LABORATORIO DI MECCANICA AGRARIA

DIPARTIMENTO DI ECONOMIA E INGEGNERIA AGRARIE

MINISTERO DELLE POLITICHE AGRICOLE E COMUNITARIE

Report DEIAGRA – sez. I.A. n° 4502

O.E.C.D. approval number: 1/2 165

Report on test in accordance with the O.E.C.D. Standard Code for the Official Testing of Agricultural and Forestry Tractor Performance
O.E.C.D. Code 1



Agricultural tractor

Make: **NEW HOLLAND;** Model: **TN 70 A**

(Two wheel drive tractor 30 km/h version)

Tractor manufacturer: CNH INTERNATIONAL, S.A., 13 Rue Aldrigen 1118, LUXEMBOURG

Date of test: March 2004 - June 2004

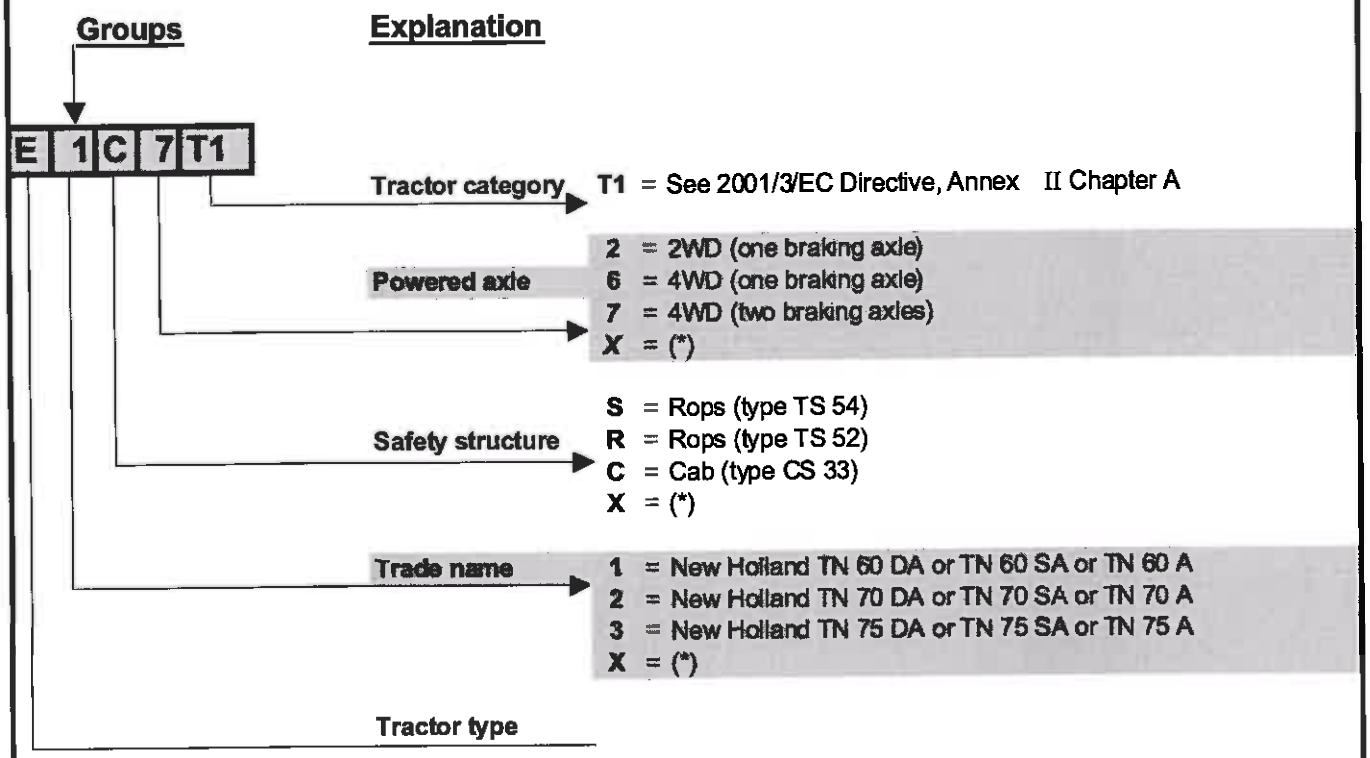
Date of approval: 30 August 2004

This report has been approved by the O.E.C.D. Co-ordinating Centre (CEMAGREF - France) as being in accordance with the O.E.C.D. Tractors Test Code

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Codification System New Holland Tractors



(*) Symbol X is inserted when the meaning is not relevant in the homologation procedure.

Example: E1C7T1 means an E tractor type, New Holland TN 60 DA trade name, with cab, 4WD, and T1 tractor category (see 2001/3/EC Directive, Annex II Chapter A)

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4.1 Test procedure for measuring hydraulic lift capacity on agricultural tractors equipped with three-point hitch - SAE J 283, Nov. 1999 36

1.2.1 Cylinders

C	- Number/disposition:	3, vertical, in line
D	- Bore/stroke:	104 mm / 115 mm
D	- Capacity:	2930 cm^3
D	- Compression ratio:	18±0.5 :1
D	- Arrangement of valves:	overhead valves, 2 per cylinder
D	- Cylinder liners:	dry liners
		The engine fitted on the tested tractor is approved according to Directive 2000/25/EC, EURO II (approval number e13*2000/25B*00/000/*0001*00).
		The engine is also in accordance with the requirements of the Environmental Protection Agency (EPA), step II, in terms of emission of gaseous and particulate pollutants

1.2.2 Supercharging

C	- Make/Model/Type:	MITSUBISHI/49377/exhaust driven supercharger, in alternative, GARRETT/TA25/ exhaust driven supercharger
D	- Pressure:	95 kPa

1.2.3 Fuel system

C	- Fuel feed system:	membrane pump
C	- Make/Model/Type of fuel filter:	CNH/not announced/ with replaceable cartridge and filter inside the fuel feed pump
D	- Capacity of fuel tank:	53 dm^3 in plastic material, on the left side, under the tractor footrest. Behind the driver's seat is placed a second fuel tank with a capacity of 37 dm^3. As option there is a 65.5 dm^3 fuel tank, in plastic material, on the left side, under the tractor footrest
C	- Make/Model/Type of injection pump:	BOSCH/L973/rotary injection pump
C	- Serial N°:	400569
	- Manufacturer's production, setting of injection pump	
C	. Flow rate (rated engine speed and full load):	75 mm^3 per stroke (corresponding to 15.5 dm^3/h)
D	. Timing:	0 ± 0.5°
D	- Make/Model/Type of injectors:	BOSCH/DLLA 132S/multihole injection nozzle

D	- Injection pressure:	26 ± 0.12 MPa

1.2.4 Governor

C	- Make/Model/Type:	BOSCH/ integrated in the injection pump/ mechanical type
C	- Governed range of engine speed:	650±30 ÷ 2500±50 min^{-1}(rev/min)
C	- Rated engine speed:	2300 ± 30 min^{-1}(rev/min)

1.2.5 Air cleaner

	- Pre-cleaner	none
	- Main cleaner	
C	Make/Model/Type:	CNH/document n.1.19.100 AC/ dry air filter, with double cartridge
C	Location of air intake	in front of the radiator, under the bonnet
C	Maintenance indicator:	warning light on dashboard

1.2.6 Lubrication system

D	- Type of feed pump:	forced feed by means of gear pump. Engine oil cooled by a heat exchanger with engine coolant
C	- Type of filter:	replaceable cartridge
C	- Number of filters:	1

1.2.7 Cooling system

C	- Type of coolant:	water-anti freeze mixture
D	- Type of pump:	centrifugal pump
	- Specification of fan or blower	propeller fan driven by engine shaft
C	Number of fan blades:	6
C	Fan diameter:	420 mm
D	- Coolant capacity:	12 dm^3
C	- Type of temperature control:	thermostat and by-pass circuit, viscous drive fan, belt driven; variable fan speed controlled by air flow temperature. As option a propeller fan driven by engine shaft
D	- Superpressure system:	71 kPa

1.2.8 Starting system

C	- Make/Model/Type:	BOSCH/1.74.400.AB /Starter motor
D	- Starter motor power rating:	2.6 kW
C	- Cold starting aid:	CAV, 357/10, as option BERU, 0101

C - Safety device: forward and reverse lever in neutral position and pto disenganged

1.2.9 Electrical system

C - Voltage: 12 V, negative earth

- Generator

C . Make/Model/Type: Denso/ 1.74.000 AC /Alternator

as option Denso/1.74.000 AD / Alternator

D . Power: 910 W

- Battery of accumulators: lead acid type

C . Number: 1

D . Rating: 88 Ah at 20 hours

1.2.10 Exhaust system

C - Make/Model/Type: CNH/document n. 1.15.001AB/ interference type with internal perforated pipe

C - Location: on the left hand side of engine, under the bonnet, with the vertical exhaust pipe (fitted on the tested tractor) or the horizontal exhaust pipe on the left side; as option exhaust pipe with ejector

1.3 Transmission

1.3.1 Clutch

D - Make/Model/Type: LUK/ 11/11 / double clutch with two dry plates included in the same clutch pressure plate, one for the pto and the other for gear box, but independently operated

(Only for travelling)

D - Number of plates: 1

D - Diameter of plates: 280 mm

C - Method of operation: mechanically operated by pedal

1.3.2 Gear box

D - Make/Model/Type: CNH/ not announced/mechanical synchronised constant mesh gears, direct engagement by hand levers

- Description:

		Forward	Reverse
C	Number of ranges/groups	4/1	4/1
C	Number of gears	4	4

C	Total of arrangements	16	16

D - Available options:

44x16 HI-LO

32x16 HI-LO

(when the reverse is engaged the position HI is automatically excluded)

12x12 mechanical

28x16 mechanical

44x16 mechanical

1.3.3 Rear axle and final drives

D - Make/Model/Type: CNH/not announced/bevel gear differential and epicyclical final drivers

- Differential lock

D . Type: mechanical or, as option, electro-hydraulic

C . Method of engagement: pushing the device control pedal on the right side of the floor or, as option, pushing a button

C . Method of disengagement: pushing one of the two brake pedals

1.3.4 Front axle and final drives

D - Make/Model/Type: CNH/not announced/ telescopic axle with hydrostatic steering

- Differential lock: not applicable

1.3.5 Total ratios and traveling speeds

TN70A with 16 forward speeds and 16 reverse speeds (fitted on the tested tractor)			
Gear No	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*)at rated engine speed of 2300 min^{-1}(rev/min) km/h
C 1	low	964.506	0.625
C 2	low	647.023	0.931
C 3	low	440.151	1.369
C 4	low	297.102	2.028
C 1	medium low	229.480	2.626
C 2	medium low	153.943	3.914
C 3	medium low	104.723	5.754

4	medium low	70.688	8.525
1	medium high	187.455	3.215
2	medium high	125.751	4.791
3	medium high	85.545	7.044
4	medium high	57.743	10.436
1	high	64.928	9.281
2	high	43.556	13.835
3	high	29.630	20.338
4	high	20.000	30.130
Reverse			
1	low	995.619	0.605
2	low	667.894	0.902
3	low	454.350	1.326
4	low	306.688	1.965
1	medium low	236.882	2.544
2	medium low	158.909	3.792
3	medium low	108.101	5.574
4	medium low	72.968	8.258
1	medium high	193.502	3.114
2	medium high	129.808	4.642
3	medium high	88.305	6.824
4	medium high	59.606	10.110
1	high	67.022	8.991
2	high	44.961	13.403
3	high	30.585	19.702
4	high	20.645	29.189

TN70A with 12 forward speeds and 12 reverse speeds			
Gear No	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*)at rated engine speed of 2300 min^{-1}(rev/min) km/h
1	low	334.069	1.804
2	low	224.105	2.689
3	low	152.452	3.953

4	low	102.9	5.856
1	medium	187.455	3.215
2	medium	125.751	4.792
3	medium	85.545	7.044
4	medium	57.743	10.436
1	high	64.928	9.281
2	high	43.556	13.835
3	high	29.630	20.338
4	high	20.000	30.130
Reverse			
1	low	344.846	1.747
2	low	231.334	2.605
3	low	157.37	3.829
4	low	106.225	5.673
1	medium	193.502	3.114
2	medium	129.808	4.642
3	medium	88.305	6.824
4	medium	59.606	10.110
1	high	67.022	8.991
2	high	44.961	13.403
3	high	30.585	19.702
4	high	20.645	29.189

TN70A with 28 forward speeds, with creeper unit (C), and 16 reverse speeds			
Gear No	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*)at rated engine speed of 2300 min^{-1}(rev/min) km/h
1	C low	3722.650	0.162
2	C low	2497.280	0.241
3	C low	1698.830	0.355
4	C low	1146.710	0.528
1	C medium low	885.712	0.680
2	C medium low	594.165	1.014
3	C medium low	404.194	1.491

C	4	C medium low	272.631	2.209
C	1	C medium high	723.511	0.833
C	2	C medium high	485.355	1.242
C	3	C medium high	330.174	1.825
C	4	C medium high	222.867	2.704
C	1	low	964.506	0.625
C	2	low	647.023	0.931
C	3	low	440.151	1.369
C	4	low	297.102	2.028
C	1	medium low	229.480	2.626
C	2	medium low	153.943	3.914
C	3	medium low	104.723	5.754
C	4	medium low	70.688	8.525
C	1	medium high	187.455	3.215
C	2	medium high	125.751	4.792
C	3	medium high	85.545	7.044
C	4	medium high	57.743	10.436
C	1	high	64.928	9.281
C	2	high	43.556	13.835
C	3	high	29.630	20.338
C	4	high	20.000	30.130
	Reverse			
C	1	low	995.619	0.605
C	2	low	667.894	0.902
C	3	low	454.350	1.326
C	4	low	306.688	1.965
C	1	medium low	236.882	2.544
C	2	medium low	158.909	3.792
C	3	medium low	108.101	5.574
C	4	medium low	72.968	8.258
C	1	medium high	193.502	3.114
C	2	medium high	129.808	4.642

C	3	medium high	88.305	6.824
C	4	medium high	59.606	10.110
C	1	high	67.022	8.991
C	2	high	44.961	13.403
C	3	high	30.585	19.702
C	4	high	20.645	29.189

TN70A with 44 forward speeds, with creeper unit (C) , and 16 reverse speeds

	Gear No	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*)at rated engine speed of 2300 min^{-1} (rev/min) km/h
C	1	C low	3722.650	0.162
C	2	C low	2497.280	0.241
C	3	C low	1698.830	0.355
C	4	C low	1146.710	0.528
C	1	C medium low	885.712	0.680
C	2	C medium low	594.165	1.014
C	3	C medium low	404.194	1.491
C	4	C medium low	272.831	2.209
C	1	C medium high	723.511	0.833
C	2	C medium high	485.355	1.242
C	3	C medium high	330.174	1.825
C	4	C medium high	222.867	2.704
C	1	low	1157.410	0.521
C	2	low	964.506	0.625
C	3	low	776.427	0.776
C	4	low	647.023	0.931
C	5	low	528.182	1.141
C	6	low	440.151	1.369
C	7	low	356.523	1.690
C	8	low	297.102	2.028
C	1	medium low	275.376	2.188

2	medium low	229.480	2.626
3	medium low	184.731	3.262
4	medium low	153.943	3.914
5	medium low	125.668	4.795
6	medium low	104.723	5.754
7	medium low	84.826	7.104
8	medium low	70.688	8.525
1	medium high	224.946	2.679
2	medium high	187.455	3.215
3	medium high	150.901	3.993
4	medium high	125.751	4.792
5	medium high	102.654	5.870
6	medium high	85.545	7.044
7	medium high	69.291	8.697
8	medium high	57.743	10.436
1	high	77.913	7.734
2	high	64.928	9.281
3	high	52.267	11.529
4	high	43.556	13.835
5	high	35.556	16.948
6	high	29.630	20.338
7	high	24.000	25.109
8	high	20.000	30.130
Reverse			
1	low	995.619	0.605
2	low	667.894	0.902
3	low	454.350	1.326
4	low	306.688	1.965
1	medium low	236.882	2.544
2	medium low	158.909	3.792
3	medium low	108.101	5.574
4	medium low	72.968	8.258
1	medium high	193.502	3.114
2	medium high	129.808	4.642
3	medium high	88.305	6.824

4	medium high	59.606	10.110
1	high	67.022	8.991
2	high	44.961	13.403
3	high	30.585	19.702
4	high	20.645	29.189

TN70A with 32 forward speeds, with HI-LO, and 16 reverse speeds			
Gear No	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*)at rated engine speed of 2300 min^{-1}(rev/min) km/h
1	low	1157.410	0.521
2	low	964.506	0.625
3	low	776.427	0.776
4	low	647.023	0.931
5	low	528.182	1.141
6	low	440.151	1.369
7	low	356.523	1.690
8	low	297.102	2.028
1	medium low	275.376	2.188
2	medium low	229.480	2.626
3	medium low	184.731	3.262
4	medium low	153.943	3.914
5	medium low	125.668	4.795
6	medium low	104.723	5.754
7	medium low	84.826	7.104
8	medium low	70.688	8.525
1	medium high	224.946	2.679
2	medium high	187.455	3.215
3	medium high	150.901	3.993
4	medium high	125.751	4.792
5	medium high	102.654	5.870
6	medium high	85.545	7.044
7	medium high	69.291	8.697
8	medium high	57.743	10.436

1	high	77.913	7.734
2	high	64.928	9.281
3	high	52.267	11.529
4	high	43.556	13.835
5	high	35.556	16.948
6	high	29.630	20.338
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8	high	20.000	30.130
Reverse			
1	low	995.619	0.605
2	low	667.894	0.902
3	low	454.350	1.326
4	low	306.688	1.965
1	medium low	236.882	2.544
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4	medium high	59.606	10.110
1	high	67.022	8.991
2	high	44.961	13.403
3	high	30.585	19.702
4	high	20.645	29.189

TN70A with 44 forward speeds, with HI-LO, with creeper unit (C), and 16 reverse speeds

Gear No	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*)at rated engine speed of 2300 min^{-1}(rev/min) km/h
1	C low	2473.090	0.244
2	C low	1659.030	0.363
3	C low	1128.590	0.534
4	C low	761.801	0.791

C	1	C medium low	588.410	1.024
C	2	C medium low	394.725	1.527
C	3	C medium low	268.520	2.244
C	4	C medium low	181.251	3.325
C	1	C medium high	480.654	1.254
C	2	C medium high	322.439	1.869
C	3	C medium high	219.346	2.747
C	4	C medium high	148.059	4.070
C	1	low	1157.410	0.521
C	2	low	964.506	0.625
C	3	low	776.427	0.776
C	4	low	647.023	0.931
C	5	low	528.182	1.141
C	6	low	440.151	1.369
C	7	low	356.523	1.690
C	8	low	297.102	2.028
C	1	medium low	275.376	2.188
C	2	medium low	229.480	2.626
C	3	medium low	184.731	3.262
C	4	medium low	153.943	3.914
C	5	medium low	125.668	4.795
C	6	medium low	104.723	5.754
C	7	medium low	84.826	7.104
C	8	medium low	70.688	8.525
C	1	medium high	224.946	2.679
C	2	medium high	187.455	3.215
C	3	medium high	150.901	3.993
C	4	medium high	125.751	4.792
C	5	medium high	102.654	5.870
C	6	medium high	85.545	7.044
C	7	medium high	69.291	8.697
C	8	medium high	57.743	10.436

1	high	77.913	7.734
2	high	64.928	9.281
3	high	52.267	11.529
4	high	43.556	13.835
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1	high	67.022	8.991
2	high	44.961	13.403
3	high	30.585	19.702
4	high	20.645	29.189

(*) Calculated with a dynamic radius index of 695 mm (in conformity with ISO 4295-1:1998)

1.4 Power take-off

1.4.1 Main power take-off

- Type: independent
- Method of engagement: by hand lever acting on a dry clutch
- Number of shafts: 1
- Method of changing power take-off shaft ends and speeds:

by lever and physically replacing the PTO shaft

1.4.1.1 Power take-off proportional to engine speed

	Type of power take-off	540 min^{-1} (rev/min)	540 min^{-1} economic (rev/min)	1000 min^{-1} (rev/min)
C	- Location:	at the rear of the tractor, in the median plane		
C	- Diameter of power take-off shaft end:	35 mm	35 mm	35 mm
C	- Number of splines (in conformity with ISO 500:1991)	6	6	21
C	- Height above ground:	665 mm	665 mm	665 mm
C	- Distance from the median plane of the tractor:	0 mm	0 mm	0 mm
C	- Distance behind rear-wheel axis:	485 mm	485 mm	485 mm
C	- PTO speed at rated engine speed (2300 rev/min):	565 min^{-1}	809 min^{-1}	1017min^{-1}
C	- Engine speed at standard power take-off speed:	2196 min^{-1}	2132 min^{-1}	2260 min^{-1}
C	- Ratio of rotation speeds (engine speed/p.t.o. speed):	4.07	2.845	2.26
D	- Power restriction:	none	none	none
D	- Maximum torque transmissible (equivalent crankshaft torque):	320 Nm	320 Nm	330 Nm
C	- Direction of rotation:	clockwise (viewed from behind tractor)		

1.4.1.2 Power take-off proportional to ground speed

	Type of power take-off	540 min^{-1} (rev/min)	540 min^{-1} economic (rev/min)	1000 min^{-1} (rev/min)
C	- Travelling distance for one revolution of take-off shaft	0.355 m	0.244 m	0.194 m
C	- Number of power take-off shaft revolutions for one revolution of (rear) driving wheels:	12.30	17.88	22.48
C	- Direction of rotation with forward gear engaged:	clockwise (viewed from behind tractor)		

1.4.2 Optional power take-off

none

1.5 Hydraulic power lift

C	- Make/Model/Type:	CNH/not announced/load, position and mixed control operated by two independent levers; a lift-o-matic device is fitted for raising and lowering quickly the lower links. As option hydraulic power lift electronically controlled.
C	- Type of hydraulic system:	open centre system
C	- Type and number of cylinders:	1, single action, internal
C	- Type of linkage lock for transport:	lift-o-matic device
D	- Relief valve pressure setting:	20.5 + 0.5 MPa
D	- Opening pressure of cylinder safety valve:	22 + 0.5 MPa
D	- Lift pump type:	rotative pump driven by the engine shaft (delivery rate of 47 l/min with pump at 2484 min^{-1}, as stated by the manufacturer)
D	- Transmission between pump and engine:	mechanical
C	- Type and number of filters:	1, replaceable paper cartridge
C	- Site of oil reservoir:	gear-box
C	- Type, number and location of tapping points:	4 tapping points, single or double acting, at the rear of tractor
D	- Maximum volume of oil available to external cylinders:	21 dm^3

1.6 *Three point linkage*

C	- Category	in conformity with category 2 of ISO 730-1:1994 + Cor.1:1995
C	- Category adapter:	none

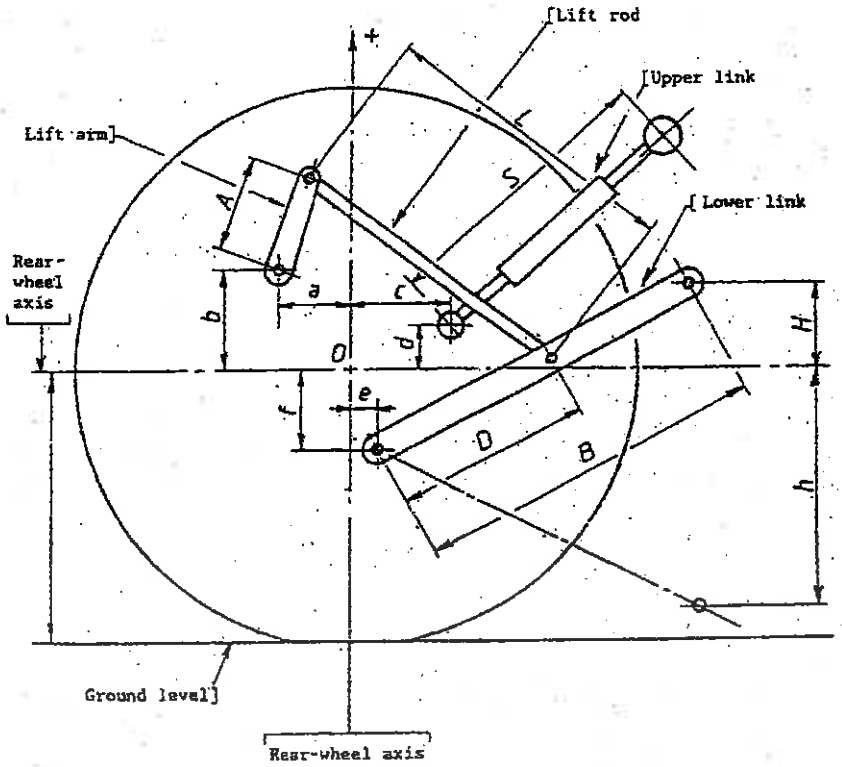


Figure 1.1

Lift test - Linkage geometry

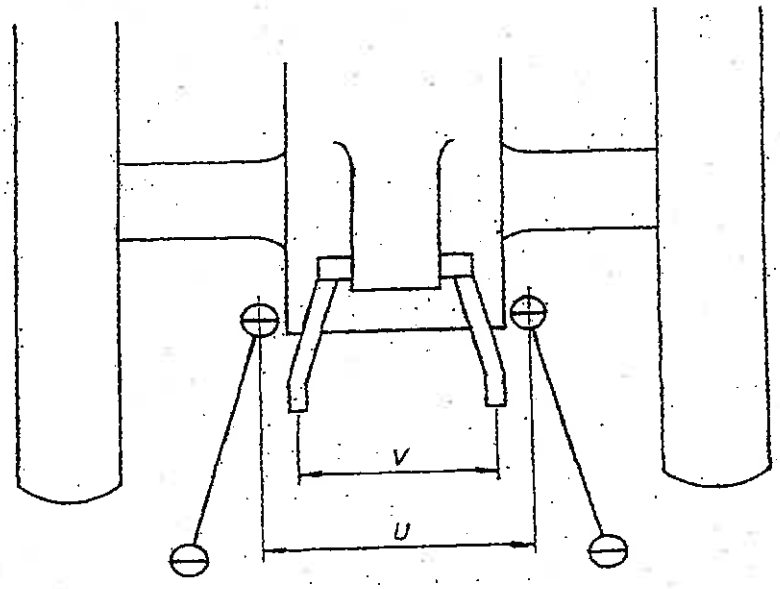


Figure 1.2

Lift test - Linkage geometry

C	Length of lower links:	(B)	880	880
	Distance of lift arm pivot point from rear wheel axis			
C	- horizontally (rearward)	(a)	145	145
C	- vertically	(b)	276	276
C	Horizontal distance between the 2 lower link points:	(U)	405	405
C	Horizontal distance between the 2 lift arm end points:	(V)	450	450
C	Length of upper link:	(S)	555⊕770	695
	Distance of upper link pivot point from rear wheel axis			
C	- horizontally (rearward)	(c)	340-345	345
C	- vertically	(d)	308-361	308
	Distance of lower link pivot point from rear wheel axis			
C	- horizontally	(e)	155	155
C	- vertically	(f)	189	189
C	Distance of lower link pivot points to lift rod pivot points on lower links:	(D)	523	523
C	Length of lift rods :	(L)	570⊕690	572
	Height of lower hitch points relative to the rear-wheel axis			
C	- in low position	(h)	305⊕650	321
C	- in high position	(H)	15⊕320	319
	Height above ground of lower hitch points when locked in transport position		710⊕1015	-
	*Assuming r=695 mm tyre dynamic radius index of ISO 4251-1:1998			

Table 2.1

Dimensions of linkage geometry when connected to the standard frame

1.7 Swinging drawbar

C - Type: CNH, Document n. 1.12.136AA, longitudinally adjustable

- Height above ground

C . Maximum: 440 mm

C . Minimum: 360 mm

C	- Type of adjustment:	by turning the drawbar
C	- Distance of hitch point from rear-wheel axis, horizontally:	691 ÷ 891 mm
	- Distance of hitch point from power take-off shaft end.	
C	. Vertically:	250 ÷ 330 mm
C	. Horizontally:	206 ÷ 406 mm
	- Lateral adjustment	
C	. Right hand:	289 mm
C	. Left hand:	289 mm
C	- Distance of pivot point from rear-wheel axis, horizontally:	310 mm
C	- Diameter of drawbar pinhole:	32 mm
C	- Maximum vertical permissible load:	5.0 kN
D		As option are available the following drawbars: CNH DGM-GA 4036A SAUERMAN HS1000-D-FT-S

1.8 Trailer hitch

C	- Type:	CBM / GTF 30015
C	- Hole diameter:	32 mm
C	- Height above ground:	450 ÷ 900 mm
C	- Distance of hitch point from rear-wheel axis, horizontally:	655 mm
	- Distance of hitch point from power take-off shaft end	
C	. Vertically:	440 mm
C	. Horizontally:	170 mm
D	- Maximum vertical permissible load:	0 kN
D		As option are present the following trailer hitch: CBM / 30014 CBM / D2 CBM / C CNH / D2 CNH / C

SAUERMAN / HS 1000-D-FT-S

1.9 Holed drawbar

Not present on the tested tractor, but available as option

1.10 Steering

D	- Make/Model/Type:	DANFOSS/ORBITROL OSPC 80 ON/hydrostatic. As option OGNIBENE/STH ON80G170LNV/hydrostatic
	- Method of operation	
D	. Pump:	independent gear pump
D	- Ram:	single acting ram positioned in the right side of the front axle and directly acting on it
D	- Working pressure:	17 MPa

1.11 Brakes

1.11.1 Service brake

D	- Make/Model/Type:	CNH/not announced/ 2 oil bath disc, 1 per rear wheel, mounted on the differential shaft;
C	- Method of operation:	foot operated bi-pedal braking device, with hydraulic transmission
C	- Trailer braking take-off:	hydraulic brake system

1.11.2 Parking brake

C	- Type:	fully independent from service brake, 4 oil bath sector double face discs and 2 oil bath sector single face discs, mounted on the pignon shaft in the gear box
C	- Method of operation:	mechanical hand lever

1.12 Wheels

	- Number	
C	. Front	2 steering
C	. Rear	2 driving
C	- Wheelbase:	2070 mm
	- Track width adjustment:	

	Minimum mm	Maximum mm	Adjustment method
D Front	1236	1945	adjusting the telescopic front axle
D Rear	1232	1949	changing the position of the rims in respect to the disc

1.13 Protective structure

C	- Make/Model/Type:	CNH/TS54/ rear roll bar
C	- Manufacturer's name and address:	CNH International SA - 13 rue Aldringen L - 1118 Luxembourg
	- Protective device	
C	. Cab/frame/rollguard/other:	rear roll bar
C	. Tiltable/not tiltable	foldable
	- OECD approval	
C	. Approval number:	4/0 516/3
C	. Date of approval:	5 June 2003
C	. N° of minor modification certificates, if any:	none

1.14 Seat

1.14.1 Driver's seat

C	- Make/Model/Type:	MT/SC78-M30i/mechanical
C	- Seat and steering wheel reversible:	no
C	- Type of suspension:	adjustable spring
C	- Type of damping:	shock absorber
	- Range of adjustment	
C	. Longitudinally:	150 mm
C	. Vertically:	60 mm
C	- Safety belt:	yes
C	. Type	2 point seat belt

1.14.2 Optional driver's seat(s)

D	- Make/Model/Type:	GRAMMER/44/520/mechanical
D	- Type of suspension:	adjustable spring
D	- Type of damping:	shock absorber
	- Range of adjustment	
C	. Longitudinally:	150 mm

C - Vertically: 60 mm

1.14.3 Passenger seat

C - Location: on the left of the driving seat

C - Capacity: 1

1.15 Lighting

	Height above ground of centre	Size	Distance from outside edge of lights to median plane of tractor
	mm	mm	mm
Headlights	1040	160x140	230
Sidelights	1580	110x70	680
Rearlights	1800	170x110	610
Reflectors	1800	170x110	610

2. TEST CONDITIONS

2.1 Overall dimensions

	Length	Width		Height at top of	
		Minimum	Maximum	Protective structure	Exhaust pipe
	mm	mm	mm	mm	mm
Ballasted	3859	1867	2428	2476	2290
Unballasted	3601				

2.2 Ground clearance

- Height: 353 mm
- Clearance-limiting part: drawbar bracket

2.3 Tractor mass

- Tractor tested: mass with TS54 rear roll bar

	Ballasted		Unballasted	
	Without driver	With driver	Without driver	With driver
	kg	kg	kg	kg
Front	1100	1110	725	740
Rear	1755	1820	1640	1700
Total	2855	2930	2365	2440

2.4 Ballast

	Weights		Water
	Number	Total mass	
		kg	kg
Front	6	290	none
Rear	4	200	none
Optional	none	none	none

2.6 Tyres and track width specifications

	Front	Rear
Tyres		
- make	TAURUS	TAURUS
- type	Farm front	Point 8
- dimensions	7.50-16	16.9 R30
- ply rating	103A6	137 A8
- type of casing	Radial	Radial
- maximum load (tyre manufacturer's)	8.6 kN	22.5 kN
- maximum load (tractor manufacturer's)	10.0 kN	17.5 kN
- inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
- dynamic radius index	375	695
Chosen track width	1500	1540

Optional

Dimension	
Front	Rear
6.00-16 94 A6	13.6R28 123 A8
6.50-16 97 A6	12.4R32 122 A8 3.80/70R28 127 A8 12.4R36 124 A8
7.50-16 103 A6	420/70R30 134 A8 14.9R28 128 A8 14.9R30 129 A8 16.9R30 137 A8 480/70R28 140 A8 380/70R28 127 A8 420/70R28 133 A8

2.7 *Fuel*

- type: AGIP diesel oil, in conformity with national standard
- density at 15°C: 0.835 g/cm^3

2.8 *Oils and lubricants*

2.8.1 Capacity and change interval

	Capacity	Oil change	Filter change
	dm^3	h	h
Engine	7.5	300	300
Gear box , rear axle, rear final drive, brakes, hydraulic system and steering	42	300	1200 hours and 2 years
Front axle	none	none	none
Final drive with brakes (front)	none	none	none

2.8.2 Specifications (SAE, API, CCMC, ACEA, MIL.L., ISO)

	Recommended	Used during test
Engine oil Type Viscosity Classification	 AMBRA SUPER GOLD 15W-40 SAE	 As recommended

Transmission oils, hydraulic fluid and steering oil Type Viscosity Classification	 AMBRA MULTI G 10W-30 SAE	 As recommended
Braking oil Type Viscosity Classification	 AKCELA LHM FLUID 7308 ISO	 As recommended

2.7.3 Grease

- number of lubrication points: 15

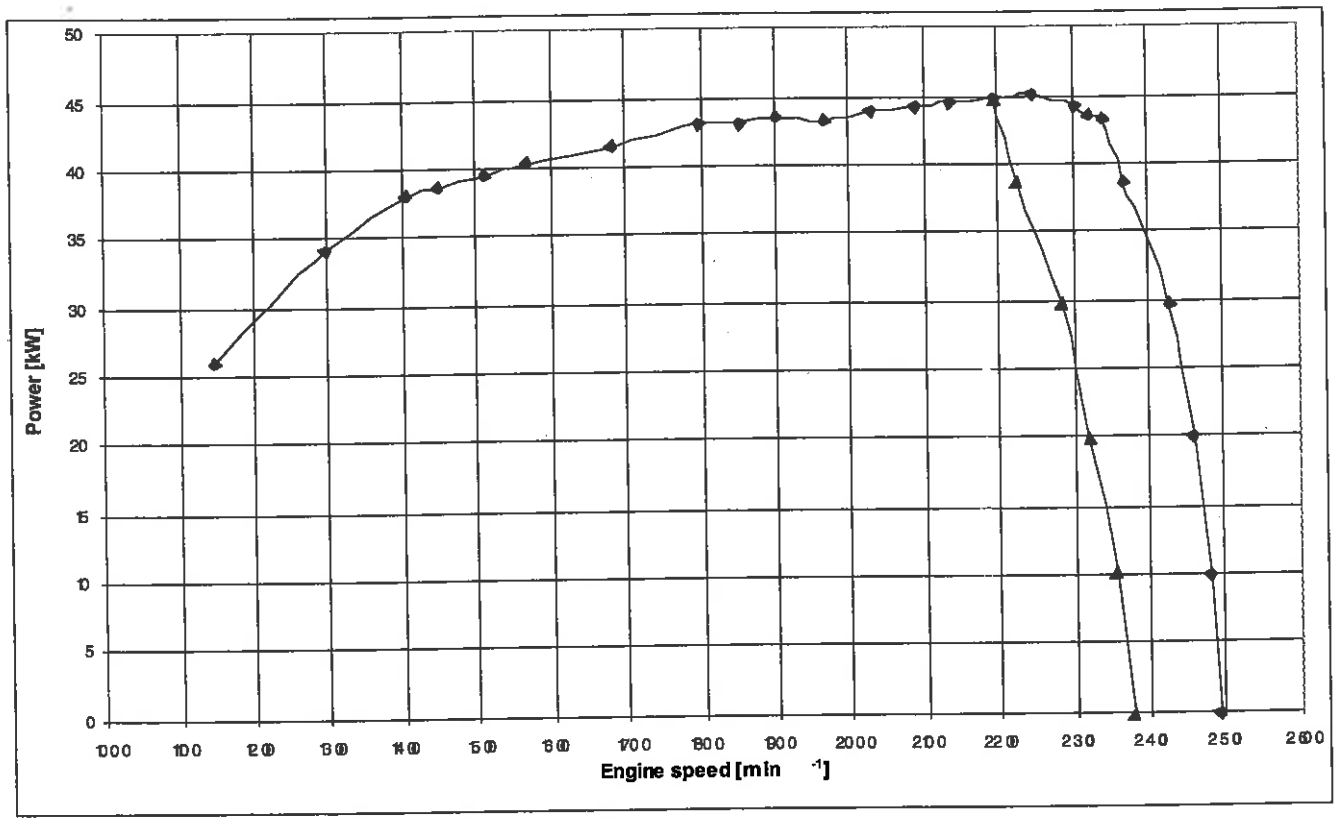
3. COMPULSORY TEST RESULTS

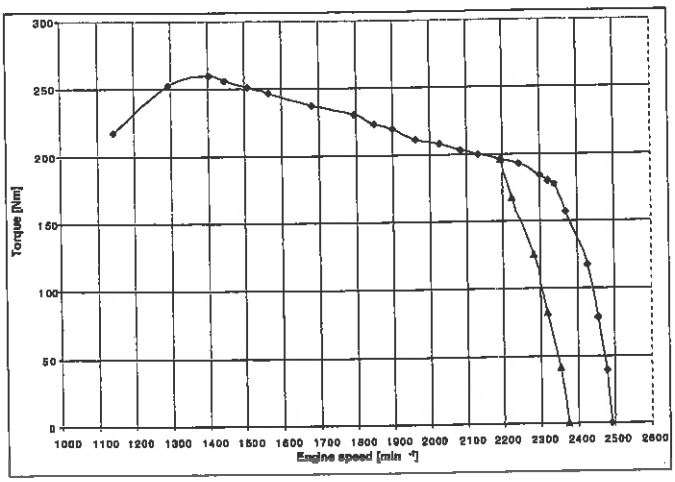
3.1 Main power take-off

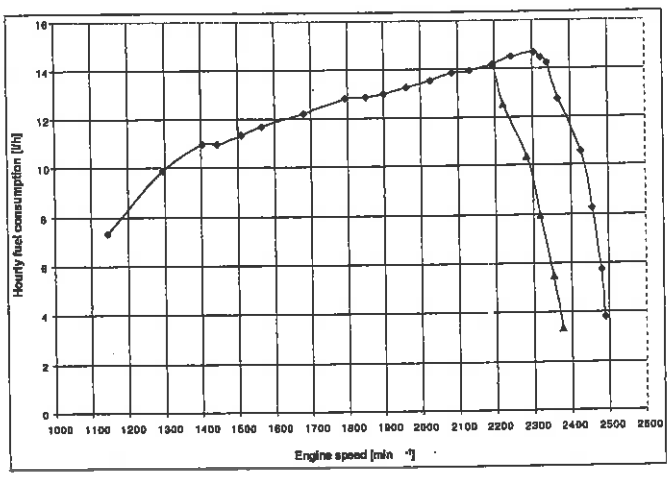
- Date and location of tests: 01.03.2004, Cadriano (BO) - Italy
- Type of dynamometer bench: Schenck U1 - 40

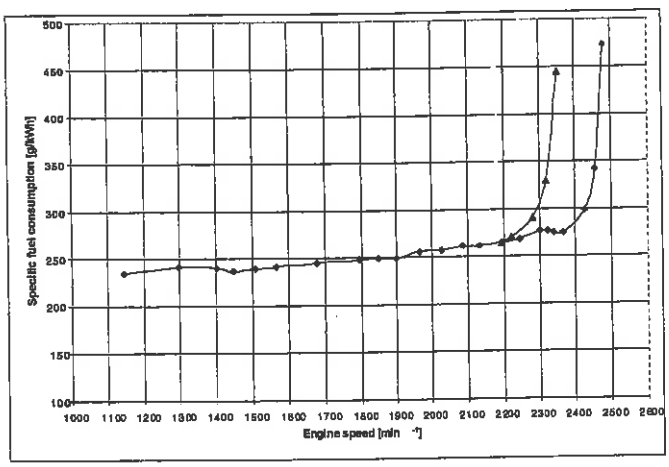
Power	Speed			Fuel consumption			Specific energy
	Engine	P.T.O.	Fan	Hourly		Specific	
kW	min^{-1} (rev/min)			kg/h	l/h	g/kWh	kWh/l
3.1.1	MAXIMUM POWER - TWO-HOUR TEST						
45.3	2245	552	2492	12.16	14.51	268	3.12
3.1.2	POWER AT RATED ENGINE SPEED						
44.4	2302	566	2540	12.30	14.68	277	3.02
3.1.3	STANDARD POWER TAKE-OFF SPEED [540 ± 10 min^{-1} (rev/min)]						
45.0	2193	539	2383	11.90	14.20	264	3.17
3.1.4	PART LOADS						
3.1.4.1	the torque corresponding to maximum power at rated engine speed						
44.4	2302	566	2540	12.30	14.68	277	3.02
3.1.4.2	85% of torque defined in 3.1.4.1						
38.8	2367	582	2615	10.68	12.74	275	3.04
3.1.4.3	75% of torque defined in 3.1.4.2						
29.8	2427	596	2683	8.88	10.60	298	2.81
3.1.4.4	50% of torque defined in 3.1.4.2						
20.2	2455	603	2398	6.90	8.23	342	2.45
3.1.4.5	25% of torque defined in 3.1.4.2						
10.1	2478	609	1650	4.80	5.73	473	1.77
3.1.4.6	unloaded						
/	2489	612	1520	3.18	3.79	/	/
3.1.5	PART LOADS AT STANDARD POWER TAKE-OFF SPEED [540 ± 10 min^{-1} (rev/min)]						
3.1.5.1	the torque corresponding to maximum power						
45.0	2193	539	2383	11.90	14.20	264	3.17
3.1.5.2	85% of torque defined in 3.1.5.1						
38.7	2222	546	2445	10.48	12.50	270	3.10
3.1.5.3	75% of torque defined in 3.1.5.2						
29.8	2282	561	2528	8.68	10.36	291	2.88
3.1.5.4	50% of torque defined in 3.1.5.2						
20.2	2319	570	2571	6.64	7.92	329	2.55
3.1.5.5	25% of torque defined in 3.1.5.2						
10.3	2353	578	1828	4.60	5.48	444	1.89
3.1.5.6	unloaded						
/	2376	584	1556	2.82	3.37	/	/

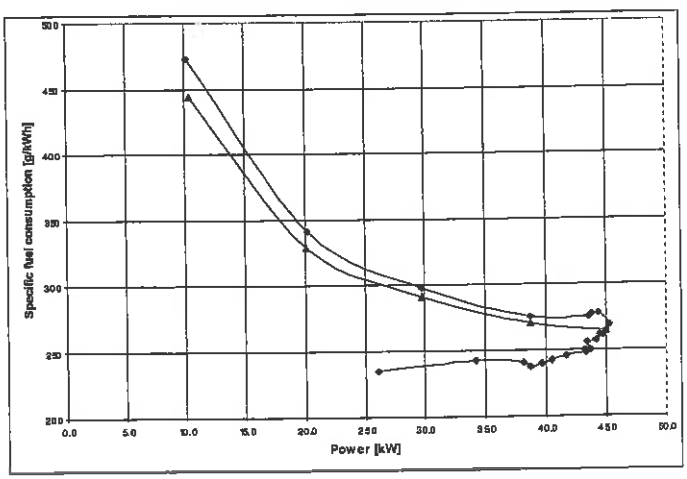
3.1.6 Curves as a function of engine speed











3.1.7 Other results

No load maximum engine speed: 2489 min^{-1}

Torque (equivalent crankshaft) at maximum power

At rated engine speed 184.0 Nm

At two-hour test 192.7 Nm

Maximum torque (equivalent crankshaft) 259.9 Nm

(engine speed) (1403 min^{-1})

Mean atmospheric conditions:	
Temperature	19 °C
Pressure	101.6 kPa
Relative humidity	63 %
Maximum temperature	
Coolant	91 °C
Engine oil	108 °C
Fuel	46 °C
Engine air intake	23 °C

3.2 Hydraulic power and lifting force

- Date of tests: 09.04.2004

3.2.1 Hydraulic power test

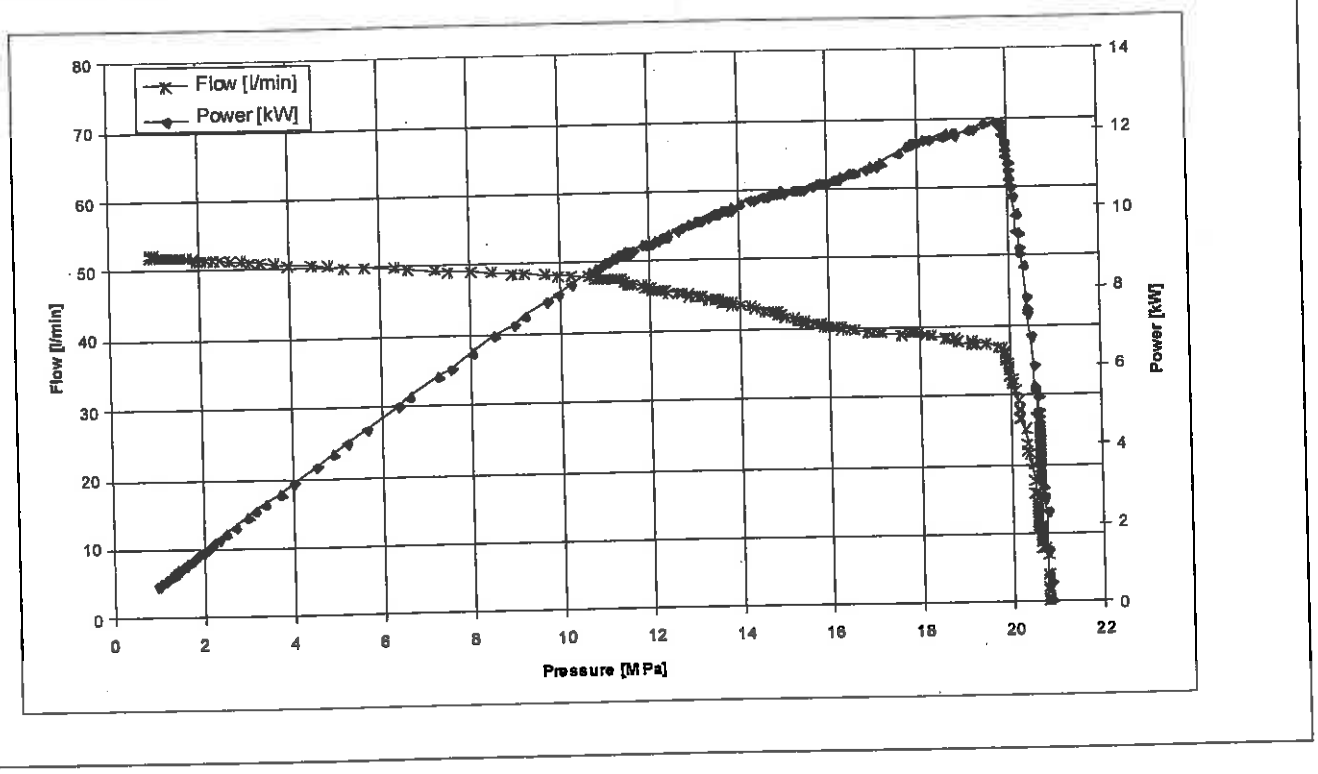
3.2.1.1 Hydraulic fluid data

- Hydraulic fluid type: AKCELA NEXPLORE
- Viscosity index: 120
- Viscosity at 65°C: 25 cSt

3.2.1.2 Compulsory Reporting:

	Pressure	Reservoir oil Temperature °C		Engine Speed	Flow rate	Power
	MPa	Min.	Max.	min^{-1}	l/min	kW
Rated Engine Speed						
3.2.1.2.1 Maximum (sustained) pressure with relief valve open as measured at the coupler Pump stalled: No	20.77	61	68	2373		
3.2.1.2.2 Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power:	18.69	66		2425	38.31	11.88

3.2.1.2.3 Maximum avaible flow and maximum power from one coupler pair:	19.70	66	2411	37.06	12.17

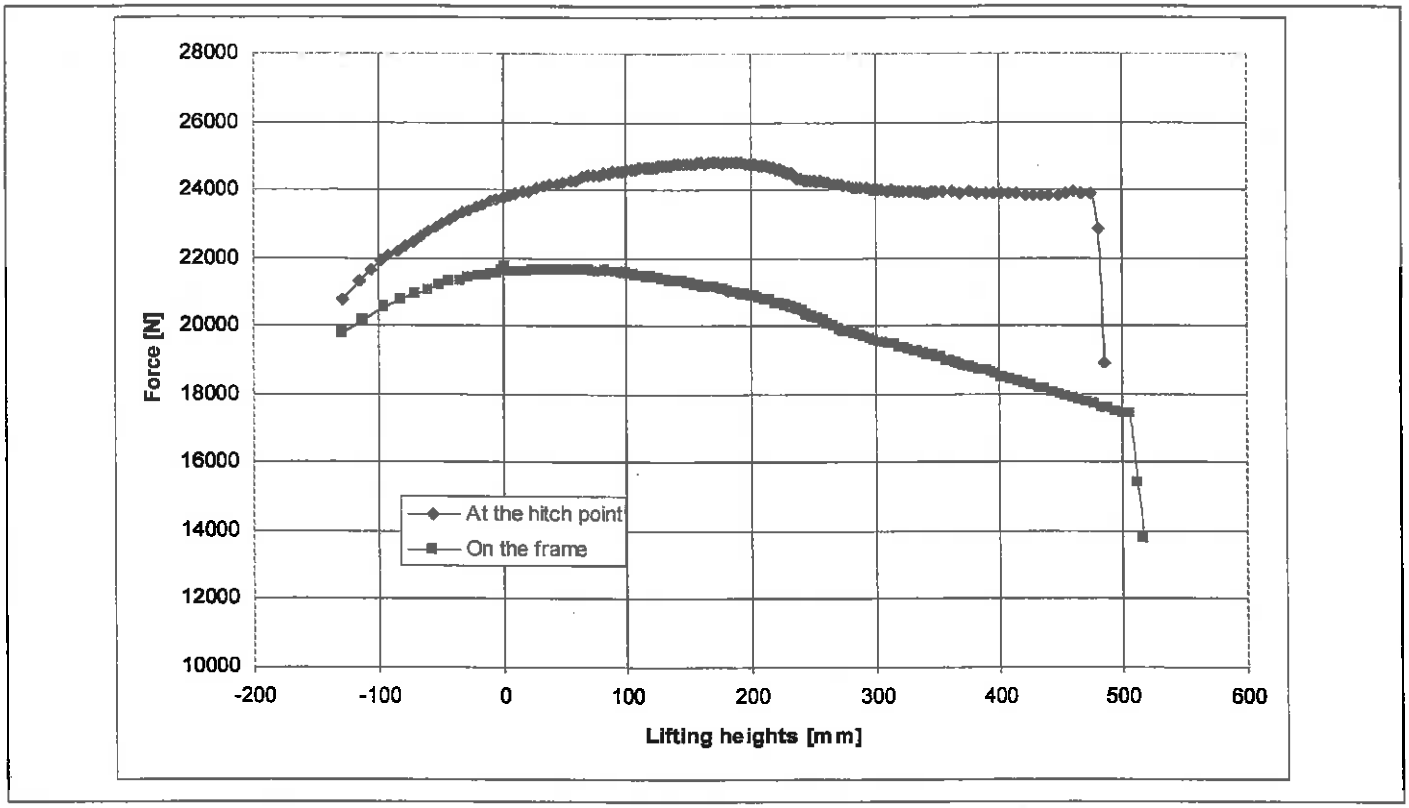


3.2.2 Power lift test:

- Linkage settings for test - see Table 2.1 and Figures 2.1 and 2.2.

	At the hitch point	On the frame
Height of lower hitch points above ground in down position:	374 mm	359 mm
Vertical movement - with lifting force - without lifting force	604 mm 640 mm	637 mm 715 mm
Maximum corrected force exerted through full range	20.77 kN	17.41 kN
Corresponding pressure of hydraulic fluid	18.69 MPa	18.69 MPa
Moment about rear-wheel axis	21.49 kNm	25.59 kNm
Maximum tilt angle of mast from vertical	-	10.1 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points								
Lifting forces:								
mm	-129	-100	0	100	200	300	400	475
at the hitch point in kN:	20.77	21.73	23.80	24.61	24.75	23.99	23.90	23.87
Corresponding pressure: 18.69 MPa								
mm	-129	-100	0	100	200	300	400	508
on the frame in kN:	19.78	20.31	21.67	21.58	20.90	19.59	18.60	17.41
Corresponding pressure: 18.69 MPa								


28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
Force [N]
-200
-100
0
100
200
300
400
500
600
Lifting heights [mm]
At the hitch point
On the frame

3.3 Drawbar Power test

- Date of tests: 12.02.04; 13.02.04
- Type of track: concrete

	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
	mm	kPa	kPa
Unballasted	570	150	125
Ballasted	720	150	125

Gear number and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Fan speed	Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
									Fuel	Coolant	Engine oil	Teperature	Relative umidity	Pressure
	kW	kN	km/h	min^{-1}	%	min^{-1}	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)														
ML 1	12.56	18.80	2.41	2450	15.0	2148	446	1.88	56	79	103	7	68	101.1
MH 1	15.49	18.90	2.95	2441	14.9	1626	389	2.15	55	80	102	5	68	101.1
ML 2	18.45	18.55	3.58	2429	15.0	2427	373	2.25	54	81	101	7	68	101.1
MH 2	22.43	18.65	4.33	2413	15.1	1902	348	2.41	56	80	103	6	68	101.1
ML 3	26.66	18.64	5.15	2398	15.0	2209	329	2.55	55	81	102	7	68	101.1
MH 3	32.39	18.63	6.26	2367	15.0	2599	310	2.70	56	80	104	6	68	101.1
ML 4	35.50	16.99	7.52	2266	11.9	2486	329	2.55	57	80	104	6	68	101.1
H 1	36.72	15.89	8.32	2271	10.1	2502	318	2.64	55	81	103	7	68	101.1
MH 4	36.54	13.83	9.51	2260	8.4	2499	319	2.62	56	80	104	6	68	101.1
H 2	37.57	10.32	13.11	2267	5.0	2515	311	2.69	55	79	103	6	68	101.1
H 3	36.40	6.71	19.53	2267	3.6	2515	321	2.61	56	80	104	7	68	101.1
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)														
L 4	11.53	22.31	1.86	2450	15.0	2339	478	1.75	56	82	103	6	70	101.0
ML 1	14.76	22.24	2.39	2443	15.0	2115	410	2.04	55	82	103	5	70	101.0
MH 1	17.86	22.18	2.90	2426	15.1	2181	403	2.08	55	81	105	5	70	101.0
ML 2	21.79	22.28	3.52	2410	14.9	1846	373	2.25	55	82	103	6	70	101.0
MH 2	26.27	22.20	4.26	2394	15.0	2338	346	2.42	54	81	106	6	70	101.0
ML 3	30.65	21.72	5.08	2365	15.1	1969	331	2.53	54	82	104	5	70	101.0
MH 3	33.15	19.44	6.14	2240	12.1	2453	343	2.44	56	81	105	5	70	101.0
ML 4	35.30	16.46	7.72	2251	8.4	2475	325	2.58	55	80	104	6	70	101.0
H 1	36.45	15.36	8.54	2256	7.4	2474	313	2.67	54	80	105	5	70	101.0
MH 4	36.65	13.49	9.78	2266	6.1	2505	313	2.68	56	81	105	6	70	101.0
H 2	35.05	9.73	12.97	2233	4.3	2454	320	2.62	55	81	105	6	70	101.0
3.3.3 FIVE-HOUR TESTS														
3.3.3.1 FIVE-HOUR TESTS at 75% of the pull corresponding to maximum power at rated speeed														
MH 3	27.94	14.62	6.88	2389	7.1	2621	341	2.46	56	83	104	10	63	101.5
3.3.3.2 FIVE-HOUR TESTS at pull corresponding to 15% of wheelslip, with additional ballast: 800 kg														
ML 3	34.16	22.44	5.48	2320	6.4	2546	-	-	56	82	105	10	63	101.5
Oil consumption during ten hours duration of tests 3.3.3.1 et 3.3.3.2: 13 g/h														

3.4 Turning area and turning circle

- Wheel equipment if several sets of tyres are tested: not applicable

	Without brakes	
	Right-hand	Left-hand
	m	m
Radius of turning area	3.68	3.63
Radius of turning circle	3.58	3.53

3.5 Location of centre of gravity

- Height above ground 798 mm
- Distance from the vertical plane containing the axis of the rear-wheels 628 mm
- Distance from the median longitudinal plane of the tractor 13 mm (to the left)

3.6 Braking

-date of tests 16.03.2004

3.6.1 Cold service braking device test

	Speed before application of brakes	Braking device control Force	Mean deceleration	Minimum stopping distance without locking the wheels
	km/h	kN	m/s^2	m
Ballasted tractor	32.5	0.10	1.33	30.6
Ballasted tractor	32.5	0.22	2.92	14.1
Ballasted tractor	32.5	0.33	3.17	12.8
Ballasted tractor	32.5	0.42	3.02	13.5
Unballasted tractor	32.5	0.10	1.80	22.5
Unballasted tractor	32.5	0.20	3.42	11.8
Unballasted tractor	32.5	0.26	3.64	11.4
Unballasted tractor	32.5	0.29	3.10	13.1

- Maximum deviation of tractor from its original course: none
- Abnormal vibration: none

3.6.2 Fade test

Speed before application of brakes	Braking device control force	Mean deceleration	Minimum stopping distance without locking the wheels
km/h	kN	m/s^2	m
32.5	0.1	1.3	31.5
32.5	0.22	2.31	17.6
32.5	0.3	2.82	14.4
32.5	0.41	2.89	14.1

4.1 Test procedure for measuring hydraulic lift capacity on agricultural tractors equipped with three-point hitch - SAE J 283, Nov. 1999

4.1.1 Tractor description

See:

Section 1 - Specification of tractor
Section 2 - Test conditions (excepted tyres)

Tested tractor was fitted with 6.50-16 tyres (with maximum overall diameter in service of 788 mm) on the front axle and 12.4R36 tyres (with maximum overall diameter in service of 1529 mm) on the rear axle.

4.1.2 Test conditions

Three-point hitch hydraulic system pressure setting: 20.77 MPa
Three-point hitch hydraulic system oil temperature: 45 ± 5 °C
Rated engine speed: 2300 min^{-1}

Tests have been performed in accordance with Section 4 - Static lift force of SAE J283. Settings of the three-point hitch specified in the table below. See figure 1.1 and 1.2 for more details on linkage geometry.

		Dimension or range	Settings used in test
		mm	mm
Length of lift arms:	(A)	255	255
Length of lower links:	(B)	880	880
Distance of lift arm pivot point from rear wheel axis			
- horizontally (rearward):	(a)	145	145
- vertically:	(b)	276	276
Horizontal distance between the 2 lower link points:	(U)	405	405
Horizontal distance between the 2 lift arm end points:	(V)	450	450
Length of upper link:	(S)	555⏲770	690
Distance of upper link pivot point from rear wheel axis			
- horizontally (rearward):	(c)	340-345	340
- vertically:	(d)	308-361	361
Distance of lower link pivot point from rear wheel axis			
- horizontally:	(e)	155	155
- vertically:	(f)	189	189
Distance of lower link pivot points to lift rod pivot points on lower links:	(D)	523	523
Length of lift rods :	(L)	570⏲690	570

4.1.3 Static lift force

Position of the hitch	Vertical lift force*	Vertical distance of lower hitch point above ground
	kN	mm
Lowest	21.41	455
1/5	23.53	577
2/5	23.47	699
3/5	22.23	821
4/5	20.79	943
Highest	19.23	1065

* Reported values are 90% of measured