STÁTNÍ ZKUŠEBNA ZEMĚDĚLSKÝCH,
POTRAVINÁŘSKÝCH
A LESNICKÝCH STROJŮ

163 04 PRAHA 6 - ŘEPY

Report on test in accordance with the OECD Standard Code for the Official Testing of Agricultural Tractor Performance

CODE 1

Full Code

Date of approval: 24th July 1995

OECD No. 1567



Agricultural Tractor

HMT 3511 (2WD)

Manufactured by:
HMT Ltd.,
Pinjore 134 101, India

Report No. 11931
Date of test: May-June 1995

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Tractor manufacturer's name and address:	HMT Ltd., Tractor Business Group, Pinjore 134 101, India
Location of tractor assembly:	Pinjore, India
Submitted for test by:	MOTOKOV a.s., 140 62 Praha, Czech Republic
Selected for test by:	The manufacturer
Place of running-in:	Záhornice, Czech Republic
Duration of running-in:	25 hours
Location of test:	SZZPLS Praha 6 - Řepy, Czech Republic

1. SPECIFICATIONS OF TRACTOR

1.1 IDENTIFICATION

Make:	HMT
Model:	3511
Type:	Wheeled, unit construction, rear wheels drive
Number of driving wheels:	2
Serial No.:	084 081
1st Serial No.:	001 001

1.2 ENGINE

Make:	HMT
Model:	3501
Type:	4-stroke diesel engine, direct injection, water cooled, naturally aspirated
Serial No.:	098 942

1.2.1 Cylinders

Number/disposition:	3, in-line, vertical
Bore/stroke:	95 mm/110 mm
Compression ratio:	17.9:1

Capacity:	2339 cm^3
Arrangement of valves:	Overhead
Cylinder liners:	Wet, replaceable
1.2.2 Supercharging	None
1.2.3 Fuel system	
Fuel feed system:	Lift pump piston-type, integral with fuel injection pump
Make, model and type of fuel filters:	MICO, 9450 030 118, two-stage with paper cartridge
Capacity of fuel tank:	40 dm^3
Make, model and type of injection pump:	MICO, PES 3A 90D 320 RS 2563Z, in-line
Serial No.:	46216607
Manufacturer's production setting of injection pump:	
Flow rate (rated engine speed and full load):	7.70±0.15 dm^3/h
Timing:	21°±1° before TDC
Make, model and type of injection:	MICO, 9430 031 270, 4 hole
Injection pressure:	16.7+0.5 MPa
1.2.4 Governor	
Make, model and type:	MICO, EP/RSV 200 1000 A1B 2051R, centrifugal, variable speed
Governed range of engine speed:	from 550 to 2200 rev/min
Rated engine speed:	2000 rev/min
1.2.5 Air cleaner	
Pre-cleaner:	
Make, model and type:	HMT, 3512 0000, cyclon type
Location of air intake:	Under bonnet forward of radiator
Main cleaner:	
Make, model and type:	HMT, 3512 0000, oil bath
Maintenance indicator:	None
1.2.6 Lubrication system	
Type of feed pump:	Gear

Type of filter:	Full flow with replaceable paper cartridge
Number:	2
Oil cooler:	None

1.2.7 Cooling system

Type of coolant:	Water and anti-freeze
Type of pump:	Centrifugal, belt driven
Specification of fan:	Axial, belt driven
Number of blades:	6
Fan diameter:	380 mm
Coolant capacity:	8.5 dm^3
Type of temperature control:	Thermostat
Superpressure system:	49 kPa

1.2.8 Starting system

Make, model and type:	LUCAS-TVS, 2 SM 114, electrical, solenoid engaged
Starter motor power rating:	1.3 kW
Cold starting aid:	None
Safety device:	Clutch pedal to be fully depressed

1.2.9 Electrical system

Voltage:	12 V, negative earth
Generator:	
Make, model and type:	LUCAS-TVS, C40 AQ, dynamo, belt driven
Power:	140 W
Battery (number of accumulators):	1
Rating:	88 Ah at 20 hours

1.2.10 Exhaust system

Make, model and type:	GREIF, 95009-0, expansion and absorption muffler
Location:	Left-hand side of engine, vertical

1.3 TRANSMISSION

1.3.1 Clutch

Make, model and type:	HMT, 5101 1100, dry for travelling and p.t.o.
Number of plates:	2
Diameter of plates:	280 mm
Method of operation:	Mechanically by pedal for travelling and p.t.o.

1.3.2 Gear box

Make, model and type:	HMT, 3519 0000, mechanical
Arrangement:	Gear box with 5 forward and 1 reverse speeds, group gear box with two speed ranges (L and H)
Number of gears:	10 forward and 2 reverse
Available options:	None
Oil cooler:	None

1.3.3 Rear axle and final drives

Make, model and type:	HMT, 3528 0000, crown wheel and bevel pinion differential and spur gear final drives
Differential lock:	
Type:	Mechanical
Method of engagement:	Mechanically by pedal
Method of disengagement:	Self-disengaging

1.3.4 Front axle

Make, model and type:	HMT, 2511 9060, telescopic with adjustable track

1.3.5 Total ratios and travelling speeds

Gear	Group	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at rated engine speed of 2000 rev/min km/h (*)
1	L	385.873	1.15
2		265.865	1.67
3		194.807	2.28
4		121.855	3.65
5		75.263	5.91
1	H	94.225	4.72
2		64.920	6.85
3		47.569	9.35
4		29.755	14.95
5		18.378	24.21
R	L	272.662	1.63
	H	66.580	6.68

(*) Calculated with a tyre dynamic radius index of 590 mm (ISO 4251/1-1992)

L: Low range, H: High range

1.4 POWER TAKE-OFF

1.4.1 Main power take-off

Type: Semi-independent, through second plate in main clutch

Method of engagement: Mechanically operated by clutch pedal

Number of shafts: 1

Method of changing power take-off speeds: None

1.4.1.1 Power take-off proportional to engine speed

Location: At rear of tractor

P.T.O.	Diameter of power take-off shaft end mm	Number of splines	In conformity with ISO 500/1991
540	34.9	6	Yes

Height above ground: 563 mm

Distance from the median plane of the tractor: 0 mm

Distance behind rear-wheel axis: 247 mm

P.T.O.	P.T.O. speed rev/min	Engine speed rev/min	Ratio of rotation speeds (engine speed/ p.t.o. speed)	Power restriction and maximum torque kW/Nm
540	540	1980	3.6667	None/None
	545	2000		

Direction of rotation (viewed from behind tractor): Clockwise

1.4.1.2 Power take-off proportional to ground speed

P.T.O. and range	Travelling distance for one revolution of p.t.o. shaft m	Number of p.t.o. shaft revolutions for one revol. of (rear) driving wheels
L	0.096	38.5067
H	0.394	9.4028

L: Low range, H: High range

Direction of rotation with forward gear engaged (viewed from behind tractor): Clockwise

1.4.2 Optional power take-off None

1.5 POWER LIFT

Make, model and type: HMT, 2511 8099, hydraulic with mechanical position, draft or mixed control, top link sensing

Type of hydraulic system: Open centre

Type and number of cylinders: 1 integral single-acting

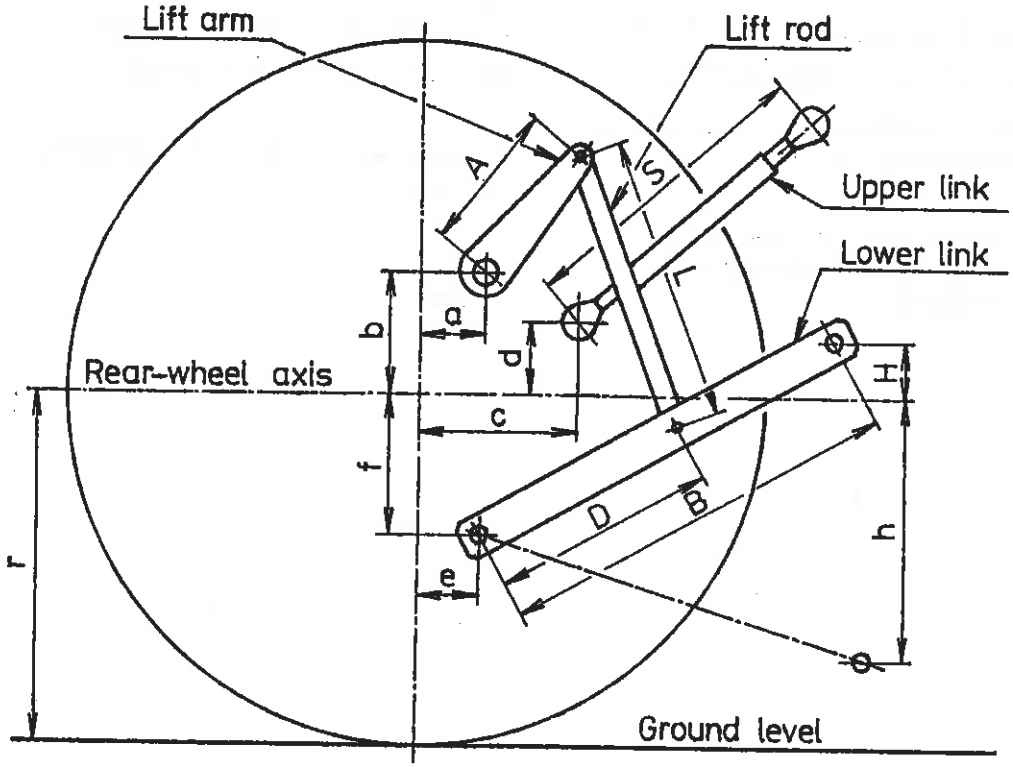
Type of linkage lock for transport: Hydraulic

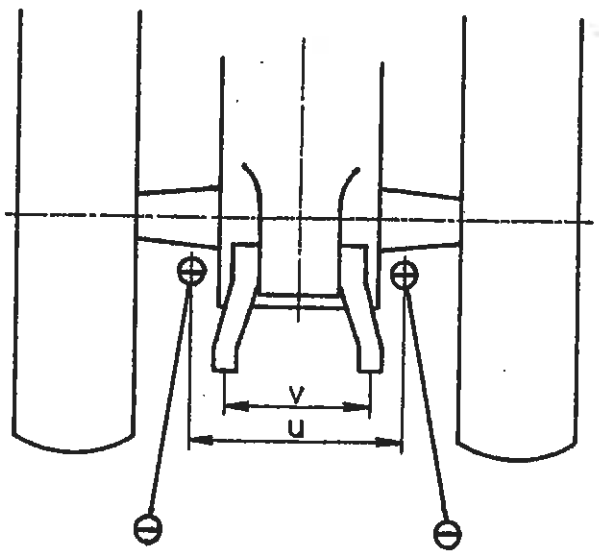
Relief valve pressure setting (tolerance): 15.2+2.0 MPa

Opening pressure of cylinder safety valve:	17.7+2.0 MPa
Lift pump type:	Gear
Transmission between pump and engine:	Gear driven from power take-off intermediate shaft
Type and number of filters:	1 magnetic and 1 screen
Site of oil reservoir:	Transmission housing
Type, number and location of tapping points:	2 pressure, quick release at rear of tractor
Maximum volume of oil available to external cylinders:	7 dm^3

1.6 THREE-POINT LINKAGE

Category:	1, in conformity with ISO 730/1-1990
Category adapter:	None





Linkage geometry dimensions:

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	320	320
Length of lower links	(B)	796	796
Distance of lift arm pivot point from :horizontally	(a)	-17	-17
rear-wheel axis :vertically	(b)	283	283
Horizontal distance between the 2 lower link points	(u)	442	442
Horizontal distance between the 2 lift arm end points	(v)	525	525
Length of upper link	(S)	535 to 790	565
Distance of upper link pivot point from :horizontally	(c)	262, 268, 274	274
rear-wheel axis :vertically	(d)	148, 182, 218	218
Distance of lower link pivot point from :horizontally	(e)	14	14
rear-wheel axis :vertically	(f)	167	167
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	400, 495	400
Length of lift rods:			
- right-hand side	(L)	430 to 530	475
- left-hand side	(L)	475	475
Height of lower hitch points relative to the rear-wheel axis:			
- in low position	(h)	300, 385	385
- in high position	(H)	225, 270	270
Height above ground of lower hitch points when locked in transport position (*)		Any height withing lift range	

(*) Assuming the tyre dynamic radius index r=590 mm of ISO 4251/1-1992

1.7 SWINGING DRAWBAR

Type: Clevis

Height above ground:	
Maximun:	410 mm
Minimum:	325 mm
Type of adjustment:	Inverting drawbar
Distance of hitch point from rear-wheel axis, horizontally:	482, 491 and 494 mm
Distance of hitch point from power take-off shaft end:	
Vertically:	153 and 238 mm
Horizontally:	235, 244 and 247 mm
Lateral adjustment (centre of clevis):	
Right-hand:	66 and 135 mm
Left-hand:	66 and 135 mm
Distance of pivot point from rear-wheel axis, horizontally:	285 mm to front
Diameter drawbar pin hole:	36 mm
Maximum vertical permissible load:	8 kN

1.8 TRAILER HITCH

Type:	Clevis
Hole diameter:	36 mm
Height above ground:	568, 628, 648, 688, 708, 748, 768 and 828 mm
Distance of hitch point from rear-wheel axis, horizontally:	480 mm
Distance of hitch point from power take-off shaft end:	
Vertically:	5, 65, 85, 125, 145, 185, 205 and 265 mm
Horizontally:	233 mm
Maximum vertical permissible load:	15 kN

1.9 HOLED DRAWBAR

Number of holes:	7
Distance between holes:	80 mm
Hole diameter:	25 mm
Thickness/width of the drawbar:	28 mm/75 mm

Height above ground:	
Maximum:	860 mm
Minimum:	205 mm
Horizontal distance to power take-off shaft end (rear):	563 mm

1.10 FRONT TOWING HITCH

Height above ground:	535 mm
Diameter of pin hole:	31 mm

1.11 STEERING

Make, model and type:	HMT, 2535 0000, ball circulating
Method of operation:	No power assistance

1.12 BRAKES

1.12.1 Service brake

On the rear axle:	
Make, model and type:	HMT, 2626 0002, dry internal expanding shoe
Method of operation:	Hydraulically by pedals, coupled or independent
On the front axle:	None
Trailer braking take-off:	Air brake operated by tractor pedals

1.12.2 Parking brake

Type:	Contracting band
Method of operation:	Mechanically by hand lever with ratchet

1.13 WHEELS

Number:	
Front:	2, steering
Rear:	2, driving
Wheelbase:	1940 mm

Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1315	1765	By extending of front axle
Rear	1285	1810	Reversing wheels and off-set lug rims

1.14 PROTECTIVE STRUCTURE

Make, model and type:	HMT, SKP 40-60061/2, two-post safety frame, rear mounted
Manufacturer's name and address:	HMT Ltd., Tractor Business Group, Pinjore 134 101, India
Protective device:	
Cab/frame/rollguard/other:	Frame
Tiltable/not tiltable:	Not tiltable
OECD approval number:	CSS 0344/1
Date of approval:	23rd October 1995
Modification certificate if any:	None

1.15 SEAT

1.15.1 Driver's seat

Make, model and type:	ARYNIT ENTERPRISES, 501 068, upholstered seat
Type of suspension:	Parallelogram linkage adjustable for driver's weight
Type of damping:	Hydraulic
Range of adjustment:	
Longitudinal:	150 mm
Vertical:	0 mm
1.15.2 Optional driver's seat	None
1.15.3 Passenger seat	None

1.16 LIGHTING

	Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1050	ϕ140	190
Sidelights	1330	60x65	705
Rearlights	1295	105x70	695
Reflectors	820	ϕ80	710

2. TEST CONDITIONS

2.1 OVERALL DIMENSIONS

	Length mm	Width		Height at top of	
		minimum mm	maximum mm	protective structure mm	exhaust silencer mm
Ballasted	3660	1665	2190	2275	2290
Unballasted	3355	1635	2160	2275	2290

2.2 GROUND CLEARANCE
(unballasted tractor): 265 mm

Clearance-limiting part: Swinging drawbar in lowest position

2.3 TRACTOR MASS AND BALLAST (with cab)

	Ballasted		Unballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	815	825	680	690
Rear	1675	1740	1220	1285
Total	2490	2565	1900	1975

2.4 BALLAST

	Weights		Water kg
	Number	Total mass kg	
Front	5	110	-
Rear	6	230	250
Optional	-	-	-

2.5 TYRES AND TRACK WIDTH SPECIFICATIONS

	Front	Rear
Tyres:		
Make	GOOD-YEAR	GOOD-YEAR
Dimensions	6.00-16	12.4-28
Ply rating	6	8
Type	diagonal	diagonal
Maximum load (tyre manufacturer's)	6.44 kN	16.15 kN
Maximum load (tractor manufacturer's)	5.60 kN	12.50 kN
Inflation pressure (tyre manufac.)	330 kPa	230 kPa
Dynamic radius index	340 mm	590 mm
Chosen track width:	1315 mm	1360 mm

2.6 OILS AND LUBRICATION

2.6.1 Capacity and change interval

	Capacity dm^3	Oil change h	Filter change h
Engine	8.0	175	175
Gear box	17.0	1000	-
Rear axle	Common with gear box		
Final drive (rear)	2x1.3	1000	-
Hydraulic system	Common with gear box		
Steering	1.6	2000	-
Air cleaner	1.0	70	-
Injection pump	0.2	2000	-

2.6.2 Specifications

	Recommended	Used during test
Engine oil: Type Viscosity Classification	SAE 20/40 13.5 cSt at 100 °C API SC/CD	As recommended
Transmission oils: Type Viscosity Classification	SAE 90 16.0 cSt at 100 °C API GL-4	As recommended

Hydraulic fluid: Same as transmission

Steering oil: Same as transmission

Air cleaner filling: Same as engine

Injection pump oil: Same as engine

2.6.3 Grease

Number of lubrication points: 17

2.7 FUEL

Type: Diesel fuel, in conformity with national standard ČSN 65 6506

Density at 15 °C: 0.837 g/cm^3 for p.t.o. tests
0.837 g/cm^3 for drawbar tests

3. COPULSORY TEST RESULTS

3.1 MAIN POWER TAKE-OFF

Date and location of tests: 10th May 1995, SZZPLS Praha

Type of dynamometer: FROUDE AG 400, eddy-current

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						
21.7	1998	545	6.56	7.84	302	2.77
3.1.2 POWER AT RATED ENGINE SPEED						
21.7	1998	545	6.56	7.84	302	2.77
3.1.3 STANDARD POWER TAKE-OFF SPEED 540±10 rev/min						
21.8	1980	540	6.52	7.79	299	2.80
3.1.4 PART LOADS						
3.1.4.1 the torque corresponding to maximum power at rated engine speed						
21.7	1998	545	6.56	7.84	302	2.77
3.1.4.2 85 % of torque obtained in 3.1.4.1						
19.3	2090	570	6.00	7.17	311	2.69
3.1.4.3 75 % of torque defined in 3.1.4.2						
14.6	2116	577	4.83	5.77	331	2.53
3.1.4.4 50 % of torque defined in 3.1.4.2						
9.9	2152	587	3.85	4.60	389	2.15
3.1.4.5 25 % of torque defined in 3.1.4.2						
5.1	2189	597	3.08	3.68	604	1.39
3.1.4.6 unloaded						
-	2211	603	2.26	2.70	-	-

Power	Speed		Fuel consumption			Specific energy
	Engine	P.T.O.	Hourly		Specific	
kW	rev/min		kg/h	l/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED 540 rev/min						
3.1.5.1 the torque corresponding to maximum power						
21.8	1980	540	6.52	7.79	299	2.80
3.1.5.2 85 % of torque obtained in 3.1.5.1						
19.1	2039	556	5.84	6.98	306	2.74
3.1.5.3 75 % of torque defined in 3.1.5.2						
14.5	2064	563	4.67	5.58	322	2.60
3.1.5.4 50 % of torque defined in 3.1.5.2						
9.8	2101	573	3.75	4.48	383	2.19
3.1.5.5 25 % of torque defined in 3.1.5.2						
5.0	2141	584	2.97	3.55	594	1.41
3.1.5.6 unloaded						
-	2163	590	2.16	2.58	-	-

No load maximum engine speed: 2211 rev/min

Torque (equivalent crankshaft) at maximum power: 103.7 Nm

at rated engine speed: 103.7 Nm

at standard power take-off speed: 105.1 Nm

Maximum torque (equivalent crankshaft): 111.9 Nm
(engine speed: 1698 rev/min)

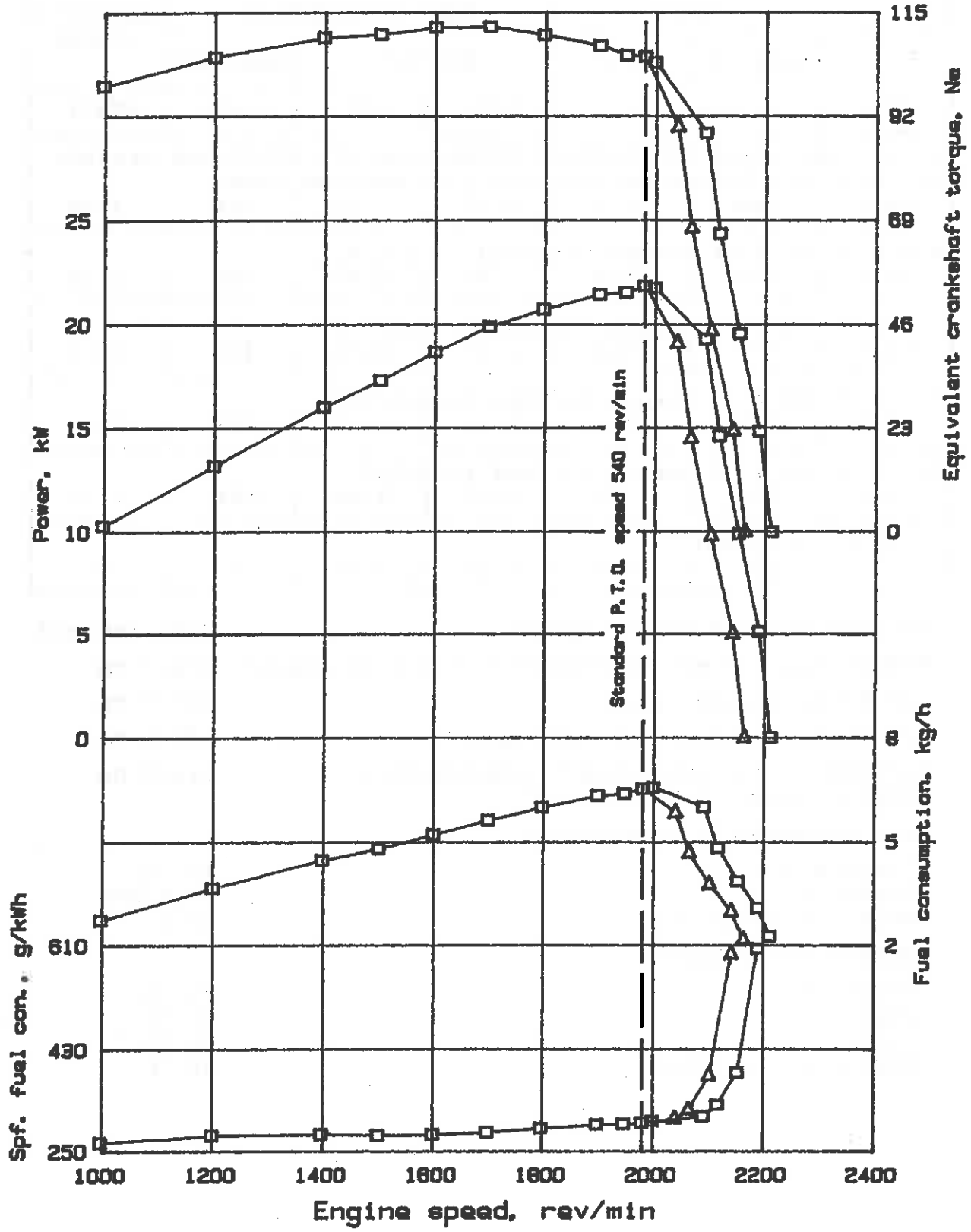
Mean atmospheric conditions:

Temperature: 19 °C
Pressure: 96.6 kPa
Relative humidity: 46 %

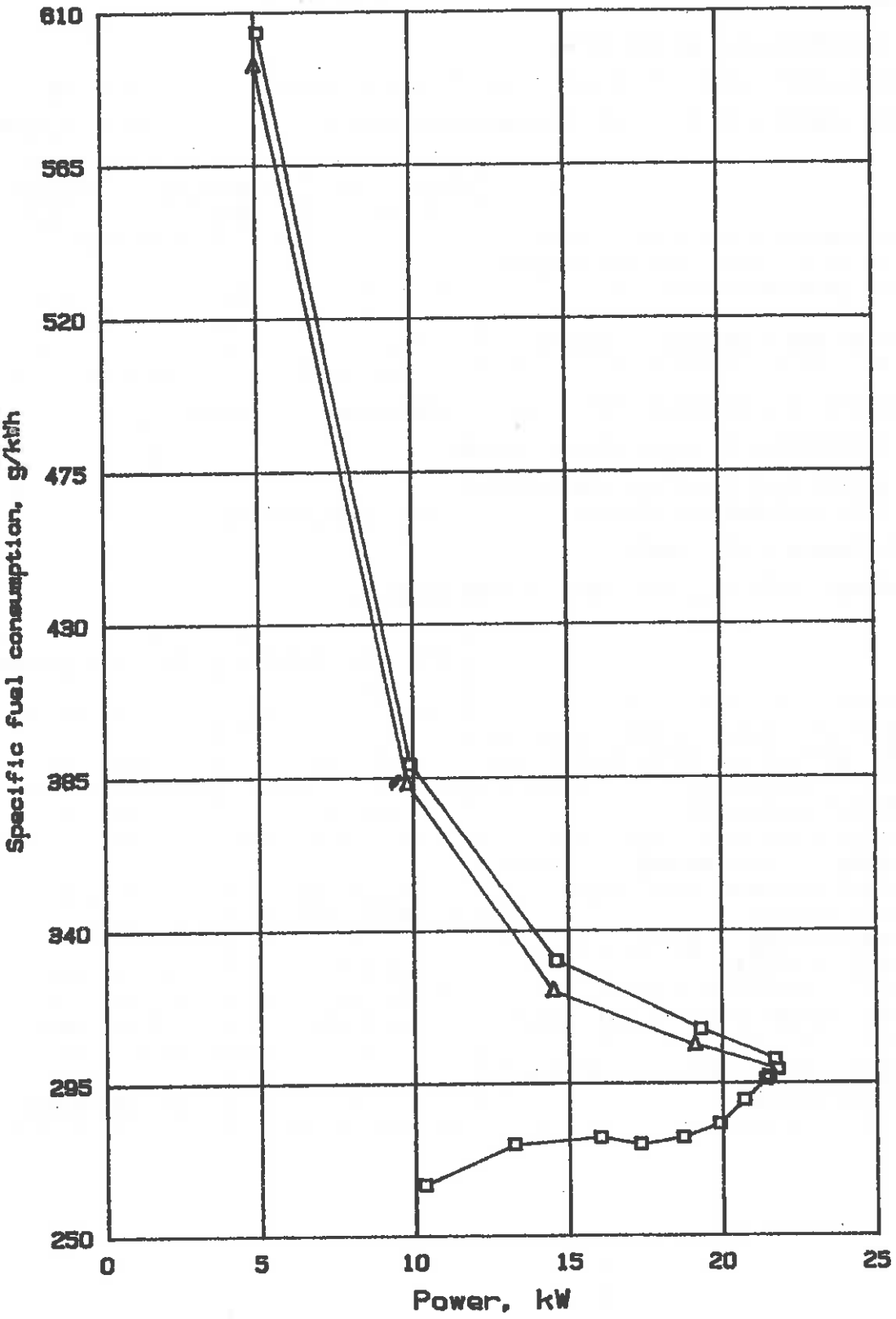
Maximum temperatures:

Coolant: 79 °C
Engine oil: 95 °C
Fuel: 50 °C
Engine air intake: 28 °C

POWER TAKE-OFF TEST



POWER TAKE-OFF TEST



3.2 HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 11th May 1995

3.2.1 Hydraulic power test

Sustained pressure with relief valve open: 14.9 MPa

Pump delivery rate at minimum pressure: 24.0 l/min

	Flow rate l/min	Pressure MPa	Power kW
At 90 % of the actual relief valve pressure setting	5.8	13.4	1.3
At maximum hydraulic power	13.0	9.3	2.0

Tapping point used for test: External tapping

Temperature of hydraulic fluid: 65 °C

Opening and closing pressuress of the unloading valve: Not applicable

3.2.2 Power lift test

Linkage setting for test - see page 11

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	205 mm	205 mm
Vertical movement	625 mm	710 mm
Maximum corrected force exerted through full range	11.0 kN	7.4 kN
Corresponding pressure of hydraulic fluid	13.4 MPa	13.4 MPa
Moment about rear-wheel axis	8.9 kNm	10.5 kNm
Maximum tilt angle of mast from vertical	-	12 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points										
mm	-233	-218	-200	-100	0	+100	+200	+300	+407	+477
Lifting forces at the hitch points, corrected to 13.4 MPa										
kN	-	11.0	11.6	12.3	12.6	12.8	12.9	13.1	12.8	-
Lifting forces at the test frame, corrected to 13.4 MPa										
kN	12.7	-	12.4	12.0	11.6	11.2	10.5	9.6	9.0	7.4

3.3 DRAWBAR PERFORMANCE

Date of tests: 30th May to 8th June 1995

Type of track: Bituminous-concrete surface

	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
Unballasted	325 mm	250 kPa	120 kPa
Ballasted	325 mm	250 kPa	120 kPa

Gear and group	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel consumption
	kW	kN	km/h	rev/min	%	g/kWh
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)						
1 L	4.0	13.0	1.11	2209	15.0	794
2 L	5.7	12.8	1.60	2196	14.9	598
3 L	7.7	12.8	2.16	2172	14.9	500
4 L	12.2	13.0	3.38	2126	15.0	408
1 H	16.0	13.3	4.33	2103	15.1	382
5 L	18.7	12.8	5.27	2002	14.8	362
2 H	19.5	11.0	6.38	2002	9.4	344
3 H	20.1	8.0	9.03	1999	5.9	334
4 H	19.8	4.8	14.84	2001	3.3	338
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)						
1 L	5.5	18.2	1.08	2201	15.2	621
2 L	7.7	17.8	1.55	2176	14.9	481
3 L	10.4	18.0	2.08	2149	15.0	433
4 L	16.3	18.0	3.25	2102	15.0	383
1 H	19.3	16.9	4.11	2002	12.9	355
5 L	20.0	13.3	5.40	2003	8.7	342
2 H	20.0	11.3	6.38	2006	7.0	344
3 H	20.6	8.3	8.93	2003	4.5	321
4 H	19.0	4.7	14.53	1999	2.8	357
3.3.3 FIVE-HOUR TESTS 3.3.3.1 FIVE-HOUR TEST at 75 % of pull corresponding to maximum						
3 H	16.4	6.2	9.51	2107	3.1	362
3.3.3.2 FIVE-HOUR TEST at pull corresponding to 15 % wheelslip,						
4 L	16.2	17.9	3.26	2099	-	-

Specific energy	Temperature			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Tempera-ture	Relative humidity	Pressure
kWh/l	°C	°C	°C	°C	%	kPa
1.05	40	87	82	20	89	96.7
1.40	41	85	87	20	84	96.7
1.67	41	86	88	21	83	96.7
2.05	42	87	90	21	82	96.7
2.19	43	87	86	22	79	96.6
2.31	42	86	91	22	81	96.7
2.43	44	86	89	24	77	96.6
2.50	44	88	92	23	74	96.6
2.48	43	87	90	24	73	96.6
1.35	42	85	84	23	68	96.6
1.74	40	86	89	23	65	96.6
1.93	42	86	89	23	71	96.6
2.18	42	87	85	17	98	96.4
2.36	42	86	85	19	80	96.4
2.45	42	86	88	17	99	96.4
2.43	41	87	88	18	87	96.4
2.61	42	88	91	19	87	96.5
2.35	40	87	90	20	77	96.6
power at rated speed						
2.31	44	87	91	17	74	97.0
with additional ballast: None						
-	46	88	93	17	70	96.6

Oil consumption during ten hours duration of tests 3.3.3.1 and 3.3.3.2: 8 g/h

3.4 TURNING AREA AND TURNING CIRCLE

	With brakes		Without brakes	
	Right-hand m	Left-hand m	Right-hand m	Left-hand m
Radius of turning area	2.99	2.99	3.50	3.51
Radius of turning circle	2.84	2.82	3.35	3.34

3.5 LOCATION OF CENTRE OF GRAVITY

Height above ground: 697 mm

Distance forward from the vertical plane containing the axis of the rear-wheels: 678 mm

Distance from the median plane of the tractor: 2 mm to left

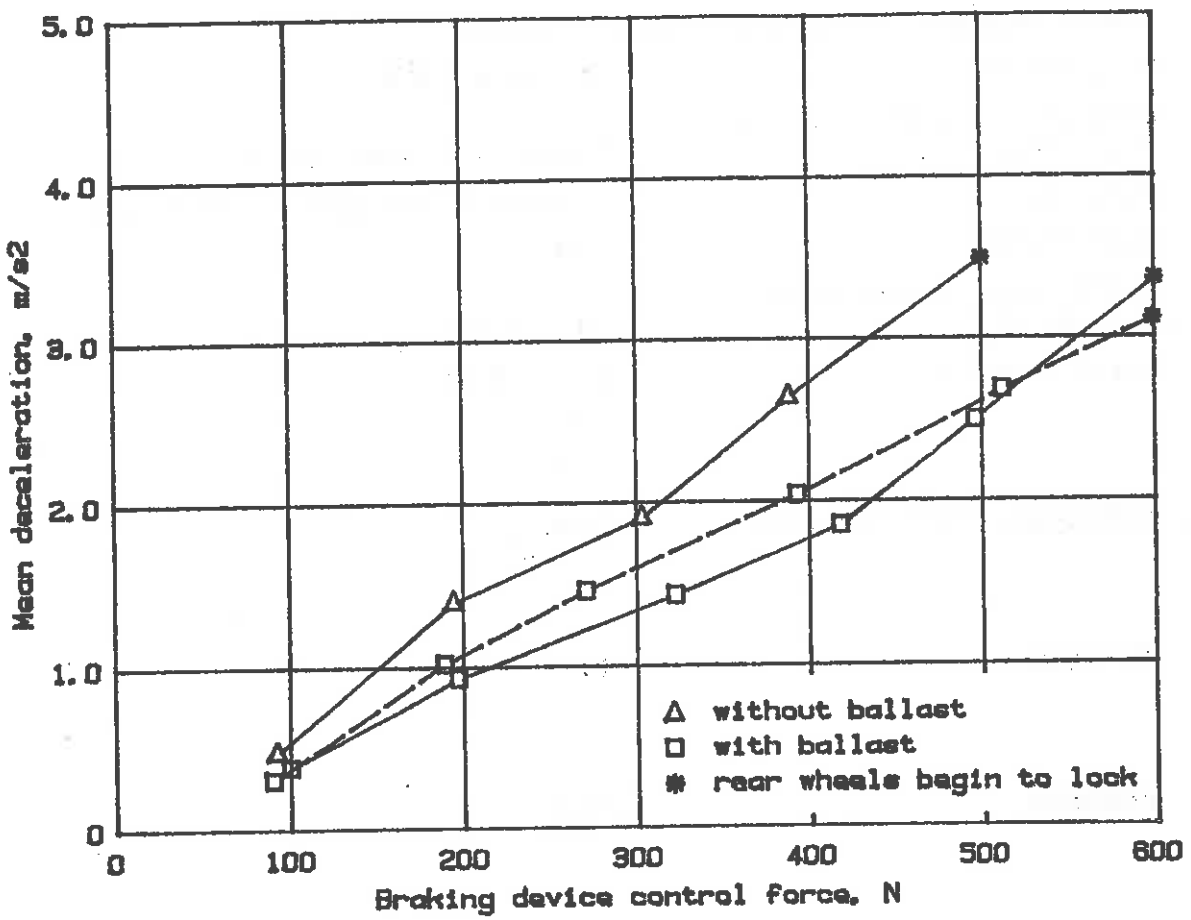
3.6 BRAKING

Date of tests: 25th and 26th May 1995

	Tractor mass (with driver)			Speed before application of brakes
	Front kg	Rear kg	Total kg	km/h
Ballasted	1120	2500	3620	25.3
Unballasted	690	1285	1975	25.0

3.6.1 Cold service braking device test (————————)

3.6.2 Fade test (- - - - - -)



Maximum deviation of tractor from its original course:	Not significant
Abnormal vibration:	None
Brake heating method:	Driven with brakes applied for 1 km at 80 % of maximum speed with a pedal force corresponding to a deceleration of 1 m/s^2

3.6.3 Parking braking device test

	Ballasted tractor on 18 % slope	
	Uphill	Downhill
Braking device control force	270 N	260 N

3.7 MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	4th May 1995
Make and model of sound level meter:	BRÜEL & KJAER, 2231
Type of track:	Bituminous-concrete surface
Gear number:	5 H
Travelling speed before acceleration:	18.8 km/h
Sound level:	81.0 dB(A)

4. OPTIONAL TEST RESULTS None

5. REPAIRS None

6. REMARKS None

Test carried out by: Dipl. Ing. Peter Pernis

Head of the Tractor Laboratory
Dipl. Ing. Peter Pernis

Director
Dipl. Ing. Vladimír Hanzlík