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REPORT ON TEST IN ACCORDANCE WITH O.E.C.D. TEST CODE FOR AGRICULTURAL TRACTORS



Dutra-Steyer DS-110 tractor
Manufacturer: Dutra Tractor Works, Budapest, Hungary

DANISH GOVERNMENT FARM MACHINERY TESTING STATION
Bygholm 8700 Horsens Denmark

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

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SPECIFICATION OF TRACTOR

Tractor manufacturer:	Dutra Tractor Works, Budapest, Hungary
Submitted for test by:	Hamjern A/S, Hamar, Norway
Selected by:	Manufacturer by agreement with Testing Station
Place of running-in:	Manufacturer and Testing Station
Duration of running-in:	1oo hours appr.
Tractor	
Make:	Dutra-Steyr
Model:	DS-11o
Type:	Four wheel drive
Serial No.:	41o84/o87
Engine	
Make:	Steyr
Model:	WD 61o.5o
Type:	Water cooled 4-stroke diesel engine
Cylinders:	6 cylinders vertical, 1o5 mm bore, 115 mm stroke, capacity 5976 cm^3, compression ratio 17:1, overhead valves, replaceable separate cylinders
Fuel system:	Fuel: commercial diesel oil, gravity feed, Bosch fuel filter 5o134oo, capacity of fuel tank 215 liters, Bosch injection pump type 91o2o548 VA6/1oo H 115o BR 16o, Bosch o433271187 injection nozzles, injection pressure 22o kg/cm^2, o,o54 cm^3 fuel injection for each stroke by 233o rev/min
Governor:	Bosch governor incorporated in injection pump governed range of speed 44o rev/min to 2595 rev/min, rated speed 233o rev/min
Air cleaner:	Oil bath type, oil capacity 1,6 liter, pre-cleaner of cyclone type

Lubrication system:	Forced feed from pump, full flow replaceable cartridge oil filter, type Mann 675o358386, oil capacity 14 liters, oil changing period 2oo hours
Cooling system:	Water cooling with thermostatic temperature control
Electrical equipment	
Voltage:	12 and 24 Volt
Starting device:	Bosch 24 Volt type oo166oo18 JD
Cold starting aid:	Flame glow plug in intake manifold
Generator:	Bosch 12 Volt type G14V16A21
Battery:	Noack 12 Volt 128 Ah

Transmission

Clutch:	Make: Fichtel & Sachs model 635o KR single dry plate type, operated by foot pedal
Gearbox:	Selective gear with 1o forward speeds, 6 speeds in normal and 4 speeds in creeping group and 2 reverse speeds
Front and rear axle and final drive:	Differential gear with crown wheel, pinion and planetary final drive on front and rear wheels, manually operated lever to engage four wheel drive, differential lock on rear axle hand lever operated
Oil capacity:	Gearbox and rear axle drive 55 liters, each planetary drive on front wheels 1,8 liters, differential on front axle 5,2 liters, recommended oil changing period 12oo hours

Total ratios and speeds

Group	Gear	Selective gear No.	Number of engine revolutions for one revolution of the driving wheel	Theoretical travelling speed at rated engine speed of 2330 rev/min km/h
		Forwards speeds		
creep	slow	1	684,3	0,9
		2	263,5	2,4
	fast	1	371,9	1,7
		2	143,2	4,4
normal	slow	1	127,5	5,0
		2	91,4	6,9
		3	63,8	9,9
	fast	1	51,0	12,4
		2	36,1	17,5
		3	23,4	27,0
		Reverse speeds		
normal	slow	reverse	106,3	5,9
	fast	reverse	40,4	15,6

Power take-off

Main:	Manually engaged, 2 speeds, live power take-off
Location:	At rear of tractor, 25 mm to the right side of median plane and 715 mm above ground
Dimensions:	Spline shaft 44,4x36,1x11,0 mm (1¾ inch), 6 splines
Speeds:	555 or 1000 rev/min at 2330 rev/min rated engine speed, standard p.t.o. speed 540 at 2268 rev/min engine speed, standard 1000 rev/min at 2330 rev/min engine speed
Direction of rotation:	Clockwise viewed from tractor rear

Belt pulley

(Not fitted on tractor tested, informations acc. to manufacturer's specification)

Location:	At rear of tractor; driving device mounted on p.t.o. shaft, 2 speeds
Direction of rotation:	Anticlockwise viewed from right hand side of tractor

Power Lift	Live hydraulic system with draft control, position control, floating position, single acting ram, pressure relief valve for ram, Bosch gear pump type o 51o 62o 3o4 driven from engine, maximum oil pressure 175 kg/cm^2, oil capacity 9 liters
Pull attachment	
Implement linkage:	Three-point implement linkage controlled by power lift and lift rods, hitch points acc. to category II (ISO R73o), hitch points height above ground from 31o mm to 116o mm, distance from rear axle to hitch points 111o mm position relative to p.t.o. shaft 575 mm from end of p.t.o. shaft
Swinging drawbar:	Height above ground 43o mm, distance from rear axle 91o mm, distance from end of p.t.o. shaft 38o mm, lateral adjustment 165 mm to each side of median plane
Steering device	Mechanical rod connections with hydraulic power assist
Brakes	
Parking brake:	Mechanically expanding brake shoes on rear wheels, operated by hand lever with ratchet
Foot brake:	Mechanically expanding brake shoes on all four wheels served by airpressure and operated by foot pedal
Drive wheels	Two at front and two at rear, tyres 18,4-3o, 8 ply pneumatic, Firestone F151 "All traction Field and Road", maximum permissible weight on ecah tyre 241o kg at 1,44 kg/cm^2 inflation pressure, track width front 1756 mm, track width rear 1726 mm, wheelbase 195o mm

Weights

Tractor (without driver but with cab and with tanks full)

	on front wheels kg	on rear wheels kg	total kg
without ballast	3210	2230	5440
with ballast	4016	3212	7228

Ballast:

	Number of weights	Weight kg	Water kg
front	4	176	630
rear	8	352	630

Seat

Type:	Sable, model breveté, upholstered seat with back rest, parallogram linkage
Suspension and damping:	Spring with hydraulic shock absorber
Adjustments:	Adjustable acc. to drivers weight, longitudinal adjustment 70 mm, height above footrest appr. 500 mm

Number of grease points

Whole tractor: 29

Overall dimensions

	Length m	Width m	Height m
With ballast	5,02 (1)	2,27	2,68 (2)
Without ballast	5,02 (1)	2,27	2,68 (2)

(1) with three-point linkage
(2) to top of cab

Lighting

	Height above ground of centre cm	Diameter cm	Distance from outside edge of tractor to centre cm
Head lights	92	17	53
Side lights	77	6x13	53
Rear lights	156	6x19	30
Reflectors	75	10	59

FUELS AND LUBRICANTS USED IN TEST

Laboratory and track tests

Fuel:	Esso diesel oil, density o,825 kg/l
Engine oil:	SAE 2o/3o HD
Transmission oil:	SAE 9o
Hydraulic oil:	Shell Rotella HD 2o

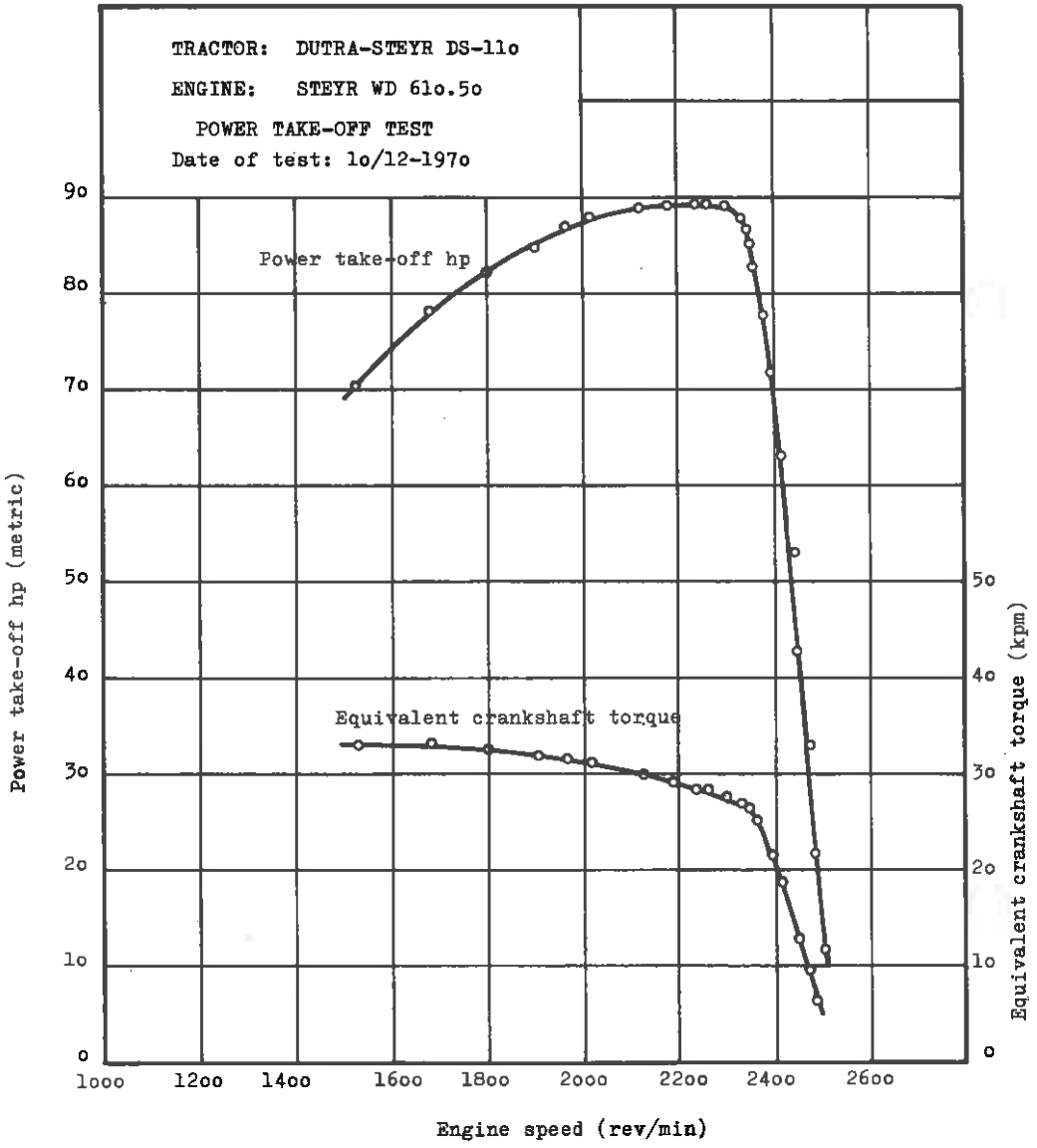
COMPULSORY TESTS

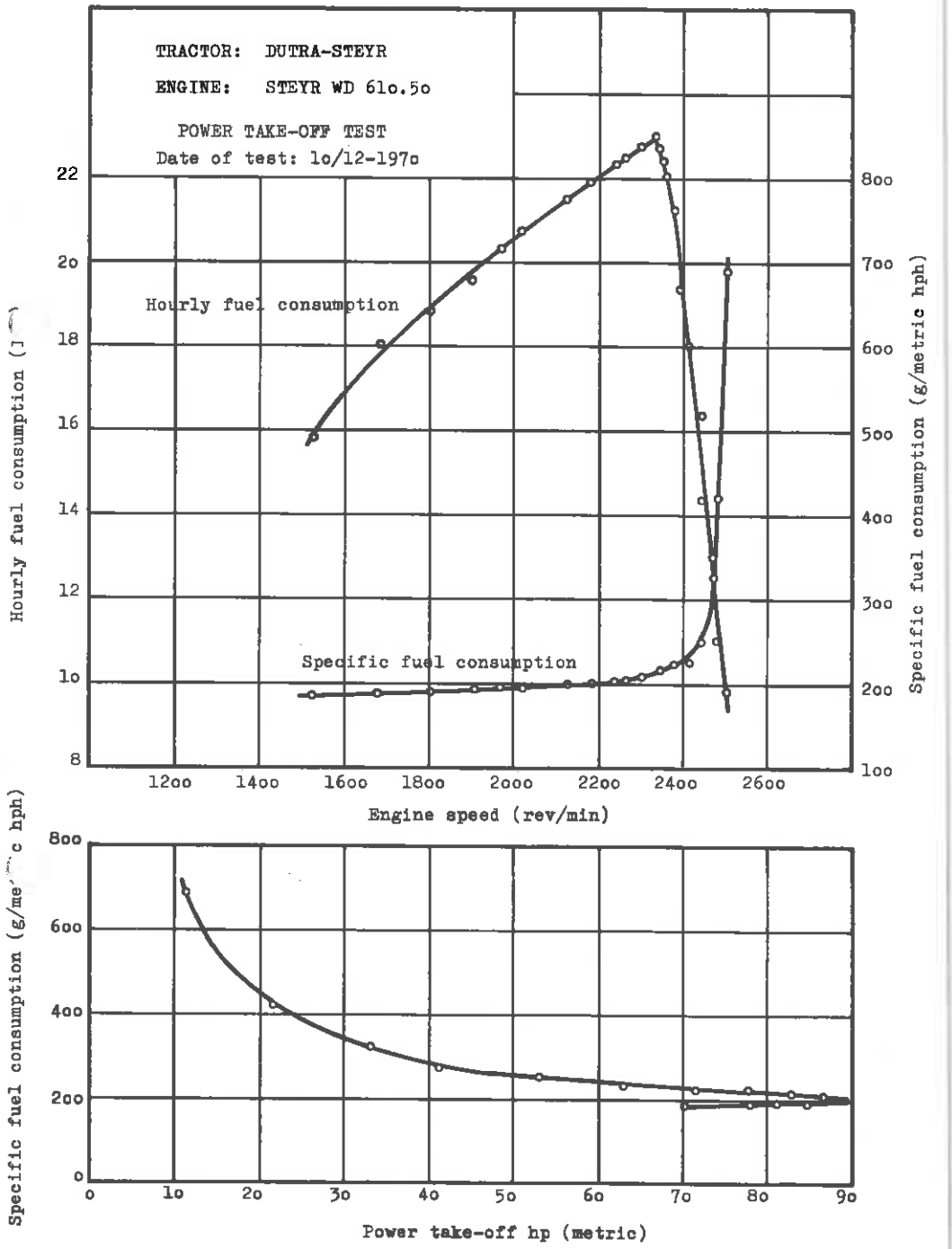
(1) MAIN POWER TAKE-OFF PERFORMANCE

Date and location of test: 9.11.1971 - Bygholm, Horsens
Type of dynamometer: Schenck hydraulic 42-3o

Horsepower	Speed		Fuel consumption		
	engine	p.t.o.	l/h	g/metric hph	metric hph/l
metric hp	rev/min	rev/min			
	At maximum power - 2 hours test				
89,o	233o	looo	22,5	2o9	3,96
	At standard p.t.o. speed (looo rev/min)				
89,o	233o	looo	22,5	2o9	3,96
	At the speed recommended by the manufacturer				
89,o	233o	looo	22,5	2o9	3,96
	Fuel consumption at part loads				
	(i) 85 % of torque at maximum power				
78,4	241o	1o35	21,1	222	3,72
	(ii) unloaded				
-	2575	11o5	6,9	-	-
	(iii) 5o % of the load defined in (i)				
47,6	249o	1o69	15,1	262	3,15
	(iv) maximum power				
89,o	233o	looo	22,5	2o9	3,96
	(v) 25 % of the load defined in (i)				
24,3	2545	1o92	11,3	384	2,15
	(vi) 75 % of the load defined in (i)				
69,9	2435	1o49	19,2	227	3,64

No load maximum engine speed:	2575 rev/min	
Torque at maximum power:	27,4 kpm	
Maximum torque:	32,2 kpm at 169o rev/min of the engine	
Mean atmospheric conditions:	temperature	25°C
	pressure	745 mm Hg
	relative humidity	23 %
Maximum temperatures:	coolant	84°C
	engine oil	97°C
	fuel	45°C


TRACTOR: DUTRA-STEYR DS-11o
ENGINE: STEYR WD 61o.5o
POWER TAKE-OFF TEST
Date of test: 1o/12-197o
Power take-off hp
Equivalent crankshaft torque
Power take-off hp (metric)
Equivalent crankshaft torque (kpm)
Engine speed (rev/min)
9o
8o
7o
6o
5o
4o
3o
2o
1o
o
1ooo
12oo
14oo
16oo
18oo
2ooo
22oo
24oo
26oo


TRACTOR: DUTRA-STEYR
ENGINE: STEYR WD 61o.5o
POWER TAKE-OFF TEST
Date of test: 1o/12-197o
Hourly fuel consumption
Specific fuel consumption
Hourly fuel consumption (l
Specific fuel consumption (g/metric hph)
22
2o
18
16
14
12
1o
8
8oo
7oo
6oo
5oo
4oo
3oo
2oo
1oo
12oo
14oo
16oo
18oo
2ooo
22oo
24oo
26oo
Engine speed (rev/min)
Specific fuel consumption (g/me c hph)
8oo
6oo
4oo
2oo
0
0
1o
2o
3o
4o
5o
6o
7o
8o
9o
Power take-off hp (metric)

(2) DRAWBAR PERFORMANCE

Date of test: 3o.6 - 6.7-1971 Type of track: concrete Height of drawbar above ground: 45o mm

Gear	Speed	Horse-power metr.	Drawbar pull	Engine speed	Slip of wheels	Fuel consumption drawbar metr.hp	Fuel consumption specific g/metric	Temperature fuel	Temperature coo-lant	Temperature en-gine	Atmospheric conditions tempe-rature	Atmospheric conditions relative humidity	Atmospheric conditions pres-sure
	km/h	hp	kg	rev/min	%	h/l	hph	°C	°C	°C	°C	%	mm Hg
(i) 2-wheel drive - maximum power (with ballast)													
1.cr.sl.	o,84	8,6	275o	2452	14,6	o,98	857	35	82	78	21	6o	769
1.cr.f.	2,27	24,o	285o	2526	15,4	1,96	421	35	82	78	21	6o	769
2.cr.sl.	1,54	17,1	3ooo	2488	15,2	1,64	5o5	36	82	78	21	6o	769
2.cr.f.	3,96	42,5	29oo	2458	15,6	2,68	3o8	36	82	78	21	6o	769
1.slow	4,39	47,2	29oo	2415	15,6	2,67	3o1	36	82	78	21	6o	769
2.slow	6,25	63,7	275o	2363	14,1	2,97	279	36	82	78	21	6o	769
3.slow	9,o6	73,8	22oo	2252	9,o	3,39	244	39	82	79	24	6o	769
1.fast	12,3	72,9	16oo	2371	6,3	3,18	261	39	82	79	24	6o	769
2.fast	17,o	66,2	1o5o	2289	4,o	2,84	282	39	82	79	24	6o	769
3.fast	25,o	64,8	7oo	2222	2,4	3,o4	273	39	82	79	24	6o	769
(i) 4-wheel drive - maximum (with ballast)													
1.cr.sl.	o,82	15,2	5ooo	2473	15,3	1,61	513	41	82	87	22	65	755
1.cr.f.	2,2o	4o,7	5ooo	2429	15,8	2,78	299	41	82	87	22	65	755
2.cr.sl.	1,54	28,3	495o	2454	14,5	2,44	34o	41	82	87	22	65	755
2.cr.f.	3,56	65,9	5ooo	2196	14,5	3,o3	275	41	82	87	22	65	755
1.slow	3,56	65,9	5ooo	1945	15,2	3,3o	251	41	82	87	22	65	755
2.slow	6,5o	74,6	31oo	2264	6,5	3,34	249	41	82	87	23	65	755
3.slow	9,27	75,5	22oo	2276	4,2	3,28	252	42	82	87	23	65	755
1.fast	11,4	67,6	16oo	2184	2,3	3,oo	276	42	82	87	23	65	755
2.fast	16,1	65,6	11oo	2176	1,8	3,o4	272	42	82	87	23	65	755
3.fast	25,o	64,8	7oo	2179	o,4	3,o1	275	42	82	87	23	65	755

Gear	Speed	Horse-power	Drawbar pull	Engine speed	Slip of wheels	Fuel consumption drawbar	Fuel consumption specific	Temperature fuel	Temperature coo-lant	Temperature en-gine	Atmospheric conditions tempe-rature	Atmospheric conditions relative humidity	Atmospheric conditions pres-sure
	km/h	metr. hp	kg	rev/min	%	metr.hp h/l	g/metric hph	°C	°C	°C	°C	%	mm Hg
(ii) 4-wheel drive - five hours test at 75 % of pull at maximun power													
2.slow	7,o	6o,3	2325	2393	5,3	3,o8	27o	42	82	87	23	65	755
(iii) 4-wheel drive - five hours test at pull corresponding to 15 % wheelslip in test (i)													
1.slow	3,13	59,1	51oo	1698	15,o	3,39	245	42	82	87	23	65	755
(iv) 2-wheel drive - maximum power (without ballast)													
1.cr.sl.	o,88	8,5	26oo	2582	15,8	o,95	89o	39	82	79	24	58	769
1.cr.f.	2,24	22,4	27oo	2532	16,8	1,87	445	39	82	79	24	58	769
2.cr.sl.	1,56	15,3	265o	2542	15,6	1,45	567	39	82	79	24	58	769
2.cr.f.	3,95	39,1	2675	2471	16,o	2,42	342	39	82	79	24	58	769
1.slow	4,54	42,9	255o	2469	15,o	2,54	327	39	82	79	24	58	769
2.slow	6,12	6o,1	265o	2349	15,3	2,75	3o1	39	82	79	24	58	769
3.slow	8,56	65,8	2o75	213o	9,3	3,12	266	39	82	79	24	58	769
1.fast	1o,5	71,9	185o	2o34	8,o	3,42	242	39	82	79	24	58	769
2.fast	15,3	66,6	1175	2o71	5,o	3,o3	272	39	82	79	24	58	769
3.fast	25,o	64,8	7oo	2231	2,7	2,92	284	39	82	79	24	58	769
(iv) 4-wheel drive - maximum power (without ballast)													
1.cr.sl.	o,86	15,2	47oo	2536	14,8	1,51	548	42	82	87	2o	69	756
1.cr.f.	2,23	39,2	475o	2458	14,3	2,7o	3o7	41	82	87	2o	69	756
2.cr.sl.	1,55	27,6	48oo	25o6	15,o	2,16	384	41	82	87	2o	69	756
2.cr.f.	3,6o	65,3	49oo	222o	14,4	3,o7	269	41	82	87	2o	69	756
1.slow	4,o7	71,6	475o	2191	14,5	3,37	246	41	82	87	19	69	756
2.slow	6,5o	77,o	32oo	2283	7,2	3,49	237	33	82	78	21	71	764
3.slow	9,6o	76,5	215o	2359	4,5	3,33	25o	33	82	78	21	71	764
1.fast	12,4	62,o	135o	2383	2,7	2,73	3o4	33	82	78	21	71	764
2.fast	17,7	65,6	1ooo	238o	1,8	2,97	28o	33	82	78	21	71	764
3.fast	22,5	66,7	8oo	1944	o,8	3,3o	251	33	82	78	21	71	764

(3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 18,4 - 3o,8 ply
rear: 18,4 - 3o,8 ply

Wheel track front: 1756 mm
rear: 1726 mm

	Without brakes	
	Right hand m	Left hand m
Radius of turning space	7,45	7,o5
Radius of turning circle	5,9o	5,43

(4) LOCATION OF CENTRE OF GRAVITY

	Without ballast mm
Height above ground	137o
Distance forward from the vertical plane containing the axis of the rear wheels	114o
Distance from median plane	o

(5) BRAKING

Foot Brake:

Date of test: 13. and 14.1. 1972

Type of track: tarmacadam

Type of measurement instrument: Tapley Brake Testing Meter and Bofors transducers type KIS-1-T1o

Travelling speed of tractor: 25 km/h

With cold brakes:		Tractor with ballast	Tractor without ballast
Deceleration	m/s^2	5,5	6,o
Stopping distance	m	6,5	6,7
Force on pedal	kp	4o	37
Force on pedal to achieve a deceleration of 2,5 m/s^2	kp	21	19

Brake fade characteristics:

		Tractor with ballast	Tractor without ballast
Deceleration hot/cold	%	102	102
Stopping distance cold/hot	%	99	101
Force on pedal cold/hot	%	102	100

Parking brake

Tractor facing up slope

Pull on hand lever 38 kg, tractor does not roll

Tractor facing down slope

Pull on hand lever 36 kg, tractor does not roll

(6) MEASUREMENT OF AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: 10.6.1971

Type of sound level meter: Brüel & Kjær, type 2203

Type of track: concrete

Results of test

Gear: 3.fast

Travelling speed: 27,8 km/h

Sound level: 90 dBA

(7) NOISE MEASUREMENT AT THE DRIVER'S EAR LEVEL

Date of test: 10.6.1971

Type of sound level and octave filter: Brüel & Kjær, type 2203 and 1613

Type of track: concrete

Results of test: Tractor equipped with cab (1)

Gear	Travelling speed km/h	Sones
2.cr.slow	2,5	130
2.slow	6,5(2)	107

(1) Cab is an integral part of the tractor and noise without cab not applicable

(2) The 2.slow gear corresponds to the travelling speed nearest to 7,25 km/h

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of test: 2.8.1971 - Bygholm, Horsens

Hydraulic fluid: Shell Rotella HD 2o

Power Lift

	Height above ground in down position		Vertical movement	Maximum force exerted through full range	Pressure	Lifting force when front of tractor lifts
	Hitch point	Frame				
	mm	mm	mm	kg	kg/cm^2	kg
Linkage giving maximum mechanical advantage						
At hitch points	425	-	565	2450	not measured	does not lift up within the measured force
On the frame		465	645	1597	not measured	does not lift up within the measured force
Linkage giving minimum mechanical advantage (none fitted)						

Pump Characteristics: Tractor is not equipped with a tapping point

(9) REPAIRS, ADJUSTMENTS AND REMARKS

The hydraulic lift pump was replaced at the start of the test

Date: Jan. -Feb. 1972