COMITATO PER L'OMOLOGAZIONE
DELLE MACCHINE AGRICOLE

Report No. 526

REPORT ON TEST IN ACCORDANCE WITH O.E.C.D. TEST
CODE FOR AGRICULTURAL TRACTORS OF:

PASQUALI 986 DIESEL TRACTOR



Manufactured by: PASQUALI MACCHINE AGRICOLE S.p.A.
Works of CALENZANO (Firenze) - Italy

Date of tests: October 1975 February 1976

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

Date of approval: 18th August 1976

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 pratical farm work.

In this report all performance characteristics are given simultaneously according to the International System of Units and to the former used Technical System of Units (numbers enclosed in brackets).

The relation between the two systems is given by the following formulas:

Forces:	1 N	= 0.10197	kg	or 1	kg	= 9.80665	N
Powers:	1 kW	= 1.35962	metric hp	or 1	metric hp	= 0.73550	kW
Pressures:	1 bar	= 1.01972	kg/cm²	or 1	kg/cm²	= 0.980665	bar
Rotation speeds:	1 rd/s	= 9.54930	rev/min	or 1	rev/min	= 0.10472	rd/s
Torques:	1 mN	= 0.10197	mkg	or 1	mkg	= 9.80665	mN

TABLE OF CONTENTS

	PAGE
Specification of tractor	2
Fuel and lubricants used in tests	7
Compulsory tests	
1 - Power take-off performance	8
2 - Drawbar performance on a concrete track	9
3 - Turning space and turning circle	10
4 - Location of centre of gravity	10
5 - Braking performance	10
6 - Measurement of ambient noise emitted by the tractor	11
7 - Noise measurement at the driver's ear level	11
8 - Power lift and hydraulic pump performance	12

PERFORMANCE CURVES

	FIG. No.
a) *Power take-off test*	
Curves of power, torque, hourly and specific fuel consumption/ crankshaft speed	1
Curves of specific fuel consumption/crankshaft power p.t.o.	2
b) *Drawbar test*	
Curves of drawbar power and wheelslip/drawbar pull (with ballast)	3
Curves of travel speed and specific fuel consumption/drawbar pull (with ballast)	4
Curves of drawbar power and wheelslip/drawbar pull (without ballast)	5
Curves of travel speed and specific fuel consumption/drawbar pull (without ballast)	6

Manufacturer:	PASQUALI MACCHINE AGRICOLE S.p.A. Works of CALENZANO (Firenze) - Italy
Submitted for test by:	The Manufacturer
Selected by:	The Manufacturer with the agreement of the testing station
Place of running-in:	Works of CALENZANO (Firenze) - Italy
Duration of running-in:	60 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	PASQUALI
Model:	986
Type:	Four wheel driven tractor, articulated construction.
Serial No.:	145

Engine

Make:	LOMBARDINI
Model:	LDA 100
Type:	4-stroke, direct injection diesel
Serial No.:	1024302
Cylinders:	1 cylinder, vertical, 100 mm bore × 90 mm stroke, capacity 707 cm³, compression ration 17 : 1, overhead valves, replaceable cast-iron dry cylinder.
Fuel system:	Gravity feed; LOMBARDINI paper filter, 273-3730 - 15 model, replaceable cartridge element; capacity of fuel tank 15 litres; BOSCH injection pump PFR/K70/302 model. Manufacturer's production setting 4.1 to 4.3 l/h at 314.2 rd/s (3000 rev/min) rated engine speed and 15 °C fuel temperature. BOSIO injector, BLL 160 SL 100 model. Injector setting 205.9 ± 4.9 bar (210 ± 5 kg/cm²).
Governor:	Lombardini make, mechanical type with centrifugal weights, separate from the injection pump. Governed range of engine speed: 104.7 rd/s to 335.1 rd/s (1000 to 3200 rev/min). Rated engine speed 314.2 rd/s (3000 rev/min).

Air cleaner:	LOMBARDINI main cleaner 24961/2 model, oil bath type; oil capacity 0.3 litres; recommended oil viscosity SAE 30.
Lubrication system:	Forced feed from gear-type pump; centrifugal filter type; oil capacity 2.6 litres. Recommended oil change period: 100 hours; recommended oil viscosity SAE 30.
Cooling system:	Air circulation type, actived by 28-blade, belt driven fan 308 mm dia.
Starting system:	Electrical; BOSCH starter motor, JD (R) model, 12 V.

Electrical system

Voltage:	12 V, negative earth.
Alternator:	DUCATI make, 403550.9100 model.
Battery:	One, VARTA make, 562-90 model; capacity 62 Ah.

Transmission

Clutch:	Own make, single dry plate type, pedal operated 186 mm dia.
Gearbox:	Own make, mechanical type with total 9 forward and 3 reverse speeds; the transmission consists of a 3 forward and 1 reverse speeds gear group in series with a 3 forward speeds sliding gear group; each of two gear groups are operated by own lever.
Rear axle, front axle and final drives:	Own make; crown wheel/pinion and bevel gear type differential in front and in the rear axle; differential lock only in the front axle, hand lever operated.
Oil capacity:	Gearbox and front differential 8 litres; rear differential 4 litres.
Oil change period:	1000 hours.
Recommended oil viscosity:	SAE 140.

Gear of 1st group No.	*Combination of 2nd group*	*Number of engine revolutions for one revolution of driving wheels*	*Travelling speed (*) for 314.2 rd/s (3000 rev/min) at rated engine speed*	
			km/h	*m/s*
1	slow	584.112	0.68	0.189
2		370.690	1.08	0.300
3		174.378	2.29	0.636
1	intermediate	218.054	1.83	0.508
2		138.382	2.88	0.800
3		55.565	7.18	1.994
1	direct	65.101	6.13	1.703
2		35.263	11.31	3.142
3		16.589	24.04	6.678
1	reverse	252.737	1.58	0.439
2		94.351	4.23	1.175
3		24.042	16.59	4.608

* Calculated with rolling radius 371 mm according to manufacturer's specifications

Power take-off
(optional)

In centre-line at rear of tractor; proportional engine speed, not independent, manually engaged and clutch driven; 34.9 mm (1 3/8 in) dia according to ISO.
Standard, 6 spline; height above ground 260 mm.
Proportional engine speeds: 62.6 rd/s and 79.8 rd/s at 314.2 rd/s rated engine speed (598 and 762 rev/min at 3000 rev/min rated engine speed).
56.5 rd/s (540 rev/min) at 283.7 rd/s (2709 rev/min) and at 222.6 rd/s (2126 rev/min) engine speed.
Direction of rotation: anti-clockwise viewed facing driving end.

Belt pulley

None on the tractor tested.

Power lift

Own make; PASQUALI 990 model; fully independent hydraulic gear pump Hidroirma make, 6K/UP model.
Position central system.
Single acting ram cylinder.
Three point linkage category 1 ISO R 730.
Oil capacity 4 litres.
Recommended oil viscosity: SAE 30.
No oil tappings.

Drawbar None on the tractor tested

Hitch Height above ground to centre of clevis 290 mm; hitch hole: 28 mm dia, distance from rear axle 270 mm.
The installation of the hitch does not allow the installation of the optional p.t.o.

Steering Own make, mechanical type, worm gear box, operated by hand-wheel, working on center tractor pivot.

Brakes Own make; mechanical type with drums and expanding shoes, mounted on rear axle, pedal operated; parking brake hand-lever with ratchet, operating working brake system.

Driving wheels Two at front and two at rear; pneumatics
« Tractor » 6.50-16 tyres, 2 ply rating, mounted on 5.50 F rims.
Maximum permissible weight on each tyre 325 kg at 0.98 bar (1.00 kg/cm²) pressure.
Track widths 0.64 mm and 0.84 mm, changed by reversing wheels.

Wheelbase: 1180 mm.

Lighting Electrical 12 V, according to italian regulation.

	Height above ground of centre cm	*Dimensions* cm	*Distance from outside edge of tractor to centre* cm
Head lights	65.0	12.5 x 8.0	38.5
Side lights (*)	65.0	12.5 x 8.0	38.5
Rear lights	83.5	7.0 x 4.0	21.0
Reflectors	88.0	5.5 dia	21.0

* In combination with head lights.

Number of grease points (whole tractor): 13

CONDITIONS DURING TEST

Weights (Tractor weight without driver but with tank full)

	Front kg	*Rear* kg	*Total* kg
Without ballast	490	240	730
With ballast	590	340	930

Ballast

	No. of weights	*Total weight kg (excluding water)*	*Water kg*
Front wheels	2	100	—
Rear wheels	2	100	—

Track width during test: Front 840 mm, rear 840 mm.

Overall dimensions

	Length m	*Width m*		*Height m*
		max.	*min.*	
Without ballast	2.66	1.01	0.84	1.05
With ballast	2.66	1.01	0.84	1.05

Remarks:
- — length measured from engine crowling to lower link in horizontal position;
- — height measured to top of steering wheel;
- — ground clearance 0.22 m (measured at differential).

Seat

Own make; upholstered mould with back rest without suspension and adjustements.

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: AGIP F1, viscosity SAE 30

Transmission oil: AGIP F1, viscosity SAE 140

Hydraulic oil: AGIP F1, OSO 55, viscosity SAE 30

COMPULSORY TESTS

1. Power take-off performance

Date and location of test: 31st October 1975 - L.M.A. TURIN - Italy
Type of dynamometer: Electrical, swinging frame.

Power	*Speed*		*Fuel consumption*			*Specific energy*
	Engine	*p.t.o.*	*Total*		*Specific*	
kW (metric hp)	*rd/s (rev/min)*	*rd/s (rev/min)*	*l/h*	*kg/h*	*g/kWh (g/metric hph)*	*kWh/l (metric hph/l)*
A - AT MAXIMUM POWER: 2 hour test						
10.7 (14.5)	314.2 (3000)	62.6 (598)	4.28	3.56	333 (245)	2.50 (3.32)
B - AT STANDARD p.t.o. SPEED - 56.5 rd/s (540 rev/min)						
10.1 (13.7)	283.7 (2709)	56.5 (540)	3.97	3.30	327 (241)	2.54 (3.45)
C - AT THE SPEED RECOMMENDED BY MANUFACTURER FOR DRAWBAR WORK						
10.7 (14.5)	314.2 (3000)	62.6 (598)	4.28	3.56	333 (245)	2.50 (3.39)
D - AT PART LOADS						
(i) 85% of the torque at maximum power						
9.6 (13.1)	321.0 (3065)	66.3 (633)	3.90	3.24	338 (247)	2.46 (3.36)
(ii) unloaded						
— —	332.5 (3175)	— —	1.44	1.20	— —	— —
(iii) 50% of the load defined in (i)						
4.9 (6.7)	344.5 (3290)	67.5 (645)	2.31	1.92	392 (287)	2.12 (2.90)
(iv) maximum power						
10.7 (14.5)	314.2 (3000)	62.6 (598)	4.28	3.56	333 (245)	2.50 (3.39)
(v) 25% of the load defined in (i)						
2.5 (3.4)	342.5 (3270)	68.3 (652)	2.17	1.80	720 (529)	1.15 (1.57)
(vi) 75% of the load defined in (i)						
7.3 (9.9)	335.1 (3200)	66.8 (638)	3.03	2.52	345 (255)	2.41 (3.27)

No load, maximum engine speed: 345.6 rd/s (3300 rev/min)

Equivalent crankshaft torque at maximum power: 34.0 mN (3.47 mkg)

Maximum equivalent chankshaft torque: 37.7 mN (3.84 mkg) at 240.9 rd/s (2300 rev/min)

Mean atmospheric conditions:
temperature 18.5 °C
pressure 993 mbar (744.5 mmHg)
relative humidity 62 %

Maximum temperature:
coolant 85 °C
engine oil 120 °C
fuel 20.5 °C
engine air intake 20.5 °C

2. Drawbar performance

Date of test: 2nd - 3rd December 1975 and 26th January 1976
Type of track: concrete
Height of draught line above the ground: 290 mm

Gear	Travelling speed		Power	Drawbar pull	Engine speed	Wheelslip	Fuel consumption		Temperature			Atmospheric conditions		
							Specific energy	Specific consumpt.	Fuel	Coolant	Engine oil	Tempe-rature	Relative humidity	Pressure
No.	km/h	m/s	kW (metric hp)	N (kg)	rd/s (rev/min)	%	kWh/l (m.hph/l)	g/kWh (g/m.hph)	°C	°C	°C	°C	%	mbar (mmHg)
1 - MAXIMUM POWER (ballasted)														
1 slow	0.65	0.18	1.5 (2.0)	8350 (850)	342.1 (3263)	15.0	—	—	—	—	102	3.4	93	991.7 (744.0)
2 slow	1.01	0.29	2.4 (3.2)	8350 (850)	342.7 (3273)	15.0	—	—	—	—	102	3.0	93	991.7 (744.0)
1 inter.	1.73	0.48	4.0 (5.5)	8350 (850)	339.7 (3244)	15.0	—	—	—	—	102	2.6	94	991.7 (744.0)
3 slow	2.12	0.59	4.9 (6.6)	8350 (850)	339.0 (3237)	15.0	—	—	—	—	102	4.5	91	987.8 (741.0)
2 inter.	2.66	0.74	6.2 (8.4)	8350 (850)	336.9 (3217)	15.0	2.14 (3.90)	389 (287)	17	—	104	5.0	91	987.8 (741.0)
1 direct	5.54	1.54	10,2 (13.9)	6600 (675)	315.4 (3012)	10.4	2.37 (3.23)	351 (258)	17	—	104	3.8	88	988.0 (741.2)
3 inter.	6.67	1.85	10.1 (13.7)	5450 (555)	316.1 (3019)	7.8	2.30 (3.12)	361 (266)	17	—	108	3.0	93	988.4 (741.5)
2 - FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER														
1 direct	6.19	1.72	8.5 (11.6)	4950 (505)	339.5 (3242)	6.8	2.48 (3.38)	335 (246)	17	—	108	2.2	95	990.6 (743.2)
3 - FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WEELSLIP IN TEST (1)														
2 inter.	—	—	—	8350 (850)	334.0 (3189)	—	—	—	—	—	108	1.9	93	991.7 (744.0)
4 - MAXIMUM POWER (unballasted)														
3 slow	2.12	0.59	4.1 (5.6)	6950 (710)	338.6 (3233)	15.0	—	—	—	—	102	1.0	71	979.8 (735.0)
2 inter.	2.66	0.74	5.1 (6.9)	6850 (700)	337.4 (3222)	15.0	1.75 (2.37)	475 (351)	17	—	104	2.0	64	979.8 (735.0)
1 direct	5.44	1.51	10.0 (13.7)	6650 (680)	316.6 (3023)	12,9	2.22 (3.04)	375 (274)	17	—	106	3.0	53	980.0 (735.2)
3 inter.	6.62	1.84	9.9 (13.4)	5400 (550)	315.4 (3012)	8.7	2.22 (3.01)	374 (276)	17	—	106	3.0	53	980.0 (735.2)

Total oil consumption during ten hours of tests (2) and (3): 12 g/h
(1) Those figures not quoted are irrelevant due to the additional ballast.

3. Turning space and turning circle

Wheel equipment:	front 6.50-16 rear 6.50-16
Track of wheels:	front 840 mm rear 840 mm

	Without brakes (*)	
	Right-hand *m*	*Left-hand* *m*
Radius of turning space	2.10	2.21
Radius of turning circle	2.02	2.13

(*) Tractor unprovided with independent brake on each wheel.

4. Location of centre of gravity

Height above ground	mm	488
Distance forward from the vertical plane containing the axis of the rear wheels	mm	710
Distance from the median plane of the tractor	mm	0

5. Braking

Date of test:	4th December 1975
Type of track:	concrete
Type of decelerometer:	MOTO METER
Weight of tractor with driver:	with ballast 1000 kg without ballast 800 kg

Cold brakes

		With ballast	*Without ballast*
Travelling speed of tractor	km/h	25.0	25.0
Max. deceleration	m/s^2	3.80	4.00
Stopping distance	m	7.80	7.35
Force exerted on the brake pedal	N (kg)	353.0 (36)	323.6 (33)
Force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2	N (kg)	215.7 (22)	196.1 (20)

Brake fade characteristics (hot tests)

[Maximum deceleration hot/maximum deceleration cold] × 100	97%
[Stopping distance cold/stopping distance hot] × 100	98%
[Force on pedal cold/force on pedal hot] × 100	90%

Parking brake

Efficiency of handbrake on a slope of 16 per cent: with a 215.7 N (22 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:	26th January 1976
Type of sound level meter:	BRUEL & KJAER 2209 model
Type of track:	concrete
Position of the exhaust silence:	vertical, downwards direction

Results of test

— gear:	3rd direct
— travelling speed before acceleration:	19.50 km/h
— sound level:	100 dBA

7. Noise measurement at the driver's ear level

Date of test:	26th January 1976
Type of sound level meter and octave filter:	BRUEL & KJAER 2209 model and 1613 model
Type of track:	concrete
Type of frequency analyzer:	octave type, with 10 bands from 31.5 to 16.000 Hz.

Results of test

Gear	*Travelling speed* ***km/h***	*Sound level*	
		dB (A)	*Sones*
3rd inter. (*)	**7.18**	105	166

(*) The gear tested corresponds to the travelling speed nearest to 7.25 km/h.

Remarks: No cab or frame fitted on tractor.

8. Power lift and hydraulic pump performance

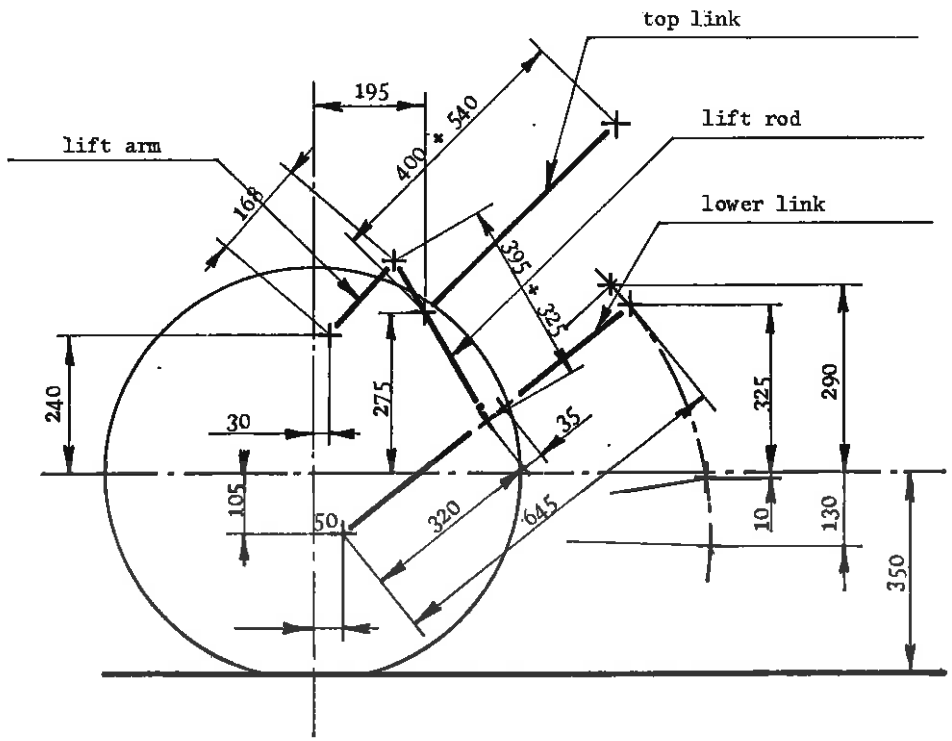
Date of test:	6th February 1976
Hydraulic fluid:	AGIP F1 OSO 55, viscosity SAE 30

Pump characteristics

1 - opening pressure of the relief valve:	93.2 bar (95 kg/cm²)
- substained pressure by the open relief valve:	103 bar (105 kg/cm²)
2 - pump delivery rate at minimum pressure and rated engine speed:	10 l/min
3 - pump delivery rate:	9.5 l/min
- delivery pressure:	93.2 bar (95 kg/cm²)
- hydraulic power:	1.47 kW (2.0 metric hp)

Power lift

Dimensions of linkage geometry for the table on page 13



LINKAGE GEOMETRY WHEN CONNECTED TO THE STANDARD FRAME

	Maximum mechanical advantage	*Minimum mechanical advantage*
Projected length in side view:		
— lower links mm	645	645
— lift arms mm	168	168
— lift rods mm	295	320
— top link mm	520	507
Distance of lift rod connection point from pivot of lower link mm	345	345

The following dimensions are given relative to the rear axle centre line 350 mm above the ground level

Lower link pivot point	50 mm behind, 105 mm below	50 mm behind, 105 mm below
Top link pivot point	195 mm behind, 275 mm above	195 mm behind, 275 mm above
Lift arm pivot point	30 mm behind, 240 mm above	30 mm behind, 240 mm above
Maximum and minimum height of lower link hitch points	325 mm above, 10 mm below	290 mm above, 130 mm below
Height of lower link hitch points when locked in transport position	no lock for transport position	

LIFTING HEIGHTS IN RELATION TO A HORIZONTAL LINE THROUGH THE LOWER LINK PIVOT POINT

		cm	— 3,3	— 2,5	0	+ 5	+ 9,5	+ 10	+ 15	+ 20	+ 25	+ 30	+ 35	+ 37	+ 40	+ 45	+ 50	+ 55	+ 60
Lifting force at hitch points	max. mech.	N	—	—	—	—	10003	—	9807	10150	10493	10787	10983	—	11376	—	—	—	—
	advantage	kg	—	—	—	—	(1020)	—	(1000)	(1035)	(1070)	(1100)	(1120)	—	(1160)	—	—	—	—
	min. mech.	N	—	7698	7894	8041	—	8483	9973	9611	10000	10150	10395	10591	—	—	—	—	—
	advantage	kg	—	(785)	(805)	(820)	—	(865)	(915)	(980)	(1020)	(1035)	(1060)	(1080)	—	—	—	—	—
	Maximum force exerted through whole range: 10003 N (1020 kg)																		
	Force at which front of tractor is calculated to lift with maximum allowable front ballast: — N (— kg)																		
Lifting force at the frame	max. mech.	N	—	—	—	—	7747	—	7502	7404	7061	6963	6914	—	6914 (705)	6914	6472	6178	4266
	advantage	kg	—	—	—	—	(790)	—	(765)	(755)	(720)	(710)	(705)	—		(705)	(660)	(630)	(435)
	min. mech.	N	6619	—	6325	6227	—	6227	6227	6178	6129	6080	5835	—	5541	5394	5099	3187	—
	advantage	kg	(675)	—	(645)	(635)	—	(635)	(635)	(630)	(625)	(620)	(595)	—	(565)	(550)	(520)	(325)	—
	Maximum force exerted through whole range: 4266 N (435 kg)																		
	Force at which front of tractor is calculated to lift with maximum allowable front ballast: — N (— kg)																		

The lifting force values are worth for the pressure 93.2 bar (95 kg/cm2) at maximum hydraulic horsepower, calculated from measurements made at maximum pressure 103 bar (105 kg/cm2)

OFFICER IN CHARGE
(R. Gioia)

HEAD OF L.M.A.
(L. Lisa)

Turin, 27th March 1976

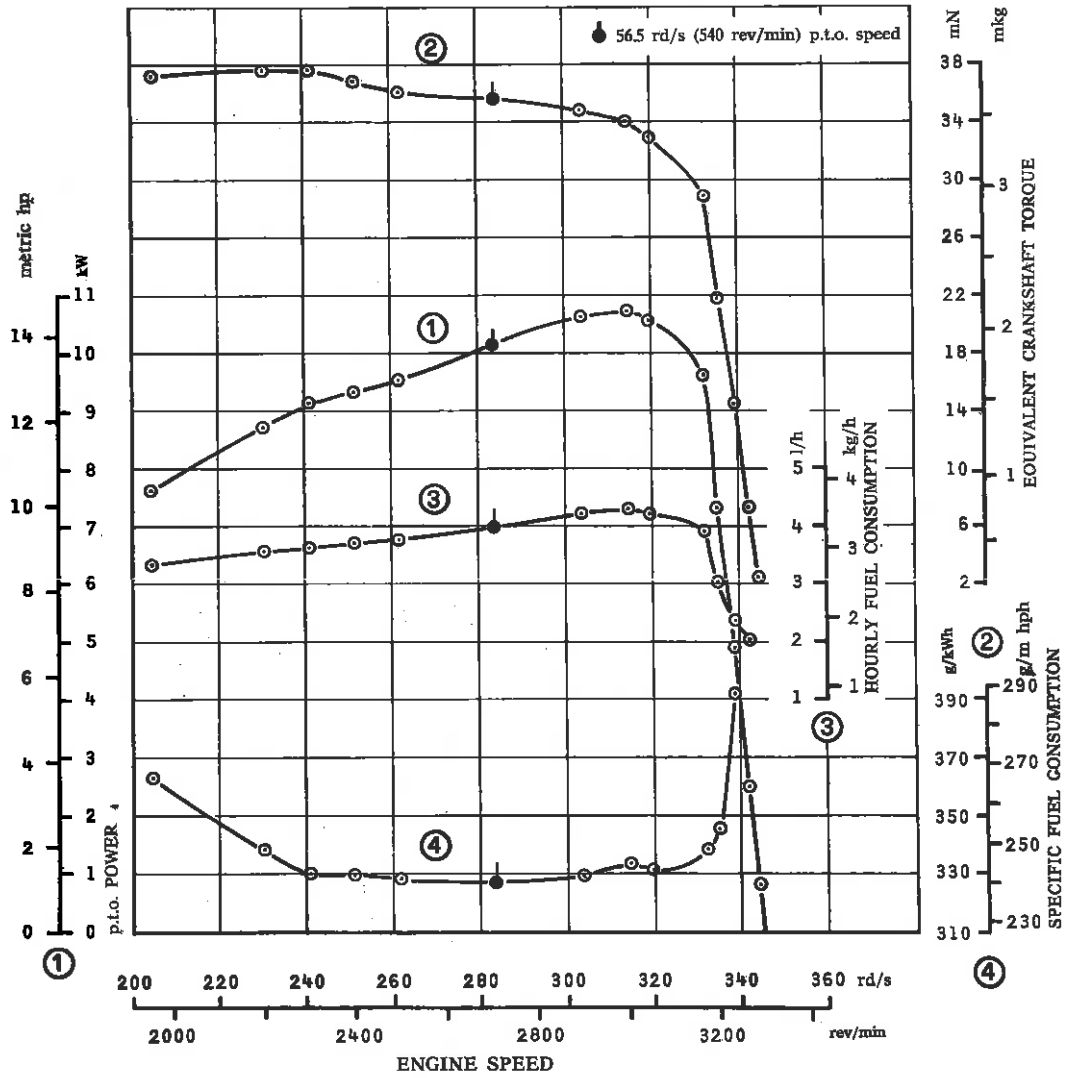


FIG. 1 - POWER TAKE-OFF TEST

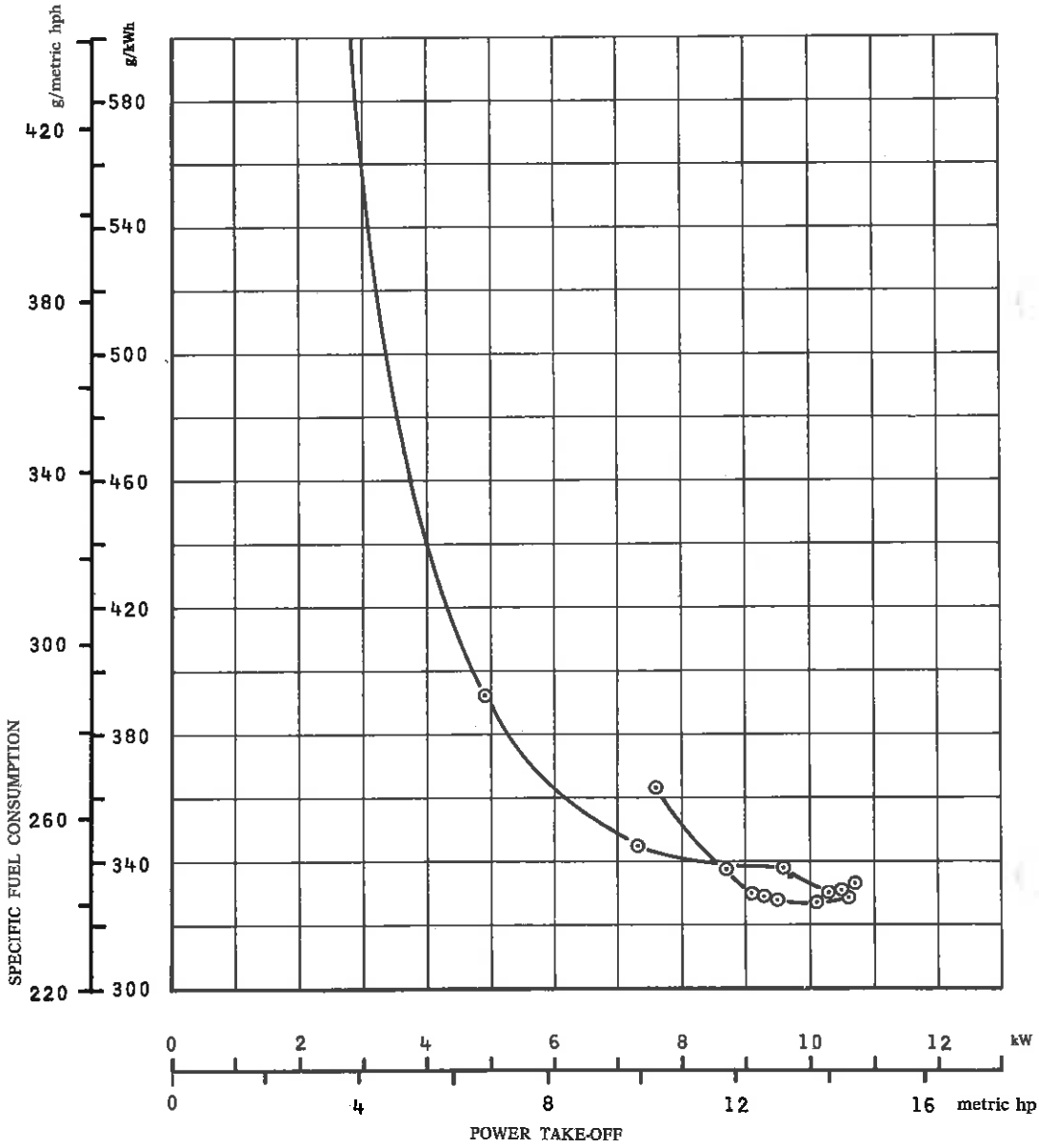


FIG. 2 - POWER TAKE-OFF TEST

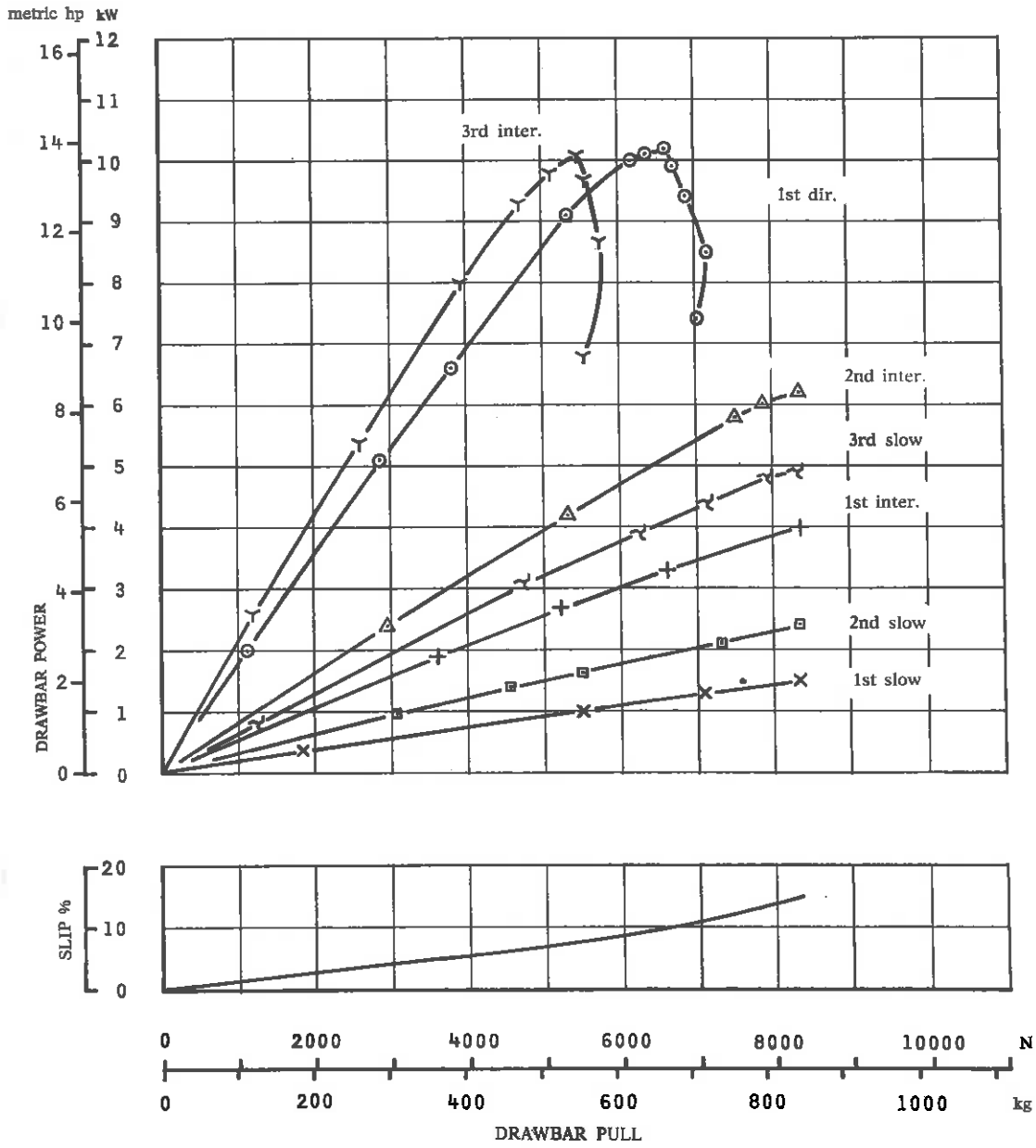


FIG. 3 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

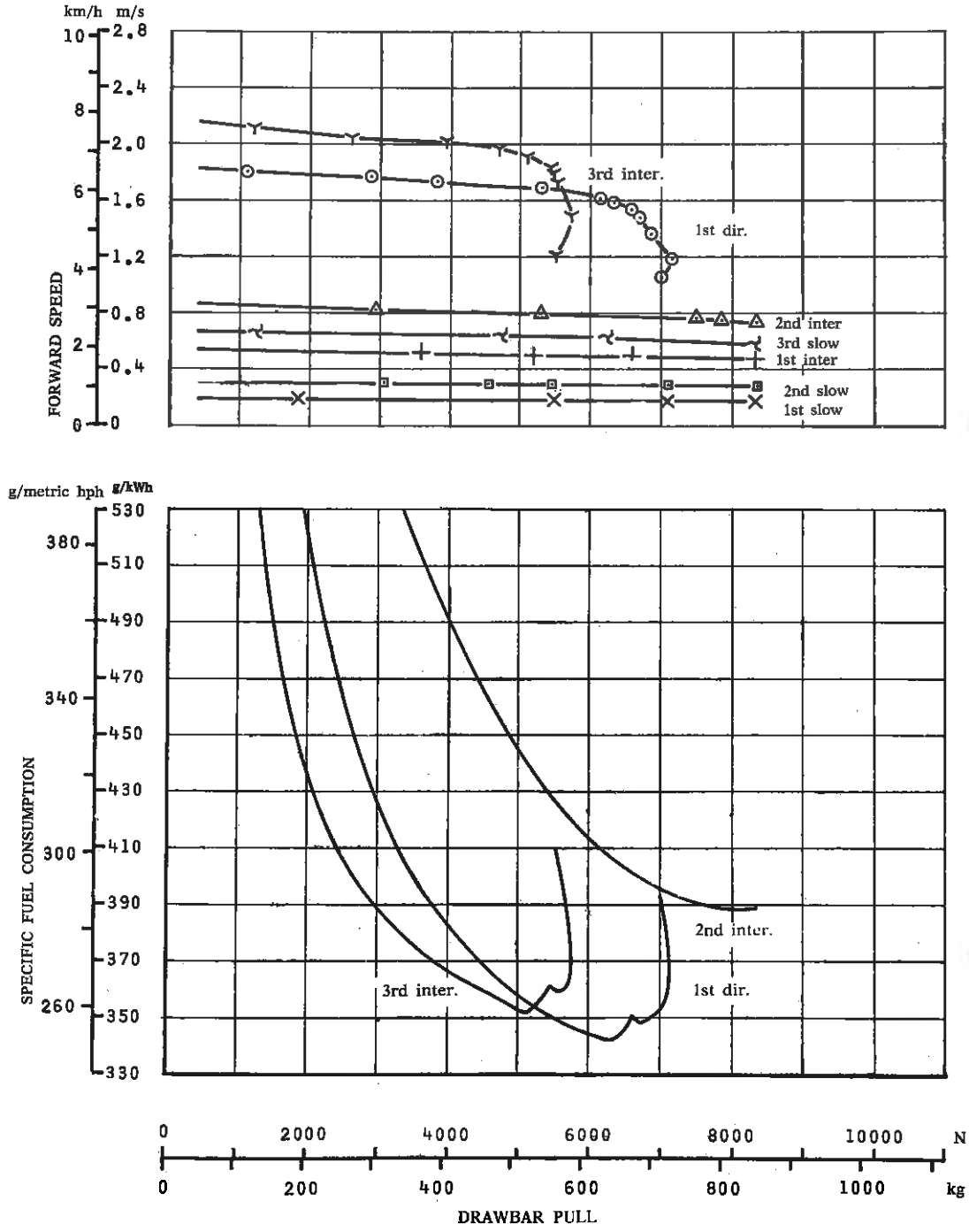


FIG. 4 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

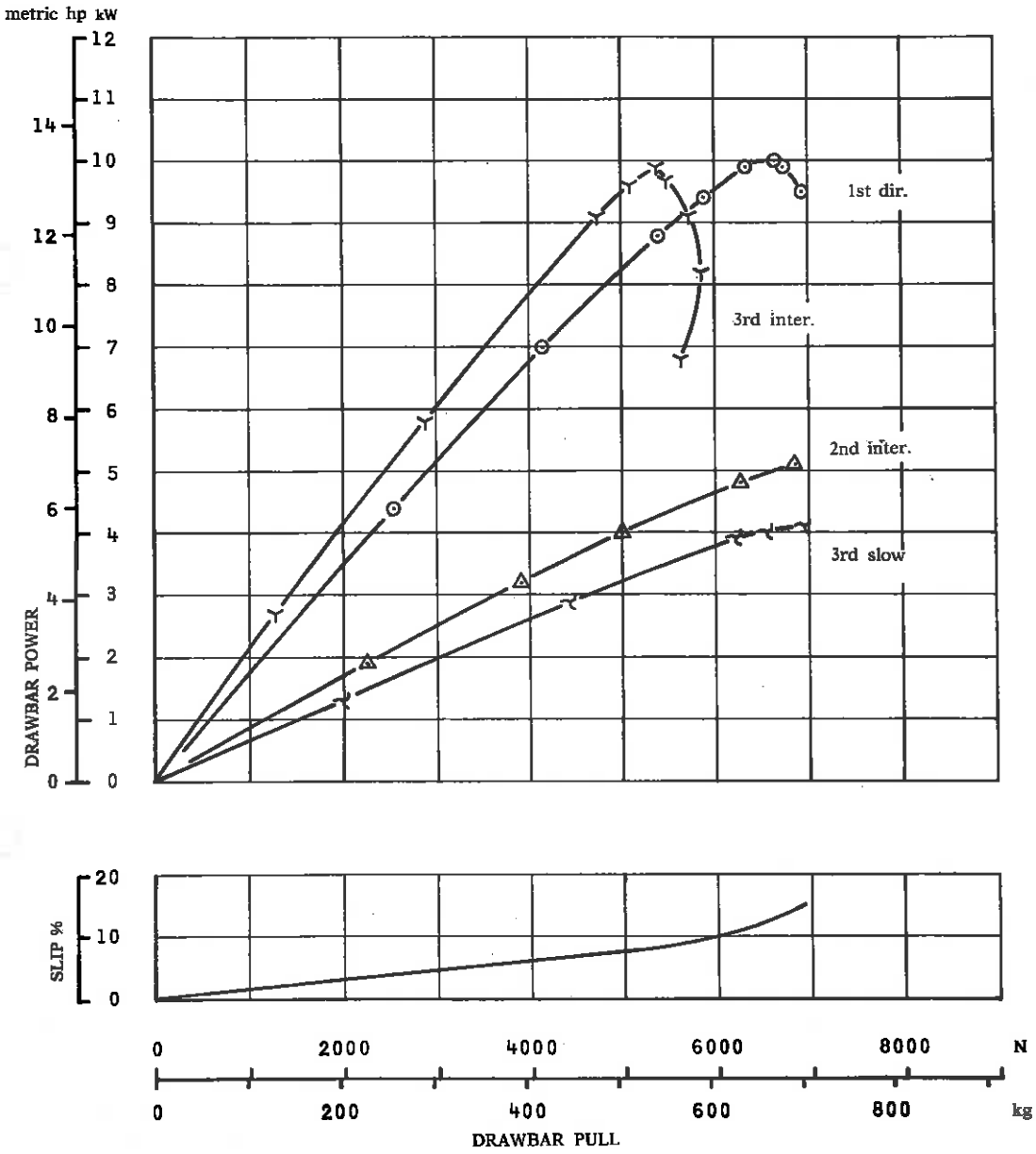


FIG. 5 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

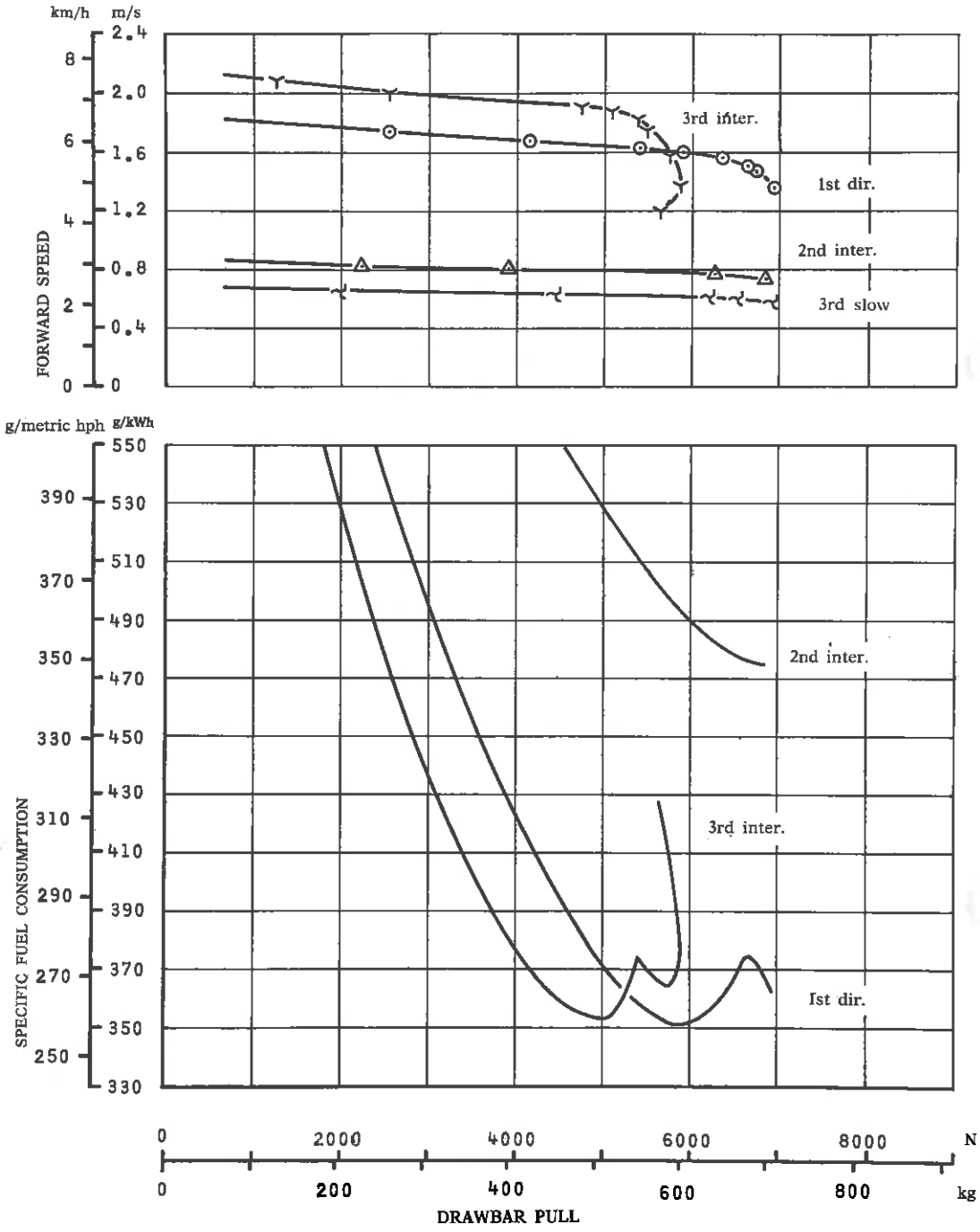


FIG. 6 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST