Prüfstelle für Landmaschinen



REPORT on test in accordance with OECD STANDARD CODE 2 for the Official Testing of Agricultural Tractor Performance

OECD No. 2/1972
6th November 2001

Agricultural Tractor

CASE IH CS 94a M2 (4WD)

Manufacturer

CASE STEYR Landmaschinentechnik GmbH
A – 4300 St. Valentin

This is a report on a tractor test in accordance with OECD STANDARD CODE for the Official Testing of Agricultural Tractor Performance (C(2000)59(FINAL), Code 2).

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

Duration of tests: January till April 2001

DLG-Testing Station for Agricultural Machinery, Max-Eyth-Weg 1,
D-64823 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: 6th November 2001 OECD No. 2/1972

Remark:
The tractor model STEYR M9094a M2
offered by the manufacturer CASE-STEYR Landmaschinentechnik GmbH , St.Valentin
Is technically identical with the tractor model CS94a M2 in all respects except in colour and design of radiator shell.

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	kp
Powers			1 kW	=	1.36	PS
Pressures	1 MPa	=	10 bar	=	10.2	kp/cm^2
	100 kPa	=	1000 mbar	=	750.10	mm Hg

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Tractor manufacturer's name and address:	CASE STEYR Landmaschinentechnik GmbH A--4300 St. Valentin
Location of tractor assembly:	A-4300 St. Valentin
Submitted for test by:	Manufacturer
Selected for test by:	Manufacturer with agreement by DLG
Place of running-in:	A-4300 St. Valentin
Duration of running-in:	Engine and tractor 165 h
Location of test:	DLG-Testing Station, D-64823 Groß-Umstadt

1 SPECIFICATIONS OF TRACTOR

1.1 Identification

1.1.1	- Make:	CASE IH
	- Model:	CS 94a M2
	- Type:	4WD
1.1.2	Numbers	
	- Serial No.:	DBD0058122
	- 1st serial No.:	DBD0007503
1.1.3	Other specifications	
	- Speed version	40 km/h
	- Technical type number	9057.85

1.2 Engine

	Make/Model/Type:	CASE STEYR / 420.88 / water-cooled 4-stroke Diesel-engine, direct injection, supercharged
	Serial No.:	420.88 K09103
1.2.1	Cylinders	
	Number/disposition:	4 / vertical in line
	Bore/stroke:	108 mm / 120 mm
	Capacity:	4397 cm^3
	Compression ratio:	18,5 ±0.5 : 1
	Arrangement of valves:	Overhead valves
	Cylinder liners:	Wet

1.2.2	Supercharging	
	- Make / Model / Type:	SCHWITZER / S100 / exhaust driven supercharger
	- Pressure	Max. 130 kPa
1.2.3	Fuel system	
	- Fuel feed system:	1 diaphragm fuel supply pump
	- Fuel filter	
	Make/Model:	Lucas / 8366 59282
	Type :	FSL paper filter with water trap, replaceable
	- Capacity of fuel tank:	100 dm^3 standard, additional tank with 50 dm^3 optional, not fitted
	- Injection pump	
	Make/Model:	STANADYNE / DB 4429-5569
	Type :	Distributor pump with timing device
	Serial no.:	D0 DB 4429-5569
	Manufacturer's production setting:	70 ±2 mm^3/stroke at full load and rated speed;
	Flow rate:	19,3 dm^3/h ± 0.55 dm^3/h at 2300 min^{-1} and full load
	Timing:	Commencement of delivery: Static 15 ±1° before TDC
	- Injectors	
	Make/Model:	STANADYNE / M34359
	Type :	multi hole
	Injection pressure:	27 +8 MPa
1.2.4	Governor	
	- Make/Model/Type:	STANADYNE / - / mechanical, centrifugal variable speed governor, integral with injection pump
	- Governed range of engine speed:	850 ± 50 to 2500 ± 50 min^{-1}
	- Rated engine speed:	2300 min^{-1}

1.2.5	Air cleaner	
	- Pre-cleaner	
	Make/Model:	KNECHT / -
	Type:	Cyclone type, integrated in main cleaner housing
	Location of air intake:	In front of engine, below bonnet
	- Main cleaner	
	Make/Model:	KNECHT / LVPO 7080 RS/10
	Type:	Dry paper element filter with additional safety cartridge, dust-drain valve
	- Maintenance indicator:	Warning light on dashboard
1.2.6	Lubrication system	Pressure lubrication with engine oil / cooling water heat exchanger in filter socket
	- Type of feed pump:	Gear pump
	- Type of filter:	Full flow, replaceable cartridge
	- Number of filters:	1
1.2.7	Cooling system	
	- Type of coolant:	Water-anti-freeze mixture
	- Type of pump:	Impeller pump
	- Specification of fan	
	Number of fan blades:	7
	Fan diameter:	460 mm
	- Coolant capacity:	12 dm^3
	- Type of temperature control:	Thermostat and by-pass circuit, viscous drive fan, belt driven; variable fan speed controlled by air flow temperature
	- Superpressure system:	70 kPa
1.2.8	Starting system	
	- Make/Model/Type:	ISKRA / - / electrical, solenoid pre-engaged drive starter motor
	- Starter motor power rating:	3.0 kW
	- Cold starting aid:	Flame glow plug in air intake manifold (Thermostart)
	- Safety device:	Clutch pedal depressed and p.t.o.-speed selector in neutral position

1.2.9 Electrical system

- Voltage: 12 V
- Generator:
  - Make/Model/Type: MAGNETON or BOSCH / 96 A or 120 A - 14 V / 3-phase alternator
  - Power: 1.33 kW (96 A) or 1.68 kW (120 A)
- Battery: 1 lead acid battery, 95 Ah at 20 hours rating

1.2.10 Exhaust system

- Make/Model/Type: ROTH / 44 . 47.05.9749.0.00 / absorption reflexion, 245 mm x 136 mm x 350 mm
- Location: Under bonnet, vertical stack at right A post of cab, mouth showing upward / forward

1.2.11 Operating hours meter: Electronic, counts real hours when engine is running

1.3 Transmission

1.3.1 Clutch

- Make/Model/Type: LUK / A3 033 060 03 / first plate of dry double clutch (travel and p.t.o.)
- Number of plates: 2
- Diameter of plates: 327 mm and 188 mm (travel)
- Method of operation: Mechanically operated by pedal

1.3.2 Gear box

- Make/Model/Type: STEYR / TW 557 / mechanical, with 2 step power shift; 40 km/h version
- Description: Speed change gear with 4 gears (synchronized), range gear with 2 ranges (Field - Road, collar shifted), 2 step power shift (High - Low), reversing gear (F / R) (synchronized)

	forward	reverse
no. of gears	4	4
no. of ranges	4	4
total	16	16

- Available options (not fitted): additional creeper gear with 2 ranges 32 forward and 16 reverse speeds

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1.3.3 Rear axle and final drives

- Make/Model/Type:	STEYR / TW 557 / bevel gear drive with bevel gear differential and planetary final drives
- Differential lock:	
Type:	Dog clutch type ,acting from half axle to differential housing
Engagement:	By rocker switch or by automatic lock management (fitted to tested tractor), electro-hydraulically operated;
Disengagement:	Self disengaging (if not locked) or by automatic lock management

1.3.4 Front axle and final drives

Make/Model/Type:	CARRARO / 20.16 / swing axle, driving and steering; axle driven through wet multi plate clutch, central shaft and bevel gear; clutch electro-hydraulically operated by rocker switch or engaged by service brake operation; planetary final drives
- Differential lock:	
Type:	Dog clutch type
Engagement:	As rear axle differential
Disengagement:	As rear axle differential
	Management in common with rear axle differential lock

1.3.5 Total ratios and travelling speeds

Range	Gear and Power Shift	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed*) at rated engine speed of 2300 min^{-1} km/h
Forward Speeds			
Field	1 L	305.19	2.26
	1 H	254.77	2.71
	2 L	172.02	4.01
	2 H	143.60	4.80
	3 L	114.68	6.01
	3 H	95.73	7.20
	4 L	71.14	9.69
	4 H	59.39	11.61
Road	1 L	93.53	7.37
	1 H	78.07	8.83
	2 L	52.71	13.08
	2 H	44.00	15.66
	3 L	35.14	19.62
	3 H	29.34	23.50
	4 L	21.80	31.62
	4 H	18.20	37.88
Reverse Speeds			
Field	1 L	309.26	2.23
	1 H	258.16	2.67
	2 L	174.31	3.95
	2 H	145.51	4.74
	3 L	116.21	5.93
	3 H	97.01	7.11
	4 L	72.09	9.56
	4 H	60.18	11.45
Road	1 L	94.77	7.27
	1 H	79.11	8.71
	2 L	53.42	12.90
	2 H	44.59	15.46
	3 L	35.61	19.36
	3 H	29.73	23.19
	4 L	22.09	31.20
	4 H	18.44	37.38

*) calculated with a dynamic radius index of 795 mm
(not in conformity with ISO 4251-1:1998)

- Number of revolutions of front wheels for one revolution of rear wheels: 1.337

1.4 Power take-off

1.4.1 Main power take-off

- Type: Independent
- Method of engagement: By second plate of double clutch (travel and p.t.o.), controlled by push-button; electro-hydraulically operated; additional remote control at rear mudguards
- Number of shafts: 1
- Method of changing power take-off shaft ends and speeds: Fixed shaft, not exchangeable; 4 different standard speeds shiftable by 2 separate levers

1.4.1.1 Power take-off proportional to engine speed,
for normal operation: 540 or 1000 p.t.o.
for economic operation: 540E or "430" p.t.o.

- Location: At rear of tractor
- Diameter of p.t.o. shaft end: 35 mm
- Number of splines: 6 in conformity with ISO 500:1991, type 1
- Height above ground: 685 mm
- Distance from the median plane of the tractor: 0 mm
- Distance behind rear wheel axis: 356 mm

p.t.o. type	p.t.o. transmission ratio	p.t.o. speed min^{-1}	Engine Speed min^{-1}	power restriction kW	max. torque transmissible Nm
540	3.787	540 607	2045 2300	-	-
1000	2.130	1000 1080	2130 2300	-	-
540E	2.789	540 825	1506 2300	-	-
430	4.954	430 464	2130 2300	-	-

- Direction of rotation (viewed from behind tractor): Clockwise

1.4.1.2	Power take-off proportional to ground speed:	Optional, not fitted
1.4.2	Optional power take-off:	Front p.t.o., independent, not fitted to tractor

1.5 Hydraulic power lift

- Make/Model/Type:	STEYR / TW 557 / detached system, electronically controlled hydraulic power lift
- Type of hydraulic system:	Open center feeds rear and front power lift (if fitted) including additional control valves, steering system
- Rear power lift:	BOSCH, EHR B electronic power lift adjustment, lower link sensing; external push-buttons on the left and right at rear mudguards; draft, position and intermixable control, floating position, fast raising, raise limit, lowering throttle, vibration damping
- Front power lift:	STEYR GR I optional, not fitted to tested tractor

	rear power lift
- Number of cylinders:	2
- Type of cylinders: Single or double acting	single
- Bore / stroke: mm	80 / 210
- Type of linkage lock for transport:	hydraulic, lowering throttle
- Opening pressure of cylinder safety valve:	24 MPa

- Relief valve pressure setting: 19.5 +1.4 MPa / -0 Mpa
- Lift pump type: BOSCH, gear pump, max. delivery 22.5 dm^3/min at rated engine speed
- Transmission between pump and engine: Pump driven by engine
- Type and number of filters: 1 filter in suction line of hydraulic pump
- Site of oil reservoir: Separate tank above rear axle
- Type number and location of tapping points: 1 pair double acting, 1 single acting at rear of tractor
- Maximum volume of oil available to external cylinders: 30 dm^3

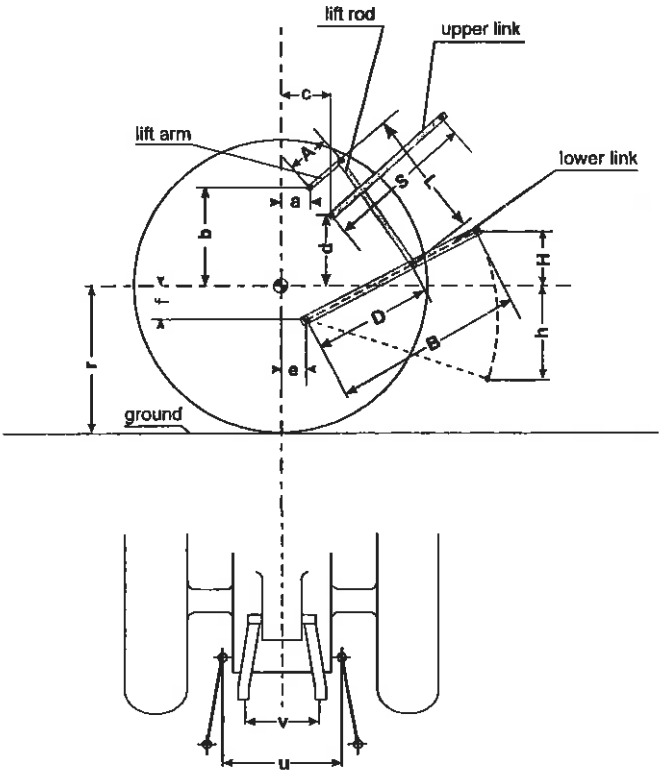
The hydraulic pump further provides hydraulic pressure for actuating of steering, power-shift gear, rear and front axle differential lock and for shifting the front axle drive clutch

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1.6 Three-point linkage:

1.6.1 Three-point linkage at rear:

- Category: 2, acc. to ISO 730-1/1994 + Cor. 1:1995
  with WALTERSCHEID quick couplers
- Category adapter: Adjustment to Cat. 1 possible



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Dimensions of rear implement linkage			projected lengths in mm: dimensions and range	projected lengths in mm: settings used in test-page 25
Rear tyres 540/65 R 38 Front tyres 480/65 R 24		(r) *) (r') *)	795 590	
Length of lift arms		(A)	360	
Length of lower links		(B)	930	
Distance of lift arm pivot points from rear wheel axis	horizontal vertical	(a) (b)	115 425	
Horizontal distance between the 2 lower link pivot points		(u)	450	
Horizontal distance between the 2 lift arm end points		(v)	578	
Length of upper link		(S)	from 610 to 840	730
Distance of upper link pivot point from rear wheel axis	horizontal vertical	(c) (d)	320 275	320 275
Distance of lower link pivot points from rear wheel axis	horizontal vertical	(e) (f)	120 200	
Distance of lower link pivot points from lift rod pivot points on lower links		(D)	490	
Length of lift rods		(L)	from 632 to 695	675

Heights (h, H, H') of lower link hitch points relative to rear wheel axis (situated 795 mm above ground), at different adjustments of L

These data are valid for unloaded power lift

Length of lift rods	(L)	632	675	695
Linkage distance of lift rods	(D)	490		
Lowest position	(h)	502	595	640
Highest position	(H)	255	125	185
Transport position	(H')	255	125	185

*) Assuming r resp. r' = tyre dynamic radius index (not in conformity with ISO 4251-1:1998)

1.7	**Swinging drawbar**	Available, not fitted	
1.8	**Trailer hitch**		
	- Make/Model/Type:	SCHARMÜLLER / 2146-1 / automatic	
	- Hitch pin diameter:		31 mm
	- Height above ground:	Mouth of coupling adjustable to 467/513/559/605/674/743/789/835/881/918	mm
	- Distance of hitch point from rear-wheel axis:	horizontal	553 mm
	- Distance of hitch point from power take-off shaft end vertical:	below above	218/172/126/80/11 mm 58/104/150/196/233 mm
	horizontal:		197 mm
	- Maximum vertically permissible load:		20 kN
1.9	**Holed drawbar**	short bar, category 2	
	Number of holes:	7	
	Distance between holes:		115 mm
	Hole diameter:		33 mm
	Thickness/width of the drawbar:		30/80 mm
	Height above ground		
	Minimum:		155 mm
	Maximum:		1050 mm
	Horizontal distance to p.t.o. shaft end (rear):		694 mm
1.10	**Steering**		
	- Make/Model/Type:	REXROTH / LAGC 125-12/LDAR-175M40 / hydrostatic steering, acting on front wheels	
	- Method of operation Pump:	gear pump delivery 52 dm^3/min at rated engine speed	
	Ram:	Integrated cylinder of symmetrical design, 212 or 240 mm stroke, 63 or 65 mm bore, 36 or 40 mm dia of piston rod	
	- Working pressure:	17.5 MPa	

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1.11 Brakes

1.11.1 Service brake

- Make/Model/ Type:	SIRMAC / 9.5"x7" / OPTISTOP, muscle power brake with hydraulic transmission oil-immersed disc brake with 10 acting faces on each differential half shaft, disc 241,3 mm dia
- Method of operation:	Pedal operated, acting on rear wheels, front axle drive is automatically engaged when braking
-Trailer braking take-off:	Optional, not fitted to tested tractor combined 1 / 2 -line air braking system or hydraulic braking system

1.11.2 Parking brake

- Type:	Mechanically acting on service brake
- Method of operation:	Hand lever with ratchet

1.12 Wheels

- Number

Front:	2, driving and steering
Rear.	2, driving

- Wheel base: 2481 mm
- Track width adjustment:

	Minimum	Maximum	Adjustment method
Front	1500	1700	reversing the wheels
Rear	1550	1736	reversing the wheels

1.13 Protective structure

- Make/Model/Type:	CASE STEYR / 130.03 / Cab
- Manufacturer's name and address:	CASE STEYR Landmaschinentechnik AG, A-4300 St. Valentin
- Protective device	
Cab:	Welded and screwed profile steel tube construction, not tiltable
- OECD approval:	
Approval Number:	None
- EC approval	
Approval number:	e12-79/622-88/413-0005
Date of approval:	November 10th, 1998

1.14 Seat

1.14.1	Driver's seat	Fitted to tractor
	- Make/Model:	Grammer / MSG95G/20
	- Type:	Air suspended upholstered seat with backrest and armrests
	- Seat and steering wheel reversible:	No
	- Type of suspension:	Pneumatic
	- Type of damping:	Hydraulic
	- Range of adjustment Longitudinal: Vertical:	 150 mm 100 mm
	- Safety belt:	No
1.14.2	Optional driver's seats	
	- Make/Model/Type:	GRAMMER / DS85H1/90 / mechanical suspension GRAMMER / MSG95A/20 / pneumatic suspension
1.14.3	Passenger seat:	Optional, fitted to tractor tested
	- Location:	On the left mudguard, beside the driver
	- Capacity:	1

1.15 Lighting

Electrical, 12 Volt

	Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1040	140 x 75	205
Sidelights	1580	115 x 35	805
Rearlights	1695	140 x 45	770
Reflectors, 1st pair 2nd pair	1715 725	125 x 35 80 dia	770 470

2. TEST CONDITIONS

2.1 Overall dimensions

	Length	Width	Height at top of	
		track width as in 2.5	protective structure	exhaust silencer pipe
	mm	mm	mm	mm
unballasted	4220	1736	2712	2595

2.2 Ground clearance 440 mm

- Clearance-limiting part: Bracket of trailer hitch

2.3 Tractor mass Unballasted (with cab)

	Without driver kg	With driver kg
Front	1585	1610
Rear	2465	2515
Total	4050	4125

2.4 Track specifications Not applicable

2.5 Tyres and track widths specifications

	Front	Rear
Tyres:	Michelin XM 108	
-dimensions	480/65 R 24	540/65 R 38
- load index speed index	133 A8	147 A8
- type	radial ply	radial ply
- maximum load (tyre manufacturer's)	20.60 kN	30.80 kN
at travelling speed	40 km/h	40 km/h
at tyre inflation pressure	140 kPa	140 kPa
dynamic radius index	590 mm	795 mm
- maximum load (tractor manufacturer's wheel load)	15.0 kN	22.5 kN
Chosen track width:	1694 mm	1700 mm

2.6 Fuel

- Type: ARAL-Diesel-fuel, in conformity with DIN 51601
- Density at 15°C: At p.t.o. tests 0.840 g/cm³
  at drawbar power tests 0.836 g/cm³

2.7 Oils and lubrication

2.7.1 Capacity and change interval

	Capacity dm³	Oil change h	Filter-change h
Engine	12	250	250
Gear box and rear axle	34	1000	1000
Front axle	5	1000	-
Rear axle	in common with gearbox		
Final drives front (each)	0.7	500	-
Final drives rear (each)	in common with gearbox		
Hydraulic system	34	1000	1000
Steering	in common with hydraulic system		

2.7.2 Specifications:

	Recommended	Used during tes
Engine oil: Used in engine		
Type	Engine Oil , Universal STOU	SHELL Engine (
Viscosity Classification	SAE 10W30, 15W30, 10W40 MIL-L-2104C/D, MIL-L-2105	SAE 15W30 MIL-L-2105, API (
Transmission oil: Used in gear box and rear axle		
Type Viscosity Classification	Universal STOU/UTTO SAE 10W30, 15W30, 10W40 MIL-L-2104C/D, MIL-L-2105, API GL 4	BP Fluid 422 API GL4
Hydraulic oil: Used in hydraulic and steering system		
Type Viscosity	Hydraulic oil ISO VG 46 HLP DIN 51524	SHELL T46 ISO VG46 HLP
Transmission oil: Used in front axle and front final drives		
Type Viscosity Classification	Transmission oil SAE 80W90, 85W90 MIL-L-2105 B	AGIP Rotra MP/S SAE 80W90 MIL-L-2105 B/C, API

2.7.3 Grease Multi purpose grease

- number of lubrication points: 20

3 COMPULSORY TESTS RESULTS

3.1 Main Power Take Off Performance (1000 min^{-1})

Date of tests: 26th January 2001
Location of tests: DLG-Testing Station Groß-Umstadt
Type of dynamometer: SCHENCK hydraulic dynamometer U1-40

Power kW	Speed Engine min^{-1}	Speed P.t.o. min^{-1}	Fuel consumption hourly kg/h	Fuel consumption hourly dm³/h	Fuel consumption specific g/kWh	Specific energy kWh/dm³
Maximum power						
3.1.1 At 2-hour test						
66.6	2102	987	15.39	18.33	231	3.63
3.1.2 At rated speed						
63.8	2300	1080	15.92	18.96	249	3.36
3.1.3 At standard p.t.o. speed						
66.6	2132	1001	15.54	18.51	233	3.60
3.1.4 **Part loads, the governor hand lever in the position corresponding to maximum power at full load (curve a)**						
3.1.4.1 the torque corresponding to maximum power at rated speed						
63.8	2300	1080	15.92	18.96	249	3.36
3.1.4.2 85% of the torque obtained in 3.1.4.1						
55.1	2345	1101	14.60	17.39	265	3.17
3.1.4.3 75% of the torque defined in 3.1.4.2						
42.2	2387	1121	12.41	14.78	294	2.85
3.1.4.4 50% of the torque defined in 3.1.4.2						
28.9	2428	1140	10.16	12.10	352	2.39
3.1.4.5 25% of the torque defined in 3.1.4.2						
14.5	2455	1153	7.74	9.22	535	1.57
3.1.4.6 unloaded						
-	2489	1169	4.62	5.50	-	-

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Power kW	Speed Engine min^{-1}	Speed P.t.o. min^{-1}	Fuel consumption hourly kg/h	Fuel consumption hourly dm³/h	Fuel consumption specific g/kWh	Specific energy kWh/dm³
3.1.5 Part loads, the governor hand lever in the position corresponding to standard p.t.o. speed at full load (curve b)						
3.1.5.1 the torque corresponding to maximum power						
66.6	2132	1001	15.54	18.51	233	3.60
3.1.5.2 85% of the torque obtained in 3.1.5.1						
57.9	2181	1024	14.21	16.93	245	3.42
3.1.5.3 75% of the torque defined in 3.1.5.2						
44.5	2240	1052	11.88	14.15	267	3.14
3.1.5.4 50% of the torque defined in 3.1.5.2						
30.2	2281	1071	9.57	11.40	317	2.65
3.1.5.5 25% of the torque defined in 3.1.5.2						
15.3	2317	1088	7.23	8.61	474	1.78
3.1.5.6 unloaded						
-	2360	1108	4.22	5.02	-	-

No load maximum engine speed:	2489 min^{-1}
Equivalent flywheel torque at rated engine speed:	265 Nm
Equivalent flywheel torque at 2-hour test:	302 Nm
at engine speed:	2102 min^{-1}
Maximum equivalent flywheel torque:	370 Nm
at engine speed:	1205 min^{-1}

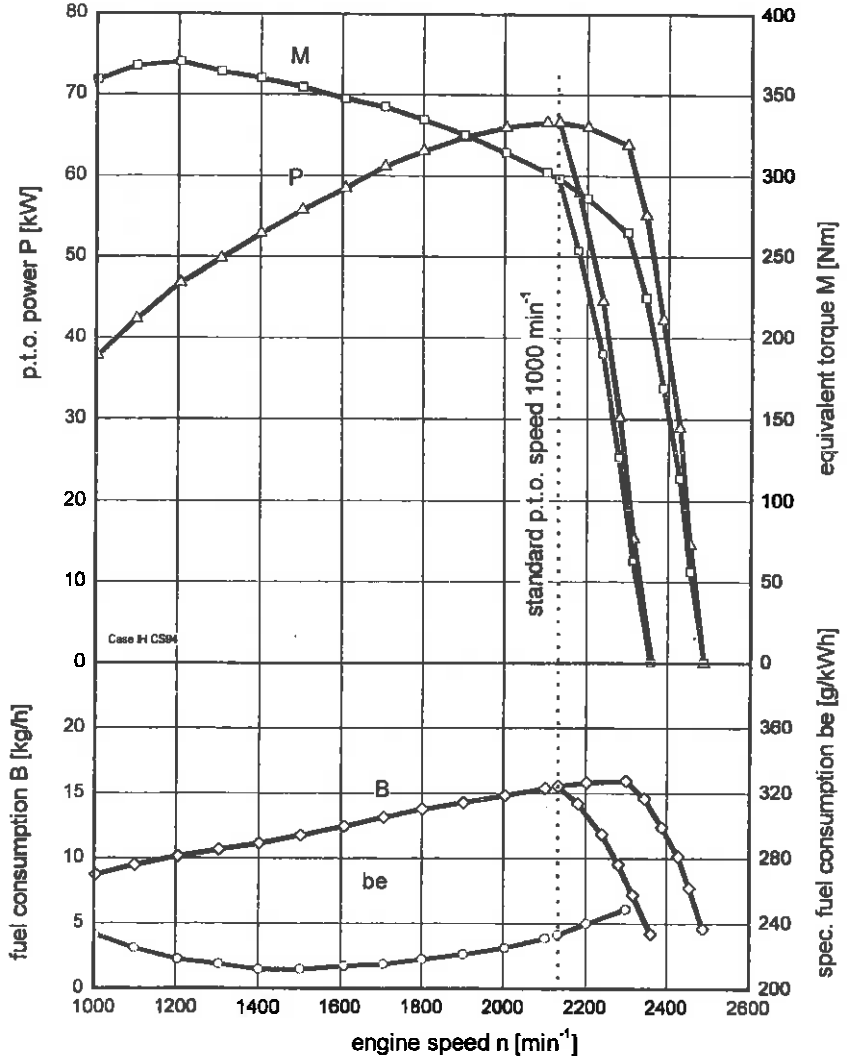
Mean atmospheric conditions

temperature:	20 °C
pressure:	99 kPa
relative humidity:	50 %

Maximum temperatures

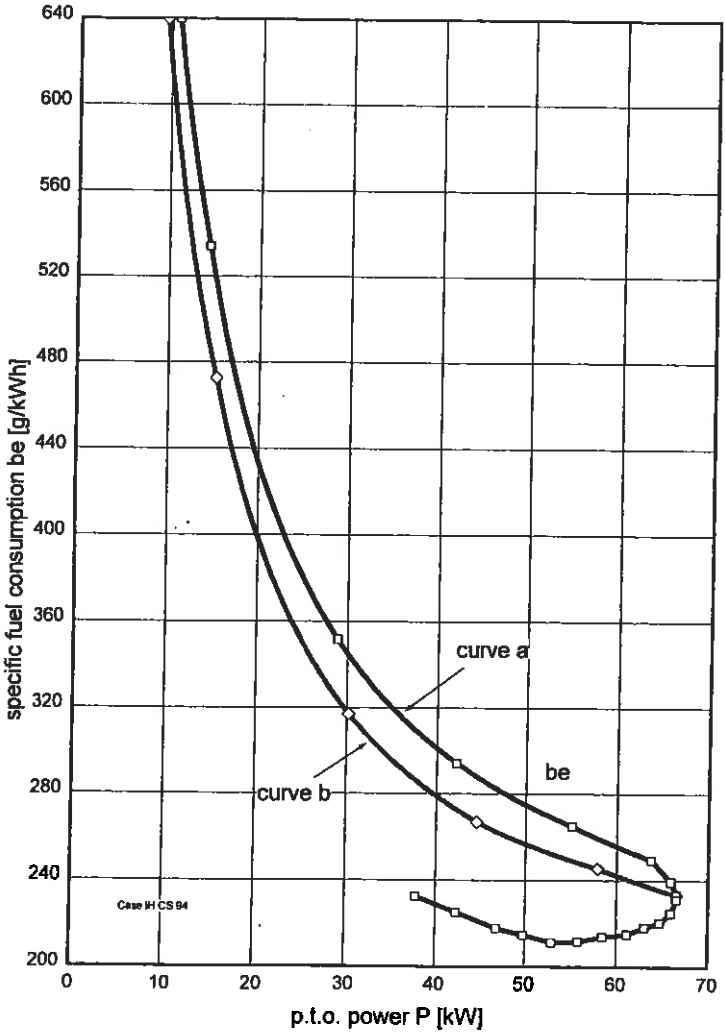
coolant:	92 °C
oil:	125 °C
fuel:	51 °C
air intake:	20 °C

P.T.O. Test


M
P
B
be
standard p.t.o. speed 1000 min-1
Case IH CS94
p.t.o. power P [kW]
equivalent torque M [Nm]
fuel consumption B [kg/h]
spec. fuel consumption be [g/kWh]
engine speed n [min-1]
80
70
60
50
40
30
20
10
0
400
350
300
250
200
150
100
50
0
20
15
10
5
0
360
320
280
240
200
1000
1200
1400
1600
1800
2000
2200
2400
2600

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P.T.O. Test



3.2 HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 31st January 2001

3.2.1 Hydraulic power test

- Sustained pressure with relief valve open: 19.5 MPa
- Pump stalled: No
- Pump delivery rate at minimum pressure: 54.0 dm^3/min

	Hydraulic power kW	Flow rate dm^3/min	Pressure MPa	Oil Temperature °C
At 90% of the actual relief valve setting	14.0	47.6	17.6	65
Maximum	14.0	47.6		

- Tapping point used for test: At rear of tractor
- Opening/closing pressure of unloading valve: Not applicable

3.2.2 Power lift test at rear power lift

	At the hitch points	On the frame
Height of lower hitch points above ground in down position	200 mm	
Vertical movement without lifting forces	780 mm	900 mm
Vertical movement with lifting forces	736 mm	765 mm
Max. corrected force exerted through full range	38.7 kN	34.2 kN
Corresponding pressure		
Moment about rear axle	-	14.28 kNm
Max. tilt angle of mast from vertical		10°

Lifting heights relative to horizontal lower links

mm	-460	-400	-300	-200	-100	0	+100	+200	+300	+336	+400	+440
Lifting forces at hitch points, corrected to 17.6 MPa												
kN		38.70	41.40	43.20	45.00	46.35	47.25	48.15	49.05	49.5		
Lifting forces at standard frame, corrected to 17.6 MPa												
kN	34.20	35.10	36.45	36.90	37.35	37.35	36.90	36.45	35.55		34.20	33.75

3.3 DRAWBAR POWER TEST (unballasted tractor)

Date of test: 12th till 16th February 2001
Type of track: Concrete

Gear number and range	Power kW	Drawbar pull kN	Speed km/h	Engine speed min^{-1}	Slip of wheels %
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)					
2 Field L	41.5	43.06	3.47	2341	15.0
2 Field H	48.7	42.94	4.08	2304	15.0
3 Field L	55.1	39.08	5.08	2093	7.3
3 Field H	57.2	32.69	6.30	2102	4.3
1 Road L	56.6	31.94	6.38	2104	5.4
1 Road H	57.5	26.76	7.74	2100	3.8
4 Field L	56.2	23.43	8.63	2113	3.1
4 Field H	54.9	19.18	10.31	2099	2.5
2 Road L	58.2	17.98	11.65	2093	1.8
2 Road H	57.7	14.80	14.03	2096	1.5
FUEL CONSUMPTION					
3.3.2.1 in selected gear, at maximum power at rated speed					
2 Road L	55.3	15.45	12.88	2309	1.6
3.3.2.1.1 75 % of pull at maximum power at rated speed					
2 Road L	42.4	11.53	13.23	2365	1.3
3.3.2.1.2 50 % of pull at maximum power at rated speed					
2 Road L	29.1	7.73	13.53	2408	0.8
3.3.2.1.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1					
2 Road H	42.3	11.42	13.33	1985	1.2
3.3.2.1.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2					
2 Road H	28.2	7.56	13.44	2000	0.9
3.3.2.2 in selected gear nearest to 7.50 km/h at rated speed					
1 Road L	56.3	28.5	7.11	2303	3.2
3.3.2.2.1 75 % of pull at maximum power at rated speed					
1 Road L	43.9	21.43	7.37	2362	2.0
3.3.2.2.2 50 % of pull at maximum power at rated speed					
1 Road L	29.9	14.18	7.58	2407	1.2
3.3.2.2.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1					
1 Road H	43.8	21.31	7.41	1981	2.5
3.3.2.2.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2					
1 Road H	30.7	14.40	7.68	2037	1.7

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	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
nballasted	470 mm	80 kPa	80 kPa

Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
		Fuel	Coolant	Engine oil	Tempe-rature	Relative humidity	Pressure
g/kWh	kWh/dm³	°C	°C	°C	°C	%	kPa
345	2.42	46	77	112	1	65	101.5
322	2.59	51	80	115	4	65	101.5
278	3.01	53	86	110	10	60	99.5
289	3.10	49	83	111	2	60	99.5
272	3.07	53	86	113	14	60	99.5
267	3.14	53	84	111	14	60	99.5
272	3.07	54	86	114	14	60	99.5
279	3.00	54	85	115	14	60	99.5
264	3.17	50	85	113	7	60	99.5
267	3.13	51	84	116	8	60	99.5
290	2.89	47	82	115	3	59	101.0
325	2.58	48	80	116	6	59	101.0
390	2.14	46	78	115	6	59	101.0
284	2.94	50	80	110	7	59	101.0
327	2.56	51	78	109	10	59	101.0
283	2.95	54	87	110	12	65	101.5
310	2.70	55	83	116	12	65	101.5
371	2.26	56	81	116	13	65	101.5
270	3.09	57	82	114	13	65	101.5
309	2.70	57	80	112	13	65	101.5

4	**OPTIONAL TESTS RESULTS**	**None**
5	**REPAIRS**	**None**
6	**REMARKS**	**None**

Head of tractor test section

Dipl.-Ing. Manfred Lober

Test carried out by

Dipl.-Landw. Friedrich Uhlig

Date: 3rd January 2002