O.E.C.D. No: 425

Printed: April 1973
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Report on test in accordance with
O.E.C.D. STANDARD CODE for the Official Testing
of Agricultural Tractors



DEUTZ AGRICULTURAL TRACTOR D 70 06

Manufactured by: Klöckner-Humboldt-Deutz AG
D-5000 Köln-Deutz

Date of Tests: November 1972 till January 1973

DLG-Testing Station for Agricultural Machinery
D-6114 Groß Umstadt

DEUTSCHE LANDWIRTSCHAFTS GESELLSCHAFT e. V.
Prüfungsabteilung für Landmaschinen
D-6000 Frankfurt/Main 1, Zimmerweg 16

This bulletin is based on engineering tests in accordance with the O.E.C.D. STANDARD CODE for the Official Testing of Agricultural Tractors. It does not contain an evaluation of the performance of the tractor on practical work.

This report has been approved by the O.E.C.D. Co-ordinating Center (C.N.E.E.M.A., France) as being in accordance with the O.E. C.D. STANDARD CODE.

Date of Approval: March 21 1973

Serial No.: 425

This tractor D 70 06 has already been subjected to an O.E.C.D. tractor test no 350 in 1971

Because of changing
(i) manufacturer's production setting of the injection pump

(ii) the number of forward speeds from 9 to 12 and those of reverse speeds from 3 to 4, retesting has been necessary.

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Tractor manufacturer:	Klöckner-Humboldt-Deutz AG D-5000 Köln-Deutz
Submitted for test by:	Manufacturer
Selected by:	Manufacturer with agreement by DLG
Place of running-in:	Köln and Groß Umstadt
Duration of running-in:	Engine appr. 75 hours Tractor appr. 100 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	Klöckner-Humboldt-Deutz AG
Model:	D 70 06
Type:	four wheel agricultural tractor, unit construction; rear wheel driven;
Serial No:	7571/161

Engine

Make:	Klöckner-Humboldt-Deutz AG
Model:	F 4 L 912
Type:	4-stroke Diesel engine with direct injection; air cooled;
Serial No:	5105 463
Cylinders:	4 in line; bore 100 mm, stroke 120 mm; capacity 3768 cm^3; compression ratio 17:1; replaceable ribbed single cylinders; overhead valves;
Fuel system:	PIERBURG fuel feed pump PE 15 252; BOSCH-in line injection pump; PES 4 A 80 D 410/3 RS 1183; manufacturer's production setting 52,5 mm^3/stroke at rated engine speed and full load; injection timing 30° before TDC; BOSCH-multihole injection nozzles DLLA 149 S 394; injection pressure 175 kp/cm^2; MANN-fuel filter with replaceable cartridge; capacity of fuel tank appr. 92 l
Governor:	BOSCH-centrifugal variable speed governor; EP/RSV 325-1150 A 8 B 492 DL; governed range of engine speed: 650 to 2450 rev/min; rated engine speed 2300 rev/min;

Air cleaner:	DEUTZ SICCOPUR dry paper element filter; precleaner and maintenance indicator; manufactured by Mann und Hummel;
Exhaust silencer:	Klöckner-Humboldt-Deutz AG; 3-chamber muffler; expansion and absorption type silencer; 125 mm diameter, 460 mm long; on the left hand side of clutch housing; mouth showing rearward;
Lubrication system:	Forced feed from gear type pump; strainer in sump; MANN oil filter in full flow with by-pass valve; replaceable cartridge; oil capacity 11 l; oil changing period 200 till 240 hours; recommended oil viscosity: winter SAE 10 W summer SAE 20 W/20 tropics SAE 30;
Cooling system:	Air cooling; V-belt driven axial blower;
Starting system:	Electrical; BOSCH starter motor JD 12 V 3 PS; BOSCH flame type plug in intake pipe;
Electrical equipment:	12 V, negative earth; BOSCH three phase generator G 1 RL 14 V 28 A 22; 1 lead acid battery 110 Ah at 20 hours rating;

Transmission

Clutch:	Lamellen- und Kupplungsbau GmbH; dry dual disc type clutch DH U 295/250; Walterscheid system; driving part disc operated by foot pedal; p.t.o.-part disc operated by hand lever;
Gear box:	Klöckner-Humboldt-Deutz AG; TW 55.4; constant mesh speed change gear with 4 forward speeds; 1st and 2nd speed jaw shifted 3rd and 4th speed synchronized;

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Test No. 72-130

Gear box: (Continuation) Group gear with 3 forward groups (slow-, fast- and intermediate group) and 1 reverse group; total 12 forward and 4 reverse speeds;

Rear axle and final drive: Crown wheel and pinion; bevel gear type differential; differential lock fitted; pedal operated, self disengaging; final spur gear drive;

Oil capacity: Speed change gear, group gear and final drive total 36,5 l;

Oil changing period: 1500 hours;

Total ratios and speeds

Group	Gear No.	Number of engine revolutions for one revolution of the driving wheel	Theoretical travelling speed at rated engine speed *)	
			km/h	m/s
slow group	1	277,0 : 1	2,24	0,62
	2	178,4 : 1	3,48	0,97
	3	142,6 : 1	4,35	1,21
	4	104,3 : 1	5,95	1,65
intermediate group	1	140,9 : 1	4,40	1,22
	2	90,8 : 1	6,83	1,90
	3	72,5 : 1	8,56	2,38
	4	53,1 : 1	11,69	3,25
fast group	1	67,7 : 1	9,17	2,55
	2	43,6 : 1	14,24	3,96
	3	34,8 : 1	17,82	4,95
	4	25,5 : 1	24,36	6,77
reverse group	1	114,9 : 1	5,40	1,50
	2	74,0 : 1	8,39	2,33
	3	59,1 : 1	10,50	2,92
	4	43,2 : 1	14,35	3,99

*) calculated with standard active tyre radius acc. DIN 7807

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Deutz D 70 06 Test No. 72-130

Power-take off
Live p.t.o., preselectable by hand lever;
driven through the hand lever operated clutch disc;
at rear of tractor;
715 mm above ground;
29 x 34,9 x 8,7 mm; 6 splines = 1 3/8";
(DIN 9611 Form A; BS 1495; ASAE S 203.5);
613 rev/min at rated engine speed;
standard p.t.o. speed 540 rev/min at 2025 rev/min engine speed;
may be set by tractormeter;
direction of rotation clockwise
(viewed from tractor rear)

Belt pulley
(Not fitted on tractor tested, fig. acc. to manufacturer's specification)
at rear of tractor;
driving device attached to p.t.o.;
engaged by p.t.o. hand lever;
320 mm diameter, 140 mm width;
1290 rev/min at rated engine speed;
linear belt speed 21,57 m/s;
direction of rotation clockwise
(viewed from the right hand side of tractor)

Power lift
Klöckner-Humboldt-Deutz AG, D-5000 Köln-Deutz;
model K 45.1;
DEUTZ-TRANSFERMATIC-System;
hydraulic power lift, unit construction;
draught control, position control,
floating position;
single acting ram, bore 90 mm, stroke 152 mm;
overpressure relief valve for ram adjusted
at 250 $\pm$ 30 kp/cm^2;
BOSCH gear pump HY/ZFR 1/11 CL (212/1)
with hydrostatic steering HY/ZFR 1/14 CL (212/1);
directly driven by engine;
DEUTZ control valve;
maximum oil pressure in main circuit 200 kp/cm^2;
4 oil tappings with supplementary DEUTZ-control valves for single or dual acting remote rams available;
hydraulically acting linkage lock for transport;
oil tank incorporated in the lift unit;
capacity 14,5 l;
oil changing period 1500 h

Implement linkage	Three-point linkage, category II (DIN 9674); operated by power lift; lifting rods length adjustable from 610 to 740 mm; lifting range above ground with lifting rods short from 445 to 1070 mm lifting rods long from 175 to 850 mm;
Drawbar	Fitted on clevis of lower links; centre hole and 4 holes on either side; 80 mm distance each (DIN 9676); all holes 33 mm diameter; height above ground adjustable by power lift in the range between 175 and 1070 mm; with lifting rods 740 mm long in standard height 450 mm above ground mechanically lockable; with lower links in horizontal position distance of centre hole: from rear axle centre 970 mm from the end of p.t.o.-shaft 575 mm;
Pull attachment	
Trailer hitch:	Height above ground 805 mm, 870 mm, 935 mm, 740 mm, 805 mm, 870 mm; changeable by shifting and reversing hitch; hitch hole 33 mm diameter; distance of hitch hole from rear axle centre 675 mm;
Towing hitch:	At front of tractor; height above ground 700 mm;
Steering	ZF-Zahnradfabrik Friedrichshafen; ZF-Gemmer steering 73 model 40; operated by steering wheel; (Optional: ZF-hydrostatic steering 74 model 09)

Brakes

Parking brake:	Simplex-shoe type brake; mechanically acting on 2 external brake drums on the differential half shafts on either side; brake drums 180 mm diameter; operated by hand lever with locking ratchet;
Foot brake:	Simplex-shoe type brake; mechanically acting on 2 external brake drums on the differential half shafts on either side; brake drums 250 mm diameter; pedal operated; Both brakes don't interact mutually;
Steering brake:	Operated by single parts of the divided foot brake pedal; for normal use both parts of brake pedal are locked together by safety bolt;

Wheels

Steering wheels:	Two pneumatics at front; 7,50-18 AS Front 6 ply (DIN 7808); maximum permissible load on each tyre 810 kp at 2,25 kp/cm² inflation pressure; when transporting mounted implements 1012 kp; track width 1425-1525-1625-1725-1825-1925 mm; changeable by extending front axle; Rims 5,50 F x 18;
Driving wheels:	Two pneumatics at rear; 18,4 - 30 AS 8 ply (DIN 7807); maximum permissible weight on each tyre 2415 kp at 1,4 kp/cm² inflation pressure; when transporting mounted implements 2584 kp; track width 1514-1614-1729-1829-1923-2023 mm; changeable by reversing wheel centres and offset lug type rims; Rims W 14 L x 30;
Wheel base:	2415 mm

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Weights — Ready for use with full tanks, as tested:

		without driver	with driver
Weight of tractor without ballast:	Front	895 kp	902 kp
	Rear	1800 kp	1868 kp
	Total	2695 kp	2770 kp
Front ballast:	2 built in weights	total	128 kp
	3 front weights 45 kp each		135 kp
Rear ballast:	12 weights per wheel 60 kp each		1440 kp
	Water in the tyres		530 kp
Weight of tractor with ballast:	Front	1228 kp	1235 kp
	Rear	3700 kp	3768 kp
	Total	4928 kp	5003 kp

Seat

Grammer;
DS 20/D 3 H;
upholstered mould seat with back and arm rests;
adjustable spring and shock absorber;
height above ground appr. 1380 mm in median position;
150 mm displaceable to and fro;

Number of grease points (Whole tractor): 14

Overall dimensions

Overall lenght:	3965 mm with three-point linkage
Overall width:	2070 mm at 1614 mm track, without ballast
Overall height:	1900 mm to backrest of passenger's seat
Maximum ground clearence:	430 mm in median plane of tractor

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Lighting equipment — Electrical;
12 Volt;
acc. to German Govt. regulations, additional with main head light beam

	Dimensions of area mm	Height above ground to centre mm	Distance from outside edge of tractor to centre mm ***
Head lights	130 ø	1045	815
Side lights *	150 x 55	1555	190
Rear lights **	150 x 55	1485	200
Reflectors	75 ø	1150	105

*) in combination with direction indicator

**) in combination with direction indicator and stop light

***) at 1514 mm track

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Test Nr. 72-130

FUELS AND LUBRICANTS USED IN TESTS

Laboratory tests

Fuel:	Aral Diesel oil (DIN 51 601); commercially available quality; specific gravity at 15°C: 0,827 kg/l;
Engine oil:	SHELL ROTELLA HD 20;
Transmission oil:	SAE 90;
Hydraulic oil:	Engine oil HD SAE 20W/20

Track tests

Fuel:	Aral Diesel oil (DIN 51 601); commercially available quality; specific gravity at 15°C: 0,831 kg/l;
Engine oil:	SHELL ROTELLA HD 20;
Transmission oil:	SAE 90;
Hydraulic oil:	Engine oil HD SAE 20W/20

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Test No. 72-130

COMPULSORY TESTS

(1) MAIN POWER TAKE-OFF PERFORMANCE

Date of tests: 21st November 1972
Type of dynamometer: Schenck hydraulic dynamometer U1-40

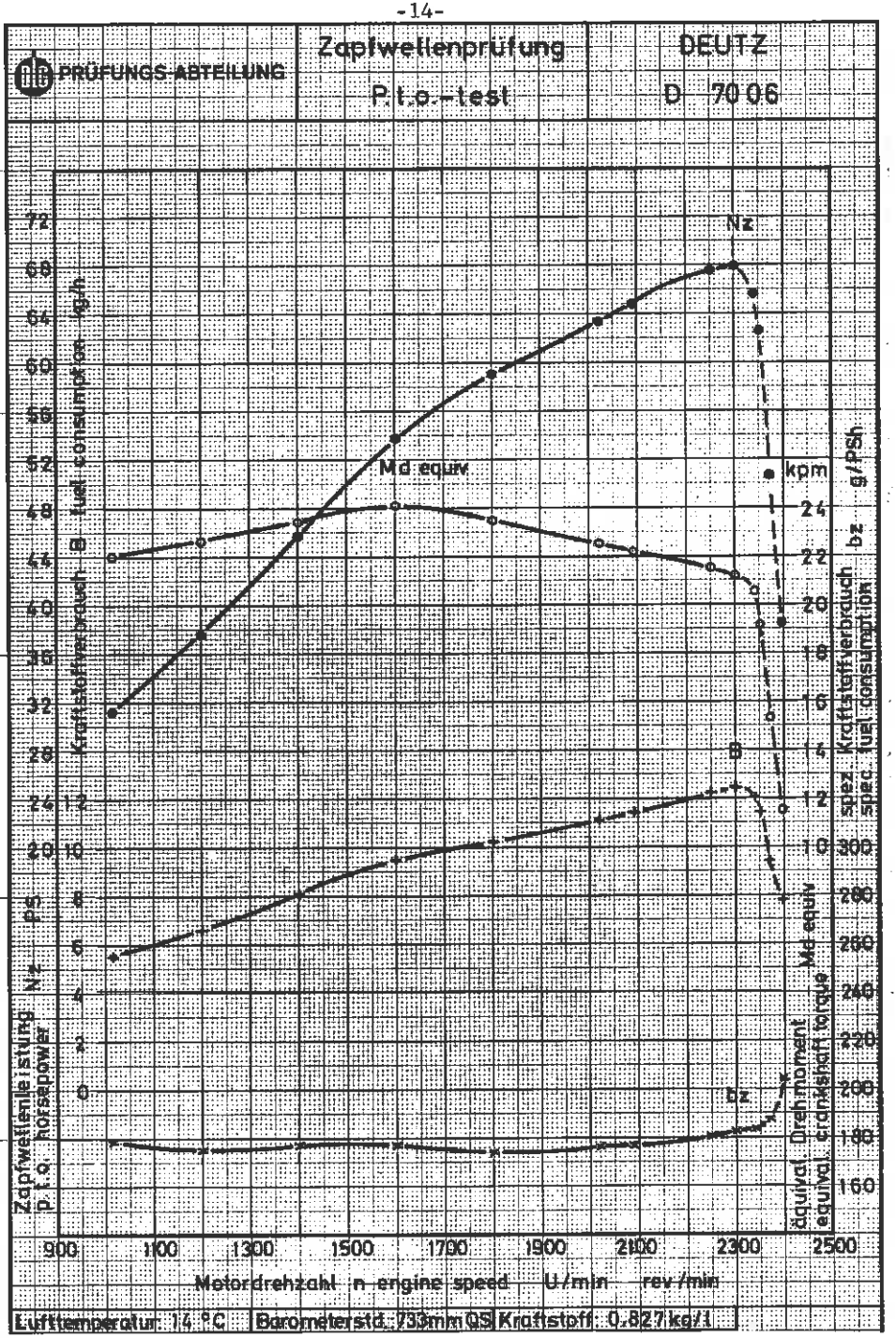
Maximum power

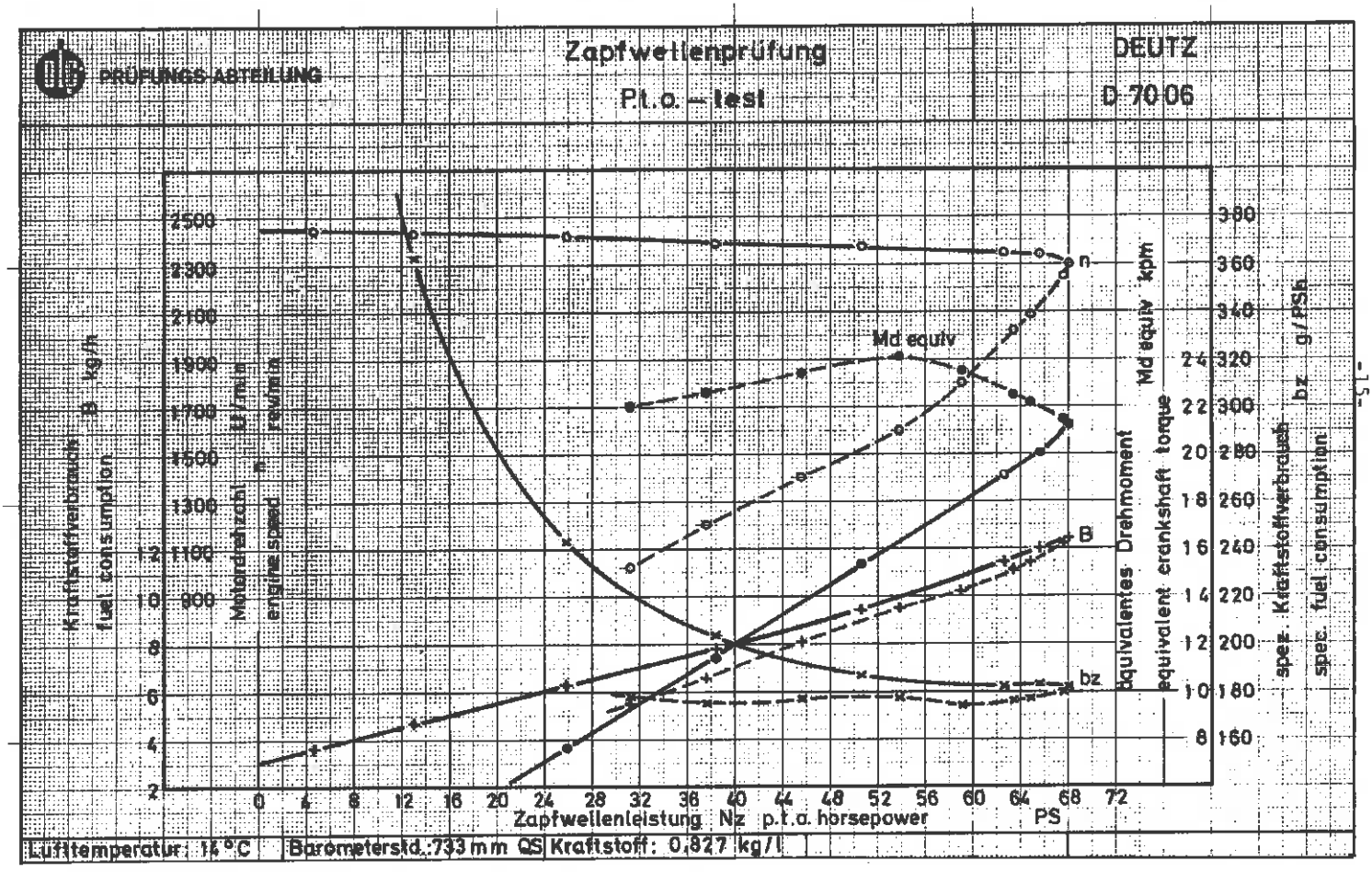
Power PS	Speed engine rev/min	Speed p.t.o. rev/min	Fuel consumption total l/h	Fuel consumption specific g/PSh	Specific energy PSh/l
At maximum power 2-hour test					
68,0	2300	613	15,00	182	4,53
At standard p.t.o. speed (540 rev/min)					
63,5	2025	540	13,32	174	4,76
At the speed recommended for drawbar work					
68,0	2300	613	15,00	182	4,53
Part loads					
(i) 85% of torque at maximum power					
59,4	2375	628	13,07	182	4,54
(ii) unloaded					
-	2452	654	3,96	-	-
(iii) 50% of the load defined in (i)					
30,3	2406	642	8,24	225	3,68
(iv) maximum power					
68,0	2300	613	15,00	182	4,53
(v) 25% of the load defined in (i)					
15,3	2434	649	5,96	322	2,57
(vi) 75% of the load defined in (i)					
45,0	2382	635	10,43	192	4,31

No load maximum engine speed: 2452 rev/min
Equivalent crankshaft torque at maximum power: 21,2 kpm
Maximum equivalent crankshaft torque: 24,1 kpm at 1610 rev/min engine speed

Mean atmospheric conditions:
- temperature 14°C
- pressure 733 mm Hg
- relative humidity 60%

Maximum temperatures:
- coolant not recorded
- engine oil 106°C
- fuel 20°C


PRÜFUNGS-ABTEILUNG
Zapfwellenprüfung
P.t.o.-test
DEUTZ
D 7006
Nz
Md equiv
kpm
g/PSh
bz
B
Kraftstoffverbrauch B fuel consumption kg/h
Zapfwellenleistung Nz p.t.o. horsepower PS
spez. Kraftstoffverbrauch bz spec. fuel consumption
äquival. Drehmoment Md equiv equival. crankshaft torque
Motordrehzahl n engine speed U/min rev/min
Lufttemperatur: 14 °C
Barometerstd. 733mm QS
Kraftstoff: 0,827 kg/l


PRÜFUNGS ABTEILUNG
Zapfwellenprüfung
P.t.o. – test
DEUTZ
D 70 06
Kraftstoffverbrauch B kg/h
fuel consumption
Motordrehzahl n U/min
engine speed n rev/min
Md equiv
Drehmoment Md equiv kpm
equivalent crankshaft torque
spez. Kraftstoffverbrauch bz g/PSe
spec. fuel consumption
n
B
bz
Zapfwellenleistung Nz p.t.o. horsepower
PS
Lufttemperatur: 14 °C
Barometerstd.: 733 mm QS
Kraftstoff: 0,827 kg/l

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(2) DRAWBAR PERFORMANCE

Date of test: 5th till 7th and 14th till 18th Dec. 1972
Type of track: concrete

Gear No. and Group	Speed km/h	Power PS	Drawbar pull kp	Engine speed rev/min	Slip of wheels %	Specific energy PSh/l
(i) MAXIMUM POWER with ballast height of drawbar above ground 450 mm						
1 slow	2,00	37,3	5040	2391	15,0	3,53
2 slow	3,02	56,2	5030	2331	15,0	3,75
3 slow	3,91	58,8	4060	2302	10,8	3,91
1 inter	3,97	58,7	4010	2302	10,5	3,90
4 slow	5,52	59,5	2910	2302	7,8	3,94
2 inter	6,40	59,7	2520	2302	6,6	3,96
3 inter	8,13	59,9	1990	2299	5,1	4,01
1 fast	8,76	60,3	1860	2302	4,8	4,03
4 inter	11,28	60,6	1450	2299	3,6	4,04
2 fast	13,82	59,3	1160	2300	3,0	3,96
(ii) FIVE-HOUR-TEST at 75% of pull at maximum power in 2nd gear of intermediate group						
2 inter	6,76	47,3	1890	2375	4,5	4,04
(iii) FIVE-HOUR-TEST at pull corresponding to 15% wheel slip in test (i)						
2 slow	-	-	5040	2330	-	-
(v) MAXIMUM POWER without ballast height of drawbar above ground 560 mm						
3 slow	3,86	42,3	2960	2370	15,0	3,54
1 inter	3,90	42,6	2950	2365	15,0	3,56
4 slow	5,19	55,0	2860	2301	13,8	3,67
2 inter	6,15	56,9	2500	2301	11,3	3,79
3 inter	7,93	58,7	2000	2299	8,1	3,94
1 fast	8,62	59,0	1850	2300	7,1	3,93
4 inter	11,19	60,1	1450	2299	5,3	4,01
2 fast	13,77	59,7	1170	2299	4,1	3,97

Total oil consumption during ten hours duration of tests (ii) and (iii): 50 g/h

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Tyres make: Front: Continental T 10;7,50-18 AS Front
Rear: Goodyear Sure Grip All Service 18,4/15-30 AS

Specific fuel consumpt. g/PSh	Temperatures Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure mm Hg
tyre inflation pressure 1,3 kp/cm² active tyre radius under static load 724 mm						
232	15	-	90	2	98	762
219	18	-	90	10	82	763
209	19	-	90	12	80	764
210	19	-	95	12	78	764
208	20	-	96	14	80	764
207	17	-	95	9	98	764
204	17	-	97	11	96	764
203	16	-	95	10	98	764
203	17	-	95	11	98	764
207	17	-	95	10	98	764
202	12	-	90	3	98	761
-	12	-	90	4	96	761
tyre inflation pressure 1,1 kp/cm² active tyre radius under static load 723 mm						
237	15	-	85	13	88	755
235	15	-	90	13	80	756
226	17	-	90	12	80	756
218	17	-	91	12	84	757
210	14	-	96	8	96	755
210	14	-	92	8	98	755
204	14	-	92	6	96	755
208	14	-	92	8	97	755

Test (iii) was carried out with additional ballast, the results for power, slip, speed and fuel consumption have no practical significance

(3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 7,50-18 AS Front, 6 ply
rear: 18,4/15-30 AS, 8 ply

Track of wheels front: 1425 mm
rear: 1614 mm

	With brakes		Without brakes	
	left-hand m	right-hand m	left-hand m	right-hand m
Radius of turning space	3,99	3,87	4,35	4,22
Radius of turning circle	3,78	3,70	4,13	4,10

(4) LOCATION OF CENTRE OF GRAVITY

Height above ground	797 mm
Distance forward from the vertical plane containing the axis of the rear wheels	811 mm
Distance of the median plane of the tractor	0 mm

(5) BRAKING PERFORMANCE

A) FOOT BRAKE

Date of tests: 12th and 13th December 1972
Type of track: Concrete
Type of decelerometer: MOTO METER-Bremsverzögerungs- und Pedalkraftschreiber
Weight of ballasted tractor: 5003 kp with driver

Cold brakes

		with ballast	without ballast
Travelling speed	km/h	25,0	25,0
Deceleration	m/s^2	5,2	5,0
Stopping distance	m	5,8	6,6
Force on pedal	kp	70	45
Force on pedal to achieve a deceleration of 2,5 m/s^2	kp	31	20

Brake fade characteristics (hot tests)

			with ballast	without ballast
Deceleration	hot/cold	%	100	100
Stopping distance	cold/hot	%	116	106
Force on pedal	cold/hot	%	98	102

B) PARK BRAKE

Tractor facing up slope:
Pull on hand brake 15 kp, tractor does not roll

Tractor facing down slope:
Pull on hand brake 14 kp, tractor does not roll

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(6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: 12th December 1972
Type of track: concrete
Type of sound level meter: Brüel and Kjaer type 2203

Results of test

Gear: 4th fast
Travelling speed before acceleration: 19,7 km/h
Sound level: 89 dBA

(7) NOISE AT THE DRIVER'S EAR LEVEL

Date of tests: 12th December 1972
Type of track: concrete
Type of sound level meter: Brüel and Kjaer type 2607
Type of frequency analyser: Brüel and Kjaer type 1614
(fitted with octave filter)

No cab or frame fitted on tractor

Results of tests

Gear	Drawbar pull at which the tractor develops the maximum sound level	Travelling speed nominal	Travelling speed effective	Sound level	
	kp	km/h	km/h	dBA	Sone
1 slow	2990	2,24	2,04	94	
2 slow	2990	3,48	3,06	95	
3 slow	2990	4,35	3,88	96	
1 inter	2990	4,40	3,89	96	
4 slow	2880	5,95	5,35	96	
2 inter*)	2600	6,83	6,11	97	98
3 inter	1870	8,56	7,94	96	
1 fast	1930	9,17	8,61	95	
4 inter	1500	11,69	11,20	96	
2 fast	1230	14,24	13,53	95	
3 fast	910	17,82	17,21	95	
4 fast	light load	24,36	26,30	92	

*) The 2nd intermediate gear corresponds to the travelling speed nearest to 7,25 km/h

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date of tests: 15th January 1973

POWER LIFT

	Height above ground in down position		Vertical movement	Maximum force excerted throughout the full lift range	Oil pressure	Lifting force when front of tractor lifts
	hitch points mm	test frame mm	mm	kp	kp/cm²	kp
Linkage giving maximum mechanical advantage						
At hitch points	445	-	625	2490	200	2245
On the frame	175	185	707	2190	200	1380
Linkage giving minimum mechanical advantage						
At hitch points	175	-	677	2290	200	2245
On the frame	445	435	765	2070	200	1380

PUMP CHARACTERISTICS

(i) opening pressure of relief valve in the remote circuit: 210 kp/cm²
sustained pressure by the open relief valve: 200 kp/cm²

(ii) pump delivery rate at minimum pressure and rated engine speed: 30,0 l/min

(iii) pump delivery rate: 26,6 l/min
delivery pressure: 188 kp/cm²

power: 11,15 PS