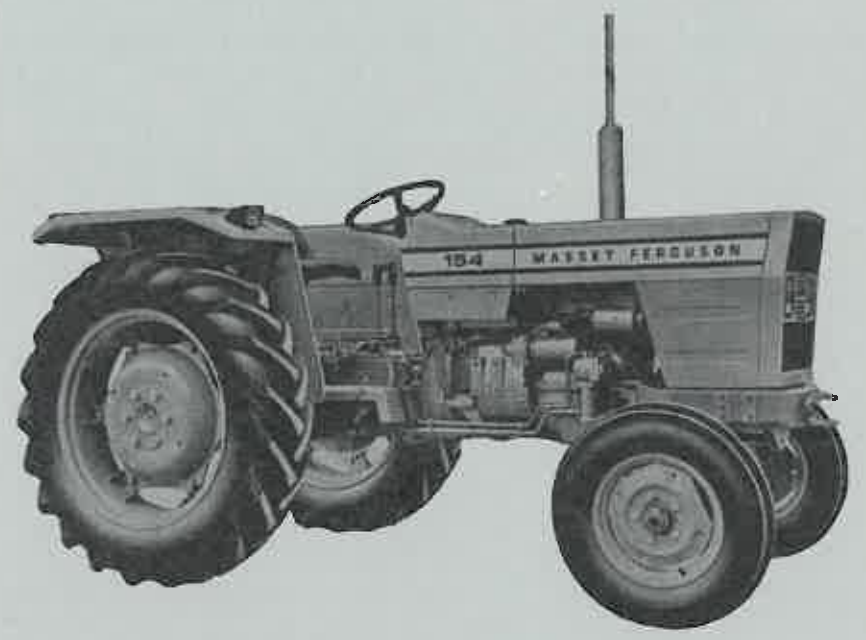
COMITATO PER L'OMOLOGAZIONE
DELLE MACCHINE AGRICOLE

REPORT No. 553

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

MASSEY FERGUSON 154 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: April-May 1976

« This report has been approved by the Coordinating Center for the implementation of the O.E.C.D. Code for the official testing of agricultural tractors on the 19th of July 1977, under no. 553 ».

« The MASSEY FERGUSON 154 tractor and the LANDINI R 5500 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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PERFORMANCE CURVES

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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:	154
Type:	TL 22 N/A - Four wheel rear wheel driven, unit construction
Serial No.:	12 21 126

Engine

Make:	PERKINS
Model:	A D3.152 S
Type:	4-stroke, direct injection diesel
Serial No.:	152 UA 231 81 DSL
Cylinders:	3 cylinders, vertical, in-line, 91.44 mm bore x 127 mm stroke, capacity 2502 cm^3, compression ratio 17.4 : 1, overhead in-line valves, replaceable cast-iron dry cylinder liners.
Fuel system:	Forced feed; DELCO diaphragm-type pump; CAV paper filters, 7111-296 model replaceable cartridge element; capacity of fuel tank 61 litres; CAV injection pump DPA 3233 F 520 model, serial No. 5020 DTS; manufacturer's production setting 9.8 to 10.2 l/h at 235.6 rd/s (2250 rev/min) rated engine speed and 15 °C fuel temperature. CAV injector, BDLL model, serial No. 150 S 6602; injector setting 166.7 ± 5 bar (170 ± 5 kg/cm^2).
Governor:	CAV mechanical type, incorporated in fuel injection pump; governed range of engine speed 68.1 to 252.4 rd/s (650 to 2410 rev/min); rated engine speed 235.6 rd/s (2250 rev/min).

Air cleaner:	FISPA main cleaner, 2132.17 model oil bath type; oil capacity 0.5 litres; FISPA pre-cleaner 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 6.8 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/cm^2) with thermostatic control; 393.7 mm diameter, 4 blade, belt-driven fan; cooling water capacity 10.4 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 2.1 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 235.6 rd/s (2250 rev/min) at rated engine speed*	
			km/h	*m/s*
1	slow	394.648	1.38	0.383
2		255.460	2.08	0.578
3		201.626	2.69	0.747
4		129.083	4.21	1.169
1	intermediate	161.321	3.36	0.933
2		104.510	5.19	1.442
3		82.509	6.58	1.828
4		52.847	10.27	2.853
1	direct	65.492	8.29	2.303
2		42.420	12.80	3.556
3		33.496	16.21	4.503
4		21.437	25.32	7.033
1	reverse	151.299	3.59	0.997
2		98.008	5.54	1.539
3		77.364	7.02	1.950
4		49.494	10.97	3.047

(*) Calculated with the rolling circumference 4021 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; height above ground 610 mm; 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:
65.5 rd/s and 122.9 rd/s at 235.6 rd/s rated engine speed (625 rev/min and 1174 rev/min at 2250 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 0.45 m and 0.24 m of travel.

Number of p.t.o. revolutions for one revolution of driving wheels: 8.94 and 16.79.
Direction of rotation: clockwise viewed facing driving end.

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; height above ground 735 mm;
34.9 (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 levers of the main p.t.o.

Proportional engine speed:

235.6 rd/s 2250 rev/min) at 235.6 rd/s (2250 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 0.125 m of travel. Number of p.t.o. revolutions for one revolution of driving wheels: 32.18.

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

Belt pulley

Optional; not fitted on tractor tested.

Figures according to manufacturer's specification:

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

— diameter/width: 240 mm/155 mm;

— speed 147.1 rd/s (1405 rev/min) at 235.6 rd/s (2250 rev/min) rated engine speed giving 17.65 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 of 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 445 and 495 mm above ground; adjustements obtained by two vertical settings of the drawbar frame; clevis coupling pin diameter 28 mm;
Distance from rear axle: 780 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 445, 545, 670 and 770 mm; changeable by shifting and reversing hitch; clevis coupling pin diameter 28 mm; distance of hitch hole to rear axle centre 400 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 » 6.50-16, 6 ply rating; maximum permissible weight on each tyre: 645 kg at 2.94 bar (3.00 kg/cm²); track width 1300 mm by 5 steps to 1800 mm obtained by extending front axle.

Driving wheels: Two at rear; PIRELLI « Tractor cinturato » 14.9/13-28, 6 ply rating, maximum permissible weight on each tyre 1690 kg at 1.27 bar (1.3 kg/cm²); W 12" - 28" rim; track width 1400 mm by 5 steps to 1900 mm changed by reversing wheel centres and offset lugs on rims.

Wheelbase: 2080 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 1400 mm rear track-width to centre* *cm*
Head lights	107	11.5 x 11.5	71.5
Side lights	140	11.5 x 3.5	14.5
Rear lights	144	5.5 x 6.0	25.0
Reflectors	137	4.5 x 5.5	10.5

Number of grease points (whole tractor): 13

CONDITIONS DURING TEST

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

	Front *kg*	*Rear* *kg*	*Total* *kg*
Without ballast	710	1300	2010
With ballast	1040	1870	2910

Ballast

	No. of weights	*Total weight (excluding water)* *kg*	*Water* *kg*
Front wheels	—	—	—
Front weight	8	260	—
Rear wheels	4	250	390

Track width during test: front 1300 mm, rear 1400 mm

Overall dimensions

	Length *m*	*Width* *m*		*Height* *m*	
		max.	*min.*	*(1)*	*(2)*
With ballast	3.80	2.26	1.85	2.26	2.24
Without ballast	3.50	2.26	1.76	2.26	2.24

Remarks:
- length measured from ballast end to lower link end in horizontal position;
- (1) height measured at top of vertical exhaust;
- (2) height measured at top of the safety frame;
- ground clearance 0.42 m measured at the 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 « TS 1 » model; O.E.C.D. report no. CS 357, approved on the 14th of 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: 26th April 1976 - 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						
32.2 (43.8)	235.6 (2250)	65.5 (625)	10.18	8.46	263 (193)	3.16 (4.30)
B - AT STANDARD P.T.O. SPEED - 56.6 rd/s (540 rev/min)						
30.6 (41.6)	203.6 (1944)	56.5 (540)	9.24	7.68	251 (185)	3.31 (4.50)
C - AT THE SPEED RECOMMENDED BY MANUFACTURER FOR DRAWBAR WORK						
32.2 (43.8)	235.6 (2250)	65.5 (625)	10.18	8.46	263 (193)	3.16 (4.30)
D - AT PART LOADS						
(i) 85% of the torque at maximum power						
28.4 (38.6)	244.0 (2330)	67.8 (647)	9.24	7.68	270 (199)	3.07 (4.16)
(ii) unloaded						
—	252.9 (2415)	—	3.18	2.64	—	—
(iii) 50% of the load defined in (i)						
14.4 (19.6)	248.2 (2370)	68.9 (658)	5.92	4.92	342 (251)	2.43 (3.31)
(iv) maximum power						
32.2 (43.8)	235.6 (2250)	65.5 (625)	10.18	8.46	263 (193)	3.16 (4.30)
(v) 25% of the load defined in (i)						
7.3 (9.9)	250.8 (2395)	69.3 (665)	4.33	3.60	493 (363)	1.69 (2.29)
(vi) 75% of the load defined in (i)						
21.4 (29.1)	245.6 (2345)	68.2 (651)	7.51	6.24	292 (215)	2.85 (3.87)

No load, maximum engine speed: 252.9 rd/s (2415 rev/min)

Equivalent crankshaft torque at maximum power: 136.8 mN (13.95 mkg)

Maximum equivalent crankshaft torque: 163.5 mN (16.67 mkg) at 146.6 rd/s (1400 rev/min)

Mean atmospheric conditions:
temperature 21.5 °C
pressure 982.6 mbar (737.0 mmHg)
relative humidity 77.0 %

Maximum temperatures:
coolant 70.0 °C
engine oil 102.0 °C
fuel 22.5 °C
engine air intake 23.5 °C

2. Drawbar performance (Massey Ferguson 154 Diesel Tractor)

Date and location of tests: 27th and 28th April, 3rd - 4th and 5th May 1976 - L.M.A. - Turin (Italy)
Type of track: concrete
Height of draught-line above ground: 670 mm with ballast and 545 mm without ballast

Gear	Travelling speed		Power	Drawbar pull	Engine speed	Wheelslip	Fuel consumption		Temperatures			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	1.27	0.352	8.2 (11.3)	23550 (2400)	249.2 (2380)	15.0	—	—	—	60	88	16.0	49	984.2 (738.2)
2 slow	1.94	0.539	12.7 (17.2)	23450 (2390)	246.4 (2353)	14.9	—	—	—	64	88	16.0	48	984.6 (738.5)
3 slow	2.44	0.679	15.8 (21.5)	23300 (2375)	245.7 (2346)	15.0	2.20 (3.00)	377 (277)	26	68	88	16.0	48	984.6 (738.5)
1 int.	3.02	0.839	19.5 (26.5)	23200 (2365)	243.0 (2320)	15.0	2.42 (3.28)	344 (253)	26	68	90	15.8	45	985.3 (739.0)
4 slow	3.73	1.036	24.2 (32.8)	23300 (2375)	239.4 (2286)	14.7	2.50 (3.39)	332 (245)	28	70	90	15.8	45	985.3 (739.0)
2 int.	4.80	1.333	27.5 (37.5)	20700 (2110)	235.8 (2252)	8.4	2.73 (3.73)	304 (223)	30	70	90	11.5	65	986.0 (739.5)
3 int.	6.23	1.731	28.0 (38.1)	16175 (1650)	234.7 (2241)	5.3	2.75 (3.75)	302 (222)	30	66	100	10.0	73	986.0 (739.5)
1 dir.	8.00	2.222	28.2 (38.4)	12700 (1295)	235.8 (2252)	4.1	2.77 (3.77)	300 (221)	30	66	98	10.0	73	986.0 (739.5)
4 int.	9.83	2.731	27.2 (37.0)	9950 (1015)	234.9 (2243)	3.7	2.66 (3.62)	312 (229)	30	66	100	8.5	75	986.0 (739.5)
2. FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER														
2 int.	5.08	1.411	21.9 (29.8)	15550 (1585)	243.2 (2322)	5.0	2.69 (3.66)	309 (227)	30	68	100	11.2	79	983.8 (737.9)
(*) 3. FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (1)														
4 slow	—	—	—	23350 (2380)	239.8 (2290)	—	—	—	—	66	102	14.4	53	985.6 (739.2)
(!) 4. MAXIMUM POWER (unballasted)														
4 slow	3.82	1.061	19.8 (26.9)	18650 (1900)	241.9 (2310)	12.9	2.48 (3.38)	334 (246)	29	68	90	18.5	57	994.4 (745.8)
2 int.	4.61	1.281	24.0 (32.6)	18725 (1910)	238.9 (2281)	13.9	2.58 (3.51)	322 (237)	29	70	95	17.0	59	994.4 (745.8)
3 int.	6.16	1.711	27.8 (37.9)	16275 (1660)	235.0 (2244)	6.1	2.72 (3.72)	305 (224)	29	78	102	17.0	59	994.4 (745.8)
1 dir.	7.88	2.189	28.6 (38.8)	13050 (1330)	235.2 (2246)	4.4	2.81 (3.81)	297 (218)	27	80	102	22.0	38	986.6 (740.0)
4 int.	9.83	2.731	28.1 (38.3)	10300 (1050)	234.0 (2235)	3.1	2.80 (3.81)	297 (218)	25	74	104	21.8	43	986.6 (740.0)

Total oil consumption during ten hours duration of test (2) and (3): 20 g/h
(*) Those figures not quoted are irrelevant due to the additional ballast
(!) Maximum drawbar pull at 15% wheelslip: 18875 N (1925 kg)

3. Turning space and turning circle

Wheel equipment: front 6.50-16
rear 14.9/13-28

Track of wheels: front 1300 mm
rear 1400 mm

	With brakes		*Without brakes*	
	Right-hand *m*	*Left-hand* *m*	*Right-hand* *m*	*Left-hand* *m*
Radius of turning space	3.31	3.38	3.71	3.75
Radius of turning circle	3.20	3.27	3.60	3.64

4. Location of centre of gravity

Height above ground	mm	782
Distance forward from the vertical plane containing the axis of the rear wheels	mm	722
Distance from the median plane of the tractor	mm	0

5. Braking

Date of tests: 4th May 1976

Type of track: concrete

Type of decelerometer: MOTO METER, recording type

Weight of tractor with driver: with ballast 2980 kg
without ballast 2080 kg

Cold brakes

		With ballast	*Without ballast*
Travelling speed of tractor	km/h	25.0	25.0
Max. deceleration	m/s^2	4.6	4.3
Stopping distance	m	6.4	7.5
Force exerted on the brake pedal	N (kg)	460 (47)	392.7 (38)
Force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2	N (kg)	127.5 (13)	147.1 (15)

Brake fade characteristics (hot tests)

	with ballast	without ballast
[Maximum deceleration hot/maximum deceleration cold] x 100	95%	100%
[Stopping distance cold/stopping distance hot] x 100	90%	98%
[Force on pedal cold/force on pedal hot] x 100	100%	120%

Parking brake

Efficiency of handbrake on a slope of 16 per cent: with a 274.6 N (28 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:	5th May 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:	20.4 km/h
— sound level:	86.5 dB (A)

7. Noise measurement at the driver's ear level

Date of tests:	5th May 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 tests

Gear No.	*Travelling speed km/h*	*Sound level*	
		dB (A)	*Sones*
3rd int. (*)	6.58	97.5	126

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

8. Power lift and hydraulic pump performance

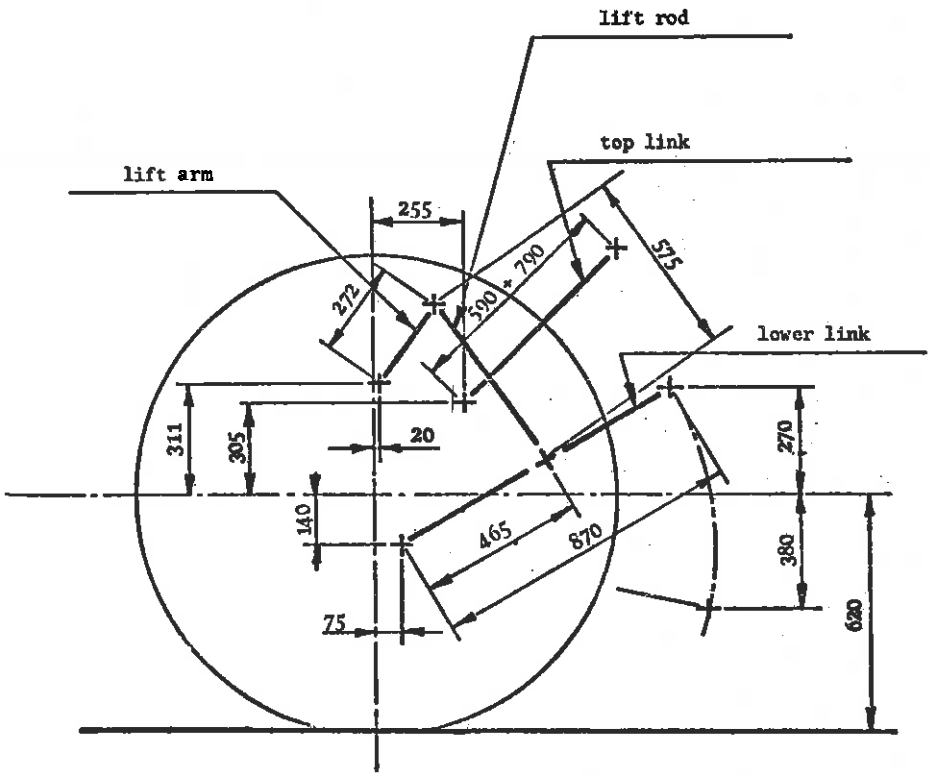
Date of tests:	25th May 1976
Hydraulic fluid:	MOBIL FLUID 422, viscosity SAE 90
— type of linkage lock transport:	none on the tractor tested
— opening pressure of the cylinder over pressure relief valve:	186.3 bar (190 kg/cm²)

Pump characteristics

1 - opening pressure on the relief valve:	166.7 bar (170 kg/cm²)
- substained pressure by the open relief valve:	181.4 bar (185 kg/cm²)
2 - pump delivery rate at minimum pressure and rated engine speed:	28.6 l/min
3 - pump delivery rate:	27 l/min
- delivery pressure:	166.7 bar (170 kg/cm²)
- hydraulic power:	7.5 kW (10.2 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	870
— lift arms	mm	272
— lift rods	mm	575
— top link	mm	680
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 620 mm above the ground level

Lower link pivot point	75 mm behind, 140 mm below
Top link pivot point	255 mm behind, 305 mm above
Lift arm pivot point	20 mm behind, 311 mm above
Maximum and minimum height of lower link hitch points	270 mm above, 380 mm below
Height of lower link hitch points when locked in transport position	no definite transport position

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

		cm	— 25	— 24	— 20	— 15	— 10	— 5	0	+ 5	+ 10	+ 15	+ 20	+ 25	+ 30	+ 35	+ 37	+ 40	+ 42
Lifting force at hitch points	max. mech. advantage	N	—	14950	16225	17700	18525	19275	20100	20600	21075	21175	21625	21950	22075	22250	22450	—	—
		kg	—	(1525)	(1655)	(1805)	(1890)	(1965)	(2050)	(2100)	(2150)	(2170)	(2205)	(2240)	(2250)	(2270)	(2290)	—	—
	min. mech. advantage	N	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		kg	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Maximum force exerted through whole range: 14950 N (1525 kg)

Force at which front of tractor is calculated to lift with maximum allowable front ballast: 22447 N (2289 kg)

Lifting force at the frame	max. mech. advantage	N	17200	—	17850	18625	19025	19375	19375	19375	19375	19275	18925	18675	18350	17650	16675	—	—
		kg	(1755)	—	(1820)	(1900)	(1940)	(1975)	(1975)	(1975)	(1975)	(1965)	(1930)	(1905)	(1870)	(1800)	(1700)	—	—
	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: 13641 N (1391 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 181.4 bar (185 kg/cm²)

OPTIONAL TESTS

9. Engine tests

Date and location of tests: 9th April 1976 - 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					
34.2 (46.5)	235.6 (2250)	10.04	8.34	244 (179)	3.41 (4.63)
B - AT STANDARD P.T.O. SPEED - 56.6 rd/s (540 rev/min)					
32.1 (43.7)	203.6 (1944)	9.24	7.68	239 (176)	3.47 (4.73)
C - AT THE SPEED RECOMMENDED BY MANUFACTURER FOR DRAWBAR WORK					
34.2 (46.5)	235.6 (2250)	10.04	8.34	244 (179)	3.41 (4.63)
D - AT PART LOADS					
(i) 85% of the torque at maximum power					
30.0 (40.8)	243.0 (2320)	9.10	7.56	252 (186)	3.30 (4.48)
(ii) unloaded					
3.0 (4.1)	252.9 (2415)	3.47	2.88	960 (711)	0.86 (1.18)
(iii) 50% of the load defined in (i)					
15.3 (20.9)	248.7 (2375)	5.78	4.80	314 (230)	2.65 (3.62)
(iv) maximum power					
34.2 (46.5)	235.6 (2250)	10.04	8.34	244 (179)	3.41 (4.63)
(v) 25% of the load defined in (i)					
7.8 (10.6)	251.7 (2404)	4.33	3.60	462 (340)	1.80 (2.45)
(vi) 75% of the load defined in (i)					
22.8 (31.0)	245.9 (2348)	7.36	6.12	268 (198)	3.10 (4.21)

No load, maximum engine speed: 253.2 rd/s (2418 rev/min)

Crankshaft torque at max. power: 145.1 mN (14.80 mkg)

Maximum equivalent crankshaft torque: 172.6 mN (17.60 mkg) at 146.6 rd/s (1400 rev/min)

Mean atmospheric conditions:
temperature 24.5 °C
pressure 986.8 mbar (740.3 mmHg)
relative humidity 35 %

Maximum temperatures:
coolant 72 °C
engine oil 104 °C
fuel 25.5 °C
engine air intake 27 °C

ADDITIONAL TESTS OF THE TRACTOR EQUIPPED WITH FRONT DRIVING AXLE

MASSEY FERGUSON 1544 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: 1.5 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 235.6 rd/s (2250 rev/min) at rated engine speed*	
			km/h	*m/s*
1	slow	288.760	1.39	0.386
2		186.918	2.15	0.597
3		147.527	2.72	0.756
4		94.449	4.25	1.801
1	intermediate	118.037	3.40	0.944
2		76.469	5.25	1.458
3		60.373	6.65	1.847
4		38.627	10.39	2.886
1	direct	47.921	8.55	2.375
2		31.039	12.92	3.589
3		24.509	16.38	4.550
4		15.686	25.58	7.105
1	reverse	110.682	3.63	1.008
2		71.692	5.60	1.556
3		56.605	7.09	1.969
4		36.214	11.08	3.078

(*) Calculated with the rolling circumference 2973 mm according to manufacturer's specifications

Wheels

Two front driving and steering wheels; PIRELLI « Tractor agricolo » 8.3/8-24, 4 ply rating W 7" rim; maximum permissible weight on each tyre 675 kg at 1.47 bar (1.50 kg/cm²); track width 1500 mm.

Two rear driving wheels; PIRELLI « Tractor cinturato » 14.9/13-28; 6 ply rating; W 12"-28" rim; maximum permissible weight on each tyre 1690 kg at 1.27 bar (1.30 kg/cm²); track width 1400 mm by 5 steps to 1900 mm changed by reversing wheel centres and offset lugs on rims.

Wheelbase: 2060 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 1400 mm rear track-width to centre* *cm*
Head lights	106	11.5 x 11.5	76.5
Side lights	140	11.5 x 3.5	19.5
Rear lights	144	5.5 x 6.0	30.0
Reflectors	137	4.5 x 5.5	15.5

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

	Front *kg*	*Rear* *kg*	*Total* *kg*
Without ballast	990	1320	2310
With ballast	1320	1860	3180

Ballast

	No. of weights	*Total weight (excluding water)* *kg*	*Water* *kg*
Front wheels	—	—	—
Front weights	8	260	—
Rear wheels	4	250	360

Overall dimensions

	Length *m*	*Width* *m*		*Height* *m*	
		max.	*min.*	*(1)*	*(2)*
With ballast	3.80	2.26	1.85	2.26	2.24
Without ballast	3.56	2.26	1.76	2.26	2.24

Remarks:

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

— (1) height measured at top of vertical exhaust

— (2) height measured at top of safety frame

— ground clearance 0.33 m measured at front differential casing

Turning space and turning circle

Wheel equipment: front 8.3/8-24
rear 14.9/13-28

Track of wheels: front 1500 mm
rear 1400 mm

	With brakes		*Without brakes*	
	Right-hand *m*	*Left-hand* *m*	*Right-hand* *m*	*Left-hand* *m*
Radius of turning space	3.37	3.31	4.87	4.90
Radius of turning circle	3.27	3.21	4.77	4.80

2. Drawbar performance on tractor equipped with front driving axle (Massey Ferguson 154-4 Diesel Tractor)

Date and location of tests: 21st and 25th May 1976 - L.M.A. - Turin (Italy)
Type of track: concrete
Height of draught-line above the ground: 545 mm

Gear	Travelling speed		Power	Drawbar pull	Engine speed	Wheelslip	Fuel consumption		Temperatures			Atmospheric conditions		
							Specific energy	Specific consumpt.	Fuel	Coolant	Engine oil	Temperature	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	1.26	0.351	9.4 (12.7)	26675 (2720)	248.8 (2376)	15.0	—	—	—	66	90	20.0	53	986.0 (739.5)
2 slow	1.94	0.538	14.3 (19.5)	26625 (2715)	247.8 (2366)	15.0	—	—	—	64	90	20.0	53	986.0 (739.5)
3 slow	2.45	0.680	17.9 (24.4)	26325 (2685)	244.1 (2331)	14.8	2.43 (3.32)	342 (251)	24	66	96	17.0	75	986.6 (740.0)
1 int.	2.99	0.830	22.0 (29.9)	26475 (2700)	241.9 (2310)	15.0	2.50 (3.40)	332 (244)	26	66	95	16.5	80	986.6 (740.0)
4 slow	3.85	1.069	26.2 (35.7)	24525 (2500)	234.4 (2238)	8.9	2.60 (3.55)	319 (234)	26	70	96	16.5	80	986.6 (740.0)
2 int.	4.97	1.381	28.1 (38.2)	20350 (2075)	235.8 (2252)	4.7	2.77 (3.75)	331 (222)	28	70	96	14.0	95	986.6 (740.0)
3 int.	6,34	1.761	27.5 (37.3)	15600 (1590)	236.4 (2257)	4.1	2.68 (3.63)	311 (229)	28	70	96	15.0	84	986.6 (740.0)
2. MAXIMUM POWER (unballasted)														
1 int.	3.02	0.841	18.6 (25.3)	22175 (2260)	243.4 (2324)	15.0	2.41 (3.28)	345 (253)	25	64	95	19.5	48	993.3 (745.0)
4 slow	3.74	1.039	23.0 (31.2)	22075 (2250)	239.8 (2290)	15.0	2.53 (3.43)	328 (242)	25	66	95	19.5	48	993.3 (745.0)
2 int.	4.75	1.319	27.2 (36.9)	20600 (2100)	234.8 (2242)	9.4	2.71 (3.67)	307 (226)	25	70	98	18.0	52	993.3 (745.0)
3 int.	6.26	1.739	28.0 (38.0)	16075 (1640)	235.9 (2253)	5.2	2.72 (3.69)	306 (225)	25	70	104	17.5	54	993.3 (745.0)
1 dir.	7.99	2.219	28.6 (38.9)	12900 (1315)	235.9 (2253)	3.8	2.81 (3.83)	295 (217)	25	68	104	17.5	54	993.3 (745.0)
4 int.	9.97	2.769	28.3 (38.4)	10200 (1040)	234.7 (2241)	2.8	2.77 (3.75)	300 (221)	23	68	96	16.5	60	993.3 (745.0)

OFFICER IN CHARGE
(R. Gioia)

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

Turin, 18th March 1977

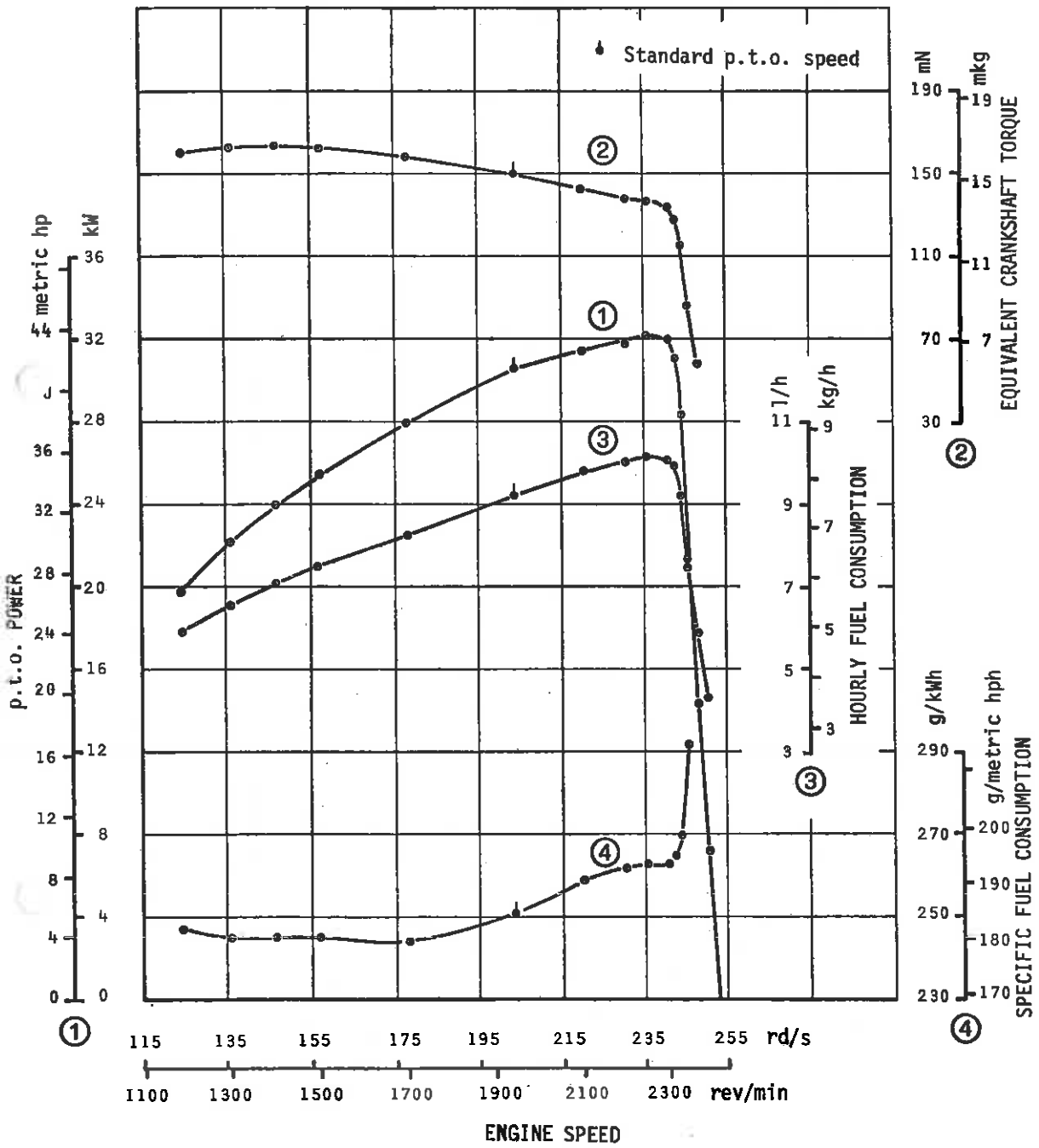


FIG. 1 - POWER TAKE-OFF TEST

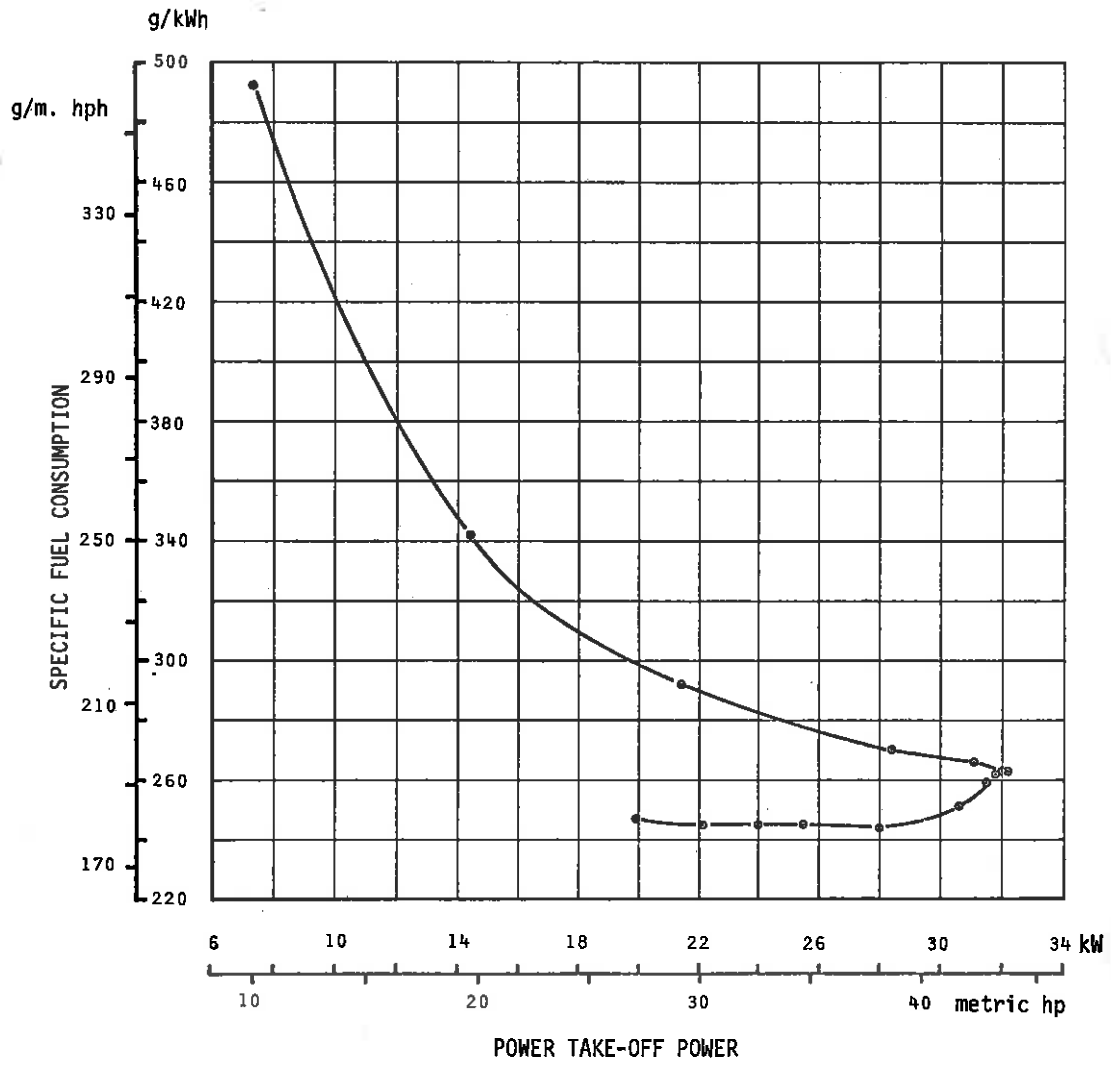


FIG. 2 - POWER TAKE-OFF TEST

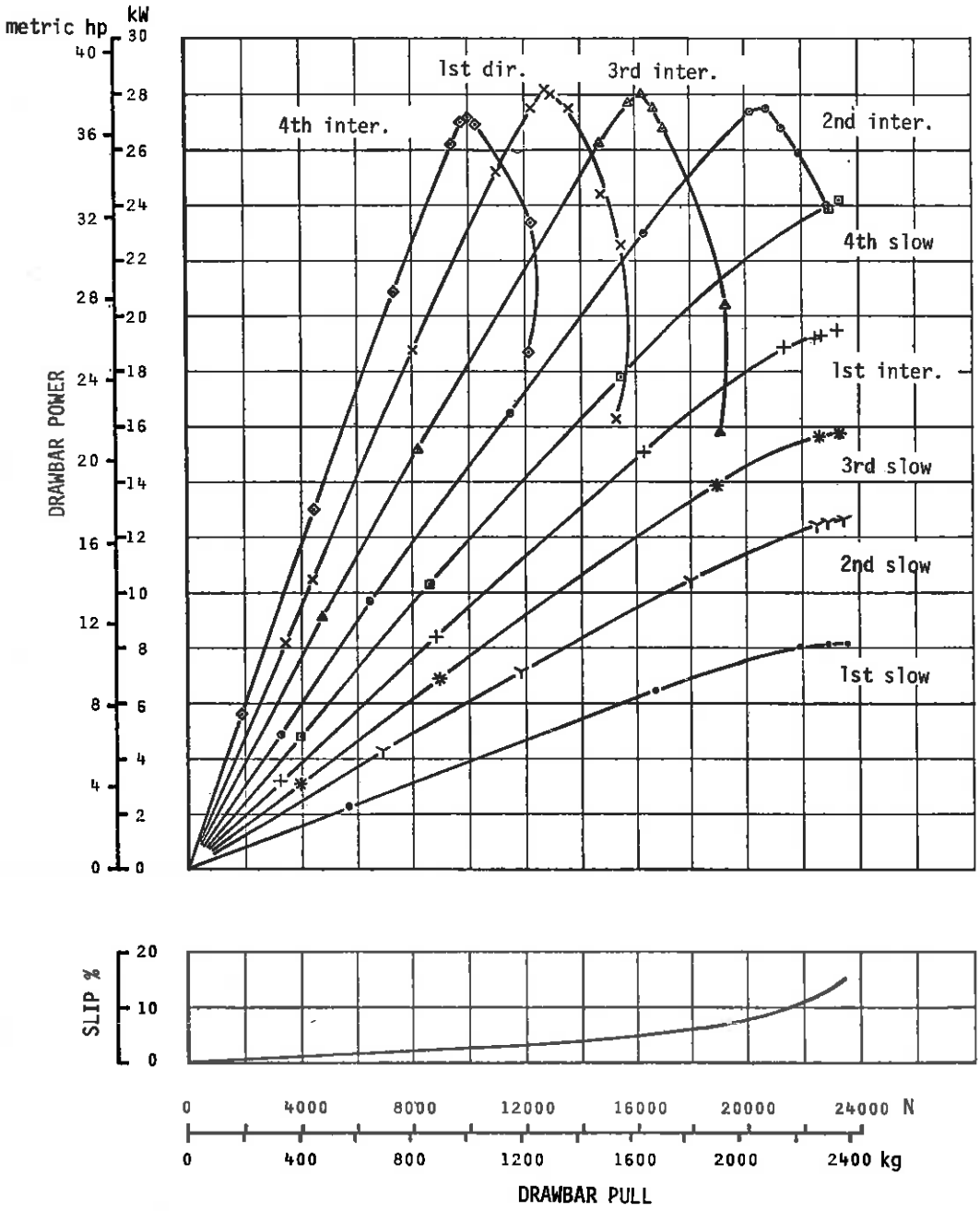


FIG. 3 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 154 Diesel Tractor)

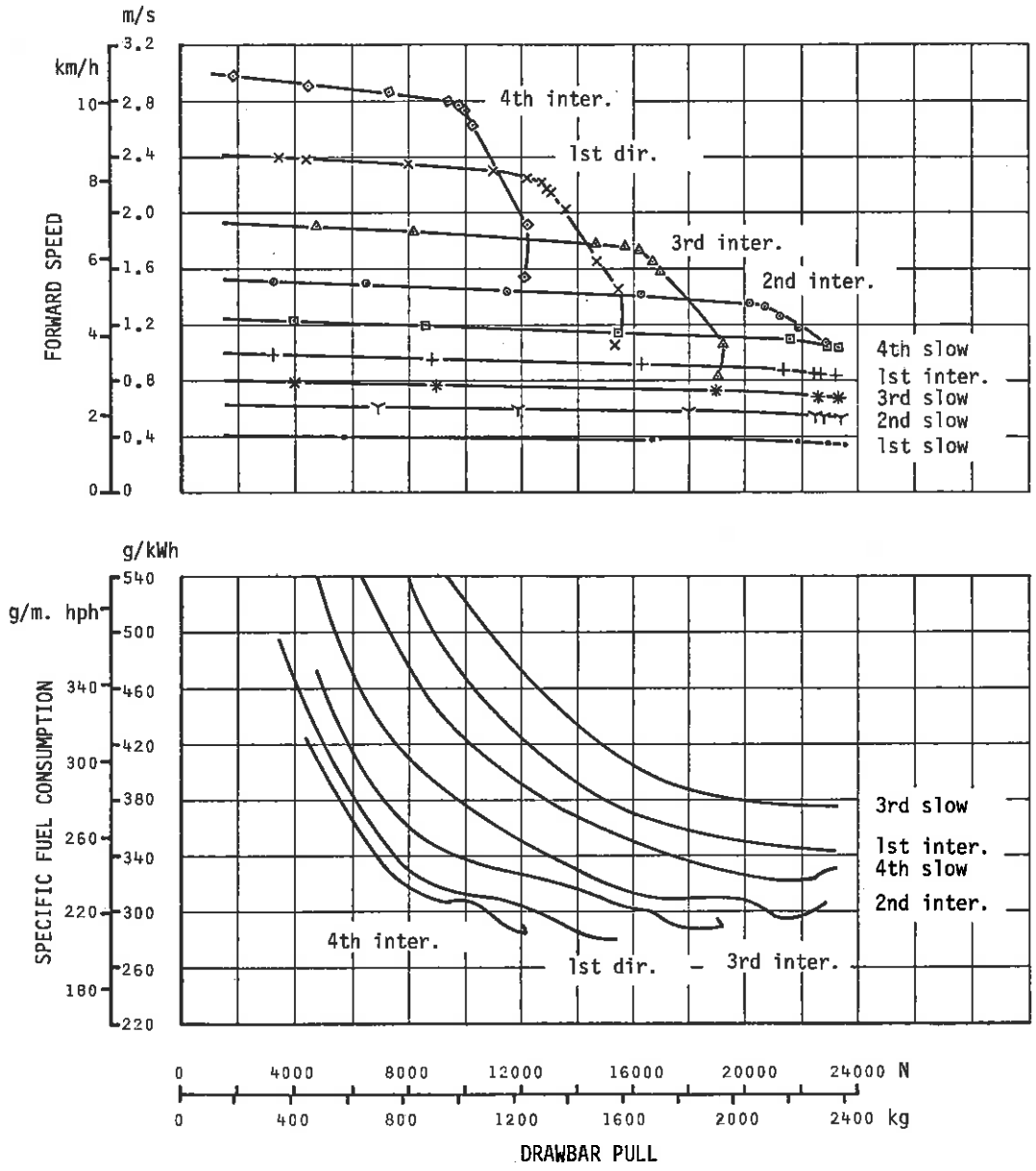


FIG. 4 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 154 Diesel Tractor)

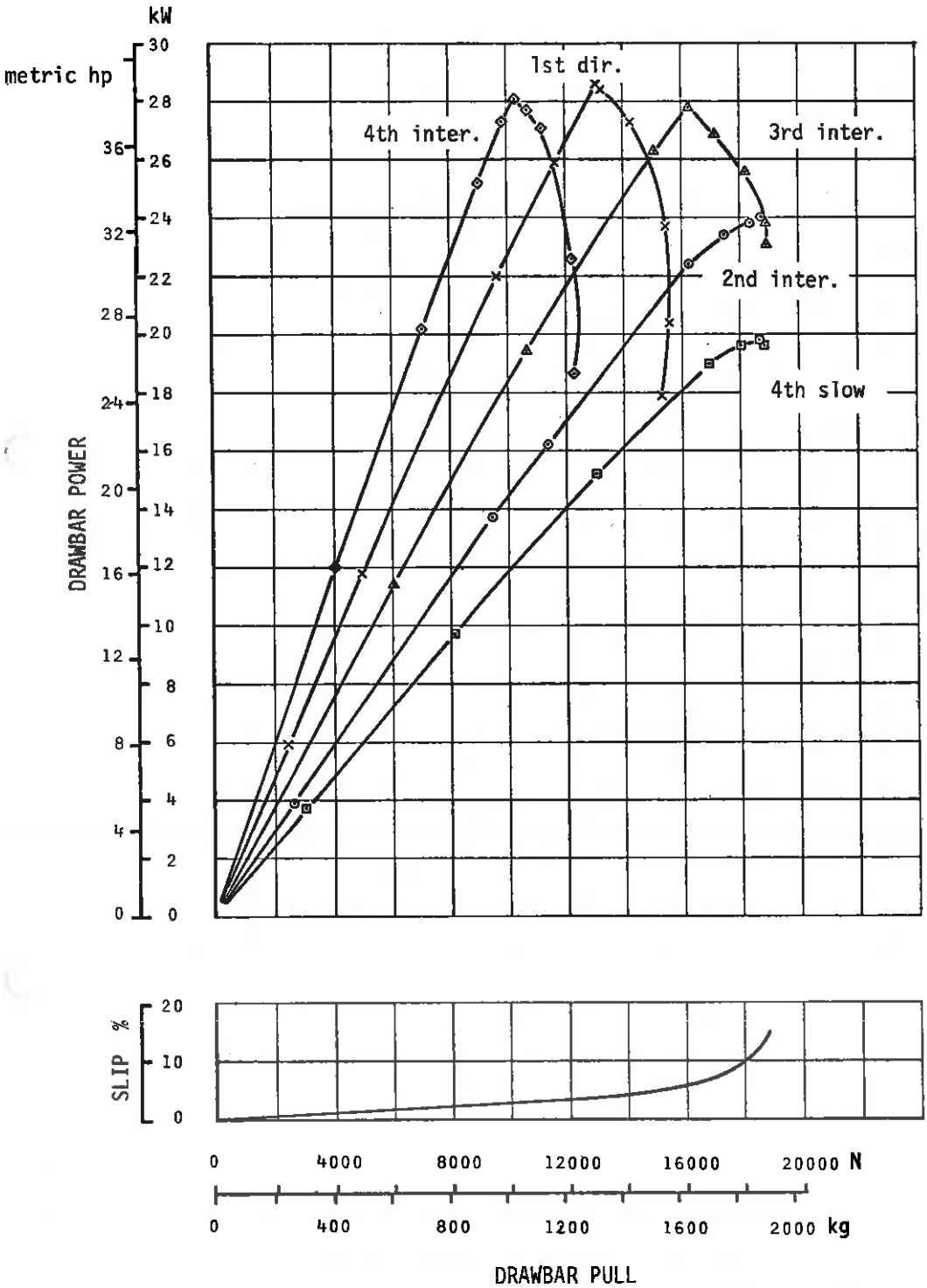


FIG. 5 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 154 Diesel Tractor)

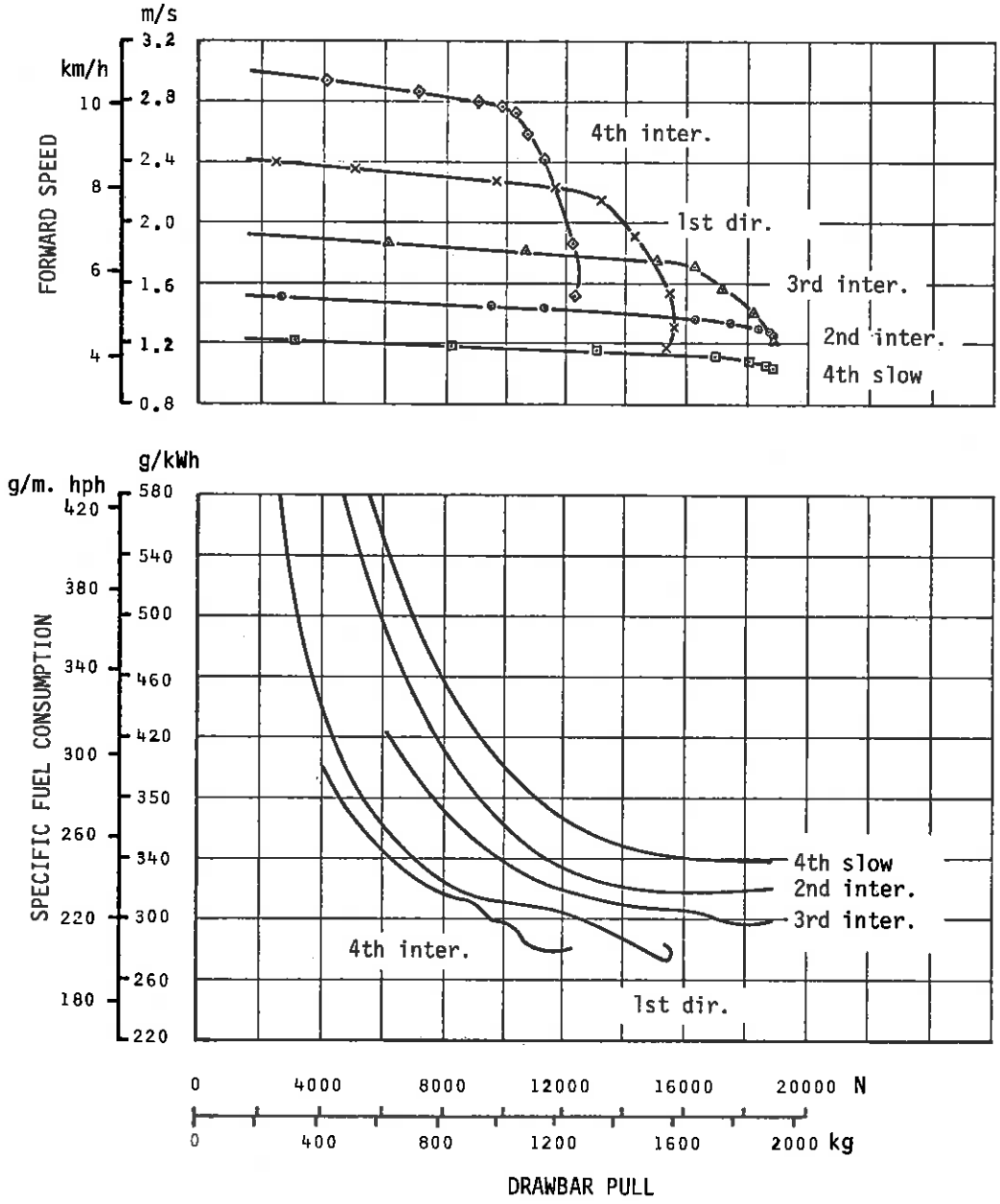


FIG. 6 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 154 Diesel Tractor)

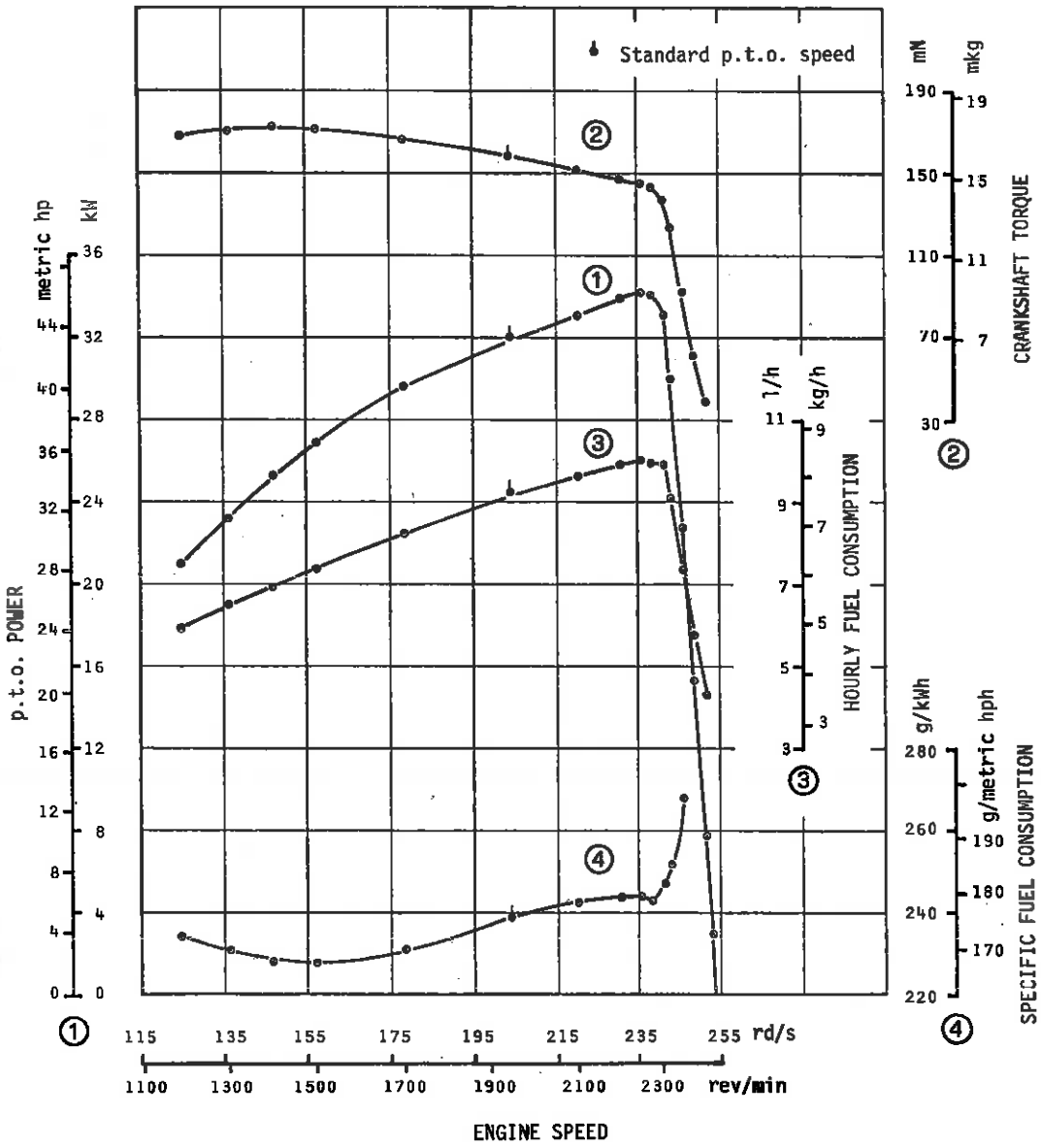


FIG. 7 - ENGINE TEST

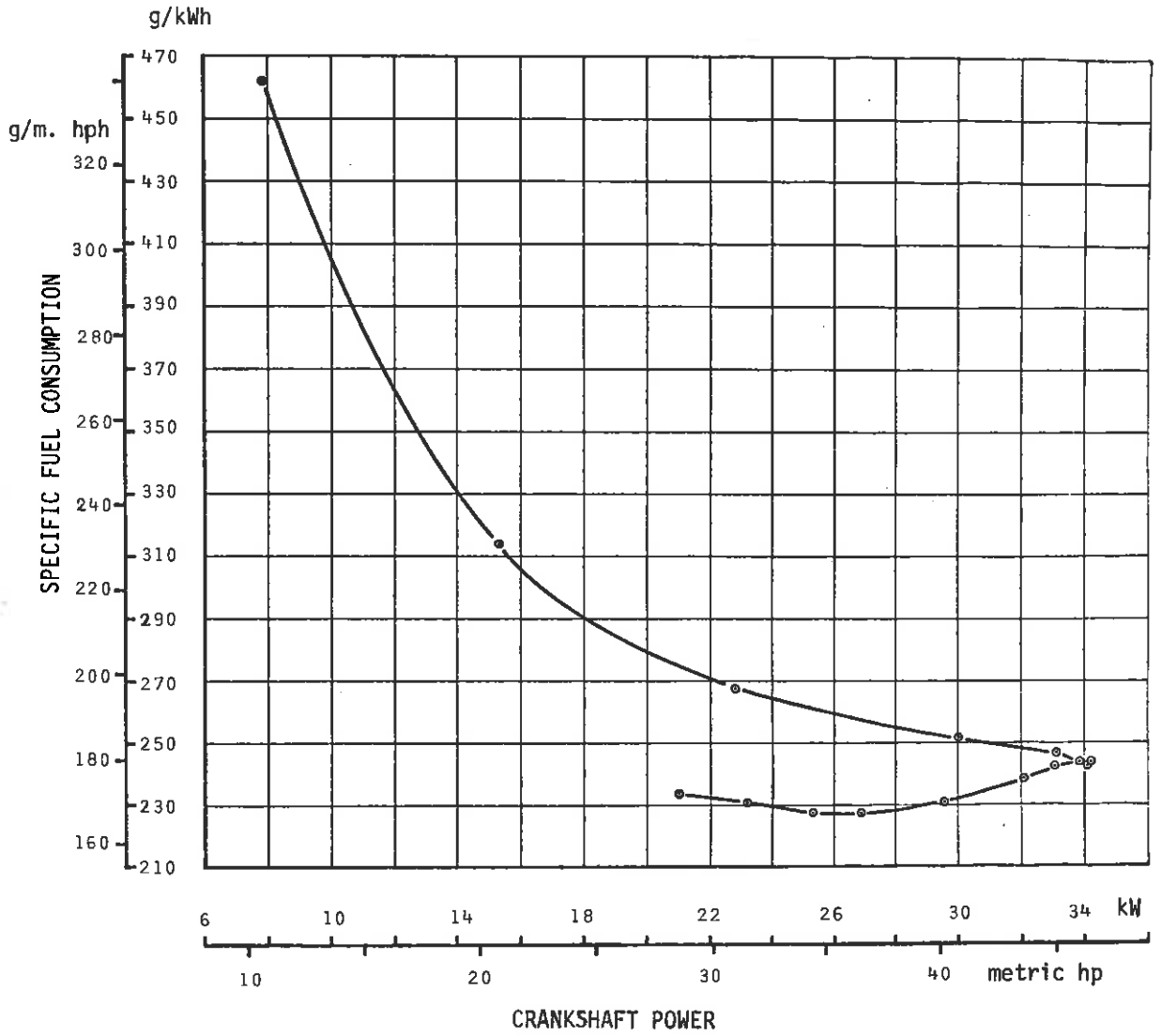


FIG. 8 - ENGINE TEST

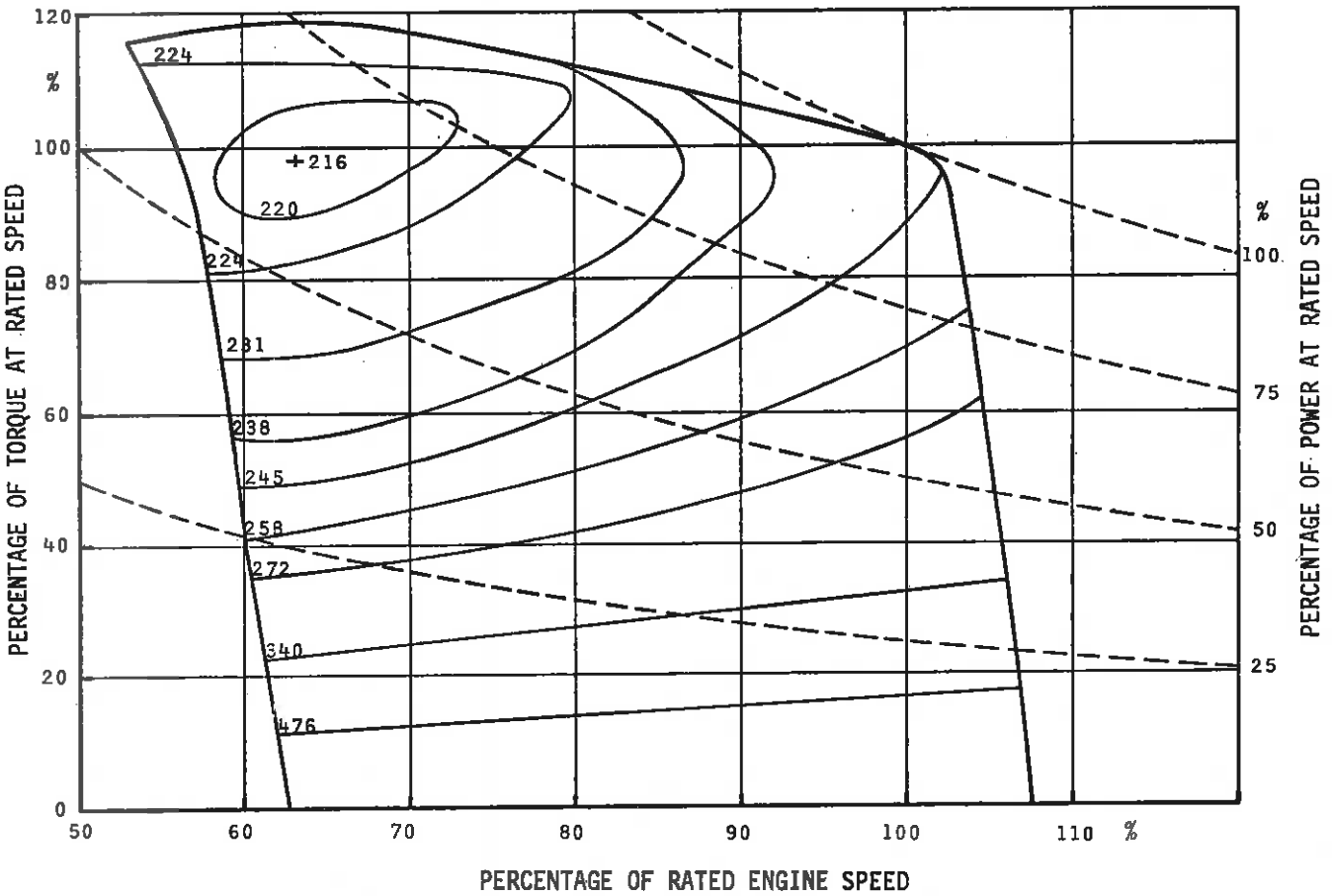


FIG. 9 - ENGINE TEST

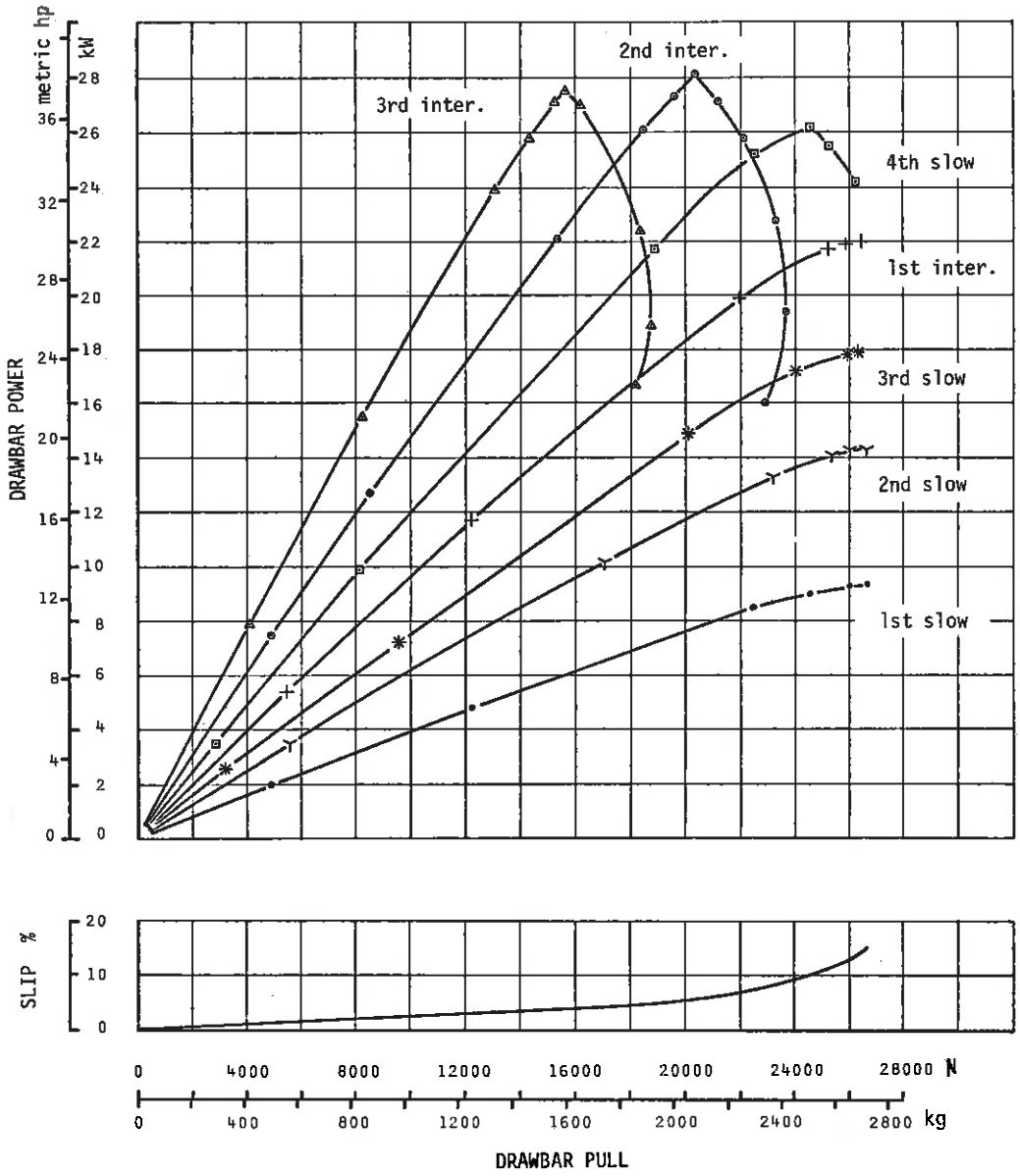


FIG. 10 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 154-4 Diesel Tractor)

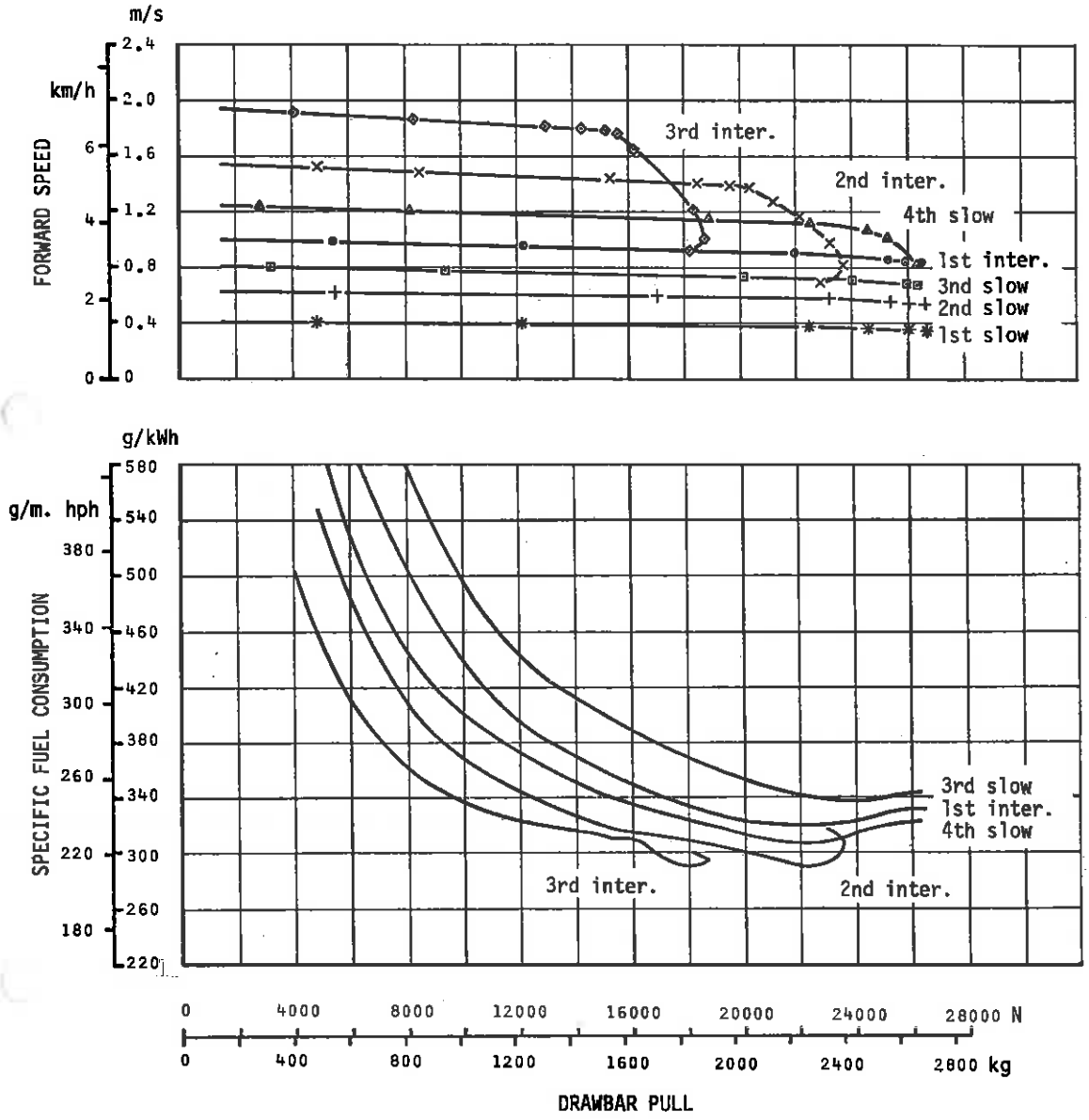


FIG. 11 - DRAWBAR TEST ON CONCRETE, WITH BALLAST

(Massey Ferguson 154-4 Diesel Tractor)

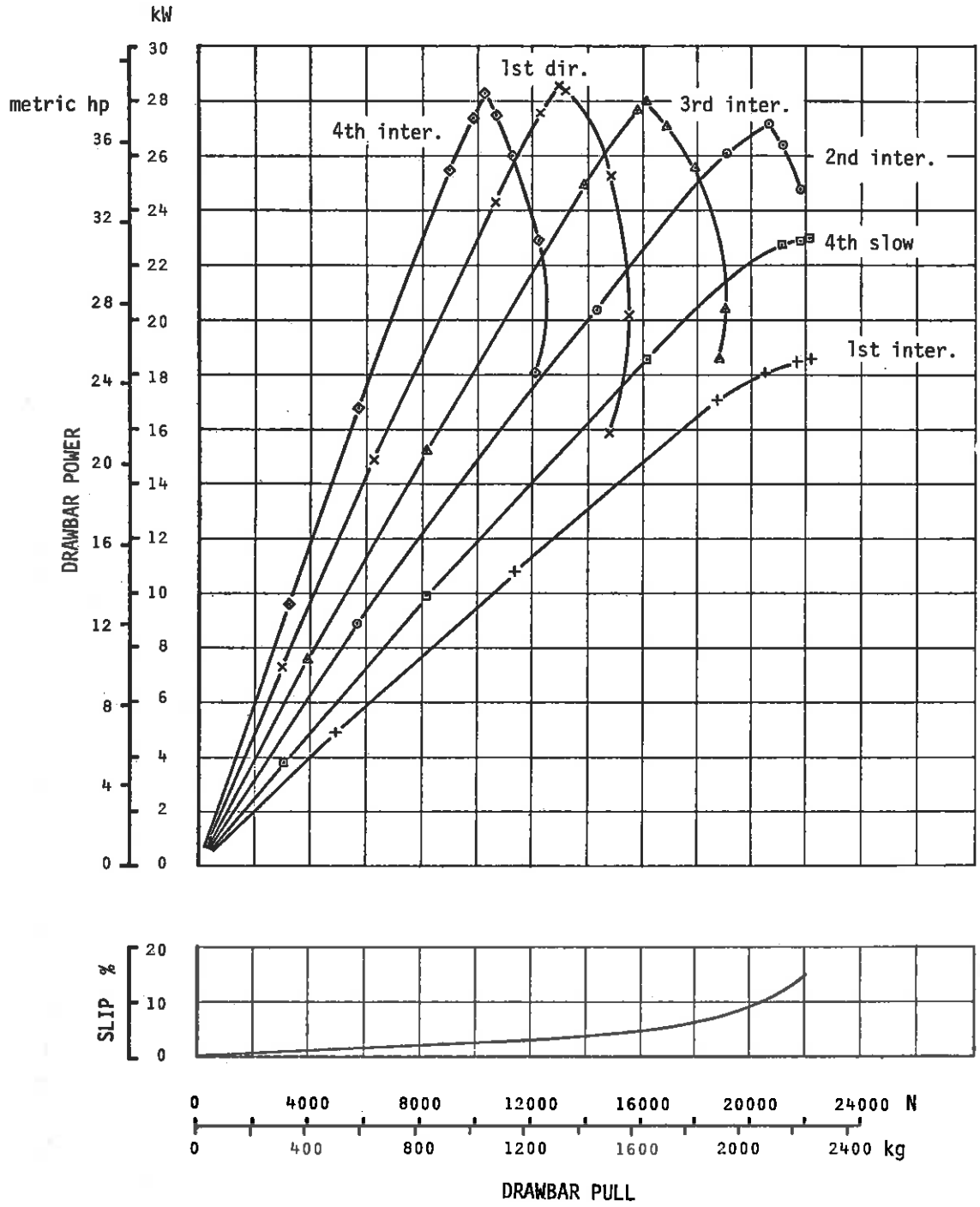


FIG. 12 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 154-4 Diesel Tractor)

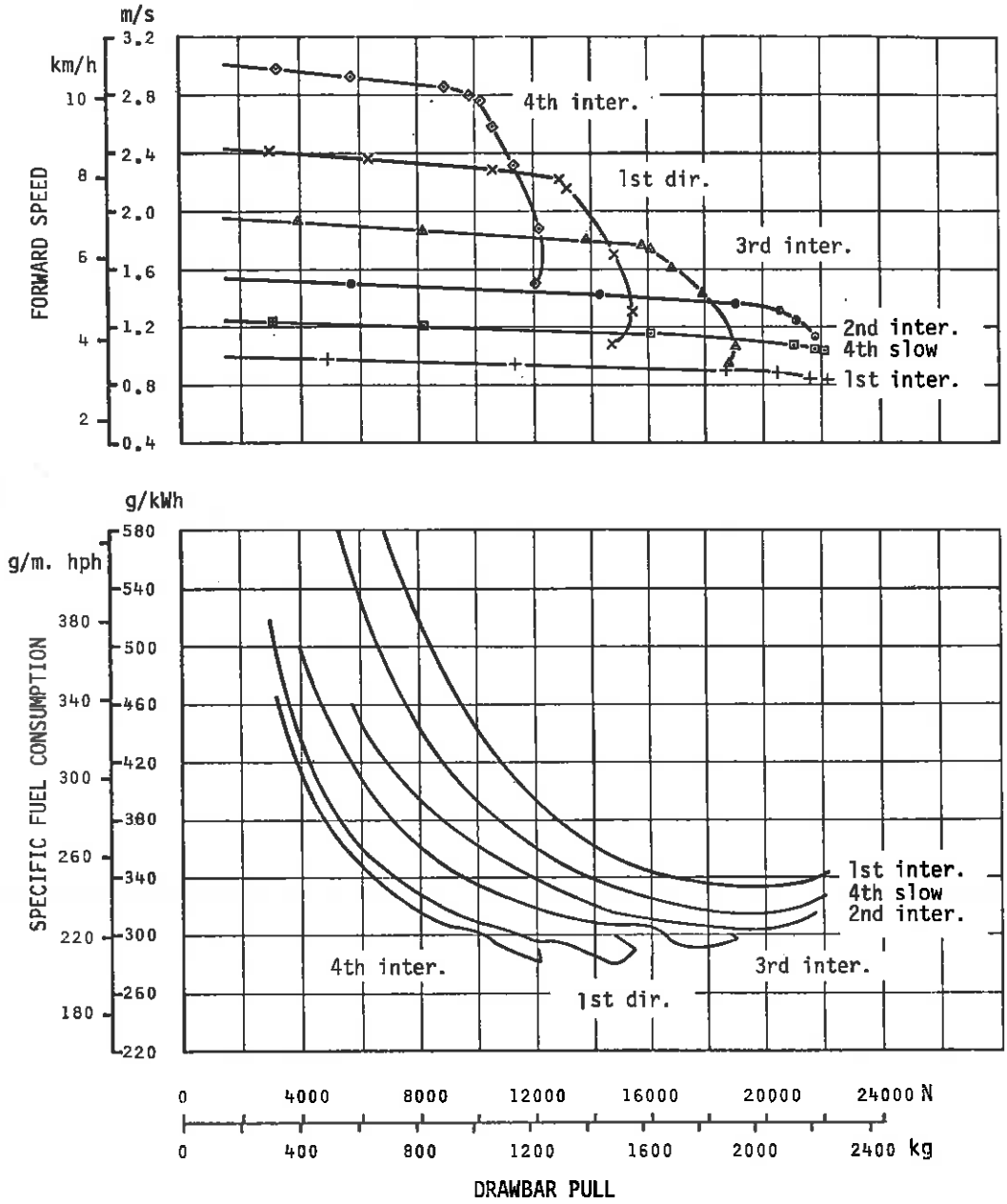


FIG. 13 - DRAWBAR TEST ON CONCRETE, WITHOUT BALLAST

(Massey Ferguson 154-4 Diesel Tractor)