CONSIGLIO NAZIONALE DELLE RICERCHE
ISTITUTO PER LA MECCANIZZAZIONE AGRICOLA
Strada delle Cacce, 73 - 10135 TORINO (Italia)

Report No. 1716/T/1993

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

TRACTOR: Make: S+L+H
Model: SAME TITAN 160 VDT
Type: 4 WD



Manufactured by: S+L+H S.p.A. - TREVIGLIO (Italy)

Date and location of tests: FEBRUARY - APRIL 1993 - Torino (Italy)

This report has been approved by the O.E.C.D. Co-ordinating Center (CEMAGREF, France) as being in accordance with the O.E.C.D. Tractor Test Code.

Number and date of approval: 1471 FULL CODE - 3rd August 1993

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

The S+L+H SAME TITAN 160 VDT tractor is manufactured in following variants:

1. with ELECTRONIC POWER SHIFT, 27 forward and 27 reverse speeds;

2. with POWER SHIFT 27 forward and 27 reverse speeds

Tests have been carried out on tractor with the first variant.

In this report all performance characteristics are given corresponding to the International System of Units.

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Tractor manufacturer's name and address:	S+L+H S.p.A. Viale Cassani, 15 TREVIGLIO (BG) - Italy
Submitted for test by:	Manufacturer
Selected by:	Manufacturer with agreement by Istituto per la Meccanizzazione Agricola - TORINO (Italy)
Place of running-in:	TREVIGLIO - Italy
Duration of running-in:	Engine and tractor appr. 50 hours
Location of test:	Istituto per la Meccanizzazione Agricola - Torino (Italy)

SPECIFICATION OF TRACTOR

TRACTOR

Make:	S+L+H S.p.A.
Model:	SAME TITAN 160 VDT
Type:	Wheeled tractor unit construction, four wheel driven.
Serial No.:	TIT 16 VT *1120*
1st serial No.:	1001

ENGINE

Make:	S+L+H S.p.A.
Model:	1000.6 ATI
Type:	4-stroke Diesel engine, direct injection, air cooled, supercharged.
Serial No.:	1117
Cylinders:	6 cylinders, vertical, in-line, 105 mm bore x 115.5 mm stroke, capacity 6000 cm^3, compression ratio 16 : 1, overhead valves, cylinder without liners.
Supercharging:	Turbine SCHWITZER make, S2B model, driven by the exhausted gases coming from the engine; supercharghing pressure: 93 kPa.
Fuel system:	Forced feed; AC CORONA type fuel pump; 2 filters, FIAMM FNA255/00 make, with replaceable cartridge element and sediment bowls on pressure side of injection pump; changing interval: 300 working houres; capacity of fuel tanks:110 l for the one positioned on the left side of the gear box and 100 l for the one positioned on the right side of the gear box; one injection pump, BOSCH make, PFR 3K 90A 516 model, in line; serial number: none.

Manufacturer's production setting 32.46 l/h at rated engine speed and full load. Injection timing: 16.0° ± 0.5° before TDC.
BOSCH multihole injectors, DLLA 150 S 1158 model; serial number: none; injector pressure 18 ± 1 MPa.

Governor: S+L+H make, 492.16 model, centrifugal variable speed governor, electronic type, governed range engine speed: from 650 to 2550 rev/min; rated engine speed 2350 rev/min.

Air cleaner: DONALDSON main cleaner, FLG 12-0309 type, dry paper element filter with two replaceable cartridge elements; DONALDSON make, P77-2531 type for the external one and P77-0678 type for the inside one.
Air intake: left side above the main cleaner.
Maintenance indicator:with warning lamp on the dashboard.

Lubrication system: Forced feed by means of gear type pump; two filters with replaceable cartridge elements, FIAMM FT 4803 IN model, installed on the pressure line to the engine.

Cooling system: Air forced cooled, 320 mm dia, 13 blades, propeller far driven by engine shaft.
Type of temperature control: none.

Starting system: Electrical, BOSCH make, JF 12 V 3.5 kW; starting motor pinion coupling solenoid operated.
Cold starting aid: thermostarter.
Safety device: on-off electrical preventing engine start in gear.

ELECTRICAL SYSTEM

Voltage: 12 V, negative earth.

Generator: Alternator BOSCH make, K1 14V 65A 20 type, three phase, 14 V, 780 W power.

Battery: One, FIAMM make, 2.9559.037.0 type; capacity: 180 Ah at 20 hours rating.

EXHAUST SILENCER: S+L+H make, DGM-SA 1686 model, one reflection absorption chamber type.
Vertical position on engine left side under the bonnet cowling, maximum outlet height above ground: 2970 mm.

TRANSMISSION TO WHEELS

Clutch: S+L+H make, 492.23 model, independent multidisk in oil bath with axial piston; 8 plates, 168 mm dia each; hydraulic pedal system only for travelling.

Gearbox: S+L+H make, 492.22 model on the tractor model tested: ELECTRONIC POWER SHIFT type, syncronized gear with total 27 forward and 27 reverse speeds. The transmission consist of three hand levers, the first with 9 speeds gear and reverse, electronic system by push button. The second with two position to select gear ratios (slow-fast). The third for

the superreductor group The SAME TITAN 160 VDT is available in the following variant:

- with 27 forward and 27 reverse speeds. The transmission consists of three hand levers and one electrohydraulic device; the device has three positions to select the gear ratios (low, normal and high), the first lever has 3 speed gears and 2 gear ratios (low and high), the second one has the superreductor group and the third one has two positions to select the way of driving (forward or reverse).

Rear axle and final drive:

S+L+H make, 492.44 model with bevel gear differential and epicyclic final drive; electrohydraulic differential lock, S+L+H make, 492.35 model, engaged by push button; disengaged by push hutton or automatically when forward speed exceeds 15 km/h.

Front axle and final drive:

S+L+H make, 492.43 model, S+L+H original system with central shaft, bevel gear drive, differential and epicyclic final drive; electrohydraulic differential lock, S+L+H make, SBA model, engaged by push button and disengaged by push button or automatically when forward speed exceeds 15 km/h.

SAME TITAN 160 VDT (with ELECTRONIC POWER SHIFT)
Total ratios and travelling speeds (tyres 20.8 R 38 and pressure 160 KPa)

Gear	Group	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed (*) at rated engine speed (2350 rev/min) km/h
FORWARD			
1 low	Low	1499.3	0.51
1 mean		1242.3	0.61
1 high		1032.8	0.73
2 low		896.6	0.84
2 mean		742.9	1.02
2 high		617.6	1.23
3 low		542.4	1.40
3 mean		449.4	1.69
3 high		376.6	2.01
1 low	Normal	303.4	2.50
1 mean		251.4	3.01
1 high		209.0	3.62
2 low		181.4	4.18
2 mean		150.3	5.04
2 high		125.0	6.06
3 low		109.0	6.65
3 mean		91.0	8.32
3 high		75.6	10.02
1 low	High	80.3	9.43
1 mean		66.5	11.39
1 high		55.3	13.70
2 low		48.0	15.78
2 mean		39.8	19.03
2 high		33.1	22.88
3 low		29.0	26.12
3 mean		24.1	31.43
3 high		20.0	37.87

(*) 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

Total ratios and travelling speeds (tyres 20.8 R 38 and pressure 160 KPa)

Gear	Group	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed (*) at rated engine speed (2350 rev/min) km/h
REVERSE			
1 low	Low	1374.4	0.55
1 mean		1138.8	0.67
1 high		946.8	0.80
2 low		821.9	0.92
2 mean		681.0	1.11
2 high		566.2	1.34
3 low		497.2	1.52
3 mean		412.0	1.84
3 high		345.2	2.19
1 low	Normal	278.1	2.72
1 mean		230.5	3.29
1 high		191.6	3.95
2 low		166.3	4.56
2 mean		137.8	5.50
2 high		114.6	6.61
3 low		99.9	7.58
3 mean		83.4	9.08
3 high		69.3	10.93
1 low	High	73.6	10.29
1 mean		61.0	12.43
1 high		50.7	14.94
2 low		44.0	17.21
2 mean		36.5	20.76
2 high		30.3	24.96
3 low		26.6	28.49
3 mean		22.1	34.29
3 high		18.3	41.32

(*) Calculated with a tyre dynamic radius index of 855 mm (ISO 4251/1-1984)

Number of revolution of front wheels for one revolution of rear wheels: 1.2515

SAME TITAN 160 VDT (with POWER SHIFT)

Total ratios and travelling speeds (tyres 20.8 R 38 and pressure 160 KPa)

Gear	Group	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed (*) at rated engine speed (2350 rev/min) km/h
FORWARD			
1 low	Low	1499.3	0.51
1 mean		1242.3	0.61
1 high		1032.8	0.73
2 low		896.6	0.84
2 mean		742.9	1.02
2 high		617.6	1.23
3 low		542.4	1.40
3 mean		449.4	1.69
3 high		376.6	2.01
1 low	Normal	303.4	2.50
1 mean		251.4	3.01
1 high		209.0	3.62
2 low		181.4	4.18
2 mean		150.3	5.04
2 high		125.0	6.06
3 low		109.0	6.95
3 mean		91.0	8.32
3 high		75.6	10.02
1 low	High	80.3	9.43
1 mean		66.5	11.39
1 high		55.3	13.70
2 low		48.0	15.78
2 mean		39.8	19.03
2 high		33.1	22.88
3 low		29.0	26.12
3 mean		24.1	31.43
3 high		20.0	37.87

(*) Calculated with a tyre dynamic radius index of 855 mm (ISO 4251/1-1984)

Number of revolution of front wheels for one revolution of rear wheels: 1.2515

Total ratios and travelling speeds (tyres 20.8 R 38 and pressure 160 KPa)

Gear	Group	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed (*) at rated engine speed (2350 rev/min) km/h
REVERSE			
1 low	Low	1595.3	0.47
1 mean		1321.8	0.57
1 high		1098.9	0.69
2 low		954.0	0.79
2 mean		790.4	0.96
2 high		657.1	1.15
3 low		577.1	1.31
3 mean		478.2	1.58
3 high		400.7	1.89
1 low	Normal	322.8	2.35
1 mean		267.5	2.83
1 high		222.4	3.41
2 low		193.0	3.92
2 mean		159.9	4.74
2 high		133.0	5.70
3 low		116.0	6.53
3 mean		96.8	7.82
3 high		80.4	9.42
1 low	High	85.4	8.87
1 mean		70.8	10.71
1 high		58.8	12.87
2 low		51.1	14.83
2 mean		42.3	17.89
2 high		35.2	21.51
3 low		30.9	24.55
3 mean		25.6	29.54
3 high		21.3	35.60

(*) Calculated with a tyre dynamic radius index of 855 mm (ISO 4251/1-1984)

Number of revolution of front wheels for one revolution of rear wheels: 1.2515

POWER TAKE OFF

Main:

Type: independent, at rear of tractor, in tractor's median plane, engaged or disengaged by push button. Driven by multiplate wet clutch independent of travel clutch.
Number of shafts: 1;
Method of changing power take-off shaft ends and speeds: it is possible, through 6 screws, to mount one PTO shaft end at 6 or 21 splines. Speed selection by external hand lever.
Height above ground 835 mm (with tyre 20.8 R 38).

Power take off proportional to engine speed:

- *540 rev/min:* distance behind rear axle 485 mm; diameter of p.t.o. shaft end 35 mm; 6 splines, in conformity with ISO 500/1990; no power restriction; 609 rev/min at rated engine speed; standard p.t.o. speed 540 rev/min at engine speed 2083 rev/min; p.t.o. shaft rotates clockwisely, viewed from tractor rear.

Ratio of rotation speed:

Engine/p.t.o. ratio = $\frac{2350}{609}$ = 3.8571

- *1000 rev/min:* distance behind rear axle 485 mm; diameter of p.t.o. shaft end: 35 mm; 21 splines, in conformity with ISO 500/1990; no power restriction; 1028 rev/min at rated engine speed; standard p.t.o. speed 1000 rev/min at engine speed 2285 rev/min; p.t.o. shaft rotates clockwisely, viewed from tractor rear.
  Ratio of rotation speed:

  Engine/p.t.o. ratio = $\frac{2350}{1028}$ = 2.2857

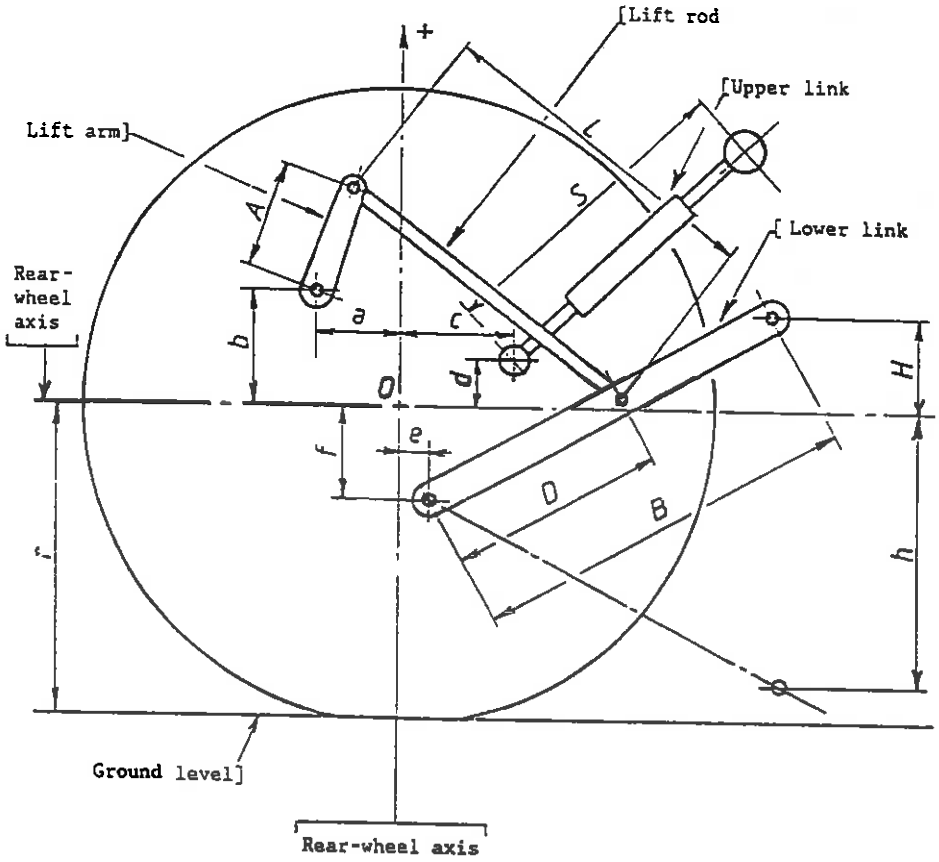
Power take off proportional to ground speed:
not available

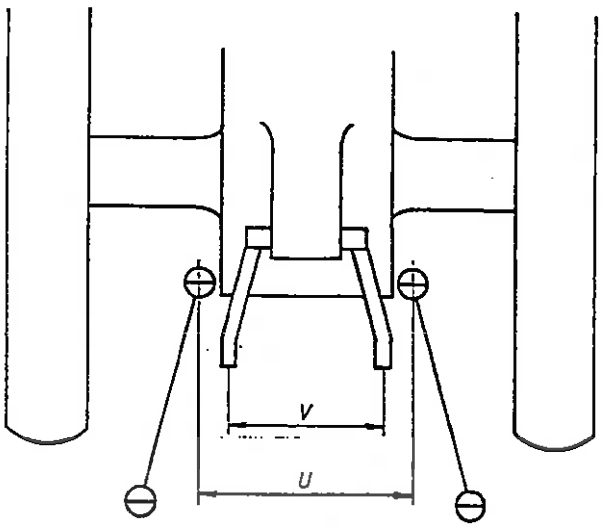
POWER LIFT:

Own make; hydraulic power lift in unit construction, 492.59 electronic control model, LOAD SENSING type.
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 ± 0.5 MPa;
opening pressure of anti-shock valve:	21.0 MPa;
lift pump type:	hydraulic rotary pump, driven by engine shaft, pump BOSCH make;
transmission between pump and engine:	mechanical;
type and number of filters:	1 with replaceable paper cartridge element;
site of oil reservoir:	gear-box;
position, type and n. of additional oil plugs:	8 ways distributor at rear of tractor;
maximum volume of oil available to external cylinders:	20 l

Three point linkage:
2nd category implement attachment with three point linkage and lower links with quick connection, in conformity with I.S.O. STANDARD 730/I-1990; category adapter: 3rd, dimensions see on pag.12





SAME TITAN 160 VDT

Dimension 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: - horizontally	(a)	140	140
- vertically	(b)	450	450
Horizontal distance between the 2 lower link points	(u)	540	540
Horizontal distance between the 2 lift arm end points	(v)	650	650
Length of upper link	(S)	from 615 to 785	710
Distance of upper link pivot point from rear wheel axis: - horizontally	(c)	420	420
- 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 points to lift rod pivot points on lower links	(D)	425-465-505	465
Length of lift rods	(L)	from 780 to 810	810
Heigth of lower hitch points relative to the rear wheel axis:			
- in low position	(h)	from 515 to 555	555
- in high position	(H)	from 185 to 225	185
Height above ground of lower hitch points when locked in transport position (*)		from 300 to 1040 above ground	-

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

SWINGING DRAWBAR: (optional not fitted on tested tractor)

HOLED DRAWBAR:

number of holes:		9	
distance between holes:		100	mm
hole diameter:		33	mm
thickness/width of the drawbar:		30/80	mm
height above ground with tyre 20.8 R 38:	min	300	mm
	max	1040	mm
horizontal distance behind power take-off shaft end:		285	mm
diameter of the pinhole:		36.6	mm

HITCH:

Own make; clevis type; 6 positions from an height above ground (with tyres 20.8 R 38) of 630 mm to 960 mm, changeable by sliding on drilled guides; hitch hole 30 mm dia; distance of hitch hole to rear axle horizontally 670 mm; position relative to p.t.o.: vertical from 205 mm below to 125 mm above; 185 mm horizontal behind.
Maximum vertical load 14.7 kN according to italian legislation (with tyres 20.8 R 38 153 A8)

STEERING:

DANFOSS make, ORBITROLL OSPC 220 OR model, hydrostatic control, with independent hydraulic circuit. BOSCH hydraulic gear pump, HY ZFS-11/19 L214 model driven from engine; two double acting cylinder directly acting on the front wheel, transversaly mounted, bore 48 mm, stroke 202 mm, piston rod 22 mm dia; working pressure 15.0 MPa.
One replaceable paper filter on pump suction line.

BRAKES:

Service brake:
Own make, 448.54 model, eight oil bath discs type, 4 at front (2 for wheel) and 4 at rear (2 for wheel), all mounted before the final drive, hydrostatically operated, on front and rear wheels, by separate pedals locked together for road drive. Front disc 224 mm dia, rear disc 302 mm dia, FRENDO HDT 303 lining material.
Trailer braking take-off: none
Parking brake:
Fully independent of service brake, 4 oil bath disc mounted on the pinion shaft in the gear box, SINTERIX 2 lining material; mechanically acting by means of hand lever.
Steering brake:
Divided pedal of service brake, for normal use locked together.

WHEELS:

Steering wheels:
at front, two tyres with steel plate discs and rims.

Driving wheels:
at front and at rear; rear wheels: two tyres with steel plate discs and rims

Tyre matching			
At front		At rear	
16.9 R 30	137 A8	20.8 R 38	153 A8
480/70 R 30	141 A8	580/70 R 38	155 A8
480/70 R 30	141 A8	650/75 R 34	157 A8

- Wheelbase: 2850 mm

- Track width adjustment

	Minimum mm	Maximum mm	Adjustement method
Front	1810	1940	Changing the position of the rims with respect to the disc
Rear	1635	1835	Changing the position of the rims with respect to the disc

PROTECTIVE STRUCTURE: S+L+H safety cab, C 33 type, not tiltable, OECD approval number CSD - 1338/12

SEAT:

Driver's seat:
GRAMMER make, LS 95 H1/90 AR model, upholstered seat with back rest, adjustable spring with shock absorber; height adjustment 60 mm in a continuos way, longitudinal adjustment 150 mm.

Passenger seat:
1 place seat at the left side of the driver seat.

LIGHTING:

	Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1415	165 x 105	240
Sidelights	1915	110 x 35	850
Rearlights	1835	115 x 70	860
Reflectors 1st pair	770	ø 80	580

TEST CONDITIONS

OVERALL DIMENSIONS

	Length	Width		Height to top of	
		mini	maxi	exhaust silencer	protective structure
	m	m	m	m	m
With ballast	5.06	2.24	2.37	2.97	2.88
Without ballast	4.74	2.24	2.37	2.97	2.88

Ground clearance: 550 mm below differential of the front axle.

Tractor mass
(with protective structure and full fuel tank):

	Without driver		With driver	
	Without ballasts kg	With ballasts kg	Without ballasts kg	With ballasts kg
Front	2480	2860	2500	2880
Rear	3675	3915	3730	3970
Total	6155	6775	6230	6850

Ballasts

	Weights		Water (kg)
	Number	Total mass (kg)	
Front wheels	-	-	-
Front weight	8	320	-
Rear wheels	6	300	-

Tyres and track width specifications

	Front	Rear
Tyres: dimensions ply rating type maximum load inflaction pressure (tyre manufacturer's) dynamic radius index	PIRELLI 16.9 R 30 137 A8 radial 2300 kg (40 km/h) 160 KPa 695 mm	PIRELLI 20.8 R 38 153 A8 radial 3650 kg (40 km/h) 160 KPa 855 mm
Chosen track width:	1940 mm	1835 mm

Oils and lubrication

- Capacity and change interval

	Capacity dm^3	Oil change hrs	Filter change hrs
Engine with filter	15.0	150	300
Gear box with power lift, rear axle differential and final drive	108.0	1200	2400 (*)
Front axle and final drive	18.0	1200	-
Steering	118.0	1200	2400 (*)

(*) or when the warning lamp is lighted.

- Specifications (SAE, API, MIL-L, ISO)

	Recommended	Used during test
Engine oil - Type: - Viscosity: - Classification:	AKROS TURBO 15 W40 12.50 cSt API CE MIL	As recommended
Hydraulic fluid - Type: - Viscosity: - Classification	AKROS MULTI 11.50 cSt API GL 4	As recommended
Front and rear axle differential and final drives - Type: - Viscosity: - Classification:	AKROS MULTI 11.50 cSt API GL 4	As recommended
Steering oil - Type: - Viscosity: - Classification:	AKROS MULTI 11.50 cSt API GL 4	As recommended

- Grease: GREASE 30
- Number of lubrication points: 10

Fuel:

- Type: Esso Diesel oil, in conformity with national standard.
- Density at 15° C: 0.835 g/cm^3

COMPULSORY TEST RESULTS

1. **MAIN POWER-TAKE-OFF PERFORMANCE**
   - Date and location of tests: 8th March 1993, I.M.A., TORINO, ITALY
   - Type of dynamometer: PARASITIC CURRENTS, BORGHI & SAVERI FA 300-30 SP

Power	Speed		Fuel consumption			Specific energy
	Engine	P.t.o.	Hourly		Specific	
kW	rev/min		kg/h	l/h	g/kWh	kWh/l
1.1 **MAXIMUM POWER - TWO HOUR TEST**						
111.59	2350	1028	27.10	32.46	243	3.44
1.2 POWER AT RATED ENGINE SPEED						
111.92	2350	1028	27.10	32.46	242	3.45
1.3 STANDARD POWER TAKE OFF SPEED (1000 ± 25 rev/min)						
110.88	2285	1000	26.53	31.77	239	3.49
1.4 **PART LOADS**						
1.4.1 the torque corresponding to maximum power at rated engine speed						
111.92	2350	1028	27.10	32.46	242	3.45
1.4.2 85% of torque obtained in 1.4.1						
98.17	2425	1061	24.75	29.64	252	3.31
1.4.3 75% of torque defined in 1.4.2						
74.66	2459	1076	20.15	24.13	270	3.09
1.4.4 50% of torque defined in 1.4.2						
50.24	2482	1086	15.65	18.74	312	2.68
1.4.5 25% of torque defined in 1.4.2						
25.23	2496	1092	11.15	13.35	442	1.89
1.4.6 unloaded						
----	2518	1102	7.33	8.78	----	----
1.5 **PART LOADS AT STANDARD POWER TAKE OFF SPEED (1000 ± 25 rev/min)**						
1.5.1 the torque corresponding to maximum power						
110.88	2285	1000	26.52	31.76	239	3.49
1.5.2 85% of torque obtained in 1.5.1						
98.70	2393	1047	24.45	29.28	248	3.37
1.5.3 75% of torque defined in 1.5.2						
75.01	2425	1061	19.60	23.47	261	3.20
1.5.4 50% of torque defined in 1.5.2						
50.46	2447	1071	15.15	18.14	300	2.78
1.5.5 25% of torque defined in 1.5.2						
25.40	2463	1078	10.75	12.87	423	1.97
1.5.6 unloaded						
----	2475	1083	6.95	8.32	----	----

No load maximum engine speed :2518 rev/min
Equivalent crankshaft torque at rated engine speed :454.8 Nm
Equivalent crankshaft torque at 2-hour test :453.5 Nm
Maximum torque :562.0 Nm at 1500 rev/min of the engine
Mean atmospheric conditions :Temperature 25.0 °C
Pressure 993.0 mbar
Relative Humidity 56%

Maximum Temperature :Coolant 46.0 °C
Engine oil 112.0 °C
Fuel 25.0 °C
Engine air intake 26.0 °C

2. HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 23th March 1993

2.1 HYDRAULIC POWER TEST

- Sustained pressure with relief valve open: 18.0 MPa
- Pump delivery rate at minimum pressure: 57.5 l/min

	Flow rate l/min	Pressure MPa	Power kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 per cent of the actual relief valve pressure setting and corresponding hydraulic power	56.0	16.2	15.12
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	56.0	18.0	16.80

- Tapping point used for test: at rear of tractor
- Temperature of hydraulic fluid: 65 °C
- Opening pressure of the relief valve: 12.0 MPa

2.2 POWER LIFT TEST

	at the hitch point		on the frame	
Height of lower hitch points above ground in down position	300	mm	300	mm
Vertical movement	740	mm	740	mm
Maximum corrected force exerted through full range	49.87	kN	55.96	kN
Corresponding pressure of hydraulic fluid	16.2	MPa	16.2	MPa
Moment about rear-wheel axis	-	kNm	96.81	kNm
Maximum tilt angle of mast from vertical	- degress		6.5 degress	

Lifting heights relative to the horizontal plane including the lower pivot points										
mm	- 315	- 250	- 150	- 50	0	+ 100	+ 200	+ 300	+ 400	+ 425
Lifting forces										
at the hitch points kN	49.87	54.54	60.37	64.87	66.19	68.67	70.96	73.52	70.17	50.31
Corresponding presure: 16.2 MPa										
at the frame kN	57.37	59.31	60.72	61.08	61.08	60.37	58.78	57.72	57.02	55.96
Corresponding pressure: 16.2 MPa										

3. DRAWBAR PERFORMANCE

Date of tests: 5th - 7th April 1993
Type of track: concrete
Tyre size - front: 16.9 R 30 137 A8
- rear: 20.8 R 38 153 A8

	Height of hitch above ground	Tyre inflaction pressure Front	Rear
Unballasted	635 mm	160 kPa	160 kPa
Ballasted	630 mm	160 kPa	160 kPa

Gear no. and group	Driving speed km/h	Power kW	Drawbar pull daN	Engine speed rev/min	Slip of wheels %	Specific fuel consumption g/kWh	Specific energy kWh/l	Temperature Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure mbar
3.1 - MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
2 low Normal	3.75	61.04	5864	2451	14.7	340	2.46	32.0	44.0	104.0	17.5	54.0	990.64
2 mean Normal	4.48	72.78	5855	2430	14.9	329	2.54	33.0	44.0	106.0	17.5	54.0	990.64
2 high Normal	5.34	86.18	5815	2372	13.5	316	2.65	32.0	44.0	113.0	17.5	54.0	990.64
3 low Normal	6.46	92.37	5148	2362	8.3	295	2.84	29.0	46.0	113.0	18.0	54.0	990.64
3 mean Normal	7.97	94.42	4266	2353	5.2	289	2.89	27.0	46.0	112.0	18.0	56.0	990.64
1 low High	9.11	97.97	3874	2356	4.6	280	2.99	29.0	46.0	109.0	18.0	56.0	990.64
3 high Normal	9.69	92.59	3442	2352	4.3	295	2.83	28.0	47.0	108.0	18.0	56.0	990.64
1 mean High	11.05	97.19	3168	2350	3.9	281	2.97	30.0	47.0	106.0	18.0	56.0	990.64
3.2 - MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
1 low Low	0.46	8.19	6374	2511	14.9	-	-	28.0	43.0	95.0	22.0	53.0	986.64
1 mean Low	0.56	9.89	6365	2509	14.6	-	-	28.0	43.0	97.0	22.0	53.0	986.64
1 high Low	0.67	11.88	6355	2507	14.6	-	-	29.0	43.0	97.0	22.0	53.0	986.64
2 low Low	0.77	13.67	6365	2504	14.7	-	-	27.0	44.0	99.0	22.5	53.0	986.64
2 mean Low	0.93	16.44	6374	2500	15.0	-	-	26.0	44.0	100.0	22.5	55.0	986.64
2 high Low	1.12	19.84	6374	2497	14.6	-	-	27.0	44.0	101.0	22.5	55.0	986.64
3 low Low	1.27	22.52	6365	2492	14.6	-	-	28.0	44.0	102.0	22.5	55.0	986.64
3 mean Low	1.53	27.06	6374	2488	14.9	-	-	30.0	45.0	103.0	22.5	55.0	986.64
3 high Low	1.83	32.44	6384	2483	14.5	-	-	30.0	45.0	103.0	23.0	56.0	986.64
1 low Normal	2.25	39.89	6384	2475	15.0	-	-	31.0	45.0	104.0	23.0	56.0	986.64
1 mean Normal	2.71	48.11	6394	2468	15.0	362	2.31	29.0	45.0	104.0	23.5	56.0	986.64
1 high Normal	3.25	57.87	6404	2464	15.0	351	2.38	30.0	46.0	106.0	23.5	56.0	986.64
2 low Normal	3.72	65.94	6384	2444	15.0	335	2.49	34.0	46.0	107.0	23.5	56.0	986.64
2 mean Normal	4.51	80.03	6394	2418	13.7	313	2.67	30.0	46.0	110.0	24.0	58.0	987.97
2 high Normal	5.57	92.48	5982	2359	9.1	293	2.85	27.0	46.0	108.0	24.0	58.0	987.97
3 low Normal	6.52	94.30	5207	2355	7.0	288	2.90	28.0	47.0	113.0	24.0	58.0	989.30
3 mean Normal	8.00	94.34	4246	2356	4.8	289	2.89	30.0	47.0	114.0	24.5	58.0	989.30
1 low High	9.14	97.85	3854	2351	3.8	278	3.00	24.0	47.0	113.0	24.5	58.0	990.64
3 high Normal	9.73	92.44	3423	2352	3.7	297	2.81	25.0	47.0	112.0	24.5	58.0	990.64
1 mean High	11.15	96.85	3128	2354	3.0	282	2.96	21.0	47.0	111.0	24.5	58.0	990.64
3.3.1 - FIVE HOUR TEST at 75% of pull at maximum power													
3 mean Normal	8.51	75.27	3185	2425	2.96	327	2.55	25.0	47.0	109.0	24.5	64.0	987.97
3.3.2 - FIVE HOUR TEST at pull corresponding to 15% wheelslip - with 380 kg as additional ballast													
2 low Normal	3.85	68.15	6374	2440	-	-	-	26.0	47.0	111.0	25.0	59.0	986.64

Oil consumption during ten hours tests 3.3.1 and 3.3.2: 65 g/h

Tests 3.3.2 was carried out with additional ballast; , the not quoted figures are irrelevant

4. **TURNING AREA AND TURNIG CIRCLE** (front wheel disengaged)

Wheel equipment front: 16.9 R 30 137 A8
rear: 20.8 R 38 153 A8
Track width front: 1940
rear: 1835

	With brakes		Without brakes	
	Right-hand m	Left-hand m	Right-hand m	Left-hand m
Radius of turning area	5.25	5.17	6.32	6.27
Radius of turning circle	5.03	4.95	6.10	6.05

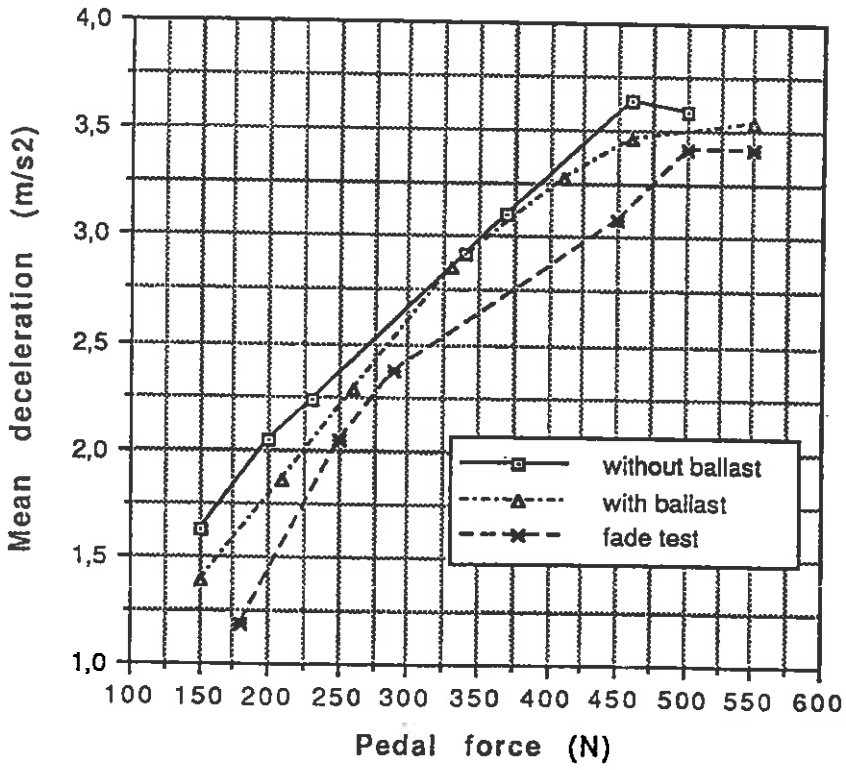
5. **LOCATION OF CENTRE OF GRAVITY**

Height above ground	890 mm
Distance forward from the vertical plane containing the axis of the rear wheels	1144 mm
Distance from the median plane of the tractor	0 mm

6. **BRAKING**

- Date of tests: 25th March 1993

6.1 *COLD SERVICE BRAKING DEVICE TEST* - 6.2 *FADE TEST*



Cold service braking device test

	Ballasted tractor	Unballasted tractor
Speed before application of brakes (km/h)	41.25	41.20

Fade test

- Maximum deviation of the tractor from its original course: none
- Abnormal vibration: none
- Brake heating method: by means of towing the tractor for 1 km at 33.05 km/h with a towing force of 6.72 kN

6.3 *PARKING BRAKING DEVICE TEST*

	Uphill	Downhill
Braking device control force	24.5 daN	25.3 daN

7. **MEASUREMENT OF EXTERNAL NOISE LEVEL**

- Date of tests: 26th March 1993
- Type of sound level meter: impulse precision BRUEL & KJAER **2209** model
- Type of track: concrete

7.1 *Results of test with DGM-SA 1686 model*
- Gear number: 4 H High
- Travelling speed before acceleration: 30.93 km/h
- Sound level: 84.5 dB(A)

8. **REPAIRS AND ADJUSTEMENT DURING TEST** = none

9. **REMARKS** = none

ADDITIONAL TEST

10. **MEASUREMENTS OF NOISE IN PROTECTIVE STRUCTURE**

Reference text: O.E.C.D. CODE V
European Directives 77/311/EEC and 82/890/EEC

- date of tests: 30.09.1992
- location: ISMA - Via Milano, 43 -
- 24047 Treviglio - (BG) Italy
- type of track: concrete
- sound level meter: BRÜEL & KJAER 2231 impulse precision sound level meter

10.1 *TABLE OF NOISE LEVELS AT DRIVER'S EAR AT DIFFERENT GEAR*

a: All openings closed
b: Doors, lateral and rear windows open

Gear ratio	Driving axle	Sound level dB(A)		Drawbar pull	Forward speed
		a	b	kN	km/h
1 low Low	1	74.3	85.7	14.7	0.5
1 low Low	2	73.4	85.3	37.3	0.5
1 mean Low	1	74.6	85.7	22.6	0.6
1 mean Low	2	73.7	85.8	38.3	0.6
1 high Low	1	74.8	86.0	32.4	0.7
1 high Low	2	73.6	86.0	41.2	0.7
2 low Low	1	75.2	86.1	28.5	0.8
2 low Low	2	73.8	86.2	44.1	0.8
2 mean Low	1	75.2	86.3	35.3	0.9
2 mean Low	2	73.8	86.2	48.8	1.0
2 high Low	1	74.6	86.3	35.4	1.2
2 high Low	2	74.2	86.0	42.2	1.2
3 low Low	1	74.9	86.6	38.3	1.3
3 low Low	2	74.4	86.2	42.2	1.4
3 mean Low	1	75.0	86.8	34.3	1.7
3 mean Low	2	74.7	86.8	43.1	1.7
3 high Low	1	75.2	87.6	41.7	2.0
3 high Low	2	76.3	87.0	48.0	2.0
1 low Normal	1	74.8	86.4	41.0	2.3
1 low Normal	2	74.8	86.6	49.5	2.5
1 mean Normal	1	74.3	86.5	39.2	3.0
1 mean Normal	2	74.4	86.3	44.1	3.0
1 high Normal	1	74.4	86.6	38.3	3.4
1 high Normal	2	74.8	86.6	41.2	3.6
2 low Normal	1	74.4	87.0	40.2	4.0
2 low Normal	2	74.5	86.5	45.1	4.2
2 mean Normal	1	74.3	87.2	34.3	5.2
2 mean Normal	2	75.0	86.5	49.8	5.1
2 high Normal	1	75.0	86.6	34.2	6.2
2 high Normal	2	75.2	86.3	45.3	5.8
3 low Normal	1	74.2	86.6	0	7.3
3 low Normal	1	74.8	86.8	39.0	6.2
3 low Normal	2	74.2	86.4	0	7.4
3 low Normal	2	75.6	86.5	46.0	6.8
3 mean Normal	1	74.2	87.2	0	9.0
3 mean Normal	1	75.1	86.7	38.2	7.6
3 mean Normal	2	75.8	86.3	31.4	8.3
3 high Normal	1	74.5	87.2	0	10.8
3 high Normal	1	75.4	86.4	31.3	9.5
3 high Normal	2	74.6	87.2	0	10.8
3 high Normal	2	76.0	86.2	26.5	10.1
1 low High	1	73.4	86.7	0	10.3
1 low High	1	74.3	86.2	31.2	9.3
1 low High	2	73.2	86.6	0	10.3
1 low High	2	74.5	86.0	31.3	9.6

10.1 *TABLE OF NOISE LEVELS AT DRIVER'S EAR AT DIFFERENT GEAR (continued)*

Gear ratio	Driving axle	Sound level dB(A)		Drawbar pull kN	Forward speed km/h
		a	b		
1 mean High	1	73.9	86.8	0	12.3
1 mean High	1	74.5	86.3	27.5	11.2
1 mean High	2	73.8	87.0	0	12.3
1 mean High	2	75.0	86.6	31.4	10.8
1 high High	1	73.9	87.0	0	14.7
1 high High	1	74.8	86.0	23.5	13.2
1 high High	2	74.2	86.6	0	14.7
1 high High	2	74.8	86.4	19.6	14.0
2 low High	1	74.0	86.4	0	17.0
2 low High	1	74.8	86.2	16.7	16.0
2 low High	2	74.1	86.9	0	17.0
2 low High	2	74.8	86.4	15.7	16.1
2 mean High	1	74.4	87.0	0	20.3
2 mean High	1	75.2	86.5	16.3	17.8
2 mean High	2	74.8	87.2	0	20.3
2 mean High	2	75.6	86.8	15.7	19.4
2 high High	1	74.2	86.8	3.6	24.2
2 high High	2	75.0	87.0	3.7	24.2
3 low High	1	74.2	86.7	0	28.1
3 low High	2	74.4	86.6	0	28.1
3 mean High	1	74.3	87.3	0	33.3
3 mean High	2	74.4	87.0	0	33.3
3 high High	1	75.4	87.4	0	40.1
3 high High	2	75.2	87.5	0	40.1

10.2 *TABLE OF NOISE LEVELS AT DRIVER'S EAR*

10.2.1 <u>According to O.E.C.D. code V</u>

a: All opening closed
b: Doors lateral and rear windows open

Gear ratio	Measured forward speed km/h	Pull kN	Sound level dB(A)		Driving axles
			a	b	
Unloaded test with the gear ratio giving the nominal forward speed nearest to 7.50 km/h					
3 low Normal	7.3	0	74.2	86.6	1
3 low Normal	7.4	0	74.2	86.4	2
Unloaded test in the gear giving the maximum speed					
3 high High	40.1	0	75.4	87.4	1
3 high High	40.1	0	75.2	87.5	2
Test with the drawbar pull for which the tractor gives the maximum sound level for the gear giving the nearest nominal speed to 7.50 km/h					
3 low Normal	6.2	39.0	74.8	86.8	1
3 low Normal	6.8	46.0	75.6	86.5	2
Test with the drawbar pull for which the tractor gives the maximum sound level for the gears giving a sound level at least 1dB(A) above the one before					
none	-	-	-	-	-

10.2.2 According to European Directive 77/311/EEC and 82/890/EEC

a: All opening closed
b: Doors lateral and rear windows open

Gear ratio	Measured forward speed km/h	Pull kN	Sound level dB(A)		Driving axles
			a	b	
Test with the drawbar pull for which the tractor gives the maximum sound level for the gear giving the nearest nominal speed to 7.25 km/h (Annex I)					
3 low Normal	6.2	39.0	74.8	86.8	1
3 low Normal	6.8	46.0	75.6	86.5	2
Test with the drawbar pull for which the tractor gives the maximum sound level for the gears giving a sound level at least 1dB(A) above the one before (Annex I)					
3 high High	40.1	0	75.4	87.4	1
3 high High	40.1	0	75.2	87.5	2
Unloaded test in the gear giving the maximum speed (Annex I)					
-	-	-	-	-	-
Unloaded test in the gear giving the nominal speed nearest to 7.25 km/h (Annex II)					
3 low Normal	7.3	0	74.2	86.6	1
3 low Normal	7.4	0	74.2	86.4	2

TEST CARRIED OUT BY:
R. MARENGO

DIRECTOR OF I.M.A.
S. POTECCHI

Turin, 4th May 1993

SAME TITAN 160 VDT (4 WD)

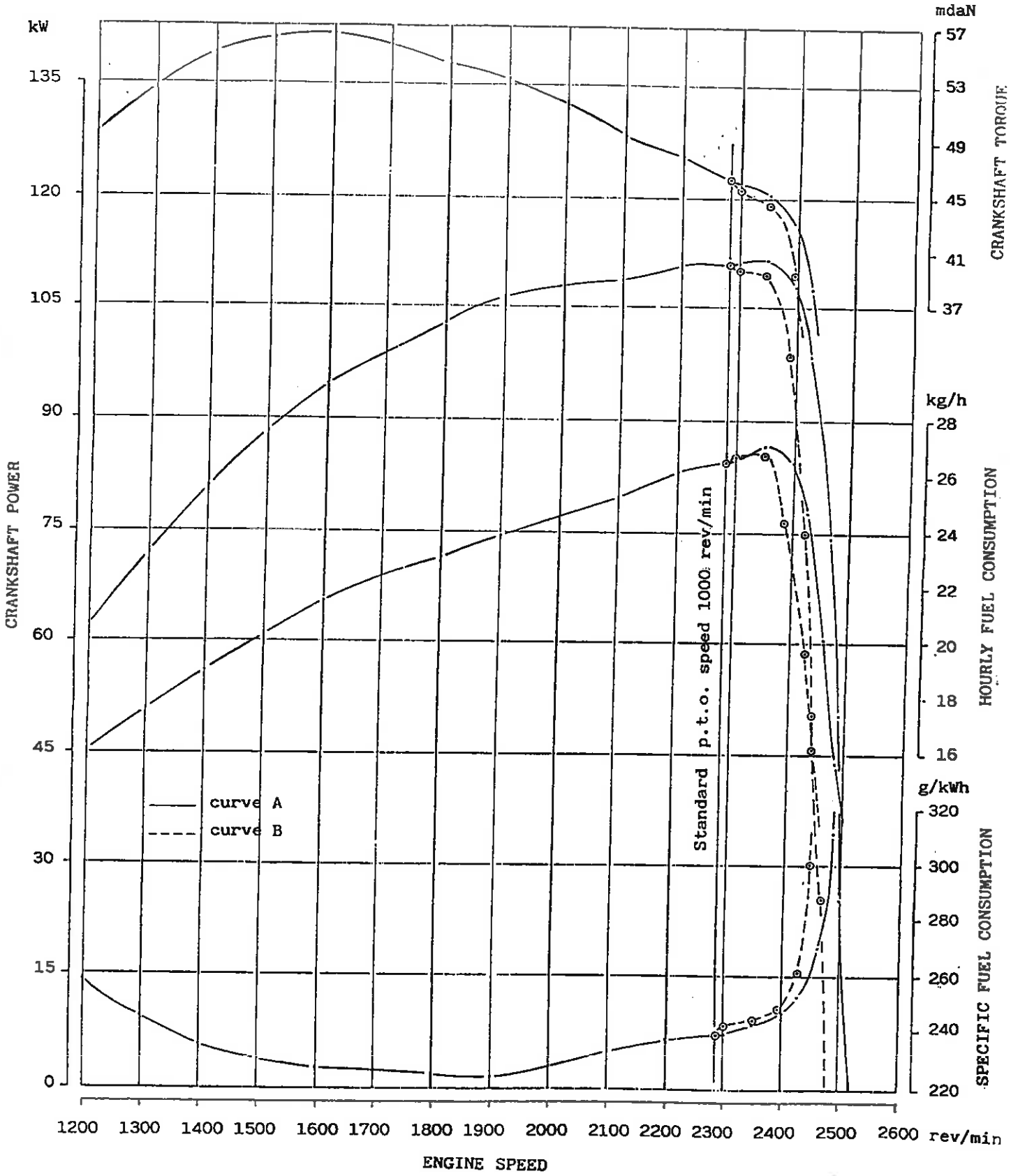


Fig. 1 – POWER TAKE-OFF TEST

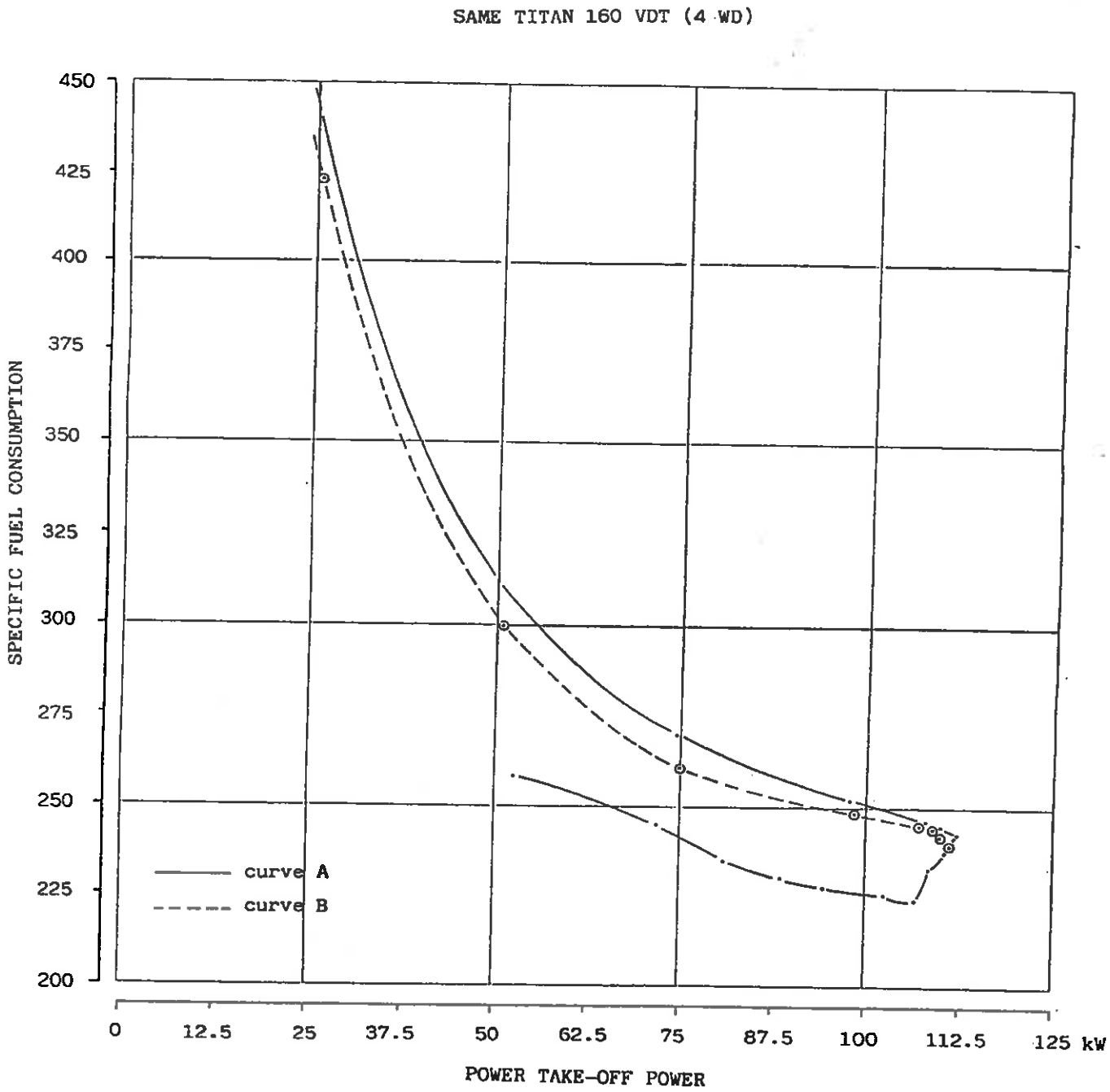


Fig. 2 - POWER TAKE-OFF TEST

DATA ACQUISITION of power take-off curves	O.E.C.D. CO-ORDINATING CENTRE

Test number:	1716/T/1993
O.E.C.D. approval number:	1471 FULL CODE
Date of approval:	3rd August 1993
Testing station:	Istituto per la Meccanizzazione Agricola - Torino - ITALY
MAKE:	S+L+H
TRADE NAME:	SAME TITAN 160 V/DT (4 WD)

Index	Power	Speed		Engine torque	Fuel consumption	
	kW	engine rev/min	p.t.o. rev/min	Nm	Hourly l/h	Specific g/kWh
Full load and varying speed: Maximum power, power at rated engine speed, power at standard power take-off speed and to the torque corresponding to an engine speed from high idle down to 50% of rated engine speed or at least 15% below the point at which maximum torque occurs, whichever is lower						
1.1	111.59	2350	1028	453.5	32.46	243
1.2	111.92	2350	1028	454.8	32.46	242
1.3	110.88	2285	1000	463.4	31.77	239
1.4	111.92	2350	1028	454.8	32.46	242
1.4.1	111.09	2300	1006	461.2	31.82	239
1.4.2	110.88	2285	1000	463.4	31.77	239
1.4.3	110.71	2200	963	480.5	31.40	237
1.4.4	108.69	2100	919	494.3	30.35	233
1.4.5	106.49	1900	831	535.2	28.60	224
1.4.6	102.71	1800	788	544.9	27.70	225
1.4.7	94.68	1600	700	565.1	25.71	227
1.4.8	88.29	1500	656	562.0	24.30	230
1.4.9	80.83	1400	613	551.3	22.72	235
1.4.10	71.84	1300	569	527.7	21.05	245
1.4.11	62.27	1200	525	495.5	19.27	258
Part loads: the governor control set for maximum power, at rated engine speed						
1.5	111.92	2350	1028	454.8	32.50	242
1.5.1	98.17	2425	1061	386.6	29.64	252
1.5.2	74.66	2459	1076	289.9	24.13	270
1.5.3	50.24	2482	1086	193.3	18.74	312
1.5.4	25.23	2496	1092	96.5	13.35	442
1.5.5	0.00	2518	1102	0.0	8.78	- -
Part loads: the governor control set for maximum power, at standard power take-off speed						
1.6	110.88	2285	1000	463.4	31.76	239
1.6.1	98.70	2393	1047	393.9	29.28	248
1.6.2	75.01	2425	1061	295.4	23.47	261
1.6.3	50.46	2447	1071	196.9	18.14	300
1.6.4	25.40	2463	1078	98.5	12.87	423
1.6.5	0.00	2475	1083	0.0	8.32	- -