No. 589/O.E.C.D.

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

DAVID BROWN MODEL 990 SELECTAMATIC TRACTOR

Manufactured by: David Brown Tractors Ltd,
Meltham,
Huddersfield,
Yorkshire



Test No.: R.68/5508/O.E.C.D.

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: 3rd January 1969 *Serial No.:* 259

NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING
WREST PARK SILSOE BEDFORD

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

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SPECIFICATION OF TRACTOR

Manufacturer:	David Brown Tractors Ltd, Meltham, Huddersfield, Yorkshire
Submitted for test by:	The manufacturer
Selected by:	The manufacturer with the agreement of the testing station
Place of running-in:	Meltham
Duration of running-in:	73 hours

Tractor

Make:	David Brown Tractors Ltd, Meltham, Huddersfield, Yorkshire
Model:	990 Selectamatic
Type:	Four wheel, rear wheel driven
Serial No:	990A/801774

Engine

Make:	David Brown	Model:	449001
Type:	4-stroke, direct injection diesel	Serial No:	2183
Cylinders:	4 cylinders, vertical, in-line, 3.939 in (100.1 mm) bore x 4 in (101.6 mm) stroke, capacity 195.0 in^3 (3.195 l), compression ratio 17:1, overhead in-line valves		
Fuel system:	AC model E/FP 63154-A mechanical type fuel feed pump with hand primer; two pressurised C.A.V. type 2FS filters in series with paper replaceable elements, sediment bowl and gauze strainer on fuel feed pump; capacity of fuel tank 13½ UKgal (61.4 l); C.A.V. type DPA 324 8820 injection pump, Serial No. 32233; manufacturer's production setting of injection pump 15.54 pt/h (8.83 l/h) to 16.22 pt/h (9.22 l/h) at 1600 rev/min engine speed; C.A.V. BDLL 140S6417 injector nozzles, injector setting 175 atm (181 kg/cm^2)		
Governor:	C.A.V. mechanical, incorporated in fuel injection pump, governed range of engine speed 700-2350 rev/min, rated engine speed 1800 rev/min		
Air cleaner:	AC oil bath, with centrifugal pre-cleaner above hood; oil capacity 1¼ pt (0.71 l)		
Lubrication system:	Forced feed from gear-type pump with metal strainer in sump; Purolator full flow replaceable paper element oil filter, total oil capacity 13 pt (7.4 l), recommended oil change period 125 h		

Cooling system:	Water cooled, impeller assisted, with 16 in (406 mm) dia, 7 blade, belt driven fan, thermostat for temperature control, pressurized at 4 lb/in^2 (0.3 kg/cm^2), cooling water capacity 3 UK gal (13.6 l)	
Starting system:	Electrical, 12V Lucas type M45G solenoid engaged starter motor operable only with clutch pedal fully depressed; retarding device on injection pump for cold starting	
Electrical system	Voltage:	12, negative earth
	Generator:	Lucas type C 40 A
	Battery:	Exide 6-TXAZ15R lead acid, capacity 96 Ah

Transmission

Clutch:	Borg and Beck dual dry clutch, two plates - one 11 in (279 mm) dia for gearbox drive and one 10 in (254 mm) dia for p.t.o. drive, pedal operated
Gearbox:	Own make, sliding gear type, 6 forward speeds and two reverse
Rear axle and final drive:	Own make, crown wheel and pinion, with differential and outboard spur gear final drives, pedal operated differential lock
Oil capacities:	Transmission 40 pt (22.7 l), final reduction units 4 pt (2.3 l) each; recommended oil change period 1000 h

Gear	Number of engine revolutions for 1 revolution of driving wheel	Nominal travelling speed for 1800 rev/min rated speed of engine, mile/h	(km/h)
Forward			
1	168.83	1.65	(2.65)
2	101.77	2.74	(4.41)
3	75.49	3.69	(5.94)
4	55.70	5.00	(8.05)
5	45.49	6.12	(9.85)
6	24.88	11.19	(18.00)
Reverse			
1	102.52	2.72	(4.38)
2	45.83	6.08	(9.78)

Power take-off

Main: At rear of tractor, 6-spline, $1\frac{3}{8}$ in (34.9 mm) dia, proportional engine speed; height above ground $27\frac{7}{8}$ in (708 mm); direction of rotation clockwise viewed from tractor rear

Low ratio: 532 rev/min at 1800 rev/min rated engine speed, 540 rev/min (standard p.t.o. speed) at 1828 rev/min engine speed

High ratio: 900 rev/min at 1800 rev/min rated engine speed, 1000 rev/min at 2000 rev/min engine speed

Power lift: Own make, live hydraulic gear pump in transmission housing, supplying oil to ram cylinder and 2 external tappings; Category 1 and 2 implement linkage with top link sensing; draught, position and T.C.U. controls selected on single operating lever; vertical lift movement above ground: $12\frac{1}{2}$ in (318 mm) to $36\frac{1}{2}$ in (927 mm)

Drawbar: Swinging drawbar, height above ground to centre of clevis $12\frac{1}{2}$ in (318 mm), $14\frac{5}{8}$ in (371 mm), $16\frac{1}{2}$ in (419 mm) and $18\frac{1}{2}$ in (470 mm); distance from rear axle centre, 22 in (559 mm) or 29 in (737 mm); distance relative to p.t.o. shaft 8 in (203 mm) or 15 in (381 mm) to rear; lateral adjustment $9\frac{1}{2}$ in (241 mm) or $11\frac{5}{8}$ in (295 mm); pivot position relative to rear axle centre 1 in (25.4 mm) forward

Steering: Recirculating ball and nut with single drop arm and drag link

Brakes: Internal expanding drum brakes on spur pinion shafts, independent or combined, pedal operated; hand lever with ratchet operating both brakes for parking

Wheels

Steering wheels: Two at front, Goodyear Super Rib 7.50 - 16 tyres, 6 ply rating, maximum permissible weight on each tyre 1560 lb (708 kg) at 36 lb/in^2 (2.5 kg/cm^2); track width 52 in (1321 mm) by 4 in (102 mm) steps to 72 in (1829 mm), changed by extending the front axle

Driving wheels: Two at rear, Goodyear Traction Sure Grip 14 - 30 tyres, 6 ply rating, mounted on D.W.12 rims; maximum permissible weight on each tyre 3920 lb (1778 kg) at 16 lb/in^2(1.12 kg/cm^2); track width $56\frac{1}{2}$ in (1435 mm) by 4 in (102 mm) to $76\frac{1}{2}$ in (1943 mm), changed by reversing wheel centres and offset lug type rims

Wheelbase: 6 ft $6\frac{3}{4}$ in (2000 mm)

Tractor and ballast weights (without driver but with tanks full)

Weight without ballast

Front:	1733 lb (786 kg)
Rear:	2982 lb (1353 kg)
Total:	4715 lb (2139 kg)

Ballast

Front:	6 frame weights and frame, total 439 lb (199 kg)
Rear:	8 weights per wheel, total 1453 lb (659 kg) Water, total 1419 lb (644 kg)

Weight with full ballast

Front:	2276 lb (1032 kg)
Rear:	5750 lb (2608 kg)
Total:	8026 lb (3641 kg)

Seat — Bostrom, upholstered cushion and backrest, torsional rubber suspension adjustable for driver's weight; range of adjustment 3 in (76.2 mm) fore and aft

Number of grease points

Whole tractor: 25

Overall dimensions

Overall length:	Without front weights 10 ft $10\frac{3}{4}$ in (3.32 m) With front frame weights 11 ft 6 in (3.51 m)
Overall width:	Without ballast weights 6 ft $0\frac{1}{4}$ in (1.84 m) at $56\frac{1}{2}$ in (1435 mm) rear wheel track With ballast weights 7 ft 6 in (2.29 m) at $56\frac{1}{2}$ in (1435 mm) rear wheel track
Overall height:	To top of exhaust pipe $85\frac{1}{4}$ in (2165 mm) To top of steering wheel $65\frac{1}{2}$ in (1664 mm)
Minimum ground clearance:	To underside of drawbar frame in lower position $13\frac{7}{8}$ in (352 mm)

Lighting

	Height above ground of centre, in	(cm)	Diameter, in	(cm)	Distance from outside edge of tractor at $56\frac{1}{2}$ in (1435 mm) wheel track, to centre, in	(cm)
Headlights	41	(104)	$4\frac{7}{8}$	(12.4)	$22\frac{1}{4}$	(56.5)
Side lights	$59\frac{1}{2}$	(151)	2	(5.1)	$14\frac{3}{4}$	(37.5)
Rear lights	$59\frac{1}{2}$	(151)	2	(5.1)	$14\frac{3}{4}$	(37.5)
Reflectors	44	(112)	$1\frac{1}{2}$	(3.8)	$19\frac{1}{4}$	(48.9)

Unrestricted beam angle of headlight in plan view 74°

FUELS AND LUBRICANTS USED IN TESTS

Fuel:	Diesel oil, density 0.845 at 60°F (15.6°C), Cetane No. 53 to Class A, B.S.2869:1957
Engine oil:	Shell Multi-purpose 20W/30
Transmission oil:	Shell Multi-purpose 20W/30
Final drive reduction oil:	Shell 140 EP

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 23rd April 1968; N.I.A.E., Silsoe, Bedford, U.K.

Type of dynamometer: Water brake, Heenan and Froude

Horsepower (Metric hp)	Speeds, rev/min		Fuel consumption,		
	Engine	P.t.o.	UKgal/h (l/h)	lb/hp h (g/metric hp h)	hp h/UKgal (metric hp h/l)
Maximum power - 2 hour test					
52.9 (53.6)	2275	672	2.59 (11.77)	0.414 (185)	20.4 (4.55)
Standard p.t.o. speed (540 rev/min)					
47.4 (48.1)	1828	540	2.25 (10.23)	0.400 (179)	21.1 (4.71)
Standard belt speed					
Not applicable					
Speed recommended by the manufacturer for drawbar work					
46.8 (47.5)	1800	532	2.22 (10.09)	0.400 (179)	21.1 (4.71)
Fuel consumption at part loads					
45.4 (46.0)	2296	678	2.27 (10.32)	0.422 (189)	20.0 (4.46)
0	2349	694	0.63 (2.86)	-	-
22.9 (23.2)	2316	684	1.37 (6.23)	0.504 (225)	16.8 (3.75)
52.9 (53.6)	2275	672	2.59 (11.77)	0.414 (185)	20.4 (4.55)
11.5 (11.7)	2335	690	1.03 (4.68)	0.755 (338)	11.2 (2.50)
34.1 (34.6)	2303	680	1.78 (8.09)	0.440 (197)	19.2 (4.28)

No load, maximum engine speed: 2349 rev/min

Equivalent crankshaft torque at maximum power: 122.2 lb ft (16.9 kg m)

Maximum equivalent crankshaft torque: 137.2 lb ft (19.0 kg m) at 1680 rev/min engine speed

Mean atmospheric conditions:
- temperature 67°F (19°C)
- pressure 30.00 in Hg (762 mm Hg)
- relative humidity 49%

Maximum temperature:
- coolant 184°F (84°C)
- engine oil 191°F (88°C)
- fuel 108°F (42°C)

The following results were obtained with the p.t.o. in high ratio:

Horsepower (Metric hp)	Speeds, rev/min		Fuel consumption,		
	Engine	P.t.o.	UKgal/h (l/h)	lb/hp h (g/metric hp h)	hp h/UKgal (metric hp h/l)
Maximum power - 2 hour test					
52.9 (53.6)	2274	1137	2.59 (11.77)	0.413 (185)	20.5 (4.57)
Standard p.t.o. speed (1000 rev/min)					
50.7 (51.4)	2000	1000	2.38 (10.82)	0.397 (178)	21.3 (4.75)

2. DRAWBAR PERFORMANCE

Date of tests: 13th June - 3rd July 1968

Type of track: Tarmacadam

Height of drawbar above ground: 18½ in (470 mm)

See table on page 10

Gear	Horse-power (Metric hp)	Drawbar pull, lb (kg)	Speed, mile/h (km/h)	Engine speed, rev/min	Wheel-slip, %	Specific fuel consumption, lb/drawbar hp h (g/metric drawbar hp h)	Specific fuel consumption, drawbar hp h/ UKgal (metric drawbar hp h/l)	Temperature, °F (°C) Coolant	Fuel	Engine oil	Atmospheric conditions Temperature, °F (°C)	Relative humidity, %	Pressure, in Hg (mm Hg)
(i) Maximum power (ballasted)													
1	*35.0 (35.5)	7200 (3266)	1.82 (2.93)	2266	15.0	0.550 (246)	15.4 (3.44)	178 (81)	77 (25)	160 (71)	64 (18)	74	29.70 (754)
2	44.9 (45.5)	5200 (2359)	3.24 (5.21)	2290	8.5	0.493 (221)	17.1 (3.82)	187 (86)	87 (31)	159 (71)	75 (24)	58	29.81 (757)
3	45.2 (45.8)	3800 (1724)	4.46 (7.18)	2231	5.5	0.503 (225)	16.8 (3.75)	175 (79)	80 (27)	145 (63)	63 (17)	64	29.81 (757)
4	44.9 (45.6)	2750 (1247)	6.13 (9.86)	2253	3.8	0.508 (227)	16.6 (3.70)	179 (82)	75 (24)	138 (59)	56 (13)	82	29.81 (757)
5	44.4 (45.0)	2200 (998)	7.56 (12.16)	2250	3.0	0.509 (228)	16.6 (3.70)	180 (82)	85 (29)	147 (64)	69 (21)	76	29.81 (757)
(ii) Five hour test at 75% of pull at maximum power													
3	35.0 (35.5)	2850 (1293)	4.61 (7.43)	2288	3.9	0.535 (239)	15.8 (3.52)	178 (81)	82 (28)	166 (74)	63 (17)	69	29.79 (757)
(iii) +Five hour test at pull corresponding to 15% wheelslip in test (i)													
1	-	7200 (3266)	1.92 (3.09)	-	-	-	-	188 (87)	-	157 (69)	64 (18)	65	29.89 (759)
(iv) Maximum power (unballasted)													
1	*22.7 (23.0)	4600 (2087)	1.85 (2.98)	2307	15.0	-	-	179 (82)	-	142 (61)	69 (21)	55	30.05 (763)
2	*37.5 (38.0)	4600 (2087)	3.06 (4.92)	2304	15.0	-	-	180 (82)	-	139 (59)	65 (18)	56	30.05 (763)
3	44.0 (44.6)	3850 (1746)	4.29 (6.90)	2235	9.4	-	-	181 (83)	-	134 (57)	70 (21)	51	30.05 (763)
4	45.2 (45.8)	2800 (1270)	6.05 (9.73)	2243	5.8	-	-	181 (83)	-	130 (54)	70 (21)	51	30.05 (763)
5	45.3 (45.9)	2300 (1043)	7.38 (11.88)	2225	4.5	-	-	180 (82)	-	134 (57)	69 (21)	51	30.05 (763)

Total oil consumption during ten hours duration of tests (ii) and (iii) 0.025 lb/h (11.3 g/h)

*Maximum power available at 15% wheelslip

+Test (iii) was carried out with additional ballast and the results for power, slip and fuel consumption have no practical significance

3 and 4. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: As in specification, without ballast

Track of wheels: Front - 52 in (1321 mm)
Rear - 56½ in (1435 mm)

	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
Radius of turning space	10 ft 8 in (3.25 m)	10 ft 7 in (3.23 m)	12 ft 2 in (3.71 m)	11 ft 10 in (3.61 m)
Radius of turning circle	10 ft 4 in (3.15 m)	10 ft 3 in (3.12 m)	11 ft 10 in (3.61 m)	11 ft 6 in (3.51 m)

5. LOCATION OF CENTRE OF GRAVITY

Height above ground	31.0 in (787 mm)
Distance forward from the vertical plane containing the axis of the rear wheels	28.1 in (714 mm)
Distance from the median plane of the tractor	0

6. BRAKING

Date of tests: 2nd July 1968

Type of track: Tarmacadam

Cold brakes

	Tractor without ballast		Tractor ballasted	
Travelling speed of tractor, mile/h (km/h)	15.0	(24.1)	15.0	(24.1)
Maximum deceleration, ft/s^2 (m/s^2)	15.1	(4.6)	16.4	(5.0)
Stopping distance, ft (m)	17.5	(5.3)	19.5	(5.9)
Force on brake pedal, lb (kg)	150	(68)	200	(91)

Brake fade characteristics (hot tests)

Maximum deceleration hot/maximum deceleration cold x 100: 98%

Stopping distance cold/stopping distance hot x 100: 109%

Force on pedal cold/force on pedal hot x 100: 90%

Efficiency of handbrake: Satisfactory

Pull on handbrake: Not applicable - lock for brake pedals

7. MEASUREMENT OF AMBIENT NOISE EMITTED BY THE TRACTOR

Date of tests:	1st July 1968	
Type of sound level meter:	Brüel and Kjoer Type 2203	
Type of track:	Tarmacadam	
Results of tests:	gear	6th
	travelling speed before acceleration	11.2 mile/h (18.0 km/h)
	sound level	87 dBA

8. NOISE MEASUREMENTS AT THE DRIVER'S EAR LEVEL

Date of tests:	1st July 1968
Type of sound level meter and octave filter:	Brüel and Kjoer Type 2203 with octave filter set Type 1612
Type of track:	Tarmacadam

Results of Tests

Gear	Travelling speed, mile/h (km/h)	Loudness, sones
3	4.54 (7.30)	125

9. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of tests: 23rd and 24th April 1968; N.I.A.E., Silsoe, Bedford, U.K.

Hydraulic fluid

Make and type:	Shell Tractor Oil Universal
Viscosity:	20W/30
Viscosity index:	105

	Vertical movement, in (mm)	Maximum force exerted through full range, lb (kg)	Pressure, lb/in^2 (kg/cm^2)	Linkage load at which unballasted front end of tractor lifts off the ground, lb (kg)
Linkage giving maximum mechanical advantage				
At lower hitch points (height above ground in down position 12½ in (318 mm))	24 (610)	4250 (1928)	2380 (167)	4200 (1905)
On the frame 24 in (610 mm) to rear of lower hitch points	25 (635)	3500 (1588)	2380 (167)	2850 (1293)

Type of linkage lock for transport:	Mechanical
Opening pressure of the cylinder over pressure relief valve (manufacturer's figures):	2600 lb/in^2 (183 kg/cm^2)
Pump characteristics	
i) opening pressure of relief valve:	2000 lb/in^2 (141 kg/cm^2)
sustained pressure of the open relief valve:	2470 lb/in^2 (174 kg/cm^2)
Pump delivery rate at external tapping	
ii) at minimum pressure (rated engine speed):	5.07 gal/min (23.05 l/min)
iii) at maximum hydraulic power:	6.00 gal/min (27.28 l/min)
delivery pressure:	2050 lb/in^2 (144 kg/cm^2)
power:	8.61 hp (8.73 metric hp)
15. REPAIRS AND ADJUSTMENTS DURING TESTS	None
REMARKS	None

Officer in charge: D.W. SMITH

Head of Testing Division: T.C.D. MANBY

Date: 20th November 1968

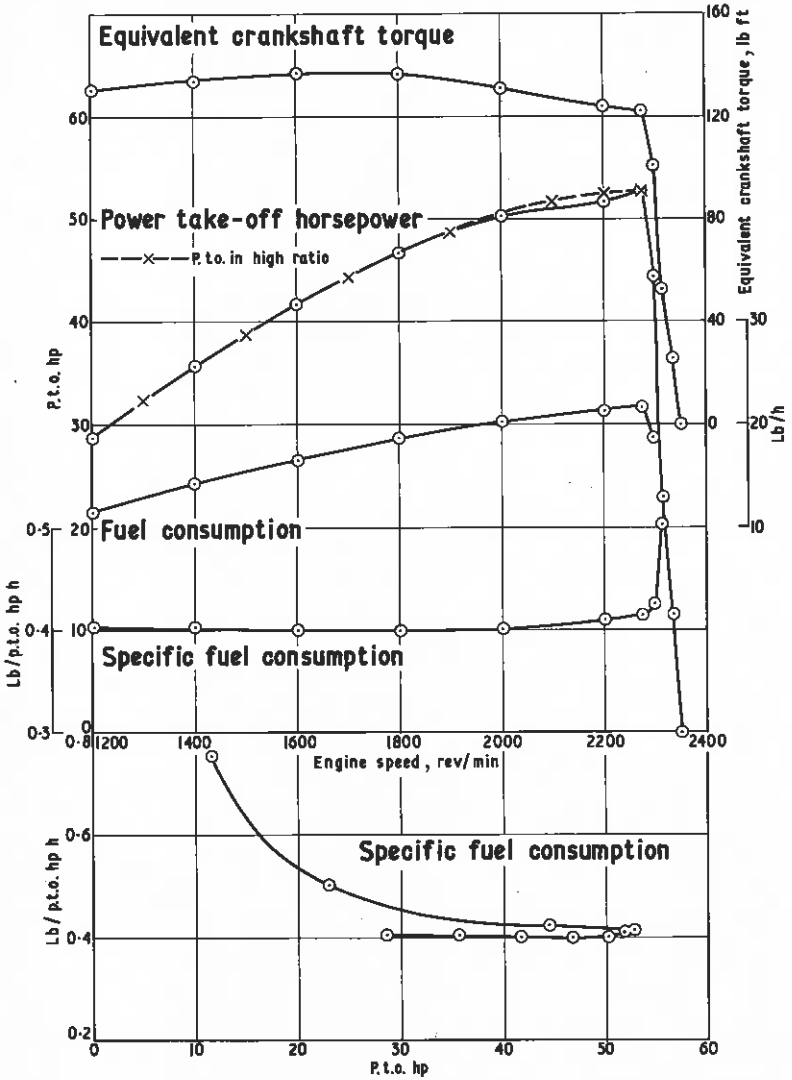
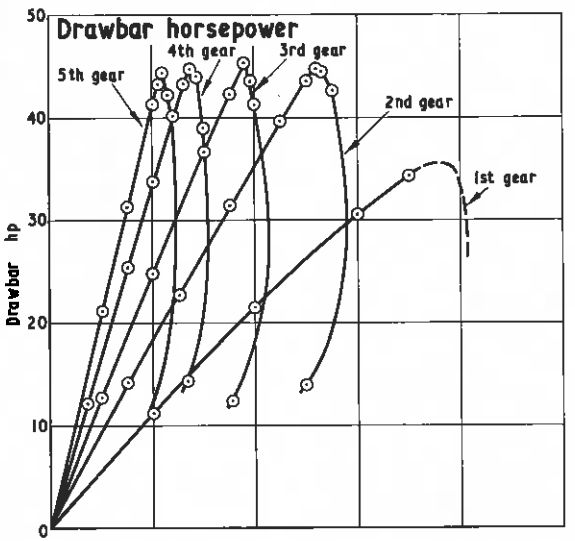


Fig. 1. Power take-off test



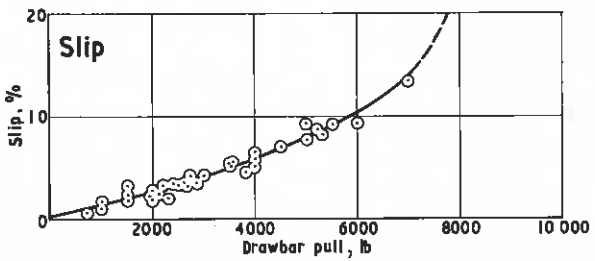


Fig. 2. Drawbar test on tarmacadam, with ballast

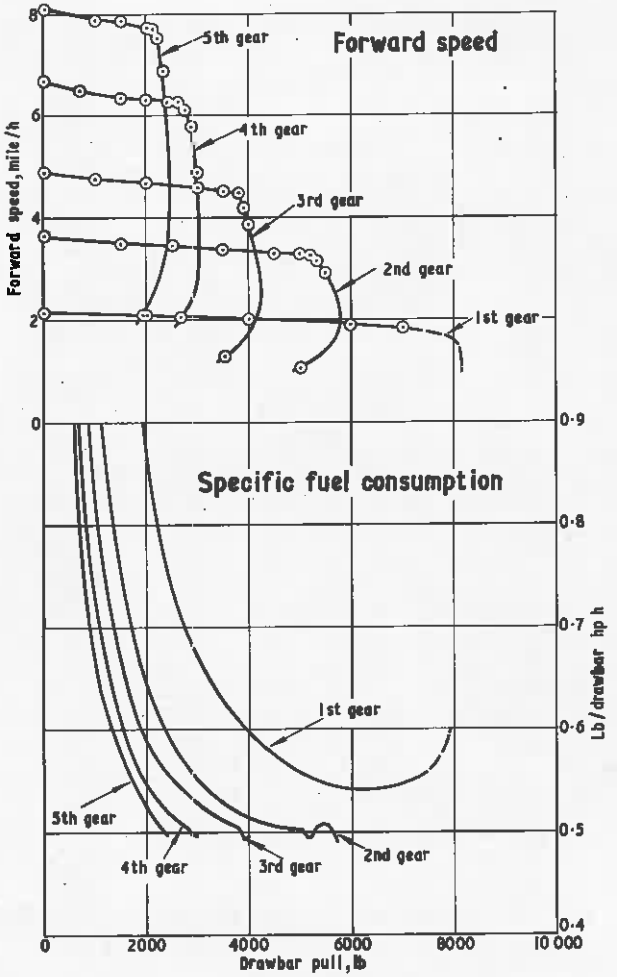


Fig. 3. Drawbar test on tarmacadam, with ballast

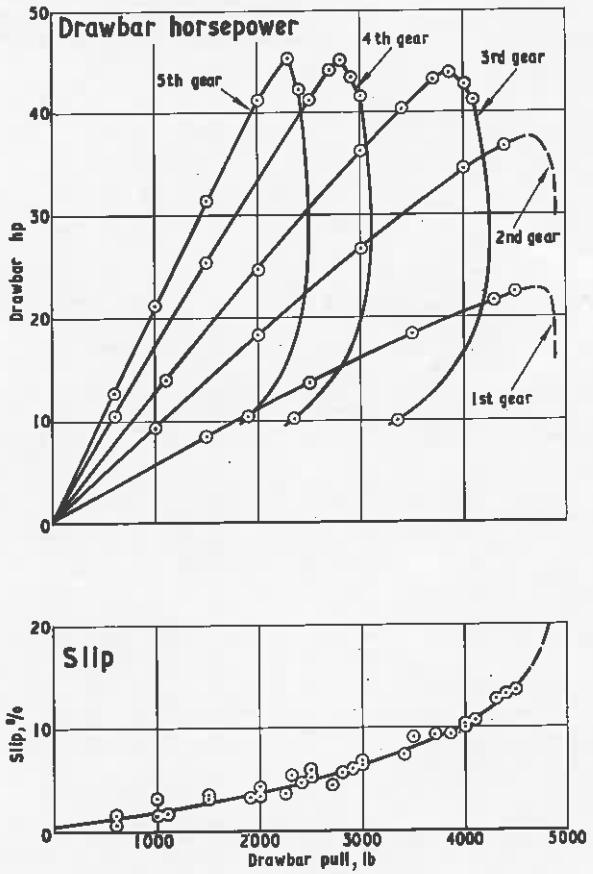


Fig. 4. Drawbar test on tarmacadam, without ballast

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