COMITATO DI COORDINAMENTO PER L'OMOLOGAZIONE
DELLE MACCHINE AGRICOLE IN ITALIA

REPORT No. 367/O.E.C.D.
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REPORT ON TEST IN ACCORDANCE WITH O.E.C.D. TEST CODE
FOR AGRICULTURAL TRACTORS

FIAT MODEL 350 S DIESEL TRACTOR

Manufactured by: FIAT S. p. A.
Torino, Italy



Date of Tests: March - May 1971

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

CONSIGLIO NAZIONALE DELLE RICERCHE
LABORATORIO PER LA MECCANIZZAZIONE AGRICOLA
TORINO - ITALY

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

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None	

PERFORMANCE CURVES

	FIG. NO.
Power take-off test	
Curves of power take-off horsepower, equivalent crankshaft torque and specific fuel consumption/engine speed	1
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Manufacturer:	FIAT S.p.A. - TORINO (Italy).
Submitted for test by:	the Manufacturer
Selected by:	the Manufacturer with the agreement of the Testing Station
Place of running-in:	FIAT - Servizio Prove Trattori - TORINO (Italy)
Duration of running-in:	engine 50 hours; p.t.o. 20 hours; transmission 30 hours.

SPECIFICATION OF TRACTOR

Make:	FIAT
Model:	350 S
Type:	Four wheel, rear wheel driven, unit construction
Serial No.:	100001

Engine:

Make:	FIAT
Model:	8025
Type:	4 - stroke, direct injection diesel
Serial No.:	166114
Cylinders:	2 cylinders, vertical, in-line, 100 mm bore x 110 mm stroke, capacity 1727 cm^3, compression ratio 17 : 1, overhead valves, replaceable dry cylinder liners.
Fuel system:	Forced feed; own make model EP/KS 22 A: LA/10 plunger type fuel pump; replaceable cartridge model CAV paper filter with water separator; capacity of fuel tank 36 litres. BOSCH injection pump model PES 2 A 80 B 410/L 4/105, serial No. 02046; manufacturer's production setting: $\leqslant$ 58.7 mm^3 stroke at 1250 rev/min pump speed and 15° C fuel temperature. Own make injector, model KB 70 S 1 F 10, serial No. 767103; injector setting 230 ± 5 kg/cm^2.
Governor:	BOSCH mechanical, incorporated in fuel injection pump. Governed range of engine speed: 600 to 2715 rev/min; rated engine speed 2500 rev/min.
Air cleaner:	Own make, oil bath air cleaner; oil capacity: 0.5 litres.
Lubrication system:	Forced feed from gear-type pump. One screen type filter installed on pump suction and one replaceable cartridge type filter installed on the pressure line to the engine. Engine sump oil capacity: 4.2 litres. Recommended oil change period: 200 hours; cartridge change period: 400 hours.
Cooling system:	Water cooled from centrifugal pump (0.5 kg/cm^2); thermostatic for temperature control; 4-blade belt-driven fan with a diameter of 320 mm. Cooling water capacity: 7 litres. Visual temperature control with thermometer.
Starting system:	Electrical, own make starter motor type M 125 - 3/12 S Var. 1; 4.5 HP.

Electrical system:

Voltage: 12 V negative earth.

Alternator: FIAT A 12 M - 124/12/42 X.

Battery: TITANO 6 AT M 15, lead acid, capacity 77 Ah.

Transmission:

Clutch: Own make, dual dry clutch with two plates 10" dia. for gearbox and p.t.o. drive operated by a single foot pedal with progressive action.

Gearbox: Own make, mechanical sliding gear type, 6 forward and 2 reverse speeds obtained with two series-connected gearboxes.

Rear axle and final drive: Own make, crown wheel and pinion with bevel gear type differential; pedal operated differential lock; bull gear final drives.

Oil capacity: Gearbox, differential and hydraulic lift: 15.5 litres; final drives: 1.9 litres each. Recommended oil change period: 1600 hours.

Gear	*Number of engine revolutions for one revolution of driving wheel*	*Travelling speed for 2500 rev/min rated engine speed km/h*
Forward		
1	229.501	2.32
2	134.809	3.95
3	82.880	6.42
4	60.107	8.86
5	35.307	15.08
6	21.707	24.53
Reverse		
1	151.135	3.52
2	39.583	13.45

Power take-off:

Main: At rear of tractor in vertical centre plane, independent of gearbox, manually engaged and clutch driven; 34.9 mm (1 3/8 in) dia, according to ISO standard; 6 splines; height above ground 535 mm.
Proportional engine speeds: 637 rev/min at 2500 rev/min engine speed; 540 rev/min at 2118 rev/min engine speed.
Direction of rotation: clockwise viewed from tractor rear in forward gear.
Optional: power take-off synchronised with gearbox.
Proportional ground speed: 1 revolution of p.t.o. for approximately 240 mm of travel.
Number of p.t.o. revolutions for one revolution of driving wheels: 14.79.
Direction of rotation: Clockwise viewed from tractor rear in forwardg ear.

Secondary: Placed under tractor transmission housing, independent of gearbox, manually engaged.
Diameter: 29.5 mm (1 1/8 in); 10 splines. Height above ground: 435 mm.
Proportional engine speed: 1105 rev/min at 2500 rev/min engine speed.
Direction of rotation: anticlockwise viewed from tractor rear.

Belt pulley:

Location: Attachable to rear of tractor in two alternative positions: on right or on left side of p.t.o.
Driven from p.t.o. clutch and bevel gears.

Diameter/width of face: 250 mm/150 mm.

Speed: 1300 rev/min giving 1021 m/min linear speed at 2500 rev/min rated engine speed. Engine speed at 945 m/min standard belt speed: 2314 rev/min.

Direction of rotation: Clockwise with pulley on right side of p.t.o., anticlockwise with pulley on p.t.o. left side, viewed from tractor right side.

Power lift: Own make, gear-type oil pump operated.
Category 1 implement linkage, draught and position controls. Oil capacity (uses transmission oil) 15.5 litres. Oil change every 1600 working hours.

Drawbar: Swinging drawbar, with clevis end sliding on drilled guide.
Vertical height to centre of clevis 380 mm. Drawbar hole 29 mm dia.; distance behind rear axle 620 to 700 mm; position relative to p.t.o.: 95 mm below, 365 mm to 445 mm to rear (horizontal line).
Lateral adjustment: 4 positions from 0 mm to 200 mm each side.

Steering: Own make, worm gear mechanical type, steering wheel control.

Brakes: Own make, band type with drums fixed to differential half-shafts; independent or combined pedal operated. Parking brake hand-lever operated with ratchet and pawl.

Wheels:

Steering wheels: Two at front, PIRELLI « Tractor » 5.50-16 tyres, 4 ply rating. Maximum permissible weight on each tyre 475 kg at 2.50 kg/cm² pressure. Track width 1190 mm by 6 steps to 1690 mm obtained by extending front axle.

Driving wheels: Two at rear, PIRELLI « Tractor cinturato » 11.2/10-28 tyres, 4 ply rating, mounted on W 10-28 rims. Maximum permissible weight on each tyre 915 kg at 1.10 kg/cm² pressure. Track width 1200 mm by 6 steps to 1700 mm changed by reversing wheel centres and offset lugs on rims.

Wheel base: 1780 mm.

Tractor weights (without driver but with tank full).

	Front kg	*Rear* kg	*Total* kg
Without ballast	520	880	1400
With ballast	670	1630	2300

Ballast

	Number of weights	*Total weight* kg	*Water* kg
Front	5 (*)	150	—
Rear	10	550	200
Additional	—	—	—

(*) One per wheel and 3 placed on a suitable support ahead of front axle.

Seat: Own make, parallelogram suspension with rubber lined coil spring; range of adjustment 25 mm fore and aft median plane of tractor.

Number of grease points

Whole tractor: 16.

Overall Dimensions:

	Length *m*	*Width* *m*	*Height* *m*
With ballast:			
— with power lift linkage	3.00	1.83 to 1.98	1.40
— without power lift linkage	2.79		
Without ballast:			
— with power lift linkage	2.96	1.48 to 1.98	1.40
— without power lift linkage	2.75		

Lighting (Tractor without ballast, rear track 1.20 m).

	Height above ground of centre *cm*	*Size* *cm*	*Distance from outside edge of tractor to centre* *cm*
Head lights	89	13 dia	31
Side lights	89	13 dia	31
Rear lights	113	7 × 5	28
Reflectors	101	5.5 dia	27

FUEL AND LUBRICANTS USED IN TESTS

Laboratory and track tests:

Fuel: Diesel oil, density 0.831 kg/l at 15° C, cetane number not recorded.

Engine oil: FIAT AMBRA, viscosity SAE 20 W-40

Transmission oil: FIAT AMBRA, viscosity SAE 20 W-40

COMPULSORY TESTS

1. Main power take-off performance:

Date and location of tests: 5th March 1971 - L.M.A. - TORINO (Italy)

Type of dynamometer: electrical, swinging frame

Horsepower	*Speeds*		*Fuel consumption*		
	Engine	*P.t.o.*	*Per hour*	*Specific*	*HP hour/unit of volume*
metric/hp	*rev/min*	*rev/min*	*l/h*	*g/metric hph*	*metric hp h/l*
A. Maximum power: 2 hour test					
33.22	2550	650	8.53	213	3.89
B. Standard p.t.o. speed (540 rev/min)					
30.08	2118	540	7.15	197	4.21
C. Speed recommended by manufacturer for drawbar work					
33.00	2500	637	8.41	212	3.92
D. Part loads					
29.02	2622	668	6.93	199	4.19
—	2715	—	2.02	—	—
14.75	2665	679	4.19	236	3.52
33.22	2550	650	8.53	213	3.89
7.43	2682	684	3.18	355	2.34
21.96	2645	674	5.49	208	4 00

No load, maximum engine speed: 2715 rev/min

Equivalent crankshaft torque at max. power: 9.33 mkg

Maximum equivalent crankshaft torque: 11.37 mkg at 1400 rev/min engine speed

Mean atmospheric conditions:
- temperature 16.0° C
- pressure 747.0 mm/Hg
- relative humidity 46%

Maximum temperature:
- coolant 80.0° C
- engine oil 105.0° C
- fuel 25.0° C

2. Drawbar performance:

Date of tests: 19th and 20th April 1971
Type of track: concrete
Height of drawbar above ground: 380 mm

Gear No.	Horse-power, metric hp	Drawbar pull, kg	Travelling speed, km/h	Engine speed, rev/min	Wheelslip, %	Fuel consumption		Temperature			Atmospheric conditions		
						Drawbar hph/l metric hph/l	Specific g/hph	Coolant °C	Fuel °C	Engine oil °C	Temperature, °C	Relative humidity, %	Pressure, mmHg
1 - Maximum power (ballasted)													
(*) 1	13.93	1718	2.19	2651	11.1	3.07	271	82	32	106	15.0	85	747.4
(*) 2	23.32	1730	3.64	2613	12.1	3.38	246	84	35	107	17.5	65	747.4
3	28.71	1279	6.06	2515	6.5	3.37	246	84	35	110	18.0	65	748.0
4	30.57	961	8.59	2531	4.5	3.64	228	85	35	113	17.5	65	748.0
5	29.73	542	14.81	2514	2.6	3.44	242	85	35	113	17.5	70	748.0
2 - Five - hour test at 75% of pull at maximum power													
3	23.22	975	6.43	2613	4.1	3.51	237	82	35	110	21.0	52	746.0
(°) 3 - Five - hour test at pull corresponding to 15% wheelslip in test (1)													
2	25.11	1780	3.81	2608	6.7	3.46	249	84	35	112	19.5	57	747.0
4 - Maximum power (unballasted)													
(●) 2	16.18	1200	3.64	2635	11.8	3.25	256	82	33	105	22.0	55	747.0
(●) 3	25.94	1185	5.91	2598	10.7	2.96	246	85	35	112	22.0	55	746.8
4	29.76	952	8.44	2539	5.4	3.55	234	85	35	112	21.5	57	746.5
5	29.70	550	14.58	2526	3.5	3.51	237	85	35	112	21.5	57	746.5

Oil consumption during ten hours duration of tests (2) and (3): 14 g/h.
(*) Maximum pull available at 15% wheelslip: 1770 kg
(°) Tractor with additional ballast
(●) Maximum pull available at 15% wheelslip: 1220 kg

3. **Turning space and turning circle:**

Details of wheel equipment: As in specification, without ballast

Track of wheels: Front 1190
Rear 1200

	With brakes		Without brakes	
	Right-hand	*Left-hand*	*Right-hand*	*Left-hand*
Radius of turning space m	2.95	3.00	3.23	3.28
Radius of turning circle m	2.85	2.90	3.13	3.18

4. **Location of centre of gravity:**

	mm
Height above ground	666
Distance forward from the vertical plane containing the axis of the rear wheels	629
Distance from the median plane of the tractor	0

5. **Braking:**

Date of tests	22nd and 26th April 1971
Type of track	concrete
Type of decelerometer	SIEMENS BREMSMESSER B 1 S
Weight of ballasted tractor	2.300 kg

Cold brakes

		Tractor ballasted	*Tractor without ballast*
Travelling speed of tractor	km/h	24.5	24.5
Maximum deceleration	m/sec²	4.00	3.80
Stopping distance	m	8.50	9.40
Force on brake pedal	kg	56	58
Force on brake pedal to a deceleration of 2.5 m/s²	kg	37	37

Brake fade characteristics (hot tests)

Maximum deceleration hot/maximum deceleration cold × 100 = 98%.

Stopping distance cold/stopping distance hot × 100 = 96%.

Force on pedal cold/force on pedal hot × 100 = 100%.

Parking brake:

Efficiency of handbrake on a slope of 16 per cent: with a 40 kg pull on handbrake no wheel rotation occurs with tractor facing first up and then down the slope.

6. Measurement of ambient noise emitted by the tractor:

Date of test: 31st May 1971
Type of sound level meter: ELIT type 905
Type of track: concrete
Results of test:
— gear 6th
— travelling speed 24.5 km/h
— sound level 84 dBA

7. Noise measurement at driver's ear level:

Date of test: 31st May 1971
Type of sound level meter and octave filter: ELIT type 905 and 955
Type of track: concrete
Type of frequency analyser: octave type, with 10 bands 31.5 to 16,000 Hz

Results of test

Gear	*Travelling speed km/h*	*Loudness sones*
4th	8.50	87

8. Power lift and hydraulic pump performance:

Date and location of tests: 30th April 1971 - L.M.A. - TORINO (Italy)
Hydraulic fluid: transmission oil
Type of linkage lock for transport: hydraulic
Opening pressure of the relief valve: 150 kg/cm²

Pump characteristics:

i) Opening pressure of the relief valve: 150 kg/cm²
Sustained pressure by the open relief valve: 170 kg/cm²
ii) Pump delivery rate at minimum pressure and rated engine speed: 13.7 l/min
iii) Pump delivery rate: 13.2 l/min
Delivery pressure: 170 kg/cm²
Power: 5.0 hp

	Height above ground in down position		*Vertical movement mm*	*Maximum force exerted through full range kg*	*Pressure kg/cm²*	*Lifting force when front of tractor lifts kg*
	Hitch point mm	*Frame mm*				
Linkage giving maximum mechanical advantage						
At hitch points	160	—	540	980	170	—
On the frame	—	120	660	770	170	650
Linkage giving minimum mechanical advantage						
At hitch points	45	—	660	850	170	—
On the frame	—	0	780	600	170	580

Officer in charge: Ing. R. Gioia
Head of L.M.A.: Dr. L. Lisa
Date: 31st May, 1971

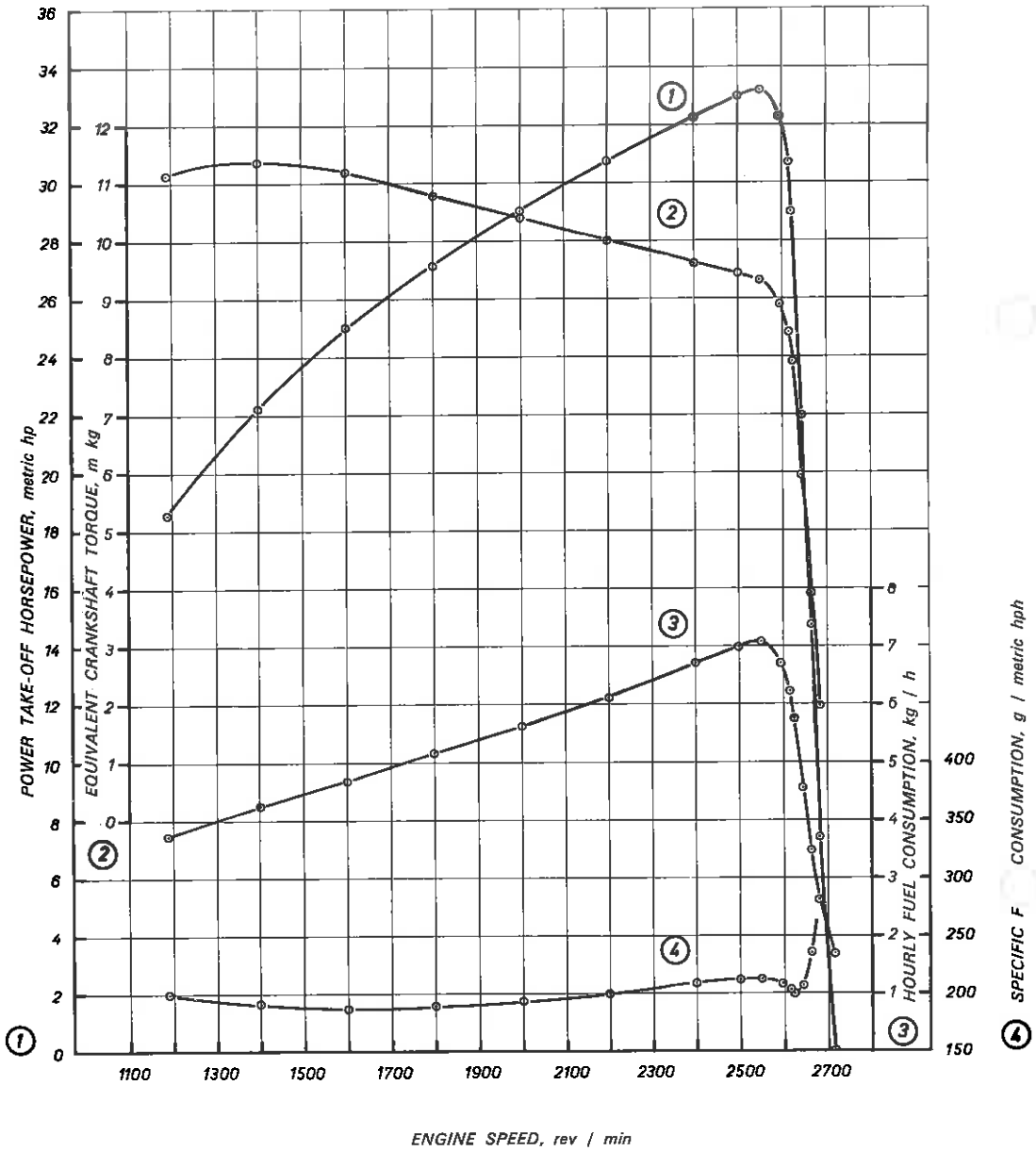


Fig. 1 - Power take-off test.

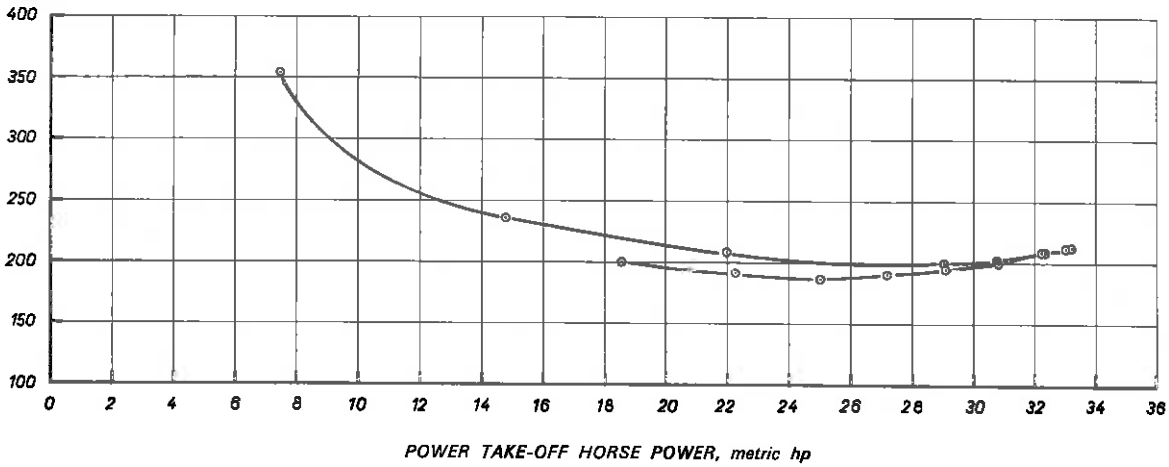


Fig. 2 - Power take-off test.

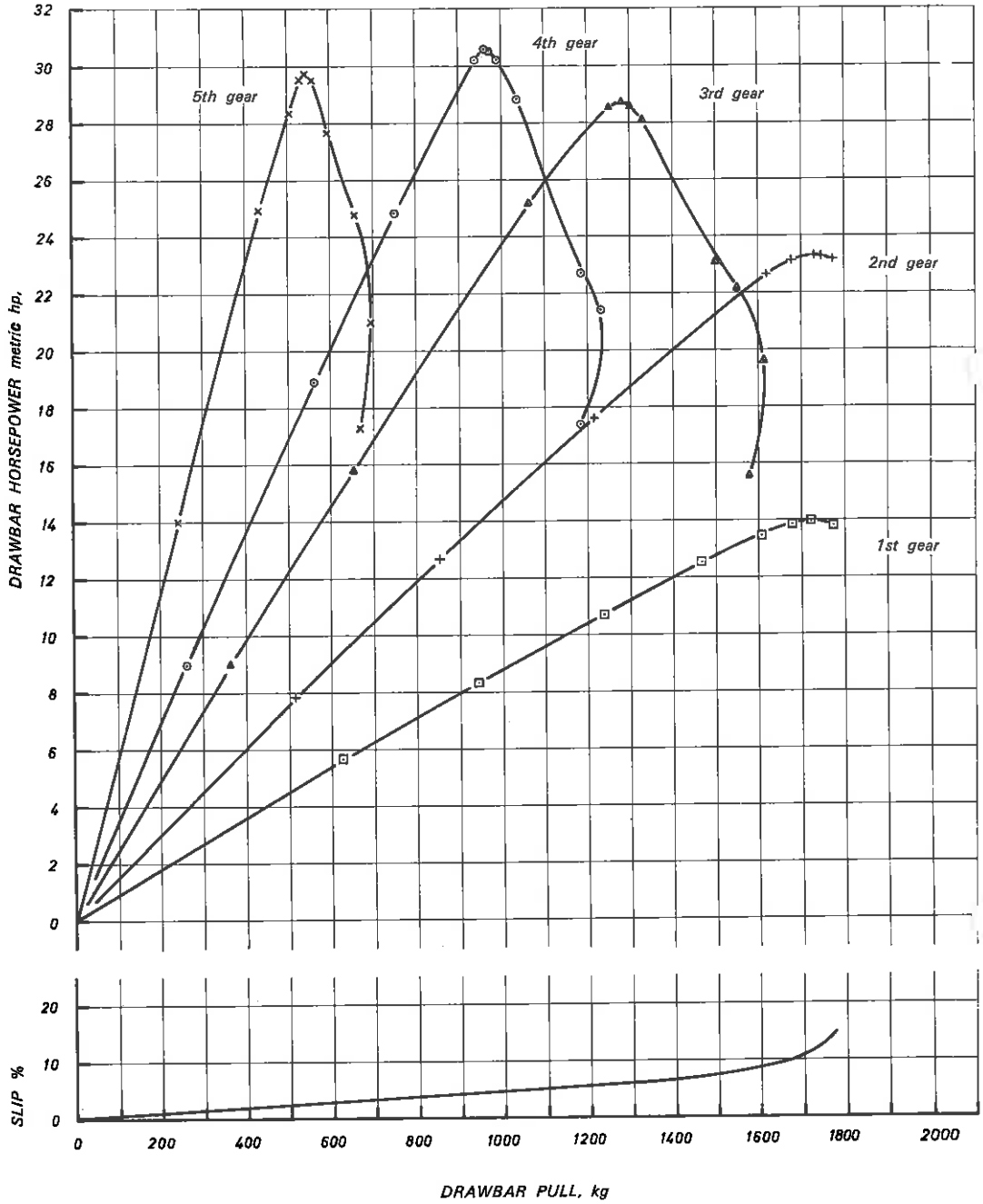


Fig. 3 - Drawbar test on concrete, with ballast.

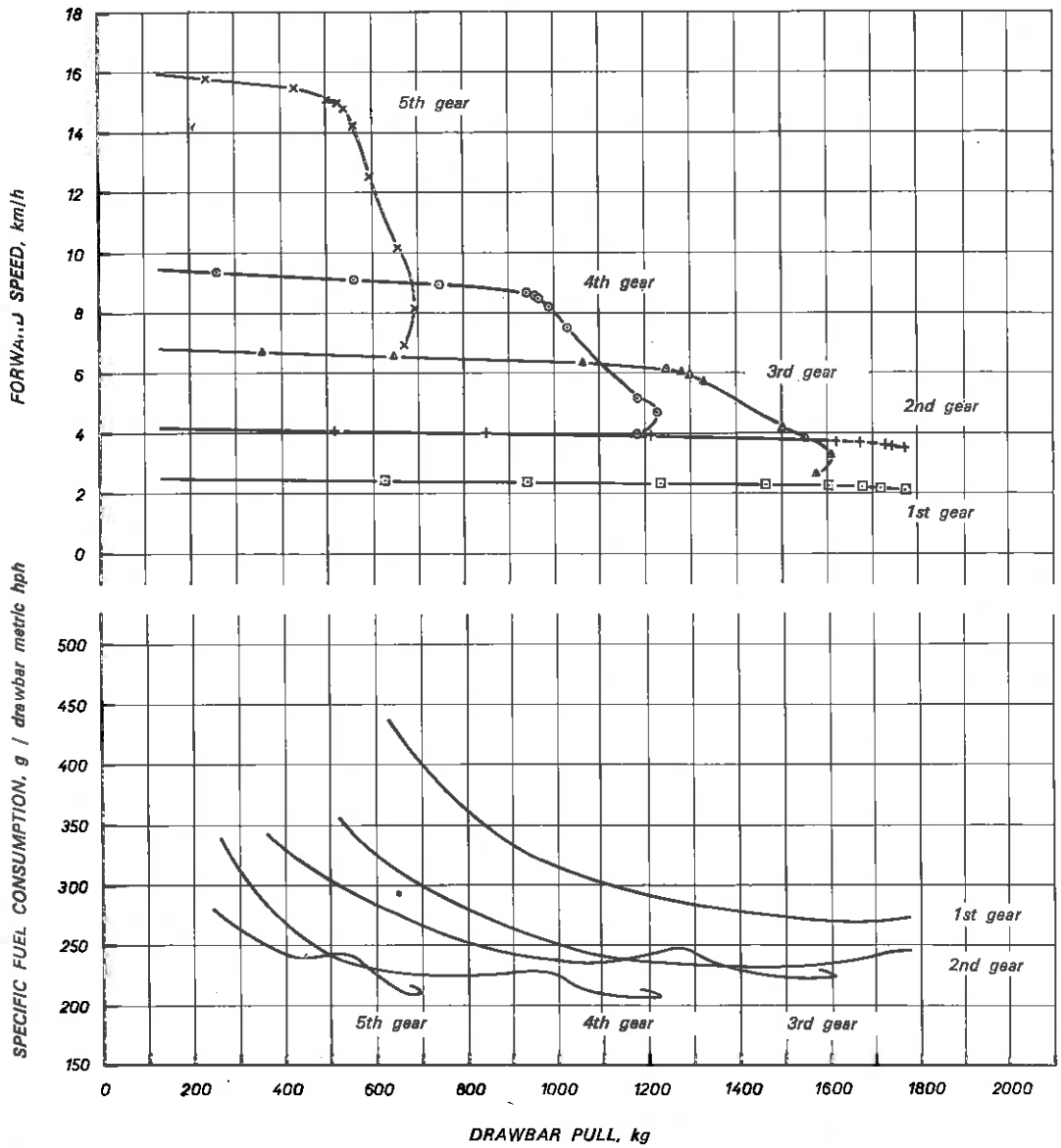


Fig. 4 - Drawbar test on concrete, with ballast.

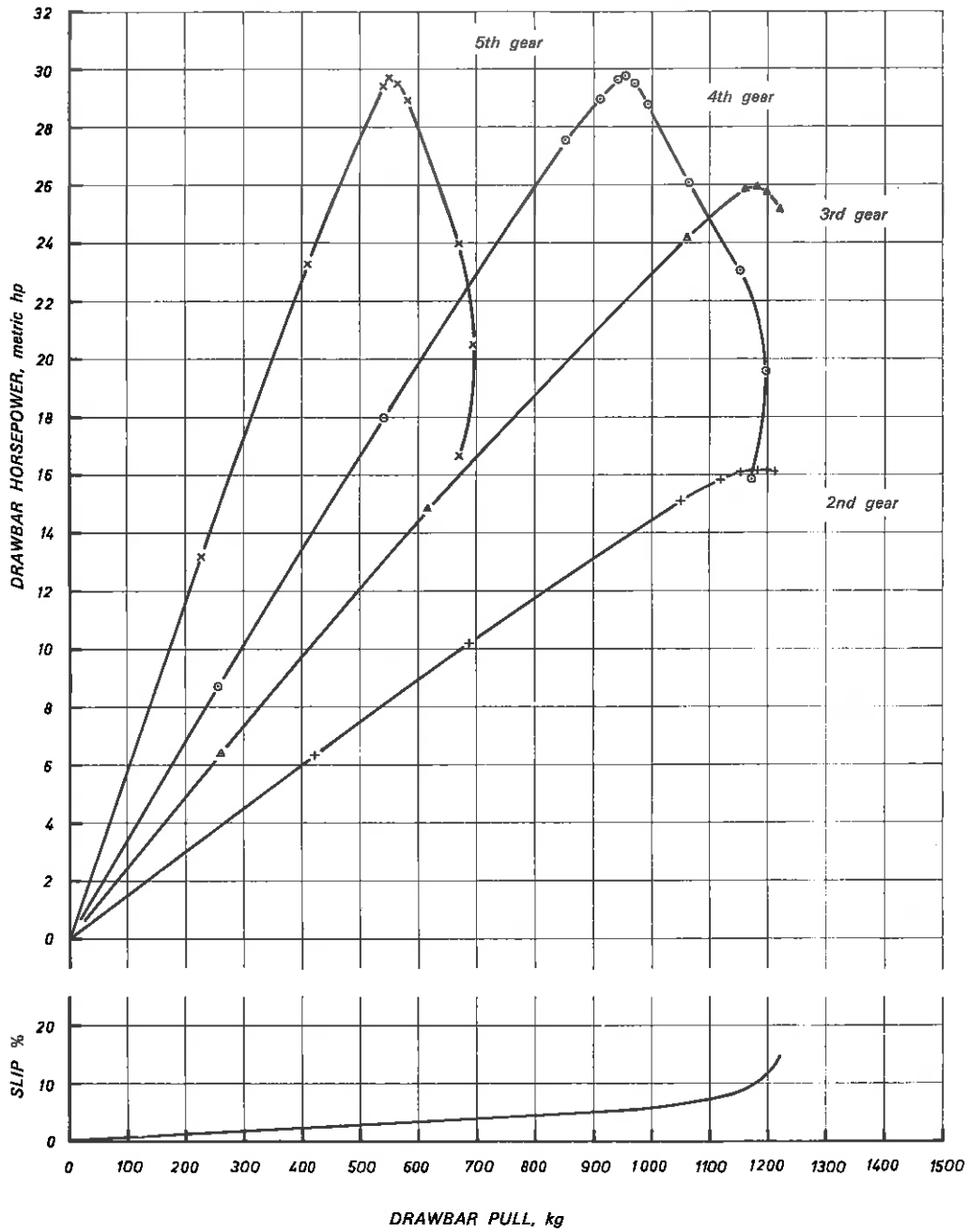


Fig. 5 - Drawbar test on concrete, without ballast.

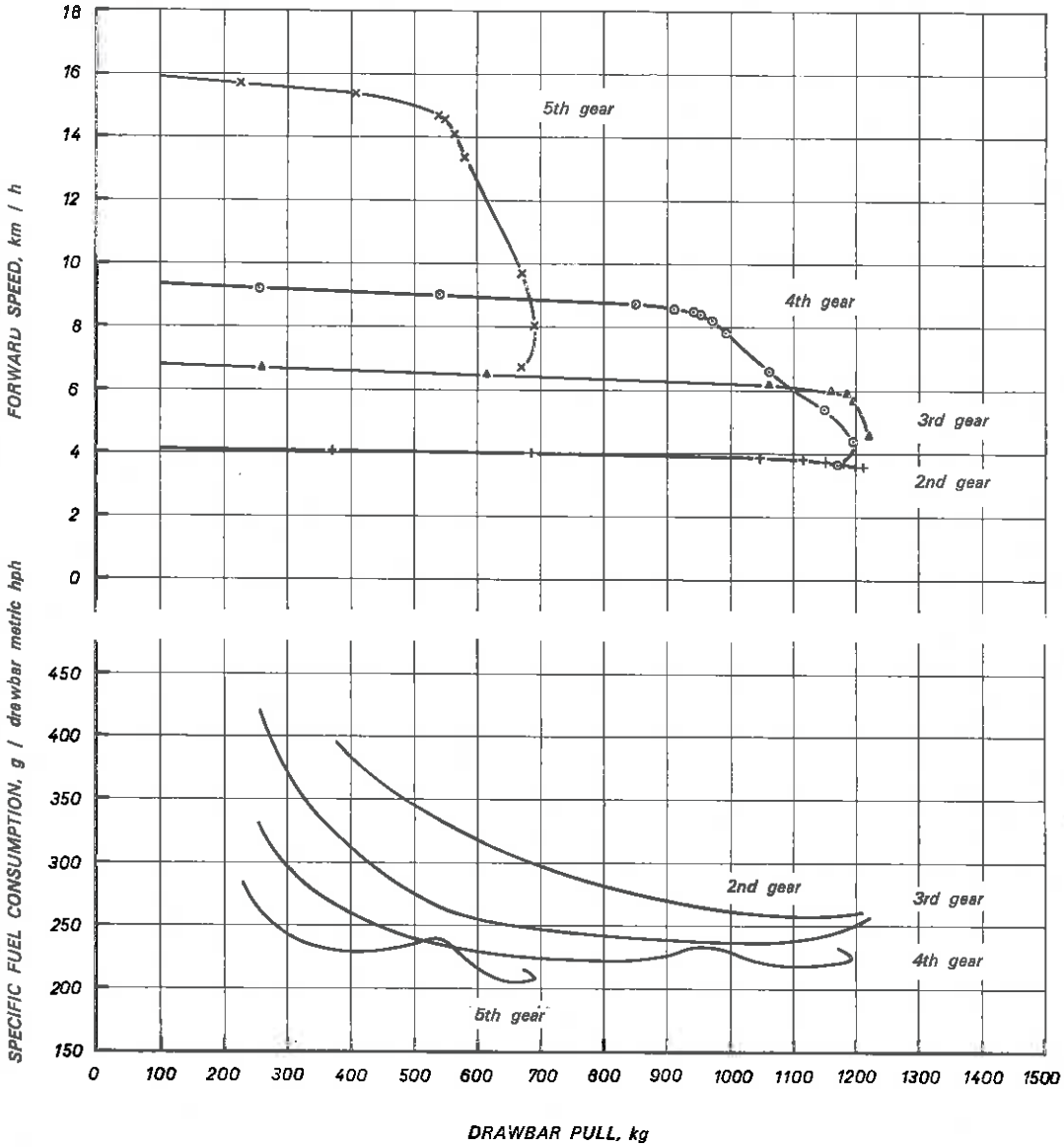


Fig. 6 - Drawbar test on concrete, without ballast.

CONSIGLIO NAZIONALE DELLE RICERCHE - ROMA
LABORATORIO PER LA MECCANIZZAZIONE AGRICOLA

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