

O.E.C.D. Report No.: 1499 Full Code

Bundesanstalt für Landtechnik

A-3250 Wieselburg, Austria

Dieseltractor STEYR 9020.35

40 km/h version

Trade name:

STEYR 970a (4WD)



Date of approval: 10.12.1993

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. Test Code

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Tractor manufacturer's name and address:	Steyr Landmaschinentechnik GmbH. A-4300 St. Valentin, Austria
Location of tractor assembly:	St. Valentin
Submitted for test by:	Manufacturer
Selected for test by:	Manufacturer by agreement with BLT Wieselburg
Place of running-in:	St. Valentin
Duration of running-in:	100 hours
Location of test:	Wieselburg, Austria

SPECIFICATIONS OF TRACTOR

TRACTOR:

Make:	STEYR
Trade name:	STEYR 970 a
Type:	9020.35
Model:	40 km/h version
Number of driving wheels:	4
Serial no.:	9020.35 - 01795
1st serial no.:	9020.35 - 01001

ENGINE:

Make:	Steyr
Model:	WD 301.87
Type:	4 stroke diesel engine with direct injection and exhaust turbo supercharger
Serial no.:	301.87-0001

Cylinder:

Number/disposition:	3, vertical in line
Bore/stroke:	105/120 mm

Capacity:	3117 cm^3
Compression ratio:	16,0 : 1
Arrangement of valves:	Overhead valves
Cylinder liners:	Wet liners

Supercharging:

Make:	SCHWITZER or KKK
Model:	S 1 B - 007 resp. K 14 134 AC
Type:	Exhaust turbo supercharger
Pressure:	max. 114 kPa

Fuel system:

Fuel feed system:	Fuel feed pump integrated in injection pump
Make, model and type of fuel filter:	KNECHT filter 7394471 with water trap
Capacity of fuel tank:	63 l
Make, model and type of injection pump:	BOSCH in line injection pump BOSCH PES 3 A90D320/3RS 2658 or BOSCH PES 3 A90D320/3RS 2826
Serial no.:	0410 893 007
Manufacturer's production setting of injection pump, flow rate and timing:	76 $\pm^2$ mm^3/stroke at pump speed of 1050 rev/min and full load 20 before TDC
Make, model and type of injectors:	BOSCH DLLA 151 S 972 or BOSCH DLLA 151 SV 3141474
Injection pressure:	22,0 $^{+0,8}$ MPa (220 $^{+8}$ bar)

Governor:

Make:	BOSCH
Type:	Variable speed governor, mechanically acting, incorporated in injection pump
Governed range of engine speed:	From 700 to 2470 $^{-40}$ rev/min engine speed
Rated engine speed:	2300 rev/min

Air cleaner:

Location of air intake:	Inside the bonnet, above and in front of the radiator
Pre-cleaner:	Incorporated in main-cleaner
Main-cleaner:	
Make:	MANN & HUMMEL or KNECHT
Model:	MANN & HUMMEL 45 165 92 824 or KNECHT LVPO 6060 S/1
Type:	Piclon combined filter, dry type with integrated cyclonic pre-cleaner with automatic dust-drain valve and changeable paper filter insert and additional safety cartridge
Location of air intake:	Above the engine, inside the bonnet
Service intervals:	
Pre-cleaner:	Visual control, each 250 hours
Main-cleaner paper insert:	Cleaning interval: when control lamp indication is shown Changing interval: 1 year
Maintenance indication:	Electric lamp indication, -65 mbar for indication

Lubrication system:

Type of feed pump:	Forced oil circulation, by gear pump
Type of filter:	STEYR 409 07 0036
Type of oilcooler:	BEHR or MODINE

Cooling system:

Type of coolant:	Water-frost protection mixture down to -20°C
Type of pump:	Centrifugal pump belt driven
Specification of fan:	Puller, 1 driving belt
Number of fan blades:	4
Fan diameter:	460 mm
Coolant capacity:	13,5 l

Type of temperature control:	Thermostat control and electrical coolant thermometer
Superpressure system:	0,7 bar

Starting system:

Make:	BOSCH
Model:	JF-12 V 2,7 kW
Type:	Solenoid engaged screw push starter motor
Starter motor power rating:	2,7 kW
Cold starting aid:	Electrically, glow plug in inlet manifold
Safety device:	Electrically starting block system by engaged clutch

Electrical system:

Voltage:	12 V, negative earth
Generator:	Make: BOSCH Type: three phase type Power: 910 W/65 A - 14 V
Battery:	1 with 12 V/100 Ah lead acid type Rating: 100 Ah at 20 hours rating

Exhaust system:

Make:	EBERSPÄCHER
Model:	16.47.190.01.0.00
Type:	Absorption-reflexion type
Location:	364 mm left of the median plane of engine, 1716 mm above centre of crankshaft end of bended exhaust tube
Optional:	Absorption reflexion type with incorporated catalyst
Type:	16.47.790.30.0.00

TRANSMISSION TO WHEELS:

Clutch:

Make:	FICHTEL & SACHS
Model:	DUT 295/280
Type:	Dry double clutch with 2 plates
Number of plates:	2
Diameter of plates:	295/280 mm
Method of operation:	2 plates incorporated in the same clutch housing are operated independent for p.t.o. and gear box

Gear box:

Make:	STEYR
Model:	TW 337
Type:	Mechanically acting gear box
Model:	as tested (40 km/h) 2 forward and 1 reverse group (FORWARD FAST, FORWARD NORMAL, REVERSE) combined with 4 speed change gear and reduction gear (ROAD - FIELD) Total: 16 forward and 8 reverse speeds
Arrangement:	1 lever for group gear (S, L, R) 1 lever for the 4 speed gear (1 - 4) 1 lever for the reduction gear (ROAD, NEUTRAL, FIELD)
Available options:	Synchronized 4 speed change gear top speed 30 km/h Total: 16 forward and 8 reverse speeds Synchronized 4 speed change gear top speed 30 km/h with crawler group Total: 16 forward and 16 reverse speeds

Rear axle and final drives:

Make:	STEYR
Model:	337
Type:	Central axle, pinion and bevel gear, reduction by planetary gear in final drives
Differential lock:	Type: mechanically acting from half axle to differential housing Method of engagement: foot lever operated Method of disengagement: lockable and preselectable, selfdisengaging when not locked

Front axle and final drives:

Make:	SIGE
Model:	0.10.s
Type:	Steering and driving axle, central type, integrated steering cylinder Driving shaft, pinion and bevel gear differential, half shafts, universal joints, planetary gears in wheel hubs
Differential lock:	Without differential lock Optional: automatically locking differential (multi-plate-clutch-type)
Front wheel drive:	Mechanically engaged, multi-plate-clutch in oil bath, hand lever operated, direct central jointless driving shaft to front axle

Total ratios and travelling speeds:

Gear no.	Group	Number of engine revolutions for one revolution of driving wheels		Nominal travelling speed at rated engine speed to 2300 rev/min *) km/h	
-	-	field L	road S	field L	road S
1	forward	317,69	95,06	1,90	6,34
2	normal	181,86	54,42	3,31	11,07
3	L	111,24	33,29	5,42	18,10
4		71,63	21,43	8,41	28,11
1	forward	233,99	70,02	2,58	8,61
2	fast	133,95	40,08	4,50	15,04
3	S	81,94	24,52	7,35	24,58
4		52,76	15,79	11,42	38,17
1		317,69	95,06	1,90	6,34
2	reverse	181,86	54,42	3,31	11,07
3	R	111,24	33,29	5,42	18,10
4		71,63	21,43	8,41	28,11

*) Calculated with rear tyre dynamic radius index of 695 mm (ISO 4251/1 - 1984)
test tyre equipment: rear 16.9 R 30
front 14.9 LR 20

Number of revolutions of front wheels for one revolution of rear wheels: 1,408

POWER TAKE-OFF:

Main power take-off:

Type:	Independent and (optional) proportional to ground speed p.t.o.
Method of engagement:	Hand lever operated, mechanically engaged dry disc clutch, driven by the 2nd plate of main clutch
Number of shafts:	1
Method of changing power take-off shaft speeds:	Speed selection by hand lever and spur gears, no changing of shaft ends

Power take-off proportional to engine speed:

540 and 1000 rev/min

Location:	At rear of tractor
Diameter of power take-off shaft end:	34,9 mm
Number of splines:	6, in conformity with ISO R 500 - 1979, type I
Height above ground:	585 mm with tyre dynamic radius index of 695 mm
Distance from the median plane of the tractor:	0 mm
Distance behind rear wheel axis:	306 mm
P.t.o. speed at rated engine speed:	607 rev/min resp. 1080 rev/min
Engine speed at standard power take-off speeds:	2045 rev/min resp. 2130 rev/min
Ratio of rotation speeds (engine speed/ p.t.o.speed):	3,79 resp. 2,13
Power restriction and max. torque:	None
Direction of rotation (viewed from behind tractor):	Clockwise

Optional additional - 540E and 1000E rev/min:	
P.t.o. speed at rated engine speed:	776 rev/min resp. 1380 rev/min
Engine speed at economic standard p.t.o. speeds:	1600 rev/min resp. 1667 rev/min
Ratio of rotation speeds (engine speed/p.t.o. speed):	2,96 resp. 1,67
Middle p.t.o.:	**Optional, not on** tested tractor
Location:	On the left side of the gear box, 590 mm above ground, 651 mm before rear axle, 186,5 mm left of median plane of tractor
Dimension of p.t.o. shaft end:	35 mm, 6 splines, in conformity with ISO R 500 - 1979, type I
P.t.o. speed at rated engine speed:	1133 rev/min Optional additional: 1512 rev/min
Engine speed at standard p.t.o. speed:	2030 rev/min Optional: 1521 rev/min
Power restriction and max. torque:	None
Direction of rotation (viewed from behind of tractor):	Clockwise
Front p.t.o.:	Optional, not on tested tractor
Location:	In front of tractor, direction frontwards, 638 mm above ground, 425 mm before front axle, in median plane. Driven directly from the engine by a propellershaft, mechanical multi plate clutch and spur gear transmission. Shaft end is blocked when multi plate clutch is disengaged.
Dimension of p.t.o. shaft end:	ISO R 500 - 1979, type I (34,9 mm, 6 splines)
P.t.o. speed at rated engine speed:	1190 rev/min
Ratio of rotation speed:	1,933

Power restriction and max. torque: None

Direction of rotation (viewed from front of tractor): Anticlockwise

Power take-off proportional to ground speed: Optional

Speed of shaft:

Travelling distance for one revolution of p.t.o. shaft: 0,112 m (with tyre dynamic radius index of 695 mm)

Location: At rear of tractor, same shaft end as p.t.o. proportional to engine speed

Number of p.t.o. shaft revolutions for one revolution of rear wheels: 38,95 rev

Direction of rotation with forward gear engaged (viewed from behind tractor): Clockwise

Stationary mode (reduction gear in neutral position - tractor not driving): Number of p.t.o. shaft revolutions at 2300 rev/min rated engine speed

Normal model, 40 km/h:

Group gear	L	S	R
Gear no.: 1	282	383	282
2	493	669	493
3	805	1094	805
4	1251	1698	1251
Direction of rotation	clockwise	clockwise	anticlockwise
	viewed from behind tractor		

POWER LIFT:

In the rear:

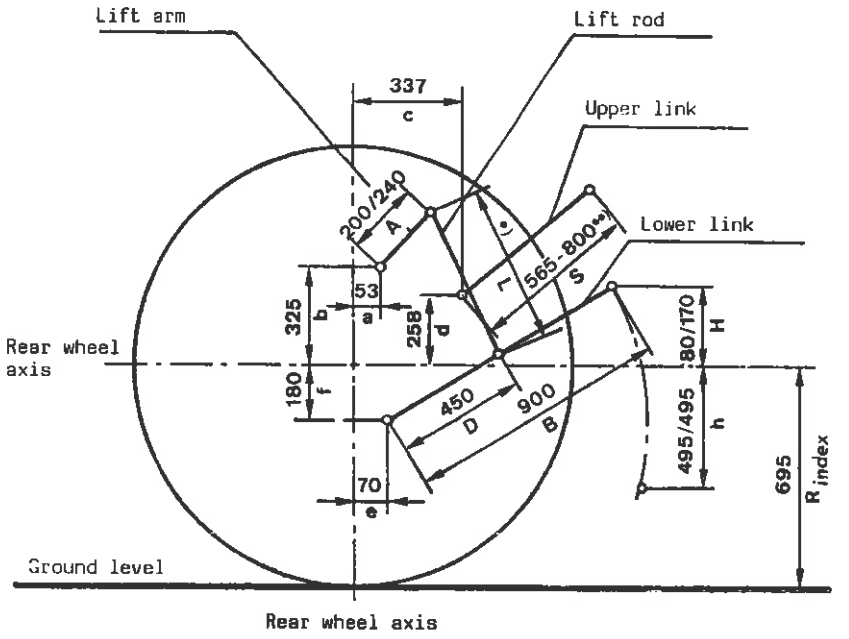
Make:	Own make
Type:	Draught control with two-stage pull, adjustment and upper link sensing, position control, floating position
Type of hydraulic system:	Open center type
Type and number of cylinder:	One single acting type 152 mm stroke, 85 mm diameter Optional: 1 additional single acting cylinder, 45 mm bore, 146 mm stroke
Type of linkage lock for transport:	Hydraulically by throttle valve
Relief valve pressure setting:	17,5 MPa (175 bar)
Opening pressure of cylinder safety valve:	24,0 MPa (240 bar)
Lift pump type:	Gear type pump
Transmission between pump and engine:	Pump directly driven by engine by gear transmission
Type and number of filter:	One filter cartridge in suction line, connected at the hydraulic housing
Site of oil reservoir:	Hydraulic housing
Type, number and location of tapping points:	Up to 8 tapping points (4 oil circuits for single or double acting cylinders), 285 mm behind rear axle, 515 - 687 mm above rear axle, max. 128 mm left or 122 mm right of median plane In accordance to ISO/DIS 5675 - 1979
Maximum volume of oil available to external cylinders:	6 l (optional 15 l)

In the front:

Make:	Own make
Type:	GR I
Type of hydraulic system:	Open center type, independent lower links with quick coupling ends cat. II fastened to a lifting frame
Type and number of cylinder:	2 single acting cylinder 152 mm stroke, 60/30 mm bore
Type of linkage lock for transport:	Hydraulically by non return valve

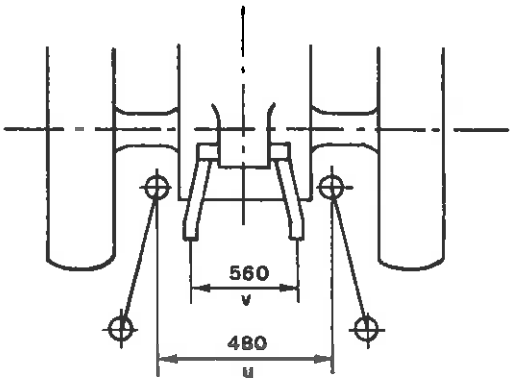
Three-point-linkage:

Category adapter: I/II; in conformity with ISO 730/1-1977



*) Left lift rod adjustable from 535 mm to 655 mm length by thread; right lift rod adjustable from 535 mm to 655 mm by thread.

**) Upper link length adjustable from 565 mm to 800 mm.



Dimensions of linkage geometry:

			Dimension of range mm	Settings used in test mm
Length of lift arms:		(A)	200/240	200/240
Length of lower links:		(B)	900	900
Distance of lift arm pivot points from rear wheel axis:	horizontally	(a)	53	53
	vertically	(b)	325	325
Horizontal distance between the lower link points:		(u)	480	480
Horizontal distance between the 2 lift arm end points:		(v)	560	560
Length of upper link:		(S)	565 - 800	660, 685
Distance of upper link pivot point from rear wheel axis:	horizontally	(c)	337	337
	vertically	(d)	258	258
Distance of lower link pivot point from rear wheel axis:	horizontally	(e)	70	70
	vertically	(f)	180	180

Height of lower link hitch points relative to the rear wheel axis (515 mm above ground)*):

	Min. lift rod length		During test		Max. lift rod length	
Length of lift arms (A) mm	200	240	200	240	200	240
Linkage distance of lift rod (D) mm	450					
Length of lift rods (L) mm	535		655	615	655	
Lowest position (h) mm	215	315	495	495	495	595
Highest position (H) mm	290	315	80	170	80	100

Height above ground of lower hitch points when locked in transport position*): Any height within lift range

*) With dynamic radius index 695 mm (ISO 4251/1 - 1984)

TRAILER HITCH:

Type:	295.93.0003, on tested tractor
Hole diameter:	32,0 mm
Height above ground:	(413)752/780 mm; (441)812/840 mm
Distance of hitch point from rear wheel axis, horizontally:	(367 mm) 447 mm
Distance of hitch point from power take-off shaft end, vertically:	(-172)167/195 mm; (-144)227/255 mm
horizontally:	(72 mm) 141 mm
Maximum vertical permissible load:	9,70 kN

or

	German	Italian
Type:	1	23
Hole diameter:	30,5 mm	28,5 mm
Height above ground:	856/808/760/712/664/616/563/490/442 mm	
Distance of hitch point from rear wheel axis horizontally:	515 mm	484 mm
Distance of hitch point from power take-off shaft end, vertically:	271/223/175/127/79/31/-22/-95/-143 mm	
horizontally:	220 mm	189 mm
Maximum vertical permissible load:	9,70 kN	9,70 kN

HOLED DRAWBAR:	Category I
Length:	825 mm
Number of holes (with central hole):	7
Distance between holes:	115 mm
Hole diameter:	33 mm

Thickness/width of the drawbar:	30/80 mm
Height above gound min.:	100 mm
max.:	1010 mm
Horizontal distance to power take-off shaft end (rear):	675 mm

STEERING:

Make:	Zahnradfabrik Friedrichshafen (ZF) or DANFOSS, Nordborg
Model:	ZF 8492 or DANFOSS OSPC 125 OR
Type:	Hydrostatic steering
Method of operation:	Steering wheel acting on front wheels
Pump:	35 l/min at rated engine speed
Rams:	Incorporated in front axle, acting piston area 20,6 cm², stroke 240 mm
Working pressure:	12,0 MPa (120 bar)

BRAKES:

Service brake:

Make:	Rear axle: SIRMAC Optional on front axle: KNOTT
Model:	Rear axle: 6 1/2" x 4 1/2" Optional on front axle: 3829
Type:	Rear axle: Multi disc brake in oil bath, 8 acting faces with 141,2 mm effective diameter each Optional on front axle: Calliper disc brake acting on front axle drive shaft piston area 12,56 cm²
Method of operation:	Pedal operated, mechanically transmission Optional: front axle brake with hydraulic transmission

Trailer braking take-off: Optional, hydraulic trailer brake or pressure air system
Storage pressure: 0,74 MPa (7,4 bar)
Storage volume: 20 l
Working pressure:
0,74 MPa (7,4 bar) two line system
0,56 MPa (5,6 bar) one line system

Parking brake:

Type: Mechanically acting on the same discs as service brake

Method of operation: Hand lever with ratchet, mechanically transmission acting on separate linkage with service brake

Steering assistance brake: Operated by divided pedal of service brake, pedals disconnectable by a flap

WHEELS:

Number: Front: 2, steering and driving function
Rear: 2, driving function

Wheelbase: 2229 mm

Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1556	1588	wheels turned around
Rear	-	1600	

PROTECTIVE STRUCTURE:

Make: Own make

Model: STEYR 125.02

Type: Cab

Manufacturer's name and address: Steyr Landmaschinen GmbH.,
A-4300 St. Valentin

Protective device: Welded and screwed profile steel tube construction

OECD-approval no.: CSD 1354/1

DRIVER'S SEAT:

Make:	KLEPP	KLEPP
Model:	Elastomat	Profi
Type:	1050 E	Star 3
Type of suspension:	2 parallel levers with a column-guiding and 2 tension springs	2 parallel levers with a column-guiding and air spring suspension with battery driven air compressor,
Type of damping:	Hydraulically damping	Hydraulically damping
Range of adjustment, longitudinal:	170 mm	200 mm
vertical:	60 mm	60 mm

MISCELLANEOUS:

Additional seat:	Own make
Location:	On left side of driver's seat
Number of places:	1

LIGHTING:

	*) Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Head lights	1150	140 x 75	220
Side lights	1475	90 x 40	675
Rear lights	1480	90 x 40	850
Brake lights			
Direction indicators front	1440	90 x 40	675
Direction indicators rear	1530	90 x 40	850
Reflectors	1425 695	92 x 48 80 Ø	850 455

*) Measured with tyre dynamic radius index at rear 695 mm and 495 mm at front (ISO 4251/1 - 1984)

TEST CONDITIONS

Overall dimensions:

	Length	Width *)	Height at top of	
			exhaust silencer **)	protective structure
	mm	mm	mm	
Ballasted	3965	1945	2375-2435	2425
Unballasted	3805	1945	2375-2435	2425

*) Measured on the outside edges of the rear wheels
**) Exhaust silencer adjustable

Ground clearance:
(unballasted tractor)

Clearance limiting part:
390 mm under the front axle
365 mm four wheel drive
375 mm under the trailer hitch mounting console (can be dismantled)

Tractor mass: With tanks full and cab

		Without driver	With driver
		kg	kg
Unballasted	Front	1260	1270
	Rear	1800	1865
	Total	3060	3135
Ballasted	Front	1685	1695
	Rear	2530	2595
	Total	4215	4290

Ballast:

	Number of weights	Mass total kg	Water kg
Front	9	340	-
Rear	2 x (2 + 1)	335	480
Optional	-	-	-

Tyres and track width specifications:

Tyres:

	Front	Rear
Dimensions	14.9 LR 20	16,9 R 30 AS
Ply rating	119 A 8	137 A8
Type	radial carcass	radial carcass
Max. load (tyre manufacturer's)	1360 kp resp. 2040 kp with 10 km/h speed limit	2300 kp resp. 3450 kp with 10 km/h speed limit
Max. load (tractor manufacturer's)	-	-
Inflation pressure (tyre manufacturer's)	2,5 bar	1,6 bar
Dynamic radius index	495 mm	695 mm
Chosen track width	1510 mm	1510 mm

Oil and lubrication:

Capacity and change interval:

	Capacity (dm^3)	Oil change (h)	Filter change (h)
Engine	7,0	250	250
Gear box and rear axle	31,0	1000	-
Front axle	4,5	1000	-
Rear axle	-	-	-
Final drive front	0,8 x 2	1000	-
Final drive rear	-	1000	-
Hydraulic system	15,0 [23,0]	1000	500
Steering	2,6	-	1000

Specifications:

	Recommended:	Used during test:
Engine oil:		
Type:	One range viscosity oil	
Viscosity:	SAE 30 summer SAE 20 W-20 winter	
Classification:	API CD/MIL-L-2104 CD	As recommended
Transmission oils:		
Type:	Transmission oil	
Viscosity:	SAE 80 W	
Classification:	API GL 4, MIL-L-2105	As recommended
Hydraulic fluid:	Hydraulic oil ISO VG 46/ ISO VG 68	
Steering oil:		
Type:	Hydraulic oil or automatic transmission oil	
Classification:	ATF Dexron II D	As recommended
Brake fluid:		
Type:	-	
Classification:	SAE J 170 3e FMVSS 116 DOT 3	
Grease:		
Type:	Lithium soap basis	
Classification:	NLGI 2 (multigrade grease)	
Number of lubrication points:	16	
Fuel:		
Type:	ELAN diesel fuel In conformity with national standard according to DIN 51601	
Density at 15°C:	0,840 g/cm³	

TEST RESULTS

COMPULSORY TEST:

Main power take-off performance:
Date and location of tests: 23.2.1993, Wieselburg, Austria
Type of dynamometer: SCHENCK eddy-current brake W 780

Main test on: ISO R 500 - 1979, type I (DIN 9611) - 1000 rev/min

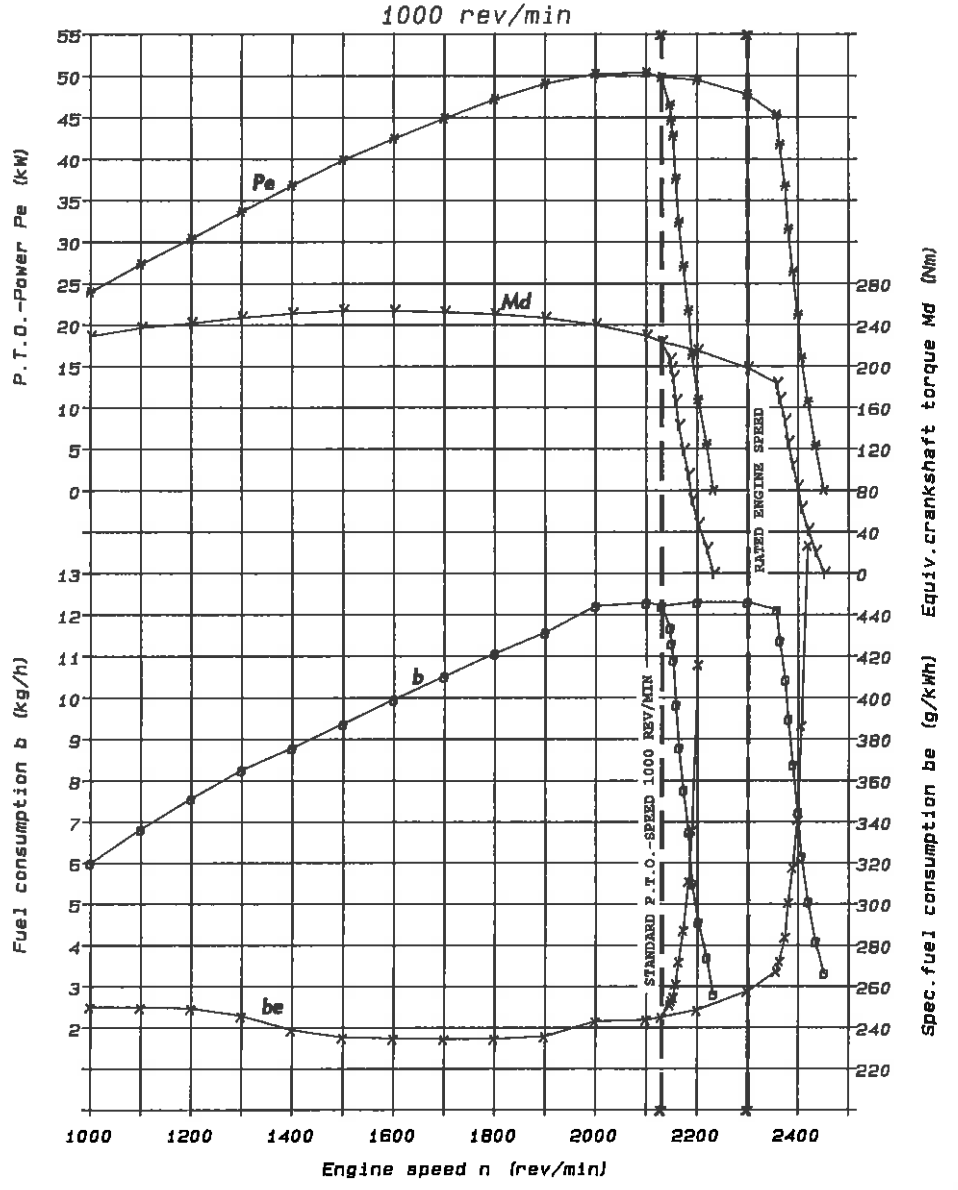
Power	Speed		Fuel consumption		Specific energy
	engine	p.t.o.	hourly	specific	
kW	rev/min	rev/min	kg/h l/h	g/kWh	kWh/l
MAXIMUM POWER					
Maximum power - 2 hours test					
50,38	2100	986	12,29 14,63	244,0	3,44
Power at rated engine speed					
47,74	2300	1080	12,30 14,64	257,5	3,26
Standard power take-off speed					
49,80	2130	1000	12,21 14,54	245,0	3,43
PART LOADS					
(i) The torque corresponding to maximum power at rated engine speed					
47,74	2300	1080	12,30 14,64	257,5	3,26
(ii) 85 % of torque obtained in (i)					
41,73	2364	1110	11,38 13,54	272,5	3,08
(iii) 75 % of torque defined in (ii)					
31,52	2381	1118	9,49 11,29	301,0	2,79
(iv) 50 % of torque defined in (ii)					
21,18	2400	1127	7,23 8,61	341,5	2,46
(v) 25 % of torque defined in (ii)					
10,67	2420	1136	5,06 6,02	474,0	1,77
(vi) unloaded					
0	2452	1151	3,33 3,96	-	-

Power	Speed		Fuel consumption		Specific energy
	engine	p.t.o.	hourly	specific	
kW	rev/min	rev/min	kg/h l/h	g/kWh	kWh/l
PART LOADS AT STANDARD POWER TAKE-OFF SPEED					
(i) The torque corresponding to maximum power available					
49,80	2130	1000	12,21 14,54	245,0	3,43
(ii) 85 % of torque obtained at maximum power					
42,76	2153	1011	10,91 12,98	255,0	3,29
(iii) 75 % of torque defined in (ii)					
32,30	2164	1016	8,79 10,47	272,5	3,09
(iv) 50 % of torque defined in (ii)					
21,73	2183	1025	6,76 8,05	311,0	2,70
(v) 25 % of torque defined in (ii)					
10,96	2202	1034	4,56 5,43	416,0	2,02
(vi) unloaded					
0	2232	1048	2,80 3,34	-	-

No load maximum engine speed: 2452 rev/min
Equivalent crankshaft torque
at maximum power: 198,2 Nm at rated engine speed
Maximum equivalent crankshaft torque: 253,7 Nm at 1500 rev/min of engine

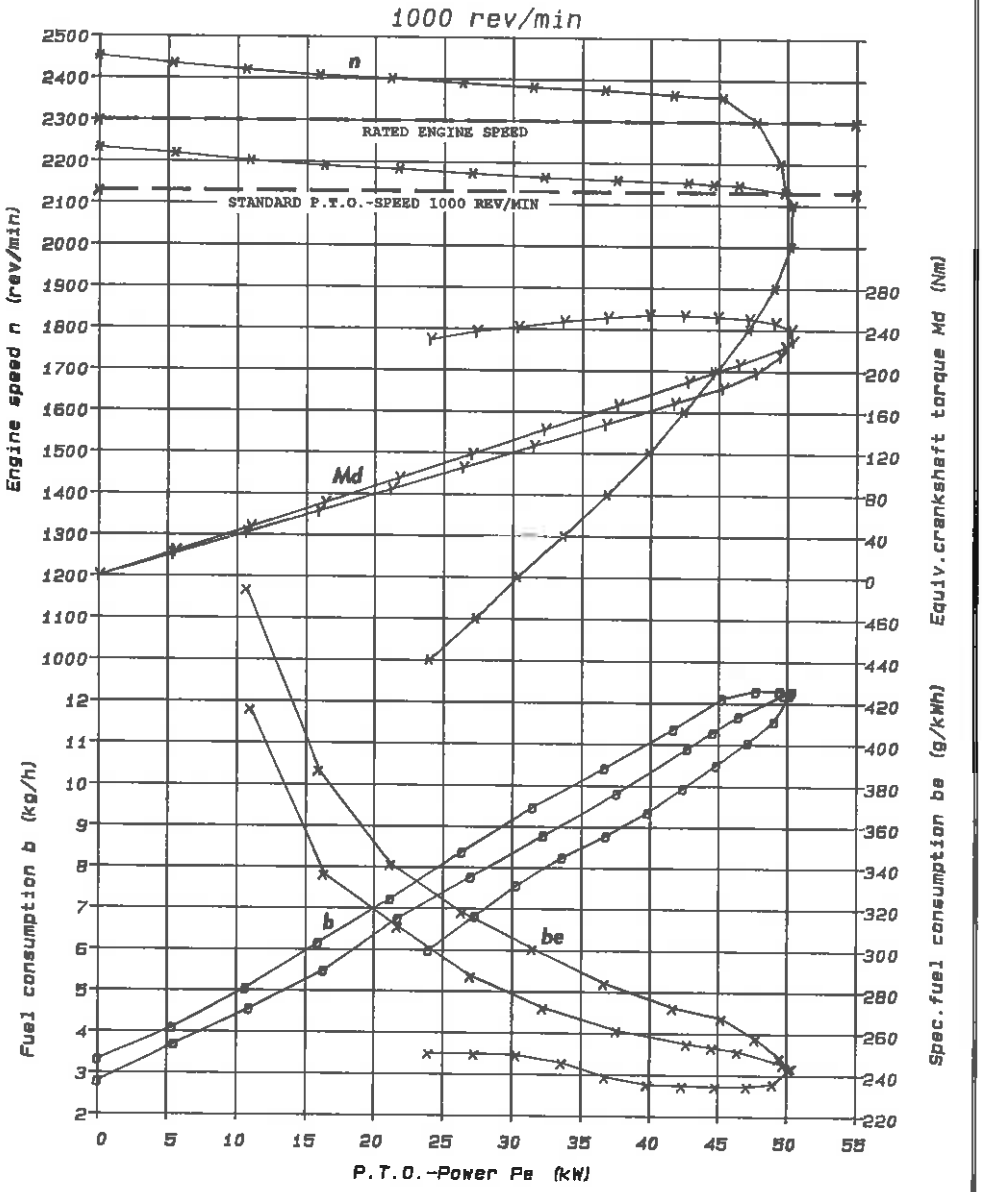
Mean atmospheric conditions	temperature:	17°C
	pressure:	990 mbar
	rel. humidity:	80 %
Maximum temperatures	coolant:	84°C
	engine oil:	116°C
	fuel:	34°C
	engine air intake:	34°C

Bundesanstalt für Landtechnik Wieselburg/Erlauf. Austria Prot.Nr.:	P.T.O.-test	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87



engine ser.nr. : 301.87-0001	atm. pressure: 990 mbar	fuel temp. : 34	signature
tractor ser.nr.: 9020.35-01795	air temper. : 17 C	d.of tests : 1993-02-22	
fuel : 0.84/15 C	coolant temp.: 84 C	test no. :	
engine oil : 15W40	oil temp. : 116 C	curves no. : 1	Haider/Schaufler

Bundesanstalt für Landtechnik Wieselburg/Erlauf, Austria Prot.Nr.:	P.T.O.-test	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87



engine ser.nr. : 301.87-0001	atm. pressure: 990 mbar	fuel temp. :34	signature
tractor ser.nr.: 9020.35-01795	air temper. : 17 C	d.of tests :1993-02-22	
fuel : 0.84/15 C	coolant temp.: 84 C	test no. :	
engine oil : 15W40	oil temp. : 116 C	curves no. : 2	Haider/Schaufler

HYDRAULIC POWER AND LIFTING FORCE:

Date of tests: 20.4.1993

Hydraulic power test:

Sustained pressure with relief valve open: 18,0 MPa (180 bar)

Pump delivery rate at minimum pressure (at rated engine speed): 43,5 l/min

	Flow rate	Pressure	Power
	l/min	MPa	kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting and corresponding hydraulic power	40,0	16,7	11,1
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	40,0	16,7	11,1

Tapping point used for test: At rear of tractor

Temperature of hydraulic fluid, if different from 65° + 5°C: -

Opening pressure of the unloading valve: 18,5 MPa (185 bar)

Closing pressure of the unloading valve: 18,0 MPa (180 bar)

Remarks:

Flow rate corresponding to a hydraulic pressure equivalent up to 80 % (14,8 MPa) of the actual relief valve pressure setting is equal to pump delivery rate at minimum pressure (at rated engine speed).

By reasons of the characteristic of the hydraulic spool valves about 20 % control flow above 14,8 MPa are normal.

Power lift test: Without additional hydraulic cylinder

	at the hitch point	on the frame	
		460 mm mast height	610 mm mast height
Height of lower hitch points above ground in down position *)	200/200 mm	200/200 mm	200/200 mm
Vertical movement *)	665/575 mm	705/605 mm	835/755 mm
Maximum corrected force exerted through full range *)	18,7/22,3 kN	14,2/18,0 kN	11,5/14,1 kN
Corresponding pressure of hydraulic fluid	16,7 MPa (167 bar)	16,7 MPa (167 bar)	16,7 MPa (167 bar)
Moment about rear wheel axis *)	18,1 / 21,6 kNm	22,4 / 28,4 kNm	18,2 / 22,3 kNm
Maximum tilt angle of mast from vertical	-	from -3 to 0° and to +5°	from -7° to 0° and to +7°

With one additional hydraulic cylinder

	at the hitch point	on the frame	
		460 mm mast height	610 mm mast height
Height of lower hitch points above ground in down position *)	200/200 mm	200/200 mm	200/200 mm
Vertical movement *)	665/575 mm	705/605 mm	835/755 mm
Maximum corrected force exerted through full range *)	24,9/28,8 kN	16,9/24,8 kN	15,6/18,3 kN
Corresponding pressure of hydraulic fluid	16,7 MPa (167 bar)	16,7 MPa (167 bar)	16,7 MPa (167 bar)
Moment about rear wheel axis *)	24,2 / 27,9 kNm	26,7 / 39,2 kNm	24,6 / 28,9 kNm
Maximum tilt angle of mast from vertical	-	from -3 to 0° and to +5°	from -7° to 0° and to +7°

*) Min.mech/max.mech. advantage

Linkage settings for test: See table and figure in specifications

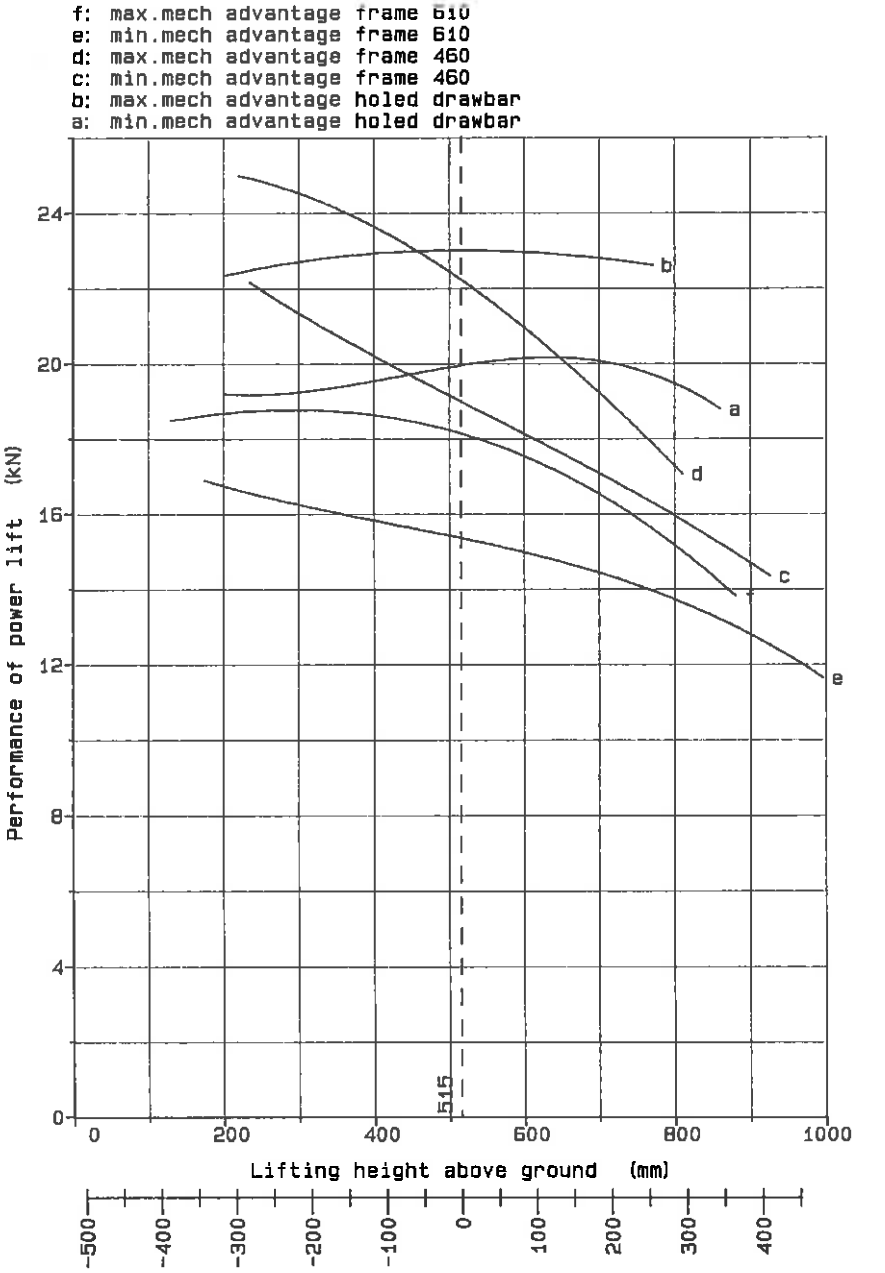
Without additional hydraulic cylinder

Lifting heights relative to the horizontal plane including the lower link pivot points															
mm		-375	-315	-280	-200	-150	-100	0	100	200	250	285	350	420	490
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting or to maximum power delivered by the hydraulic system, which is lower)															
Corresponding pressure: 16,7 MPa (167 bar)															
at the hitch point kN	max.mech. advantage		22,3	22,5	22,8	22,9	22,9	23,0	22,9	22,8	22,6				
	min.mech. advantage		19,2	19,2	19,3	19,4	19,6	20,0	20,2	20,0	19,7	19,5	18,7		
at the frame kN (460 mm mast height)	max.mech. advantage			24,9	24,4	24,0	23,5	22,2	20,7	18,9	18,0				
	min.mech. advantage			22,1	21,2	20,6	20,0	19,0	18,0	16,9	16,3	15,9	15,1	14,2	
at the frame kN (610 mm mast height)	max.mech. advantage	18,5	18,7	18,7	18,8	18,7	18,6	18,1	17,4	16,3	15,7	15,2	14,1		
	min.mech. advantage		16,7	16,5	16,2	16,0	15,8	15,4	14,9	14,3	14,0	13,7	13,1	12,4	11,5

With one additional hydraulic cylinder

Lifting heights relative to the horizontal plane including the lower link pivot points															
mm		-375	-315	-280	-200	-150	-100	0	100	200	250	285	350	420	490
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting or to maximum power delivered by the hydraulic system, which is lower)															
Corresponding pressure: 16,7 MPa (167 bar)															
at the hitch point kN	max.mech. advantage		29,0	29,3	30,0	30,4	30,8	31,2	30,9	29,8	28,8				
	min.mech. advantage		24,9	25,2	25,7	26,0	26,1	26,3	26,3	26,2	26,2	26,2	26,2		
at the frame kN (460 mm mast height)	max.mech. advantage			34,2	32,5	31,5	30,4	28,4	26,7	25,4	25,0	24,8			
	min.mech. advantage			30,0	28,1	27,1	26,2	24,7	23,3	21,7	20,9	20,2	18,7	16,9	
at the frame kN (610 mm mast height)	max.mech. advantage	26,3	25,3	24,8	23,9	23,5	23,1	22,5	21,8	20,8	20,1	19,5	18,3		
	min.mech. advantage		21,8	21,5	21,1	20,8	20,5	20,0	19,3	18,6	18,2	17,9	17,2	16,5	15,6

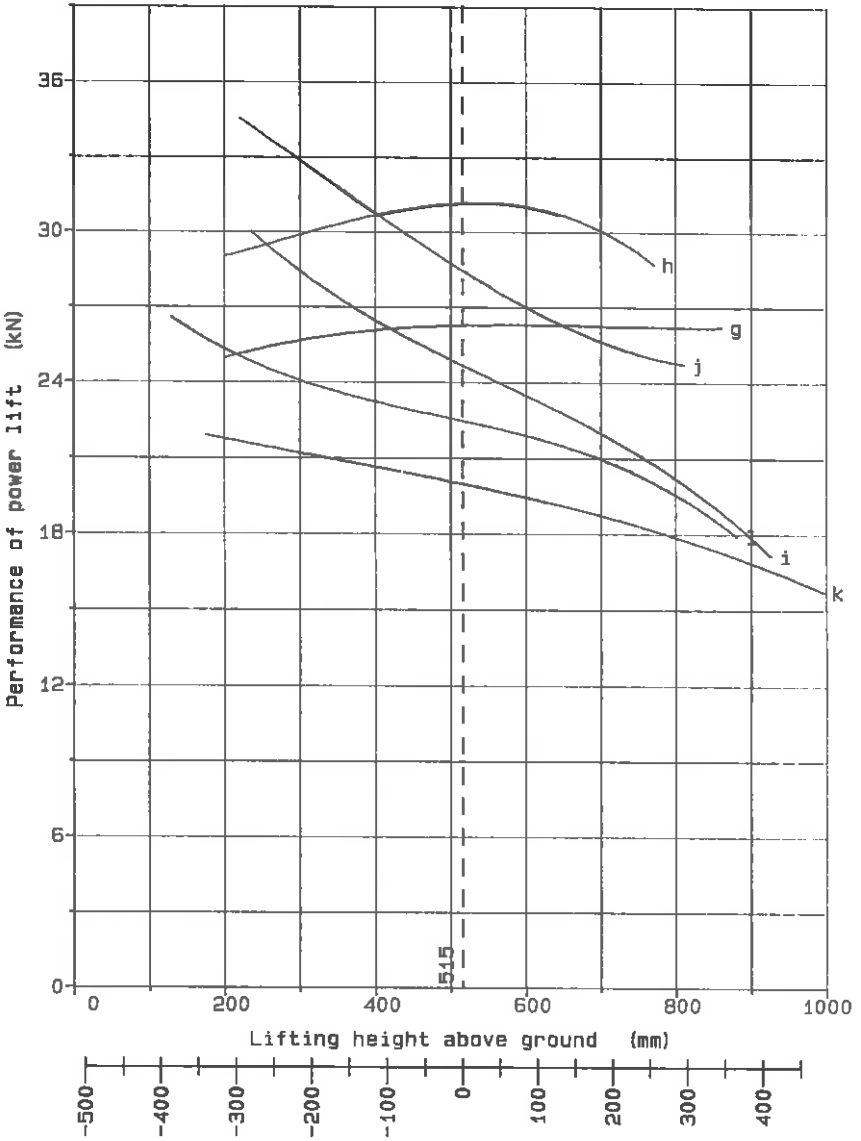
Performance of power lift: Without additional hydraulic cylinder



Height relative to the horizontal plane including the lower link pivot points (dyn. radius index 695 mm)

With one additional hydraulic cylinder

l: max.mech advantage frame 610
k: min.mech advantage frame 610
j: max.mech advantage frame 460
i: min.mech advantage frame 460
h: max.mech advantage holed drawbar
g: min.mech advantage holed drawbar



Height relative to the horizontal plane including the lower link pivot points (dyn. radius index 695 mm)

Drawbar performance:

Date of test: 29. and 30.3.1993
29.4.1993

Type of track: Concrete

Height of drawbar above ground: unballasted 380 mm, ballasted 380 mm

Tyre inflation pressure: front: unballasted 120 kPa, ballasted 130 kPa
rear: unballasted 110 kPa, ballasted 110 kPa

Tyre sizes: front: 14.9 LR 20; rear: 16.9 R 30

Gear	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel consumption	Specific energy	Temperature			Atmosph. conditions		
								Fuel	Coolant	Engine oil	Temperature	Rel.humidity	Pressure
	kW	kN	km/h	rev/mdn	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
(i) Maximum power in tested gears (unballasted tractor)													
L 1 L	14,23	29,65	1,73	2413	15,0	-	-	23	80	96	19	50	99,0
L 1 S	19,35	29,69	2,34	2403	15,0	-	-	23	82	98	20	50	99,0
L 2 L	24,70	29,62	2,99	2390	15,0	384,5	2,18	25	84	99	20	50	99,0
L 2 S	33,15	29,60	4,03	2373	15,0	322,5	2,58	26	85	101	20	48	99,0
L 3 L	38,63	28,25	4,93	2300	11,4	315,5	2,66	27	86	104	22	48	99,0
S 1 L	40,44	24,49	5,94	2300	8,6	301,5	2,79	29	85	104	18	48	99,0
L 3 S	39,31	20,10	7,06	2300	6,8	310,0	2,71	29	85	104	18	48	99,0
L 4 L	39,06	17,30	8,14	2300	6,0	312,0	2,69	29	85	105	19	50	99,0
S 1 S	39,80	17,22	8,32	2300	5,8	306,5	2,74	29	85	105	20	49	99,0

Gear	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel consumption	Specific energy	Temperature			Atmosph. conditions		
								Fuel	Coolant	Engine oil	Temperature	Rel.humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
(ii) Maximum power in tested gears (ballasted tractor)													
L 1 L	17,85	37,00	1,73	2407	15,0	-	-	18	79	93	14	62	99,0
L 1 S	24,05	37,19	2,34	2394	15,0	355,0	2,36	19	80	97	15	61	99,0
L 2 L	30,79	37,12	2,99	2382	15,0	322,5	2,53	21	81	100	13	62	99,0
L 2 S	39,02	33,91	4,14	2300	10,3	312,5	2,69	22	82	103	15	62	99,0
L 3 L	39,75	27,84	5,15	2300	7,5	306,5	2,74	24	81	103	16	58	99,0
S 1 L	40,96	24,07	6,12	2300	5,9	297,5	2,82	25	81	104	16	58	99,0
L 3 S	39,76	20,01	7,16	2300	5,2	306,5	2,74	24	82	103	17	58	99,0
L 4 L	39,57	17,28	8,24	2300	4,5	308,0	2,74	26	82	104	17	58	99,0
S 1 S	39,56	16,91	8,42	2300	4,3	308,0	2,73	26	82	104	15	58	99,0
(iii) Five-hour-test at 75 % of pull at maximum power													
S 1 L	32,20	18,05	6,41	2380	4,6	308,5	2,64	28	83	102	3	60	99,3
(iv) Five-hour-test at pull corresponding to 15 % wheelslip in test (ii)													
L 2 L	30,65	37,15	2,97	2385	15,0	310,0	2,71	25	82	110	5	56	99,5

Oil consumption during 10 hours duration of tests (iii) and (iv): 34,6 g/h

TURNING AREA AND TURNING CIRCLE:

Wheel equipment: front: 14.9 LR 20
rear: 16.9 R 30 AS, 137 A 8

Track of wheel: front: 1510 mm
rear: 1510 mm

Results *)	With brakes		Without brakes	
	right-hand	left-hand	right-hand	left-hand
	m	m	m	m
Radius of turning area	4,08/4,22	3,97/4,13	5,20/4,88	5,20/4,85
Radius of turning circle	3,88/4,02	3,77/3,93	5,00/4,68	5,00/4,65

*) Four-wheel-drive switched: ON/OFF

LOCATION OF CENTRE OF GRAVITY:

	mm
Height above ground	911
Distance forward from the vertical plane containing the axis of the rear wheels	903
Distance from the median plane of the tractor, right-side	3,6

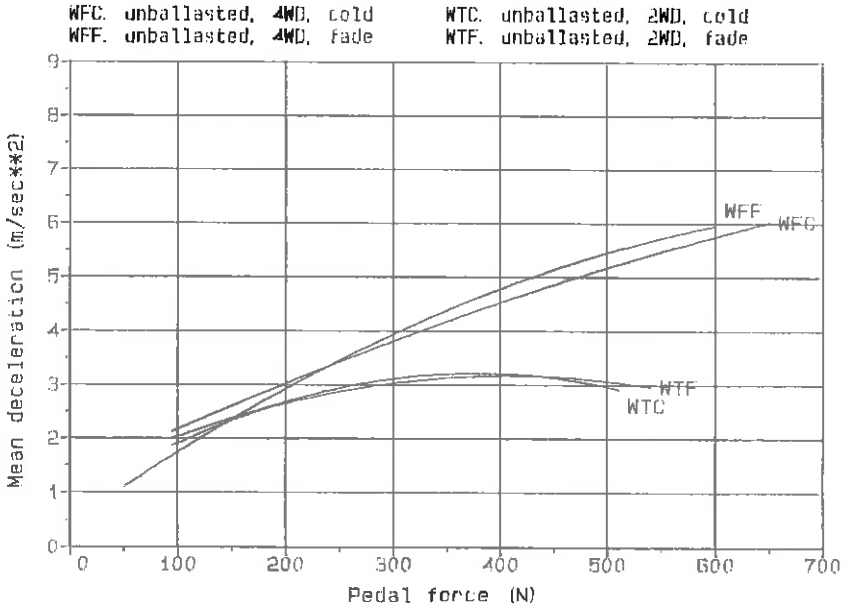
BRAKING:

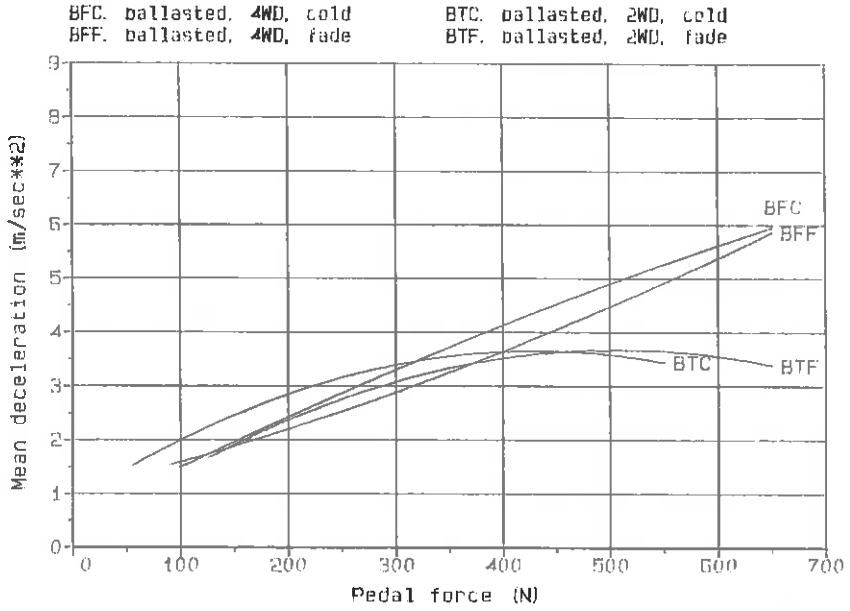
Date of tests: 18. and 19.11.1992
Type of track: Concrete
Type of decelerometer: Moto-Meter Nr. 03382 (Kombi-Schreiber)

Tractor mass during brake tests (with driver):

	Front kg	Rear kg	Total kg
Ballasted	1695	2595	4290
Unballasted	1270	1865	3135

Service brake:





Speed before application of brakes: 39,04 km/h
The tractor brakes were heated by towing of the tractor for 1 km

Maximum deviation of tractor from its original course: None

Abnormale vibration: None

Parking brake device test:

	Ballasted tractor on 18 % slop	
Braking device control force	up	down
	230/260 N	220/250 N

Four-wheel-drive switched: ON/OFF

MEASUREMENT OF EXTERNAL NOISE LEVEL:

Date of test: 8.7.1993

Type of sound level meter: BRÜEL & KJAER 2209 and 2308

Type of track: Concrete

Gear number: S 4 S

Travelling speed before acceleration: 29,8 km/h

Sound level: 82,0 dB(A)

OPTIONAL TESTS

Main power take-off performance:

Date and location of tests: 24.2.1993, Wieselburg, Austria
Type of dynamometer: SCHENCK eddy-current brake W 780

Main test on: ISO R 500 - 1979, type I (DIN 9611) - 540 rev/min

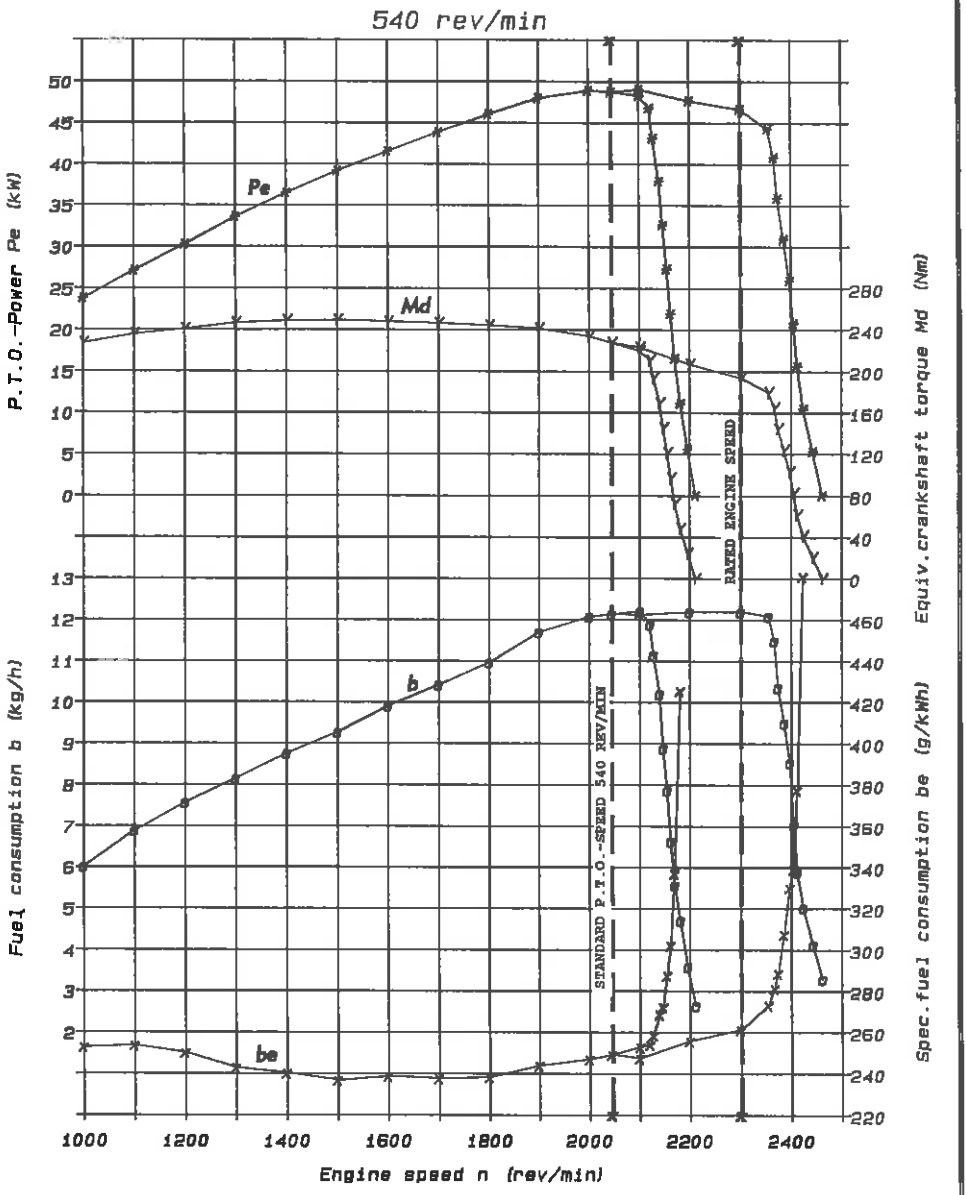
Power	Speed		Fuel consumption		Specific energy
	engine	p.t.o.	hourly	specific	
kW	rev/min	rev/min	kg/h l/h	g/kWh	kWh/l
MAXIMUM POWER					
Maximum power - 2 hours test					
48,97	2100	554	12,13 14,44	247,5	3,39
Power at rated engine speed					
46,62	2300	607	12,19 14,51	261,5	3,21
Standard power take-off speed					
48,71	2045	540	12,14 14,45	249,0	3,37
PART LOADS					
(i) The torque corresponding to maximum power at rated engine speed					
46,62	2300	607	12,19 14,51	261,5	3,21
(ii) 85 % of torque obtained in (i)					
40,80	2367	625	11,49 13,68	281,5	2,98
(iii) 75 % of torque defined in (ii)					
30,87	2386	630	9,50 11,31	308,0	2,73
(iv) 50 % of torque defined in (ii)					
20,76	2405	635	7,05 8,39	339,5	2,47
(v) 25 % of torque defined in (ii)					
10,43	2424	640	5,02 5,98	481,5	1,74
(vi) unloaded					
0	2462	650	3,29 3,92	-	-

Power	Speed		Fuel consumption		Specific energy
	engine	p.t.o.	hourly	specific	
kW	rev/min	rev/min	kg/h l/h	g/kWh	kWh/l
PART LOADS AT STANDARD POWER TAKE-OFF SPEED					
(i) The torque corresponding to maximum power available					
48,71	2045	540	12,14 14,45	249,0	3,37
(ii) 85 % of torque obtained at maximum power					
43,10	2128	562	11,15 13,27	259,0	3,25
(iii) 75 % of torque defined in (ii)					
32,60	2147	567	8,88 10,57	272,5	3,08
(iv) 50 % of torque defined in (ii)					
21,92	2162	571	6,63 7,89	302,5	2,78
(v) 25 % of torque defined in (ii)					
11,05	2181	576	4,71 5,60	426,0	1,97
(vi) unloaded					
0	2212	584	2,65 3,16	-	-

No load maximum engine speed: 2462 rev/min
Equivalent crankshaft torque
at maximum power: 193,6 Nm at rated engine speed
Maximum equivalent crankshaft torque: 249,1 Nm at 1500 rev/min of engine

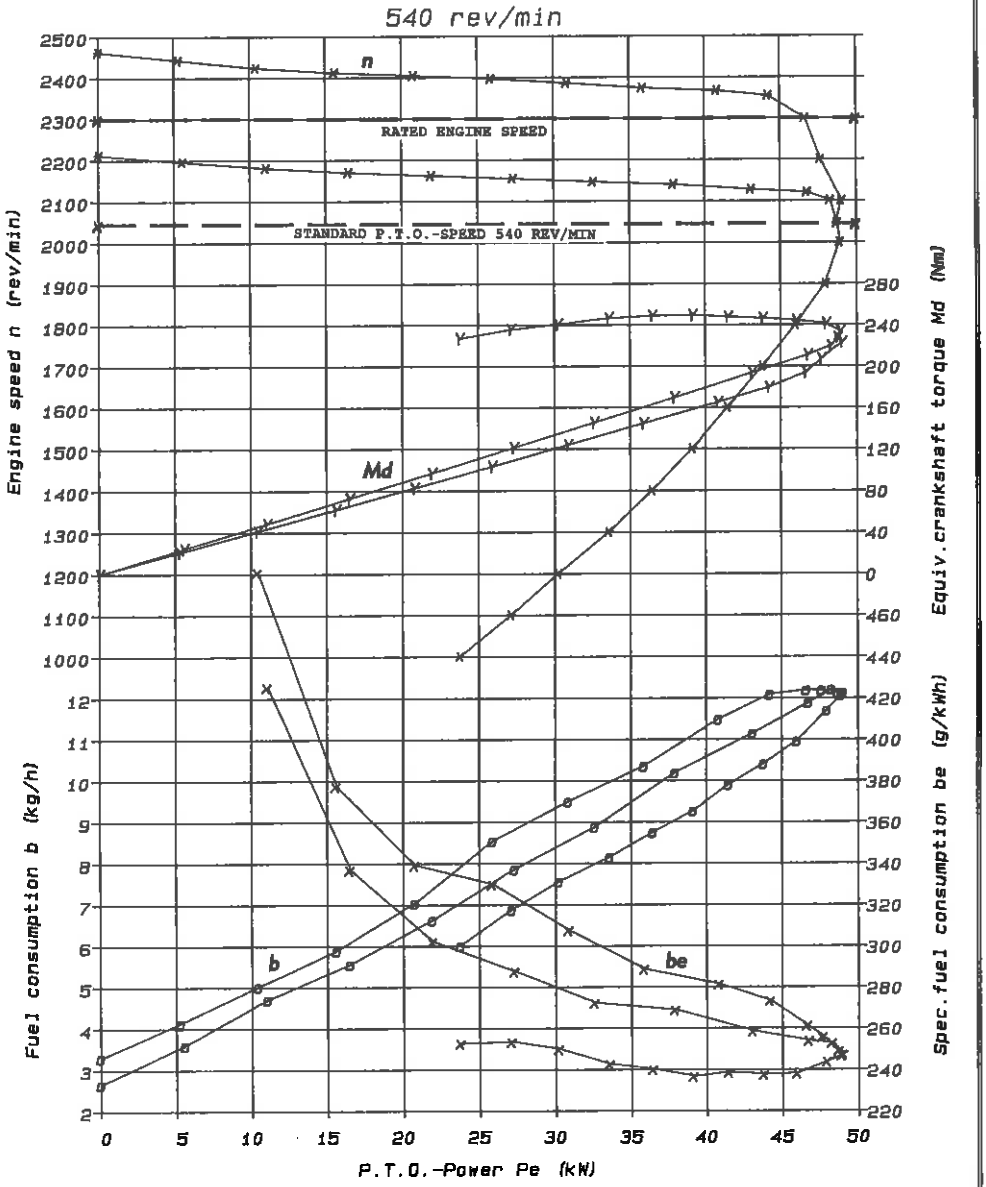
Mean atmospheric conditions	temperature:	17°C
	pressure:	994 mbar
	rel. humidity:	50 %
Maximum temperatures	coolant:	84°C
	engine oil:	114°C
	fuel:	34°C
	engine air intake:	36°C

Bundesanstalt für Landtechnik Iesselburg/Erlauf, Austria Prot.Nr.:	P.T.O.-test	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87



Engine ser.nr. : 301.87-0001	atm. pressure: 994 mbar	fuel temp. : 34 C	signature
Tractor ser.nr.: 9020.35-01785	air temper. : 17 C	d.of tests : 1993-02-24	
Fuel : 0.84/15 C	coolant temp.: 84 C	test no. :	
Engine oil : 15W40	oil temp. : 114 C	curves no. : 3	Haider/Schaufler

Bundesanstalt für Landtechnik Wieselburg/Erlauf, Austria Prot.Nr.:	P.T.O.-test	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87



engine ser.nr. : 301.87-0001	atm. pressure: 994 mbar	fuel temp. : 34 C	signature
tractor ser.nr.: 9020.35-01795	air temper. : 17 C	d.of tests : 1993-02-24	
fuel : 0.84/15 C	coolant temp.: 84 C	test no. :	
engine oil : 15W40	oil temp. : 114 C	curves no. : 4	Haider/Scheufler

Engine performance:

Date and location of test: 12.1.1993, Wieselburg, Austria
Type of dynamometer: SCHENCK eddy-current brake W 150

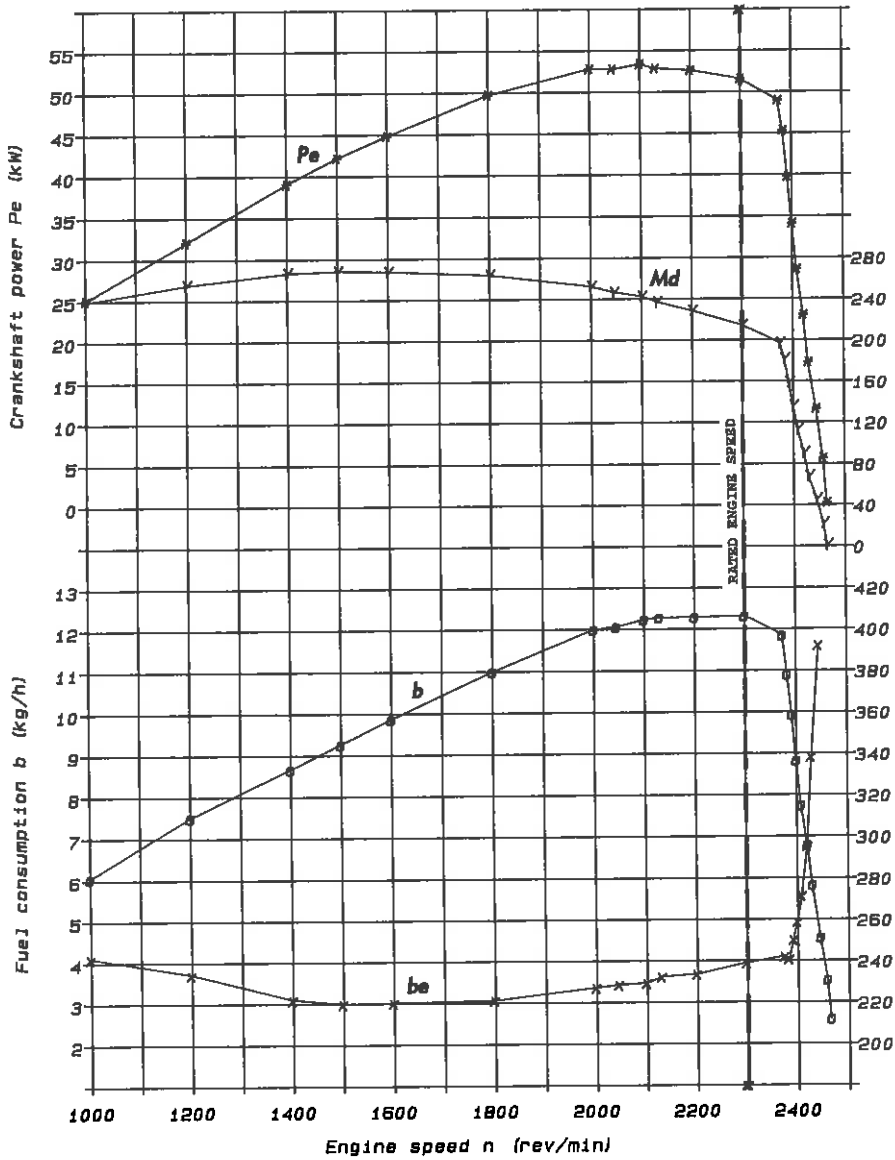
Power	Engine speed	Fuel consumption		Specific energy
		hourly	specific	
kW	rev/min	kg/h l/h	g/kWh	kWh/l
Maximum power - 2 hours test				
53,34	2100	12,23 14,56	229,5	3,66
Power at rated engine speed				
51,52	2300	12,31 14,65	239,0	3,52
Standard power take-off speed				
Part loads				
(i) The torque corresponding to maximum power at rated engine speed				
51,52	2300	12,31 14,65	239,0	3,52
(ii) 85 % of torque obtained in (i)				
45,28	2383	10,90 12,98	241,0	3,49
(iii) 75 % of torque defined in (ii)				
34,08	2400	8,82 10,50	259,0	3,25
(iv) 50 % of torque defined in (ii)				
23,00	2421	6,80 8,10	295,5	2,84
(v) 25 % of torque defined in (ii)				
11,61	2445	4,56 5,43	392,5	2,14
(vi) unloaded				
-	2465	2,60 3,10	-	-

No load maximum engine speed: 2465 rev/min
Torque at maximum power: 213,9 Nm at rated engine speed
Maximum torque: 268,4 Nm at 1500 rev/min of engine

Mean atmospheric conditions:
temperatur: 16°C
pressure: 985 mbar
relative humidity: 52 %

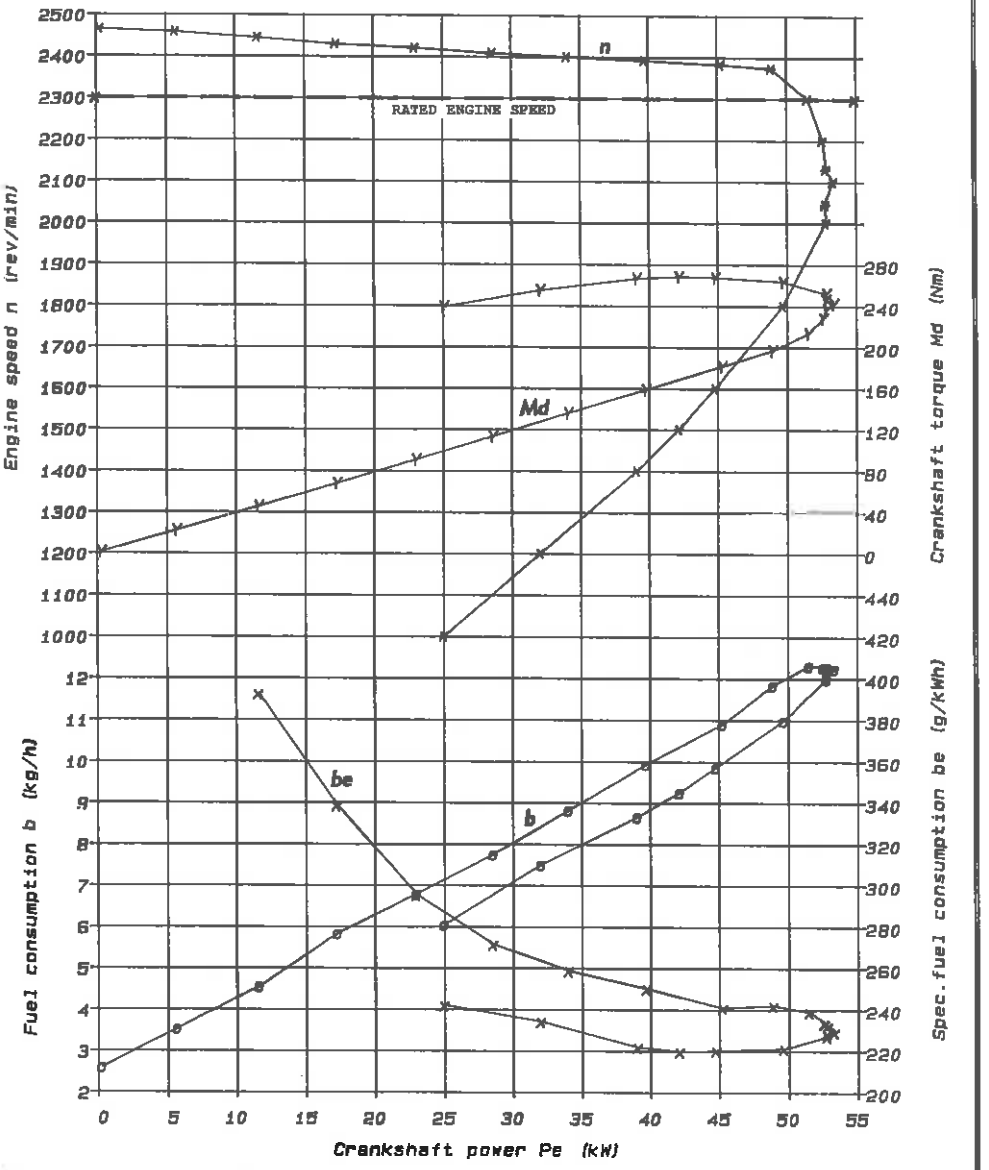
Maximum temperatures:
coolant: 83°C
engine oil: 109°C
fuel: 33°C
engine air intake: 34°C

Bundesanstalt für Landtechnik Wieselburg/Erlauf, Austria Prot.Nr.:	Engine-test	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87



engine ser.nr. : 301.87-0001	atm. pressure: 985 mbar	fuel temp. : 33 C	signature
tractor ser.nr.: 9020.35-01795	air temper. : 16 C	d.of tests : 1993-01-12	
fuel : 0.84/15 C	coolant temp.: 89 C	test no. :	
engine oil :	oil temp. : 109 C	curves no. : 5	Haider/Schaufler

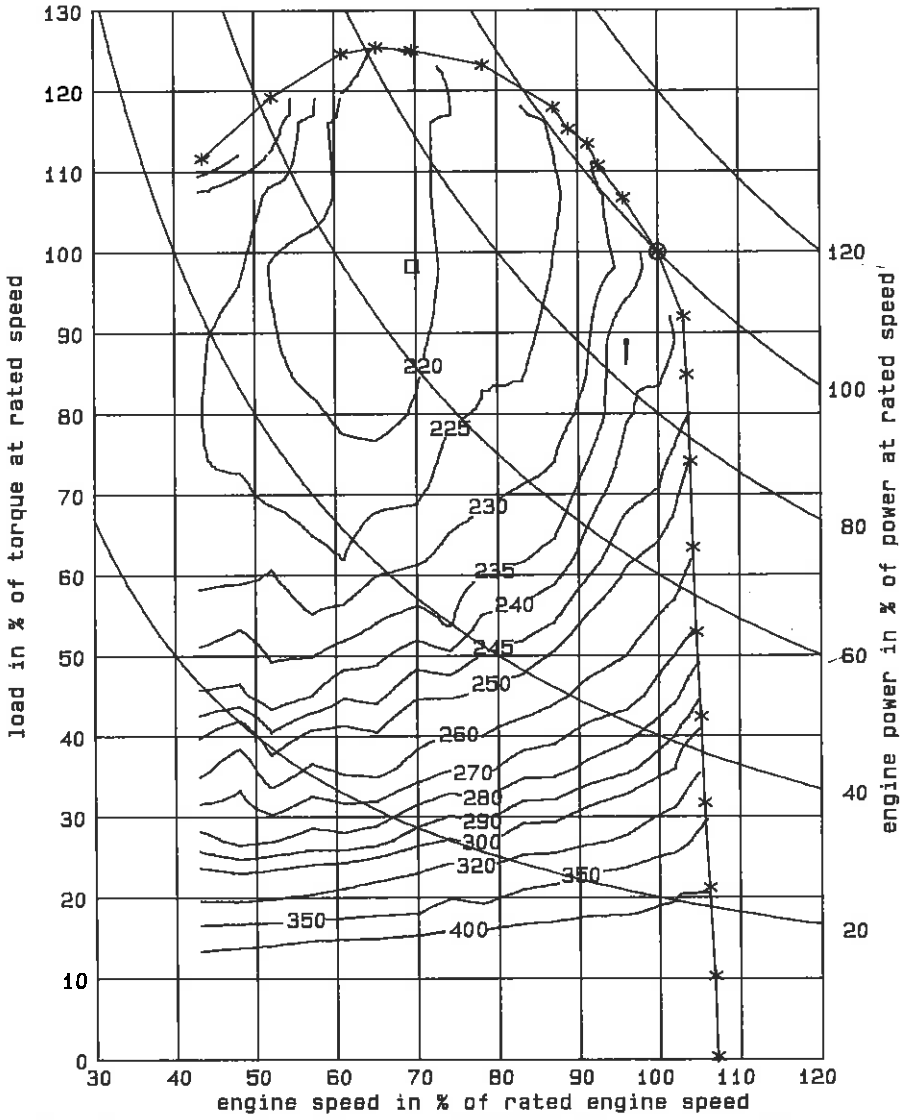
Bundesanstalt für Landtechnik Wieselburg/Erlauf, Austria Prot.Nr.:	Engine-test	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87



Engine ser.nr. : 301.87-0001	atm. pressure: 985 mbar	fuel temp. : 33 C	signature	
Tractor ser.nr.: 9020.35-01795	air temper. : 16 C	d.of tests : 1993-01-12		
Fuel : 0.84/15 C	coolant temp.: 83 C	test no. :		
Engine oil :	oil temp. : 109 C	curves no. : 6		Haider/Scheufler

BUNDESANSTALT FÜR LANDTECHNIK Wieselburg/Erlauf, Austria Prot.Nr.:	ENGINE PERFORMANCE CHARACTERISTIC	Steyr-Dieseltractor Typ 9020.35 (970a) (4WD) Mot.Typ Steyr WD 301.87

□ ....min. fuel 215.09 g/kWh at n = 1600. rev/min
Md = 210.08 Nm, P = 35.2 kW
⊛ ....N = 2300. rev/min, Md = 213.9 Nm, P = 51.5 kWh



engine ser.nr. : *301.87-0001*	atm. pressure: 985 mbar	fuel temp. : 33 C	signature
tractor ser.nr.: 9020.35-01795	air temper. : 16 C	d.of tests : 1993-01-12	
fuel : 0.84/15 C	coolant temp.: 83 C	test no. :	
engine oil :	oil temp. : 109 C	curves no. : 7	Haider/Schaufler

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REPAIRS: None

REMARKS: None

The head of department:

(Dipl.Ing. H. Lampel)
Oberrat

Bundesanstalt für Landtechnik, Wieselburg a. d. Erlauf

Test and report carried out by:

(Ing. Hermann Schaufler)

The director of testing station:

(Dipl.Ing.Dr. J. Schrottmaier)
Hofrat