Report on test in accordance with
O.E.C.D. STANDARD CODE I for the Official
Testing of Agricultural Tractor Performance

O.E.C.D. Approval No. **1/1840** FULL CODE
Date of approval: 5th August, 1999
Test No. OECD-H11-T001



Agricultural Tractor

KUBOTA M-110DT (4WD)

Manufactured by: **KUBOTA Corporation**
1-2-47 Shikitsu-higashi, Naniwa-ku, Osaka City,
Osaka, 556-8601 JAPAN

INSTITUTE OF AGRICULTURAL MACHINERY
BIO-ORIENTED TECHNOLOGY RESEARCH ADVANCEMENT INSTITUTION
(IAM-BRAIN)
OMIYA, Japan

This bulletin is based on engineering tests in accordance with the O.E.C.D. STANDARD CODE for the Official Testing of Agricultural Tractor Performance (Code I). It does not contain the evaluation of the tractor performance on practical work. This report has been approved by the O.E.C.D. Coordinating Center (C.E.M.A.G.R.E.F., France) as being in accordance with the O.E.C.D. STANDARD CODE.

Test No.:	H 11-T001
Duration of Test:	May, 1999
Date of Approval:	5th August, 1999
Make:	KUBOTA
Model:	M-110DT
Type:	4WD
Serial number:	M11-50094
1st serial number:	M11-50001

In this report all performance characteristics are given corresponding to the international system of units.
The reference to the former used technical systems of units is given by the following relations:

Forces	1 kgf	=	9.80665 N
Powers	1 PS	=	0.7355 kW
	1 HP	=	0.7453 kW
Pressures	1 kgf/cm^2	=	98.0665 kPa

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Printed in **JAPAN**

TABLE OF CONTENTS

	Page
GENERALITIES	4
1. SPECIFICATIONS OF TRACTOR	4
2. TEST CONDITIONS	14
3. COMPULSORY TESTS RESULTS	16
Main power take-off performance	16
Hydraulic power and lifting force	20
Drawbar performance	22
Turning area and turning circle	24
Location of center of gravity	24
Braking	25
External noise level	26
REPAIRS AND ADJUSTMENTS DURING TESTS	26
REMARKS	26

GENERALITIES

Tractor manufacturer's name and address:	KUBOTA Corporation 1-2-47 Shikitsu-higashi, Naniwa-ku, Osaka City, OSAKA, 556-8601 JAPAN
Location of tractor assembly:	KUBOTA Corporation, SAKAI Plant 64 Ishizukitamachi, Sakai City, OSAKA, 590-0823 JAPAN
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with agreement by BRAIN
Place of running-in:	KUBOTA Corporation, SAKAI Plant
Duration of running-in:	Engine and tractor 70 hours
Location of test:	BRAIN

1. SPECIFICATIONS OF TRACTOR

1.1 IDENTIFICATION

Make:	KUBOTA
Model:	M-110DT
Type:	Four-wheel drive, unit construction Agricultural tractor
Number of driving wheels:	Four (4)
Serial Number:	M11-50094
1st Serial Number:	M11-50001

1.2 ENGINE

Make:	Own make
Model:	F5802-TE1
Type:	4-cycle diesel engine, direct injection, water cooled, exhaust turbocharged
Serial Number:	F5802-XE3128

1.2.1 Cylinders

Number:	Five (5)
Disposition:	Vertical, in-line
Bore/Stroke:	109 mm / 125 mm
Capacity:	5832 cm^3
Compression ratio:	19.0:1
Arrangement of valves:	Over head
Cylinder liners:	Replaceable, dry

1.2.2 Supercharging

Make:	MITSUBISHI HEAVY INDUSTRIES, LTD
Model:	TD06-20G-12
Type:	Exhaust gas turbine
Pressure:	0.05 MPa

1.2.3 Fuel System

Fuel feed system:	Forced feed type
Filters	
Make:	TENNEX
Model:	16550-43011
Type:	Replaceable paper element, cartridge type
Number:	One (1)
Capacity of fuel tank:	150 dm^3
Injection pump	
Make:	ZEXEL
Model:	NP-PES5AD100B410L
Type:	AD type (in-line)
Serial Number:	962S876775
Manufacturer's production setting of injection pump	
Flow rate:	22.6 ± 0.8 dm^3/h at rated engine speed and full load
Timing:	9 degrees before T.D.C.
Injectors	
Make:	ZEXEL
Model:	KBLII/DLLA-S (piece:NP-DLLA150SM212)
Type:	Hole type
Injection pressure:	16.7 ~ 22.1 MPa

1.2.4 Governor

Make:	ZEXEL
Model:	NP-EP/RSV200-1300AQ39C311
Type:	Mechanical (all speed governor)
Governed range of engine speed:	From 680 to 2620 rev/min
Rated engine speed:	2400 rev/min

1.2.5 Air cleaner

Pre-cleaner:	Optional, not fitted in tested tractor
Make:	NIPPON DONALDSON Co., LTD.
Model:	PBH00-8297
Type:	Cyclone type
Location of air intake:	Above the bonnet
Main cleaner:	
Make:	NIPPON DONALDSON Co., LTD.
Model:	FT-G108430
Type:	Dry dual paper element
Location of air intake:	Under the bonnet, in front of the radiator
Maintenance indicator:	Not fitted

1.2.6 Lubrication system

Type of feed pump:	Forced lubrication (gear pump)
Type of filter:	Replaceable cartridge paper element type
Number:	One (1)

1.2.7 Cooling system

Type of coolant:	50/50 solution of permanent antifreeze and clean water
Specification of pump	
Type:	Centrifugal
Model:	1G411-73031
Specification of fan	
Type:	Axial type
Number of fan blades:	Eight (8)
Fan diameter:	460 mm
Coolant capacity:	12.9 dm^3
Type of temperature control:	Wax type thermostat
System pressure:	88.3 kPa

1.2.8 Starting System

Make:	DENSO
Model:	128000-9492
Type:	Solenoid engaged type
Starter motor power rating:	12 V, 3.0 kW
Cold starting aid:	Intake air heater
Safety device:	Operable only with shuttle lever in neutral and PTO clutch disengaged

1.2.9 Electrical system

Voltage:	12 V
Generator	
Make:	MITSUBISHI ELECTRIC
Model:	A5TA5999
Type:	Three phase generator
Power:	80 Amps
Battery	
Number:	One (1)
Rating:	120 Ah at 5 hours rating

1.2.10 Exhaust system

Make:	Own make
Model:	-
Type:	Multi chamber absorption-expansion
Location:	Inside of the bonnet

1.3 TRANSMISSION

1.3.1 Clutch (travel alone)

Make:	Dynax
Model:	DR376.0B
Type:	Hydraulic wet multi-plate clutch
Number of plates:	Seven (7)
Diameter of plates:	133.5 mm
Method of disengagement:	Operated by foot pedal

1.3.2 Gear box

Make: Own make

Model: -

Type: Mechanical

Description: Powershift 8 speed (1st ~ 8th) gears with +/- button switch on shift lever, synchromesh 2 speed high(H) / low(L) range gears with shift lever (16 speed operation with one shift lever).
Powershift 2 speed forward(F) / reverse(R) shuttle gears with shuttle lever.

	Forward	Reverse
Number of gears	8	8
Number of ranges	2	2
Total of arrangements	16	16

Available options: Not fitted on the tested tractor
Additional one constant mesh creeper gear
Totally 24 forward / 24 reverse speeds

1.3.3 Rear axle and final drives

Make: Own make

Type: Bevel gear type differential and planetary gear type final drives

Model: -

Differential lock

Type: Electro / Hydro dog clutch

Model: -

Method of engagement: Operated by foot pedal switch

Method of disengagement: Self disengagement

1.3.4 Front axle and final drives

Make: Own make

Type: Bevel gear type differential, bevel and planetary gear type final drives

Differential lock

Type: Electro / Hydro dog clutch

Model: -

Method of engagement: Operated by hand button switch

Method of disengagement: Operated by hand button switch

Available options: " Bi-speed turn " system; mechanism of increase speed of front tyre in turning, 1.64 times faster than the standard 4WD front tyre speed

1.3.5 Total ratios and travelling speeds

Gear Number(*)	Range	Number of engine revolutions for one revolution of the driving wheels		Nominal travelling speed(**) at rated engine speed of 2400 rev/min [km/h]	
		Forward	Reverse	Forward	Reverse
(1)	1-C	2031.99	2014.63	0.34	0.35
(2)	2-C	1631.21	1617.26	0.43	0.43
(3)	3-C	1304.36	1293.21	0.53	0.54
(4)	4-C	1038.79	1029.91	0.67	0.68
(5)	5-C	848.27	841.02	0.82	0.83
(6)	6-C	680.96	675.14	1.02	1.03
(7)	7-C	544.51	539.86	1.28	1.29
(8)	8-C	433.65	429.94	1.60	1.62
1	1-L	364.19	361.08	1.91	1.93
2	2-L	292.36	289.86	2.38	2.40
3	3-L	233.78	231.78	2.97	3.00
4	4-L	186.18	184.59	3.74	3.77
5	5-L	152.03	150.73	4.57	4.61
6	6-L	122.05	121.00	5.70	5.75
7	7-L	97.59	96.76	7.13	7.19
8	8-L	77.72	77.06	8.95	9.02
9	1-H	104.23	103.34	6.67	6.73
10	2-H	83.67	82.96	8.31	8.38
11	3-H	66.91	66.33	10.39	10.48
12	4-H	53.28	52.83	13.05	13.16
13	5-H	43.51	43.14	15.98	16.12
14	6-H	34.93	34.63	19.91	20.08
15	7-H	27.93	27.69	24.90	25.11
16	8-H	22.24	22.05	31.27	31.54

(*) The between brackets are not available on the tested tractor.
(**) Calculated with a tyre dynamic radius index (ISO 4251-1:1992) of 769 mm (tyre: 18.4R34).

Number of revolutions of front wheels for one revolution of rear wheels: 1.36
2.23 (In turning with " Bi-speed turn " switch on)

1.4 POWER TAKE-OFF

1.4.1 Main power take-off

Type: Independent PTO
Method of engagement: Hydraulic wet multi-plate clutch by hand lever
Number of shafts: Two (2), replaceable
Method of changing power take-off shafts ends speeds: Speed change by replacing power take-off shaft

1.4.1.1 Power take-off proportional to engine speed

Power take-off at 540 rev/min

Location: At rear of tractor
Diameter of power take-off shaft end: 35 mm
Number of splines: Six (6), in conformity with ISO 500:1991/SAE J1170
Height above ground: 752 mm

Distance from the median plane of the tractor: 0 mm
Distance behind rear axle center: 421 mm
Direction of rotation (viewed from shaft end): Clockwise

PTO type	PTO speed [rev/min]	Engine speed [rev/min]	Engine/PTO transmission ratio	Power restriction/Maximum torque transmissible
540	540	2035	3.769	43.2 kW / 1413 Nm
	637	2400		

Power take-off at 1000 rev/min

Location: At rear of tractor
Diameter of power take-off shaft end: 35 mm
Number of splines: Twenty one (21), in conformity with ISO 500:1991/SAE J1170
Height above ground: 752 mm
Distance from the median plane of the tractor: 0 mm
Distance behind rear axle center: 421 mm
Direction of rotation (viewed from shaft end): Clockwise

PTO type	PTO speed [rev/min]	Engine speed [rev/min]	Engine/PTO transmission ratio	Power restriction/Maximum torque transmissible
1000	1000	2211	2.211	43.2 kW / 829 Nm
	1086	2400		

1.4.1.2 Power take-off proportional to ground speed Not fitted

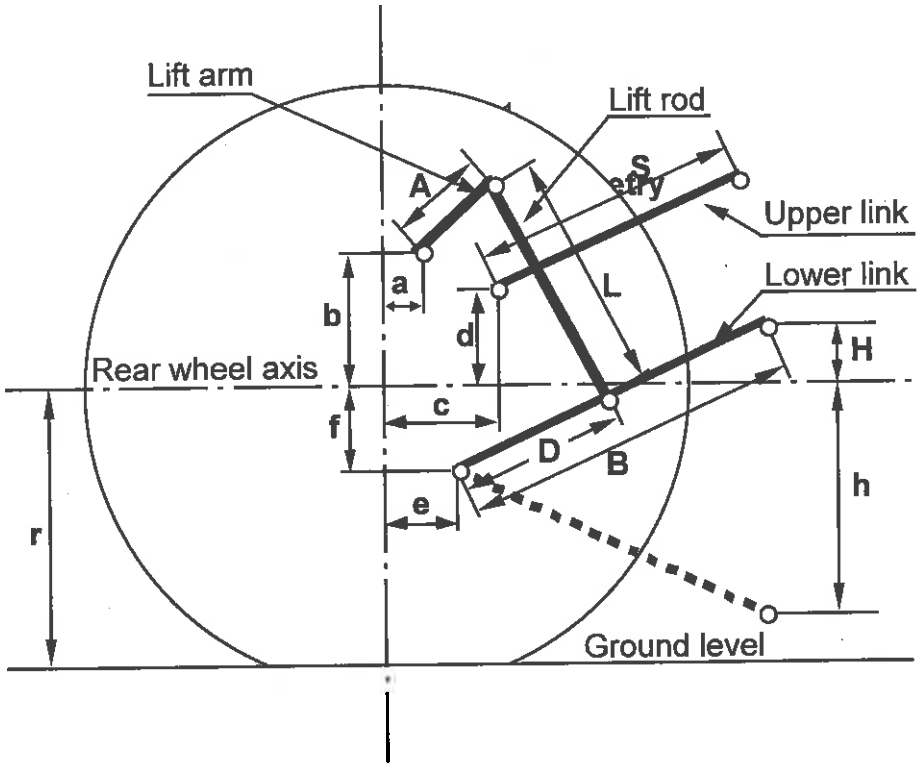
1.5 HYDRAULIC POWER LIFT

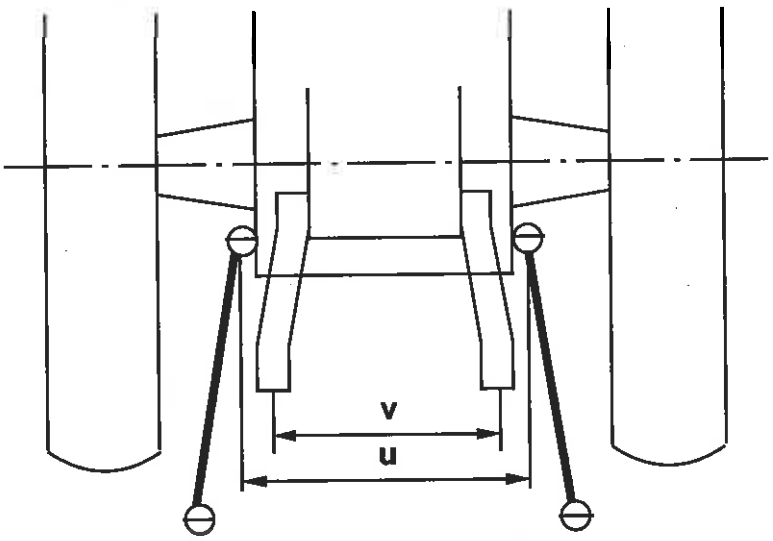
Make: Own make
Type: Hydraulic 3-point hitch
Position, draft and mix control
Model:
Type of hydraulic system: Open center system
Make, type and number of cylinders: Own make, single acting, one (1)
Type of linkage lock for transport: Hydraulically closed by throttle valve
Relief valve pressure setting (tolerance): 19.7 ~ 20.2 MPa
Opening pressure of cylinder safety valve: 23 ~ 24.5 MPa
Lift pump type: Gear type
Transmission between pump and engine: Shaft drive
Type and number of filters: Paper cartridge type, three (3)
Site of oil reservoir: In rear transmission case
Type, number and location of tapping points
type: ISO5675, SAE-J1036, ASAE R366, hydraulic female coupler
number: Two (2) sets
location: At rear of tractor
Maximum volume of oil available to external cylinders: Hydraulic oil should be added for external hydraulic circuit
Available options: Additional one (1) external cylinder
Additional two (2) external cylinders

1.6 THREE POINT LINKAGE

Category: 2, in conformity with category 2 of ISO 730-1:1994 and ISO 730-2:1979

Category adapter: None





		Dimension of range [mm]	Settings used in test [mm]
Length of lift arms	(A)	250	250
Length of lower links	(B)	900	900
Distance of lift arm pivot point from rear-wheel axis:			
- horizontally	(a)	70	70
- vertically	(b)	303	303
Horizontal distance between the 2 lower link points	(u)	512	512
Horizontal distance between the 2 lift arm end points	(v)	535	535
Length of upper link	(S)	from 660 to 895	750
Distance of upper link pivot point from rear wheel axis:			
- horizontally	(c)	273 290	290
- vertically	(d)	286 221	221
Distance of lower link pivot point from rear wheel axis:			
- horizontally	(e)	115	115
- vertically	(f)	176	176
Distance of lower link pivot points to lift rod pivot points on lower links:	(D)	455, 508	455
Length of lift rods:	(L)	from 545 to 685	645
Height of lower hitch points relative to the rear wheel axis:			
- in low position	(h)	from 246 to 687	579
- in high position	(H)	from 37 to 305	124
Height above ground of lower hitch points when locked in transport position(*)		from 805 to 1073	902
(*) Assuming r = rear tyre dynamic radius index (ISO 4251-1:1992): 769 mm (tyre: 18.4R34)			

Table 1.1.

Dimensions of linkage geometry when connected to the standard frame

1.7 SWINGING DRAWBAR

Type:	Bar type, clevis type (as option)
Height above ground	
Maximum:	622 mm at top surface of bar
Minimum:	472 mm at top surface of bar (tyre size 18.4R34, r = 769 mm)
Type of adjustment:	Changing by turning the bar
Distance of hitch point from rear-wheel axis,	
Horizontally:	772 mm and 822 mm

Distance of hitch point from power take-off shaft end Vertically:	280 mm and 130 mm at top surface of bar
Horizontally:	350 mm and 400 mm
Lateral adjustment (center of clevis)	
Right hand:	130 mm and 141 mm
Left hand:	130 mm and 141 mm
Distance of pivot point from rear-wheel axis, Horizontally:	215 mm
Diameter of drawbar pin hole:	33.5 mm
Maximum vertical permissible load:	14.7 kN

1.8 TRAILER HITCH

Not fitted

1.9 HOLED DRAWBAR

Not fitted

1.10 STEERING

Make:	SUMITOMO EATON HYDRAULICS CO., LTD
Model:	WEGKW1D
Type:	Hydrostatic, load reaction type
Method of operation:	Steering wheel operated and full hydraulic power
Pump:	Independent hydraulic pump
Ram:	Balanced type cylinder
Working pressure:	12.7 MPa

1.11 BRAKES

1.11.1 Service brake

Make:	Own make
Model:	-
Type:	Hydraulic (master cylinder) acting, oil-immersed disk type three (3) disks on each differential half shaft
Method of operation:	Independent or combined pedal
Trailer breaking take-off:	Option

1.11.2 Parking brake

Type:	Mechanical acting cam-disk type
Method of operation:	Pull type brake handle

1.12 WHEELS

Number:	Four (4)
Front:	Two (2), steering and driving
Rear:	Two (2), driving
Wheelbase:	2510 mm

Track width adjustment:

	Minimum [mm]	Maximum [mm]	Adjustment method
Front	----	1660	Fixed
Rear	1530	2010	Changing by turning wheels and offset of rims

1.13 PROTECTIVE STRUCTURE

Make:	KUBOTA
Model:	IC120
Type:	Safety cab.
Protective device:	Cab., not tiltable
OECD approval	
Approval number:	4/0 590
Date of approval:	6th September, 1999

1.14 SEAT

1.14.1 Driver's seat

Make:	ARACO
Model:	HG11
Type:	-
Seat and steering wheel reversible:	No
Type of suspension:	Coil spring
Type of dumping:	Oil dumping
Range of adjustment	
Longitudinal:	120 mm
Vertical:	30 mm
Safety belt:	Option (ELR type)

1.14.2 Optional driver's seat — Not fitted

1.14.3 Passenger seat — Not fitted

1.15 LIGHTING

	Height above ground of center	Size	Distance from outside edge of lights to median plane of tractor
	[mm]	[mm]	[mm]
Headlights	1085	143x192	240
Sidelights	----	----	----
Rear lights	1592	75x115	782.5
Reflectors	1592	42x42	776.5
Flashers	2496	ϕ 117x70	863.5
	1592	75x75	857.5

2. TEST CONDITIONS

2.1 OVERALL DIMENSIONS

	Length	Width		Height	
		Minimum	Maximum	Protective structure	Exhaust silencer
	[mm]	[mm]	[mm]	[mm]	[mm]
Unballasted	4155	2065	2065	2675	2620
Ballasted	4586	2065	2065	2669	2597

2.2 GROUND CLEARANCE

Ground clearance: 475 mm
Clearance-limiting part: Front wheel drive case

2.3 TRACTOR MASS

	Ballasted		Unballasted	
	Without driver [kg]	With driver [kg]	Without driver [kg]	With driver [kg]
Front	2246	2254	1456	1464
Rear	3206	3273	2424	2491
Total	5452	5527	3880	3955

2.4 BALLAST

Front:	1 bracket	72 kg
	12 weights, total	537 kg
Rear:	6 weights, total	312 kg
	Water in the tyres	651 kg

2.5 TYRES AND TRACK WIDTH SPECIFICATIONS

		Front	Rear
Tyres:			
- dimension		13.6R24	18.4R34
- ply rating		121A8	144A8
- type		Radial	Radial
- maximum load (tyre manufacture's)	[kN]	13.0	25.2
- inflation pressure	[kPa]	140	140
- dynamic radius index	[mm]	566	769
Chosen track width	[mm]	1660	1530

2.6 FUEL

Type: EPA Diesel fuel E45-LS
Density at 15 °C: 0.8563 g/cm^3

2.7 OILS AND LUBRICATION

2.7.1 Capacity and change interval

	Capacity [dm^3]	Oil change [h]	Filter change [h]
Engine	20.8	300	600
Gear box Rear axle Final drive (rear) Hydraulic system Power steering	55.0	600	200
Front differential case	7.0	600	----
Front axle gear case Final drive (front)	3.5	600	----
Service brake	----	----	----

2.7.2 Specifications

	Recommended		Used during test
Engine oil Type: Viscosity: Classification:	API grade CD Below 0 °C: From 0 °C to 25 °C: Above 25 °C:	SAE 10W, 10W-30, 10W-40 SAE 20, 10W-30, 10W-40 SAE 30,10W-30, 10W-40	SAE 10W-30
Transmission oils Hydraulic fluid Steering oil Type: Viscosity: Classification:	API grade GL-3 SAE 75W/80 (ISO VG46)		API grade GL-3 SAE 75W/80 (ISO VG46)

2.7.3 Grease

Number of lubrication points: Twelve (12), grease nipple and batt. terminal multipurpose type grease

3. COMPULSORY TESTS RESULTS

3.1 MAIN POWER TAKE-OFF

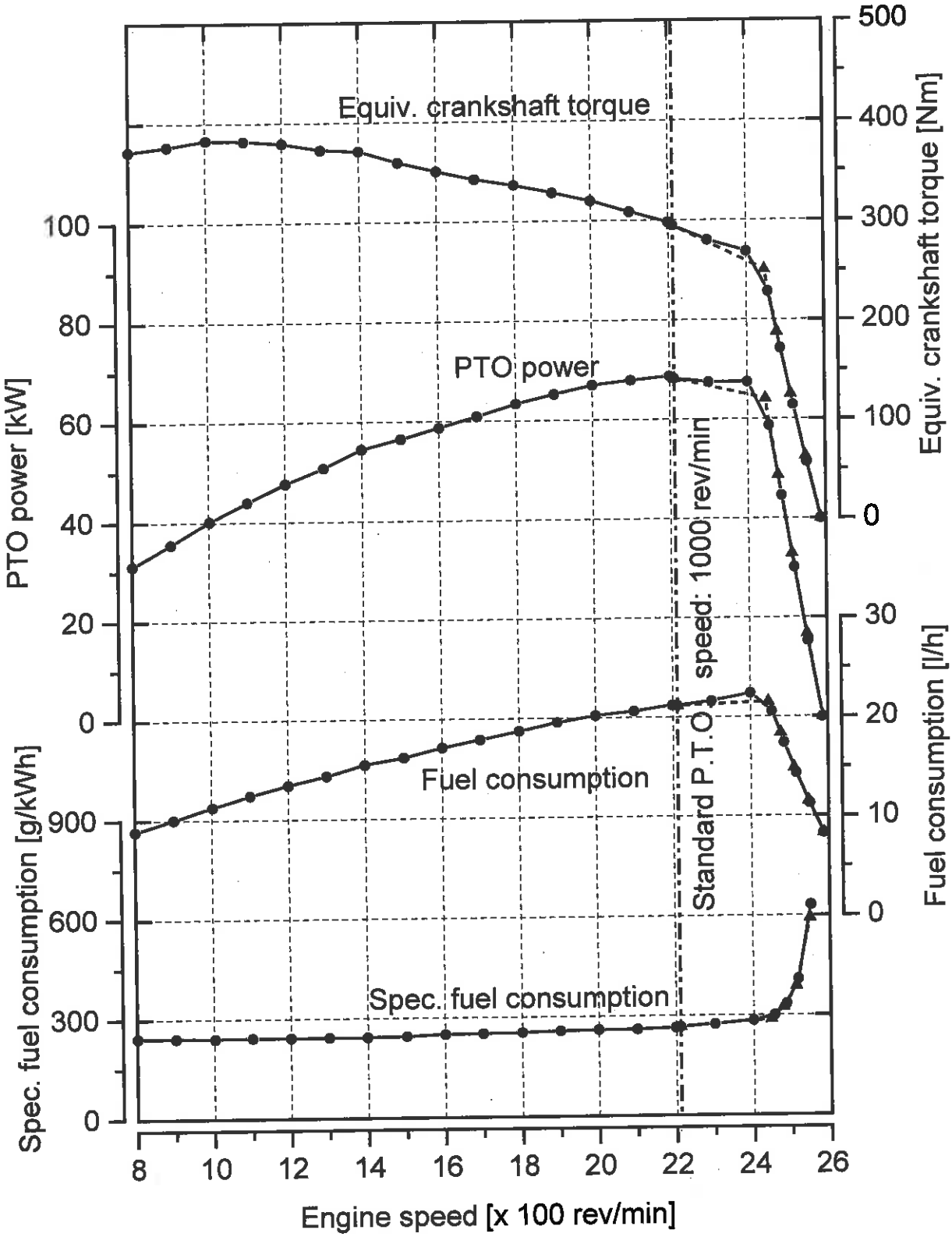
Date and location of tests: 19th May, 1999, BRAIN, Omiya

Type of dynamometer: Alternating current, MEIDEN FC-95

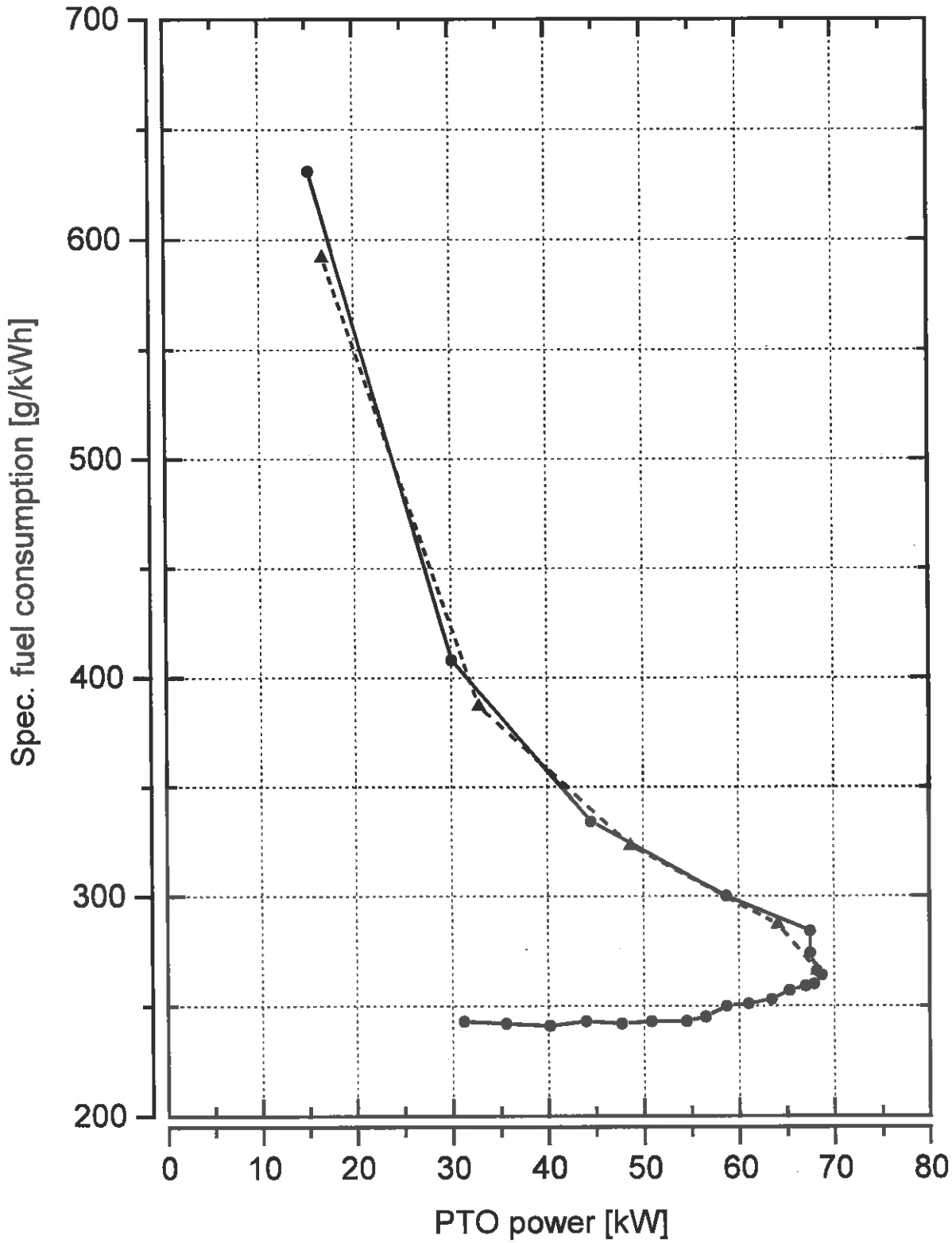
Power	Speed		Fuel consumption			Specific energy
	Engine	P.T.O.	Hourly		Specific	
[kW]	[rev/min]		[kg/h]	[l/h]	[g/kWh]	[kWh/l]
3.1.1	MAXIMUM POWER - TWO-HOUR TEST					
68.7	2200	995	18.15	21.20	264	3.24
3.1.2	POWER AT RATED ENGINE SPEED					
67.5	2400	1086	19.15	22.36	284	3.02
3.1.3	STANDARD POWER TAKE-OFF SPEED [1000 rev/min]					
68.2	2211	1000	18.12	21.16	266	3.22
3.1.4	PART LOADS AT RATED ENGINE SPEED					
3.1.4.1	The torque corresponding to maximum power at rated engine speed					
67.5	2400	1086	19.15	22.36	284	3.02
3.1.4.2	85% of torque obtained in 3.1.4.1					
58.7	2455	1111	17.61	20.56	300	2.86
3.1.4.3	75% of torque defined in 3.1.4.2					
44.6	2486	1125	14.89	17.39	334	2.56
3.1.4.4	50% of torque defined in 3.1.4.2					
30.1	2517	1139	12.27	14.33	408	2.10
3.1.4.5	25% of torque defined in 3.1.4.2					
15.3	2551	1154	9.66	11.28	631	1.36
3.1.4.6	Unloaded					
0.0	2587	1170	7.11	8.30	----	----
3.1.5	PART LOADS AT STANDARD POWER TAKE-OFF SPEED [1000 rev/min]					
3.1.5.1	The torque corresponding to maximum power at standard power take-off speed					
68.2	2211	1000	18.12	21.16	266	3.22
3.1.5.2	85% of torque obtained in 3.1.5.1					
64.1	2446	1107	18.41	21.50	287	2.98
3.1.5.3	75% of torque defined in 3.1.5.2					
48.7	2477	1121	15.74	18.38	323	2.65
3.1.5.4	50% of torque defined in 3.1.5.2					
32.9	2511	1136	12.67	14.80	385	2.22
3.1.5.5	25% of torque defined in 3.1.5.2					
16.7	2548	1153	9.89	11.55	592	1.45
3.1.5.6	Unloaded					
0.0	2587	1170	7.11	8.30	----	----

Other results

No load maximum engine speed:	2587	rev/min
Torque (equivalent crankshaft) at maximum power		
At rated engine speed:	268.7	Nm
At 2-hour test:	298.2	Nm
Maximum torque (equivalent crankshaft):	382.9	Nm
(engine speed: 1000 rev/min)		
Mean atmospheric conditions		
Temperature:	22	°C
Pressure:	99.9	kPa
Relative humidity:	82	%
Maximum temperatures		
Coolant:	87	°C
Engine oil:	115	°C
Fuel:	20	°C
Engine air intake:	27	°C



Power take-off performance



Power take-off performance

3.2 HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 24th May, 1999

3.2.1 HYDRAULIC POWER TEST

Tapping point used for test: Auxiliary service connection
(can be measured by transferring circuit)

Sustained pressure with relief valve open: 20.1 MPa
Pump delivery rate at minimum pressure: 76.0 l/min
Temperature of hydraulic fluid: 66 °C

	Flow rate [l/min]	Pressure [MPa]	Power [kW]
Flow rate corresponding to a hydraulic pressure equivalent to 90 percent of the actual relief valve pressure setting and corresponding hydraulic power	29.6	18.1	8.93
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	69.4	14.1	16.3

3.2.2 POWER LIFT TEST

3.2.2.1 Standard setting (without additional external cylinder)

	At hitch point	On the frame
Height of lower hitch points above ground in down position [mm]	197	103
Vertical movement without lifting forces [mm]	703	910
with lifting forces [mm]	678	888
Maximum corrected force exerted through full range (*) [kN]	19.69	15.28
Corresponding pressure of hydraulic fluid [MPa]	18.1	18.1
Moment about rear wheel axle [kNm]	19.99	24.83
Maximum tilt angle mast from vertical [Degrees]	----	10

Lifting heights(**) [mm]		-489	-400	-395	-300	-200	-100	±0	+100	+200	+283	+300	+399
Lifting force (*)	at the hitch point [kN]	----	----	19.69	20.26	21.19	21.85	22.33	22.18	22.20	22.33	----	----
	at the frame [kN]	15.99	16.43	----	16.92	17.24	17.24	17.06	16.43	16.08	----	15.59	15.28

(*) The values of force measured are corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting.

(**) Lifting heights relative to the horizontal plane including the lower link pivot points.

3.2.2.2 Setting with one additional external cylinder

		At hitch point	On the frame
Height of lower hitch points above ground in down position	[mm]	197	103
Vertical movement without lifting forces	[mm]	703	910
with lifting forces	[mm]	675	878
Maximum corrected force exerted through full range (*)	[kN]	27.00	19.10
Corresponding pressure of hydraulic fluid	[MPa]	18.1	18.1
Moment about rear wheel axle	[kNm]	27.41	31.04
Maximum tilt angle mast from vertical	[Degrees]	----	10

Lifting heights(**) [mm]		-489	-400	-395	-300	-200	-100	±0	+100	+200	+280	+300	+389
Lifting force (*)	at the hitch point [kN]	----	----	27.00	27.35	28.24	28.64	28.76	28.46	28.33	28.31	----	----
	at the frame [kN]	21.82	22.24	----	22.64	22.84	22.37	22.11	21.18	20.54	----	19.63	19.10

(*) The values of force measured are corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting.

(**) Lifting heights relative to the horizontal plane including the lower link pivot points.

3.2.2.3 Setting with two additional external cylinders

		At hitch point	On the frame
Height of lower hitch points above ground in down position	[mm]	197	103
Vertical movement without lifting forces	[mm]	703	910
with lifting forces	[mm]	675	868
Maximum corrected force exerted through full range (*)	[kN]	34.22	22.99
Corresponding pressure of hydraulic fluid	[MPa]	18.1	18.1
Moment about rear wheel axle	[kNm]	34.73	37.36
Maximum tilt angle mast from vertical	[Degrees]	----	10

Lifting heights(**) [mm]		-489	-400	-395	-300	-200	-100	±0	+100	+200	+280	+300	+379
Lifting force (*)	at the hitch point [kN]	----	----	34.75	34.88	35.45	35.46	35.90	34.93	34.36	34.22	----	----
	at the frame [kN]	28.16	28.21	----	28.57	28.40	27.77	27.33	26.09	24.91	----	23.88	22.99

(*) The values of force measured are corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting.

(**) Lifting heights relative to the horizontal plane including the lower link pivot points.

3.3 DRAWBAR POWER TEST (ballasted and unballasted tractor)

Date of test: 20th, 21st, 26th and 27th May, 1999

Type of track: Concrete

Tyre size: front: 13.6R24 121A8 rear: 18.4R34 144A8

Tyre inflation pressure: front / rear

unballasted: 140 kPa 140 kPa

ballasted: 140 kPa 140 kPa

Height of drawbar above ground: unballasted: 507 mm

ballasted: 501 mm

Gear number and range	Power [kW]	Drawbar pull [kN]	Speed [km/h]	Engine speed [rev/min]	Slip of wheels [%]	Specific fuel consumption [g/kWh]	Specific energy [kWh/l]	Temperature			Atmospheric conditions		
								Fuel [°C]	Coolant [°C]	Engine oil [°C]	Temperature [°C]	Relative humidity [%]	Pressure [kPa]
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
2 – L	21.3	36.2	2.12	2503	14.8	581	1.47	43	87	107	32	46	100.0
3 – L	26.8	36.3	2.66	2487	15.1	494	1.73	39	85	109	31	50	100.0
4 – L	33.3	36.2	3.31	2476	14.9	448	1.91	47	86	105	29	55	100.0
5 – L	40.5	36.2	4.03	2446	15.0	411	2.08	36	85	107	33	41	100.0
6 – L	50.8	36.0	5.08	2438	13.3	370	2.31	22	85	105	28	59	100.1
7 – L	58.8	34.6	6.12	2253	9.5	324	2.64	27	85	99	23	73	100.0
8 – L	59.6	27.7	7.74	2199	6.7	310	2.76	35	87	107	24	67	100.1
1 – H	57.9	35.1	5.94	2388	11.6	335	2.56	25	86	106	28	61	100.1
2 – H	60.5	30.4	7.16	2210	7.7	306	2.80	32	85	105	24	70	100.0
3 – H	60.0	24.1	8.96	2164	5.6	306	2.80	32	85	107	26	64	100.1

Gear number and range	Power [kW]	Drawbar pull [kN]	Speed [km/h]	Engine speed [rev/min]	Slip of wheels [%]	Specific fuel consumption [g/kWh]	Specific energy [kWh/l]	Temperature			Atmospheric conditions		
								Fuel [°C]	Coolant [°C]	Engine oil [°C]	Temperature [°C]	Relative humidity [%]	Pressure [kPa]
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
1 – L	26.0	51.9	1.80	2524	11.1	491	1.74	29	86	69	28	39	101.1
2 – L	32.0	52.3	2.20	2491	11.9	441	1.94	30	86	105	30	35	101.1
3 – L	39.3	52.4	2.70	2473	12.1	405	2.12	31	86	106	31	35	101.1
4 – L	48.8	52.0	3.38	2440	11.7	370	2.31	63	87	106	31	34	101.1
5 – L	55.4	48.2	4.14	2429	11.2	344	2.49	62	86	109	34	15	101.3
6 – L	58.3	43.2	4.86	2220	8.4	308	2.78	60	86	109	34	17	101.3
7 – L	60.6	34.6	6.30	2233	5.6	303	2.83	58	86	104	31	17	101.3
8 – L	59.8	27.2	7.92	2200	4.0	298	2.87	62	87	107	33	17	101.3
1 – H	60.4	38.2	5.69	2179	6.5	304	2.81	58	87	109	33	16	101.3
2 – H	60.7	30.2	7.24	2189	4.8	307	2.79	55	87	108	32	16	101.3
3 – H	60.7	23.7	9.22	2194	3.5	293	2.92	55	87	109	32	17	101.3
3.3.3 FIVE HOUR TEST at 75 % of pull at maximum power													
1 – H	52.0	28.7	6.52	2442	4.3	343	2.50	46	86	112	30	38	101.1
3.3.4 FIVE HOUR TEST at pull corresponding to 15 % wheelslip (*)													
3 – L	39.3	52.4	2.70	2473	12.1	405	2.12	47	86	111	29	60	99.7

(*) The test was carried out at pull corresponding to maximum power.

Oil consumption during ten hours duration of test 3.3.3 and 3.3.4: 31.4 g/h

3.4 TURNING AREA AND TURNING CIRCLE

Front wheel drive disengaged

	With brakes		Without brakes	
	Left-hand [m]	Right-hand [m]	Left-hand [m]	Right-hand [m]
Radius of turning area	3.90	3.90	4.51	4.50
Radius of turning circle	3.64	3.64	4.17	4.17

Front wheel drive engaged

	With brakes		Without brakes	
	Left-hand [m]	Right-hand [m]	Left-hand [m]	Right-hand [m]
Radius of turning area	3.96	3.96	5.20	5.18
Radius of turning circle	3.61	3.61	4.80	4.79

Front wheel drive engaged ("Bi-speed turn" switch on)

	With brakes		Without brakes	
	Left-hand [m]	Right-hand [m]	Left-hand [m]	Right-hand [m]
Radius of turning area	4.12	4.14	4.18	4.19
Radius of turning circle	3.79	3.80	3.90	3.90

3.5 LOCATION OF CENTER OF GRAVITY

Height above ground:	1009 mm
Distance forward from the vertical plane containing the axis of the rear-wheels:	929 mm
Distance from the median plane of the tractor (to the left):	2 mm

3.6 BRAKING (front wheel drive engaged)

Date of tests: 20th and 25th May, 1999

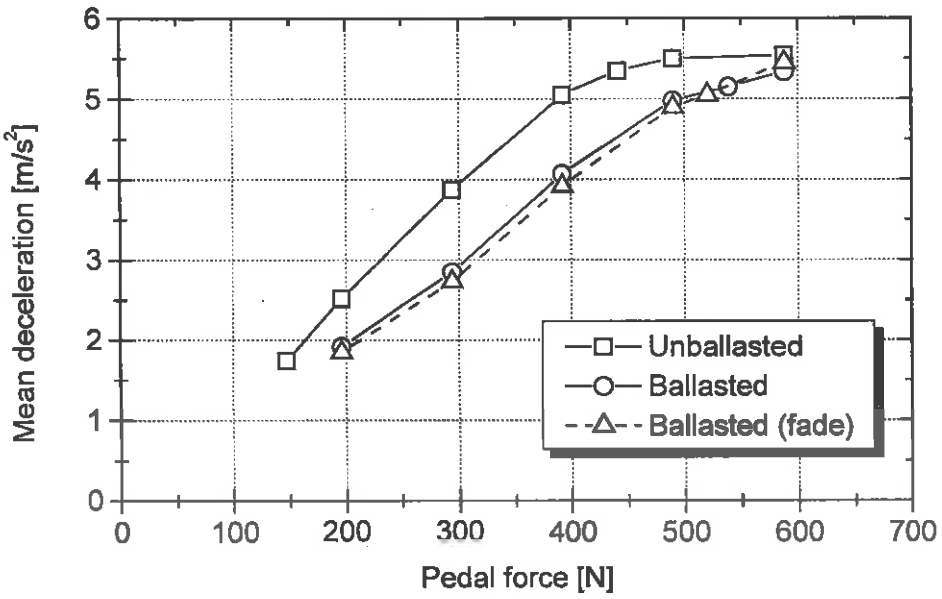


Figure
Cold service braking device test and fade test

3.6.1 Cold service braking device test

	Speed before application of brakes [km/h]	Braking device control force [N]	Mean deceleration [m/s²]
Ballasted tractor	33.0	196	1.92
		294	2.85
		392	4.07
		490	4.98
		539	5.15
		588	5.34
Unballasted tractor	33.4	147	1.74
		196	2.52
		294	3.87
		392	5.05
		441	5.35
		490	5.50
		588	5.54

Maximum deviation of tractor from its original course: None
Abnormal vibration: None

3.6.2 Fade test

Speed before application of brakes [km/h]	Braking device control force [N]	Mean deceleration [m/s^2]
33.0	196	1.85
	294	2.73
	392	3.92
	490	4.90
	520	5.05
	588	5.45

Maximum deviation of tractor from its original course: None
Abnormal vibration: None
Brake heating method: By means of towing the tractor for 1 km at 26.4 km/h with the towing force of 5.35 kN

3.6.3 Parking braking device test

	Ballasted tractor on 18 % slope	
	Uphill	Downhill
Braking device control force [N]	78.5	78.5

3.7 EXTERNAL NOISE LEVEL

Date of tests: 18th May, 1999
Sound level meter
Make: RION
Model: NA-61
Type: Precision integrating sound level meter
Type of track: Concrete
Gear number: 8-H
Travelling speed before acceleration: 25.1 km/h
Sound level: 85 dB(A)

REPAIRS AND ADJUSTMENTS DURING TESTS

None

REMARKS

None