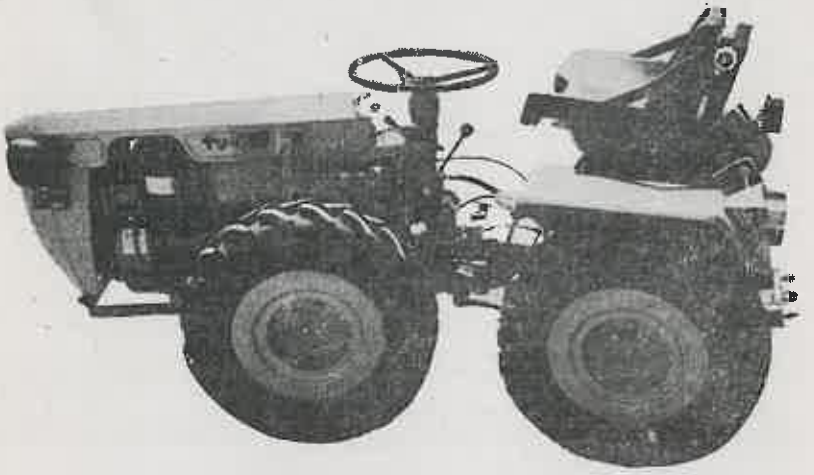
SOCIALISTIC REPUBLIC OF CROATIA
INSTITUTE FOR MECHANIZATION, TECHNOLOGY AND BUILDINGS IN AGRICULTURE
ZAGREB

TEST BULLETIN: O. E. C. D. No. 833

Report on test in accordance with O. E. C. D. Standard Code for the official testing of Agricultural Tractors

Date of Approval: 30th June 1982



TOMO VINKOVIĆ TV 419

ARTICULATED FOUR-WHEEL-DRIVE DIESEL TRACTOR

Manufactured by: TOMO VINKOVIĆ, tvornica traktora i ljevaonica
43000 Bjelovar, Yugoslavia

Date of Tests: July — December 1981

This report has been approved by the O. E. C. D. Coordinating Centre (C. N. E. E. M. A., Antony, France) as being in accordance with the O. E. C. D. Standard Code.

Date of Approval: 30th June 1982. Serial No. 833

This bulletin is based on engineering tests in accordance with O. E. C. D. Tractor Code. It does not contain evaluation of the performance of the tractor on practical farm work.

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In this report all measurements are given in SI units.

The relation with former Technical System of Units is given by the following relations

Forces:	1 N = 0.102 kp	or 1 kp = 9.81 N
Powers:	1 kw = 1.36 hp	or 1 hp = 0.736 kW
Pressures:	100 kPa = 1.02 kp/cm² = 750.1 mmHg	or 1 kp/cm² = 98.1 kPa

Tractor manufacturer:	TOMO VINKOVIĆ, Tvornica traktora i ljevaonica, Bjelovar
Submitted for test by:	Manufacturer
Selected by:	Manufacturer in agreement with the Institute
Place of running-in:	Zagreb
Duration of running-in:	50 hours

SPECIFICATION OF TRACTOR

Tractor	
Make:	TOMO VINKOVIĆ
Model:	TV 419
Type:	Articulated four-wheel-drive design
Serial No.:	522
Engine	
Make:	LOMBARDINI — DMB
Model:	LDA—100
Type:	4-stroke diesel engine, air cooled, direct injection
Serial No.:	5016207
Cylinders:	1 cylinder vertical; bore 100 mm, stroke 90 mm, capacity 707 cm^3; compression ratio 17 : 1; overhead valves
Fuel sistem:	Gravity type fuel feed: FIAAM FNA 32/01 fuel filter with replaceable cartridge; capacity of fuel tank 8.5 l, IPM type YPFR 170 YS 6459/311 piston injection pump serial No. 24747/80; Manufacturers production setting 42 mm^3 per cycle at rated engine speed and full load; BOSCH type KBL 86 S 26 injection nozzle; injection pressure 20.6 MPa, injection 29° before TDC.
Governor:	LOMBARDINI, mechanical, centrifugal, variable speed type governor, governed range of engine speed 1000 rev/min to 3200 rev/min; rated engine speed 3000 rev/min
Air cleaner:	FRAD oil bath type with pre-cleaner incorporated, oil capacity 0.3 l
Exhaust silencer:	Reflexion-type silencer, 50 × 100 mm oval, 190 mm long; mouth on the right-hand side of the tractor, 620 mm above ground
Lubrication system:	Forced feed from gear type pump; FIAM oil filter with replaceable cartridge, oil capacity (engine sump) 2.6 l, oil change period 100 hours, oil filter change period 300 hours Recommended oil type acc. MIL-L-45199A Recommended oil viscosities: Below 0°C — SAE 10 Below 20° C — SAE 20 Over 20°C — SAE 40
Cooling system:	Air cooling from flywheel blower; fan 308 mm dia with 28 blades
Starting system:	Electrical, pre-engaged-drive starting motor, ISKRA type AZJ 010212 V, 1.4 kW
Aid for cold starting:	Mechanical incorporated in fuel pump
Electrical equipment:	Voltage 12 V DUCATI, 3-phase alternator 12 V, 190 W MUNJA lead-acid battery 12 V, 70 Ah at 20 hours rating

Transmission

Clutch: Make: POBEDA, Novi Sad, dry single plate clutch, 190 mm dia plate, pedal operated

Gearbox: Own make; sliding gear type with 3 forward speeds plus a 2 forward and 1 reverse range transfer box at the input end; total number of speeds 6 forward + 3 reverse

Axle and final drive: Own make; crown and pinion with differential; differential lock fitted on front axle, not self disengaging; operated by hand lever

Transmission lubrication: gear box and front housing 8 l; rear axle housing 6 l; recommended oil changing period 500 hours
Recommended oil type acc. API service classification: service GL 3; viscosity SAE 90

Total ratios and speeds:

Speed range	Gear	Number of engine revolutions for one revolution of driving wheel	Nominal traveling speed for rated speed of engine[1] 3000 rev/min (km/h)
low	1	235.7	1.68
	3	87.09	4.55
	5	32.45	12.20
high	2	160.7	2.46
	4	59.38	6.67
	6	22.12	17.90
reverse	1	160.7	2.46
	2	59.38	6.67
	3	22.12	17.90

[1] Calculated with a tyre dynamic radius index of 350 mm

Power take-off

Main power take-off: Non independent proportional to engine speed; p.t.o. directly driven from the transfer box output
Location: at rear of tractor, in median plane 275 above ground, 155 mm behind rear axle centre; 21.5 mm dia — with 10 splines (not ISO standard)

Anticlockwise 2 speeds (727.3 rev/min and 1403.2 rev/min at rated engine speed);
Clockwise and anticlockwise 2 speeds (1066.7 rev/ /min and 2057.6 rev/min at rated engine speed)
540 p.t.o. rev/min at 2228 engine rev/min; 1000 p.t.o. rev/min at 2813 engine rev/min

Power lift: Make: PRVA PETOLETKA, Trstenik; disintegrated construction, type 311.5.422.29 gear type pump directly driven by engine supplies oil to a single ram cylinder; maximum oil pressure 11.8 MPa; separate hydraulic oil reservoir with 8 l capacity;
Recommended oil type: oil for hödraulic circuits viscosity 6.75°E/50°C; oil change period 500 hours
Oil filter with replaceable cartridge, filter change interval 1000 hours
Position control: Hydraulic linkage lock for transport

Implement linkage: Two point linkage not standardized, controlled by power lift; lift height above ground from 90 mm to 430 mm; with links in horizontal position distance of rear plane to rear axle centre 410 mm

The length of:
Lower links 350 mm
Lift chains 370 mm

Lift range: 343 mm

Hitch: Height above ground 290 or 400 mm; Horizontal distance from rear axis 220 mm; 0 or 110 mm above the p.t.o.; 65 mm behind p.t.o.
Maximum permissible vertical load 300 kg

Steering: Own make screw and nut steering, operated by hand wheel

Brakes

Service brake: Own make: internal expanding brakes, mechanically acting on rear wheels, operated by foot pedal. All four wheels are always mechanically engaged

Parking brake: Lever operated service brakes

Wheels: Two at front, two at rear, all tyres 6.00—16 diagonal, 4-ply pneumatic; maximum permissible weight on each tyre 3.75 kN at 150 kPa; track with 610 or 840 mm by shifting the hub on the axle shaft

Wheelbase: 1085 mm

Lighting

	Heigh from ground to centre mm	Dimensions mm	Distance from outside edge of tractor to centre* mm
Headlights	810	100 ϕ	215
Side lights	785	50 ϕ	60
Rear lights	785	105 × 93	95

* At track setting 840 mm

Unrestricted beam angle of headlight in plan wiew 29°.

Overall dimensions:

	Length m	Width m		Maximum height* m
		max	min	
With ballast	2.30	1.05	0.82	1.15
Without ballast	2.30	1.05	0.82	1.15

* To the top of the seat

Ground clearance 210 mm (at brakes' drums)

Seat: Make: AGIS, Ptuj, upholstered seat with back rest. Mechanical suspension adjustable to driver's mass. Damping by hydraulic shock absorber. Range of vertical adjustment 70 mm

CONDITIONS DURING TEST

Masses:

Tractor without driver but with tanks full

	Front kg	Rear kg	Total kg
Without ballast	523	225	748
With ballast	612	313	925

Ballast:

	No. of weights	Total mass kg	Water kg
Front	2	89	—
Rear	2	88	—

Track setting

During test Front & rear 840 mm

FUELS AND LUBRICANTS USED IN TESTS

Laboratory and track tests:

Fuel:	INA D-2	
	Density at 15°C	0,844 kg/l
	Viscosity at 50°C	2.6 cSt
	Cetane number	53
	Conforms to standard	JUS B. H2. 411.
Engine oil:	INA Super 3 SAE 30	
	Viscosity at 50°C	8°E
Transmission oil:	INA Hypenol 90 (SAE 90)	
	Viscosity at 50°C	15°E
Hydraulic oil:	INA Hydraol 70	
	Viscosity at 50°C	6.8°E

COMPULSORY TESTS

(1) Main power take-off performance

Date and location of tests: 1981. 09. 09. Zagreb

Type of dynamometer: SCHENK hydraulic dynamometer U1—40

Power kW	Speed Engine rev/min	Speed p. t. o rev/min	Fuel consumption hourly l/h	Fuel consumption specific kg/kWh	Specific energy kWh/l
Maximum power — 2 hour test					
9.53	3003	728	3.70	0.328	2.57
The speed recommended by manufacturer for drawbar work					
9.53	3003	728	3.70	0.328	2.57
Part loads at rated engine speed					
(i) 85 per cent of the torque obtained at maximum power					
8.14	3044	738	3.17	0.328	2.57
(ii) unloaded					
0	3147	763	1.02	—	—
(iii) half the torque defined in (i)					
4.15	3086	748	1.98	0.402	2.10
(iv) the torque corresponding to maximum power					
9.53	3003	728	3.70	0.328	2.57
(v) one — quarter of the torque defined in (i)					
1.99	3102	752	1.48	0.627	1.35
(vi) three — quarters of the torque defined in (i)					
6.16	3061	742	2.44	0.334	2.52
Part loads — standard speed of the p.t.o. (540 rev/min) (i) 85% of the torque obtained at maximum power					
7.09	2285	554	2.35	0.280	3.01
(ii) unloaded					
0	2409	584	0.654	—	—
(iii) half the torque defined in (i)					
3.65	2351	570	1.43	0.331	2.55
(iv) the torque corresponding to maximum power available					
8.14	2228	540	2.91	0.302	2.80
(v) one — quarter of the torque defined in (i)					
1.83	2384	578	1.01	0.466	1.81
(vi) three — quarters of the torque defined in (ii)					
5.44	2331	565	1.85	0.288	2.94

STANDARD SPECIFIC FUEL CONSUMPTION (kg/kWh)

a (i)	0.328
a (iii)	0.402
b (i)	0.280
b (iii)	0.331

No load maximum engine speed: 3150 rev/min

Equivalent crankshaft torque at maximum power: 30,3 Nm

Maximum torque: 37.5 Nm at 1800 rev/min of the engine

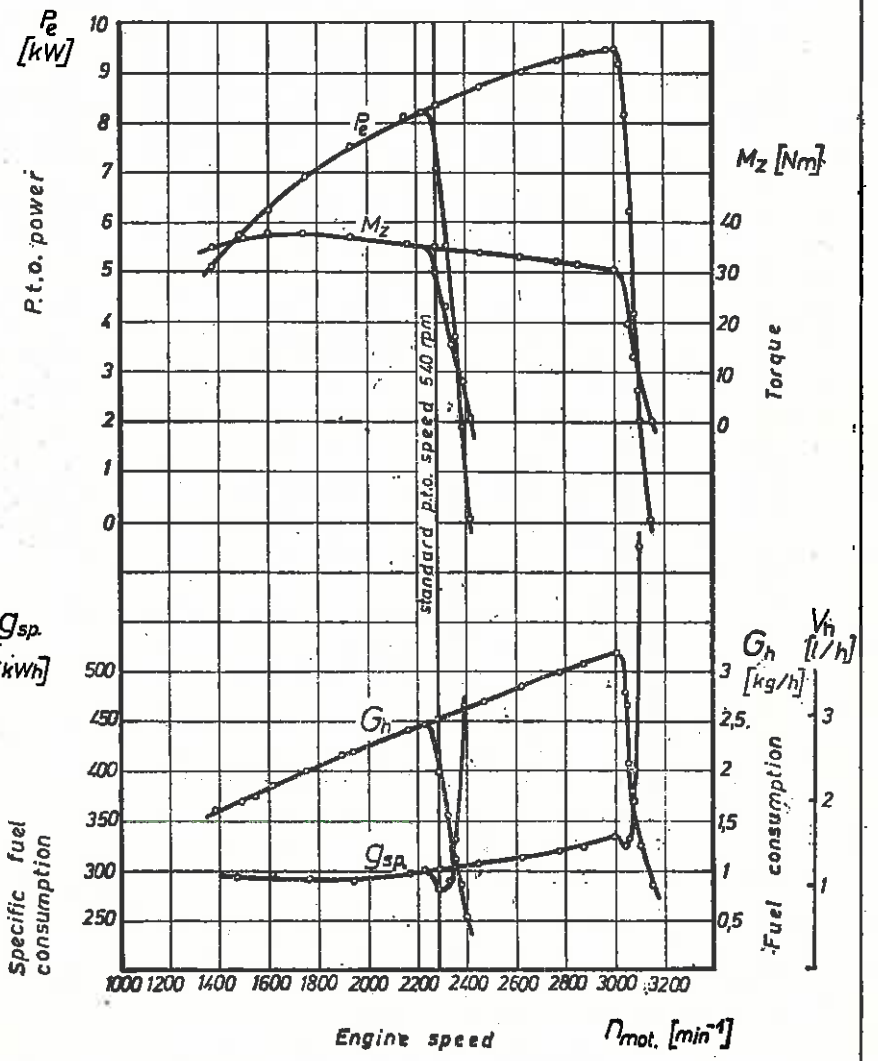
Mean atmospheric conditions :

Temperature	18°C
Pressure	101. kPa
Relative humidity: 90	per cent

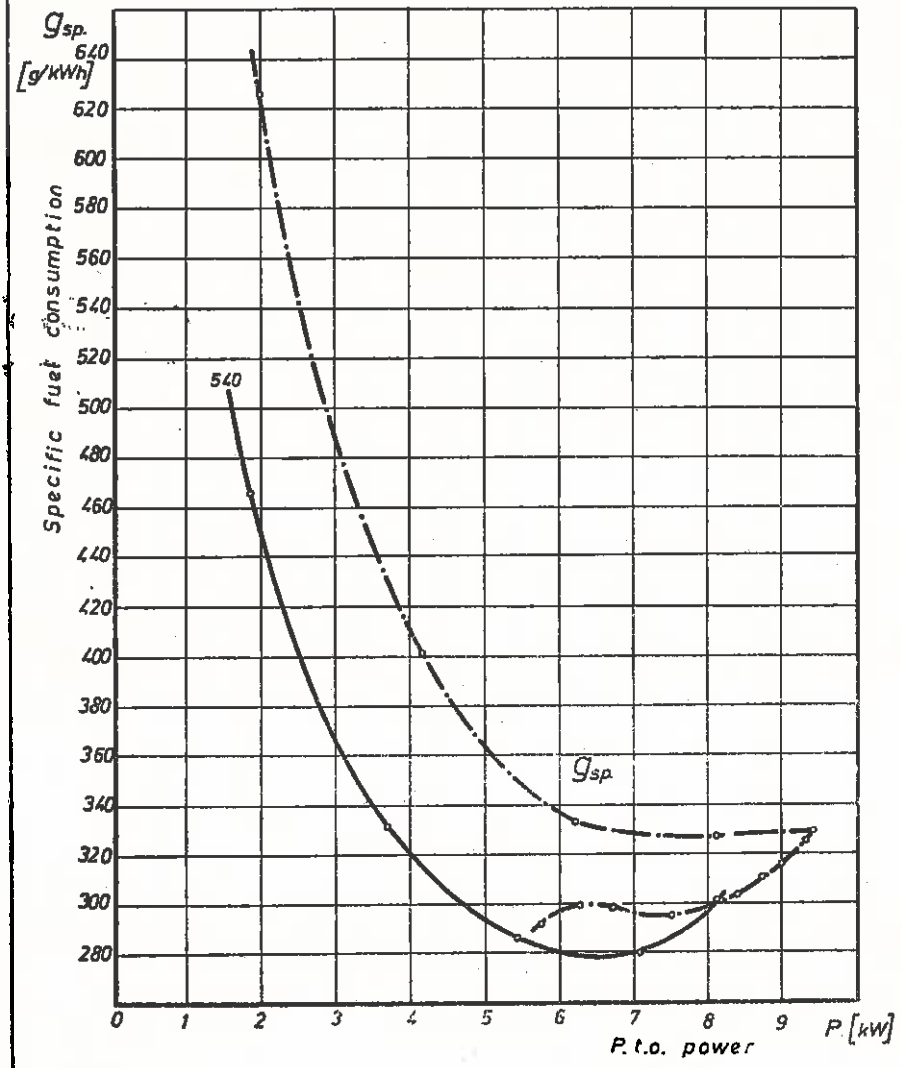
Maximum temperatures:

Cylinder head	115°C
Engine oil	110°C
Fuel	19°C
Engine air intake	39°C

Tractor „TOMO VINKOVIĆ" TV 419



Tractor „TOMO VINKOVIĆ" TV 419



(2) **Drawbar performance**

Date of tests: 1982. 11. 11—13 Type of track: Tarmacadam Height of hitch above ground: 290 mm

Tyre inflation pressure: 120 kPa

Gear	Speed	Power	Drawbar pull	Engine speed	Wheel-slip percent	Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
								fuel	coolant	oil	temperature	relative humidity percent	pressure kPa
	km/h	kW	N	rev/min		kg/kWh	kWh/l	°C	°C	°C	°C		
	(i) Maximum power (unballasted)												
1	1.49	2.76	6630	3040	15	0.625	1.35	1	—	74	2	72	101.5
2	2.20	3.89	6380	3050	15.4	0.524	1.61	2	—	80	4	65	101.5
3	4.08	7.23	6375	3000	13.4	0.420	2.01	3	—	84	4	60	101.5
4	5.54	8.75	5690	2850	9.7	0.370	2.28	5	—	84	5	56	101.5
5	10.3	8.27	2900	2720	3.0	0.380	2.22	6	—	86	8	56	101.5
6	14.2	8.11	2060	2650	1.9	0.365	2.31	6	—	88	8	56	101.5
	(ii) Maximum power (ballasted)												
1	1.50	3.23	7750	3080	15.0	0.585	1.44	6	—	78	8	56	101.5
2	2.18	4.72	7800	3045	15.0	0.475	1.78	7	—	82	8	56	101.5
3	4.09	8.36	7360	3010	9.1	0.382	2.21	7	—	86	8	56	101.5
4	5.59	8.83	5690	2980	7.5	0.370	2.28	7	—	88	8	56	101.5
5	9.95	8.40	3040	2720	3.6	0.353	2.39	7	—	87	8	56	101.5
6	13.74	8.05	2110	2540	2.5	0.345	2.45	8	—	89	8	56	101.5
	(iii) Five hour test at 75 per cent of pull at maxi mum power												
4	6.62	7.83	4260	3020	4.8	0.358	2.36	8	—	88	8	72	101.1
	(iv) Five hour test at pull corresponding to 15 per cent wheelslip in test (ii)												
2	2.26	4.80	7650	—	—	—	—	12	—	90	13	67	101.5

Oil consumption during ten hours' testing (iii) and (iv): 10 g/h

(3) Turning space and turning circle

Details of wheel equipment: Tractor with ballast
Tyres: 6.00—16 4 PLY
Track of wheels: Front/rear: 840 mm

	Without brakes	
	Right-hand m	Left-hand m
Radius of turning space	2.32	2.34
Radius of turning circle	2.21	2.23

Separate braking of wheels is not possible.

(4) Location of centre of gravity

Height above ground: 495 mm
Distance forward from the vertical plane containing the axis of rear wheels: 690 mm
Distance from the median plane: 2,5 mm to left
Distance from the vertical plane containing the mind points of the front and rear axes with maximum articulation (33.5⁰) to left: 8 mm to left
to right: 5 mm to right

(5) Braking

Date of tests: 1981. 06. 10.
Tractor masses during brake tests

	Front kg	Rear kg	Total kg
Ballasted	615	393	1008
Unballasted	525	307	832

Type 0 (ordinary cold service braking device performance) test

Speed before application of brakes 18.4 km/h

Ballasted	Braking device control force	N	175	210	295	360	Locked 415
	Mean deceleration m/s²		2.55	3.92	5.30	5.98	6.68
Unballasted	Braking device control force	N	140	230	290	340	Locked 400
	Mean deceleration m/s²		2.70	3.30	4.40	4.70	5.80

Type I (fade) test

Braking device control force	N	150	200	280	310	Locked 415
Mean deceleration	m/s²	1.90	2.95	4.45	5.10	5.90

Maximum deviation of tractor from its original course: 0 m
Abnormal vibration: None
The brakes were heated by: The first method

Parking braking device test

Braking device control force N	18 per cent slope		12 per cent slope with trailer of 1.1 tonne	
	Up	Down	Up	Down
	210	220	215	225

(6) Measurement of external noise level

Date of tests:	1981. 11. 02.
Type of sound level meter:	Brüel & Kjaer Type 2203
Type of track:	Tarmacadam
Results of tests:	
Gear:	6
Travelling speed before acceleration:	13.7 km/h
Sound level:	97.4 dB(A)

(7) Noise measurement at the driver's ear

Date of tests:	1981. 11. 11.
Type of sound level meter:	Brüel & Kjaer Type 2203
Type of track:	Tarmacadam
Cab fitted:	No.
Results of tests:	

Gear	Drawbar pull at which the tractor develops the maximum sound level KN	Measured traveling speed km/h	Sound level dB(A)
4*	6.0	5.54	99.6
4*	light load	6.84	92.5
6	light load	18.6	93.7

* The 4th gear corresponds to the nominal travelling speed nearest to 7.5 km/h.

(8) Power lift and hydraulic pump performance

Date and location of tests:	1981. 10. 08. Zagreb
Hydraulic fluid	
Make and type:	INA Hidraol 70
Viscosity:	6.6—6.9°E/50°C
Viscosity index:	min 100
Type of linkage lock for transport:	Hydraulic
Power lift	

	Height of lower hitch point above ground in down position mm	Vertical movement mm	Maximum force exerted through full range kN	Corresponding pressure of hydraulic fluid MPa	Moment about rear axle kNm	Maximum tilt angle of mast over range of lift degrees
At hitch points	74	343	7.1	11.3	2.91	31

Temperature of hydraulic fluid at start of test: 62°C

Hydraulic pump performance:

Opening pressure of the relief valve:	11.77 MPa
Sustained pressure with relief valve open:	11.32 MPa
Pump delivery rate at minimum pressure, the governor control lever being set for maximum power:	16.9 l/min
Hydraulic power at 90% of relief valve setting:	1.9 kW
Corresponding: delivery rate	11.2 l/min
pressure	10.2 MPa

Linkage geometry
Projected length in side view:

Lower links	350 mm
Lift arms	214 mm
Lift chains	370 mm
Top link	—
Distance of lift rod connection point from pivot point of lower link	260 mm

The following dimensions are given relative to the rear wheel centre line, situated 335 mm above the ground level

Lower link pivot point	68.5 mm behind	118.5 mm below
Top link pivot point	—	
Lift arm pivot point	69 mm behind	203 mm above
Maximum and minimum height of hitch point	82 mm above	261 mm below
Height of lower link hitch points when locked in transport position	417 mm	

Date: 30th March 1982.

Head of Testing Division: Dr Ivan Piria

Director: Dr Ivo Todorić