



FOR AGRICULTURAL MACHINERY

Head office: Ultuna, UPPSALA 7, Sweden

Testing Stations for Agricultural, Forestry and Garden Machines:

(South Sweden)

(Middle Sweden)

(North Sweden)

ALNARP

Ultuna, UPPSALA 7

Röbäcksdalen, TEG

Testing Station for Dairy Machines: ALNARP

TEST BULLETIN : OEEC No. 012

Date of Approval: 24th August 1961

**TEST IN ACCORDANCE WITH OEEC TEST CODE FOR
AGRICULTURAL TRACTORS**

Tractor Bolinder-Munktell/Volvo BM/T 470

Test requested by:

AB Bolinder-Munktell of the Volvo-group, Eskilstuna, Sweden

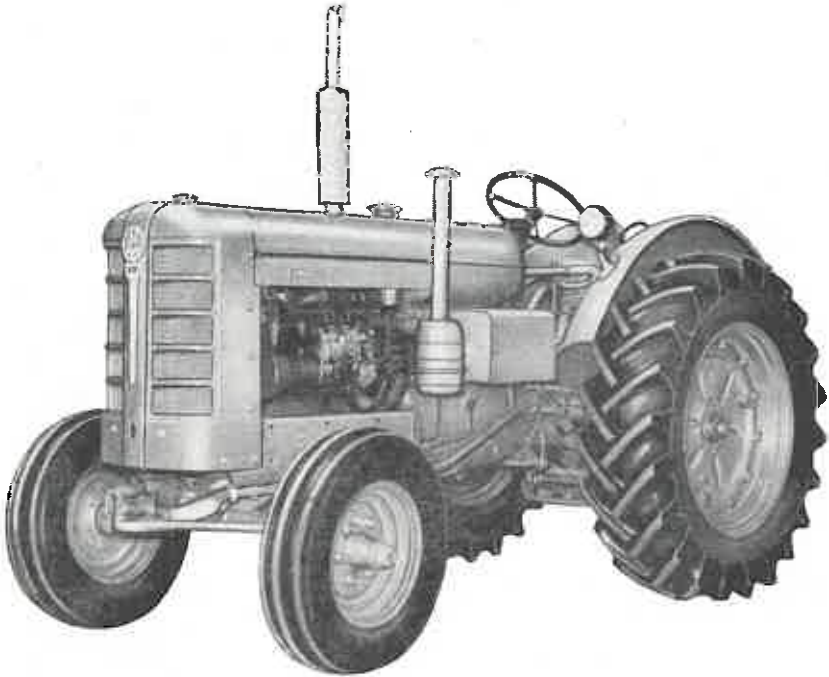
Manufactured by:

AB Bolinder-Munktell of the Volvo-group, Eskilstuna, Sweden

Date of test: May 1961

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This Bulletin is based on engineering tests in accordance with the OEEC Tractor code. It does not contain an evaluation of the performance of the tractor on practical farm work.

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Section 1

Specification of tractor

Tractor:

Make: AB Bolider-Munktell of the Volvo-group
Model: BOLINDER-MUNKTELL/VOLVO BM/T 470
Type: Diesel
No: 1592

Engine:

Make: Own make; Model 1114, direct injection engine, No. 14500-2020
Rated output: 61 hp_{metric} at 1500 r/m, 70 hp_{metric} at 1800 r/m
Cylinders: 4 cylinders, vertical, in-line, 111,12 mm bore × 130 mm stroke, compression ratio 16,5: 1; replaceable wet cylinder liners, overhead valves
Rated speeds: For belt work and p.t.o. work 1500 r/m, for drawbar work 1800 r/m
Minimum speed: (For full load work) Not specified
Fuel system: Fuel: Diesel oil
Injection pump: Bosch PE 4 B 80 E 320 RS 1394/11
Injection nozzles: Bosch DLLA 150 S 720
Injection timing 24° before T.D.C.; injector opening pressure 135—140 kp/cm²
Capacity of fuel tank: 110 litres
Governor: Bosch RQV 200-900 B 341/1, centrifugal type
Governed range of engine speed 400 to 1800 r/m
Air cleaner: Mann und Hummel, oil bath, oil capacity 0,9 litre
Oiling system: Forced feed from gear type pump. Recommended oil SAE 20-20 W heavy duty oil, below 0°C SAE 10-10 W. Filter Fram, full flow. Recommended oil change period, 125 hours. Oil capacity 12,0 litres
Cooling system: Pressurised, (0,38—0,45 kp/cm²) impeller assisted with 4-blade belt driven fan, thermostat and radiator shutter for temperature control. Cooling water capacity 19 litres

Transmission:

Clutch: Borg and Beck 14 in. diameter, single plate, dry, foot-pedal operated
Gearbox: Own make, sliding gear type and constant mesh, 5 forward speeds and 1 reverse
Differential: Crown wheel and pinion, differential and spur gear final drive. Differential lock fitted. Total transmission oil capacity 55 litres

Gear No.	Number of engine revolutions for one revolution of driving wheel	Theoretical travelling speed for rated speed of engine km/h	
		1500 r/m	1800 r/m
1	119,61	3,36	4,03
2	75,47	5,32	6,39
3	60,60	6,63	7,96
4	33,08	12,1	14,6
5	17,50	23,0	27,6
Reverse	99,62	4,03	4,84

Steering device: Worm and dual peg type (Ross) with single drop arm and fixed length drag link

Brakes: Hand brake connected to left steering brake pedal
Foot brakes—internal expanding type on differential half shafts; independent or combined foot-pedal operated

Wheels:

Steering wheels: Two at front. Tyres, 7.50—18, 4-ply rating pneumatic, track 1330 mm

Driving wheels: Two at rear. Tyres 14—34, 6-ply rating pneumatic, track 1510 mm
Maximum possible weight on each tyre 1895 kg

Belt pulley:

Location: Offside of tractor

Diameter/width: 350 mm/225 mm

Speed: 850 r/m (at 1500 r/m)

Belt linear speed: 15,6 m/s

Direction of

rotation: Clockwise viewed from tractor right-side

Power take off:

Main: 6-spline, 34,9 mm (1 3/8 in.) diameter, at rear of tractor

Height above

ground: 660 mm

Speed: 530 r/m (at 1500 r/m engine speed)

Direction of

rotation: Clockwise viewed from tractor rear

Power lift: Optional. Own make, single acting. Independent pump drive, working pressure 120 kp/cm². Oilflow 23,5 l/min at 1800 r/m engine speed. Oil capacity 12,5—15 litres, force at end of lower links 1300 kp. Diameter of hitch pin hole 28,4 mm (1,135 in.)

Drawbar: Swinging drawbar. Heights above ground minimum 250 mm, maximum 475 mm
Lateral adjustment, total 620 mm. Vertical adjustment by stretching screws and horizontal adjustment on drawbar frame

Distance from
rear axle: 822 mm

Hitch: None fitted

Electrical equipment:

Voltage: 12 V

Generator: Bosch LJ/GJM 130/12 11500 R 20

Battery: 152 amp-hour

Starting device: Bosch BNG 4/12 C R 221, 4 hp solenoid engaged starter motor

Overall dimensions:

Overall length: 3,45 m

Overall width: 1,90 m (to outside of tyres)

Overall height: 2,47 m (to top of exhaust pipe)

Minimum ground

clearance: 0,43 m (to front axle, without drawbar)

Weights:

	Without additional weight, kg	With maximum additional weight, kg
On front wheels.	1030	1220
On rear wheels..	2375	3785
Total.....	3405	5005

Section 2

Laboratory tests

I Compulsory tests:

Belt test

Date and location of tests: May 5, 1961, Ultuna, Uppsala 7

Type of dynamometer: Hydraulic

Position of governor control: Index for belt work and fully open

Fuel: Diesel oil, density 0,827 at 20°C, Cetane No. 48

Oil: Heavy Duty, SAE 20-20 W

1. Sustained power tests

Duration of test h	Power hp _{metric}	Engine speed r/m	Torque kpm	Spec. fuel consumption g/hph	Fuel temp. °C	Oil temp. °C	Coolant temp. °C	Air temp. °C	Atmos. press. mm Hg	Remarks
2	59,8	1501	28,5	185	33	85	76	21	761	Max. power Speed less than at max. torque
1	37,4	896	29,9	190	33	77	79	20	761	

2. Varying speed tests

Power hp _{metric}	Engine speed r/m	Fuel consumption			Temperature			Atmospheric conditions		Remarks
		kg/h	hph/kg	g/hph	Fuel °C	Oil °C	Coolant °C	Temp. °C	Press. mm Hg	
60,4	1500	11,04	5,47	183	30	84	77	18	761	Rated speed for belt and p. t. o. work Lowest recorded Rated speed for drawbar work Lowest recorded
4,6	1661	3,10	1,47	680	29	80	71	17	761	
68,0	1800	12,86	5,29	189	33	87	75	20	761	
6,50	1925	4,07	1,60	626	29	86	70	18	761	

II Supplementary tests: Power take off test

Date and location of tests: May 3, 1961, Ultuna, Uppsala 7

Type of dynamometer: Hydraulic

Position of governor control: Index for p. t. o. work and fully open

Fuel: Diesel oil, density 0,827 at 20°C, Cetane No. 48

Oil: Heavy Duty, SAE 20-20 W

1. Sustained power tests

Duration of test h	Power hp _{metric}	Engine speed r/m	Torque kpm	Spec. fuel consumption g/hph	Fuel temp. °C	Oil temp. °C	Coolant temp. °C	Air temp. °C	Atmos. press. mm Hg	Remarks
2	61,8	1501	29,5	179	26	81	75	19	760	Max. power Speed less than at max. torque
1	38,9	898	31,0	183	27	76	79	23	760	

2. Varying speed tests

Power hp _{metric}	Engine speed r/m	Fuel consumption			Temperature			Atmospheric conditions		Remarks
		kg/h	hph/ kg	g/hph	Fuel °C	Oil °C	Coolant °C	Temp. °C	Press. mm Hg	
62,3	1500	11,07	5,63	178	24	79	80	16	760	Rated speed for belt and p. t. o. work
1,8	1672	2,55	0,69	1441	23	76	69	16	760	Lowest re- corded
70,5	1800	12,99	5,43	184	26	83	77	17	760	Rated speed for drawbar work
4,1	1949	3,29	1,25	797	24	81	68	18	760	Lowest re- corded

Section 3

Drawbar tests on drum dynamometer

Date of tests: May 8—10, 1961

Type of surface: Concrete

Position of governor control: Fully open

Type of tyre: Rear, Good Year 14—34, 6-ply rating

Front, Good Year 7.50—18, 4-ply rating

Fuel: Diesel oil, density 0,827 at 20°C, Cetane
No. 48

Oil: Heavy Duty, SAE 20-20 W

A. Tests with maximum additional weight

Weight of tractor

without ballast: Front 1030 kg, rear 2375 kg

with ballast: Front 1220 kg, rear 3785 kg

with ballast: Total 5005 kg

Weight of ballast

front: 190 kg (2 weights per wheel, 80 kg, water 55 kg per
wheel)

rear: 1410 kg (5 weights per wheel, 700 kg, water 355 kg
per wheel)

Tyre pressure, rear: 1,1 kp/cm²

Height of drawbar

above ground: 384 mm

1. Maximum powers and pulls

Gear No.	Maximum powers								Maximum pulls	
	Power hp _{metric}	Corresponding pull kp	Wheel slip %	Engine speed r/m	Travelling speed km/h	Engine temp. °C	Air temp. °C	Atmos. press. mm Hg	Pull kp	Reason for stall
1	57,4	4390	16	1800	3,53	76	12	742	4460	Wheelspin
2	61,7	2740	8	1800	6,08	79	19	749	3060	Engine stall
3	61,8	2180	6,5	1800	7,65	79	19	749	2435	" "
4	61,1	1145	3,5	1800	14,4	77	20	749	1290	" "
5	55,0	532	2	1800	27,9	79	22	749	637	" "

2. Fuel consumption

Gear No.	Optimum fuel consumption			Range of pull over which specific fuel consumption does not exceed the optimum consumption by more than 10%
	Spec. fuel consumption g/hph	hph/kg	Corresponding pull kp	
1	217	4,61	3660	2040—4390
2	207	4,83	3060	1420—3060
3	202	4,95	2400	1260—2435
4	204	4,90	1290	740—1290
5	216	4,63	635	500—637

B. Test without ballast

Weight of tractor

front: 1030 kg

rear: 2375 kg

total: 3405 kg

Tyre pressure, rear: 1,1 kp/cm²

Height of drawbar

above ground: 384 mm

1. Maximum powers and pulls

Gear No.	Maximum powers								Maximum pulls	
	Power hp _{metric}	Corresponding pull kp	Wheel slip %	Engine speed r/m	Travelling speed km/h	Engine temp. °C	Air temp. °C	Atmos. press. mm Hg	Pull kp	Reason for stall
1	41,8	3125	18	1859	3,61	79	13	742	3160	Wheelspin
2	60,1	2790	12	1800	5,82	77	13	757	3105	Engine stall
3	63,4	2260	8,5	1800	7,57	79	12	742	2500	" "
4	64,3	1190	4,5	1800	14,6	80	11	742	1350	" "
5	60,1	582	2	1800	27,9	79	11	742	690	" "

2. Fuel consumption

Gear No.	Optimum fuel consumption			Range of pull over which specific fuel consumption does not exceed the optimum consumption by more than 10 %
	Spec. fuel consumption g/hph	hph/kg	Corresponding pull kp	
1	233	4,29	2520	1740—3160
2	211	4,74	2135	1340—3105
3	204	4,90	2495	1180—2500
4	198	5,05	1345	780—1350
5	200	5,00	670	505— 690

Section 4

I Location of centre of gravity:

Tractor with tanks filled, with driver, without water in tyres and ballast weight—644 mm forward of rear wheel centre

Tractor with tanks filled, with driver, fully ballasted—522 mm forward of rear wheel centre

II Turning space and turning radius:

Type of wheels: Front 7.50—18, rear 14—34

Tread: Front 1330 mm, rear 1510 mm

Results	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
Radius of turning space.....	3,8	3,9	4,5	4,5
Turning radius.....	3,7	3,8	4,4	4,4

Section 5

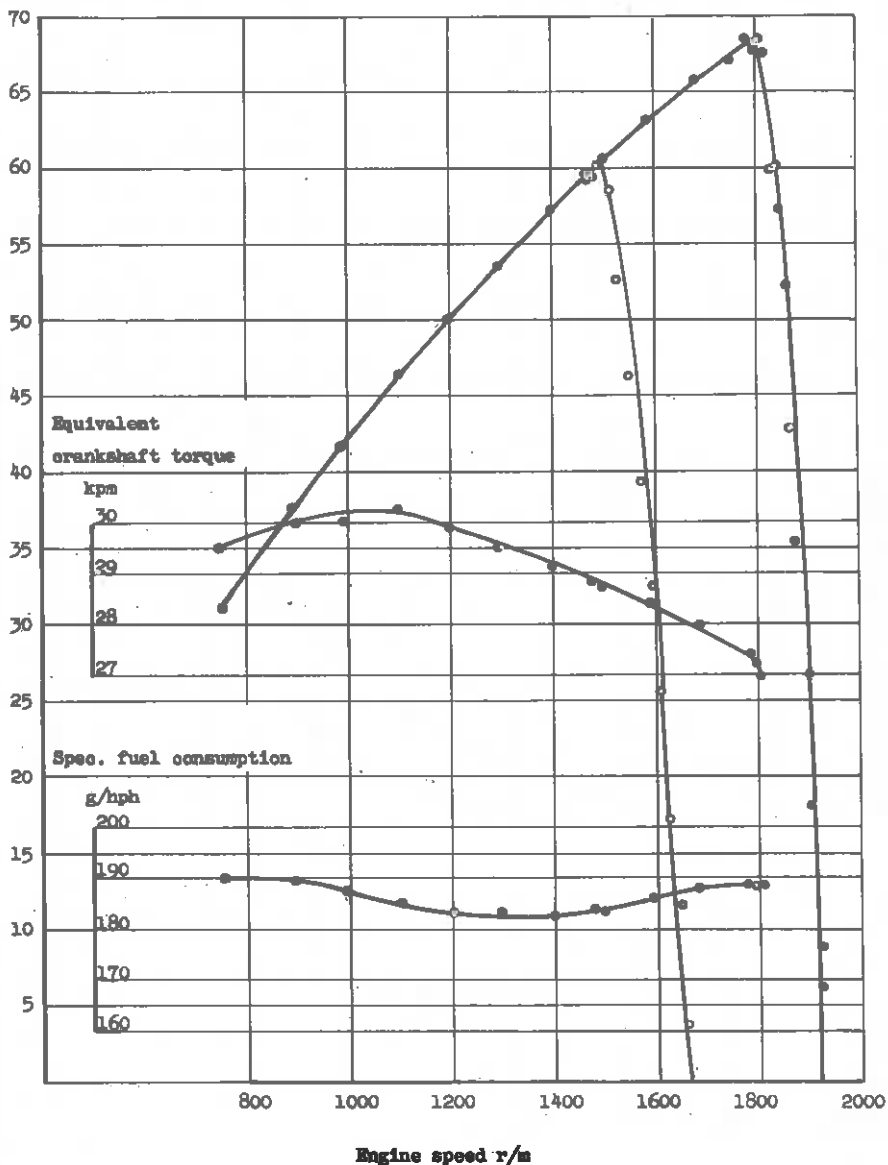
1. Repairs and adjustments during test: None

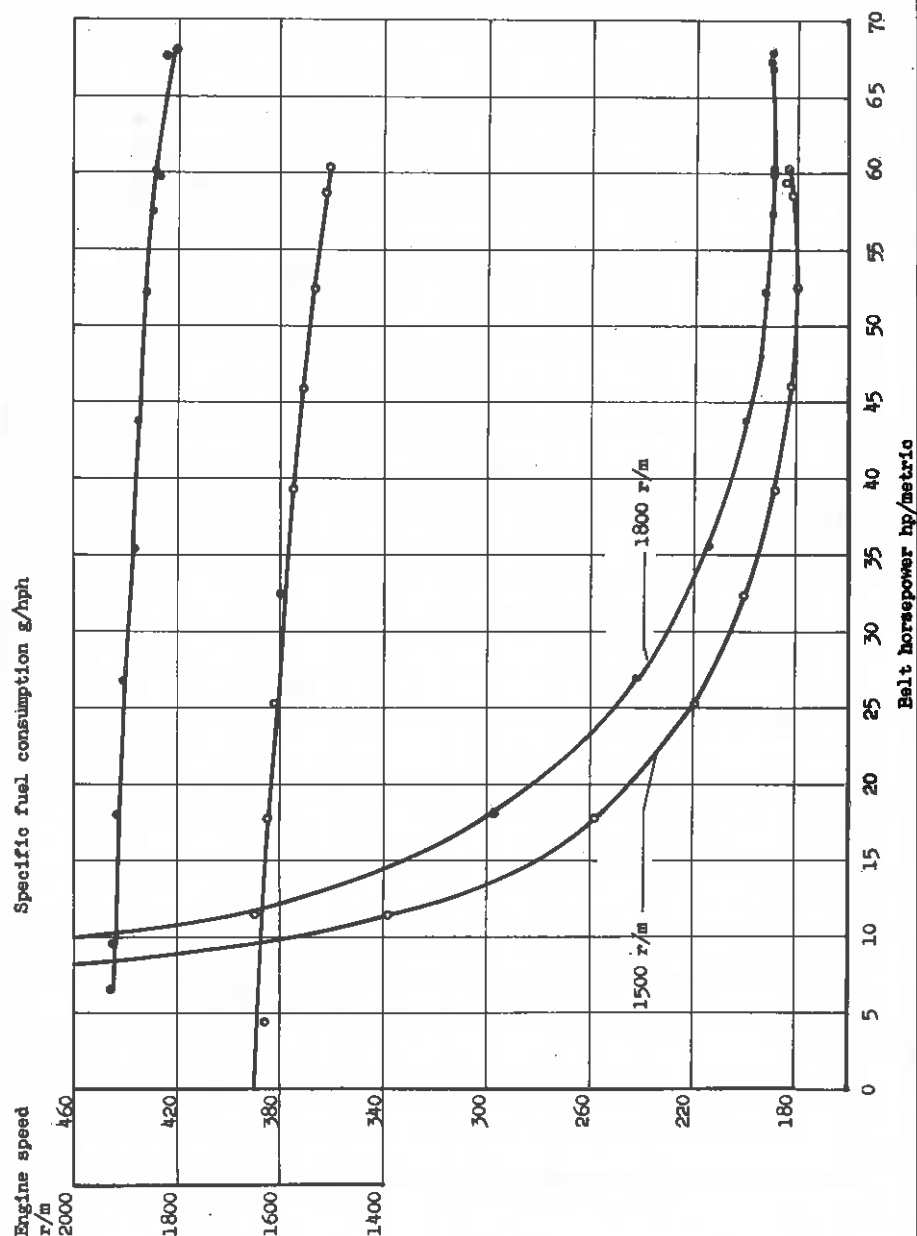
2. Remarks: None

Ultuna, Uppsala 7, 19th June, 1961

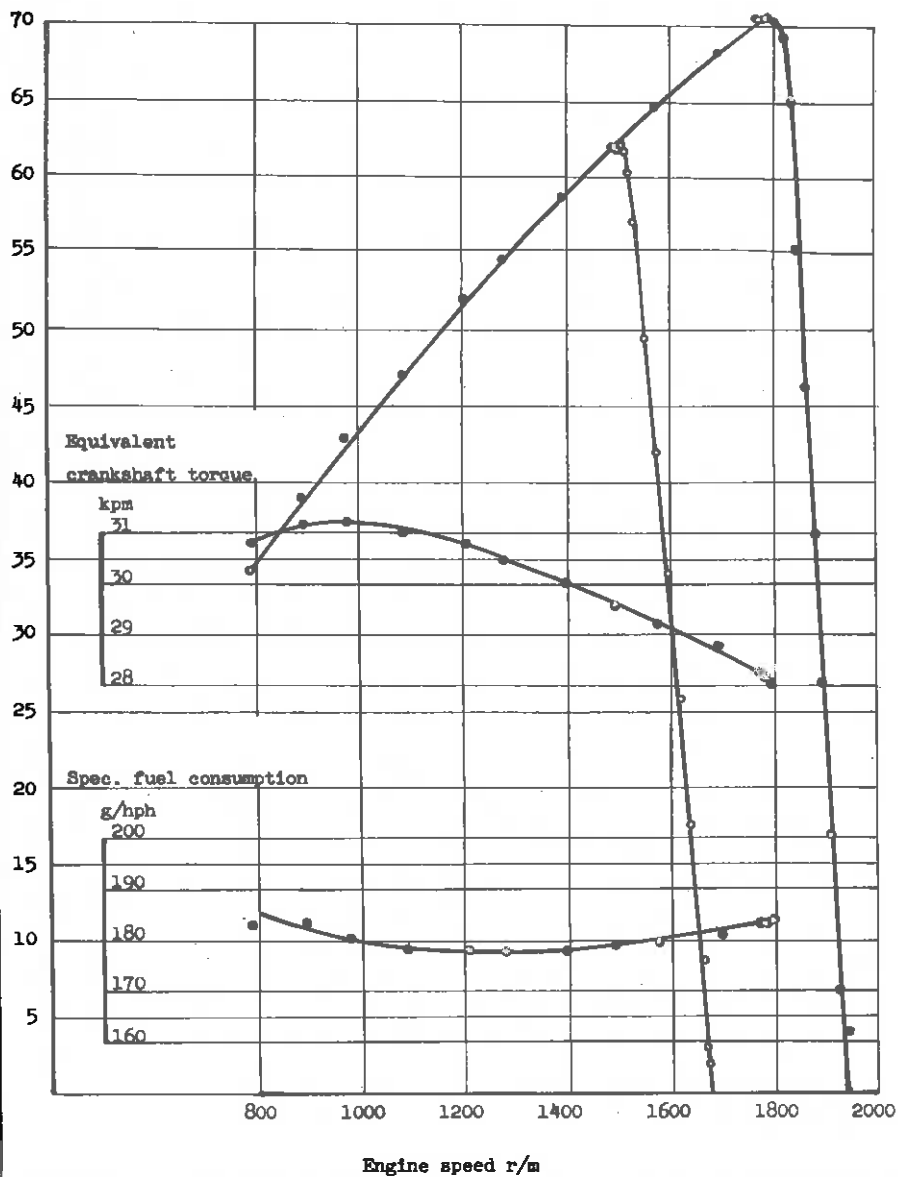
National Swedish Testing Institute for Agricultural Machinery

Belt horsepower hp/metric





P.t.o. horsepower hp/metric

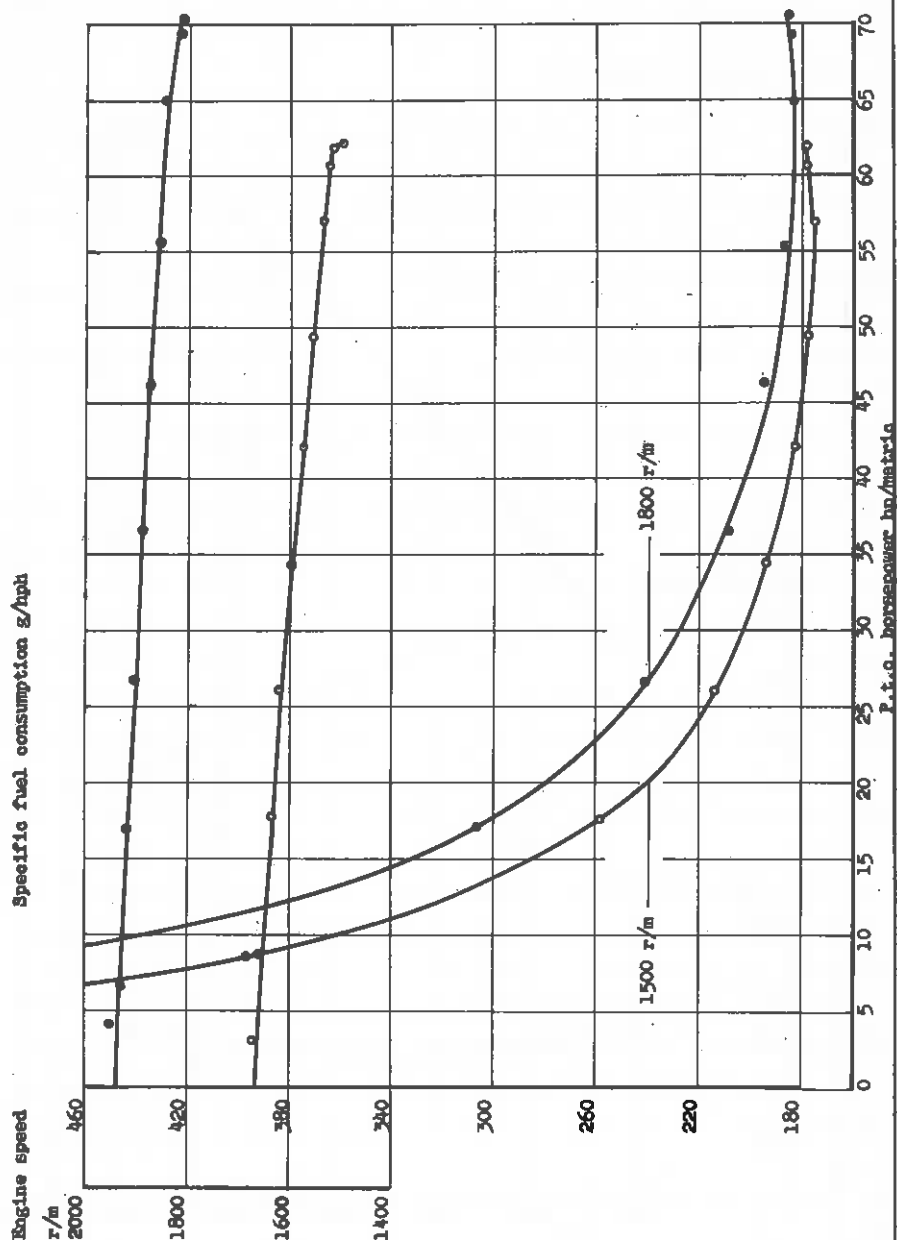


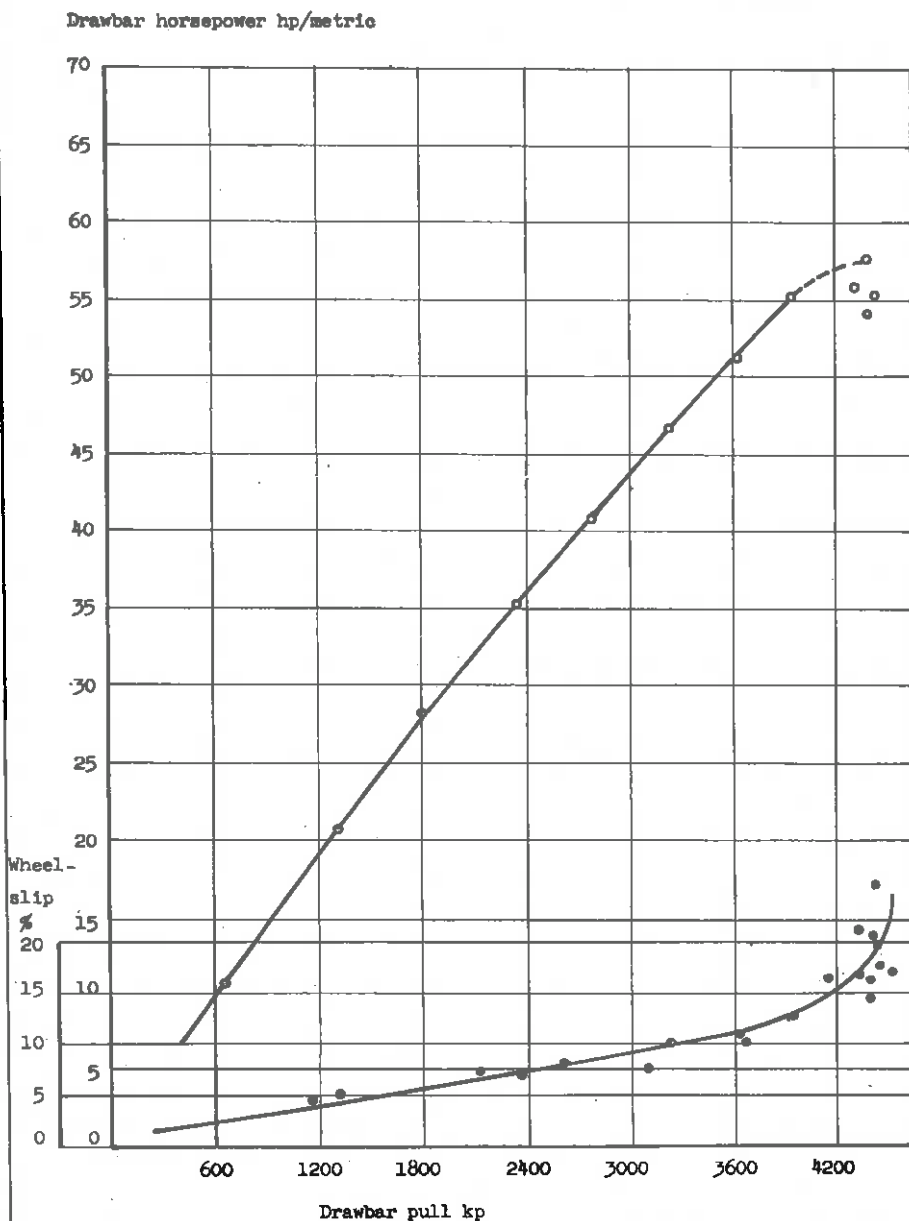
National Swedish
Testing Institute
for Agricultural
Machinery

Power take off test
BM/Volvo 470
Load-governed speeds

Figure 4.

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National Swedish
Testing Institute
for Agricultural
Machinery

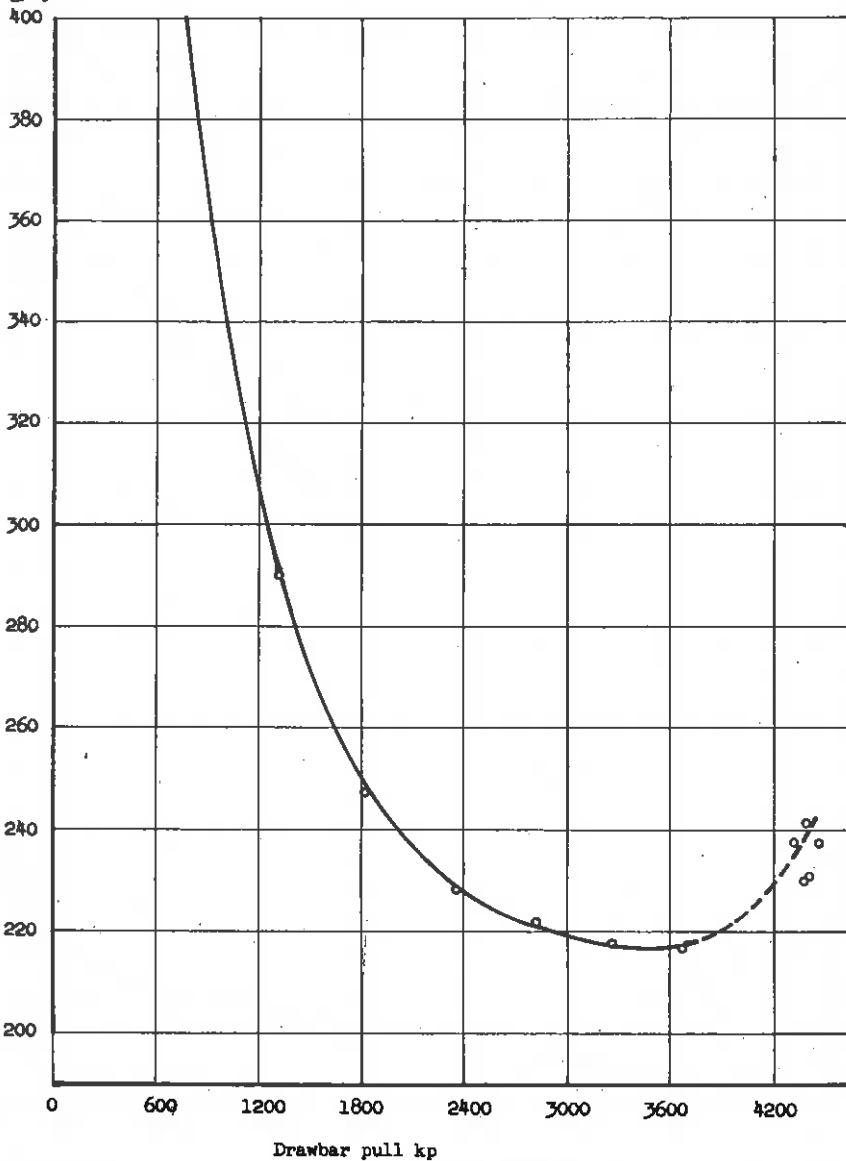
Drawbar test on drum dynamometer
BM/Volvo 470 with ballast
Equipped with 14-34 tyres
Gear 1

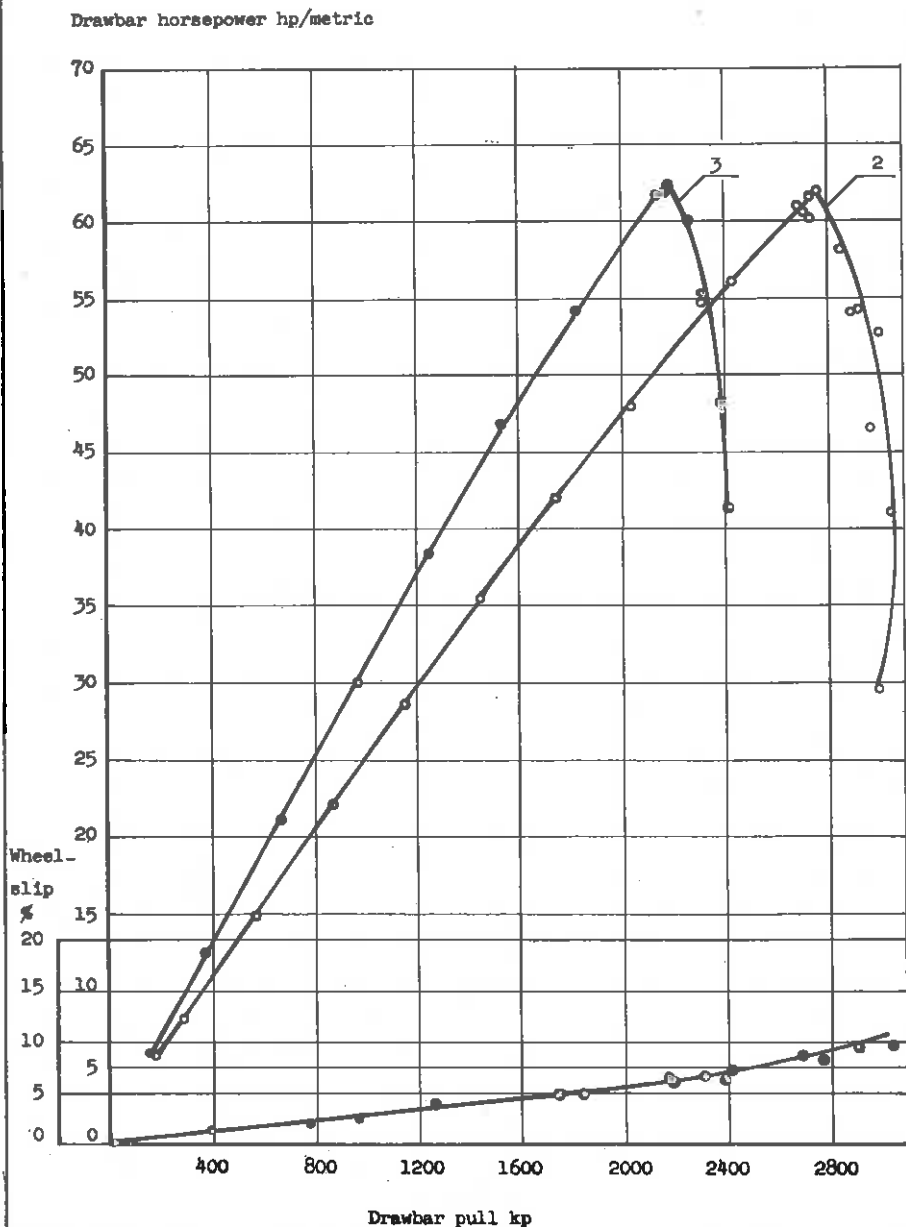
Figure 6.

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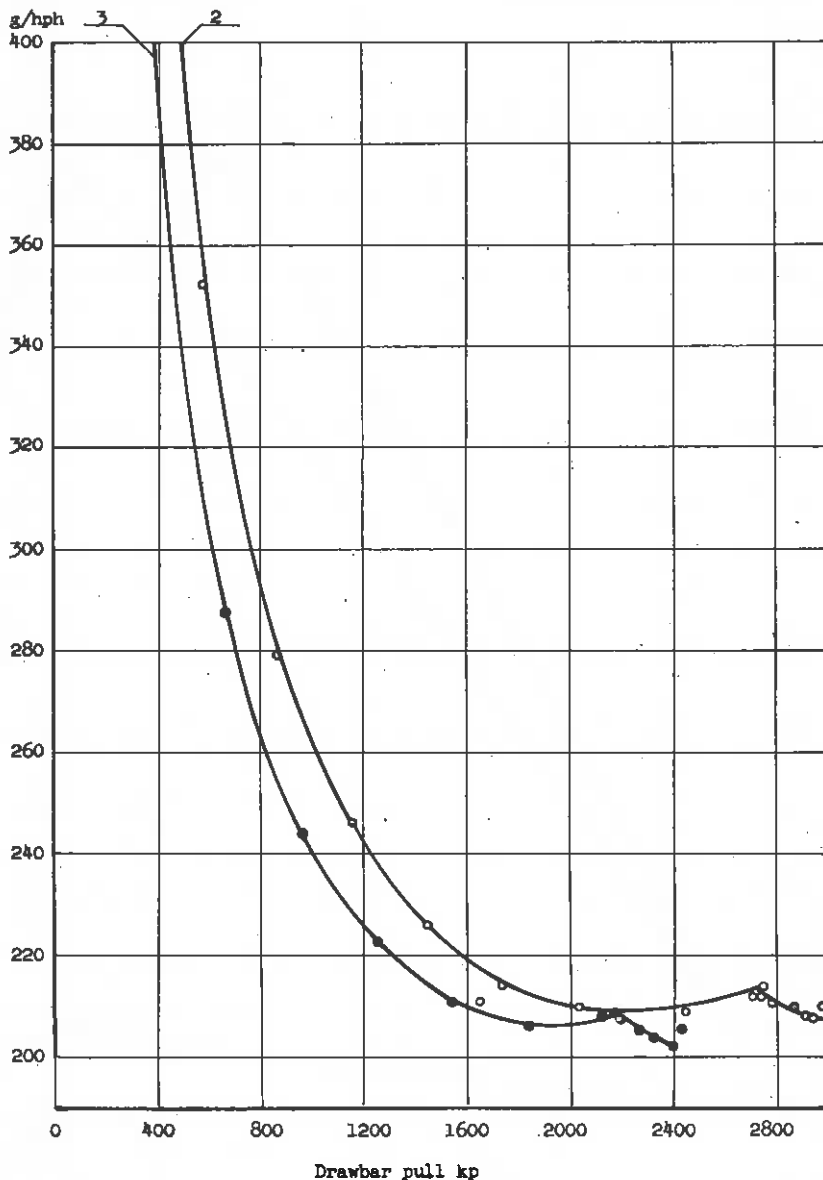
Specific fuel consumption

g/hph

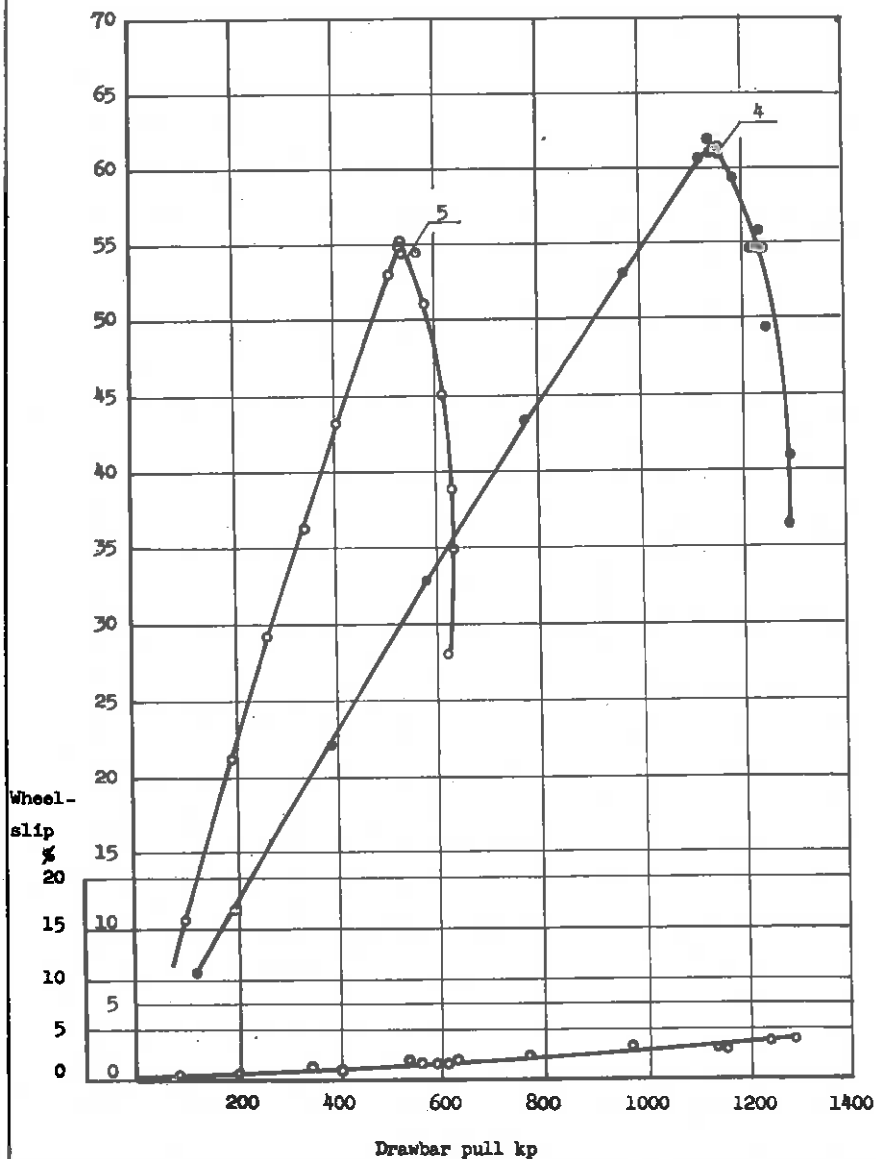




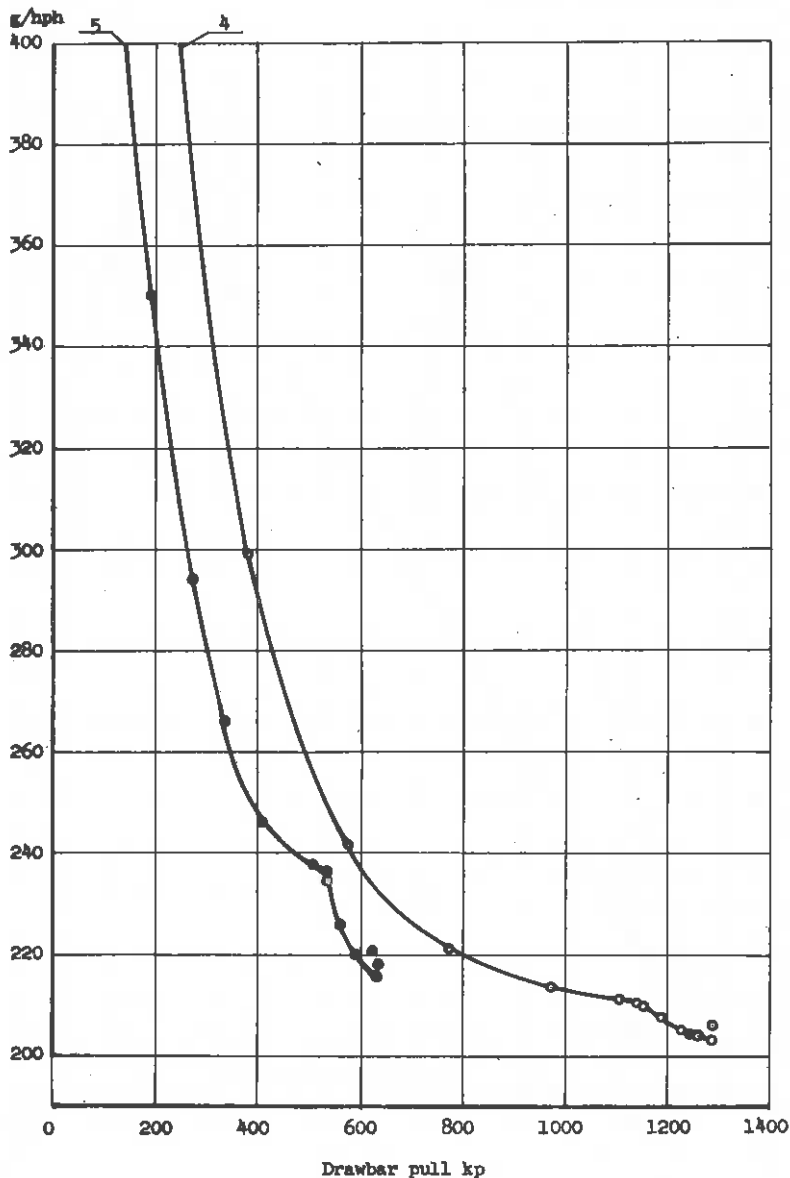
Specific fuel consumption

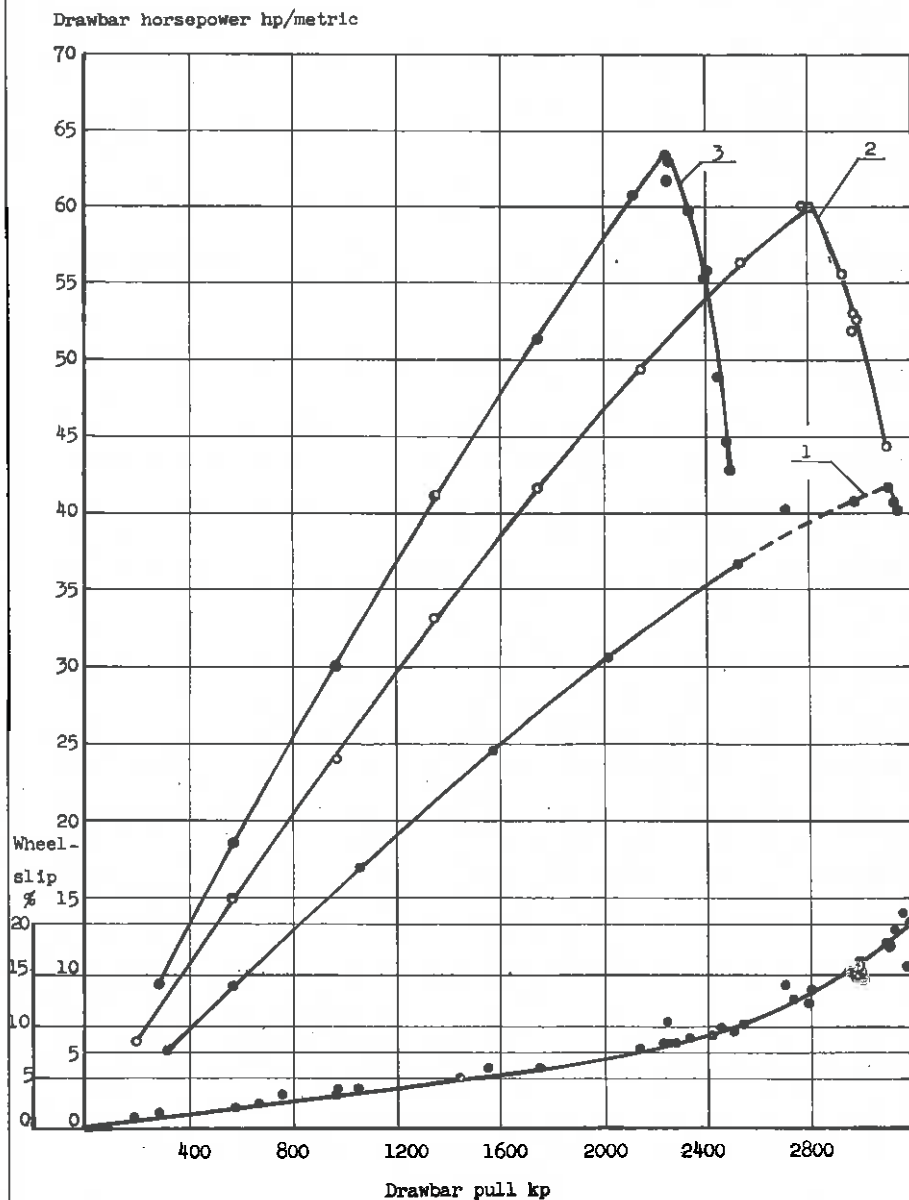


Drawbar horsepower hp/metric

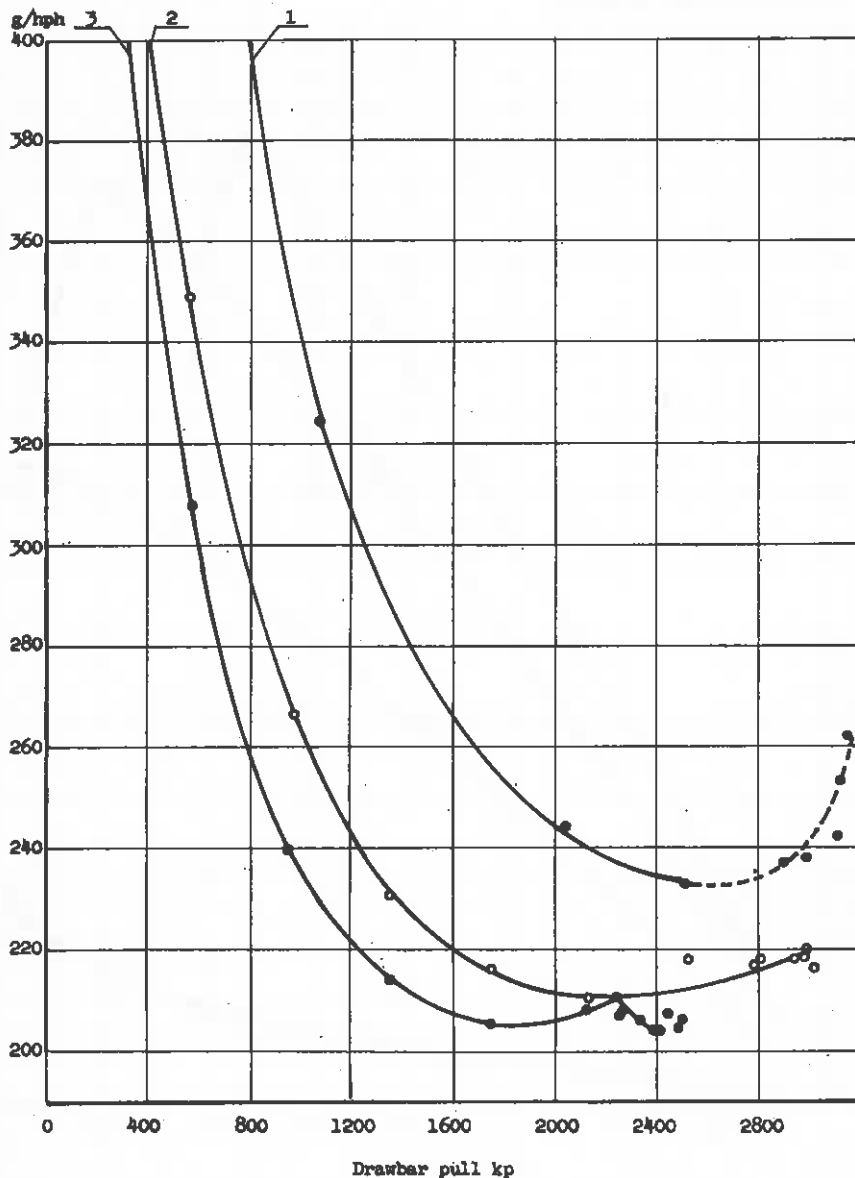


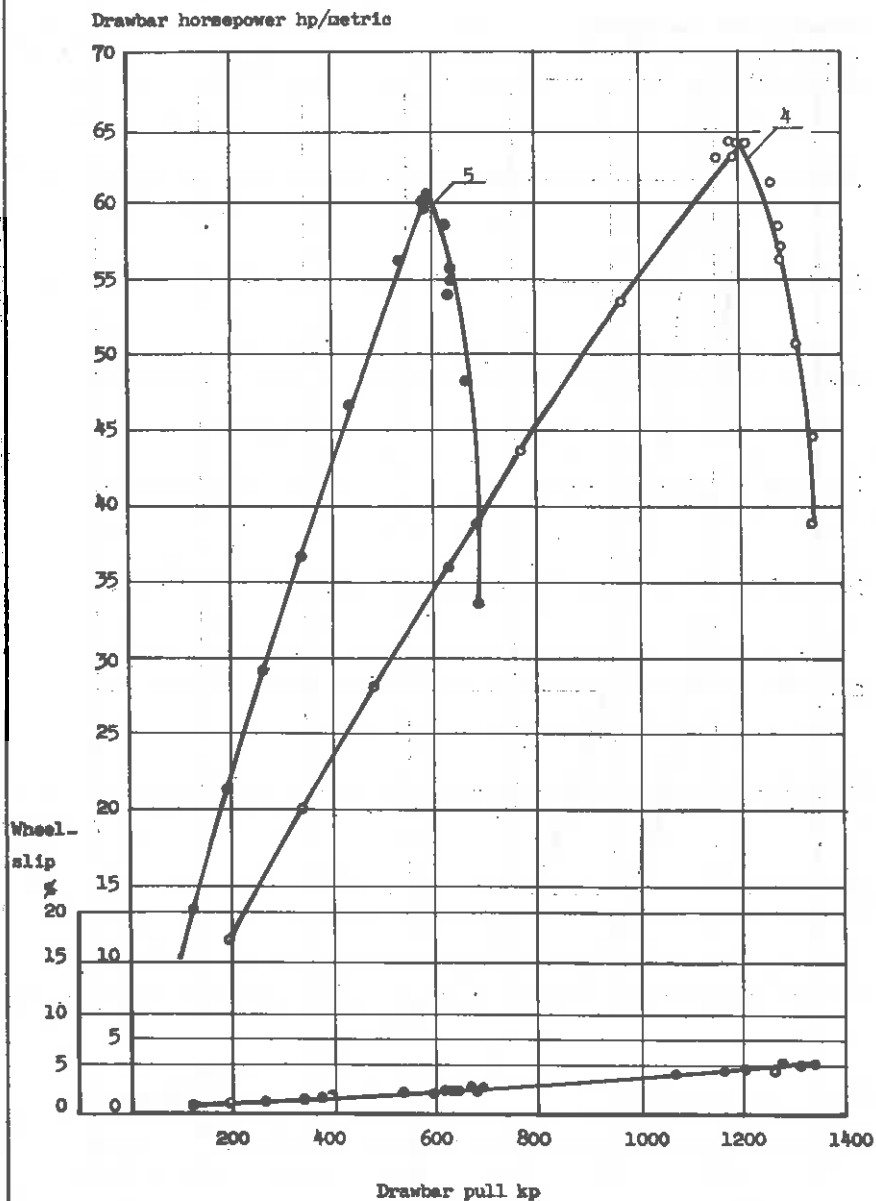
Specific fuel consumption





Special fuel consumption





Specific fuel consumption

