No. 515/O.E.C.D.

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

DAVID BROWN MODEL 880 SELECTAMATIC LIVEDRIVE DIESEL TRACTOR

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



Date of Tests: January-March 1966
Test No.: R.66046/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: 28th July 1966 *Serial No.:* 117

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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PART I

SPECIFICATION OF TRACTOR

Tractor

Make:	David Brown
Model:	880 Selectamatic Livedrive
Serial No.:	880A 530246

Engine

Make:	David Brown direct injection diesel, type AD3/55A, Serial No. AD3/55A 1241
Cylinders:	3 cylinders, vertical, in-line, 3.9375 in (100 mm) bore x 4.5 in (114.3 mm) stroke, capacity 164.4 in^3 (2.694 l), compression ratio 17:1, monobloc construction, overhead valves
Rated speeds:	2200 rev/min, governor setting - maximum no load engine speed 2350 rev/min
Fuel system:	Fuel - Diesel oil C.A.V. type DPA 3233000 injection pump, Serial No. R1549OWG; C.A.V. type BDLL 140S 6417 injector nozzles. Manufacturer's production setting for injection pump: 13.68 pt/h (7.77 l/h) to 14.20 pt/h (8.07 l/h) at 1600 rev/min engine speed. Injection pressure 175 atm (181 kp/cm^2), AC type E/FP63154-B fuel feed pump, two C.A.V. paper cartridge fuel filters on pressure side of feed pump, sediment bowl on feed pump. Capacity of fuel tank $11\frac{1}{2}$ UKgal (52.3 l)
Governor:	C.A.V. mechanical, incorporated in fuel injection pump. Governed range of engine speed 700-2350 rev/min
Air cleaner:	A.C. oil bath with centrifugal pre-cleaner above hood. Oil capacity $1\frac{1}{4}$ pt (0.71 l)
Lubricating system:	Forced feed from gear-type pump with metal strainer in sump. Purolator replaceable paper element full flow filter. Multi-purpose 20W/30 oil. Recommended oil change period 125 h. Oil capacity 11 pt (6.3 l).
Cooling system:	Water cooled, pressurized at 4 lb/in^2 (0.28 kp/cm^2), impeller assisted with 16 in (406 mm) dia, belt driven, 2-blade fan, thermostat for temperature control. Cooling water capacity 2.25 UKgal (10.2 l)

Transmission

Clutch:	Borg and Beck dual dry clutch, two 10 in (254 mm) dia plates for p.t.o. and gear-box drives, two stage foot-pedal operated
Gear-box:	Own make sliding gear type, 6 forward speeds and 2 reverse
Differential:	Crown wheel and pinion and differential with spur gear final drives, foot-pedal operated differential lock. Oil capacities, transmission 40 pt (22.7 l) multi-purpose 20W/30 oil, final drives 4 pt (2.27 l) each of gear oil type EP 140

Gear	Number of engine revolutions for one revolution of driving wheel	Theoretical travelling speed for 2200 rev/min rated speed of engine, mile/h (km/h)	
Forward			
1	135.37	2.40	(3.86)
2	81.60	3.98	(6.40)
3	60.53	5.37	(8.64)
4	44.66	7.27	(11.70)
5	36.47	8.90	(14.32)
6	19.95	16.28	(26.19)
Reverse			
low	82.20	3.95	(6.36)
high	36.75	8.84	(14.22)

Steering device Recirculating ball type with single drag link

Brakes Internal expanding on differential half shafts, independent or combined foot-pedal operated. Hand lever with ratchet operating both brakes for parking

Wheels

Steering wheels: Two at front. Tyres 6.00-16, 6-ply pneumatic. Track 52 in (1321 mm) by 4 in (102 mm) steps to 72 in (1829 mm) changed by extending front axle. Track of 50 in (1270 mm) obtainable by further movement inwards of the right-hand axle. Maximum permissible weight on each tyre: 1260 lb (572 kg) at 48 lb/in^2 (3.4 kp/cm^2), 990 lb (449 kg) at 32 lb/in^2 (2.2 kp/cm^2)

Driving wheels: Two at rear. Tyres 11-32, 6-ply pneumatic. Track 52 in (1321 mm) by 4 in (102 mm) steps to 76 in (1930 mm) changed by reversing wheel centres and offset lug type rims. Maximum permissible weight on each tyre: 2860 lb (1297 kg) at 22 lb/in^2 (1.5 kp/cm^2), 2370 lb (1075 kg) at 16 lb/in^2 (1.1 kp/cm^2)

Wheelbase: 6 ft 7$\frac{3}{4}$ in (2026 mm)

Belt pulley

Location: Attachable to rear of tractor in two alternative positions, main p.t.o. driven

Diameter x width: 8$\frac{1}{2}$ in (216 mm) x 5 11/16 in (144 mm)

Speeds: 1553 rev/min giving 3455 ft/min (17.55 m/s) linear speed at 2200 rev/min rated engine speed. 1393 rev/min giving 3100 ft/min (15.75 m/s) linear speed at 1974 rev/min engine speed, p.t.o. in high ratio

Direction of rotation: Optional, related to position of unit

Power take-off

Main: 6-spline, 1$\frac{3}{8}$ in (34.9 mm) dia, at rear of tractor

Height above ground: 26$\frac{1}{4}$ in (667 mm)

Speeds: High ratio, 1100 rev/min at 2200 rev/min rated engine speed
1000 rev/min at 2000 rev/min engine speed
Low ratio, 650 rev/min at 2200 rev/min rated engine speed
540 rev/min at 1828 rev/min engine speed

Direction of rotation: Clockwise viewed from tractor rear

Power lift

Own make with gear-type pump, operated either together with or independently of the power take-off; oil (from transmission) is supplied at nominal pressure of 2000 lb/in^2 (141 kp/cm^2) to a ram cylinder and 2 external tappings. Category 1 or 2 implement linkage. Single lever operation with selection of draught, position, external services or T.C.U. (selective weight transfer from depth wheel fitted implements) by pointer and dial, variable rate of drop. Oil flow at maximum horsepower delivered by hydraulic system, test figures: 4.0 gal/min (18.2 l/min) at 1700 lb/in^2 (120 kp/cm^2) and 1800 rev/min engine speed. Maximum load liftable through complete range of movement at the centre of the ball joint at the rear of the lower links of the tractor: verified that the manufacturer's maximum recommended working load of 1800 lb (816 kg) was attainable; test figure 2900 lb (1315 kg). Radius of motion of lower links 33½ in (851 mm)

Drawbar

Swinging drawbar: Radius of swing 23 in (584 mm) and 30 in (762 mm), lateral adjustment 9 in (229 mm) and 11¼ in (286 mm), vertical heights to centre of clevis 10¾ in (273 mm), 12¾ in (324 mm), 14⅞ in (378 mm) and 16⅞ in (429 mm). Distance behind rear axle 21 in (533 mm) and 28 in (711 mm)

Hitch

Optional hook type, automatic (not fitted)

Electrical equipment

Voltage: 12, negative earth

Generator: Lucas C40A

Battery: Exide type 6 TXMZ 15L, capacity 96 Ah

Starting device: Lucas 12V M45 G solenoid engaged starter motor

Overall dimensions

Overall length: 10 ft 8¾ in (3.27 m) as tested

Overall width: 5 ft 8¾ in (1.75 m) at 52 in (1321 mm) track, no ballast weights, 6 ft 10¼ in (2.09 m) at 52 in (1321 mm) track to outside of wheel weights, 6 per wheel

Overall height: 7 ft 1⅝ in (2.17 m) to top of exhaust pipe
4 ft 10⅝ in (1.49 m) to top of steering wheel

Minimum ground clearance: 12¾ in (324 mm) to bottom of drawbar frame

Weights

With full fuel tank, oil, cooling water, no driver

	Without additional weight, lb (kg)		With maximum additional weight, lb (kg)	
On front wheels	1549	(703)	1874	(850)
On rear wheels	2733	(1240)	4616	(2094)
Total	4282	(1943)	6490	(2944)

Special remarks

Ether plug in manifold and retarding device on fuel pump for cold starting

PART II

LABORATORY TESTS

1. Compulsory tests : Power take-off test (low ratio)
   Date and location of tests : 25th-26th January 1966, N.I.A.E., Silsoe, Bedford, U.K.
   Type of dynamometer : Water brake, Heenan and Froude
   Fuel : Diesel oil, density 0.837 at 60°F (15.6°C), Cetane No. 54
   Engine oil : Multi-purpose 20W/30
   Transmission oil : Multi-purpose 20W/30

Horse-power (Metric hp)	Speeds, rev/min		Equiv. crank-shaft torque, lb ft (kp m)	Fuel consumption, UKgal/h (l/h)	lb/hp h (g/metric hp h)	hp h/ UKgal (metric hp h/l)	Temperature, °F (°C)			Atmos. conditions	
	Engine	P.t.o.					Cool-ant	Oil	Fuel	Temp., °F (°C)	Press., inHg (mmHg)
A. Maximum power											
42.0 (42.6)	2251	665	98.0 (13.55)	2.17 (9.9)	0.432 (193)	19.4 (4.33)	182 (83)	200 (93)	107 (42)	65 (18)	29.33 (745)
B. Power at standard p.t.o. speed (540 rev/min)											
37.4 (37.9)	1828	540	107.5 (14.87)	1.78 (8.1)	0.399 (178)	21.0 (4.69)	182 (83)	189 (87)	103 (39)	61 (16)	29.33 (745)
C. Power at maximum torque											
32.2 (32.7)	1500	443	112.6 (15.57)	1.44 (6.5)	0.375 (168)	22.3 (4.98)	186 (86)	187 (86)	108 (42)	66 (19)	29.33 (745)
D. Power at rated speed											
41.4 (42.0)	2200	650	98.8 (13.66)	2.14 (9.7)	0.432 (193)	19.4 (4.33)	182 (83)	200 (93)	108 (42)	63 (17)	29.33 (745)
No load, maximum engine speed: 2340 rev/min											

The following results were obtained in high ratio

A. Maximum power											
43.2 (43.8)	2250	1125	100.9 (13.95)	2.18 (9.9)	0.422 (189)	19.9 (4.44)	182 (83)	200 (93)	103 (39)	63 (17)	29.50 (749)
B. Power at standard p.t.o. speed (1000 rev/min)											
40.7 (41.3)	2000	1000	106.8 (14.77)	1.95 (8.9)	0.401 (179)	20.9 (4.66)	182 (83)	190 (88)	103 (39)	66 (19)	29.50 (749)

2. Supplementary tests : Belt test (high ratio)
Date and location of tests : 27th January 1966, N.I.A.E., Silsoe, Bedford, U.K.
Type of dynamometer : Electrical, swinging frame
Fuel : Diesel oil, density 0.837 at 60°F (15.6°C), Cetane No. 54
Engine oil : Multi-purpose 20W/30
Transmission oil : Multi-purpose 20W/30

Horse-power (Metric hp)	Speeds		Equiv. crank-shaft torque, lb ft (kp m)	Fuel consumption,			Temperature, °F (°C)			Atmos. conditions	
	Engine, rev/min	Belt, ft/min (m/s)		UKgal/h (l/h)	lb/hp h (g/metric hp h)	hp h/ UKgal (metric hp h/l)	Cool-ant	Oil	Fuel	Temp., °F (°C)	Press., inHg (mmHg)
A. Maximum power											
40.5 (41.1)	2239	3516 (17.86)	95.0 (13.14)	2.16 (9.8)	0.447 (200)	18.7 (4.17)	185 (85)	201 (94)	109 (43)	65 (18)	29.63 (753)
B. Power at standard belt speed of 3100 ft/min (15.75 m/s)											
38.1 (38.6)	1974	3100 (15.75)	101.4 (14.02)	1.92 (8.7)	0.423 (189)	19.8 (4.42)	187 (86)	195 (91)	110 (43)	65 (18)	29.63 (753)
C. Power at maximum torque											
33.0 (33.5)	1600	2513 (12.77)	108.3 (14.98)	1.56 (7.1)	0.397 (178)	21.1 (4.71)	187 (86)	183 (84)	111 (44)	63 (17)	29.63 (753)
D. Power at rated speed											
40.2 (40.8)	2200	3455 (17.55)	96.0 (13.28)	2.14 (9.7)	0.445 (199)	18.8 (4.19)	187 (86)	200 (93)	109 (43)	64 (18)	29.63 (753)
No load, maximum engine speed: 2330 rev/min											

PART III

DRAWBAR TESTS ON ARTIFICIAL TRACK

Date of tests: 16th February - 8th March 1966

Type of track: Tarmacadam

Position of governor control lever: Fully open, giving maximum no-load engine speed of 2350 rev/min

Type of tyre: Rear - Dunlop Fieldmaster, open centre, 11-32, 6-ply pneumatic
Front - Dunlop Tractor, 6.00-16, 6-ply, pneumatic

Fuel: Diesel oil, density 0.837 at 60°F (15.6°C), Cetane No. 54

Engine oil: Multi-purpose 20W/30

Transmission oil: Multi-purpose 20W/30

A. TESTS WITH MAXIMUM ADDITIONAL WEIGHT

Weight of tractor without driver:

Weight without ballast:	Front - 1549 lb (703 kg) Rear - 2733 lb (1240 kg)
Ballast:	Front: Weights, 2 per wheel - 325 lb (147 kg) Water - nil Rear: Weights, 6 per wheel - 1049 lb (476 kg) Water - 834 lb (378 kg)
Weight with full ballast:	Front - 1874 lb (850 kg) Rear - 4616 lb (2094 kg) Total - 6490 lb (2944 kg)
Tyre pressure:	Front - 32 lb/in^2 (2.2 kp/cm^2) Rear - 16 lb/in^2 (1.1 kp/cm^2)
Height of drawbar above ground:	18 in (457 mm)

(1) Maximum powers and pulls

Gear	Maximum powers						Air temp., °F (°C)	Atmos. press., inHg (mmHg)	Maximum pulls	
	Horse-power (Metric hp)	Corres-ponding pull, lb (kp)	Wheel-slip, %	Engine speed, rev/min	Speed, mile/h (km/h)	Engine coolant temp., °F (°C)			Pull, lb (kp)	Reason for stall
1	30.4 (30.8)	5500 (2495)	16.6	2254	2.07 (3.33)	190 (88)	52 (11)	30.06 (764)	5900 (2676)	Wheelspin and bouncing
2	37.3 (37.8)	3700 (1678)	6.4	2209	3.78 (6.08)	182 (83)	52 (11)	30.06 (764)	4200 (1905)	Engine stall
3	38.4 (38.9)	2800 (1270)	4.4	2179	5.14 (8.27)	183 (84)	49 (9)	30.06 (764)	3150 (1429)	Engine stall
4	38.8 (39.3)	2050 (930)	3.2	2202	7.10 (11.42)	180 (82)	50 (10)	30.06 (764)	2300 (1043)	Engine stall
5	38.1 (38.6)	1650 (748)	2.7	2181	8.66 (13.93)	180 (82)	50 (10)	30.06 (764)	1850 (839)	Engine stall

(2) Fuel consumption

Gear	Optimum fuel consumption[M]			Range of pull, lb (kp) over which specific fuel consumption does not exceed optimum consumption by more than 10%	
	Specific fuel consumption, lb/drawbar hp h (g/metric drawbar hp h)	Drawbar hp h/UKgal (metric drawbar hp h/l)	Corresponding pull, lb (kp)		
1	0.543 (243)	15.4 (3.44)	4700 (2132)	2880 (1306) - 5700 (2586)	
2	0.498 (223)	16.8 (3.75)	3700 (1678)	2270 (1030) - 4200 (1905)	M.S.P.
3	0.481 (215)	17.4 (3.88)	2800 (1270)	1860 (844) - 3150 (1429)	M.S.P.
4	0.481 (215)	17.4 (3.88)	2050 (930)	1500 (680) - 2300 (1043)	M.S.P.
5	0.486 (217)	17.2 (3.84)	1650 (748)	1160 (526) - 1850 (839)	M.S.P.

[M]The drawbar specific fuel consumption curves in Gears 2 to 5 had no clearly marked minima and the values shown for optimum fuel consumption are those corresponding to maximum drawbar horsepower

B. TESTS WITHOUT BALLAST

Weight of tractor without driver:

Weight without ballast: Front - 1549 lb (703 kg)
Rear - 2733 lb (1240 kg)
Total - 4282 lb (1943 kg)

Tyre pressure: Front - 24 lb/in^2 (1.7 kp/cm^2)
Rear - 12 lb/in^2 (0.8 kp/cm^2)

Height of drawbar above ground: 18 in (457 mm)

(1) Maximum powers and pulls

Gear	Maximum powers						Air temp., °F (°C)	Atmos. press., inHg (mmHg)	Maximum pulls	
	Horse-power (Metric hp)	Corres-ponding pull, lb (kp)	Wheel-slip, %	Engine speed, rev/min	Speed, mile/h (km/h)	Engine coolant temp., °F (°C)			Pull, lb (kp)	Reason for stall
1	21.5 (21.8)	3800 (1724)	16.0	2288	2.12 (3.41)	175 (79)	49 (9)	30.08 (764)	4000 (1814)	Wheelspin
2	35.1 (35.6)	3700 (1678)	14.1	2242	3.56 (5.73)	182 (83)	50 (10)	30.08 (764)	4000 (1814)	Wheelspin
3	38.3 (38.8)	2800 (1270)	7.8	2237	5.13 (8.25)	192 (89)	51 (11)	30.08 (764)	3200 (1452)	Engine stall
4	39.0 (39.5)	2050 (930)	5.2	2215	7.13 (11.47)	184 (84)	52 (11)	30.08 (764)	2325 (1055)	Engine stall
5	39.0 (39.5)	1675 (760)	4.2	2225	8.73 (14.05)	180 (82)	51 (11)	30.08 (764)	1850 (839)	Engine stall

PART IV

1. Location of centre of gravity

	Tractor unballasted
Height above ground	27.8 in (706 mm)
Distance forward from the vertical plane containing the axis of the rear wheels	27.8 in (706 mm)
Distance from the median plane parallel to the longitudinal axis of the tractor bisecting the track	0

2. Turning space and turning radius

Wheel equipment: As for drawbar test without ballast

Wheel track: Front - 52 in (1321 mm)
Rear - 52 in (1321 mm)

	With brakes		Without brakes	
	Right-hand	Left-hand	Right-hand	Left-hand
Radius of turning space	10 ft 8¾ in (3.3 m)	10 ft 8¾ in (3.3 m)	11 ft 9¼ in (3.6 m)	11 ft 8¼ in (3.6 m)
Turning radius	10 ft 5½ in (3.2 m)	10 ft 5½ in (3.2 m)	11 ft 6 in (3.5 m)	11 ft 5 in (3.5 m)

PART V

1. Repairs and adjustments during tests: During the drawbar test the injectors were cleaned and reset to rectify a small loss of power.

2. Remarks: None

Officer in charge: D. W. Smith

Head of Tractor and Drier Performance Department: P. H. Bailey

Date: 8th July 1966

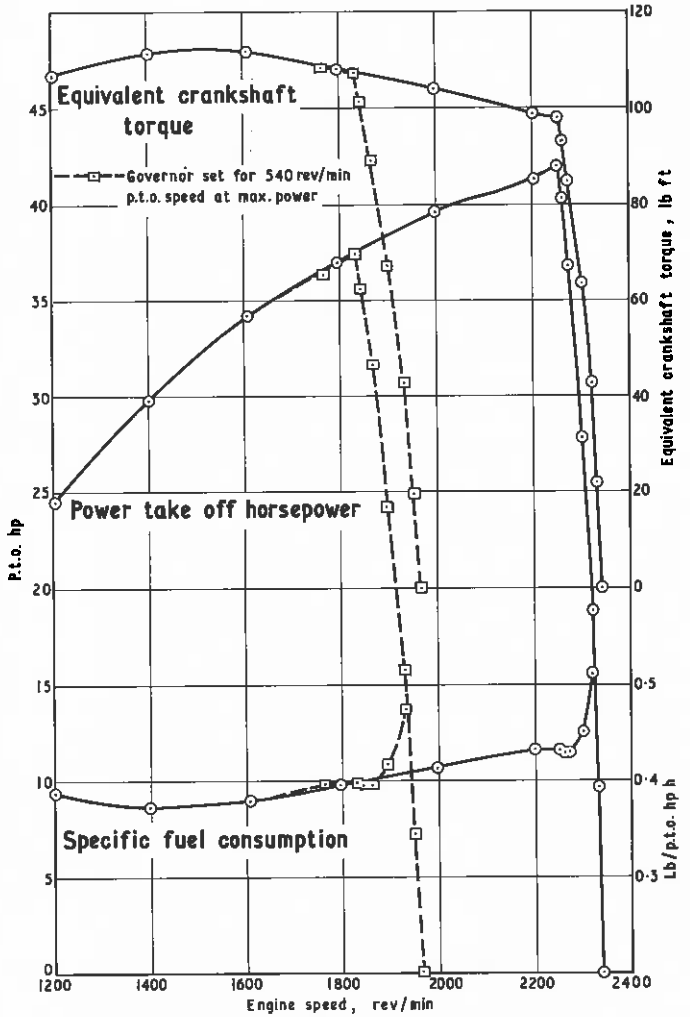


Fig.1. Power take-off test (low ratio)

David Brown Model 880 Selectamatic Livedrive Diesel Tractor

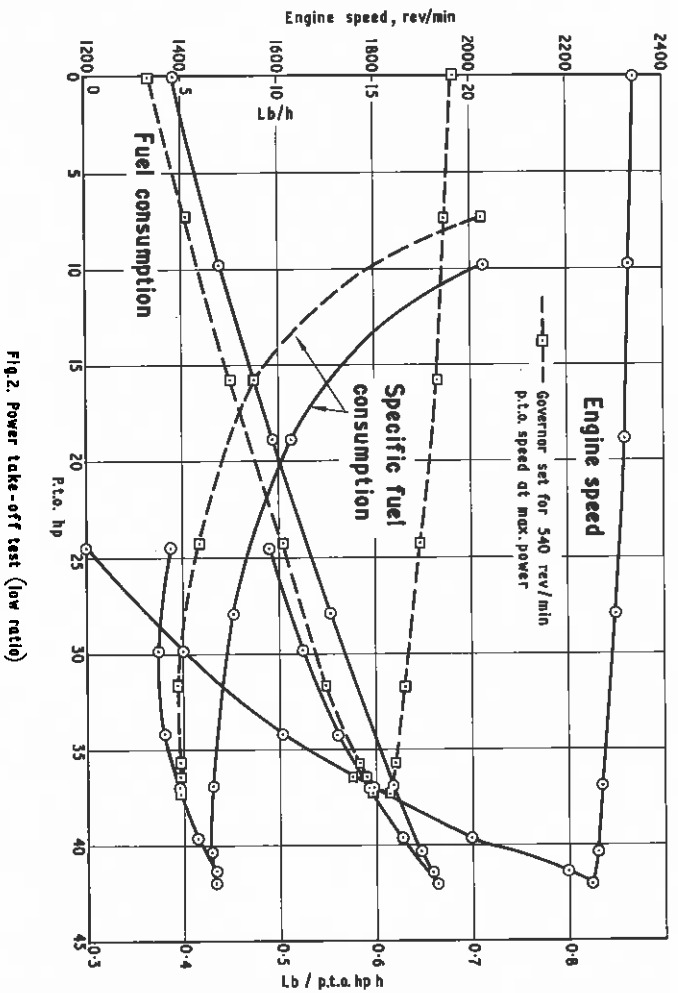


Fig.2. Power take-off test (low ratio)

David Brown Model 880 Selectamatic Livedrive Diesel Tractor

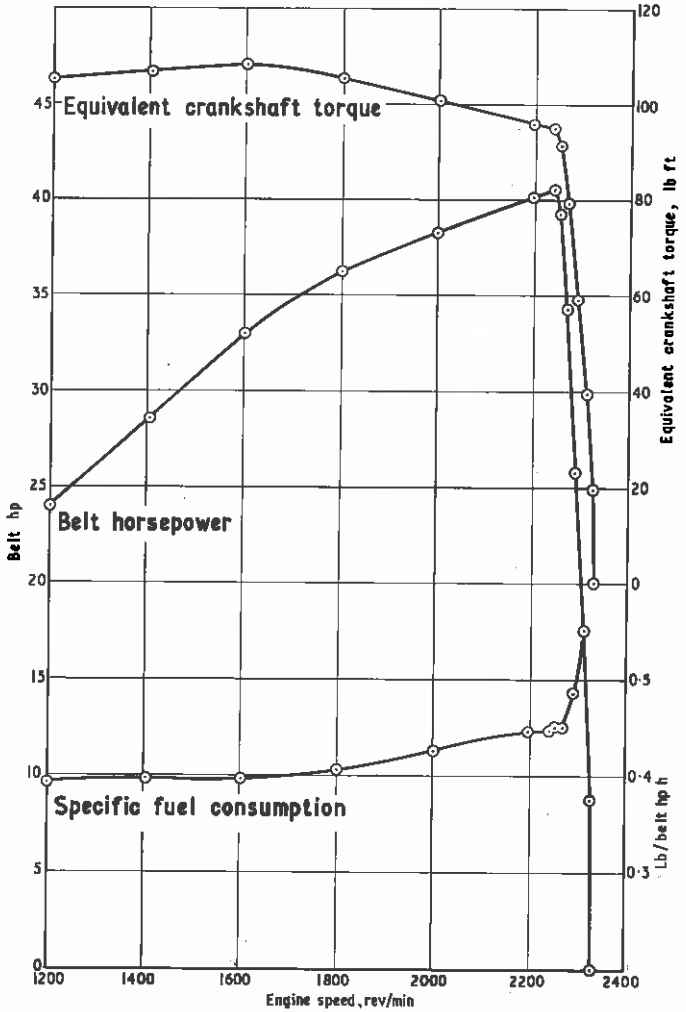


Fig.3. Belt test (high ratio)

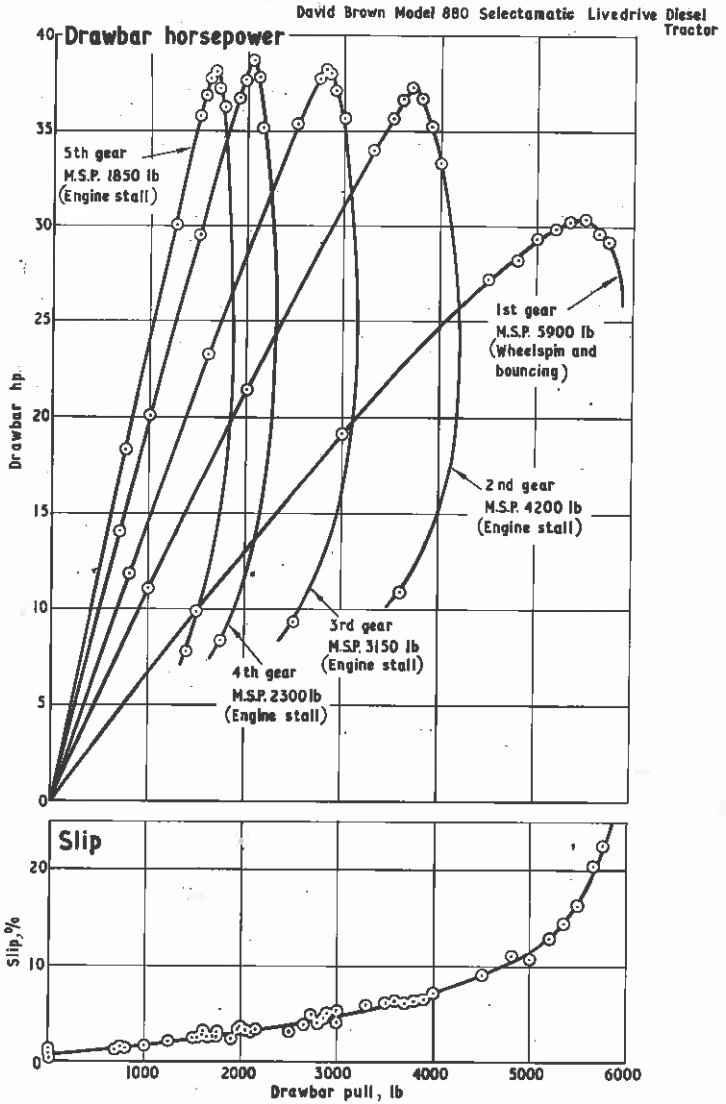


Fig.4. Drawbar test on tarmacadam, with ballast

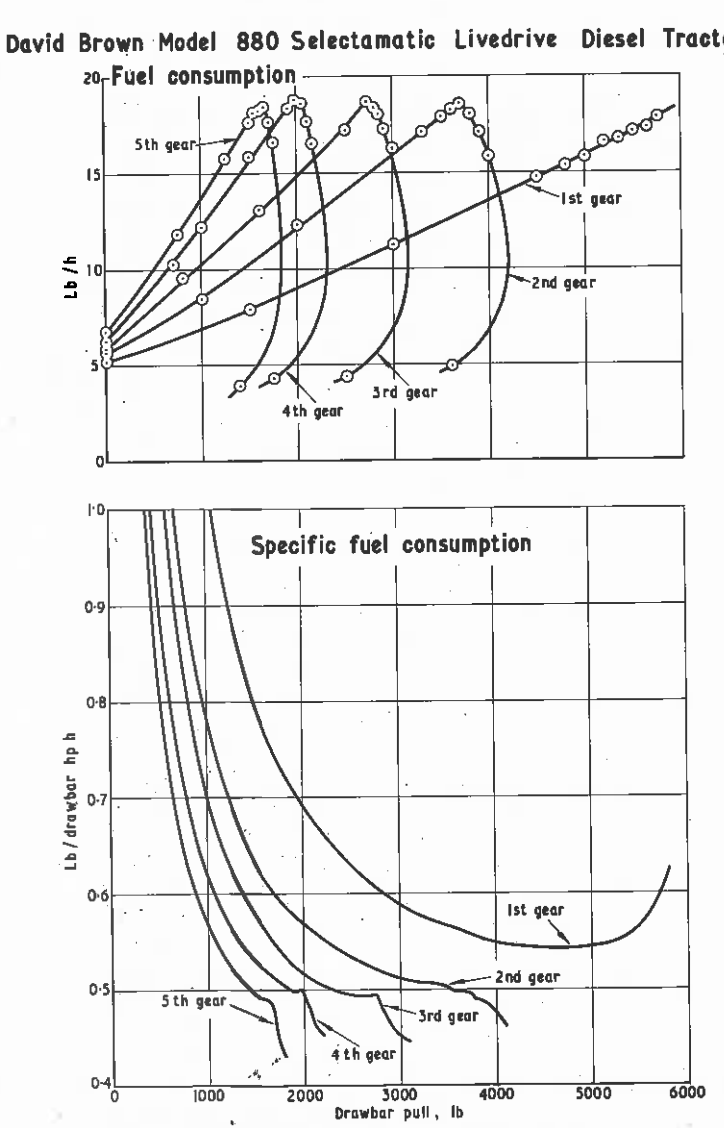


Fig. 5. Drawbar test on tarmacadam, with ballast

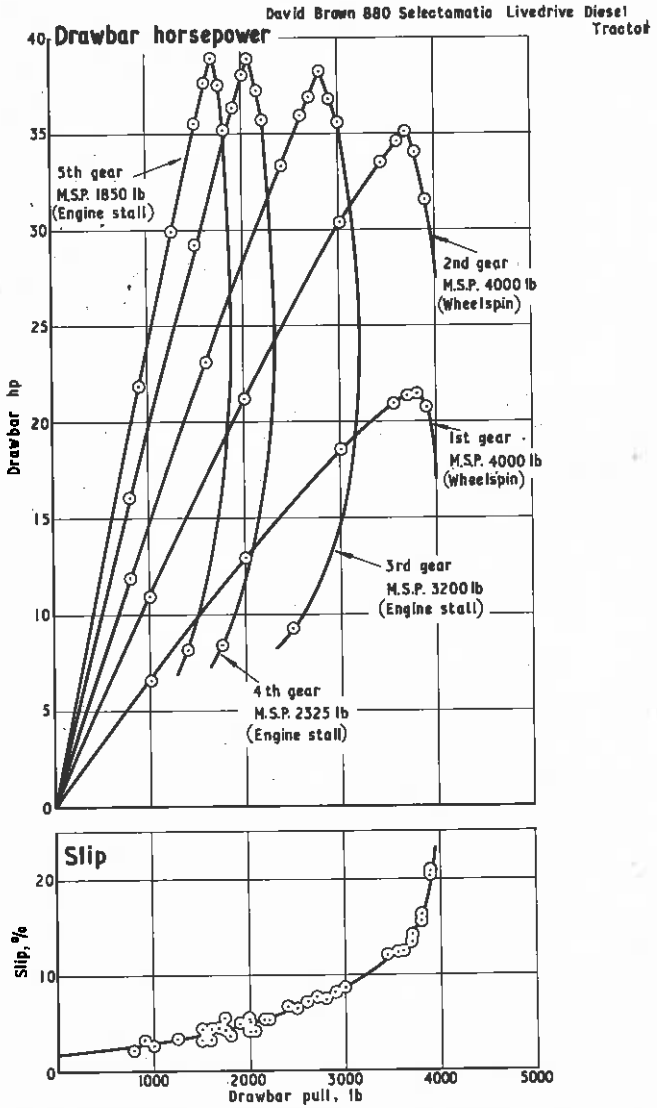


Fig. 6. Drawbar test on tarmacadam, without ballast

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