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Kuratorium für Technik in der Landwirtschaft
Schlepper-Prüffeld Darmstadt-Kranichstein

No. 514/O.E.C.D.

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

DAVID BROWN MODEL 770 SELECTAMATIC LIVEDRIVE DIESEL TRACTOR

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



Date of Tests: January-February 1966
Test No.: R.66034/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: 8th July 1966 *Serial No.:* 114

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:	770 Selectamatic Livedrive
Serial No.:	770A/582097/S

Engine

Make:	David Brown direct injection diesel, type AD3/49, Serial No. AD3/49A 1013
Cylinders:	3 cylinders, vertical, in-line, 3.9375 in (100 mm) bore x 4 in (101.6 mm) stroke, capacity 146.1 in^3 (2.394 l), compression ratio 17:1, monobloc construction, overhead valves
Rated speeds:	2000 rev/min, governor setting - maximum no load engine speed 2150 rev/min
Fuel system:	Fuel - Diesel oil C.A.V. type DPA 3232998 injection pump, Serial No. R12491XG; C.A.V. type BDLL 140S 6417 injector nozzles. Manufacturer's production setting for injection pump 11.14 pt/h (6.33 l/h) to 11.66 pt/h (6.63 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 CAV paper cartridge fuel filters on pressure side of feed pump, sediment bowl on feed pump. Capacity of fuel tank: 8 UKgal (36.4 l)
Governor:	C.A.V. mechanical, incorporated in fuel injection pump. Governed range of engine speed 700-2150 rev/min
Air cleaner:	A.C. oil bath with centrifugal pre-cleaner under hood. Oil capacity 1 pt (0.57 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 14 in (356 mm) dia, belt driven, 4-blade fan, thermostat for temperature control. Cooling water capacity 2 UKgal (9.1 l)

Transmission

Clutch:	Borg and Beck dual dry clutch, two 10 in (254 mm) dia plates for p.t.o. and gearbox drives, two stage foot-pedal operated
Gearbox:	Own make, sliding gear type, 12 forward speeds and 4 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 1½ pt (0.85 l) each of gear oil type EP 140

Gear	Number of engine revolutions for one revolution of driving wheel	Theoretical travelling speed for 2000 rev/min rated speed of engine, mile/h (km/h)	
Forward			
1	302.50	0.87	(1.40)
2	182.40	1.44	(2.32)
3	135.30	1.94	(3.12)
4	120.10	2.18	(3.51)
5	99.79	2.63	(4.23)
6	81.50	3.21	(5.16)
7	72.42	3.62	(5.82)
8	53.72	4.87	(7.84)
9	44.59	5.87	(9.44)
10	39.64	6.60	(10.62)
11	32.37	8.09	(13.02)
12	17.70	14.79	(23.80)
Reverse			
1	183.70	1.43	(2.30)
2	82.14	3.19	(5.13)
3	72.96	3.59	(5.78)
4	32.62	8.03	(12.92)

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 5.50-16, 4-ply pneumatic. Track 48 in (1219 mm) by 4 in (102 mm) steps to 72 in (1829 mm) changed by extending front axle. Maximum permissible weight on each tyre: 655 lb (297 kg) at 20 lb/in^2 (1.4 kp/cm^2), 860 lb (390 kg) at 32 lb/in^2 (2.2 kp/cm^2)

Driving wheels: Two at rear. Tyres 10-28, 4-ply pneumatic. Track 48 in (1219 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: 1575 lb (714 kg) at 12 lb/in^2 (0.8 kp/cm^2), 1860 lb (844 kg) at 16 lb/in^2 (1.1 kp/cm^2)

Wheelbase: 6 ft 3 in (1905 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 3/16 in (132 mm)

Speeds: 1377 rev/min and 3064 ft/min (15.57 m/s) linear speed at 2000 rev/min rated engine speed; 1393 rev/min and 3100 ft/min (15.75 m/s) linear speed at 2023 rev/min engine speed

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: $23\frac{3}{4}$ in (603 mm)

Speeds: 667 rev/min at 2000 rev/min rated engine speed
540 rev/min at 1620 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 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: 3.5 gal/min (15.9 l/min) at 1600 lb/in^2 (112 kp/cm^2) and 1600 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 manufacturer's maximum recommended working load of 1600 lb (726 kg) attainable (test figure 2600 lb - 1179 kg). Radius of motion of lower links: 33½ in (851 mm)

Drawbar

Swinging drawbar: Radius of swing 24½ in (622 mm), lateral adjustment 12½ in (318 mm), vertical heights to centre of clevis 11½ in (292 mm) and 15 in (381 mm). Distance behind rear axle 28 in (711 mm). Alternative position, fixed, at 15 in (381 mm) height, 16¾ in (425 mm) behind rear axle

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 type M45 G solenoid engaged starter motor

Overall dimensions

Overall length: 10 ft 6 in (3.20 m) as tested

Overall width: 5 ft 4¾ in (1.64 m) at 52 in (1321 mm) track no ballast weights, 6 ft 6 in (1.98 m) at 52 in (1321 mm) track to outside of wheel weights, 4 per wheel

Overall height: 6 ft 8½ in (2.04 m) to top of exhaust pipe
4 ft 7½ in (1.41 m) to top of steering wheel

Minimum ground clearance: 12 in (305 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	1324	(601)	1650	(748)
On rear wheels	2124	(963)	3489	(1583)
Total	3448	(1564)	5139	(2331)

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
   Date and location of tests : 13th 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) Cool-ant	Oil	Fuel	Atmos. conditions Temp., °F (°C)	Press., inHg (mmHg)
	Engine	P.t.o.									
A. Maximum power											
32.7 (33.2)	2055	685	83.6 (11.56)	1.62 (7.4)	0.415 (186)	20.2 (4.51)	177 (81)	190 (88)	92 (33)	62 (17)	30.38 (772)
B. Power at standard p.t.o. speed (540 rev/min)											
27.0 (27.4)	1620	540	87.5 (12.10)	1.22 (5.5)	0.379 (170)	22.1 (4.93)	178 (81)	179 (82)	94 (34)	63 (17)	30.38 (772)
C. Power at maximum torque											
20.3 (20.6)	1200	400	88.7 (12.27)	0.94 (4.3)	0.388 (174)	21.6 (4.82)	179 (82)	173 (78)	95 (35)	60 (16)	30.38 (772)
D. Power at rated speed											
32.3 (32.8)	2000	667	84.8 (11.73)	1.58 (7.2)	0.408 (182)	20.5 (4.57)	177 (81)	191 (88)	92 (33)	61 (16)	30.38 (772)
No load, maximum engine speed: 2139 rev/min											

2. Supplementary tests : Belt test
   Date and location of tests : 14th 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, UKgal/h (l/h)	lb/hp h (g/metric hp h)	hp h/UKgal (metric hp h/l)	Temperature, °F (°C) Cool-ant	Oil	Fuel	Atmos. conditions Temp., °F (°C)	Press., inHg (mmHg)
	Engine, rev/min	Belt, ft/min (m/s)									
A. Maximum power											
31.7 (32.1)	2052	3144 (15.97)	81.1 (11.22)	1.60 (7.3)	0.423 (189)	19.8 (4.42)	178 (81)	190 (88)	95 (35)	66 (19)	30.32 (770)
B. Power at standard belt speed of 3100 ft/min (15.75 m/s)											
31.5 (31.9)	2023	3100 (15.75)	81.8 (11.31)	1.58 (7.2)	0.421 (188)	19.9 (4.44)	178 (81)	190 (88)	96 (36)	64 (18)	30.32 (770)
C. Power at maximum torque											
19.7 (20.0)	1190	1823 (9.26)	87.0 (12.03)	0.93 (4.2)	0.393 (175)	21.3 (4.75)	178 (81)	172 (78)	96 (36)	59 (15)	30.32 (770)
D. Power at rated speed											
31.3 (31.7)	2000	3064 (15.57)	82.2 (11.37)	1.57 (7.1)	0.419 (187)	20.0 (4.46)	178 (81)	190 (88)	97 (36)	64 (18)	30.32 (770)
No load, maximum engine speed: 2134 rev/min											

PART III

DRAWBAR TESTS ON ARTIFICIAL TRACK

Date of tests:	3rd-15th February 1966
Type of track:	Tarmacadam
Position of governor control lever:	Fully open, giving maximum no-load engine speed of 2150 rev/min
Type of tyre:	Rear - Dunlop Fieldmaster open centre, 10-28, 4-ply, pneumatic Front - Dunlop Tractor, 5.50-16, 4-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 - 1324 lb (601 kg) Rear - 2124 lb (963 kg)
Ballast:	Front - Weights, 2 per wheel - 326 lb (148 kg) Water - nil Rear - Weights, 4 per wheel - 833 lb (378 kg) Water - 532 lb (241 kg)
Weight with full ballast:	Front - 1650 lb (748 kg) Rear - 3489 lb (1583 kg) Total - 5139 lb (2331 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:	16 in (406 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	8.2 (8.3)	4250 (1928)	22.0	2125	0.72 (1.16)	175 (79)	37 (3)	29.74 (755)	4500 (2041)	Wheelspin
2	13.5 (13.7)	4200 (1905)	20.4	2107	1.21 (1.95)	175 (79)	37 (3)	29.74 (755)	4500 (2041)	Wheelspin
3	17.6 (17.8)	4100 (1860)	17.8	2091	1.61 (2.59)	176 (80)	38 (3)	29.74 (755)	4500 (2041)	Wheelspin
4	19.8 (20.1)	4100 (1860)	17.8	2080	1.81 (2.91)	176 (80)	37 (3)	29.74 (755)	4500 (2041)	Wheelspin
5	25.3 (25.7)	4100 (1860)	17.8	2044	2.31 (3.72)	178 (81)	55 (13)	29.04 (738)	4500 (2041)	Wheelspin and engine stall
6	26.4 (26.8)	3350 (1520)	8.9	2030	2.96 (4.76)	180 (82)	55 (13)	29.62 (752)	3525 (1599)	Engine stall
7	27.5 (27.9)	3075 (1395)	7.7	2030	3.35 (5.39)	180 (82)	53 (12)	29.73 (755)	3325 (1508)	Engine stall
8	28.3 (28.7)	2250 (1021)	5.0	2050	4.72 (7.59)	180 (82)	48 (9)	29.90 (759)	2450 (1111)	Engine stall
9	28.0 (28.4)	1825 (828)	4.0	2046	5.75 (9.25)	177 (81)	48 (9)	29.90 (759)	1980 (898)	Engine stall
10	28.5 (28.9)	1650 (748)	3.6	2037	6.48 (10.43)	180 (82)	48 (9)	29.90 (759)	1775 (805)	Engine stall
11	27.4 (27.8)	1300 (590)	3.0	2034	7.90 (12.71)	176 (80)	54 (12)	29.73 (755)	1400 (635)	Engine stall

(2) Fuel consumption

Gear	Optimum fuel consumption*			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	0.794 (355)	10.5 (2.34)	4150 (1882)	3000 - >4400 (1361) (1996)
2	0.643 (288)	13.0 (2.90)	3850 (1746)	2590 - 4390 (1175) (1991)
3	0.581 (260)	14.4 (3.21)	3500 (1588)	2450 - 4270 (1111) (1937)
4	0.558 (250)	15.0 (3.35)	3450 (1565)	2340 - >4200 (1061) (1905)
5	0.526 (235)	15.9 (3.55)	3100 (1406)	1960 - >4200 (889) (1905)
6	0.510 (228)	16.4 (3.66)	3350 (1520)	2230 - 3525 M.S.P. (1012) (1599)
7	0.490 (219)	17.1 (3.82)	3075 (1395)	1890 - 3325 M.S.P. (857) (1508)
8	0.480 (215)	17.4 (3.88)	2250 (1021)	1480 - 2450 M.S.P. (671) (1111)
9	0.490 (219)	17.1 (3.82)	1825 (828)	1400 - 1980 M.S.P. (635) (898)
10	0.489 (219)	17.1 (3.82)	1650 (748)	1150 - 1775 M.S.P. (522) (805)
11	0.491 (220)	17.1 (3.82)	1300 (590)	930 - 1400 M.S.P. (422) (635)

*The drawbar specific fuel consumption curves in Gears 6-11 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 - 1324 lb (601 kg)
Rear - 2124 lb (963 kg)
Total - 3448 lb (1564 kg)

Tyre pressure: Front - 20 lb/in^2 (1.4 kp/cm^2)
Rear - 12 lb/in^2 (0.8 kp/cm^2)

Height of drawbar above ground: 16 in (406 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
6	21.2 (21.5)	2900 (1315)	17.3	2079	2.74 (4.41)	175 (79)	38 (3)	29.75 (756)	3175 (1440)	Wheelspin
7	23.7 (24.0)	2900 (1315)	17.3	2064	3.06 (4.92)	172 (78)	38 (3)	29.75 (756)	3175 (1440)	Wheelspin
8	27.8 (28.2)	2350 (1066)	9.7	2043	4.44 (7.14)	178 (81)	38 (3)	29.75 (756)	2525 (1145)	Engine stall
9	27.6 (28.0)	1875 (851)	6.8	2035	5.52 (8.88)	178 (81)	40 (4)	29.75 (756)	2050 (930)	Engine stall
10	28.3 (28.7)	1700 (771)	6.0	2037	6.24 (10.04)	177 (81)	40 (4)	29.75 (756)	1850 (839)	Engine stall
11	28.1 (28.5)	1350 (612)	4.5	2034	7.81 (12.57)	174 (79)	40 (4)	29.75 (756)	1475 (669)	Engine stall

PART IV

1. Location of centre of gravity

	Tractor unballasted
Height above ground	25.2 in (640 mm)
Distance forward from the vertical plane containing the axis of the rear wheels	27.5 in (699 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 tests without ballast

Wheel track: Front - 48 in (1219 mm)
Rear - 52 in (1321 mm)

	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
Radius of turning space	10 ft 0½ in (3.1 m)	10 ft 1½ in (3.1 m)	11 ft 0 in (3.4 m)	11 ft 1½ in (3.4 m)
Turning radius	9 ft 8½ in (3.0 m)	9 ft 9½ in (3.0 m)	10 ft 8 in (3.3 m)	10 ft 9½ in (3.3 m)

PART V

1. Repairs and adjustments during tests: None

2. Remarks: None

Officer in charge: D. W. Smith

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

Date: 20th May 1966

David Brown Model 770 Selectamatic Livedrive Diesel Tractor

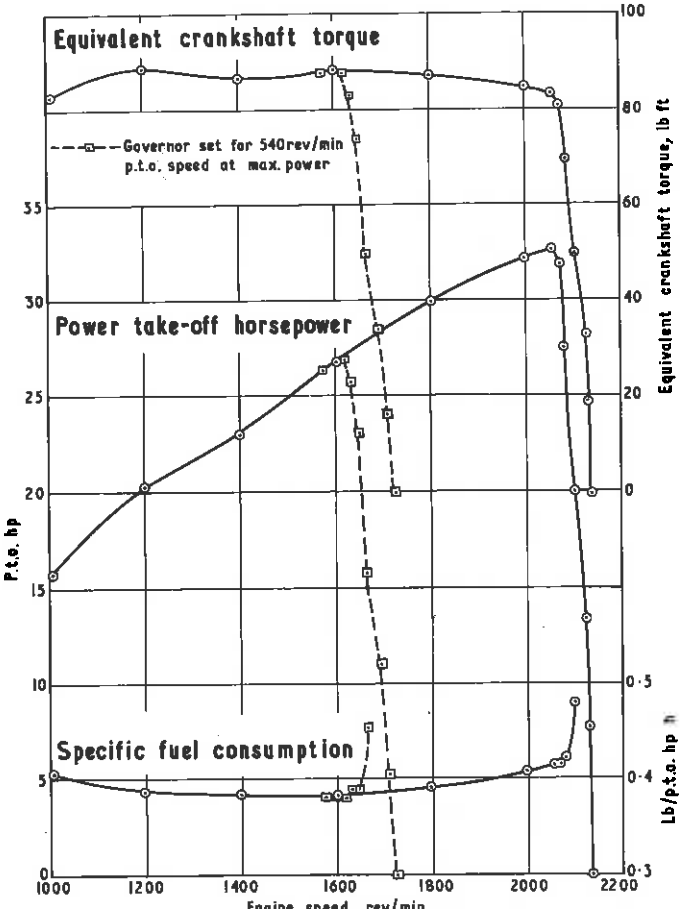


Fig. 1. Power take-off test

David Brown Model 770 Selectamatic Livedrive Diesel Tractor

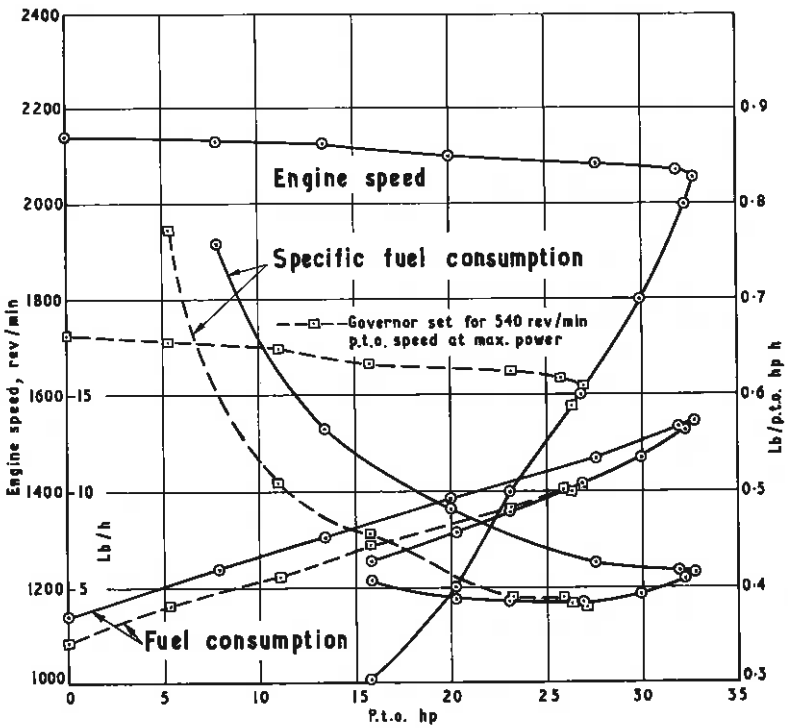


Fig. 2. Power take-off test

David Brown Model 770 Selectamatic Livedrive Diesel Tractor

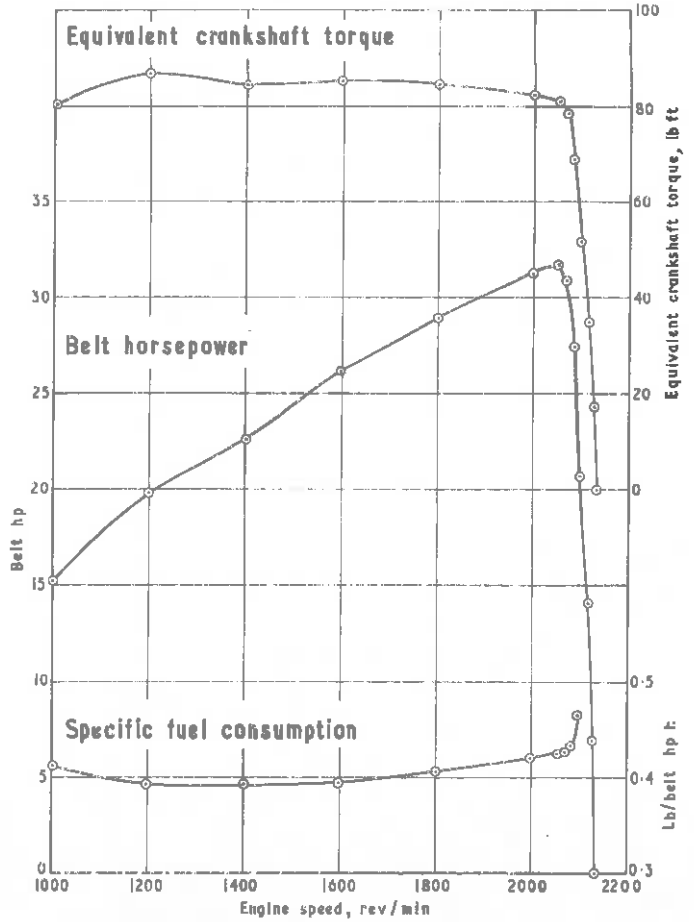


Fig.3. Belt test

David Brown Model 770 Selectamatic Livedrive Diesel Tractor

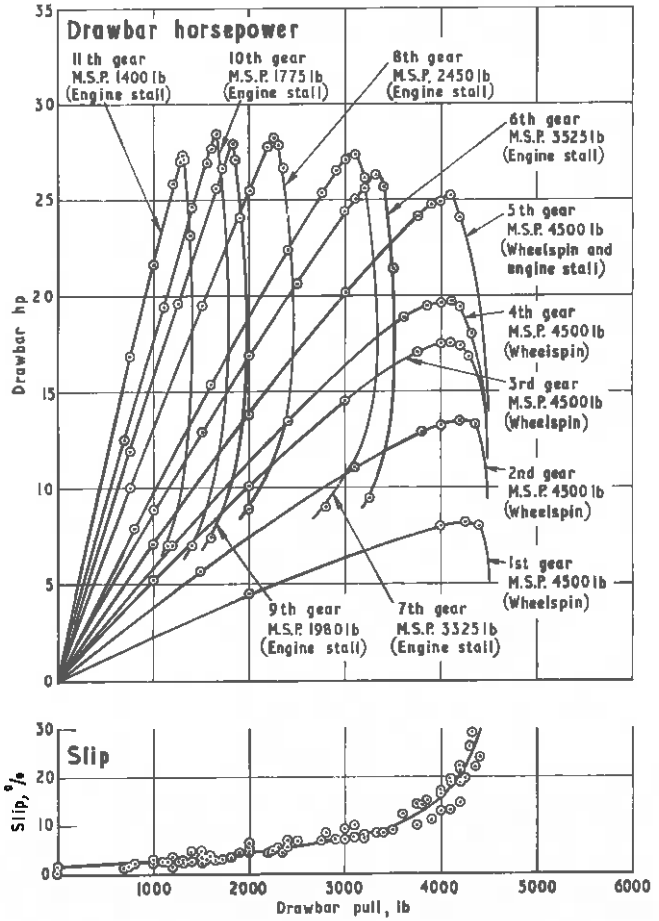


Fig. 4. Drawbar test on tarmacadam, with ballast

David Brown Model 770 Selectamatic Livedrive Diesel Tractor

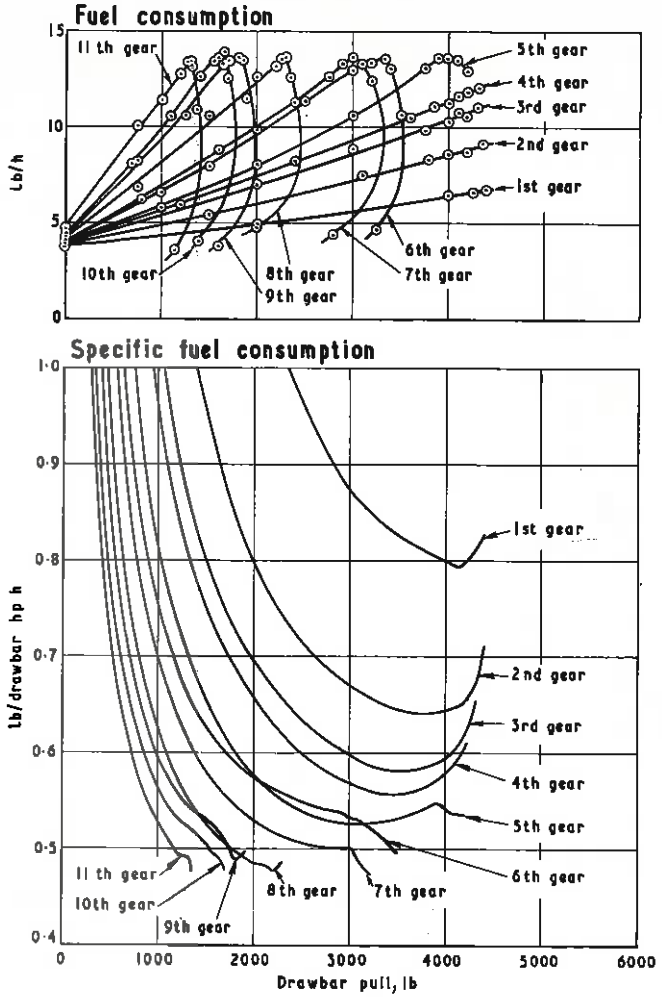


Fig.5. Drawbar test on tarmacadam, with ballast

David Brown Model 770 Selectamatic Livedrive Diesel Tractor

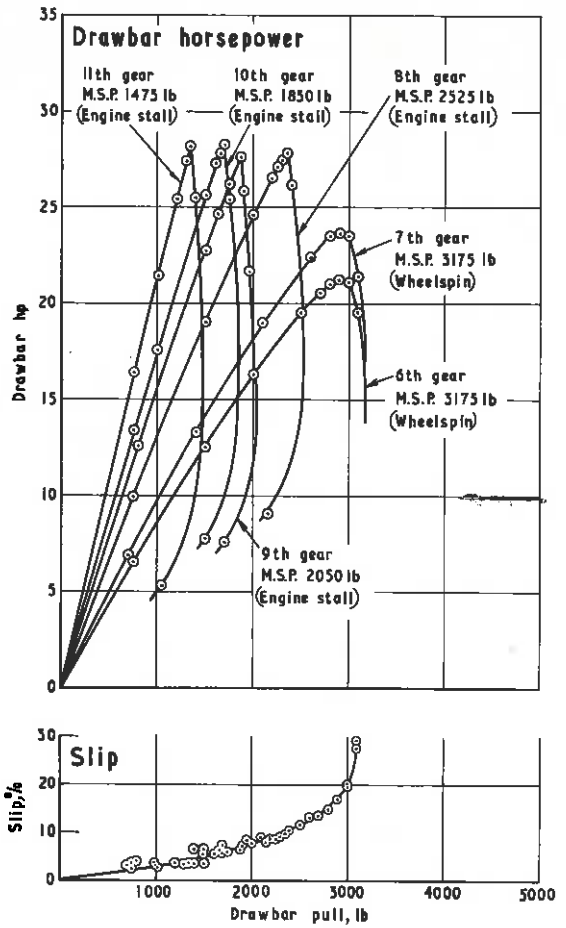


Fig. 6. Drawbar test on tarmacadam, without ballast

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