque defined in 1.4.2						
16,8	2492	1135	9,45	7,92	470	1,78
1.4.6 unloaded						
-	2529	1152	6,08	5,10	-	-

PRÜFUNGS-ABTEILUNG

MB-TRAC 1100 Test No. 87-192

Power kW	speed engine rev/min	speed p.t.o. rev/min	fuel consumption hourly l/h	fuel consumption hourly kg/h	fuel consumption specific g/kWh	specific energy kWh/l
1.5 Part loads, the governor hand lever in the position corresponding to the standard p.t.o. speed at full load (curve b)						
1.5.1 the torque corresponding to maximum power						
75,5	2196	1000	21,96	18,40	244	3,44
1.5.2 85% of the torque obtained in 1.5.1						
64,6	2212	1007	19,04	15,96	247	3,39
1.5.3 75% of the torque defined in 1.5.2						
49,0	2237	1018	15,23	12,77	261	3,22
1.5.4 50% of the torque defined in 1.5.2						
33,2	2276	1036	11,80	9,88	297	2,82
1.5.5 25% of the torque defined in 1.5.2						
16,9	2311	1052	8,51	7,13	423	1,98
1.5.6 unloaded						
-	2330	1061	5,49	4,60	-	-

No load maximum engine speed: 2529 rev/m
Equivalent flywheel torque at rated engine speed: 304 Nm
Maximum equivalent flywheel torque: 367 Nm at 1502 rev/min of the engine
Equivalent flywheel torque at max. power (2-hour test): 314 Nm

Mean atmospheric conditions

temperature	20 °C
pressure	99 kPa
rel. humidity	40 %

Maximum temperatures

coolant	85 °C
oil	105 °C
fuel	21 °C
air intake	21 °C

PRÜFUNGS-ABTEILUNG
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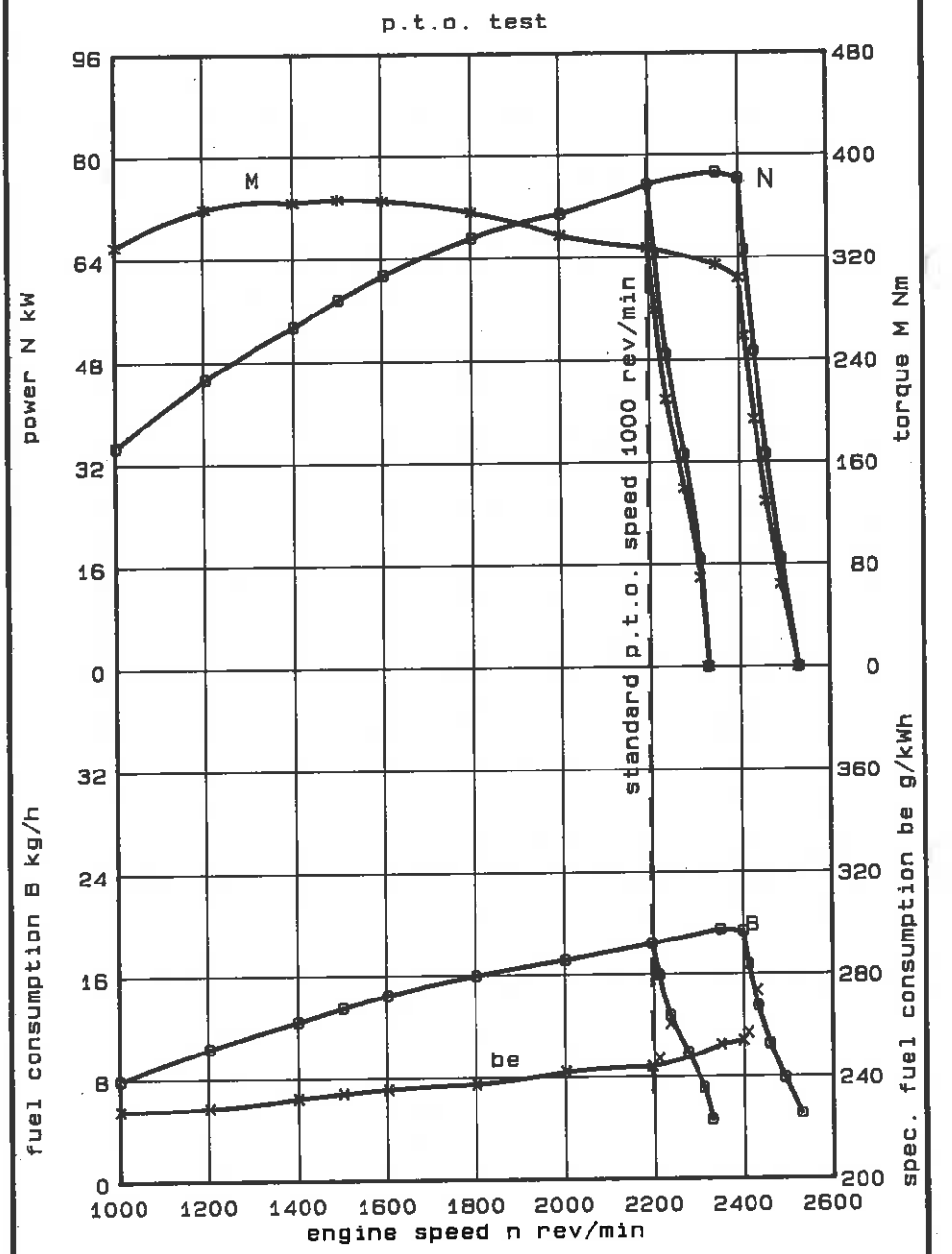
Test-No.87-192



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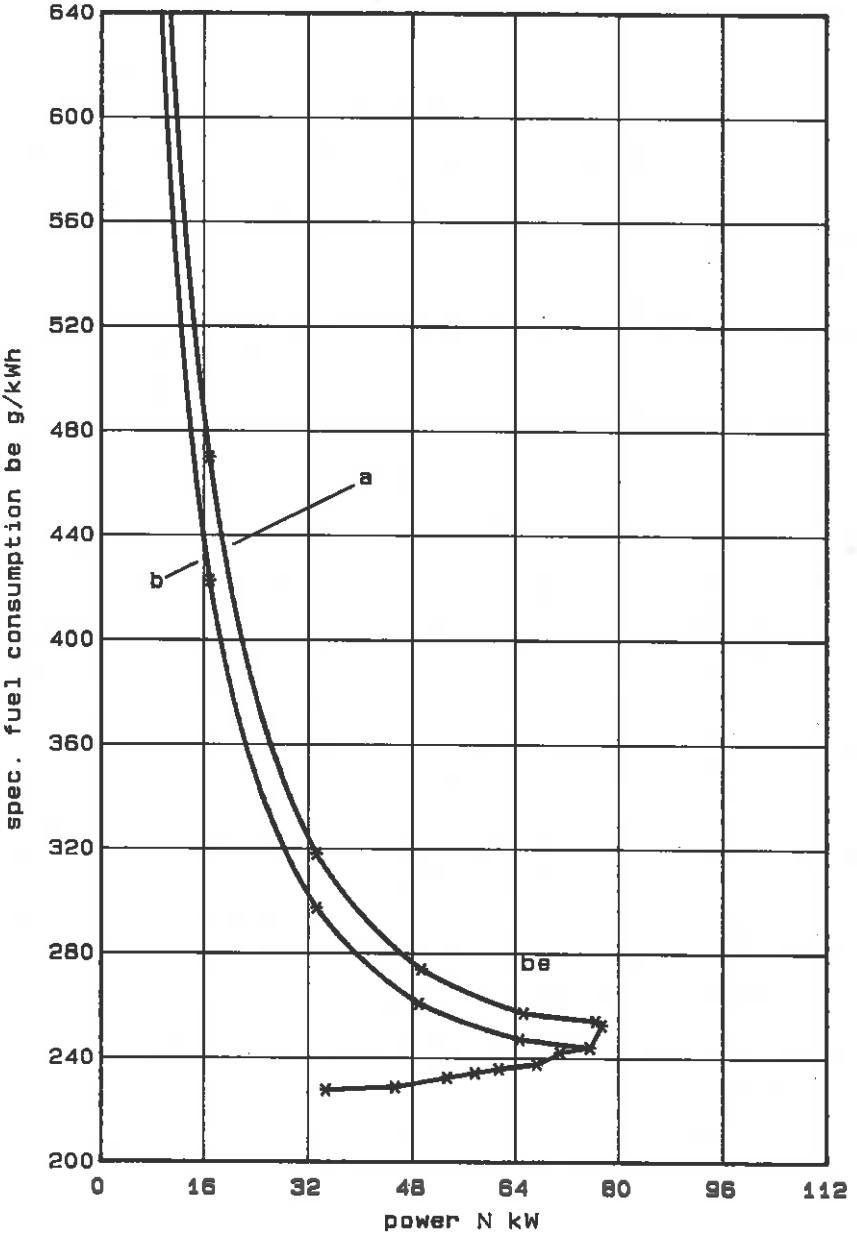
p.t.o. test



(2) HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 2nd November and 16th December 1987

(2.1) Hydraulic power test

Sustained pressure with relief valve open 18,5 MPa
Pump delivery rate at minimum pressure 55,2 l/min

	Hydraulic power kW	Flow rate l/min	Pressure MPa	Oil temperature °C
at 90% of the actual relief valve setting	10,6	38,2	16,7	65
maximum	13,0	50,9	15,3	65

Tapping point used for test: At rear of tractor

(2.2) Lifting force at front power lift (spring suspension at front axle locked)

linkage dimensions see page 12

	Height of lower hitch points above ground in down position mm	Vertical movement mm	Max.force exerted through full range kN	Corresp. pressure of hydraul. fluid MPa	Moment about front axle kNm	Max.tilt angle of mast from vertical degrees
At hitch points	390	615	21,30	15,3	-	-
On the frame	390	660	18,20	15,3	49,2	6

Temperature of hydraulic fluid at start of test 65°C

Lifting heights relative to horizontal lower links

mm	-215	-200	-100	0	+100	+200	+300	+400	+445
Lifting forces at hitch points									
kN	21,3	21,3	21,7	22,1	22,7	23,1	23,9	23,7	
Lifting forces at test frame									
kN	22,1	22,1	21,9	21,5	21,0	20,6	20,0	18,8	18,2

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(2.3) Lifting force at rear power lift
linkage dimensions see pages 10 and 11

	Height of lower hitch points above ground in down position mm	Vertical movement mm	Max.force exerted through full range kN	Corresp. pressure of hydraul. fluid MPa	Moment about rear axle kNm	Max.tilt angle of mast from vertical degrees
At hitch points	200	600	32,7	15,3	-	-
On the frame	200	508	32,7	15,3	58,5	3,0

Temperature of hydraulic fluid at start of test 65°C

Lifting heights relative to horizontal lower links

mm	-324	-317	-300	-200	-100	0	+100	+191	+200	+276
Lifting forces at hitch points										
kN	32,7		33,1	34,0	34,8	35,6	36,0		36,4	36,4
Lifting forces at test frame										
kN		35,6	35,6	35,2	34,7	34,3	33,5	32,7		

(3) DRAWBAR PERFORMANCE

Date of tests: 12th till 14th January 1988
Type of track: Concrete

Gear	Driving speed km/h	Power kW	Drawbar pull kN	Engine speed rev/min	Slip of wheels %
(3.1) Maximum power in tested gears (unballasted tractor) Height of drawbar above ground 490 mm					
1 I H	2,97	39,2	47,57	2425	14,9
2 I L	3,99	52,7	47,56	2409	14,9
2 I H	5,16	61,2	42,70	2352	9,9
1 II L	6,28	64,3	36,84	2350	6,2
3 I L	7,01	64,2	32,99	2348	4,9
1 II H	8,10	63,8	28,34	2352	3,6
3 I H	8,96	64,1	25,75	2350	3,1
2 II L	11,02	64,6	21,09	2348	2,4
4 I L	11,89	64,2	19,45	2352	2,1
2 II H	13,95	62,2	16,06	2352	1,6
(3.2) Maximum power in tested gears (ballasted tractor) Height of drawbar above ground 495 mm					
1 I L	2,39	47,4	71,34	2420	14,9
1 I H	2,93	58,0	71,31	2376	15,0
2 I L	4,29	64,2	53,90	2350	6,4
2 I H	5,51	64,4	42,08	2354	4,1
1 II L	6,50	65,3	36,16	2348	3,1
3 I L	7,21	64,6	32,28	2348	2,7
1 II H	8,25	64,1	27,97	2348	2,2
3 I H	9,10	62,8	24,84	2350	1,9
2 II L	11,18	63,6	20,47	2354	1,5
(3.3.1) Five-hour-test at 75% of pull at maximum power in 1 II L gear					
1 II L	6,77	51,1	27,16	2420	2,1
(3.3.2) Five-hour-test at pull corresponding to 15% wheel slip in test (3.2)					
1 I L	2,36	46,8	71,42	2402	-

Total oil consumption during ten hours duration of tests (3.3.1) and (3.3.2) 32 g/h

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Tyre size front and rear: 16.9 R 26 135 A8

Specific fuel consumpt. g/kWh	Specific energy kWh/l	Temperatures Fuel °C	Coolant °C	Engine-oil °C	Atmospheric conditions Tempe-rature °C	Relative humidity %	Pressure mbar
tyre inflation pressure: 80 kPa at front, 100 kPa at rear							
360	2,30	16	83	92	8	71	1005
338	2,45	17	81	90	7	80	1005
318	2,61	17	82	90	7	79	1005
303	2,74	16	81	91	7	79	1005
304	2,73	15	82	90	7	87	1006
304	2,73	18	83	92	8	89	1006
305	2,72	19	81	94	8	79	1003
300	2,76	19	82	94	8	79	1003
305	2,72	19	81	92	8	82	1003
312	2,66	19	80	91	8	82	1003
tyre inflation pressure: 150 kPa at front and 120 kPa at rear							
345	2,40	14	82	92	4	59	996
333	2,49	15	80	89	3	84	997
302	2,74	16	81	91	3	84	996
302	2,74	15	81	92	3	86	997
299	2,78	15	81	92	3	87	997
301	2,75	15	81	90	3	86	997
303	2,73	16	82	91	4	86	997
309	2,68	16	81	91	4	88	997
306	2,71	17	81	91	4	86	997
315	2,64	19	81	94	4	98	998
-	-	21	81	95	8	79	998

Test (3.3.2) was carried out with additional ballast, the figures not quoted are therefore irrelevant

(4) TURNING AREA AND TURNING CIRCLE

Wheel equipment front and rear: 16.9 R 26

Track of wheels front and rear: 1650 mm

Front wheel drive disengaged

	left hand	right hand
Radius of turning area	6,30	6,37
Radius of turning circle	6,05	6,13

(5) POSITION OF CENTRE OF GRAVITY

Height above ground	1028 mm
Distance forward from rear axle centre	1517 mm
Distance from tractor's median plane, to the right	4 mm

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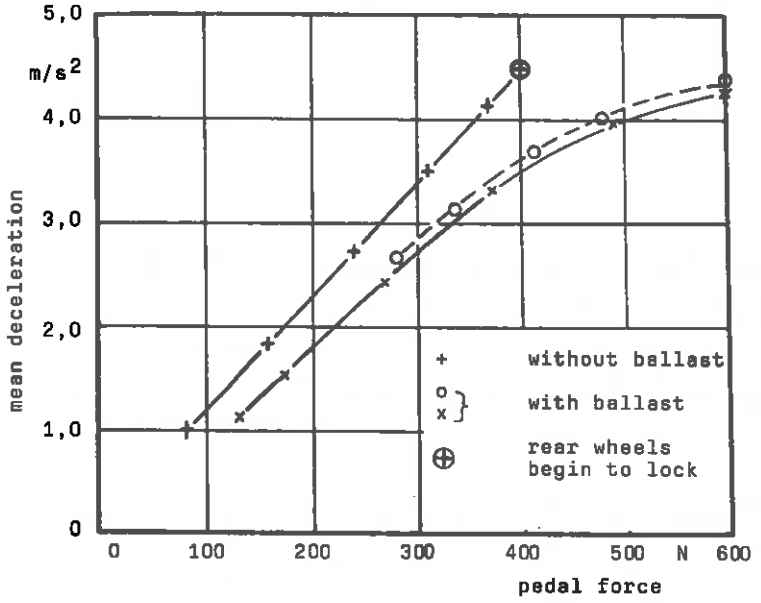
(6) BRAKING (Front wheel drive disengaged)

Date of test: 13th and 14th January 1988

	Tractor mass (with driver) front kg	rear kg	total kg	Speed before application of brakes km/h
Without ballast	2700	1935	4635	40,6
With ballast	4000	3500	7500	39,7

(6.1) Cold service braking device test ————

(6.2) Fade test ----------



No significant deviation of tractor from original course and no abnormal vibrations,

Brakes-heating: Actuating of brake for 1 km with pedal force corresponding to 1 m/s²

(6.3) Parking braking device test

		Ballasted tractor on 18% - slope
Braking device control force	kN	Parking brake pneumatically controlled by hand valve, tractor doesn't roll

(7) MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of test: 12th January 1988
Type of track: Concrete
Type of sound level meter: BRÜEL & KJAER model 2209

Results of test

Gear: 4 II H**)
Travelling speed before acceleration: 30,5 km/h
Sound level: 85,0 dB(A)

APPENDIX

MEASUREMENTS OF NOISE IN THE PROTECTIVE STRUCTURE

Results of OECD-Test No. CSD 0568/7-a(C)

Date of tests: 25th March 1987
Type of track: Concrete
Type of sound level meter: BRÜEL & KJAER model 2209

Gear	Drawbar pull kN	Travelling speed km/h	Sound level dB(A)	Noise rating N
1 II L *)	33,29	6,68	80,0	79,0
1 II L *)	light load	7,52	78,5	
4 II H**)	light load	41,14	79,0	

*) The 1 II L gear corresponds to the nominal travelling speed nearest to 7,5 km/h

**) Front wheel drive disengaged

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OPTIONAL TEST

8. ENGINE PERFORMANCE

Date of tests: 23rd September 1987
Location of tests: DLG-Testing-Station Groß-Umstadt
Type of dynamometer: SCHENCK eddy-current-dynamometer WM 400

Power kW	Engine speed rev/min	Fuel consumption hourly l/h	Fuel consumption hourly kg/h	Fuel consumption specific g/kWh	Specific energy kWh/l
Maximum power					
8.1 At 2-hour test					
82,6	2400	23,39	19,46	236	3,53
8.2 At rated engine speed					
82,6	2400	23,39	19,46	236	3,53
8.3 At standard p.t.o. speed (1000 rev/min)					
80,2	2196	21,99	18,29	228	3,65
8.4 Part loads					
8.4.1 the torque corresponding to maximum power at rated speed					
82,6	2400	23,39	19,46	236	3,53
8.4.2 85% of the torque obtained in 8.4.1					
71,6	2447	20,34	16,93	237	3,52
8.4.3 75% of the torque obtained in 8.4.2					
54,0	2462	16,07	13,37	248	3,36
8.4.4 50% of the torque obtained in 8.4.2					
36,4	2491	12,26	10,20	280	2,97
8.4.5 25% of the torque obtained in 8.4.2					
18,4	2524	8,85	7,36	399	2,09
8.4.6 unloaded					
-	2556	5,58	4,64	-	-

Optimum fuel consumption: 212 g/kWh at 35.3 kW and 1080 rev/min
No load maximum engine speed: 2555 rev/min
Torque at rated engine speed: 328 Nm
Maximum torque: 388 Nm at 1599 rev/min of the engine

Mean atmospheric conditions	temperature	23 °C
	pressure	99 kPa
	relative humidity	80 %
Maximum temperatures	coolant	85 °C
	oil	104 °C
	fuel	24 °C
	engine air intake	23 °C

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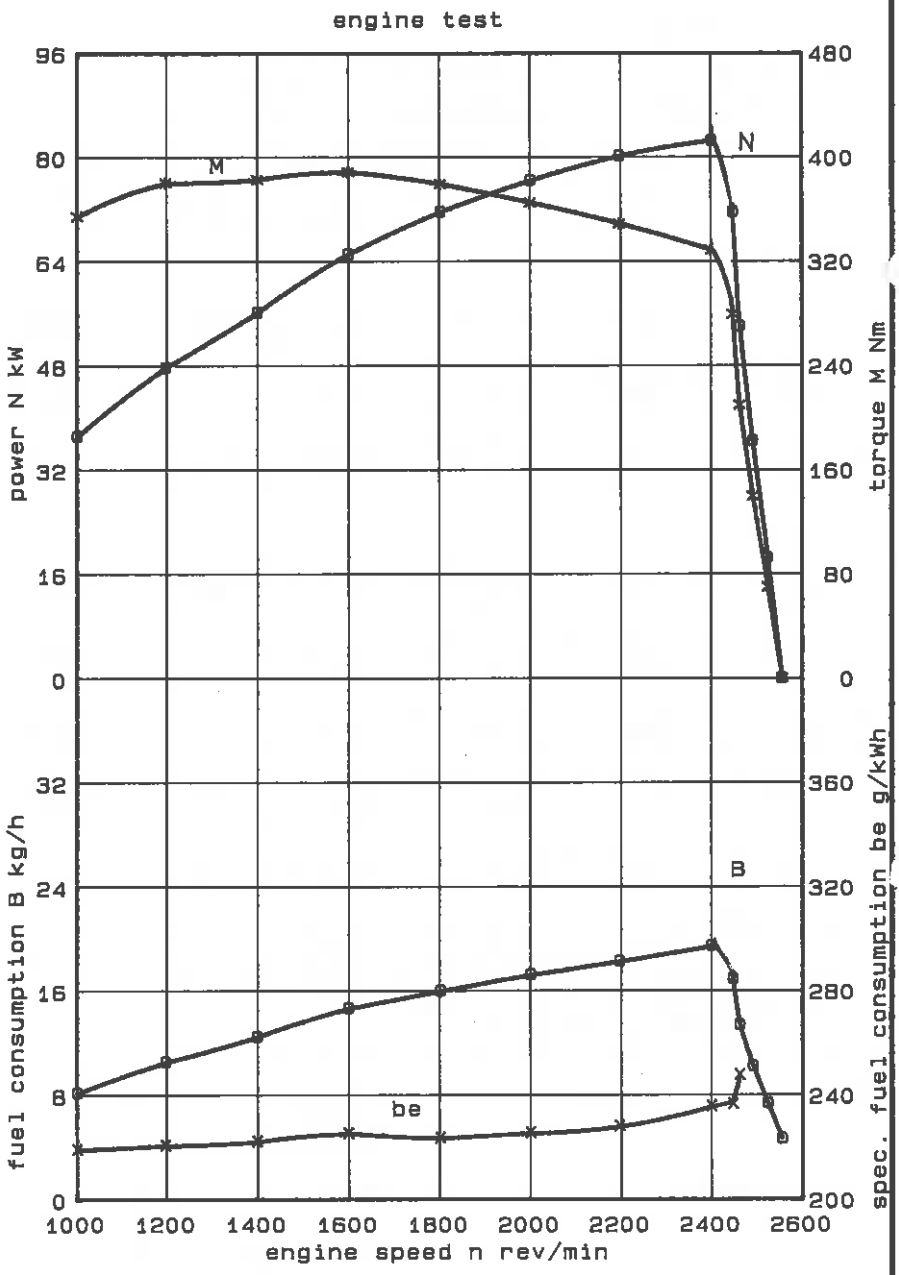

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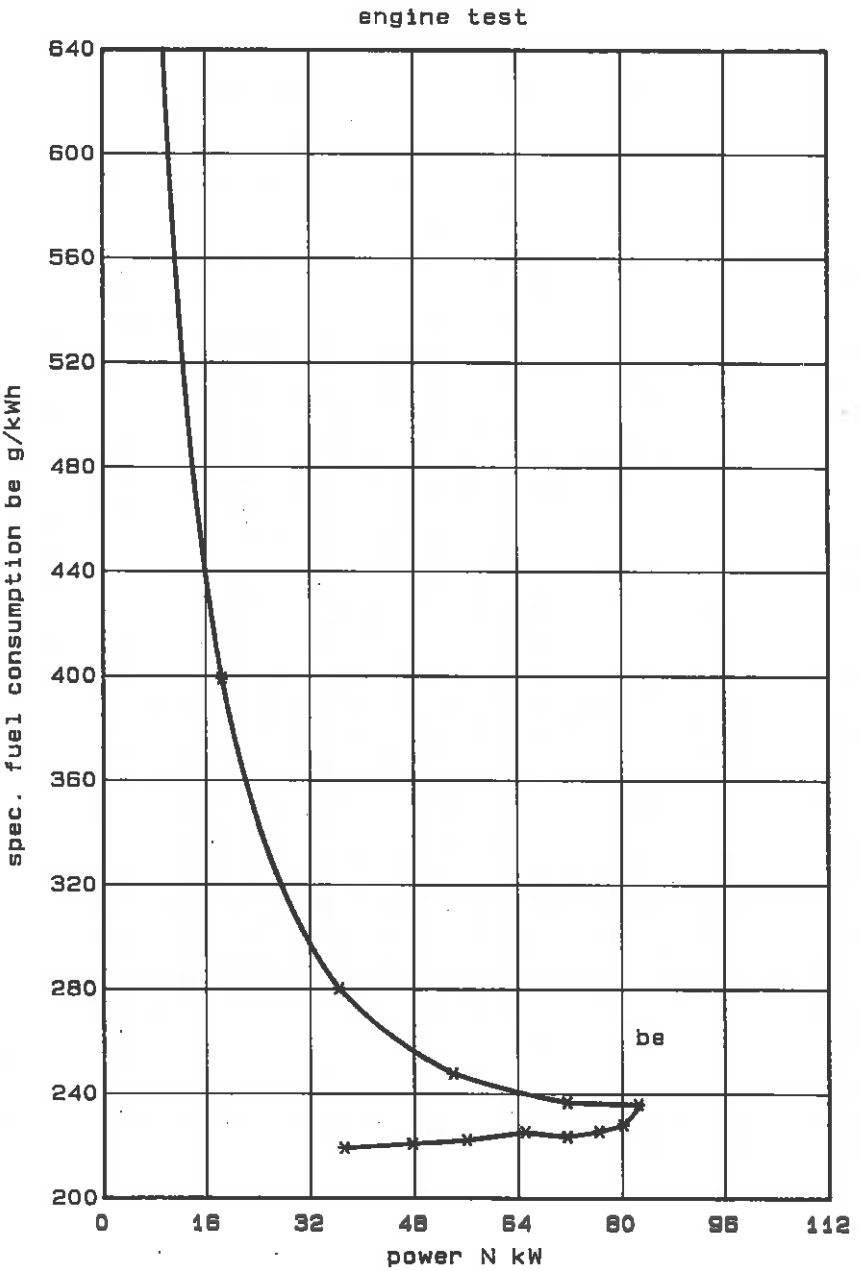

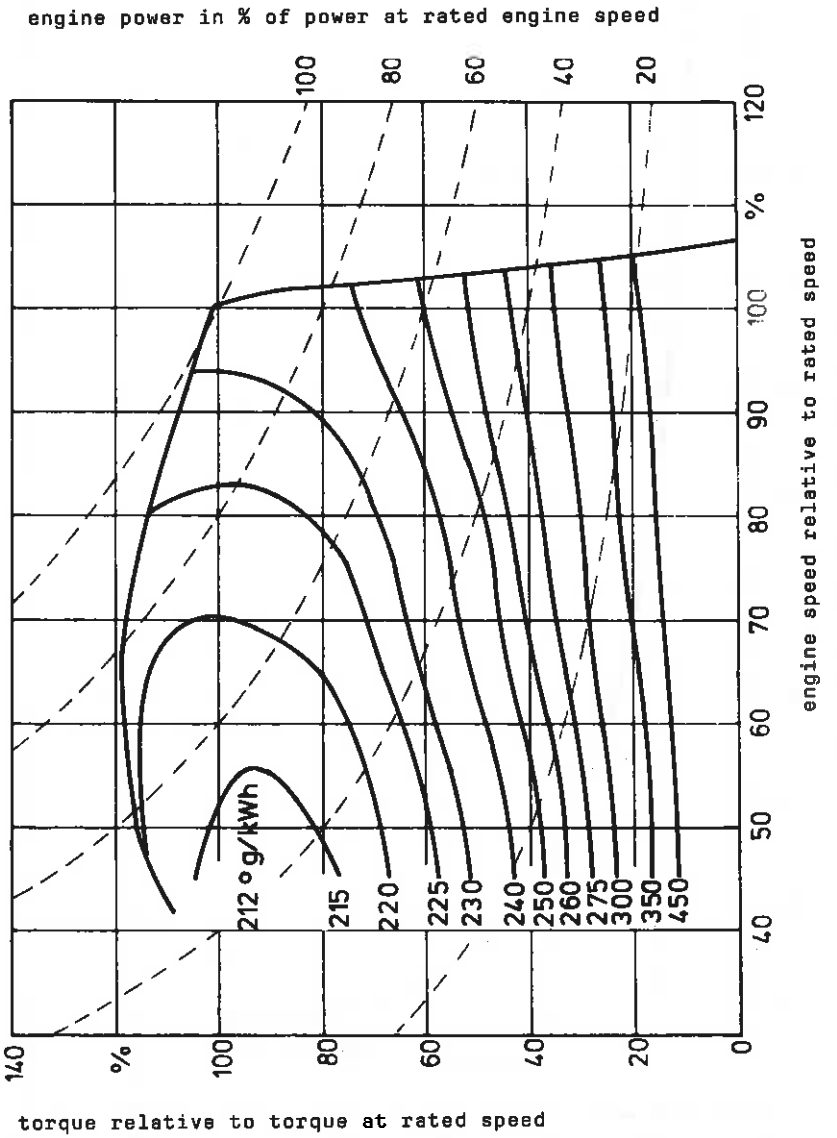
engine power in % of power at rated engine speed
100
80
60
40
20
120
%
100
90
80
70
60
50
40
engine speed relative to rated speed
212 g/kWh
215
220
225
230
240
250
260
275
300
350
450
140
%
100
80
60
40
20
0
torque relative to torque at rated speed

ADDITIONAL TESTS

under the responsibility of the DLG-Testing Station

(9) LIFTING FORCES at rear power lift with modified linkage setting

Date of tests: 17th December 1987

Length of lift rods	(L)	590 mm
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	625 mm
Distance of upper link pivot point from rear wheel centre, vertical	(d)	434 mm
Length of upper link	(S)	745 mm

see pages 10 and 11

	Height of lower hitch points above ground in down position mm	Vertical movement mm	Max.force exerted through full range kN	Corresp. pressure of hydraul. fluid MPa	Moment about rear axle kNm	Max.tilt angle of mast from vertical degrees
At hitch points	475	455	42,2	15,3	-	-
On the frame	475	406	38,2	15,3	68,3	1,0

Temperature of hydraulic fluid at start of test 65°C

Lifting heights relative to horizontal lower links

mm	-49	0	+100	+200	+300	+357	+400	+406
Lifting forces at hitch points								
kN	44,9	44,6	43,8	43,4	42,9		42,3	42,2
Lifting forces at test frame								
kN	45,4	44,9	43,0	41,2	39,6	38,2		

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