



NATIONAL MACHINERY TESTING INSTITUTE

Headoffice: S-750 07 Uppsala, Sweden

Testing stations:

S-750 07 Uppsala

S-230 53 Alnarp

S-901 11 Umeå

(Central Sweden)

(South Sweden)

(North Sweden)

✓
*Hydrauliklösningarna
inbegriper inte den
Code!*

TEST BULLETIN: OECD No. 814

Date of approval 1981-11-23

REPORT ON TEST IN ACCORDANCE WITH OECD TEST CODE FOR
THE OFFICIAL TESTING OF AGRICULTURAL TRACTORS

AGRICULTURAL TRACTOR ZETOR 7045

Manufactured by: Zetor, 632 00 BRNO, Czechoslovakia

Test No. 5572

Test Bulletin: OECD No. 814

Agricultural Tractor ZETOR 7045



This Bulletin is based on engineering tests in accordance with OECD Tractor Code. It does not contain an evaluation of the performance of the tractor on practical farm work.

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Tractor manufacturer's name and address:	ZETOR — Brno., Czechoslovakia
Submitted for test by:	The manufacturer
Selected by:	The manufacturer
Place of running in:	National Machinery Testing Institute, Sweden
Duration of running in:	46 hours

Specification of tractor

Tractor

Make	ZETOR
Model	7045
Type	Four wheel driven, unit construction
Serial No.	1008

Engine

Make	Zbrojovka
Model	7001
Type	4-stroke, direct injection diesel engine, water cooled
Serial No.	0112
Cylinder Number	4
Disposition	Vertical, in-line
Bore/Stroke	102 mm/110 mm
Capacity	3.595 dm ³
Compression ratio	17:1
Arrangement of valves	Overhead
Cylinder liners	Wet, replaceable

Fuel system

Type of fuel feed	Mechanical fuel feed pump, CD1A Motorpal (piston type)
Make, type and model of fuel filters	Autobrzdy — 03-9800.00, full flow replaceable paper element filter
Fuel tank capacity	70 dm ³
Make, type and model of injection pump	Motorpal, PP4A8K 115g-2444, in-line type
Manufacturer's production setting	Fuel delivery 10.5 — 11.0 cm ³ for 200 injections at 1100 rev/min pump speed (bench test figures), injection timing 24.5° — 2°, before T.D.C.
Make, type and model of injectors	Motorpal, multihole injection nozzles DOP 150S 335.4359 in nozzle holders VA 2646
Manufacturer's production setting	14.7+0.8 MPA

Governor

Make	Motorpal
Type	Mechanical, incorporated in fuel injection pump, RU 10A
Range of engine speed	Governed range of engine speed 600 — 2460 rev/min
Rated engine speed	2200 rev/min

Air cleaner

Make	Sandrik
Type and model of cleaner	Oil type, 9420.11 pre-cleaner PC 250 (centrifugal)
Oil capacity	1.5 dm ³

Exhaust silencer

Expansion chamber type
Dimensions: 90×170×575 mm
Vertical outside bonnet on left hand-side, debouch 2.70 m above ground

Lubrication system

Type	Forced feed from gear type pump with metal strainer in oil sump
Make and type of filters	Full flow, centrifugal, RHP 2/A, Motor, C. Budejovice, service period 100 and 200 hours
Oil capacity	12 dm ³
Changing period	200 h
Recommended oil	Engine oil according to API-SC/CA SAE 20W/30

Cooling system

Type	Water cooled (thermosyphon) assisted by centrifugal pump, 380 mm dia 6-blade belt driven fan
Coolant capacity	13 dm ³
Means for temperature control	Thermostat
Pressure	Over pressure 30—40 kPa

Starting system

Make	Electrical
Type	Pal Magnetron
Cold starting aids	443 115 144 722 electrical, solenoid-engaged starter motor, 2.9 kW
	Motorpal ZS-10-969, incorporated in fuel injection pump

Electrical system

Voltage	12V
Generator	
Make	Pal Magnetron
Type	Alternator 443 113 516 030, 35 A
Battery	
Make	AKUMA
Type	6T 150 Lead-acid, 1 battery 12V
Capacity	150 Ah at 20 h rating

Transmission

Clutch	
Make	Zbrojovka
Type and diameter of disc	Double plate dry clutch, 280 mm dia, with organic friction material
Method of operation	Foot pedal for gearbox, handlever for p.t.o.

Gearbox

Make	Own make
Type	Sliding gear. Gearbox with 5 forward speeds and 1 reverse. Reduction gearbox with 2 ranges. Torque amplifier by pneumatic operated reduction gear, foot pedal operated, self-disengaging
No. of speeds	Totally 20 forward and 4 reverse

Rear axle and final drive

Make	ZETOR
Type	Crown wheel and pinion, differential and spur gear final drive. Pedal operated self-disengaging differential lock
Oil capacity	Gearbox, rear axle and final drive: 32 + 4 l. Change period 1000 hours. Recommended oil: PP80 SAE 80. (API GL4).

Gear number	Number of engine revolutions for one revolution of driving wheels	Nominal travelling speed for rated engine speed*	
		km/h	m/s
Forward			
1 — Low	394.158	1.42	0.39
1L MP**	517.460	1.08	0.30
2L	264.891	2.11	0.59
2L MP	347.754	1.61	0.45
3L	190.084	2.95	0.82
3L MP	249.545	2.24	0.62
4L	123.826	4.52	1.26
4L MP	162.561	3.44	0.96
5L	97.323	5.75	1.60
5L MP	127.766	4.38	1.22
1 — High	93.065	6.02	1.67
1H MP	122.178	4.58	1.27
2H	62.544	8.95	2.49
2H MP	82.109	6.82	1.89
3H	44.881	12.47	3.46
3H MP	58.921	9.50	2.64
4H	29.238	19.15	5.32
4H MP	38.383	14.59	4.05
5H	22.979	24.36	6.77
5H MP	30.167	18.56	5.16
Reverse			
Low	301.976	1.85	0.51
Low MP	396.440	1.41	0.39
High	71.300	7.85	2.18
High MP	93.604	5.98	1.66

* With tyre rolling radius of 699 mm (Tyres 16.9/14-30).

** Reduction gear (24% speed reduction)

Power take off

Make	ZETOR
Location	At rear of tractor
Type of drive	Independent p.t.o. Engaged by hand lever operated disc clutch 2 shiftable speeds 540/1000 rev/min
Dimensions	According to ISO 500
No. of splines	6 (dia. 34.9 mm)
Height above ground	705 mm, in tractor's median plane, distance to the rear axle centre 268 mm
540 rev/min p.t.o. speed	596 rev/min at rated engine speed Standard p.t.o. speed 540 rev/min at 1994 rev/min engine speed. Direction of rotation clockwise viewed facing driving end
1000 rev/min p.t.o. speed	1073 rev/min at rated engine speed Standard p.t.o speed 1000 rev/min at 2050 rev/min. Direction of rotation clockwise viewed facing driving end

Belt pulley

(Not fitted for test)

Power lift

Make	Own make
Type	Single acting. Gear type pump with 2 shiftable speeds. Independent pump drive from p.t.o. intermediate shaft. Working pressure 16.0–18.0 MPa. Oil supplied from rear axle housing to ram cylinder. Oil capacity: 25 dm ³ . Category 2 implement linkage according to ISO 730 with top link sensing. Draught, mixed and position control. Four operating levers. External tappings: 1 single acting or 1 double acting

Drawbar

Swinging drawbar.
Height above ground 515 mm.
Horizontal distance from rear axle 623–668 mm.
Position relative to p.t.o. 355–400 mm.
Lateral adjustment 170–200 mm from centre position. Pivot position relative to rear wheel centre 180 mm forward. Coupling pin diameter 30 mm

Hitch

Height above ground 630–930 mm, adjustable in 7 steps, hitchhole diameter 26 mm, horizontal distance from rear axle 623 mm, position relative to p.t.o. 355 mm. Permissible vertical load 11.8 kN

Steering

Make	NSK — Japan. Technometra — Radotin
Type	Mechanical power assisted, hydraulic pump directly driven by the engine with own oil circuit. Oil capacity 4.4 dm ³ . Recommended oil ATF-200. Change period: 1000 hours

Brakes

Make	Own make
Type	Hydraulically actuated, dry drum brakes mounted on final gear shafts. Independent or combined pedal operated. Parking brake with hand-lever operated band brake on differential pinion shaft

Wheels

Steering and driving wheels	Two at front. Type: Pneumatic, multirib 11.2/10—24/6-ply rating, cross-ply tyres. Maximum permissible mass on each tyre 1045 kg at 170 kPa pressure. Track width 1510 mm.
Driving wheels	Two at rear. Type: Pneumatic, multirib 16.9/14—30/8-ply rating, crossply tyres. Maximum permissible mass on each tyre 2245 kg at 170 kPa pressure. Track width 1425, 1500, 1575, 1650, 1725, 1800 mm changed by reversing wheel centres and off-set lugs or rims.
Wheelbase	2220 mm

Seat

Make	ZETOR, model 5911, 5400
Type	Mechanical suspension, adjustable to driver's mass. Damping by hydraulic shock absorber. Range of adjustment 150 mm forward and backwards and 60 mm up and down

Protective cab

Make	Own make
Type	BK 5911

Number of grease points

Whole tractor	26
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Overall dimensions

	Length, m	Width, ¹ m	Height, ² m
With ballast	4.00	1.98	2.70
Without ballast	3.72	1.98	2.70

Minimum ground clearance 362 mm to underside of front axle.

¹ With track width of 1425 mm (Rear wheels)

² Measured to top of exhaust pipe

Lighting

The lighting system is in accordance with the national Czechoslovak regulations for road traffic and the national Swedish regulations (FK 20§)

	Height above ground of centre mm	Size mm	Distance from outside edge of tractor to centre ² mm
Head lights	1040	130	820
Side lights	1480	60×145 ¹	300
Rear lights	1495	70×210 ¹	165

¹ Rectangular

² With track width of 1425 mm Rear wheels
1430 mm Front wheels

Conditions during test

Masses	Tractor without driver but with tanks full		
Without ballast	Part of mass on front wheels		1 445 kg
	Part of mass on rear wheels		1 910 kg
	Total mass		3 355 kg
With ballast	Part of mass on front wheels		1 845 kg
	Part of mass on rear wheels		2 690 kg
	Total mass		4 535 kg
Ballast	Front: Frame and front weights	total	400 kg
	Rear: Weights	total	300 kg
	Liquid	total	480 kg
Track setting	Front: 1 510 mm		
	Rear: 1 425 mm		

Fuel and lubricants used in tests

Diesel fuel to Swedish Standard SS 155432. Density at 15°C 0.830 g/cm³. Viscosity at 20°C 3.2 mm²/s. Cetane number 49.

Engine oil Benzina M5AD*

Transmission oil Benzina PP 80**

* Corresponds to SAE 20W/30 API SC/CA

** Corresponds to SAE 80 API GL4

Compulsory tests

1. Main power take-off performance

Date and location of tests: 1980-07-07, Ultuna, Uppsala, Sweden

Type of dynamometer: Eddy current, make Zöllner

Power kW	Speed rev/min		Fuel consumption				Specific energy	
	Engine	p.t.o.	l/h	kg/h	g/MJ	kg/kWh	MJ/l	kWh/l
Maximum power — 2 hours test								
44.0	2200	596	13.60	11.29	71	0.256	11.7	3.25
The speed recommended by the manufacturer for drawbar work								
44.0	2200	596	13.60	11.29	71	0.256	11.7	3.25
Varying loads at rated engine speed								
(1) 85% of the torque obtained at maximum power								
38.8	2278	617	12.10	10.04	72	0.259	11.5	3.19
(2) Unloaded								
0.3	2363	640	3.96	3.29	—	—	—	—
(3) 50% of the load defined in (1)								
19.9	2334	632	7.61	6.32	88.5	0.318	9.4	2.61
(4) Maximum power								
44.4	2200	596	13.57	11.26	70.5	0.254	11.8	3.28
(5) 25% of the load defined in (1)								
10.0	2348	636	5.61	4.66	129.5	0.466	6.4	1.78
(6) 75% of the load defined in (1)								
29.4	2315	627	9.78	8.12	76.5	0.275	10.8	3.00
Varying loads, the governor hand lever in the position corresponding to the standard p.t.o. speed at full load (540 rev/min)								
(1) 85% of the torque obtained at maximum power								
36.2	2057	557	10.92	9.06	69.5	0.250	12.0	3.33
(2) Unloaded								
0.3	2160	585	3.37	2.80	—	—	—	—
(3) 50% of the load defined in (1)								
18.8	2127	576	6.92	5.74	85	0.306	9.8	2.72
(4) Maximum power								
41.6	1994	540	12.34	10.24	68	0.245	12.2	3.39
(5) 25% of the load defined in (1)								
9.4	2145	581	4.96	4.12	121	0.436	6.8	1.89
(6) 75% of the load defined in (1)								
27.7	2097	568	8.84	7.34	73.5	0.265	11.3	3.14

Standard specific fuel consumption: g/MJ (kg/kWh)

a) 72 (0.259)

b) 88.5 (0.318)

c) 69.5 (0.250)

d) 85 (0.306)

No load, maximum engine speed 2363 rev/min

Equivalent crankshaft torque at maximum power 191 Nm

Maximum equivalent crankshaft torque 199 Nm at 1600 rev/min engine speed

Mean atmospheric temperature 17°C

pressure 101.3 kPa

relative humidity 53%

Maximum temperature coolant 86°C

engine oil 103°C

fuel 20°C

air intake 25°C

2. Drawbar performance

Date of tests: 1981-05-12 — 1981-06-29

Type of track: Tarmac

Height of drawbar above ground: Unballasted 420 mm
Ballasted 415 mm

Tyre inflation pressure:		Unballasted kPa	Ballasted kPa
	Front	120	140
	Rear	100	130

Results see Table 1

Engine oil consumption during ten hours duration of test (iii and iv) was 34 g/h. Test (iv) was carried out with additional ballast. Power, speed, slip and fuel consumption do not correspond to test (ii) gear L3.

Table 1. Drawbar performance

Gear	Power kW	Draw- bar pull kN	Speed m/s	km/h	Engine speed rev/s	rev/ min	Wheel slip %	Spec. fuel consumption		Spec. energy MJ/l	kWh/l	Temperature		Atmospheric conditions				
								g/MJ	kg/kWh			Co- lant °C	Fuel °C	Engine oil °C	Transm. oil °C	Tempe- rature °C	Rel. hum. %	Pressure sure kPa
i) Maximum power (unballasted tractor)																		
4L	32.6	28.6	1.14	4.10	37.7	2264	15.0	—	—	—	—	86	—	72	28	12	31	102.4
1H-MP	33.7	28.8	1.17	4.21	37.5	2250	15.0	—	—	—	—	67	—	79	42	19	31	102.4
5L	34.7	23.0	1.51	5.44	36.7	2200	7.4	—	—	—	—	80	—	74	32	14	31	102.4
1H	35.7	22.6	1.58	5.69	36.7	2200	7.9	—	—	—	—	68	—	77	41	19	31	102.4
2H-MP	35.3	19.4	1.82	6.55	36.7	2200	6.4	—	—	—	—	75	—	83	44	18	31	102.4
2H	36.5	14.9	2.45	8.82	36.7	2200	4.5	—	—	—	—	74	—	79	43	18	31	102.4
3H-MP	36.5	14.1	2.59	9.32	36.7	2200	3.9	—	—	—	—	76	—	87	45	17	31	102.4
3H	36.8	10.7	3.44	12.38	36.7	2200	2.9	—	—	—	—	82	—	86	45	15	31	102.4
4H-MP	35.7	8.8	4.06	14.62	36.7	2200	2.0	—	—	—	—	68	—	84	48	15	31	102.4
ii) Maximum power (ballasted tractor)																		
1L-MP	10.9	39.4	0.28	1.01	38.8	2331	15.0	142.5	0.513	5.8	1.62	67	30	91	56	20	68	101.3
1L	14.2	39.5	0.36	1.30	38.8	2325	15.0	127	0.457	6.5	1.82	68	30	91	55	19	68	101.3
2L-MP	16.7	39.8	0.42	1.51	38.7	2321	15.0	114.5	0.413	7.2	2.01	72	29	91	54	21	68	101.3
2L	21.6	40.0	0.54	1.94	38.5	2308	15.0	104	0.375	8.0	2.21	72	29	89	53	18	68	101.3
3L-MP	23.1	39.9	0.58	2.09	38.5	2308	15.0	99.5	0.359	8.3	2.31	72	28	87	52	20	68	101.3
3L	29.8	39.8	0.75	2.70	37.9	2275	15.0	93	0.335	8.9	2.48	66	26	82	47	16	68	101.3
4L-MP	34.1	39.7	0.86	3.10	36.7	2200	13.6	92	0.331	9.0	2.51	72	25	77	44	15	68	101.3
5L-MP	35.7	30.8	1.16	4.18	36.7	2200	7.5	88	0.316	9.4	2.62	70	22	70	38	15	68	101.3
4L	36.0	30.3	1.19	4.28	36.7	2200	7.6	86.5	0.311	9.6	2.67	68	24	74	43	15	68	101.3
1H-MP	36.3	30.0	1.21	4.36	36.7	2200	7.8	84	0.303	9.9	2.74	86	34	95	60	22	68	101.3
5L	36.8	23.6	1.56	5.62	36.7	2200	5.0	85	0.307	9.7	2.70	72	20	67	33	15	68	101.3
1H	37.3	23.0	1.62	5.83	36.7	2200	5.3	83	0.298	10.0	2.79	81	34	93	59	21	68	101.3
2H-MP	37.0	20.0	1.85	6.66	36.7	2200	4.5	82.5	0.297	10.0	2.79	85	35	96	60	21	68	101.3
2H	37.4	15.2	2.46	8.86	36.7	2200	3.3	81.5	0.294	10.2	2.82	83	35	95	59	21	68	101.3
3H-MP	36.9	14.1	2.62	9.43	36.7	2200	3.2	83.5	0.301	9.9	2.76	78	35	91	59	17	68	101.3
iii) Five hour test at 75% pull at maximum power																		
1H	29.4	17.2	1.71	5.31	38.1	2285	3.8	86	0.309	9.7	2.68	81	34	97	77	21	26	102.4
iv) Five hour test corresponding to 15% wheel slip																		
3L	31.6	40.0	0.79	2.84	37.8	2270	9.5	—	—	—	—	84	—	98	86	16	63	100.6

3. Turning space and turning circle

Details of wheel equipment: As in specification without ballast
 Track of wheels: Front 1510 mm
 Rear 1425 mm

	With brakes		Without brakes	
	Left-hand m	Right-hand m	Left-hand m	Right-hand m
Radius of turning space	4.04 (4.46)*	4.27 (4.62)	5.53 (5.16)	5.56 (5.25)
Radius of turning circle	3.80 (4.22)	4.04 (4.38)	5.30 (4.92)	5.32 (5.02)

* Figures in brackets indicate that the front-wheel drive is disengaged

4. Location of centre of gravity

Height above ground 891 mm
 Distance forward from the vertical plane
 containing the axis at rear wheels 945 mm
 Distance from the median plane 9 mm (To the left)

5. Braking

Date of tests: 1980-10-01 – 1981-01-22

Tractor masses during brake tests:

Front kg	Rear kg	Total kg
2000	3600	5600

Type 0 (ordinary cold service braking device performance) test

Speed before application of brakes 26.3 km/h

Ballasted	Braking device control force, N	580	500	365	270
	Mean deceleration, m/s ²	3.87	3.50	2.50	1.59
Unballasted	Braking device control force, N	350	300	270	230
	Mean deceleration, m/s ²	3.35	2.88	2.50	2.00

Type I (fade) test

Braking device control force, N	600*	520	475	390	300
Mean deceleration, m/s ²	3.34	2.88	2.50	2.00	1.37

* Not locked

Maximum deviation of tractor from its original course
 Abnormal vibration
 The brakes were heated by

0 m
 None
 Towing

Parking braking device test

	18 per cent slope		12 per slope with trailer of 3000 kg	
	Up	Down	Up	Down
Braking device control force, N	464	285	382	275

6. Measurement of external noise level

Date of tests: 1980-07-17

Type of sound level meter: Brüel & Kjaer 2204

Type of track: Tarmac

Results of tests:

Gear 5 High

Travelling speed before acceleration 19.9 km/h

Sound level 87.5 dB(A)

7. Noise measurement at the driver's ear

Date and location of tests: 1980-06-04, Alnarp, Sweden

Type of sound level meter: Brüel & Kjaer 2204

Type of track: Tarmac

Cab fitted: Yes

Result of tests

Gear	Drawbar pull at which the tractor develops the maximum sound level kN	Measured travelling speed		Sound level dB(A)
		m/s	(km/h)	
(i) all openings closed				
2 High*	13.2	2.58	(9.3)	86.5
4 High	6.9	5.47	(19.7)	88
2 High*	light load	2.83	(10.2)	83
Top gear	light load	7.64	(27.5)	83.5

* Gear corresponds to the nominal travelling speed nearest to 2.08 m/s (7.5 km/h)
Reduction gear 2 High MP only for temporary use.

8. Power lift and hydraulic pump performance

Date of tests: 1981-02-05 — 03-23

Hydraulic fluid

Make and type:

The same as transmission

Viscosity:

Min. 7.5 mm²/s (cSt) at 100°C

Viscosity index:

90

Type of linkage lock for transport: Hydraulic

Power Lift

	Height above ground in down position mm	Vertical movement mm	Maximum force exerted through full range kN	Corres- ponding pressure of hydraulic fluid MPa	Moment about rear axle kNm	Tilt angle of mast degrees
At hitch points	257	611	17.7	14.4	15.3	—
On the frame	193	809	10.9	14.4	16.1	18.5

Temperature of hydraulic fluid at start of test 60°C.

Hydraulic pump performance

Tapping point:

Double acting external
tapping

Pressure specified by the manufacturer
for external hydraulic motor

13.5/13.0* MPa
15.2/14.7* MPa

Opening pressure of the relief valve

Sustained pressure with relief valve open

Opening pressure of the unloaded valve

Closing pressure of the unloaded valve

Pump delivery rate at rated engine speed:
at minimum pressure

0.39/0.67* l/s
(23.4/40.0* l/min)

at 90 % of opening pressure of the
relief valve (12.2/11.7* MPa)

0.32/0.60* l/s
(19.5/35.8* l/min)

Hydraulic power at 90% of opening
pressure of the relief valve

3.9/7.0* kW
60—62°C

Temperature of hydraulic fluid

* Hydraulic pump with 2 shiftable speeds

Table 2. Linkage geometry when connected to the standard frame

Projected length in side view

lower links, mm	782.5
lift arms, mm	320
lift rods, mm	520
top link, mm	580
Distance of lift rod connection point from pivot point of lower link, mm	391

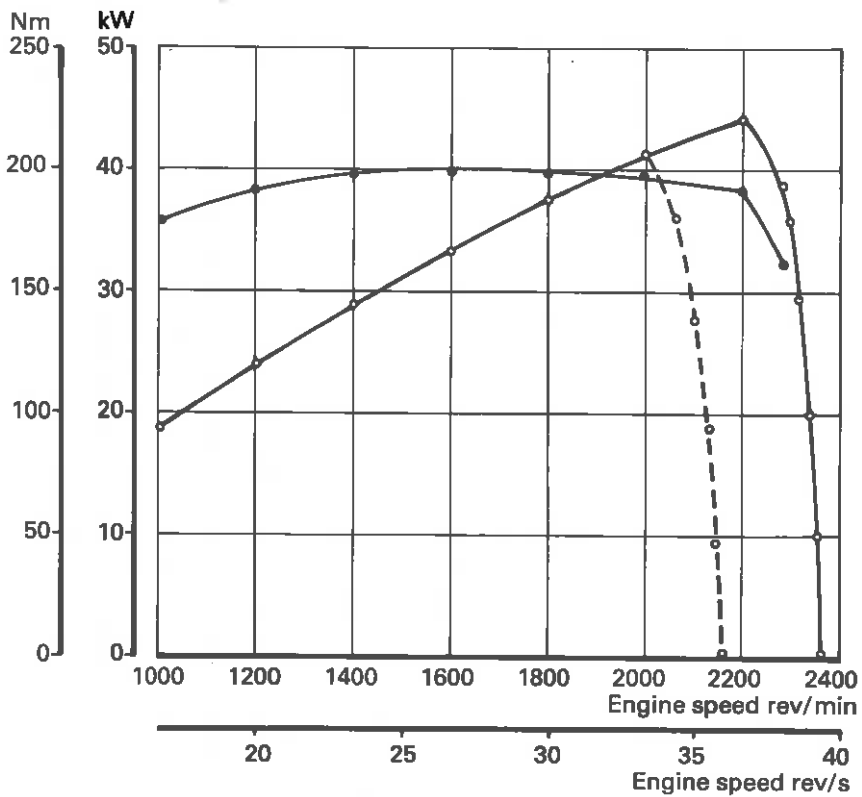
The following dimensions are given relative to the rearwheel centre line, situated 699 mm above the ground level

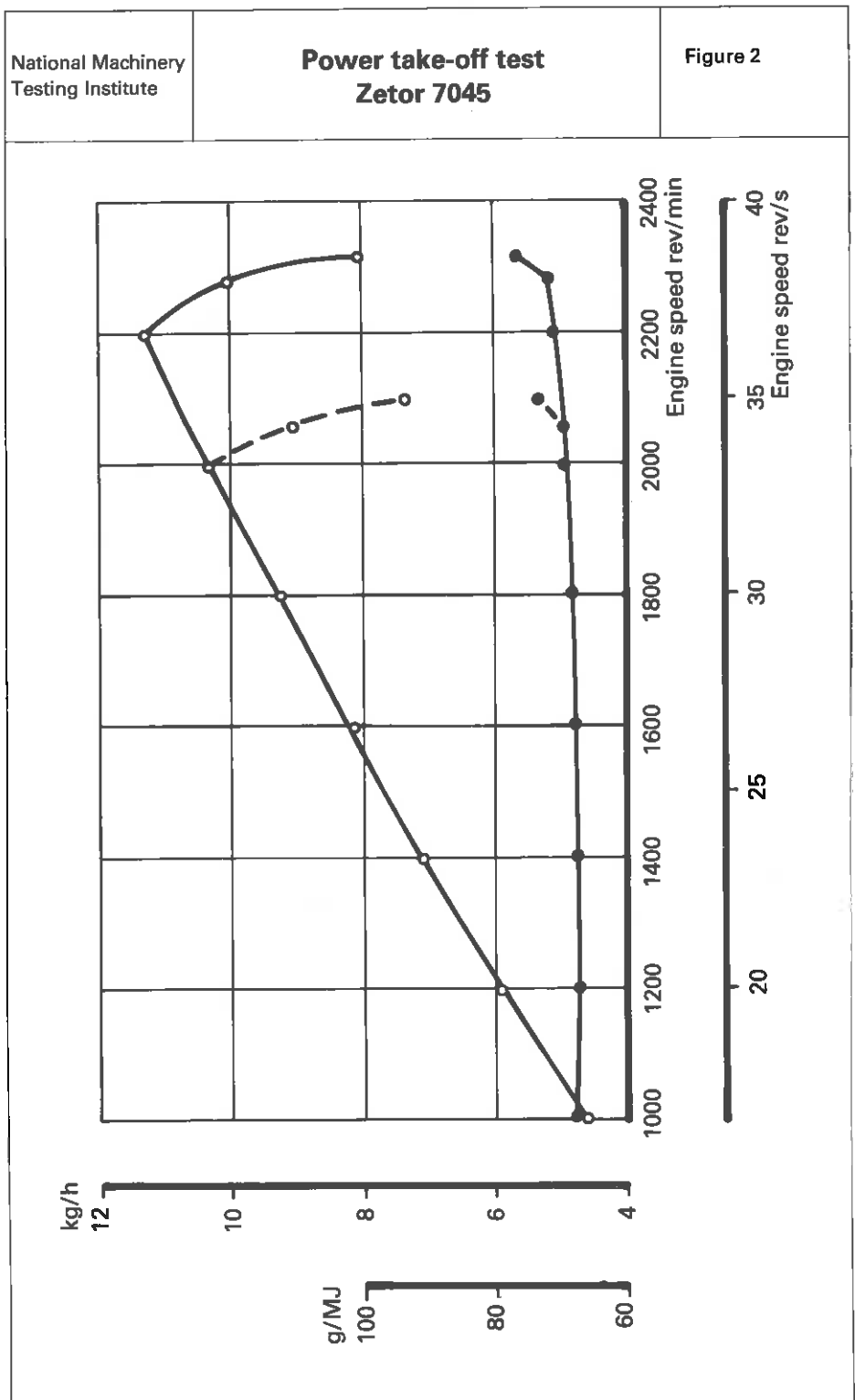
Lower link pivot point	83 mm behind, 138 mm below
Top link pivot point	293 mm behind, 212 mm above
Lift arm pivot point	35 mm behind, 362 mm above
Maximum and minimum height of lower link hitch points	169 mm above, 460 mm below
Height of lower link hitch points when locked in transport position	169 mm above

Ultuna, Uppsala 1981-07-13
NATIONAL MACHINERY TESTING INSTITUTE

National Machinery
Testing Institute**Power take-off test
Zetor 7045**

Figure 1





National Machinery
Testing Institute

**Power take-off test
Zetor 7045**

Figure 3

Specific fuel consumption
g/MJ

