LABORATORIO DI MECCANICA AGRARIA

DIPARTIMENTO DI ECONOMIA E INGEGNERIA AGRARIE

MINISTERO DELLE POLITICHE AGRICOLE E COMUNITARIE

Report DEIAGRA - sez. I.A. n° 4498 **O.E.C.D. approval number: 1/2 166**

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



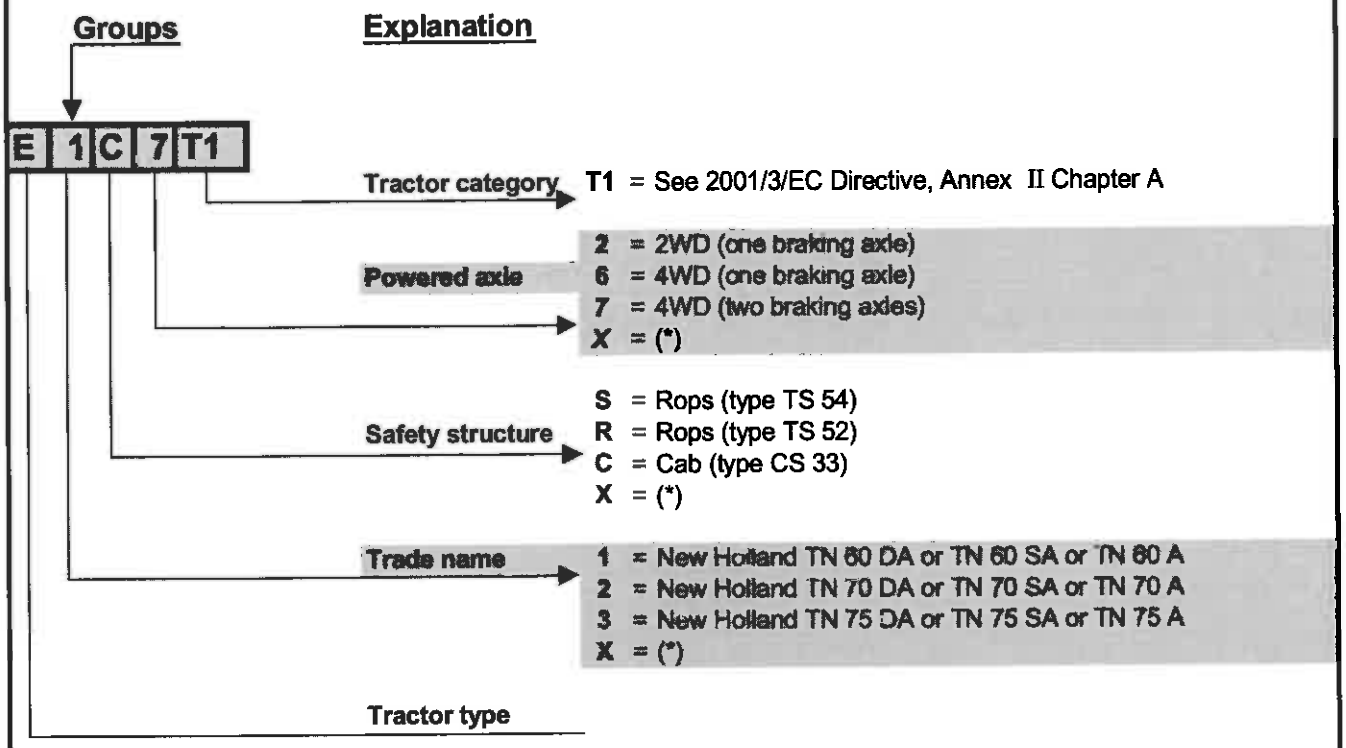
Agricultural tractor
Make: **NEW HOLLAND**; Model: **TN 70 DA**
(Four wheel drive tractor 40 km/h version)

Tractor manufacturer: CNH INTERNATIONAL, S.A., 13 Rue Aldrigen 1118, LUXEMBOURG
Date of test: February 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

ALMA MATER STUDIORUM - UNIVERSITA' DI BOLOGNA
VIA GANDOLFI. 19 - 40057 CADRIANO - BOLOGNA - ITALIA - TEL. 051-766632 - FAX 051-765318

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

C	- Tractor manufacturer's name and address:	CNH International SA - 13 rue Aldringen L - 1118 Luxembourg
D	- Location of tractor assembly:	CNH Italia SpA, via Leone XIII - Jesi (AN) - Italy
D	- Submitted for test by:	CNH Italia SpA, viale delle Nazioni 55, Modena – Italy
C	- Selected for test by:	The manufacturer with the agreement of the testing station
D	- Place of running-in:	Modena (MO) – Italy
D	- Duration of running-in:	57 hours
C	- Location of test:	Department of Agricultural Economics and Engineering - University of Bologna - Section of Agricultural Engineering - Laboratory of Cadriano (BO - Italy)

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

C	**1.1.1 Make of the tractor:**	NEW HOLLAND
C	- Model (trade name):	TN70DA
C	- Type:	4WD

1.1.2 Numbers

D	- 1St Serial N° or prototype	HJE296852
C	- Serial N°:	HJE296852

1.1.3 Other specification

D	- Model for other countries:	none
C	- Transmission type:	16+16, mechanical
C	- Speed version:	40 km/h
D	- Manufacturer identification or Technical type number:	E2C6

1.2 Engine

C	- Make/Model/Type:	CNH Italia/IVECO 8035.25R/ water-cooled 4 stroke Diesel engine, direct injection, supercharged
C	- Serial N°:	859194

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:	70 dm^3 or, as option, 75 dm^3, in plastic material, on the left side, under the tractor footrest
C	- Make/Model/Type of injection pump:	BOSH/L973/rotary injection pump
C	- Serial N°:	398722
	- 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 with 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: 1.2 kW

- 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)

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

total ratios and traveling speeds

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

- Differential lock

D . Type: automatic and electro-hydraulic

C . Method of engagement: automatic

C . Method of disengagement: automatic

1.3.5 Total ratios and traveling speeds

	TN70DA 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	769.412	0.783
C	2	low	516.148	1.168
C	3	low	351.121	1.716
C	4	low	237.007	2.543
C	1	medium low	183.062	3.292

C	2	medium low	122.804	4.907
C	3	medium low	83.540	7.213
C	4	medium low	56.390	10.686
C	1	medium high	149.538	4.030
C	2	medium high	100.315	6.007
C	3	medium high	68.242	8.830
C	4	medium high	46.063	13.082
C	1	high	51.795	11.635
C	2	high	34.746	17.343
C	3	high	23.636	25.495
C	4	high	15.955	37.770
	Reverse			
C	1	low	794.232	0.759
C	2	low	532.797	1.131
C	3	low	362.447	1.663
C	4	low	244.652	2.463
C	1	medium low	188.968	3.189
C	2	medium low	126.766	4.754
C	3	medium low	86.235	6.988
C	4	medium low	58.209	10.353
C	1	medium high	154.362	3.904
C	2	medium high	103.551	5.819
C	3	medium high	70.443	8.555
C	4	medium high	47.549	12.673
C	1	high	53.465	11.271
C	2	high	35.866	16.802
C	3	high	24.399	24.698
C	4	high	16.469	36.590

TN70DA 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
C 1	C low	2969.660	0.203
C 2	C low	1992.150	0.302

C	3	C low	1355.200	0.445
C	4	C low	914.762	0.659
C	1	C medium low	706.556	0.853
C	2	C medium low	473.982	1.271
C	3	C medium low	322.436	1.869
C	4	C medium low	217.645	2.769
C	1	C medium high	577.164	1.044
C	2	C medium high	387.181	1.556
C	3	C medium high	263.388	2.288
C	4	C medium high	177.787	3.389
C	1	low	769.412	0.783
C	2	low	516.148	1.168
C	3	low	351.121	1.716
C	4	low	237.007	2.543
C	1	medium low	183.062	3.292
C	2	medium low	122.804	4.907
C	3	medium low	83.540	7.213
C	4	medium low	56.390	10.686
C	1	medium high	149.538	4.030
C	2	medium high	100.315	6.007
C	3	medium high	68.242	8.830
C	4	medium high	46.063	13.082
C	1	high	51.795	11.635
C	2	high	34.746	17.343
C	3	high	23.636	25.495
C	4	high	15.955	37.770
	Reverse			
C	1	low	794.232	0.759
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C	3	low	362.447	1.663
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C	1	medium low	188.968	3.189
C	2	medium low	126.766	4.754
C	3	medium low	86.235	6.988
C	4	medium low	58.209	10.353
C	1	medium high	154.362	3.904
C	2	medium high	103.551	5.819
C	3	medium high	70.443	8.555
C	4	medium high	47.549	12.673
C	1	high	53.465	11.271
C	2	high	35.866	16.802
C	3	high	24.399	24.698
C	4	high	16.469	36.590

TN70DA 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	2969.660	0.203
C 2	C low	1992.150	0.302
C 3	C low	1355.200	0.445
C 4	C low	914.762	0.659
C 1	C medium low	706.556	0.853
C 2	C medium low	473.982	1.271
C 3	C medium low	322.436	1.869
C 4	C medium low	217.645	2.769
C 1	C medium high	577.164	1.044
C 2	C medium high	387.181	1.556

C	3	C medium high	263.388	2.288
C	4	C medium high	177.787	3.389
C	1	low	923.295	0.653
C	2	low	769.412	0.783
C	3	low	619.377	0.973
C	4	low	516.148	1.168
C	5	low	421.345	1.430
C	6	low	351.121	1.716
C	7	low	284.408	2.119
C	8	low	237.000	2.543
C	1	medium low	219.675	2.743
C	2	medium low	183.062	3.292
C	3	medium low	147.365	4.089
C	4	medium low	122.804	4.907
C	5	medium low	100.248	6.011
C	6	medium low	83.540	7.213
C	7	medium low	67.668	8.905
C	8	medium low	56.390	10.686
C	1	medium high	179.446	3.358
C	2	medium high	149.538	4.030
C	3	medium high	120.378	5.006
C	4	medium high	100.315	6.007
C	5	medium high	81.890	7.359
C	6	medium high	68.242	8.830
C	7	medium high	55.276	10.902
C	8	medium high	46.063	13.082
C	1	high	62.153	9.695
C	2	high	51.795	11.635
C	3	high	41.695	14.453
C	4	high	34.746	17.343
C	5	high	28.364	21.246
C	6	high	23.636	25.495
C	7	high	19.146	31.475

C	8	high	15.955	37.770
	Reverse			
C	1	low	794.232	0.759
C	2	low	532.797	1.131
C	3	low	362.447	1.663
C	4	low	244.652	2.463
C	1	medium low	188.968	3.189
C	2	medium low	126.766	4.754
C	3	medium low	86.235	6.988
C	4	medium low	58.209	10.353
C	1	medium high	154.362	3.904
C	2	medium high	103.551	5.819
C	3	medium high	70.443	8.555
C	4	medium high	47.549	12.673
C	1	high	53.465	11.271
C	2	high	35.866	16.802
C	3	high	24.399	24.698
C	4	high	16.469	36.590

TN70DA 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
C 1	low	923.295	0.653
C 2	low	769.412	0.783
C 3	low	619.377	0.973
C 4	low	516.148	1.168
C 5	low	421.345	1.430
C 6	low	351.121	1.716
C 7	low	284.408	2.119
C 8	low	237.000	2.543
C 1	medium low	219.675	2.743
C 2	medium low	183.062	3.292
C 3	medium low	147.365	4.089
C 4	medium low	122.804	4.907

C	5	medium low	100.248	6.011
C	6	medium low	83.540	7.213
C	7	medium low	67.668	8.905
C	8	medium low	56.390	10.686
C	1	medium high	179.446	3.358
C	2	medium high	149.538	4.030
C	3	medium high	120.378	5.006
C	4	medium high	100.315	6.007
C	5	medium high	81.890	7.359
C	6	medium high	68.242	8.830
C	7	medium high	55.276	10.902
C	8	medium high	46.063	13.082
C	1	high	62.153	9.695
C	2	high	51.795	11.635
C	3	high	41.695	14.453
C	4	high	34.746	17.343
C	5	high	28.364	21.246
C	6	high	23.636	25.495
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	Reverse			
C	1	low	794.232	0.759
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C	4	high	16.469	36.590

TN70DA 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
C 1	C low	1972.850	0.305
C 2	C low	1323.460	0.455
C 3	C low	900.310	0.669
C 4	C low	607.709	0.992
C 1	C medium low	469.391	1.284
C 2	C medium low	314.883	1.914
C 3	C medium low	214.206	2.813
C 4	C medium low	144.589	4.168
C 1	C medium high	383.431	1.572
C 2	C medium high	257.218	2.343
C 3	C medium high	174.978	3.444
C 4	C medium high	118.110	5.102
C 1	low	923.295	0.653
C 2	low	769.412	0.783
C 3	low	619.377	0.973
C 4	low	516.148	1.168
C 5	low	421.345	1.430
C 6	low	351.121	1.716
C 7	low	284.408	2.119
C 8	low	237.000	2.543
C 1	medium low	219.675	2.743
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C	3	medium low	147.365	4.089
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C	8	medium low	56.390	10.686
C	1	medium high	179.446	3.358
C	2	medium high	149.538	4.030
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C	4	medium high	100.315	6.007
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C	6	medium high	68.242	8.830
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C	4	medium low	58.209	10.353
C	1	medium high	154.362	3.904
C	2	medium high	103.551	5.819
C	3	medium high	70.443	8.555
C	4	medium high	47.549	12.673

C	1	high	53.465	11.271
C	2	high	35.866	16.802
C	3	high	24.399	24.698
C	4	high	16.469	36.590

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

C - Number of revolutions of front wheels for one revolution of rear-wheels: 1.303

1.4 Power take-off

1.4.1 Main power take-off

C - Type: independent

C - Method of engagement: by hand lever acting on a dry clutch

C - Number of shafts: 1

C - 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}	1017 min^{-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})
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

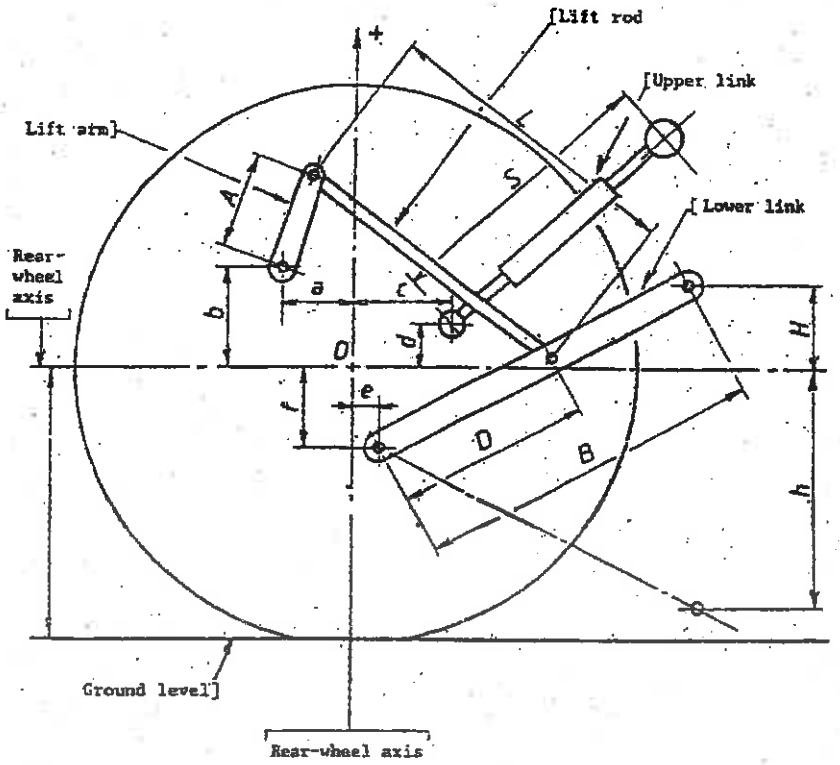


Figure 1.1

Lift test - Linkage geometry

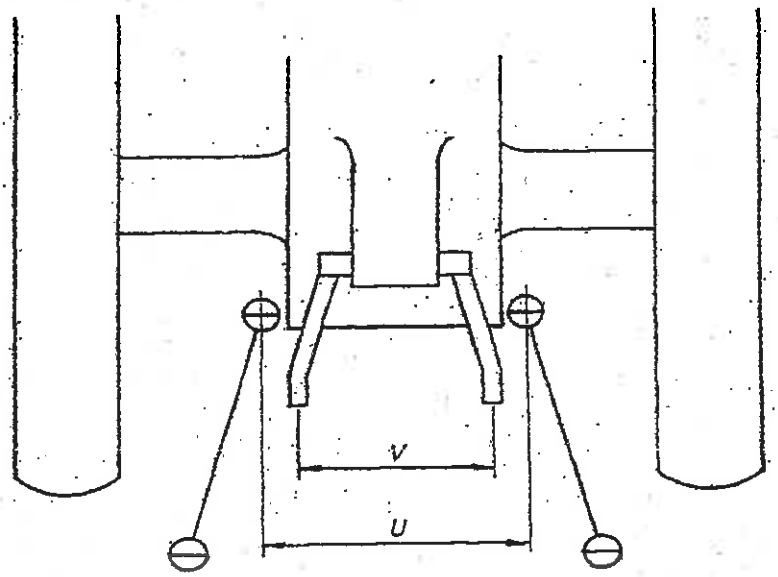


Figure 1.2

Lift test - Linkage geometry

		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	694
Distance of upper link pivot point from rear wheel axis			
- horizontally (rearward)	(c)	340-345	345
- vertically	(d)	308-361	308
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	573
Height of lower hitch points relative to the rear-wheel axis			
- in low position	(h)	305⊕650	324
- in high position	(H)	15⊕320	316
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
D	- Maximum vertical permissible load:	5 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 ÷ 510 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:	8.4 ⏲ 11.2 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, available as option
	1.10 Steering	
D	- Make/Model/Type:	DANFOSS/ORBITROL OSPC 80N/hydrostatic. As option OGNIBENE/STH ON80G170LNV/hydrostatic
	- Method of operation	
D	. Pump:	independent gear pump
D	- Ram:	single acting ram mounted on the middle of the front axle and directly acting on it. As option two acting rams, one on the left and one on the right side, acting on the front axle
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; further there is the automatic engagement of four-wheel drive, providing the four wheel braking. As option 4 oil bath disc, 1 per rear wheel and 1 per front wheel, mounted on the differential shaft; further there is the automatic engagement of four-wheel drive, providing the four wheel braking
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 driving and steering

C . Rear: 2 driving

C - Wheelbase: 2065 mm

- Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
D Front	1236	1945	Changing the position of the rims in respect to the disc
D Rear	1232	1949	Changing the position of the rims in respect to the disc

1.13 Protective structure

C - Make/Model/Type: CNH/CS33/ cab

C - Manufacturer's name and address: CNH International SA - 13 rue Aldringen L - 1118 Luxembourg

- Protective device

C . Cab/frame/rollguard/other: cab

C . Tiltable/not tiltable: not tiltable

- OECD approval

C . Approval number: 4/0 465/4

C . Date of approval: 5 June 2003

C . N° of minor modification certificates, if any: 3

Optional

D - Make/Model/Type: CNH/TS52/ rear roll bar

D - Manufacturer's name and address: CNH International SA - 13 rue Aldringen L - 1118 Luxembourg

1.14 Seat

1.14.1 Driver's seat

C - Make/Model/Type: MT/SC78-M97/3/pneumatic

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
	- Safety belt:	yes
C	. Type	2 point seat belt

1.14.2 Optional driver's seat(s)

D	- Make/Model/Type:	MT/SC78-M91/mechanical
D	- Type of suspension:	adjustable spring
D	- Type of damping:	shock absorber
	- Range of adjustment	
C	. Longitudinally:	150 mm
C	. Vertically:	80 mm
D	- Make/Model/Type:	GRAMMER/MSG83/520/mechanical
D	- Type of suspension:	adjustable spring
D	- Type of damping:	shock absorber
	- Range of adjustment	
C	. Longitudinally:	150 mm
C	. Vertically:	60 mm
D	- Make/Model/Type:	GRAMMER/MSG93/520/pneumatic
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
C	Headlights	1040	160x140	230
C	Sidelights	1580	110x70	680
C	Rearlights	1450	155x65	680
C	Reflectors	1450	45x55	640

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	3919	1867	2428	2410	2290
Unballasted	3691				

2.2 Ground clearance

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

2.3 Tractor mass

- Tractor tested: mass with cab CS33

	Ballasted		Unballasted	
	Without driver	With driver	Without driver	With driver
	kg	kg	kg	kg
Front	1390	1405	1030	1045
Rear	2020	2080	1890	1950
Total	3410	3485	2920	2995

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	Point 8	Point 8
- dimensions	11.2 R24	16.9 R30
- ply rating	114 A8	137 A8
- type of casing	Radial	Radial
- maximum load (tyre manufacturer's)	11.6 kN	22.5 kN
- maximum load (tractor manufacturer's)	10.8 kN	17.5 kN
- inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
- dynamic radius index	515	695
Chosen track width	1550	1540

Optional

Dimension	
Front	Rear
300/70R20 A8	13.6R28 123 A8
8.3R24 104 A8	12.4R32 122 A8
300/70R20 110 A8	3.80/70R28 127 A8
36070R20 120 A8	420/70R30 134 A8
11.2R20 111 A8	14.9R28 128 A8
12.4R20 116 A8	14.9R30 129 A8
11.2R24 114 A8	12.4R36 124 A8 16.9R30 137 A8
300/70R24 113 A8	480/70R28 140 A8
300/70 R20 110 A8	380/70R28 127 A8
320/70R20 113 A8	420/70R28 133 A8
380/70R20 122 A8	480/70R30 141 A8
335/80R18 153 A2/143B	480/65R28 129 A8
375/75R20 155 A2/143B	540/65R28 137 A8
340/75R20 117 A8	16.9R28 136 A8
405/70R20 155A2/143	540/65R30 138 A8
14.9LR20 118A8/116B	16.9R30 137 A8

2.7 Fuel

- type: AGIP diesel oil, in conformity with national standard
- density at 15°C: 0.838 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	4,5	300	none
Final drive with brakes (front)	3,0	1200 (or 2 years)	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	 AMBRA BRAKE LHM 7308 ISO	As recommended

2.8.3 Grease

- number of lubrication points: 15

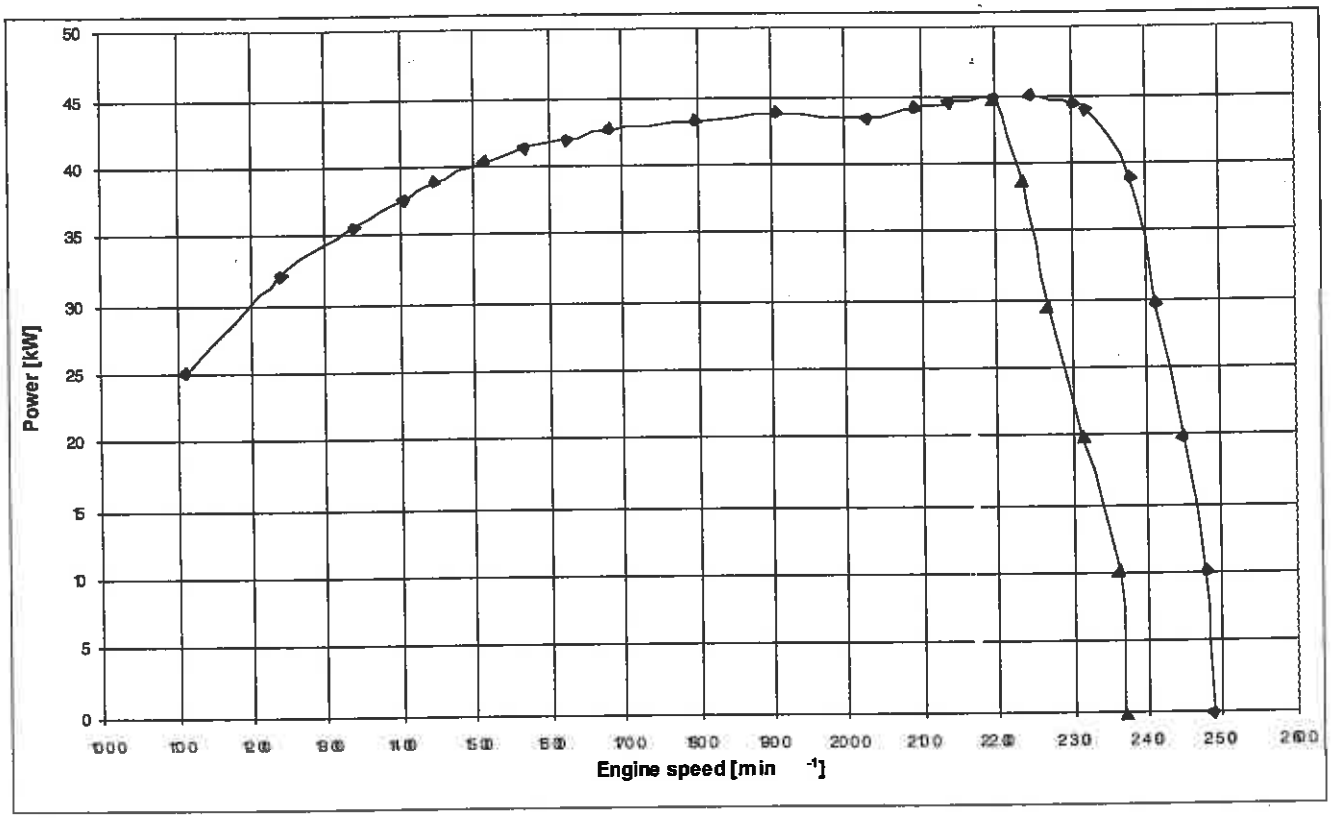
3. COMPULSORY TEST RESULTS

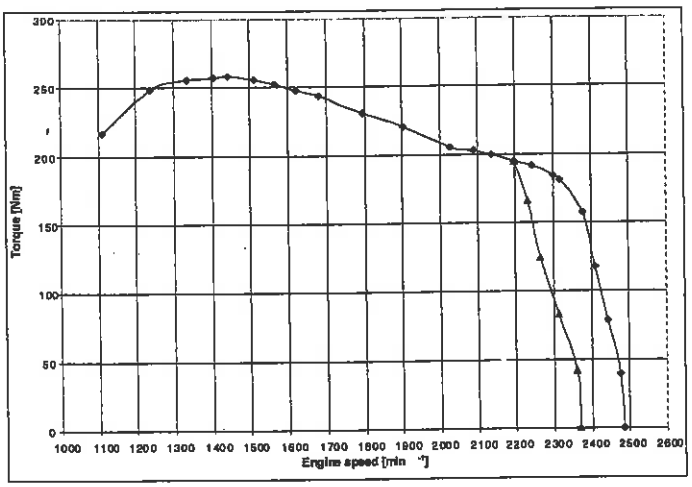
3.1 Main power take-off

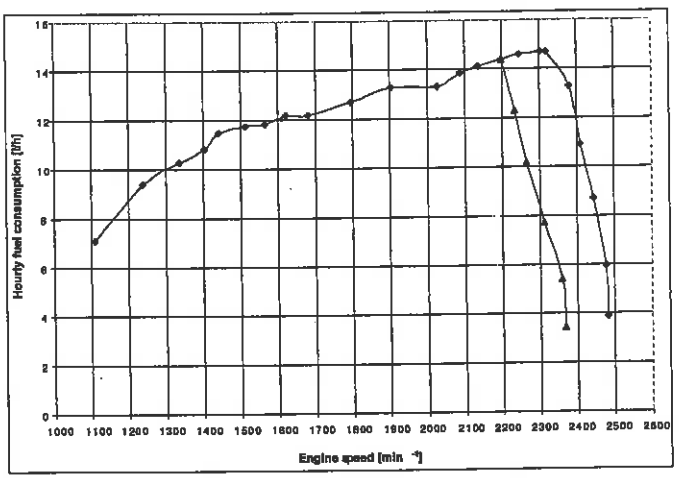
- Date and location of tests: 26.02.2004, Cadriano (BO) - Italy
- Type of dynamometer bench: Schenck U1 - 40

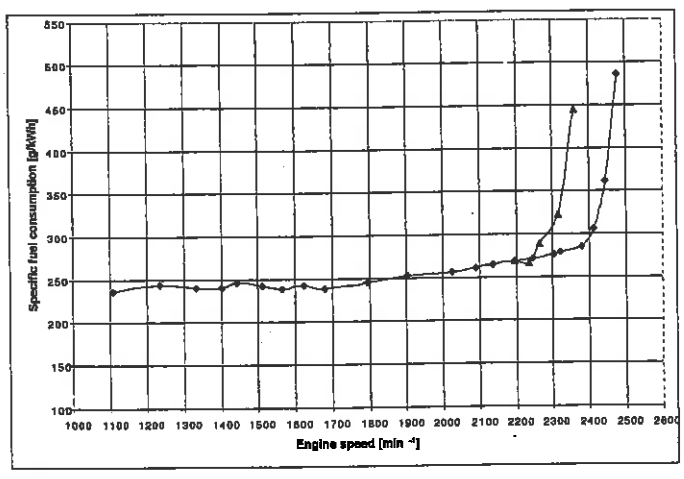
Power	Speed			Fuel consumption			Specific energy
	Engine	P.T.O.	Fan	Hourly		Specific	
kW	min^{-1} (rev/min)			kg/h	l/h	g/kWh	kWh/l
3.1.1	MAXIMUM POWER - TWO-HOUR TEST						
45.1	2245	552	2492	12.22	14.58	271	3.09
3.1.2	POWER AT RATED ENGINE SPEED						
44.5	2302	566	2540	12.32	14.70	277	3.03
3.1.3	STANDARD POWER TAKE-OFF SPEED [540 ± 10 min^{-1} (rev/min)]						
44.9	2196	540	2386	12.05	14.38	269	3.12
3.1.4	PART LOADS						
3.1.4.1	the torque corresponding to maximum power at rated engine speed						
44.5	2302	566	2540	12.32	14.70	277	3.03
3.1.4.2	85% of torque defined in 3.1.4.1						
39.1	2378	584	2628	11.13	13.28	285	2.95
3.1.4.3	75% of torque defined in 3.1.4.2						
29.8	2410	592	2664	9.12	10.88	306	2.74
3.1.4.4	50% of torque defined in 3.1.4.2						
20.1	2444	600	2387	7.26	8.66	361	2.32
3.1.4.5	25% of torque defined in 3.1.4.2						
10.2	2475	608	1648	4.98	5.94	486	1.72
3.1.4.6	unloaded						
/	2484	610	1516	3.24	3.87	/	/
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						
44.9	2196	540	2386	12.05	14.38	269	3.12
3.1.5.2	85% of torque defined in 3.1.5.1						
38.8	2233	549	2458	10.32	12.32	266	3.15
3.1.5.3	75% of torque defined in 3.1.5.2						
29.5	2265	556	2509	8.52	10.17	289	2.90
3.1.5.4	50% of torque defined in 3.1.5.2						
20.1	2313	568	2564	6.48	7.73	323	2.60
3.1.5.5	25% of torque defined in 3.1.5.2						
10.2	2359	579	1833	4.56	5.44	445	1.88
3.1.5.6	unloaded						
/	2367	582	1550	2.88	3.44	/	/

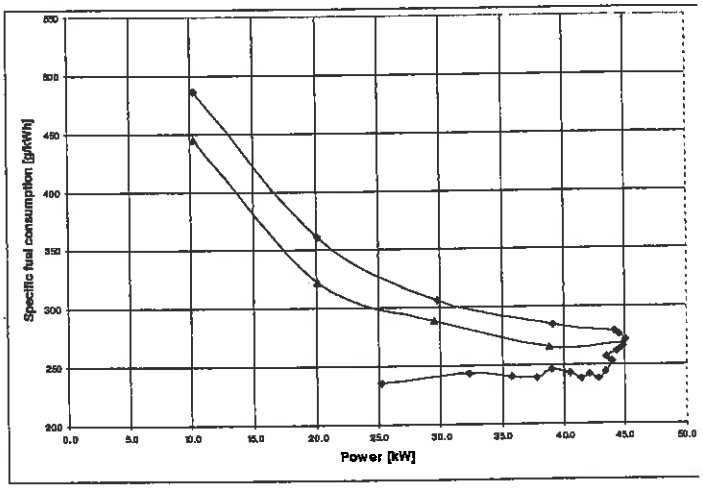
3.1.6 Curves as a function of engine speed











3.1.7 Other results

No load maximum engine speed: 2484 min^{-1}

Torque (equivalent crankshaft) at maximum power

At rated engine speed 184.8 Nm

At two-hour test 191.7 Nm

Maximum torque (equivalent crankshaft) 258.4 Nm

(engine speed) (1442 min^{-1})

Mean atmospheric conditions:	
Temperature	21 °C
Pressure	101.8 kPa
Relative humidity	55 %
Maximum temperature	
Coolant	98 °C
Engine oil	112 °C
Fuel	48 °C
Engine air intake	28 °C

3.2 Hydraulic power and lifting force

- Date of tests: 09.03.2004

3.2.1 Hydraulic power test

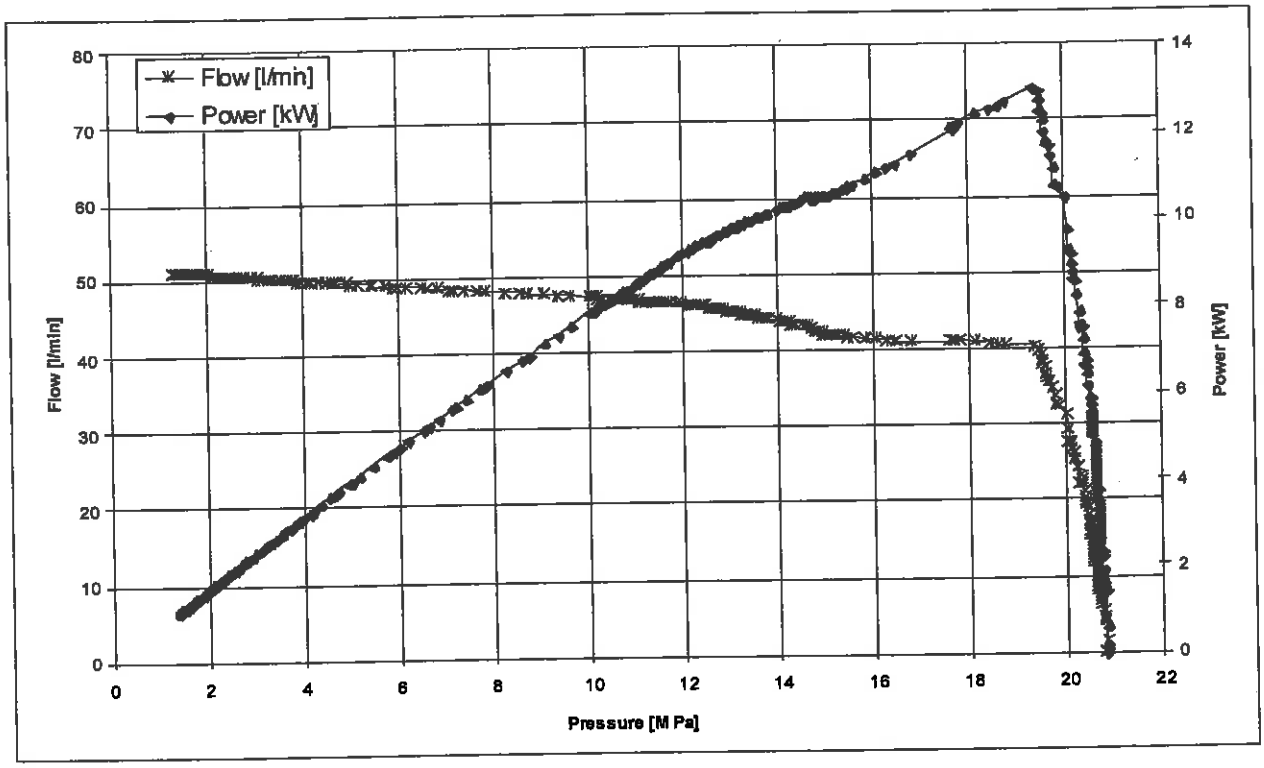
3.2.1.1 Hydraulic fluid data

- 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	20.80	60	69	2361		

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:	18.72	67	2431.	40.58	12.68
3.2.1.2.3 Maximum avaible flow and maximum power from one coupler pair:	19.33	67	2408	40.37	13.01

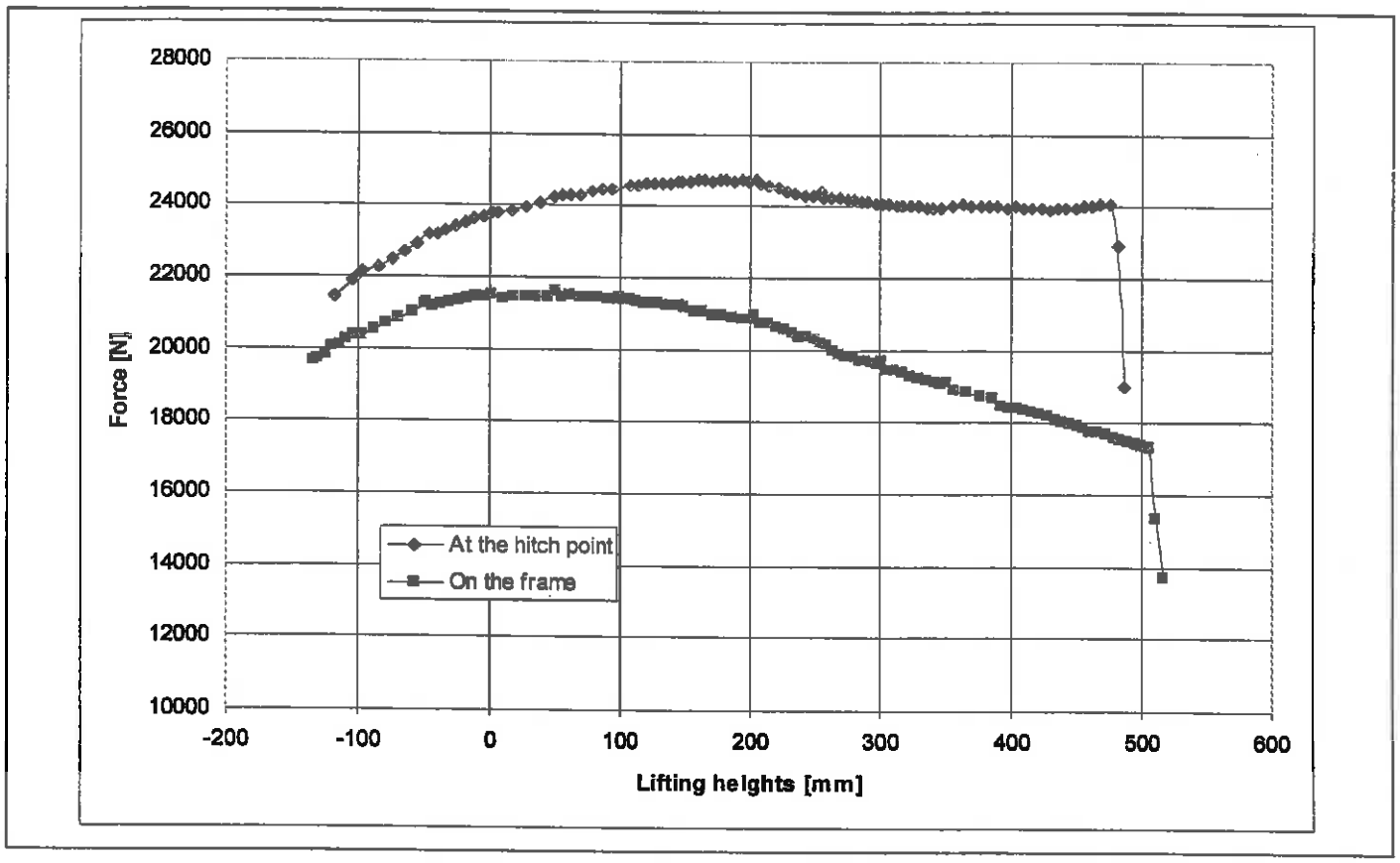


3.2.2 Power lift test:

- 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:	371 mm	359 mm
Vertical movement - with lifting force - without lifting force	 595 mm 640 mm	 639 mm 717 mm
Maximum corrected force exerted through full range	21.43 kN	17.36 kN
Corresponding pressure of hydraulic fluid	18.72 MPa	18.72 MPa
Moment about rear-wheel axis	22.17 kNm	25.51 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	-117	-100	0	100	200	300	400	478
at the hitch point in kN:	21.43	22.03	23.71	24.49	24.68	24.08	24.00	24.07
Corresponding pressure: 18.72 MPa								
mm	-134	-100	0	100	200	300	400	505
on the frame in kN:	19.66	20.37	21.45	21.47	20.83	19.71	18.43	17.36
Corresponding pressure: 18.72 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: 17-18.05.2004
- Type of track: concrete

	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
	mm	kPa	kPa
Unballasted	490	125	135
Ballasted	490	125	135

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)														
L 4	16.49	25.37	2.34	2435	14.9	1757	382	2.19	54	88	108	24	42	102.1
ML 1	21.24	25.41	3.01	2418	15.0	1906	359	2.34	56	86	109	25	42	102.1
MH 1	25.61	25.40	3.63	2399	15.0	2104	337	2.48	53	87	111	23	42	102.1
ML 2	30.92	25.36	4.39	2384	14.9	2408	323	2.60	56	90	110	24	42	102.1
MH 2	35.08	24.15	5.23	2251	13.2	2494	330	2.54	55	87	109	25	42	102.1
ML 3	36.99	19.75	6.74	2269	7.5	2517	312	2.69	57	90	113	24	42	102.1
MH 3	37.48	16.15	8.35	2264	5.8	2509	313	2.68	55	86	111	25	42	102.1
ML 4	37.44	13.04	10.34	2284	4.8	2529	320	2.62	57	90	114	24	42	102.1
H 1	38.21	12.17	11.30	2284	4.4	2535	312	2.69	56	89	113	23	42	102.1
MH 4	37.24	10.66	12.58	2250	4.1	2496	320	2.62	53	88	113	24	42	102.1
H 2	35.24	7.59	16.71	2255	3.2	2498	329	2.55	54	90	115	24	42	102.1
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)														
L 4	19.25	29.75	2.33	2422	15.0	1747	365	2.30	57	86	110	20	50	102.0
ML 1	24.37	29.54	2.97	2405	14.9	1895	337	2.48	57	87	109	22	50	102.0
MH 1	29.88	29.71	3.62	2390	15.1	2096	321	2.61	58	86	112	21	50	102.0
ML 2	35.25	29.43	4.31	2301	14.7	2324	329	2.55	56	88	111	20	50	102.0
MH 2	37.66	24.80	5.47	2272	10.3	2517	313	2.68	54	89	113	20	50	102.0
ML 3	37.68	20.00	6.78	2268	6.5	2513	314	2.67	57	90	115	21	50	102.0
MH 3	37.99	16.11	8.49	2282	5.2	2533	312	2.69	59	89	115	19	50	102.0
ML 4	37.55	12.99	10.41	2286	4.5	2536	317	2.64	59	88	114	20	50	102.0
H 1	37.88	12.08	11.29	2284	4.1	2531	316	2.65	55	88	114	20	50	102.0
MH 4	36.29	10.17	12.85	2303	3.8	2551	328	2.55	57	88	115	19	50	102.0
H 2	35.90	7.70	16.79	2241	2.8	2487	333	2.51	58	86	112	20	50	102.0
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	29.81	12.11	8.86	2382	4.2	2618	330	2.54	57	94	103	19	58	101.7
3.3.3.2 FIVE-HOUR TESTS at pull corresponding to 15% of wheelslip, with additional ballast: 900 kg														
ML 2	38.11	29.38	4.67	2325	7.9	2323	-	-	55	95	110	17	58	101.7
Oil consumption during ten hours duration of tests 3.3.3.1 et 3.3.3.2: 11 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	3.72	3.72
Radius of turning circle	3.58	3.58

3.5 Location of centre of gravity

- Height above ground 805 mm
- Distance from the vertical plane containing the axis of the rear-wheels 720 mm
- Distance from the median longitudinal plane of the tractor 9 mm (to the left)

3.6 Braking

- date of tests 12.04.2004

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	40.4	0.10	1.19	53.0
Ballasted tractor	40.4	0.20	2.02	31.2
Ballasted tractor	40.4	0.30	3.00	21.2
Ballasted tractor	40.4	0.43	3.90	16.1
Ballasted tractor	40.4	0.52	4.56	13.9
Ballasted tractor	40.4	0.60	4.59	13.8
Unballasted tractor	40.4	0.10	2.21	28.5
Unballasted tractor	40.4	0.21	2.62	24.1
Unballasted tractor	40.4	0.32	3.93	16.0
Unballasted tractor	40.4	0.46	4.91	12.7
Unballasted tractor	40.4	0.51	6.02	10.5
Unballasted tractor	40.4	0.57	5.99	10.6

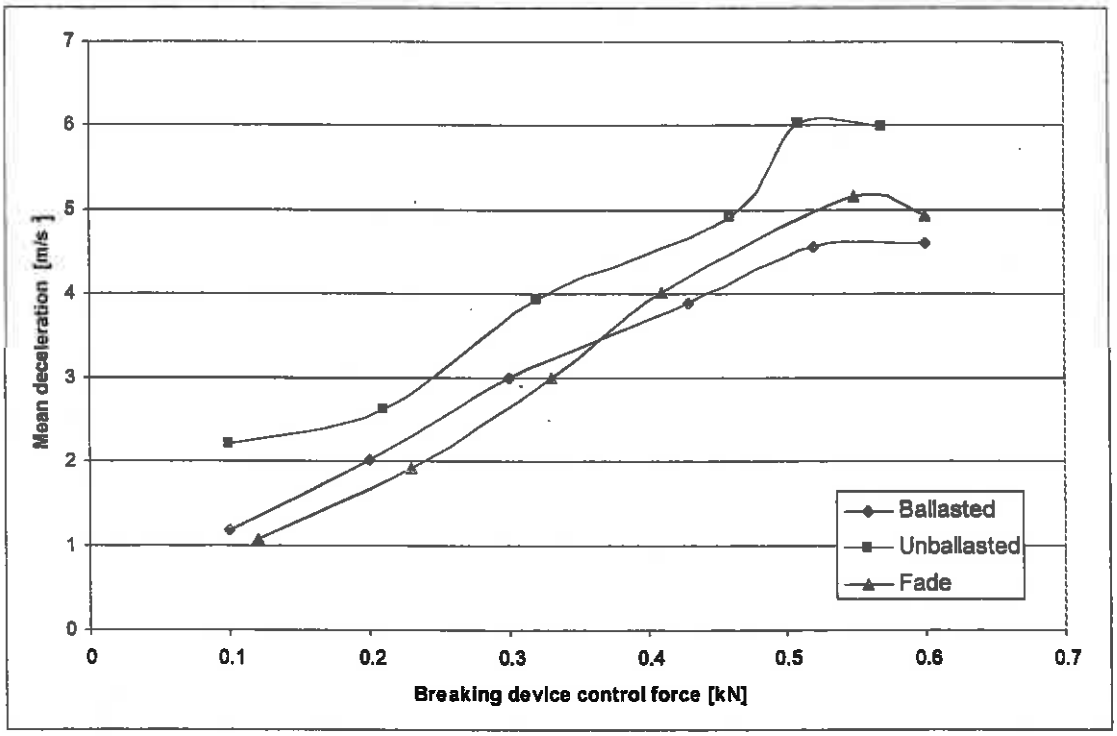
- Maximum deviation of tractor from its original course: none
- Abnormal vibration: none

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
40.4	0.12	1.08	58.4
40.4	0.23	1.92	32.8
40.4	0.33	3.00	21.2

40.4	0.41	4.01	15.8
40.4	0.55	5.15	12.3
40.4	0.60	4.93	12.8

- Maximum deviation of tractor from its original course: none
- Abnormal vibration: none
- Brake heating method: the tractor has been driven for 1 km at a speed of 34.3 km/h and the force for actuating the service brake has been 90 N



3.6.3 Parking braking device test

	Uphill	downhill
Braking device control force	0.33 kN	0.35 kN

3.7 *Measurement of external noise*

- Date of tests: 12.04.2004
- Sound level meter: Bruel&Kjaer / 2238
- Type of track: concrete
- Gear number: 4 high
- Travelling speed before acceleration: 30.2 km/h
- Sound level: 82.6 dB (A) (tractor left side)

4. OTHER TEST RESULTS

Not covered by OECD approval.

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 11.2R24 tyres (with maximum overall diameter in service of 1135 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: 20.80 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	21.56	455
1/5	23.33	575
2/5	23.20	697
3/5	22.14	819
4/5	20.75	941
Highest	19.21	1065

* Reported values are 90% of measured

Bologna, 16 June 2004

TEST CARRIED OUT BY

Dr. Valda Rondelli

Dr.Ing. Giovanni Molari

Dr. Antonio Marocchi

HEAD OF TESTING STATION

Prof. Ing. Adriano Guarnieri