COMITATO PER L'OMOLOGAZIONE
DELLE MACCHINE AGRICOLE

REPORT No. 517

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

MASSEY FERGUSON 184 DIESEL TRACTOR

(this report covers both 2 W.D. and 4 W.D. models)



Manufactured by: MASSEY FERGUSON S.p.A.
Works of FABBRICO (Reggio Emilia) - Italy

Date of tests: September 1975 - April 1977

« This report has been approved by the Coordinating Centre for the implementation of the O.E.C.D. Code for the official testing of agricultural tractors on the 2nd of March 1976 for 2 W.D. model and on the 2nd of August 1978 for 4 W.D. model, under no. 517 ».

« The MASSEY FERGUSON 184 tractor and the LANDINI R 7500 tractor being mechanically similar, the tests have not been repeated and the approval number is valid for both models of tractor ».

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.

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

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Manufacturer:	MASSEY FERGUSON S.p.A. Works of FABBRICO (Reggio Emilia) - Italy
Submitted for test by:	The Manufacturer
Selected by:	The Manufacturer with the agreement of the testing station
Place of running-in:	Works of FABBRICO (Reggio Emilia) - Italy
Duration of running-in:	60 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	MASSEY FERGUSON
Model:	184
Type:	TL 20 N/B - Four wheel rear wheel driven, unit construction
Serial No.:	12 00 773

Engine

Make:	PERKINS
Model:	A 4.236
Type:	4-stroke, direct injection diesel
Serial No.:	236 UA 95990
Cylinders:	4 cylinders, vertical, in-line, 98.42 mm bore x 127 mm stroke, capacity 3865 cm^3, compression ratio 16 : 1, overhead in-line valves, replaceable cast-iron dry cylinder liners.
Fuel system:	Forced feed; DELCO diaphragm-type fuel pump; CAV paper filters, type 7111-296 replaceable cartridge element; capacity of fuel tank 61 litres; CAV model DPA 3241 F 490 injection pump, serial No. 19528 NS; manufacturer's production setting 15.0 to 15.4 l/h at 230.4 rd/s (2200 rev/min) rated engine speed and 15 °C fuel temperature. CAV injector, model BDLL serial No. 150 S 6561; injector setting 171.6 ± 5 bar (175 ± 5 kg/cm^2).
Governor:	CAV mechanical type, incorporated in fuel injection pump; governed range of engine speed 68.1 to 240.9 rd/s (650 to 2300 rev/min); rated engine speed 230.4 rd/s (2200 rev/min).

Air cleaner:	FISPA main cleaner, model 2133.15 oil bath type; oil capacity 0.7 litres; FISPA precleaner centrifugal type, 2073.01 model; recommended oil: SHELL ROTELLA T, viscosity SAE 30.
Lubrication system:	Forced feed from gear-type pump; one screen type filter installed on pump suction and one, PERKINS 2654403 model, replaceable cartridge type filter installed on the pressure line to the engine; oil capacity 7.1 litres; recommended oil change period: 100 hours; cartridge change period: 200 hours; recommended oil: SHELL ROTELLA T, viscosity SAE 30.
Cooling system:	Water cooled from centrifugal pump 0.69 bar (0.7 kg/cm²) with thermostatic control; 406 mm diameter, 4 blade, belt-driven fan; cooling water capacity 15 litres. Temperature visual control with thermometer.
Starting system:	LUCAS make M 45 G model electric motor, 12 V; low temperature starting device (<15 °C), CAV make, MK III C « thermostart » model.

Electrical system

Voltage:	12 V, negative earth.
Generator:	LUCAS make, C 40 A model.
Battery:	SCAINI make, 6 FR 7 M model, lead acid type, capacity 92 Ah at 20 hours rating.

Transmission

Clutch:	LUK make, independent dry dual disc clutch, 279 mm dia plates; driving part pedal operated; p.t.o. part hand lever operated.
Gearbox:	Own make, mechanical type with total 12 forward and 4 reverse speeds; the transmission consists of a 4 forward speeds synchronized gear group in series with a 3 forward and 1 reverse speed sliding gear group; each of two gear groups are operated by own lever.
Rear axle and final drive:	Own make, mechanical type with Gleason crown wheel and pinion; bevel gear type differential with pedal operated and self-disengaging lock; spur gear final drive.
Oil capacity:	Transmission 21 litres; final drives 4 litres each.

Oil change period: 1600 hours.

Recommended oil: Transmission and final drives: MOBIL FLUID 422, viscosity SAE 90.

Gear of 1st group No.	*Combination of 2nd group*	*Number of engine revolutions for one revolution of driving wheels*	*Travelling speed (*) for 230.4 rd/s (2200 rev/min) at rated engine speed*	
			km/h	*m/s*
1	slow	437.028	1.31	0.364
2		283.075	2.03	0.564
3		223.480	2.57	0.714
4		143.027	4.02	1.116
1	intermediate	178.784	3.21	0.892
2		115.803	4.96	1.378
3		91.424	6.28	1.744
4		58.511	9.82	2.728
1	direct	72.783	7.89	2.192
2		47.014	12.22	3.394
3		37.116	15.47	4.297
4		23.754	24.18	6.716
1	reverse	167.646	3.43	0.953
2		108.557	5.29	1.469
3		85.723	6.70	1.861
4		54.843	10.47	2.908

(*) Calculated with the rolling circumference 4352 mm according to manufacturer's specifications

Power take-off

Main p.t.o.: Independent p.t.o. driven through the hand lever operated clutch disc; in centre line at rear of tractor; 650 mm above ground; proportional engine speed or proportional ground speed preselectable by hand lever;

34.9 mm (1 3/8 in) dia according to ISO Standard, 6 spline; two angular speeds preselectable by hand lever: 56.5 rd/s (540 rev/min) and 104.7 rd/s (1000 rev/min) according to ISO Standard.

Proportional engine speeds:
64 rd/s (611 rev/min) and 120.2 rd/s (1148 rev/min) at 230.4 rd/s (2200 rev/min) rated engine speed;

56.5 rd/s (540 rev/min) at 203.6 rd/s (1944 rev/min) engine speed;

104.7 rd/s (1000 rev/min) at 200.6 rd/s (1916 rev/min) engine speed.

Direction of rotation: clockwise viewed facing driving end.

Proportional ground speed:

1 revolution of p.t.o. for approximately 0.44 m and 0.23 m of travel.

Number of p.t.o. revolutions for one revolution of driving wheel: 9.90 and 18.60.

Direction of rotation: clockwise viewed facing driving end with tractor in forward gear.

Auxiliary p.t.o.:

Independent p.t.o.; in centre line at rear of tractor above the main p.t.o. shaft; proportional ground speed; 775 mm above ground; 34.9 mm (1 3/8 in) dia; 6 spline.

This auxiliary p.t.o. is driven by the same disc clutch and operated by the same hand lever of the main p.t.o.

Proportional engine speed:

230.4 rd/s (2200 rev/min) at 230.4 rd/s (2200 rev/min) rated engine speed.

Direction of rotation: anti-clockwise viewed facing driving end.

Proportional ground speed:

1 revolution of p.t.o. for approximately 0.12 m of travel.
Number of p.t.o. revolutions for one revolution of driving wheel 35.76.

Direction of rotation: anti-clockwise viewed facing driving end with tractor in forward gear.

Belt pulley

Optional; not fitted on tractor tested.

Figures according to manufacturer's specification:

— location at rear tractor, fitted on auxiliary p.t.o.; two positions: on right or on left side of auxiliary p.t.o.;

— diameter/width: 240 mm/155 mm;

— speed 144 rd/s (1375 rev/min) at 230.4 rd/s (2200 rev/min) rated engine speed giving 17.25 m/s linear speed;

— engine speed 210.3 rd/s (2008 rev/min) at 15.75 m/s standard belt linear speed;

— direction of rotation: clockwise viewed from tractor right side with pulley connected to the right side of p.t.o.; opposite direction of rotation with pulley connected to the left side p.t.o.

Power lift

Own make hydraulic power lift, unit construction; draught control, position control, floating position; live gear pump directly driven by engine independently from the p.t.o. shaft; oil from independent reservoir supplied to single acting ram cylinder and up to 6 oil tappings for remote drive by supplementary control-valves.

Own make control valve with sensitivity adjuster and lower rate control device.

One screen type filter and a magnetic-plug installed in the suction line.

Oil capacity 21 litres, 6 litres may be taken off by oil tappings; oil change period 1600 hours.

Recommended oil viscosity: SAE 90.

Three point linkage category 2 (ISO R 730).

Swinging drawbar

Own make; clevis type sliding on a drilled guide.

Vertical height to centre of clevis: 2 positions 510 and 560 mm above ground; adjustements obtained by two vertical settings of the drawbar frame; clevis coupling pin diameter 28 mm.

Distance from rear axle: 750 mm; position relative to p.t.o. 500 mm to rear.

Lateral adjustements: 3 positions from 0 to 250 mm per each side.

Pivot position 280 mm rear of the rear wheel centre line.

Hitch

Height above ground 480, 580, 710 and 810 mm; changeable by shifting and reversing hitch; clevis coupling pin diameter 28 mm; distance of hitch hole to rear axle centre 370 mm; position relative to p.t.o. 125 mm to rear.

Steering

CAM GEARS make, worm and peg mechanical type; steering wheel control. Optional, not fitted: DANFOSS make hydraulic power steering.

Brakes

GIRLING make, dual dry disc type on rear axle high speed shafts; independent or combined pedal operated, hand lever with ratchet operating both brakes for parking.

Wheels

Steering wheels: Two at front; PIRELLI « Tractor » 7.50-16, 6 ply rating; maximum permissible weight on each tyre: 745 kg at 2.45 bar (2.50 kg/cm²); track width 1400 mm by 5 steps to 1900 mm obtained by extending front axle.

Driving wheels: Two at rear; PIRELLI « Tractor cinturato » 16.9/14-30, 6 ply rating; maximum permissible weight on each tyre 1935 kg at 1.08 bar (1.10 kg/cm²); W 13" - 30" rim; track width 1400 mm by 5 steps to 1900 mm changed by reversing wheel centres and offset lugs on rims.

Wheelbase: 2240 mm.

Lighting Electrical 12 V, according to D.G.M. italian regulations

	Height above ground of centre cm	*Dimensions* cm	*Distance from outside edge of tractor at 5100 mm rear track-width to centre* cm
Head lights	114.5	11.5 x 11.5	79.5
Side lights	143.5	11.5 x 3.5	22.5
Rear lights	148.5	5.5 x 6.0	32.0
Reflectors	141.5	4.5 x 5.5	17.5

Number of grease points (whole tractor): 13

CONDITIONS DURING TEST

Weights (Tractor weight without driver but with full tank and safety frame)

	Front kg	*Rear* kg	*Total* kg
Without ballast	920	1430	2350
With ballast	1240	2160	3400

Ballast

	No. of weights	*Total weight (excluding water)* kg	*Water* kg
Front wheels	—	—	—
Front weight	8	260	—
Rear wheels	4	250	540

Track width during test: front 1400 mm, rear 1500 mm

Overall dimensions

	Length	*Width* m		*Height* m	
	m	*max.*	*min.*	*(1)*	*(2)*
With ballast	3.93	2.33	1.94	2.26	2.31
Without ballast	3.62	2.33	1.82	2.26	2.31

Remarks:

— length measured from ballast end to lower link end in horizontal position

— (1) height measured at top of vertical exhaust pipe

— (2) height measured at top of the safety frame 2.31 m

— ground clearance 0,44 m measured at hitch support.

Seat

FRITZMEIER S 7030 model; upholstered cushion and back rest; parallelogram linkage with spring and air damper adjustable for driver's weight;
longitudinal adjustment 105 mm, vertical adjustment 55 mm.

Safety frame
(Optional)

Own make, MFL « TS1 » model; O.E.C.D. report no. CS 357, approved in date 14th February 1974.

FUEL AND LUBRICANTS USED IN TESTS

Laboratory and track tests

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

Engine oil: SHELL ROTELLA T, viscosity SAE 30.

Transmission and power lift oil: MOBIL FLUID 422, viscosity SAE 90.

COMPULSORY TESTS

1. Power take-off performance

Date and location of tests: 24th September 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						
48.1 (65.4)	230.4 (2200)	64.0 (611)	15.19	12.62	262 (193)	3.17 (4.31)
B - AT STANDARD P.T.O. SPEED - 56.5 rd/s (540 rev/min)						
45.9 (62.4)	203.6 (1944)	56.5 (540)	14.04	11.67	254 (187)	3.27 (4.44)
C - AT THE SPEED RECOMMENDED BY MANUFACTURER FOR DRAWBAR WORK						
48.1 (65.4)	230.4 (2200)	64.0 (611)	15.19	12.62	262 (193)	3.17 (4.31)
D - AT PART LOADS						
(i) 85% of the torque at maximum power						
42.1 (57.2)	236.8 (2261)	65.8 (628)	13.29	11.04	262 (193)	3.17 (4.31)
(ii) unloaded						
—	240.9 (2300)	—	4.33	3.60	—	—
(iii) 50% of the load defined in (i)						
21.1 (28.7)	237.5 (2268)	66.0 (630)	8.09	6.72	318 (234)	2.61 (3.55)
(iv) maximum power						
48.1 (65.4)	230.4 (2200)	64.0 (611)	15.19	12.62	262 (193)	3.17 (4.31)
(v) 25% of the load defined in (i)						
8.7 (11.8)	239.8 (2290)	66.6 (636)	5.92	4.92	566 (417)	1.47 (1.99)
(vi) 75% of the load defined in (i)						
31.3 (42.5)	234.5 (2239)	65.1 (622)	10.28	8.54	273 (201)	3.04 (4.13)

No load, maximum engine speed: 241.4 rd/s (2305 rev/min)

Equivalent crankshaft torque at maximum power: 208.9 mN (21.30 mkg)

Maximum equivalent crankshaft torque: 246.7 mN (25.16 mkg) at 136.11 rd/s (1300 rev/min)

Mean atmospheric conditions:
temperature 26.5 °C
pressure 998.0 mbar (748.5 mmHg)
relative humidity 63 %

Maximum temperatures:
coolant 86 °C
engine oil 125 °C
fuel 29 °C
engine air intake 28 °C

2. Drawbar performance (Massey Ferguson 184 Diesel Tractor)

Date and location of tests: 28th January, 11th - 12th and 23rd February 1976 - L.M.A. - Turin (Italy)
Type of track: concrete
Height of draught line above ground: 710 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	1.19	0.33	9.3 (12.7)	28250 (2880)	238.9 (2282)	15.0	—	—	—	64	100	— 2.5	82	981.8 (736.5)
2 slow	1.80	0.50	14.1 (19.2)	28250 (2880)	237.7 (2270)	15.0	—	—	—	64	100	3.0	45	981.0 (736.0)
3 slow	2.27	0.63	17.8 (24.2)	28250 (2880)	236.7 (2260)	15.0	2.17 (2.94)	384 (282)	20	64	100	3.0	38	981.0 (736.0)
1 inter.	2.84	0.79	22.3 (30.3)	28250 (2880)	236.4 (2257)	15.0	2.37 (3.22)	349 (258)	20	68	100	3.0	35	981.0 (736.0)
4 slow	3.50	0.97	27.4 (37.3)	28250 (2880)	233.0 (2225)	15.0	2.52 (3.43)	330 (242)	20	74	102	4.0	35	981.0 (736.0)
2 inter.	4.32	1.20	33.8 (45.9)	28150 (2870)	233.2 (2227)	15.0	2.64 (3.58)	315 (232)	20	74	104	4.5	40	981.0 (736.0)
3 inter.	5.72	1.59	41.4 (56.3)	26050 (2655)	234.2 (2236)	11.0	2.75 (3.75)	302 (222)	20	78	108	3.5	45	981.0 (736.0)
1 dir.	7.31	2.03	43.8 (59.7)	21600 (2205)	231.4 (2210)	7.6	2.86 (3.90)	290 (213)	20	82	115	— 3.0	72	981.0 (736.0)
4 inter.	9.22	2.56	42.6 (58.1)	16650 (1700)	232.4 (2219)	6.6	2.77 (3.78)	300 (220)	20	85	115	— 1.0	65	981.0 (736.0)
2. FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER														
3 inter.	5.90	1.64	32.0 (43.5)	19525 (1990)	232.7 (2222)	6.5	2.79 (3.80)	298 (219)	20	60	105	3.5	70	984.4 (738.5)
(*) 3. FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (1)														
2 inter.	—	—	—	28250 (2880)	232.5 (2220)	—	—	—	—	60	105	5.0	55	985.8 (739.5)
4. MAXIMUM POWER (unballasted)														
3 inter.	5.44	1.51	32.6 (44.3)	21575 (2200)	232.2 (2217)	15.0	2.64 (3.58)	315 (232)	20	64	105	12.0	52	1002.4 (752.0)
1 dir.	6.91	1.92	41.4 (56.3)	21575 (2200)	234.5 (2239)	14.9	2.71 (3.68)	307 (226)	20	64	110	7.0	80	1002.4 (752.0)
4 inter.	9.14	2.54	43.9 (59.6)	17275 (1760)	231.3 (2209)	6.3	2.89 (3.93)	287 (212)	20	64	105	4.0	93	1002.4 (752.0)
2 dir.	11.59	3.22	43.6 (59.2)	13525 (1380)	230.9 (2205)	4.3	2.85 (3.87)	291 (216)	20	70	105	13.0	45	1002.4 (752.0)

Total oil consumption during 10 hours duration of tests (2) and (3): 60 g/h
(*) Those figures not quoted are irrelevant due to the additional ballast

3. Turning space and turning circle

Wheel equipment:	front 7.50-16 rear 16.9/14-30
Track of wheels:	front 1400 mm rear 1500 mm

	With brakes		*Without brakes*	
	Right-hand *m*	*Left-hand* *m*	*Right-hand* *m*	*Left-hand* *m*
Radius of turning space	3.42	3.55	3.85	3.98
Radius of turning circle	3.29	3.42	3.72	3.85

4. Location of centre of gravity

Height above ground	mm	794
Distance forward from the vertical plane containing the axis of the rear wheels	mm	836
Distance from the median plane of the tractor	mm	0

5. Braking

Date of tests:	13th February 1976
Type of track:	concrete
Type of decelerometer:	MOTO METER, recording type
Weight of tractor with driver:	— with ballast 3470 kg — without ballast 2420 kg

Cold brakes

		With ballast	*Without ballast*
Travelling speed of tractor	km/h	25.00	25.00
Max. deceleration	m/s^2	4.25	4.15
Stopping distance	m	7.00	7.60
Force exerted on the brake pedal	N (kg)	411.9 (42)	362.8 (37)
Force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2	N (kg)	294.2 (30)	196.1 (20)

Brake fade characteristics (hot tests)

	With ballast	Without ballast
[Maximum deceleration hot/maximum deceleration cold] x 100	85%	90%
[Stopping distance cold/stopping distance hot] x 100	86%	93%
[Force on pedal cold/force pedal hot] x 100	111%	100%

Parking brake

Efficiency of handbrake on a slope of 16 per cent: with a 196.1 N (20 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 tests: 23rd February 1976

Type of sound level meter: BRÜEL & KJAER model 2209

Type of track: concrete

Position of the exhaust pipe: vertical

Results of tests

— gear number: 4th dir.

— travelling speed before acceleration: 18.63 km/h

— sound level: 85.5 dB (A)

7. Noise measurement at the driver's ear level

Date of tests: 23rd February 1976

Type of sound level meter and octave filter: BRÜEL & KJAER model 2209 and model 1613

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*
1st dir. (*)	7.30	98	118

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

Remarks: With frame fitted on the tractor

8. Power lift and hydraulic pump performance

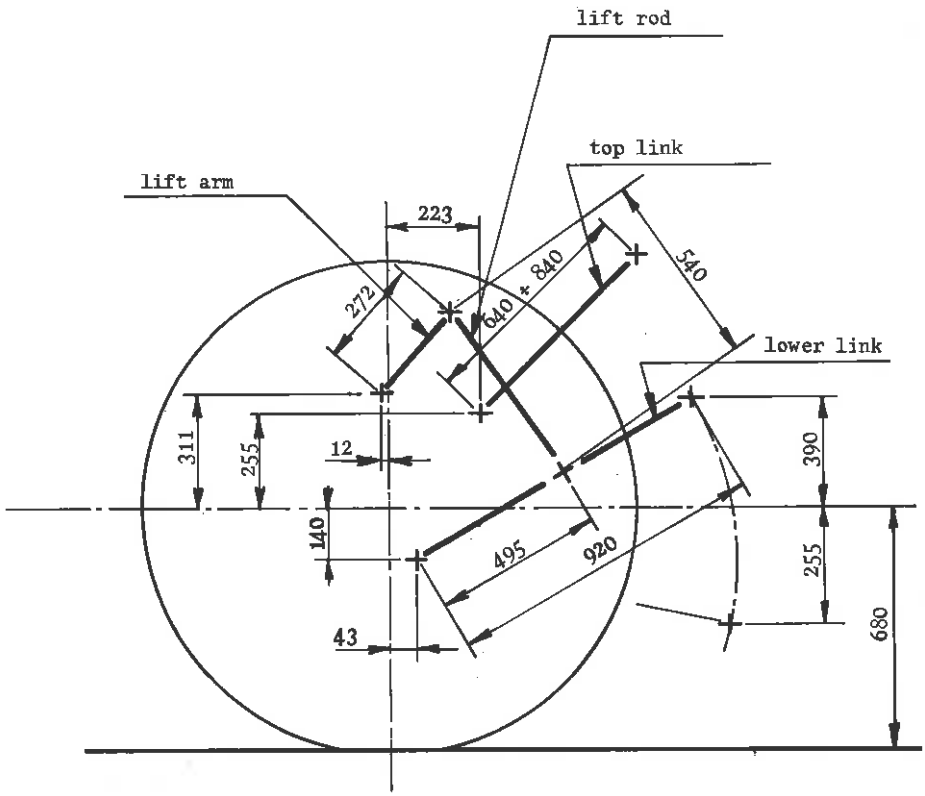
Date of tests:	25th February 1976
Hydraulic fluid:	MOBIL FLUID 422, viscosity SAE 90
— opening pressure of the cylinder over pressure relief valve:	186.3 bar (190 kg/cm²)

Pump characteristics

1 - opening pressure of the relief valve:	166.7 bar (170 kg/cm²)
- substained pressure by the open relief valve:	176.5 bar (180 kg/cm²)
2 - pump delivery rate at minimum pressure and rated engine speed:	28 l/min
3 - pump delivery rate:	26.5 l/min
- delivery pressure:	166.7 bar (170 kg/cm²)
- hydraulic power:	7.3 kW (9.9 metric hp)

Power lift

Dimensions of linkage geometry for the table on page 16.



LINKAGE GEOMETRY WHEN CONNECTED TO THE STANDARD FRAME

		Maximum mechanical advantage
Projected length in side view		
— lower links	mm	920
— lift arms	mm	272
— lift rods	mm	540
— top link	mm	725
Distance of lift rod connection point from pivot point of lower link	mm	451

The following dimensions are given relative to the rear axle centre line 680 mm above the ground level

Lower link pivot point	43 mm behind, 140 mm below
Top link pivot point	223 mm behind, 255 mm above
Lift arm pivot point	12 mm before, 311 mm above
Maximum and minimum height of lower link hitch points	390 mm above, 255 mm below
Height of lower link hitch points when locked in transport position	no lock for transport position

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

			cm	— 11,5	— 5	0	+ 5	+ 10	+ 15	+ 20	+ 25	+ 30	+ 35	+ 40	+ 45	+ 50	+ 53
Lifting force at hitch points	max. mech. advantage	N		16675	19025	19650	20250	20750	21325	21475	21575	21675	21775	21975	22175	22400	—
		kg		(1700)	(1940)	(2005)	(2065)	(2115)	(2175)	(2190)	(2200)	(2210)	(2220)	(2240)	(2260)	(2285)	—
	min. mech. advantage	N		—	—	—	—	—	—	—	—	—	—	—	—	—	—
		kg		—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Maximum force exerted through whole range: 16675 N (1700 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. advantage	N		18250	18975	19225	19025	19025	18925	18475	18250	18000	17250	16675	15300	14900	14325
		kg		(1860)	(1935)	(1960)	(1940)	(1940)	(1930)	(1885)	(1860)	(1835)	(1760)	(1700)	(1560)	(1520)	(1460)
	min. mech. advantage	N		—	—	—	—	—	—	—	—	—	—	—	—	—	—
		kg		—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Maximum force exerted through whole range: 14325 N (1460 kg)																
	Force at which front of tractor is calculated to lift with maximum allowable front ballast: 16675 N (1700 kg)																

All values of forces correspond to the pressure at maximum hydraulic power 166.7 bar (170 kg/cm²) calculated from measurements made at maximum oil pressure 176.5 bar (180 kg/cm²)

OPTIONAL TESTS

9. Engine tests

Date and location of tests: 15th September 1975 - L.M.A. - Turin (Italy)
Type of dynamometer: Electrical, swinging frame

Power	*Engine speed*	*Fuel consumption*			*Specific energy*
		Total		*Specific*	
kW (metric hp)	*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					
51.4 (69.9)	230.4 (2200)	15.31	12.72	247 (182)	3.36 (4.56)
B - AT STANDARD P.T.O. SPEED - 56.5 rd/s (540 rev/min)					
48.9 (66.5)	203.6 (1944)	14.15	11.76	240 (177)	3.46 (4.70)
C - AT THE SPEED RECOMMENDED BY MANUFACTURER FOR DRAWBAR WORK					
51.4 (69.9)	230.4 (2200)	15.31	12.72	247 (182)	3.36 (4.57)
D - AT PART LOADS					
(i) 85% of the torque at maximum power					
45.0 (61.1)	237.1 (2264)	13.43	11.16	248 (183)	3.35 (4.55)
(ii) minimum load					
3.0 (4.2)	239.8 (2285)	4.62	3.84	1280 (925)	0.65 (0.91)
(iii) 50% of the load defined in (i)					
22.5 (30.8)	237.1 (2264)	8.09	6.72	299 (220)	2.78 (3.81)
(iv) maximum power					
51.4 (69.9)	230.4 (2200)	15.31	12.72	247 (182)	3.36 (4.56)
(v) 25% of the load defined in (i)					
11.3 (15.4)	239.1 (2273)	5.92	4.92	435 (319)	1.90 (2.60)
(vi) 75% of the load defined in (i)					
33.5 (45.5)	235.1 (2245)	10.40	8.64	258 (190)	3.22 (4.38)

No load, maximum engine speed: 240.9 rd/s (2300 rev/min)

Crankshaft torque at max. power: 223.1 mN (22.75 mkg)

Maximum equivalent crankshaft torque: 265.8 mN (27.1 mkg) at 136.1 rd/s (1300 rev/min)

Mean atmospheric conditions:
temperature 23 °C
pressure 991 mbar (743.5 mmHg)
relative humidity 68 %

Maximum temperatures:
coolant 76 °C
engine oil 115 °C
fuel 20 °C
engine air intake 28 °C

ADDITIONAL TESTS OF THE TRACTOR EQUIPPED WITH FRONT DRIVING AXLE

MASSEY FERGUSON 184-4 DIESEL TRACTOR

Characteristics that may vary due to the fitting of the front driving axle are only given hereunder.

Front axle and final drive

Own make, mechanical type with Gleason crown wheel and pinion, bevel gear type differential, epicyclic unit final drives.

oil capacity:

Differential casing: 4.5 litres
Final drive units: 1.8 litres each
Oil change period: 1200 hours
Oil viscosity: SAE 90 EP

Gear of 1st group No.	*Combination of 2nd group*	*Number of engine revolutions for one revolution of driving wheels*	*Travelling speed (*) for 230.4 rd/s (2200 rev/min) at rated engine speed*	
			km/h	*m/s*
1	slow	315.909	1.35	0.375
2		204.492	2.09	0.581
3		161.397	2.65	0.736
4		103.329	4.13	1.147
1	intermediate	129.135	3.31	0.919
2		83.659	5.10	1.417
3		66.048	6.46	1.794
4		42.258	10.10	2.806
1	direct	52.426	8.14	2.261
2		33.957	12.57	3.492
3		26.814	15.92	4.422
4		17.161	24.88	6.911
1	reverse	121.112	3.52	0.978
2		78.425	5.44	1.511
3		61.929	6.89	1.914
4		39.620	10.77	2.992

(*) Calculated with the rolling circumference 3234 mm according to manufacturer's specifications

Wheels

Two front driving and steering wheels; PIRELLI « Tractor agricolo » 11.2/10-24, 4 ply rating, W 10-24" rim; maximum permissible weight on each tyre 845 kg at 1.18 bar (1.20 kg/cm²); track width 1530 mm.
Two rear driving wheels; PIRELLI « Tractor cinturato » 16.9/14-30, 6 ply rating, W 13"-30" rim; maximum permissible weight on each tyre 1925 kg at 1.08 bar (1.10 kg/cm²); track width 1400 mm by 5 steps to 1900 mm changed by reversing wheel centres and offset lugs on rims.

Wheelbase: 2210 mm

Lighting

Electrical 12 V, according to D.G.M. italian regulations

	Height above ground of centre *cm*	*Dimensions* *cm*	*Distance from outside edge of tractor at 1500 mm rear track-width to centre* *cm*
Head lights	113.5	11.5 x 11.5	79.5
Side lights	149.5	11.5 x 3.5	22.5
Rear lights	151.0	5.5 x 6.0	32.0
Reflectors	144.5	4.5 x 5.5	17.5

Weights (Tractor weight without driver but with full tank and safety frame)

	Front *kg*	*Rear* *kg*	*Total* *kg*
Without ballast	1130	1430	2560
With ballast	1640	2140	3780

Ballast

	No. of weights	*Total weight (excluding water)* *kg*	*Water* *kg*
Front wheels	—	—	180
Front weights	8	260	—
Rear wheels	4	250	530

Overall dimensions

	Lenght *m*	*Width* *m*		*Height* *m*	
		max.	*min.*	*(1)*	*(2)*
With ballast	3.93	2.33	1.94	2.26	2.31
Without ballast	3.74	2.33	1.82	2.26	2.31

Remarks:

— length measured from ballast end to lower link end in horizontal position

— (1) height measured at top of vertical exhaust pipe

— (2) height measured at top of safety frame

— ground clearance 0.39 m measured at front differential casing.

Turning space and turning circle

Wheel equipment: front 11.2/10-24
rear 16.9/14-30

Track of wheels: front 1530 mm
rear 1500 mm

	With brakes		*Without brakes*	
	Right-hand *m*	*Left-hand* *m*	*Right-hand* *m*	*Left-hand* *m*
Radius of turning space	3.21	3.06	5.01	4.86
Radius of turning circle	3.07	2.92	4.87	4.72

2. Drawbar performance on tractor equipped with front driving axle (Massey Ferguson 184-4 Diesel Tractor)

Date and location of tests: 20th and 21st April 1977 - L.M.A. - Turin (Italy)
Type of track: concrete
Height of draught line above ground: 480 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	1.21	0.337	11.2 (15.2)	33343 (3400)	238.1 (2274)	13.4	—	—	—	70	100	10.0	98	999.8 (750.0)
2 slow	1.84	0.512	17.2 (23.3)	33539 (3420)	236.8 (2261)	14.6	—	—	—	72	100	10.0	98	999.8 (750.0)
3 slow	2.35	0.653	21.8 (29.6)	33343 (3400)	235.6 (2250)	13.2	2.24 (3.04)	372 (274)	15	72	105	12.0	70	999.8 (750.0)
1 inter.	2.88	0.800	27.0 (36.7)	33735 (3440)	233.6 (2231)	14.6	2.44 (3.32)	340 (250)	15	76	107	12.0	70	999.8 (750.0)
4 slow	3.57	0.992	33.4 (45.4)	33637 (3430)	232.4 (2219)	15.0	2.63 (3.57)	316 (232)	15	76	107	13.1	65	999.8 (750.0)
2 inter.	4.58	1.271	40.4 (55.0)	31774 (3240)	232.9 (2224)	10.8	2.71 (3.69)	307 (225)	15	76	107	13.1	65	999.8 (750.0)
3 inter.	6.05	1.681	42.5 (57.7)	25252 (2575)	231.2 (2208)	5.5	2.77 (3.76)	300 (221)	15	78	110	15.0	50	999.8 (750.0)
1 dir.	7.66	2.128	42.8 (58.2)	20104 (2050)	230.0 (2196)	4.1	2.80 (3.81)	296 (218)	15	78	110	15.0	50	999.8 (750.0)
4 inter.	9.55	2.653	41.9 (57.0)	15789 (1610)	230.2 (2198)	3.9	2.75 (3.74)	303 (222)	15	80	115	15.6	60	999.8 (750.0)
2 dir.	11.99	3.331	42.6 (58.0)	12798 (1305)	229.7 (2193)	2.9	2.81 (3.82)	296 (217)	15	80	110	15.6	60	999.8 (750.0)
2. MAXIMUM POWER (unballasted)														
4 slow	3.58	0.995	25.1 (34.1)	25252 (2575)	232.8 (2223)	15.0	2.38 (3.24)	349 (257)	15	72	98	13.0	65	1002.2 (751.8)
2 inter.	4.52	1.255	30.8 (41.9)	24517 (2500)	231.1 (2207)	11.5	2.52 (3.43)	330 (242)	15	72	98	13.0	65	1002.2 (751.8)
3 inter.	5.69	1.581	39.2 (53.3)	24811 (2530)	231.4 (2210)	12.4	2.63 (3.58)	316 (232)	15	77	102	13.0	65	1002.2 (751.8)
1 dir.	7.50	2.083	43.6 (59.3)	20937 (2135)	230.7 (2203)	6.9	2.59 (3.52)	288 (212)	15	77	102	13.0	65	1002.2 (751.8)
4 inter.	9.41	2.614	43.1 (58.6)	16475 (1680)	228.7 (2184)	4.9	2.85 (3.87)	292 (215)	15	80	107	13.0	65	1002.2 (751.8)
2 dir.	11.96	3.322	43.3 (58.9)	13043 (1330)	231.0 (2206)	3.7	2.85 (3.87)	291 (214)	15	80	107	13.0	65	1002.2 (751.8)

OFFICER IN CHARGE
(R. Gioia)

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

Turin, 30th May 1978

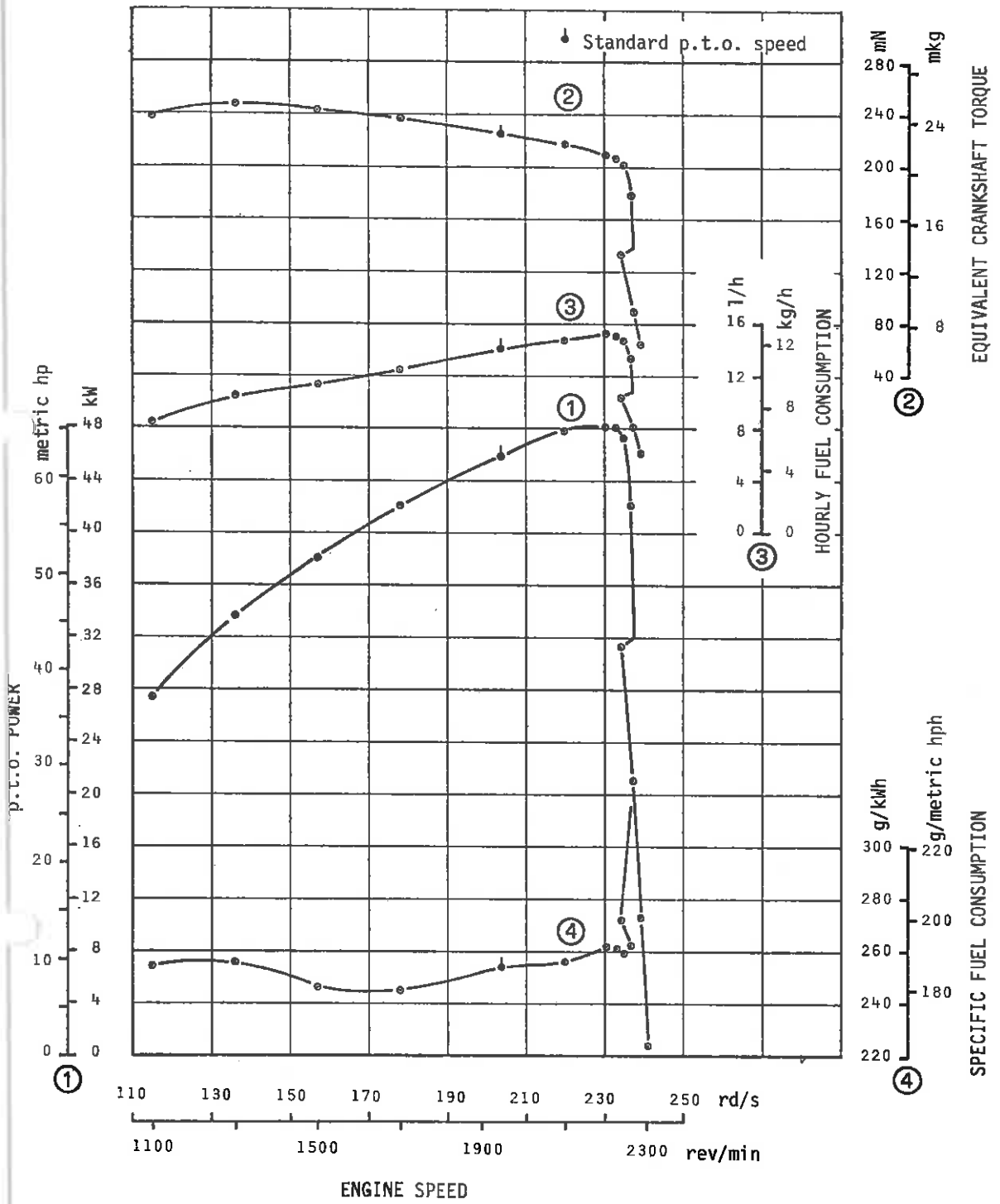


FIG. 1 - POWER TAKE-OFF TEST

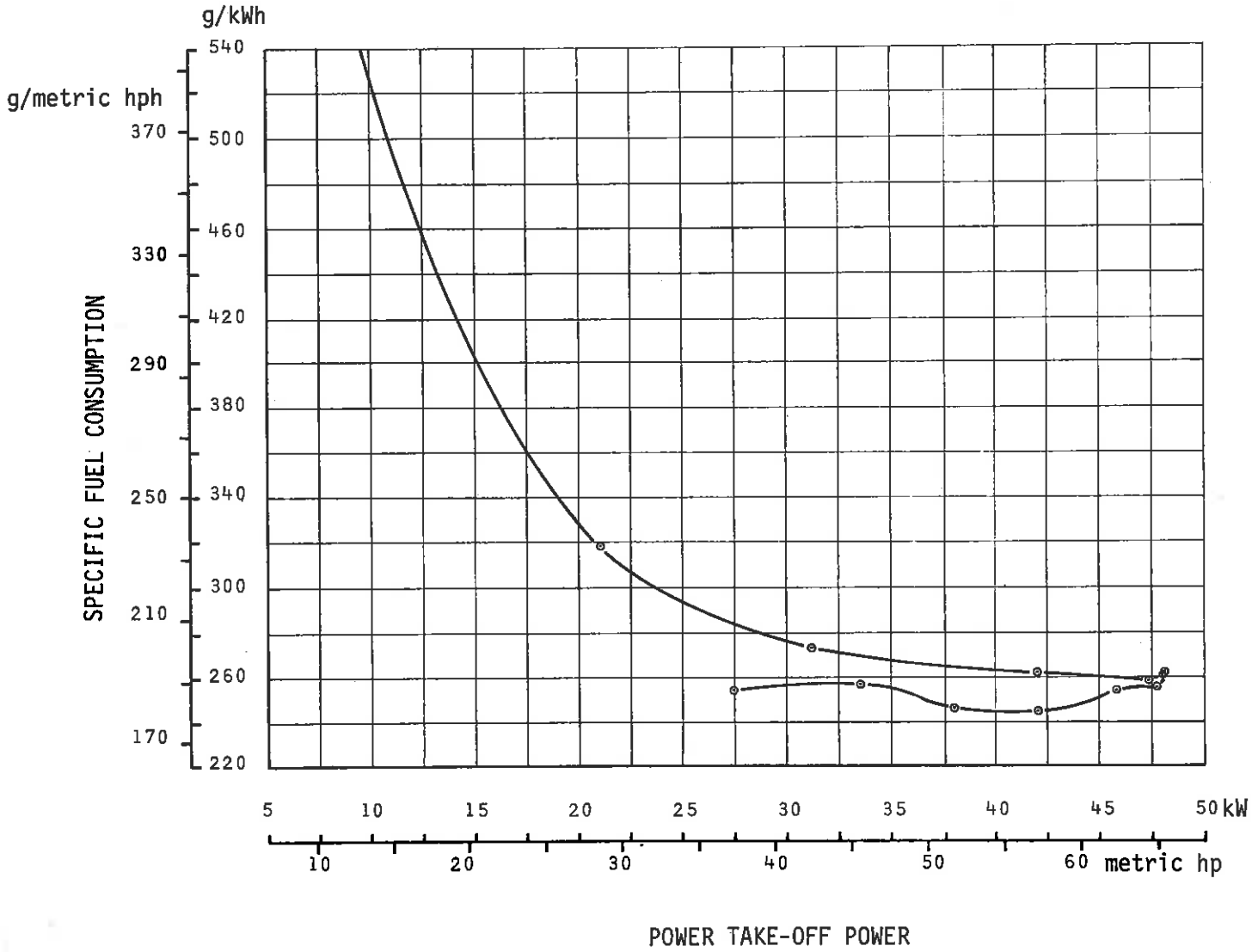


FIG. 2 - POWER TAKE-OFF TEST

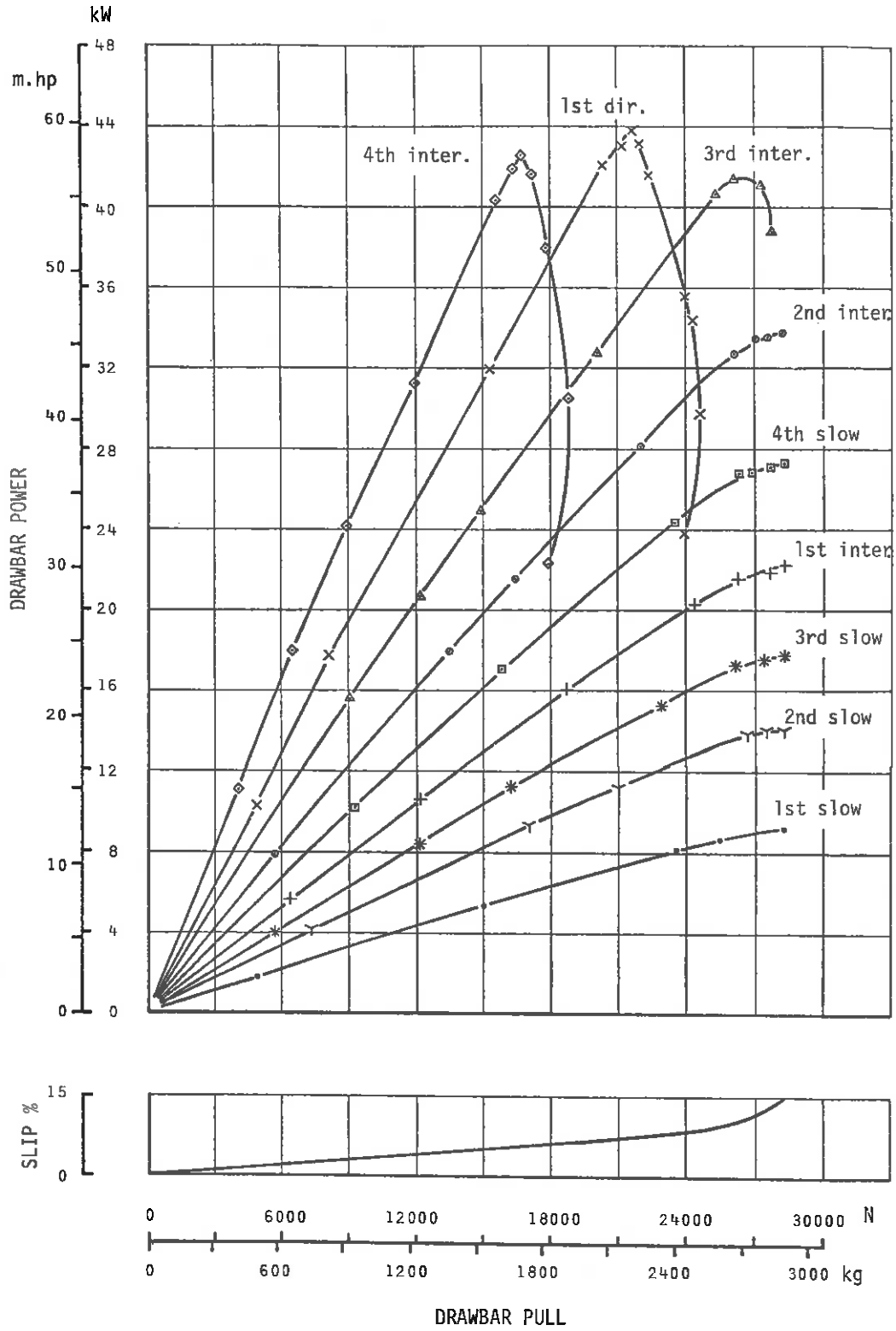


FIG. 3 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 184 Diesel Tractor)

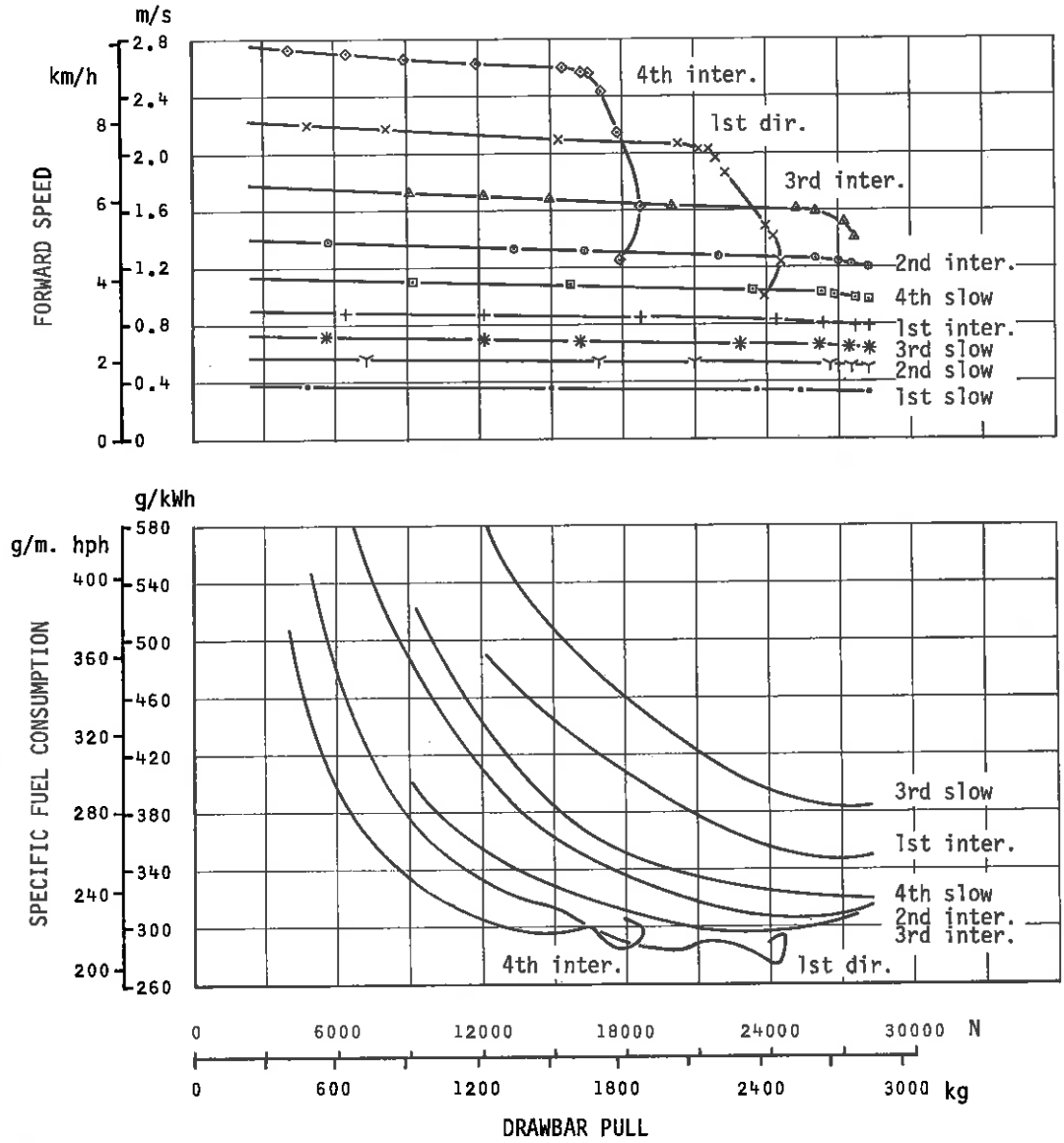


FIG. 4 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 184 Diesel Tractor)

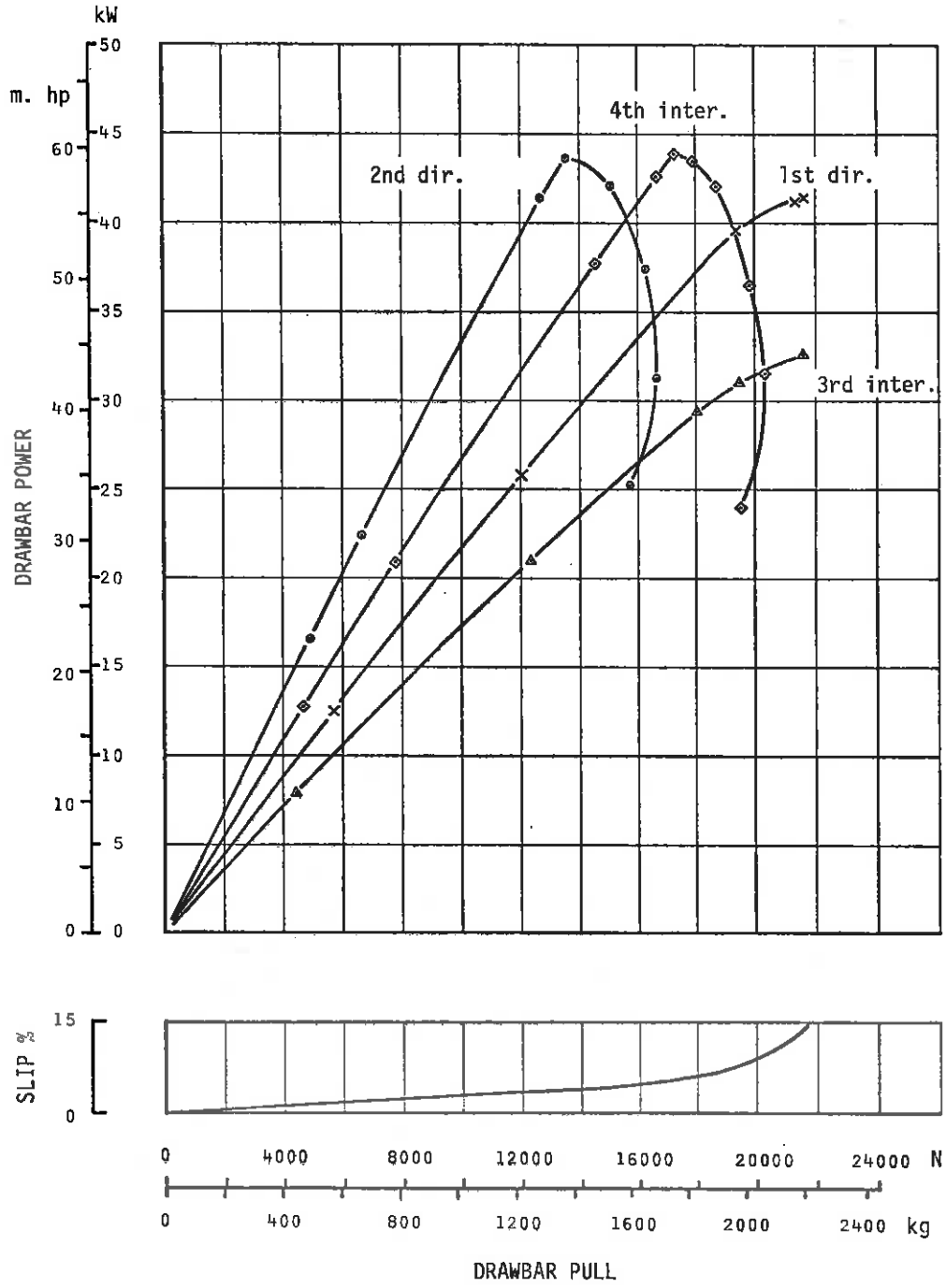


FIG. 5 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 184 Diesel Tractor)

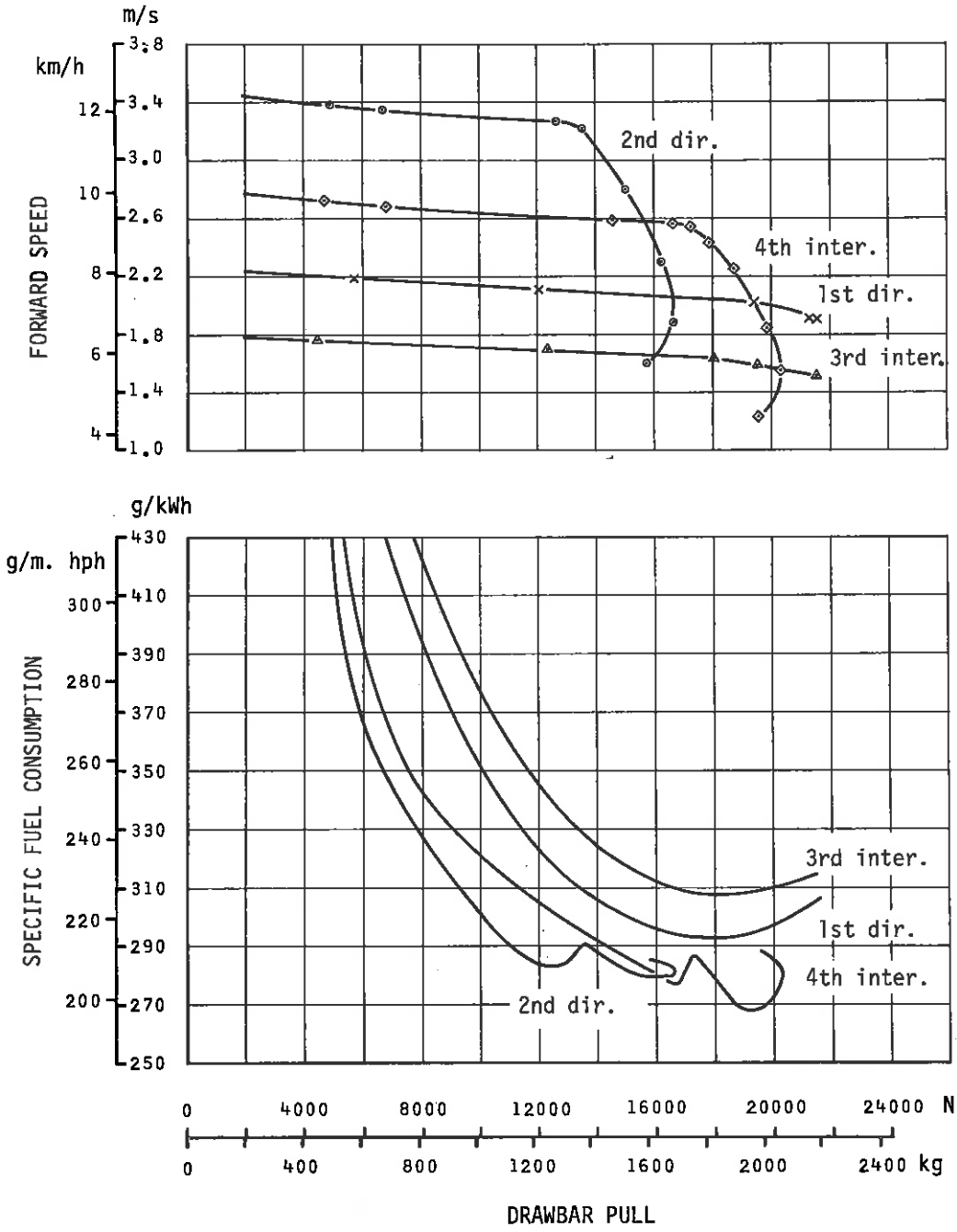


FIG. 6 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 184 Diesel Tractor)

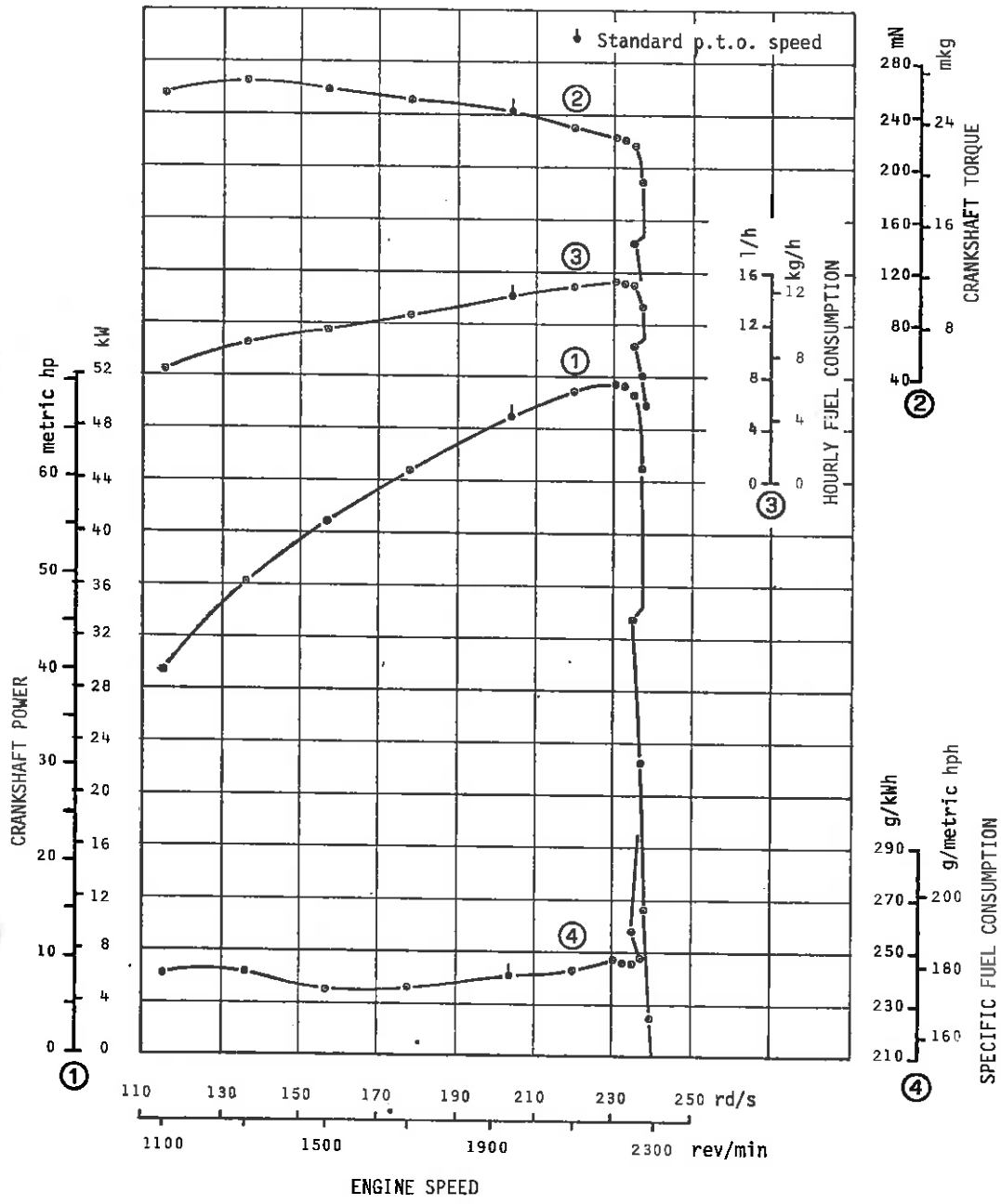


FIG. 7 - ENGINE TEST

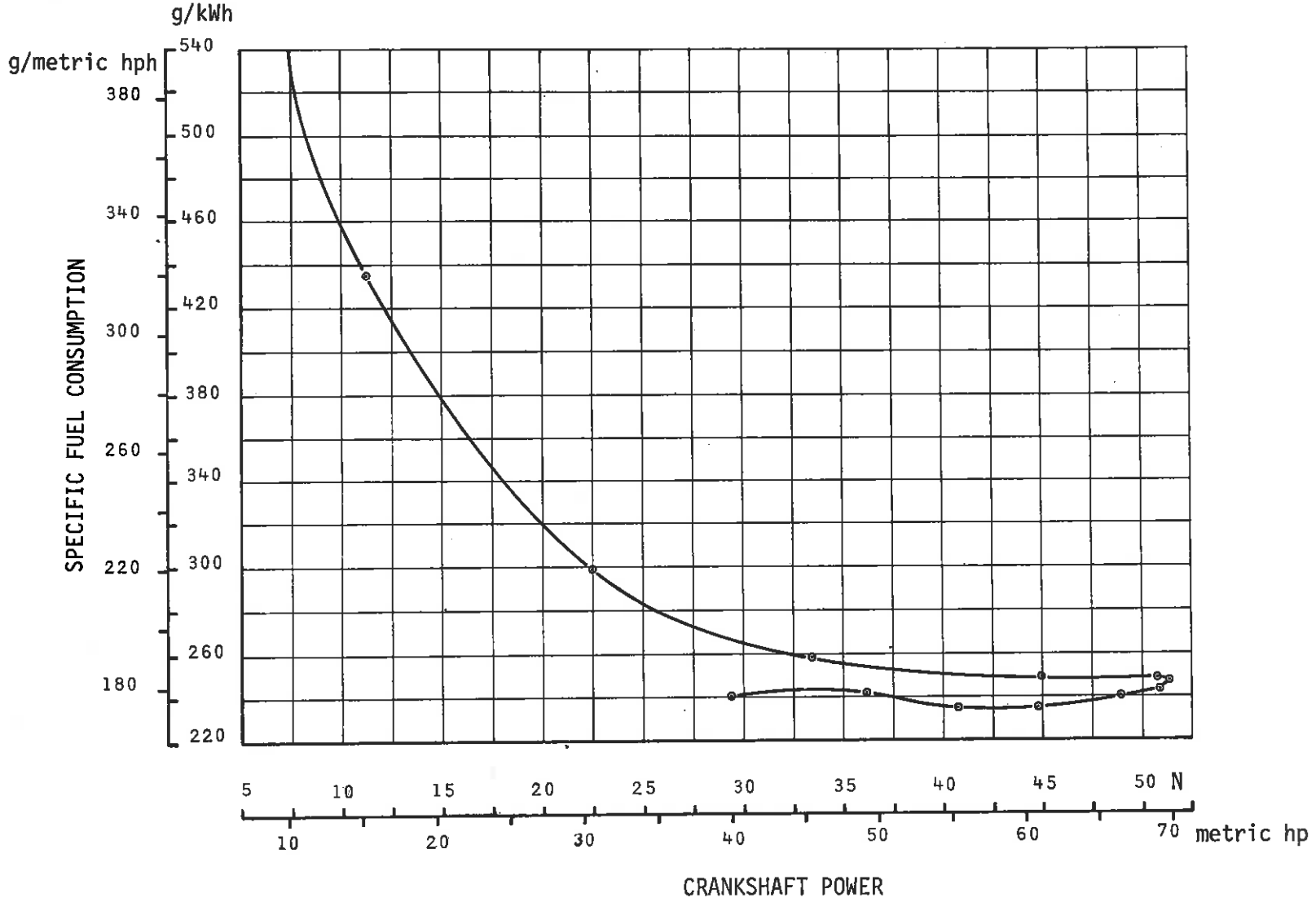


FIG. 8 - ENGINE TEST

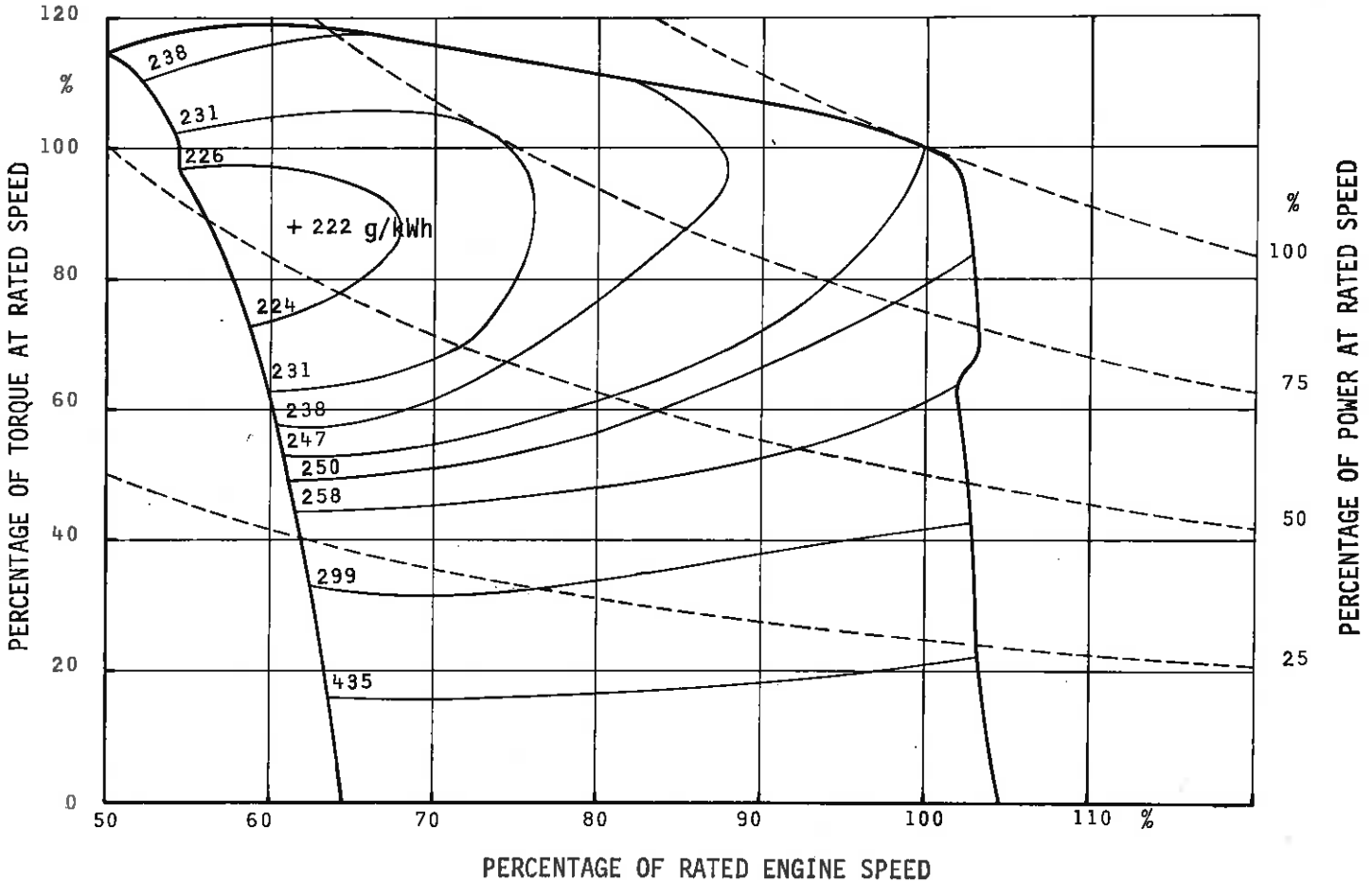


FIG. 9 - ENGINE TEST

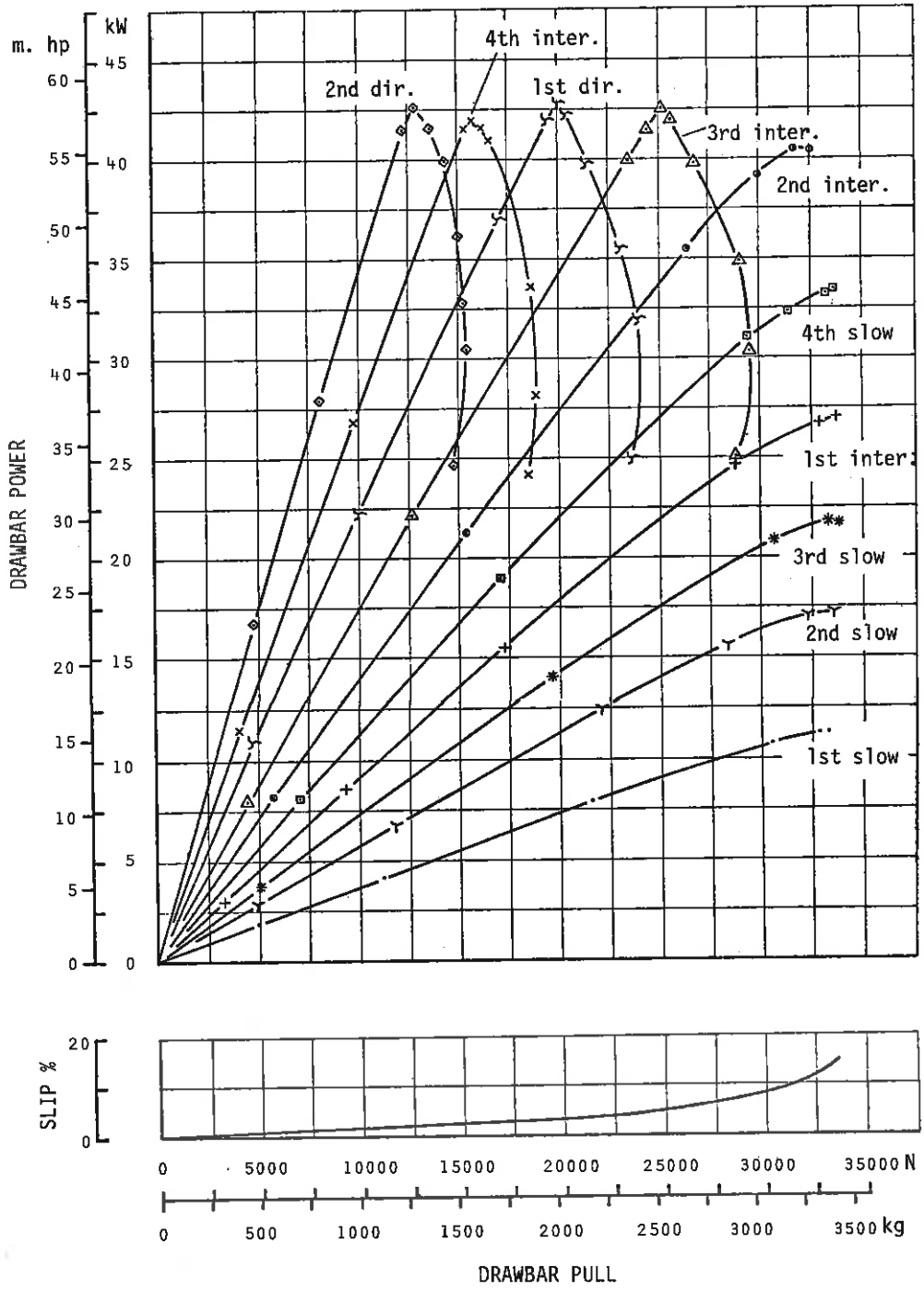


FIG. 10 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 184-4 Diesel Tractor)

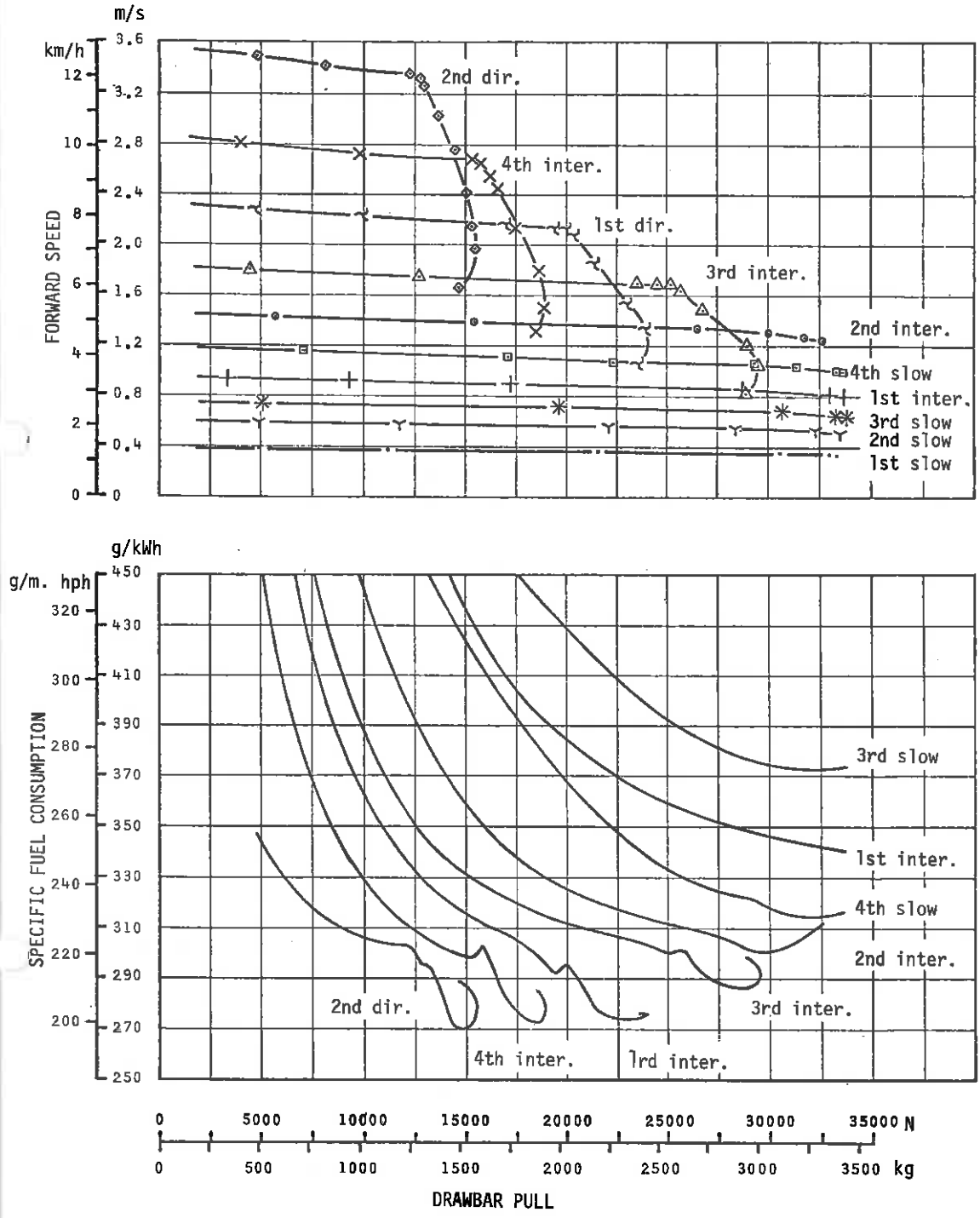


FIG. 11 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 184-4 Diesel Tractor)

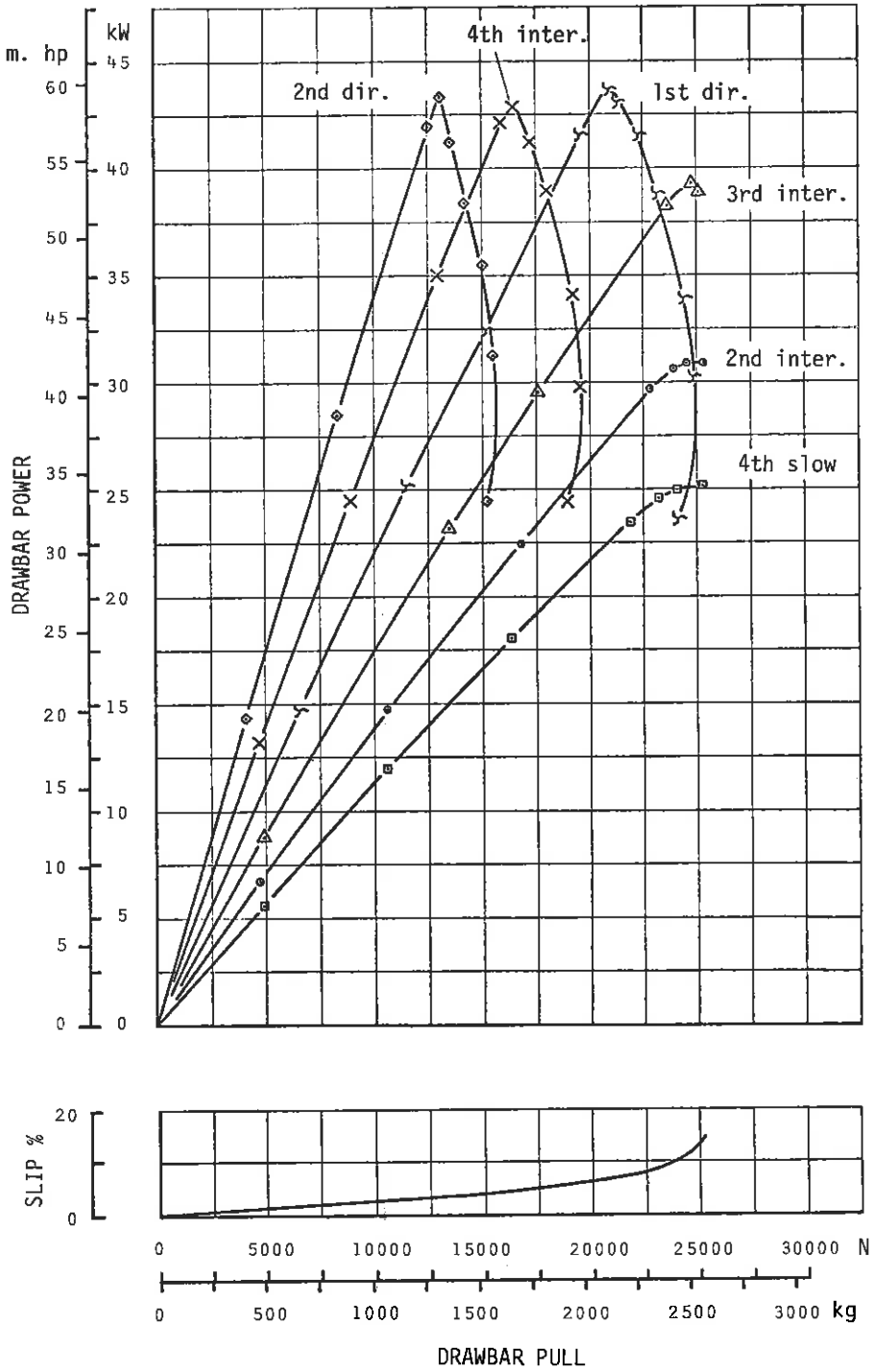


FIG. 12 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 184-4 Diesel Tractor)

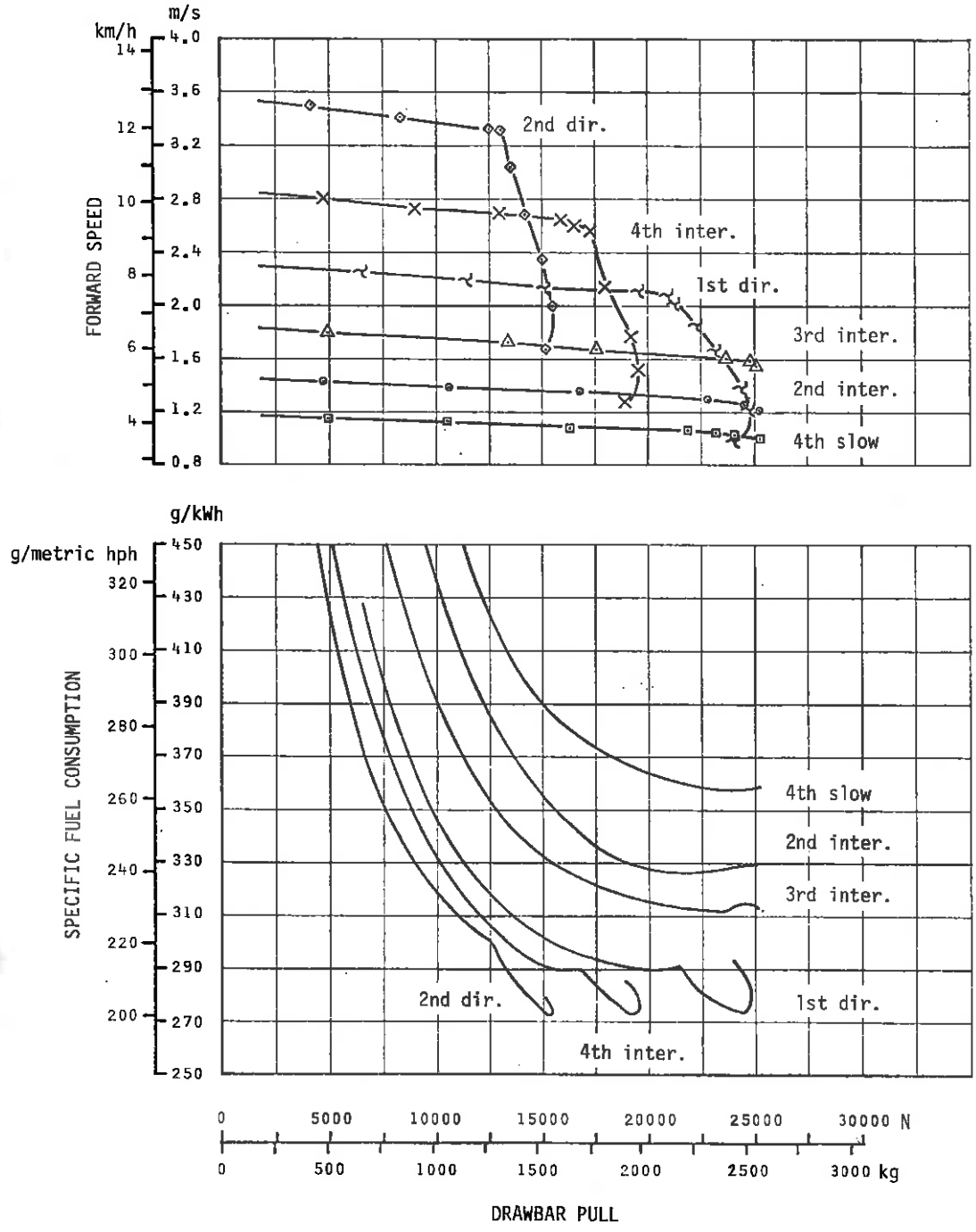


FIG. 13 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 184-4 Diesel Tractor)