ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

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

SAME TITAN 190 VDT

Four-wheel drive agricultural tractor

OECD No. 1453/2
Full Code



LAMBORGHINI 190 VDT

Four-wheel drive agricultural tractor

OECD No. 1453/1
Full Code



Manufactured by: S+L+H S.p.A
V.le F. Cassani 15
24047 Treviglio BG
Italy

Date of OECD approval: 04.06.1993
Period of test: January - February 1993

ISMA Via Milano 43 24047 Treviglio BG Italy
Tel: (0363) 49603 Fax: (0363) 302007

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The SAME TITAN 190 VDT (4WD) and LAMBORGHINI 190 VDT (4WD) tractors are technically identical in all main respects except with regard to model designation, colour and side bonnets design. All tests were carried out on the SAME TITAN 190 VDT.

All stated dimensions and tests refer to tyre size 16.9R30 (A8) at front and 20.8R38 (A8) at rear, as well as to track widths 1920 mm at front and 1840 mm at rear.

Tractor manufacturer

- Name: S+L+H S.p.A.;
- Address: V.le F. Cassani 15, 24047 Treviglio BG, Italy;
- Location of tractor assembly: Treviglio BG, Italy;
- Submitted for test by: the manufacturer;
- Selected by: the manufacturer with the agreement of ISMA;
- Place of running in: Treviglio BG, Italy;
- Duration of running in: 50 hours,
- Location of test: ISMA, Via Milano 43, Treviglio BG, Italy.

SPECIFICATION OF TRACTOR

TRACTOR

- Make: SAME;
- Model: 190 VDT;
- Type: wheeled tractor, unit construction, all wheels drive tractor;
- Number of driving wheels: 4;
- Serial number: 1064;
- First serial number: 1001.

ENGINE

- Make: S+L+H;
- Model: 1000.6 WTR;
- Type: water cooled 4-stroke diesel engine, direct injection, turbo charged;
- Serial number: 1131.

Cylinders

- Number and disposition: 6, vertical, in-line;
- Bore x stroke: 105 x 115.5 mm;
- Capacity: 6000 cm^3;
- Compression ratio: 16:1;
- Arrangement of valves: overhead;
- Cylinder liners: wet liners.

Supercharging

- Make:	GARRET;
- Model:	VG 0126A TO4E49;
- Type:	turbocharger;
- Supercharging pressure:	93 kPa.

Fuel system

- Fuel feed system:	AC corone fuel feed pump;
- Make, model and type of fuel filter:	FIAMM FNA 255/00;
- Capacity of fuel tank:	210 dm^3;
- Make, model and type of injection pump:	BOSCH PFR 1K 90A 516, immersed pump, one per cylinder, without serial number, in line injection pump;
- Manufacturer's production setting of injection pump:	
. flow rate:	93 ± mm^3/stroke at rated speed and full load corresponding 39.20 dm^3/h;
. timing:	16 ± 0.5° before TDC;
- Make, model and type of injectors:	BOSCH DLLA 150 S 1158 multihole injection nozzles;
- Injection pressure:	18 ± 1 MPa.

Governor

- Make:	S+L+H;
- Model:	488.16;
- Type:	electronic;
- Governor range of engine speed:	from 650 to 2553 rev/min;
- Rated engine speed:	2350 rev/min.

Air cleaner

- Main filter	
. make:	DONALDSON;
. model:	FLG 12-0309;
. type:	dry paper element filter;
. location:	front of engine;
. air intake location:	below bonnet;
- Maintenance indicator:	with the warning lamp on the dashboard.

Lubrication system

- Type of feed pump:	forced feed from gear pump;
- Type of filter:	FIAMM FT 48 03 IN;
- Oil specifications:	see page 23.

Cooling system

- Type and detail:	water cooling with impeller pump;
- Specification of fan:	propeller fan driven by engine shaft;
- Number of fan blades:	6;
- Fan diameter:	400 mm;
- Type of temperature control:	electrical indicator.

Starting system

- Make:	BOSCH;
- Model:	JF 12 V;
- Type:	electromagnetic engagement;
- Starter motor power rating:	3 kW;
- Safety device:	none (gear is automatically disengaged when engine is stopped);
- Starting system for low temperatures:	none.

Electrical equipment

- Voltage:	12 V;
- Generator	
. make:	BOSCH;
. model:	K1 14V 65A 20;
. type:	alternator:
. power:	14 V, 780 W;
- Battery:	1 lead acid;
. capacity:	100 Ah at 20 hours rating.

Exhaust system

- Make:	S+L+H;
- Model:	83683.3 - DGM SA 1686;
- Type:	one reflection absorption chamber;
- Location:	on the left hand side of engine, under the bonnet cowling, vertical position;
- Height of outlet above ground:	2970 mm.

TRANSMISSION

Clutch (utilized only for travelling of tractor)

- Make:	own make;
- Model:	488.23;
- Type:	multi-disk in oil bath with axial piston;
- Number of plates:	8;
- Plates diameter:	168 mm;
- Control system:	hydraulically operated by pedal.

Gear box

- Make:	S+L+H;
- Model:	488.22;
- Type:	electronic power shift, with mechanical reduction gear;
- Arrangement:	nine speeds forward and reverse, with three ranges of speeds, number of speeds: 27 forward and 27 reverse;
- Available options:	power shift, 27 forward and 27 reverse.

Rear axle and final drives

- Make:	own make;
- Model:	488.44;
- Type:	bevel gear differential and epicyclic final drive.

Rear differential lock

- Make:	own make;
- Model:	488.35;
- Type:	electrohydraulic;
- Control system:	engaged by push button, disengaged by push button or automatically when steering angle exceeds 17 degrees, or when forward speed exceeds 15 km/h.

Front axle and final drives

- Make:	own make;
- Model:	488.43;
- Type:	original S+L+H system with central shaft, bevel gear drive, differential and epicyclic final drives.

Front differential lock

- Make: own make;
- Model: 488.34;
- Type: electrohydraulic;
- Control system: engaged by push button, disengaged by push button or automatically when steering angle exceeds 17 degrees, or when forward speed exceeds 15 km/h.

Total ratios and speeds

Gear	Group	Number of engine revolutions for one revolution of the driving wheels		Nominal travelling speed at rated engine speed of 2350 rev/min (*), km/h	
		Forward	Reverse	Forward	Reverse
1	s R	1499.3	1374.4	0.51	0.55
2	s R	1242.3	1138.8	0.61	0.67
3	s R	1032.8	946.8	0.73	0.80
4	s R	896.6	821.9	0.84	0.92
5	s R	742.9	681.0	1.02	1.11
6	s R	617.6	566.2	1.23	1.34
7	s R	542.4	497.2	1.40	1.52
8	s R	449.4	412.0	1.69	1.84
9	s R	376.6	345.2	2.01	2.19
1	S	303.4	278.1	2.50	2.72
2	S	251.4	230.5	3.01	3.29
3	S	209.0	191.6	3.62	3.95
4	S	181.4	166.3	4.18	4.56
5	S	150.3	137.8	5.04	5.50
6	S	125.0	114.6	6.06	6.61
7	S	109.0	99.9	6.95	7.58
8	S	91.0	83.4	8.32	9.08
1	F	80.3	73.6	9.43	10.29
9	S	75.6	69.3	10.02	10.93
2	F	66.5	61.0	11.39	12.43
3	F	55.3	50.7	13.70	14.94
4	F	48.0	44.0	15.78	17.21
5	F	39.8	36.5	19.03	20.76
6	F	33.1	30.3	22.88	24.96
7	F	29.0	26.6	26.12	28.49
8	F	24.1	22.1	31.43	34.29
9	F	20.0	18.3	37.87	41.32

s R = super-Reduction; S = Slow; F = Fast.

(*) Calculated with a tyre dynamic radius index of 855 mm (ISO 4251/1-1984).
Number of revolutions of front wheels for one revolution of rear wheels: 1.2515.

POWER TAKE-OFF

Power take-off proportional to engine speed

- Type:	independent, at rear of tractor, in tractor's median plane, engaged or disengaged by push button; driven by multi-plate wet clutch independent of travel clutch; ISO 500-1979;
- Number of shafts:	1;
- Method of changing power take-off shaft ends:	it is possible, through 6 screws, to mount a 6- or 21-spline PTO shaft end;
- Method of changing speed:	by hand lever.

1) 540 rev/min

- Category (ISO 500-1979):	1 (35 mm, 6 splines);
- PTO speed at rated engine speed:	609 rev/min;
- Engine speed at standard PTO speed:	2083 rev/min;
- Ratio of rotation speeds (engine speed/PTO speed):	3.8571;
- Power restriction and maximum torque:	power and torque of the engine.

2) 1000 rev/min

- Category (ISO 500-1979):	2 (35 mm, 6 splines);
- PTO speed at rated engine speed:	1028 rev/min;
- Engine speed at standard PTO speed:	2285 rev/min;
- Ratio of rotation speeds (engine speed/PTO speed):	2.2857.
- Power restriction and maximum torque:	power and torque of the engine.

Secondary power take-off

- Category (ISO 500-1979):	2 (35 mm, 6 splines);
- Type:	independent, at front of tractor, in tractor's median plane, engaged or disengaged by push button; driven by multi-plate wet clutch independent of travel clutch.
- Number of shafts:	1;
- Method of changing power take-off shaft ends and speed:	none.
- Ratio of rotation speeds (engine speed/PTO speed):	2.400.

	PTO Rear mm	PTO Front mm
Height above ground:	835	890
Distance from the median plane of the tractor:	0	0
Distance behind rear axle or forward from front axle:	485	660
Direction of rotation (viewed facing driving end):	clockwise	anticlockwise

Power take-off proportional to ground speed: not available.

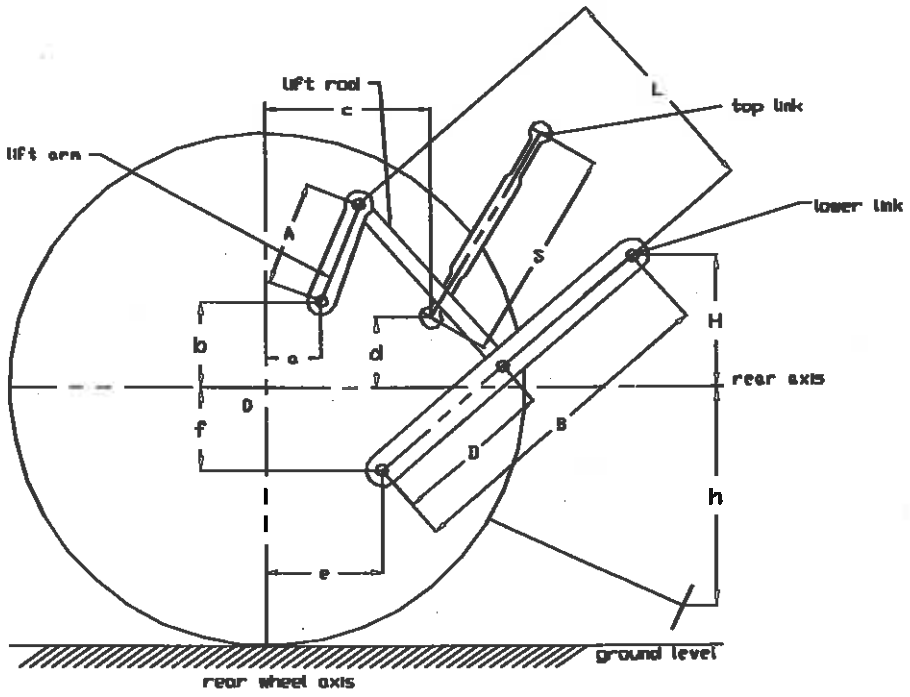
REAR POWER LIFT

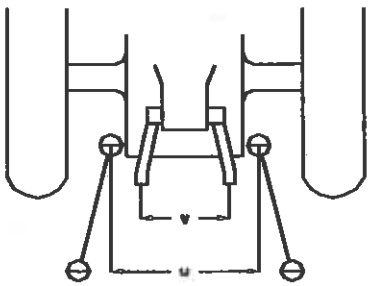
- Make: S+L+H;
- Model: 488.59 electronic control;
- Type: load sensing;
- Type of hydraulic system: open centre system;
- Type and number of cylinders: 1 internal single acting, and 2 external single acting;
- Type of lock for transport: mechanical, with screwed tie rods that lock the lower links;
- Relief valve pressure setting: 18.0 ± 0.5 MPa;
- Opening pressure of anti-shock valve: 21.0 MPa;
- Lift pump
  . make: BOSCH A 510 241 101;
  . type: hydraulic rotary pump, driven by engine shaft;
- Transmission between pump and engine: mechanical;
- Type and number of filters: 1, replaceable paper cartridge;
- Oil capacity: 118 dm^3;
- Site of oil reservoir: gear box;
- Position, type and no. of additional oil plugs: 8 ways distributor at rear of tractor;
- Maximum volume of oil available to external cylinders: 20 dm^3.

- Recommended oil: see page 23.

Three-point linkage

- Category (ISO 730/1-1990): 2;
- Category adapter (ISO 730/1-1990): to category 3.


lift rod
c
L
top link
lift arm
lower link
A
S
H
b
a
d
rear axis
D
f
B
D
h
e
ground level
rear wheel axis


v
u

REAR POWER LIFT (continued)

Dimensions of linkage geometry (when connected to the standard frame)

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	305	305
Length of lower links	(B)	950	950
Distance of lift arm pivot point from rear wheel axis (behind)			
- horizontally	(a)	141	141
- vertically	(b)	450	450
Horizontal distance between the 2 lower link points	(u)	650	650
Horizontal distance between the 2 lift arm end points	(v)	540	540
Length of upper link	(S)	from 615 to 785	716
Distance of upper link pivot point from rear wheel axis			
- horizontally	(c)	410	410
- vertically	(d)	245-310-375	245
Distance of lower link pivot point from rear wheel axis			
- horizontally	(e)	170	170
- vertically	(f)	240	240
Distance of lower link pivot point to lift rod pivot points on lower links	(D)	465	465
Length of lift rods	(L)	from 780 to 910	870
Height of lower hitch points relative to the rear wheel axis			
- in Low position	(h)	from 407 to 694	605
- in High position	(H)	from -7 to 240	70
Height above ground of lower hitch points when locked in transport position (*)			925

(*) *Assuming the dynamic radius index = 855 mm (ISO 4251/1-1984)*

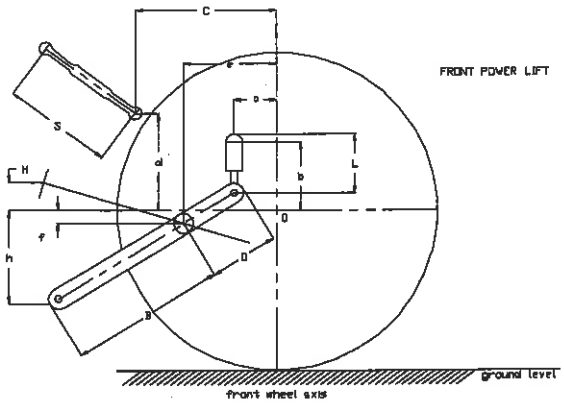
FRONT POWER LIFT

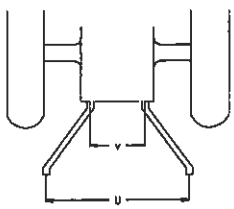
Optional, fitted on tested tractor

- Make:	S+L+H;
- Model:	488.59 front;
- Type and number of cylinders:	2 single acting;
- Type of lock for transport:	none;
- Relief valve pressure setting:	18.0 ± 0.5 MPa;
- Opening pressure of anti-shock valve:	21.0 MPa;
- Lift pump	
. make:	BOSCH;
. type:	hydraulic rotary pump, driven by engine shaft;
- Transmission between pump and engine:	mechanical;
- Type and number of filters:	1, replaceable paper cartridge;
- Oil capacity:	118 dm^3;
- Site of oil reservoir:	gear box;
- Recommended oil:	see page 23.

Three-point linkage

- Category (ISO 730/1-1990):	2;
- Category adapter:	none.





FRONT POWER LIFT (continued)

Dimensions of linkage geometry (when connected to the standard frame)

		Dimension or range mm	Settings used in test mm
Length of lower links	(B)	738	738
Distance of cylinders pivot point from front wheel axis (forward)			
- horizontally	(a)	360	360
- vertically	(b)	310	310
Horizontal distance between the 2 lower link points	(u)	880	880
Horizontal distance between the 2 lift arm end points	(v)	350	350
Length of upper link	(S)	from 510 to 690	580
Distance of upper link pivot point from front wheel axis			
- horizontally	(c)	639	639
- vertically	(d)	450	450
Distance of lower link pivot point from front wheel axis			
- horizontally	(e)	469	469
- vertically	(f)	30	30
Distance of lower link pivot point to cylinders pivot points on lower links	(D)	180	180
Length of cylinders			
- in Low position	(L)	303	303
- in High position	(L)	472	472
Height of lower hitch points relative to the front wheel axis			
- in Low position	(h)	385	385
- in High position	(H)	305	305
Height above ground of lower hitch points in High position (*)			1000

(*) *Assuming the dynamic radius index = 695 mm (ISO 4251/1-1984)*

SWINGING DRAWBAR

Optional, not fitted on tested tractor

- Type:	97308.20.0;
- Height above ground (tyre size: 20.8R38):	530 mm and 555 mm;
- Type of adjustment:	reversible;
- Distance of hitch point from rear wheel axis	
. horizontally:	895 mm;
- Distance of hitch point from power take-off shaft end	
. vertically:	320 mm below;
. horizontally:	410 mm behind;
- Lateral adjustment (centre of clevis)	
. right hand:	290 mm;
. left hand:	290 mm;
- Distance of pivot point from rear wheel axis	
. horizontally:	25 mm forward;
- Diameter of drawbar pin hole:	34 mm;
- Maximum vertical permissible load:	not specified.

HOLED DRAWBAR

- Number of holes:	9;
- Distance between holes:	100 mm;
- Hole diameter:	33 mm;
- Thickness x width of the drawbar:	30 x 80 mm;
- Height above ground, (tyre size: 20.8R38)	
. min:	300 mm;
. max:	1120 mm;
- Horizontal distance behind power take-off shaft end:	635 mm;
- Diameter of the pinhole:	36.6 mm.

TRAILER HITCH

- Type:	SAME DGM-GA 901/C;
- Hole diameter:	28 mm;
- Height above ground	
. min:	640 mm;
. max:	810 mm;
- Distance of hitch point from rear wheel axis	
. horizontally:	670 mm;
- Distance of hitch point from power take-off shaft end	
. vertically:	195 mm below, 120 mm above;
. horizontally:	180 mm;
- Maximum vertical permissible load:	14.7 kN.

STEERING

- Specification:	hydrostatic steering with BOSCH hydraulic gear pump, HY ZFS 11/19 L214 two double acting rams acting directly on front axle.
- Make:	DANFOSS;
- Model:	ORBITROL OSPC 220 OR;
- Type:	hydrostatic;
- Working pressure:	15 MPa;
- Recommended oil:	see page 23.

BRAKES

Service brake

- Make:	S+L+H;
- Model:	448.54;
- Type:	oil bath disc, total 8 discs, 4 at front (2 per wheel) and 4 at rear (2 per wheel), all mounted before the final drive;
. front disc diameter:	224 mm;
. rear disc diameter:	302 mm,
. material:	FRENDO HDT 303 lining material;
- Method of operation:	hydraulically actuated with 2 pedals;
- Trailer braking take-off:	none.

Parking brake

- Type:	fully independent of service brake, 4 oil bath disc mounted on the pinion shaft in the gear box, SINTERIX 2 lining material;
- Method of operation:	mechanical by hand lever.

Steering brake

- Metod of operation:	divided pedal of service brake, for normal use locked together.

STEERING WHEELS

- Number:	2;
- Location:	at front;
- Track widths	
. min:	1810 mm:
. max:	1940 mm;
- Adjustment:	changing the position of the rims with respect to the disc.

DRIVING WHEELS

- Number:	4;
- Location:	two at front and two at rear;
- Rear track widths	
. min:	1635 mm;
. max:	1835 mm;
- Adjustment:	changing the position of the rims with respect to the disc.

WHEELBASE: 2850 mm.

PROTECTIVE STRUCTURE

Specifications

- OECD approval No.:	CSD 1338/6 for the LAMBORGHINI 190 VDT (4WD) tractor, CSD 1338/10 for the SAME TITAN 190 VDT (4WD) tractor;
- Date of approval:	23 September 1991;
- Location and country of test of protective structure:	Istituto di Ingegneria Agraria, Università degli Studi di Milano, Italy;
- Reference mass and wheelbase used for calculating impact energies and crushing forces:	6300 kg and 2856 mm;
- Make:	S+L+H;
- Model:	C 33;
- Type:	cab, not tiltable;
- Manufacturer's name:	S+L+H S.p.A.
. address:	V.le F. Cassani 15, 24047 Treviglio BG, Italy;
- Protective device:	cab.

Materials used in the construction and dimensions

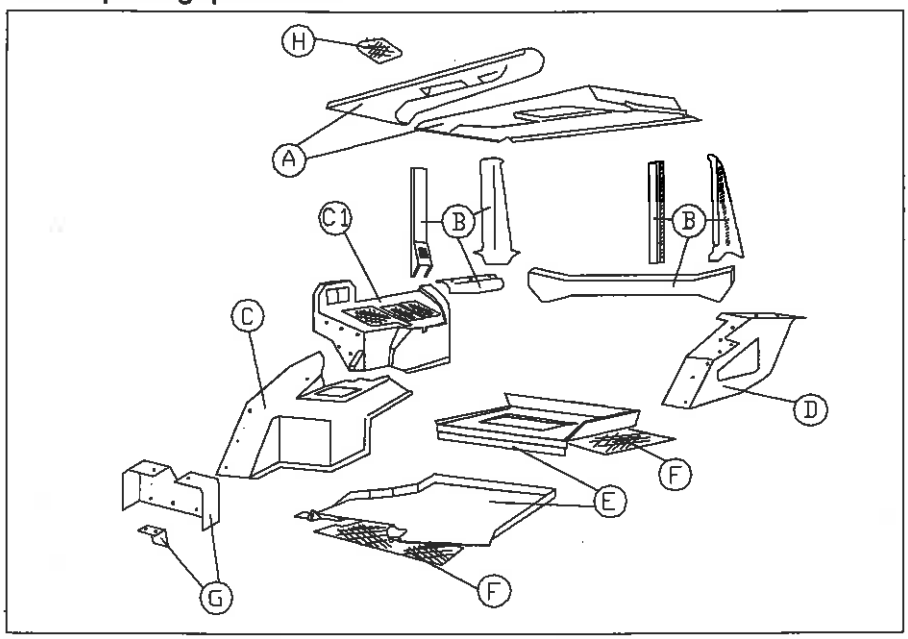
- Interior padding:	see next page;
- Glass:	
. type:	security glass, tickness 5 and 6 mm;
. model:	43 R - 000589 (doors, windscreen, windows);
- Windscreen wipers:	OSLV, parallelogram type;
- Direction indicators:	COBO E3;
- Heaters and ventilators:	BORLETTI;
- Draught proofing:	rubber GMTA 20 - 70 P, SP 550 and PEC 75.

DRIVER'S SEAT

- Make:	GRAMMER;
- Model:	LS 95 H1/90 AR;
- Type:	upholstered seat with back rest;
- Type of suspension:	adjustable spring;
- Type of damping:	shock absorber;
- Range of adjustment	
. longitudinal:	150 mm;
. vertical:	60 mm.

PASSENGER'S SEAT : none.

Interior padding specification



A) Porous material, 50-60 g/cm^3, thickness 15-20 mm + Tassel AD, 1200-1400 g/cm^3, thickness 6 mm + textile fiber + TNT.

B) PUR, low density, 250-300 g/m^3, coated with expanded laminated PVC.

C) Polypropylene, thickness 3 mm, internally covered with polyurethan foam, thickness 30 mm, and bitumen sheet.

C1) Polypropylene, thickness 3 mm, internally covered with polyurethan foam, thickness 30 mm.

D) Tassel AD, 1400-1600 g/m^3 + PVC, thickness 12 + 22 mm.

E) Rubber, 2-3 kg/m^3, thickness 5 mm + polyurethan foam, thickness 20 mm + thermoplastic film.

F) Bitumen, thickness 6 mm.

G) Rubber + Tassel AB X AD, 800-1000 g/m^3 + Tassel AB X BD, 1400 g/m^3, thickness 23 mm.

H) Polyurethan foam, thickness 30 mm.

LIGHTING

Lighting system in accordance with EEC 78/933

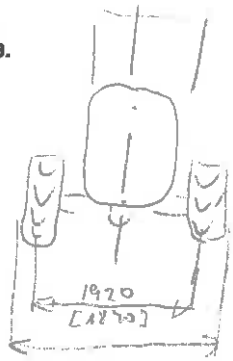
	Height above ground of centre with tyre 20.8R38	Size	Distance from outside edge of tractor to centre at 1840 mm track width
	mm	mm	mm
Headligths	1620	165 x 105	990
Front parking lights	1860	110 x 35	440
Front direction indicators	1890	110 x 35	440
Rear parking lights	1835	115 x 60	420
Rear direction indicators	1810	70 x 100	340
Brake lights	1810	70 x 100	520
Reflectors	750	dia 80	600

TEST CONDITIONS

OVERALL DIMENSIONS

	Length	Width		Height at top of	
		min	max	exaust sil.	protect. struct.
	mm	mm	mm	mm	mm
Ballasted	5270	2160	2485	2970	2930
Unballasted	5385	2160	2485	2970	2930

- Ground clearance: 550 mm;
- Clearance-limiting part: front axle.



TRACTOR MASS (with full fuel tanks, cab and no water in tyres)

	Front kg	Rear kg	Total kg
Without driver			
Unballasted	2610	3750	6360
Ballasted	3260	3800	7060
With driver			
Unballasted	2625	3810	6435
Ballasted	3275	3860	7135

BALLAST

	Weights no.	Total weight kg	Water kg
Front	1	400	-
Rear	3 + 3	300	-
Additional	-	-	-

TYRES AND TRACK WIDTH SPECIFICATIONS

		Front	Rear
- Tyres			
. dimensions		16.9R30	20.8R38
. ~~ply rating~~ speed index		A8	A8
. type		radial	radial
. maximum load (tyre manufacturer's)	daN	2255	3579
. maximum load (tractor manufact.'s)	daN	1961	3432
. inflation pressure (tyre manufact.'s)	kPa	160	160
. dynamic radius index	mm	695	855
- Chosen track width	mm	1920	1840
- Other tyres available		480/70R30	520/70R38
		480/70R30	650/75R34

OILS AND LUBRICATION

Capacity and change interval

	Capacity dm^3	Oil change h	Filter change h
Engine	15.0	150	300
Gear box	118.0	1200	2400 (*)
Front axle	13.0	1200	-
Final drives (front)	5.0	1200	-
Rear axle and final drives	in common with gear box		
Hydraulic system	in common with gear box		
Other (steering, etc.)	in common with gear box		

(*) *Or when the warning lamp is lighted*

FUEL AND LUBRICANTS RECCOMENDED AND USED IN TESTS

Fuel
- Type: AGIP DIESEL, DIN 51601;
- Specific gravity at 15 °C: 0.837 g/cm^3.

Engine oil
- Type: AKROS TURBO 15 W/40;
- Viscosity: 12.50 cSt;
- Classification: API CE, MIL-L-2104 E.

Transmission (front and rear axle, final drives and gear box), hydraulic system and steering oil
- Type: AKROS MULTI;
- Viscosity: 11.50 cSt;
- Viscosity index: 95;
- Classification: API GL 4.

Grease
- Type: GREASE 30;
- Number of lubrication points: 10.

TEST RESULTS

COMPULSORY TESTS RESULTS

1. MAIN POWER TAKE-OFF PERFORMANCE

- Date and location of test: 25 January 1993, ISMA, Treviglio BG, Italy

- Type of dynamometer: ZÖLLNER B 500

Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min	rev/min	l/h	kg/h	g/kW	kWh/l
1.1 MAXIMUM POWER - 2 HOUR TEST						
133.3	2347	1027	39.20	32.81	246	3.40
1.2 POWER AT RATED ENGINE SPEED						
133.3	2347	1027	39.20	32.81	246	3.40
1.3 STANDARD POWER TAKE-OFF SPEED (1000 ± 25 rev/min)						
132.9	2286	1000	38.20	31.97	241	3.48
1.4 PART LOADS						
1.4.1 The torque corresponding to maximum power at rated engine speed						
133.3	2347	1027	39.20	32.81	246	3.40
1.4.2 85% of torque obtained in 1.4.1						
117.8	2441	1068	35.73	29.91	254	3.30
1.4.3 75% of torque defined in 1.4.2						
90.2	2491	1090	28.91	24.20	268	3.12
1.4.4 50% of torque defined in 1.4.2						
60.7	2514	1100	22.68	18.98	313	2.68
1.4.5 25% of torque defined in 1.4.2						
30.5	2530	1107	13.31	15.90	436	1.92
1.4.6 unloaded						
0	2553	1117	9.80	8.20	-	-

Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min	rev/min	l/h	kg/h	g/kW	kWh/l
1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 rev/min)						
1.5.1 The torque corresponding to maximum power available						
132.9	2286	1000	38.20	31.97	241	3.48
1.5.2 85% of torque obtained in 1.5.1						
117.7	2382	1042	35.10	29.38	250	3.35
1.5.3 75% of torque defined in 1.5.2						
90.3	2437	1066	28.45	23.81	264	3.17
1.5.4 50% of torque defined in 1.5.2						
60.7	2455	1074	21.46	17.96	296	2.83
1.5.5 25% of torque defined in 1.5.2						
30.6	2473	1082	15.60	13.06	427	1.96
1.5.6 unloaded						
0	2491	1090	9.21	7.71	-	-

- No load maximum engine speed: 2553 rev/min;
- Torque (1) at maximum power at rated engine speed: 54.24 daNm;
- Maximum torque (1) (engine speed: 1648 rev/min) 67.82 daNm.

- Mean atmospheric conditions

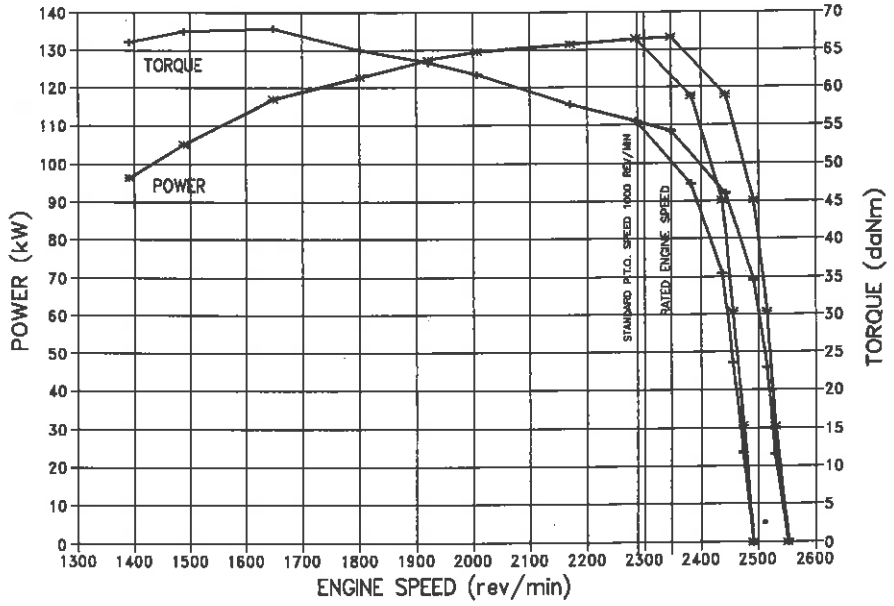
. temperature: 18 °C
. pressure: 99.2 kPa
. relative humidity: 76 %

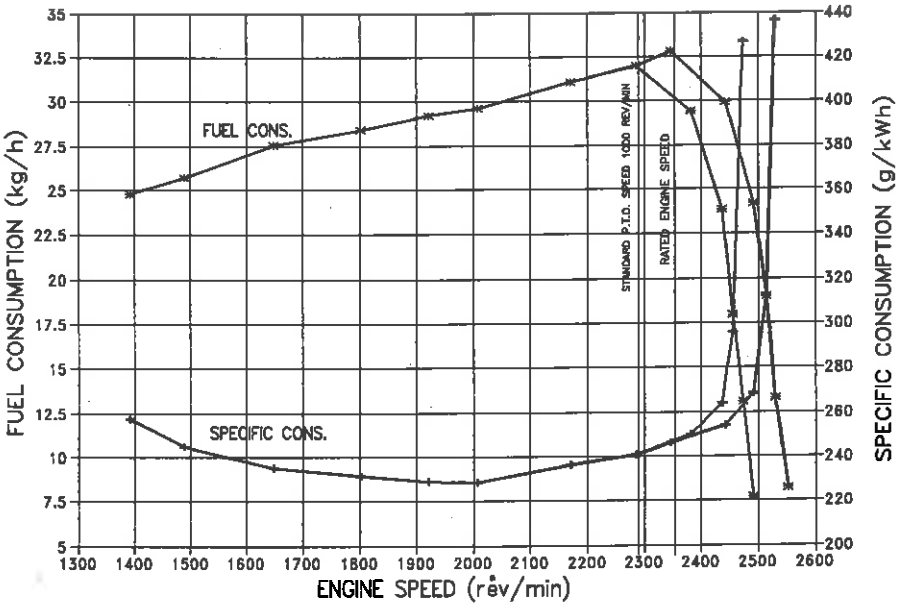
- Maximum temperatures

. coolant: 90 °C
. engine oil: 132 °C
. fuel: 36 °C
. engine air intake: 33 °C

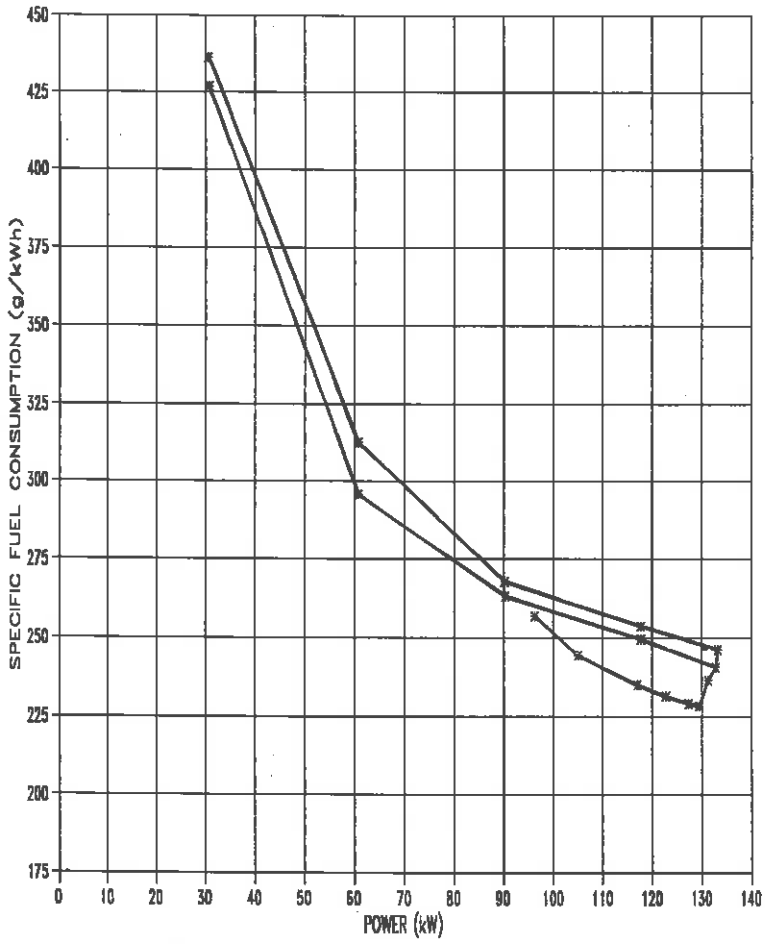
(1) *The torque is the equivalent crankshaft torque.*

PTO test


TORQUE
POWER
POWER (kW)
TORQUE (daNm)
ENGINE SPEED (rev/min)
STANDARD P.T.O. SPEED 1000 REV/MIN
RATED ENGINE SPEED


FUEL CONS.
SPECIFIC CONS.
FUEL CONSUMPTION (kg/h)
SPECIFIC CONSUMPTION (g/kWh)
ENGINE SPEED (rev/min)
STANDARD P.T.O. SPEED 1000 REV/MIN
RATED ENGINE SPEED

PTO test


SPECIFIC FUEL CONSUMPTION (g/kWh)
450
425
400
375
350
325
300
275
250
225
200
175
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
POWER (kW)

2. HYDRAULIC POWER AND LIFTING FORCE

- Date and location of tests: 26 January 1993, ISMA, Treviglio BG, Italy

2.1 HYDRAULIC POWER TEST

- Sustained pressure with relief valve open: 18.0 MPa;
- Pump delivery rate at minimum pressure: 60.8 l/min;

	Hydraulic power kW	Flow rate l/min	Pressure MPa	Oil temp. °C
At 90% of the actual relief valve setting	10.42	38.6	16.2	63
Maximum	13.36	55.3	14.5	62

- Tapping point used for test: at rear of tractor;
- Hydraulic fluid: see page 23.

2.2 REAR POWER LIFT

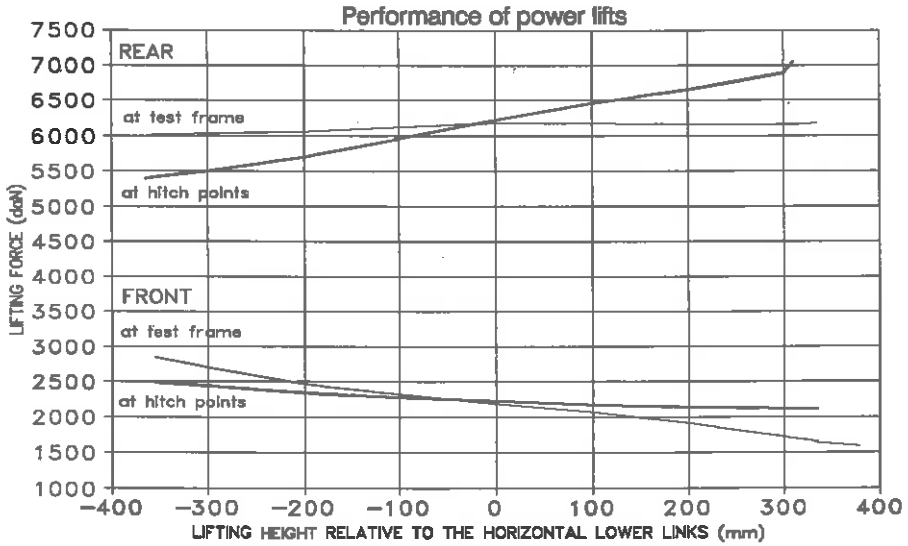
		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	250	250
vertical movement	mm	675	696
Maximum corrected force exerted through full range	daN	5396	6004
Corresponding pressure of hydraulic fluid	MPa	18.0	18.0
Moment about rear axle	daNm	5936	10267
Maximum tilt angle of mast over range of lift	degrees	-	2

Lifting heights relative to the horizontal lower links (mm)									
-365	-300	-200	-100	0	+100	+200	+300	+310	+331
Lifting forces at hitch points (daN)									
5396	5500	5712	5964	6220	6460	6651	6896	7044	-
Lifting forces at test frame (daN)									
6004	6031	6063	6131	6180	6175	6161	6156	-	6171

2.3 FRONT POWER LIFT

		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	310	310
vertical movement	mm	690	733
Maximum corrected force exerted through full range	daN	2098	1587
Corresponding pressure of hydraulic fluid	MPa	18.0	18.0
Moment about front axle	daNm	2532	2884
Maximum tilt angle of mast over range of lift	degrees		4

Lifting heights relative to the horizontal lower links (mm)									
-355	-300	-200	-100	0	+100	+200	+300	+335	+378
Lifting forces at hitch points (daN)									
2486	2438	2342	2276	2220	2173	2139	2109	2098	-
Lifting forces at test frame (daN)									
2845	2698	2467	2320	2183	2055	1906	1721	-	1587



3. DRAWBAR PERFORMANCE

- Date of test: 27 January to 2 February 1993
- Type of track: concrete

3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)

- Height of drawbar above ground: 660 mm;
- Tyre inflation pressure: 160 kPa front, 160 kPa rear.

Gear and range	Power kW	Draw. pull daN	Speed km/h	Eng. speed rev/min	Slip of wheels %	Specific ener. kWh/l	Specific cons. g/kWh	Temperatures Fuel °C	Cool. °C	Eng. °C	Atm. conditions Temp. °C	Hum. %	Press. kPa
1 s R	5.1	3962	0.46	2540	15	0.38	2194	32	85	104	11	65	100.1
2 s R	7.0	4501	0.56	2538	15	0.51	1643	32	88	106	11	66	100.1
3 s R	9.5	5089	0.67	2533	15	0.63	1331	32	88	105	10	65	100.0
4 s R	11.3	5273	0.77	2531	15	0.73	1152	31	88	106	10	65	100.1
5 s R	11.6	4480	0.93	2530	15	0.73	1150	31	87	106	11	65	100.2
6 s R	15.6	5007	1.12	2530	15	0.98	857	32	88	107	10	66	100.2
7 s R	18.2	5121	1.28	2528	15	1.08	775	31	88	108	10	64	100.2
8 s R	21.9	5127	1.54	2525	15	1.22	684	31	89	109	11	64	100.1
9 s R	26.1	5135	1.83	2521	15	1.33	629	31	88	109	11	64	100.3
1 S	32.2	5101	2.27	2519	15	1.53	547	30	89	111	11	65	100.2
2 S	39.8	5232	2.74	2511	15	1.69	495	30	90	111	12	65	100.2
3 S	46.5	5107	3.28	2505	15	1.86	450	31	90	112	11	65	100.1
4 S	53.8	5137	3.77	2498	15	1.98	422	30	90	112	11	65	100.2
5 S	62.2	4937	4.54	2492	15	2.18	384	29	90	113	12	66	100.3
6 S	72.6	4824	5.42	2474	15	2.32	361	29	89	112	12	66	100.1
7 S	81.8	4780	6.16	2451	15	2.38	352	30	90	113	12	65	100.3
8 S	91.9	4526	7.31	2432	15	2.54	330	30	91	113	12	65	100.2
1 F	106.6	4429	8.67	2350	8	2.72	307	31	89	112	12	64	100.3
9 S	99.8	3825	9.40	2350	6	2.55	328	30	90	113	13	64	100.0
2 F	100.5	3359	10.78	2350	5	2.56	326	30	90	112	13	64	100.0

s R = super-Reduction; S = Slow; F = Fast.

3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)

- Height of drawbar above ground: 650 mm;
- Tyre inflation pressure: 160 kPa front, 160 kPa rear.

Gear and range	Power kW	Draw. pull daN	Speed km/h	Eng. speed rev/min	Slip of wheels %	Specific ener. kWh/l	Specific cons. g/kWh	Temperatures Fuel °C	Cool. °C	Eng. °C	Atm. conditions Temp. °C	Hum. %	Press. kPa
1 s R	5.3	4153	0.46	2538	15	0.38	2185	32	90	102	9	67	100.0
2 s R	7.1	4564	0.56	2536	15	0.50	1690	32	90	102	9	67	100.2
3 s R	9.6	5133	0.67	2533	15	0.63	1335	33	89	102	10	67	100.2
4 s R	11.4	5351	0.77	2530	15	0.72	1171	32	90	103	10	66	100.1
5 s R	15.8	6135	0.93	2530	15	0.99	845	32	90	104	10	66	100.1
6 s R	19.0	6159	1.11	2528	15	1.12	748	31	91	104	10	66	100.1
7 s R	21.8	6217	1.26	2526	15	1.21	690	31	91	105	9	67	100.0
8 s R	25.6	6057	1.52	2523	15	1.38	606	31	90	107	10	66	100.1
9 s R	28.7	5707	1.81	2521	15	1.45	579	32	90	107	11	66	100.0
1 S	38.8	6217	2.25	2516	15	1.76	476	31	90	108	11	65	100.2
2 S	44.9	5962	2.71	2512	15	1.93	435	31	90	110	11	65	100.2
3 S	54.6	6051	3.25	2504	15	2.13	392	30	89	110	11	65	100.2
4 S	65.0	6276	3.73	2494	15	2.31	363	30	89	111	12	65	100.1
5 S	73.4	5884	4.49	2486	15	2.48	338	30	90	111	12	65	100.1
6 S	78.8	5315	5.34	2462	15	2.41	348	29	89	112	12	65	100.1
7 S	90.8	5394	6.06	2438	15	2.53	331	29	89	113	12	65	100.2
8 S	101.1	4860	7.49	2350	9	2.58	324	30	90	113	12	66	100.2
1 F	111.1	4609	8.68	2352	7	2.84	295	30	90	114	12	66	100.2
9 S	105.1	4070	9.30	2349	6	2.68	312	29	90	114	12	65	100.1
2 F	112.0	3766	10.71	2350	5	2.86	293	29	90	113	12	65	100.1
3 F	104.5	2893	13.01	2350	4	2.67	314	30	90	113	12	65	100.2

3.3 FIVE HOUR TESTS

Gear and range	Power kW	Draw. pull daN	Speed km/h	Eng. speed rev/min	Slip of wheels %	Specific ener. kWh/l	Specific cons. g/kWh	Temperatures Fuel °C	Cool. °C	Eng. °C	Atm. conditions Temp. °C	Hum. %	Press. kPa
3.3.1) FIVE HOUR TEST at 75% of pull at maximum power													
6 S	64.5	3972	5.85	2491	8	2.24	374	28	90	112	16	63	100.1
3.3.2) FIVE HOUR TEST at pull corresponding to 15% wheelslip with additional ballast: 300 kg													
7 S	96.0	5370	6.44	2423	(*)	(*)	(*)	29	90	113	15	63	99.9

s R = super-Reduction; S = Slow; F = Fast.
(*) Having the test been carried out with additional ballast, these figures are irrelevant.

Oil consumption during ten hours duration of tests 3.3.1 and 3.3.2: 54 g/h.

4. TURNING AREA AND TURNING CIRCLE

	With brakes on four wheels		Without brakes	
	Right hand	Left hand	Right hand	Left hand
	m	m	m	m
Radius of turning area	4.40	4.45	6.00	6.00
Radius of turning circle	4.20	4.25	5.80	5.82

5. LOCATION OF CENTRE OF GRAVITY

Height above ground	mm	1032
Distance forward fom rear axle centre	mm	1163
Distance from tractor's median plane	mm	0

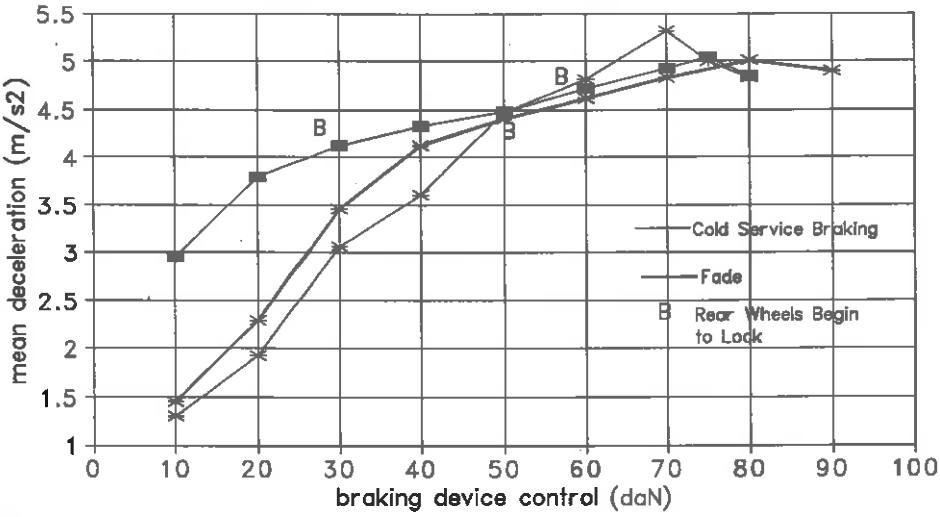
6. BRAKING PERFORMANCE

- Date of test: 5 February 1993
- Type of track: asphalt
- Type of decelerometer: PEISELER

Tractor mass (with driver)

	Front axle	Rear axle	Total
	kg	kg	kg
Unballasted	2625	3810	6435
Ballasted	3480	6520	10000

6.1 SERVICE BRAKES (all wheels braked)



- Speed before application of brakes (unballasted tractor): 40.5 km/h.
- Speed before application of brakes (ballasted tractor): 40.5 km/h.

The tractor brakes were heated by towing of the tractor for 1 km.
No significant deviation of tractor from original course and no abnormal vibrations were observed.

6.2) PARKING BRAKE

Ballasted tractor on 18% slope

		Up	Down
Braking device control force	daN	22.6	23.5

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

- Date of test: 8 February 1993
- Type of track: concrete
- Type of sound level meter: BRÜEL & KJÆR, model 2231

Gear and group		9 F
Travelling speed before acceleration	km/h	30.7
Sound level	dB(A)	86.5

8. REPAIRS AND REMARKS: none.

APPENDIX

MEASUREMENT OF NOISE IN THE PROTECTIVE STRUCTURE - OECD code V

- Test report of: SAME TITAN 190 VDT "4WD";
- Protective structure: S+L+H C 33;
- OECD test No.: CSD 1338/10/NM 1020;
- Date of test: 15 June 1992;
- Location: ISMA, Treviglio BG, Italy;
- Type of sound level meter: BRÜEL & KJÆR, model 2231;
- Type of track: concrete.

Gear	Brake-load kN	Trav.speed km/h	Sound level dB(A) a	b	Driving wheels no.
Unloaded test in the gear giving the speed nearest to 7.5 km/h					
7 N	0	7.5	73.2	85.7	4
Unloaded test in the gear giving the maximum speed					
9 F	0	42.6	73.8	87.3	4
Loaded test with nominal travelling speed nearest to 7.5 km/h					
7 N	44.8	6.9	75.0	86.5	4
Loaded test by which the tractor develops maximum sound in the gears in which the sound level is at least 1 dB(A) over the mentioned maximum					
-	-	-	-	-	-

a - *all openings closed;*
b - *doors and rear windows open.*

- Test report of: LAMBORGHINI 190 VDT "4WD";
- Protective structure: S + L + H C 33;
- OECD test No.: CSD 1338/6/NM 1004;
- Date of test: 19 May 1992;
- Location: ISMA, Treviglio BG, Italy;
- Type of sound level meter: BRÜEL & KJÆR, model 2231;
- Type of track: concrete.

Gear	Brake-load kN	Trav.speed km/h	Sound level dB(A) a	b	Driving wheels no.
Unloaded test in the gear giving the speed nearest to 7.5 km/h					
7 N	0	7.5	74.4	85.6	4
Unloaded test in the gear giving the maximum speed					
9 F	0	42.5	75.8	86.9	4
Loaded test with nominal travelling speed nearest to 7.5 km/h					
7 N	48.1	6.6	75.8	87.2	4
Loaded test by which the tractor develops maximum sound in the gears in which the sound level is at least 1 dB(A) over the mentioned maximum					
-	-	-	-	-	-

a - *all openings closed;*
b - *doors and rear windows open.*

TEST CARRIED OUT BY
(Per. agr. Giovanni LAMORATTA)

THE DIRECTOR OF TESTING STATION
(Prof. Giuseppe COLZANI)

HEAD OF ISMA - ROMA
(Ing. Giovanni SANTORO)

Text and graphics processed by: Per. agr. Gianluigi ROZZONI

