OECD Approval No. 828

Test in accordance with the OECD standard code for the official testing of agricultural tractors

Report on test of David Brown 1690 Two-Wheel Drive Hydra-Shift Tractor



Manufactured by David Brown Tractors Ltd.,
Meltham,
Huddersfield. HD7 3AR.

Test No. R81/2/7742/OECD

Report No. 678

Date December 1981

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

National Institute of Agricultural Engineering
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SPECIFICATION OF TRACTOR

Manufacturer's name and address: David Brown Tractors Ltd.,
Meltham,
Huddersfield. HD7 3AR.

Submitted for test by: The manufacturer

Selected for test by: The manufacturer with the agreement of the testing station

Place of running-in: Meltham

Duration of running-in: 50 hours

Tractor:

Make: David Brown

Model: 1690 Hydra-Shift

Type: Four-wheel, rear wheel driven, unit construction, front wheel steering

Serial No.: 11210142

Engine:

Make: David Brown

Model: 330001

Type: 4 stroke, direct injection diesel

Serial No.: 11450165

Cylinders:

Number and disposition: 6, vertical in line

Bore: 100.1 mm (3.9 in)

Stroke: 114.3 mm (4.5 in)

Capacity: 5392 cm^3 (329 in^3)

Compression ratio: 16:1

Arrangement of valves: Overhead

Liners: None used

Fuel system:

Feed system: A.C. Delco mechanical pump with hand primer

Make, type and model of filters: C.A.V. dual paper element

Tank capacity: 136.0 l (29.9 UK gal)

Make, type and model of injection pump: C.A.V. Minimec in line, P5463

Injection pump Serial No.: OOOWX00861

Manufacturer's production setting of injection pump: 16.1 l/h (3.54 UK gal/h) to 16.7 l/h (3.68 UK gal/h) at 1600 rev/min engine speed on full load and 15.6°C (60°F) temperature, using fuel of .843 specific gravity at 15.6°C (60°F)

Fuel system (Cont'd)

Make, type and model of injectors:	C.A.V., BKBL 9755153, BDLL 140S6592 4 hole nozzles
Injection pressure:	17.7 MPa (175 atm)
Injection pump delivery starts:	25° before T.D.C.

Governor:

Make and type:	C.A.V. centrifugal
Governed range of engine speed:	700 rev/min to 2475 rev/min
Rated engine speed:	2300 rev/min

Air cleaner:

Make and type:	Two, Burgess, 3 stage paper element, one per 3 cylinders
Model:	-
Oil capacity:	-
Position:	Above engine, under bonnet

Pre-cleaner:

Make and type:	Burgess stack pipe with wide mesh screen
Position:	Above the bonnet on left-hand side

Turbo-charger:

Make and type:	None

Lubrication system:

Type of feed and pump:	Forced feed, gear pump
Type of filters:	Strainer in sump, purolator full flow replaceable paper elemer
Total oil capacity including filter(s):	12.5 l (22.0 pt)
Recommended oil:	S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F)
M.I.L. standard:	MIL-L-2104B
Oil change period:	100/125 hours
Filter change period:	200/250 hours

Cooling system:

Coolant:	Water
Type of pump:	Impeller
Fan diameter:	432 mm (17 in)
Number of fan blades:	6
Type of temperature control:	Thermostat
Coolant capacity:	15.3 l (26.9 pt)
System pressure:	48 kPa (7 lb/in^2)

Starting system:

Make, type and model of starter motor:	Lucas, electrical, M50, solenoid engaged
Starter motor power rating:	2.3 kW (3.1 hp)
Safety features:	Gear lever must be in neutral position
Cold starting aid:	Thermostart controlled by starter isolation switch

Exhaust system

Make and construction:	Burgess oval baffle type
Dimensions of expansion chamber:	203 mm (8.0 in) x 102 mm (4.0 in) x 610 mm (24.0 in) long
Position:	Vertical, above bonnet on left-hand side

Electrical system

Voltage:	12
Earth polarity:	Negative
Make and type of generator:	Lucas 15 ACR alternator
Output:	26.5 A at 4600 rev/min
Make and type of battery:	Chloride 254, lead-acid
Rating:	96 Ah at 20 hour rating

Transmission

Clutch:

Make and type:	Laycock, dual dry
Diameter of plates:	Main 305 mm (12 in) Pto 305 mm (12 in)
Method of operation:	Gearbox drive - pedal and hydraulics Pto drive - hand lever

Gearbox:

Make and type:	Own make constant mesh and epicyclic
Number of speeds:	12 Forward, 4 reverse
Arrangement:	Four speed planetary power shift with three speed and reverse range box

Rear axle and final drive(s):

Make and type:	Own make, crown wheel and pinion and differential with outboard spur gear final drives
Type of differential lock and method of engagement:	Mechanical, pedal operated, self-disengaging
Transmission oils:	Combined

	Gearbox and rear axle	Final drives
Recommended oil: S.A.E.	20W/30	15W/30
Capacity:	42.0 l (73.9 pt)	7.4 l (13 pt) each
Viscosity at 50°C (122°F)	54 cSt	50 cSt
M.I.L. standard	MIL-L-2104B	MIL-L-2104C
Oil change period	1000 hours	1000 hours
Filter change period	500 hours	-

Gear	Number of engine revolutions for one revolution of driving wheel	Nominal travelling speed for 2300 rev/min rated engine speed,* km/h	(mile/h)
Forward L1	336.0	1.99	(1.24)
L2	245.9	2.72	(1.69)
L3	189.0	3.53	(2.19)
M1	156.1	4.28	(2.66)
L4	138.3	4.83	(3.00)
M2	114.2	5.85	(3.64)
M3	87.8	7.60	(4.72)
H1	74.8	8.93	(5.55)
M4	64.2	10.40	(6.46)
H2	54.8	12.18	(7.57)
H3	42.1	15.86	(9.86)
H4	30.8	21.68	(13.47)
Reverse 1	146.3	4.56	(2.83)
2	107.0	6.24	(3.88)
3	82.3	8.11	(5.04)
4	60.2	11.09	(6.89)

*Calculated with a tyre radius index of 770 mm (30.3 in)

Power take-off

Position: At rear of tractor in vertical centre plane

Height above ground 540 rev/min: 766 mm (30.2 in),
1000 rev/min: 766 mm (30.2 in)

Distance behind rear axle 540 rev/min: 344 mm (13.5 in),
1000 rev/min: 317 mm (12.5 in)

Diameter: 34.9 mm ($1^{3}/8$ in)

Number of splines 540 rev/min: 6 to I.S.O. standard

1000 rev/min 21 to I.S.O. standard

Proportional engine speed pto:

Type of drive: Independent of main clutch, operated through secondary plate, hand-lever operated

Speed at rated engine speed 540 rev/min: 598 rev/min,
1000 rev/min: 1123 rev/min

Engine speed at standard pto speed: 540 rev/min: 2077 rev/min
1000 rev/min: 2048 rev/min

Direction of rotation (viewed facing driving end): Clockwise

Proportional ground speed pto: None fitted

Belt pulley	None fitted
Power lift	
Make and type of pump:	David Brown, live hydraulic, gear pump
Nominal working pressure:	15.5 MPa (2500 lb/in^2)
Pump drive:	Engine driven from front of crankshaft
Oil supplied from:	Transmission housing
Oil capacity:	42.0 l (9.2 gal)
Oil capacity available for external use:	13.6 l (3.0 gal)
Number of rams:	One internal
Type, number and position of external tappings:	A.S.A.E. standard female couplers, two at rear of tractor
Linkage:	Category 2, Jeffes type implement attachment, to I.S.O. standard
Controls:	Draught and position, selective response on drop
Drawbar	
Type:	Swinging
Vertical height to centre of clevis:	min. 340 mm (13.4 in), max. 495 mm (19.5 in)
Changed by:	Raising or lowering support frame and inverting drawbar
Distance behind rear wheel centre:	535 mm (21.1 in) and 710 mm (28.0 in)
Distance behind pto:	540 rev/min 191 mm (7.5 in) and 366 mm (14.4 in) 1000 rev/min 217 mm (8.5 in) and 392 mm (15.4 in)
Lateral adjustment:	255 mm (10.0 in) and 337 mm (13.3 in)
Pivot position relative to rear wheel centre:	75 mm (3.0 in) forward
Drawbar pin hole diameter:	26 mm (1.0 in)
Linkage drawbar:	Not available
Hitch	Automatic pick-up hitch available, not fitted for test
Steering	
Make and type:	Danfoss hydrostatic orbitrol unit incorporating manual control for emergency
Make and type of pump:	Plessey gear
Oil supplied from:	Own reservoir
Recommended oil:	Tellus 37, viscosity 24.5 cSt at 50°C (122°F)
Oil change period:	500 hours
Filter change period:	500 hours

Brakes

Make and type:	Girling, oil-immersed multi-disc
Position:	On spur pinionshafts
Method of operation:	Pedal operated independently or combined hydraulic
Type of parking brake:	Operates both service brakes
Method of operation:	Hand lever and cable

Wheels

Steering wheels:

Make and size:	Goodyear Super Rib, Tractor 7.50-18
Type:	Cross-ply, 8 ply rating
Maximum mass on each tyre and pressure:	945 kg (2083 lb) at 370 kPa (54 lb/in^2)
Track width:	1422 mm (56 in) by 102 mm (4 in) steps to 2034 mm (80 in)
Changed by:	Extending axle

Driving wheels:

Make and size:	Firestone F151 All Traction Field and Road 18.4/15-34
Type:	Cross-ply, 6 ply rating
Maximum mass on each tyre and pressure:	2250 kg (4960 lb) at 110 kPa (16 lb/in^2)
Track width:	1524 mm (60 in) by 102 mm (4 in) steps to 2136 mm (84 in)
Changed by:	Reversing wheels and offset lug rims

Wheelbase 2540 mm (100 in)

Safety Cab

Approval No.:	CSD 0215/3-b(C)
Description:	Sekura, type S 80 SEK 415, welded and bolted hollow section and sheet steel, anti-vibration mounts, door and mounting step on each side, roof hatch, heating, ventilating and demisting system

Lighting

Unrestricted beam angle of headlight in plan view 80°

	Height above ground of centre, mm (in)	Size, mm (in)	Distance from outside edge of tractor at 1524 mm (60 in) wheel track, to centre, mm (in)
Headlights	1027 (40.4)	155 (6.1) x 95 (3.7)	831 (32.7)
Side lights	1720 (67.7)	70 (2.8) x 20 (0.8)	209 (8.2)
Rear lights	1610 (63.4)	75 (3.0) x 70 (2.8)	226 (8.9)
Reflectors	1610 (63.4)	65 (2.6) x 40 (1.6)	163 (6.4)

Number of grease points

Whole tractor: 21

Overall dimensions

	Length, m (in)	Width, max. m (in)	Width, min. m (in)	Maximum height to top of exhaust pipe, m (in)
Without ballast	4.25 (167)	2.62 (103)	2.01 (79)	2.69 (106)
With ballast	4.59 (181)	2.86 (113)	2.25 (89)	2.69 (106)

Minimum ground clearance 398 mm (15.7 in) to underside of drawbar frame

Seat

Make and type: Grammer, upholstered pan

Suspension: Helical spring

Damping: Hydraulic, adjustable for driver's weight

Range of adjustment: longitudinal 150 mm (5.9 in)

vertical 60 mm (2.4 in)

CONDITIONS DURING TEST

Masses

Tractor (without driver but with tanks full)

	Front, kg (lb)	Rear, kg (lb)	Total, kg (lb)
Without ballast	1373 (3027)	2547 (5615)	3920 (8642)
With ballast	1788 (3942)	3826 (8435)	5614 (12377)

Ballast

	Number of weights	Total mass, kg (lb)	Water, kg (lb)
Front wheels	Nil	Nil	Nil
Rear wheels	10	429 (946)	917 (2022)
Additional	8	348 (767)	Front frame and weights

Track setting during tests

Front - 1422 mm (56 in)

Rear - 1524 mm (60 in)

FUEL AND LUBRICANTS USED IN TESTS

Fuel — Diesel oil to Class D British Standard 2869:1970, specific gravity 0.8495 at 15°C (59°F), viscosity 2.64 cSt at 50°C (122°F), Cetane No. 53.0

Oil

Engine:	Agricastrol M.P. S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F)
Transmission and power lift:	Shell Tractor Oil Universal S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F)
Final drives:	Shell Donax TT, S.A.E. 15W/30, viscosity 50 cSt at 50°C (122°F)
Steering system:	Shell Tellus 37, viscosity 24.5 cSt at 50°C (122°F)

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 16th April 1981, NIAE, Silsoe, Bedford, UK.

Type of dynamometer: Water brake, Heenan and Froude

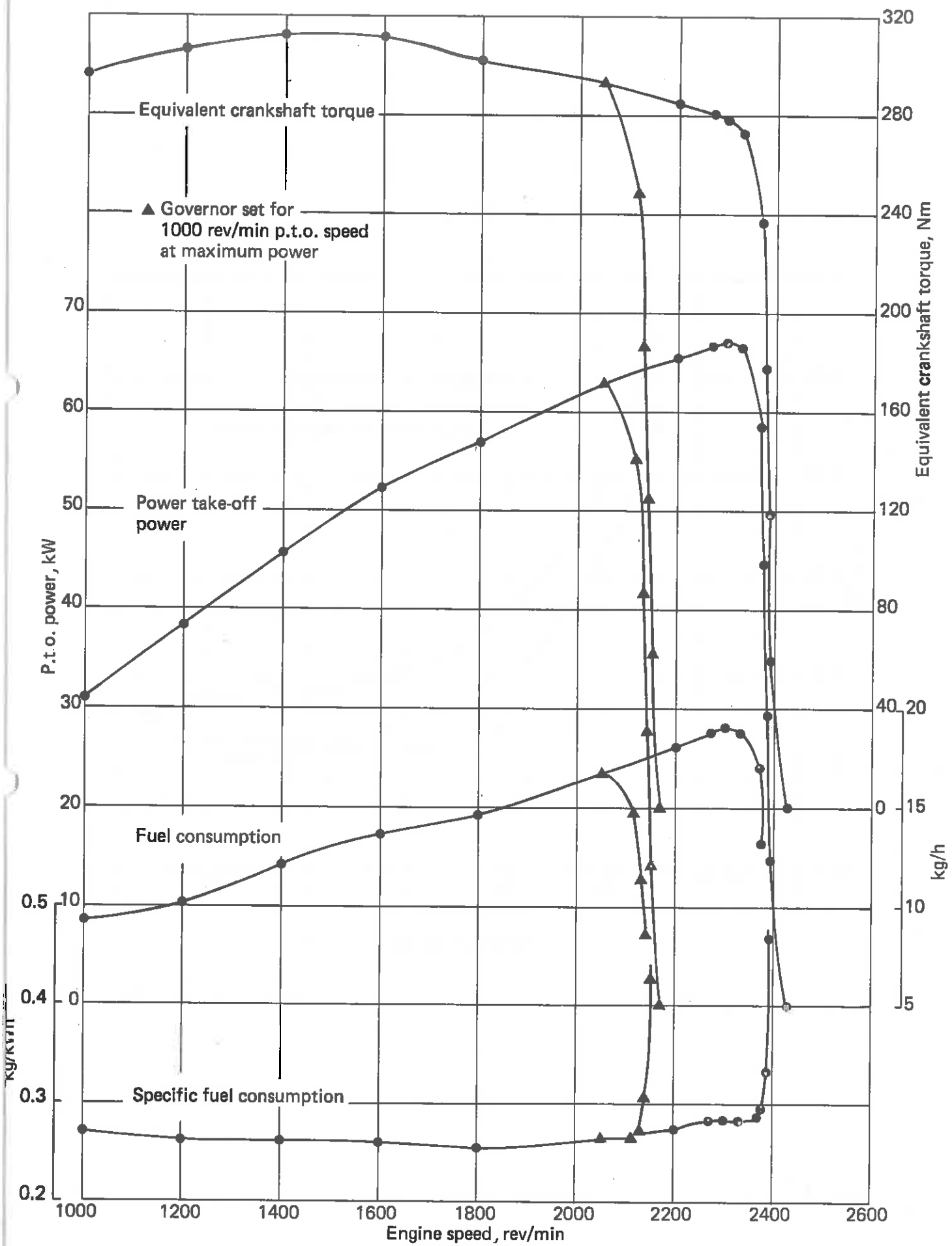
Power, kW (hp)	Speed, rev/min		Fuel consumption,			
	Engine	P.t.o.	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Maximum power - 2 hour test						
67.1 (90.0)	2300	1123	22.48 (4.95)	19.10 (42.10)	0.284 (0.468)	2.99 (18.2)
The speed recommended by the manufacturer for drawbar work						
67.1 (90.0)	2300	1123	22.48 (4.95)	19.10 (42.10)	0.284 (0.468)	2.99 (18.2)
Part loads						
(1) 85% of the torque obtained at maximum power						
58.8 (78.9)	2370	1157	20.04 (4.41)	17.03 (37.53)	0.289 (0.476)	2.93 (17.9)
(2) Unloaded						
-	2425	1184	5.22 (1.15)	4.43 (9.77)	-	-
(3) 50% of the torque defined in (1)						
29.6 (39.6)	2383	1164	11.54 (2.54)	9.80 (21.61)	0.332 (0.545)	2.56 (15.6)
(4) Maximum power						
67.1 (90.0)	2300	1123	22.48 (4.95)	19.10 (42.10)	0.284 (0.468)	2.99 (18.2)
(5) 25% of the torque defined in (1)						
14.9 (19.9)	2394	1169	8.20 (1.80)	6.97 (15.37)	0.468 (0.770)	1.82 (11.1)
(6) 75% of the torque defined in (1)						
44.3 (59.3)	2378	1161	15.48 (3.41)	13.15 (29.00)	0.297 (0.489)	2.86 (17.4)

Power, kW (hp)	Speed, rev/min		Fuel consumption,			
	Engine	P.t.o.	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Part loads, the governor hand lever in the position corresponding to the standard p.t.o. speed at full load (1000 rev/min)						
(1) 85% of the torque obtained at maximum power						
55.4 (74.3)	2118	1034	17.43 (3.83)	14.80 (32.63)	0.267 (0.439)	3.18 (19.4)
(2) Unloaded						
-	2167	1058	4.16 (0.91)	3.53 (7.78)	-	-
(3) 50% of the torque defined in (1)						
28.0 (37.5)	2140	1045	10.15 (2.23)	8.63 (19.02)	0.308 (0.507)	2.76 (16.8)
(4) Maximum power						
63.0 (84.5)	2048	1000	19.79 (4.35)	16.81 (37.06)	0.267 (0.439)	3.18 (19.4)
(5) 25% of the torque defined in (1)						
14.1 (18.8)	2150	1050	7.09 (1.56)	6.02 (13.28)	0.429 (0.704)	1.98 (12.1)
(6) 75% of the torque defined in (1)						
41.8 (56.1)	2130	1040	13.49 (2.97)	11.46 (25.26)	0.274 (0.450)	3.10 (18.9)

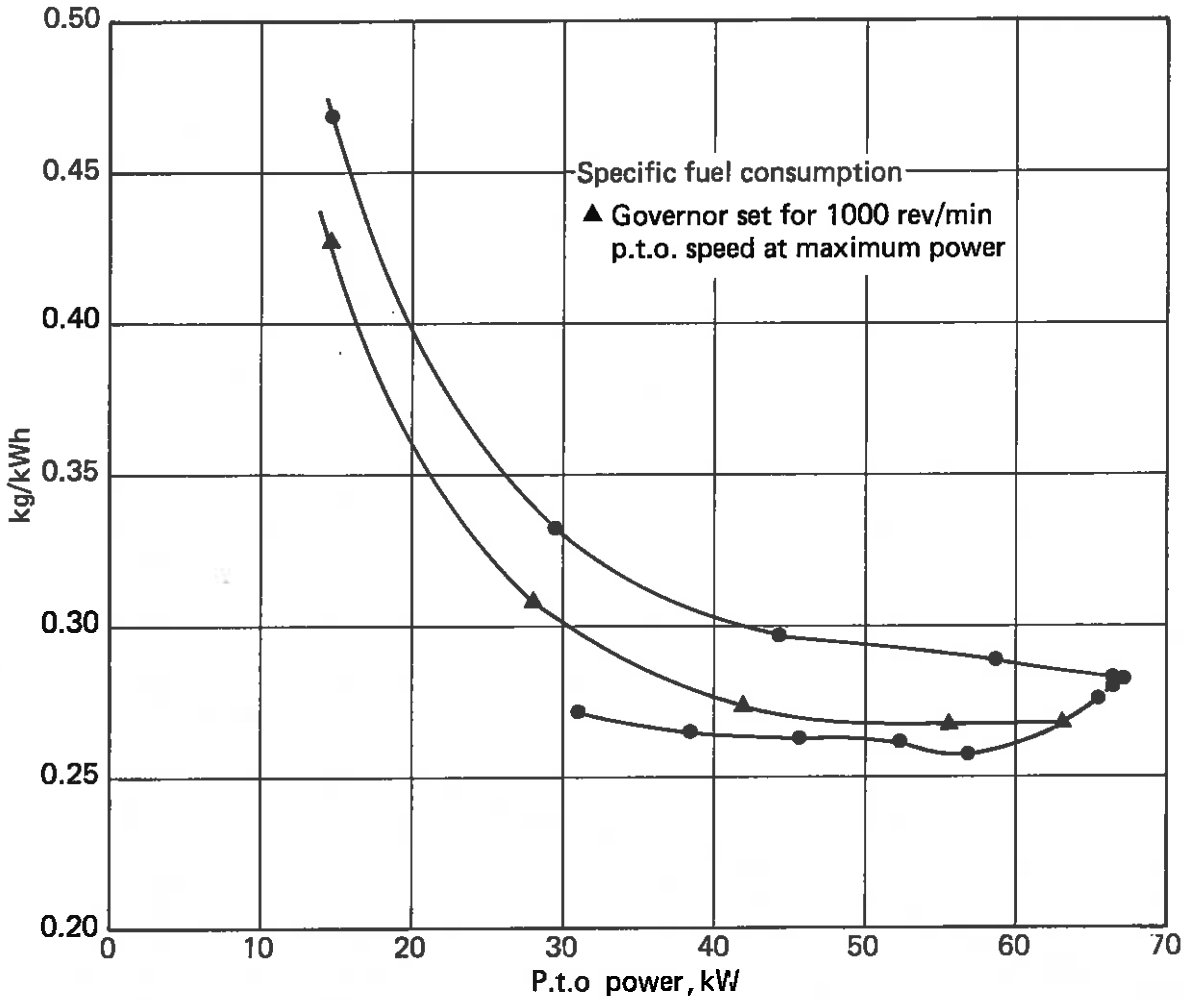
Standard specific fuel consumption, kg/kWh (lb/hph)

(a) 0.289 (0.476) (b) 0.332 (0.545) (c) 0.267 (0.439) (d) 0.308 (0.507)

No load, maximum engine speed		2425 rev/min
Equivalent crankshaft torque at maximum power		278.8 Nm (205.6 lb ft)
Maximum equivalent crankshaft torque		313.5 Nm (231.2 lb ft) at 1490 rev/min engine speed
Mean atmospheric conditions	temperature	23°C (73°F)
	pressure	1024 m bar (30.24 in Hg)
	relative humidity	48%
Maximum temperature	coolant	102°C (216°F)
	engine oil	128°C (262°F)
	fuel	29°C (84°F)
	air intake	25°C (77°F)



Power take-off test



Power take-off test

2 DRAWBAR PERFORMANCE

Date of tests: May-June 1981 Height of drawbar above ground: Unballasted: 450 mm (17.7 in)
Type of track: Concrete Ballasted: 445 mm (17.5 in)

Gear	Speed, km/h (mile/h)	Power, kW (hp)	Drawbar pull, kN (lb)	Engine speed, rev/min	Wheel-slip, %	Specific fuel consumption, kg/kWh (lb/hph)	Specific fuel consumption, kWh/l (hph/UKgal)	Temperature, °C (°F) Fuel	Coolant	Engine oil	Atmospheric conditions Temperature, °C (°F)	Relative humidity, %	Pressure, m bar (in Hg)
(i) MAXIMUM POWER (unballasted) Tyre inflation pressure: front 221 kPa (32 lb/in^2), rear 80 kPa (12 lb/in^2)													
L4	4.21 (2.62)	*33.9 (45.5)	29.0 (6520)	2382	15.0	-	-	28 (82)	85 (185)	97 (207)	16 (61)	70	1012 (29.88)
M2	5.05 (3.14)	*40.7 (54.6)	29.0 (6520)	2377	15.0	-	-	27 (81)	85 (185)	108 (226)	14 (57)	70	1011 (29.85)
M3	6.46 (4.01)	52.0 (69.7)	29.0 (6520)	2328	15.0	-	-	27 (81)	85 (185)	110 (230)	14 (57)	70	1011 (29.85)
H1	7.93 (4.93)	52.9 (70.9)	24.0 (5400)	2312	10.4	-	-	27 (81)	85 (185)	108 (226)	14 (57)	70	1012 (29.88)
M4	9.39 (5.83)	54.8 (73.5)	21.0 (4720)	2307	8.6	-	-	29 (84)	86 (187)	116 (241)	14 (57)	70	1012 (29.88)
H2	11.24 (6.98)	53.1 (71.2)	17.0 (3820)	2309	6.9	-	-	31 (88)	85 (185)	104 (219)	14 (57)	70	1012 (29.88)
(ii) MAXIMUM POWER (ballasted) Tyre inflation pressure: front 345 kPa (50 lb/in^2), rear 80 kPa (12 lb/in^2)													
L1	1.68 (1.04)	*19.3 (25.9)	41.4 (9310)	2385	15.0	0.455 (0.748)	1.87 (11.4)	35 (95)	83 (181)	115 (239)	16 (61)	62	1021 (30.15)
L2	2.30 (1.43)	*26.5 (35.5)	41.4 (9310)	2380	15.0	0.419 (0.689)	2.03 (12.4)	29 (84)	83 (181)	115 (239)	15 (59)	61	1021 (30.15)
L3	2.98 (1.85)	*34.3 (46.0)	41.4 (9310)	2377	15.0	0.382 (0.628)	2.22 (13.5)	34 (93)	84 (183)	113 (235)	16 (61)	62	1021 (30.15)
M1	3.60 (2.24)	*41.4 (55.5)	41.4 (9310)	2367	15.0	0.381 (0.627)	2.23 (13.6)	31 (88)	85 (185)	122 (252)	15 (59)	61	1021 (30.15)
L4	4.09 (2.54)	*47.0 (63.0)	41.4 (9310)	2365	15.0	0.380 (0.625)	2.24 (13.7)	30 (86)	86 (187)	120 (248)	16 (61)	62	1021 (30.15)
M2	5.00 (3.11)	52.8 (70.8)	38.0 (8540)	2302	12.6	0.364 (0.599)	2.34 (14.3)	30 (86)	86 (187)	120 (248)	15 (59)	61	1021 (30.15)
M3	6.85 (4.26)	54.0 (72.4)	28.4 (6380)	2298	8.2	0.366 (0.602)	2.32 (14.1)	27 (81)	86 (187)	117 (243)	14 (57)	60	1022 (30.18)
H1	8.17 (5.08)	53.8 (72.1)	23.7 (5330)	2304	6.8	0.361 (0.594)	2.36 (14.4)	31 (88)	85 (185)	114 (237)	15 (59)	61	1021 (30.15)
M4	9.61 (5.97)	54.7 (73.4)	20.5 (4610)	2301	5.9	0.353 (0.581)	2.41 (14.7)	30 (86)	86 (187)	109 (228)	15 (59)	61	1021 (30.15)
H2	11.37 (7.07)	53.7 (72.0)	17.0 (3820)	2299	5.0	0.359 (0.591)	2.37 (14.4)	33 (91)	87 (189)	118 (244)	15 (59)	61	1021 (30.15)
(iii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
M3	7.23 (4.49)	42.8 (57.4)	21.3 (4790)	2370	6.1	0.329 (0.541)	2.58 (15.7)	41 (106)	84 (183)	121 (250)	15 (59)	80	1021 (30.15)
(iv) FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (ii)													
L4	4.28 (2.66)	-	41.4 (9310)	2352	-	-	-	44 (111)	84 (183)	127 (261)	20 (68)	58	1027 (30.33)

Total oil consumption during ten hours duration of tests (iii) and (iv) 41.7 g/h (0.092 lb/h)

*Maximum power available at 15% wheelslip

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

3. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: As in specification, without ballast

Track of wheels: front - 1422 mm (56 in)
rear - 1524 mm (60 in)

	With brakes		Without brakes	
	Left-hand	Right-hand	Left-hand	Right-hand
Radius of turning space, m (in)	3.86 (152)	3.87 (152)	4.36 (172)	4.36 (172)
Radius of turning circle, m (in)	3.75 (148)	3.76 (148)	4.25 (167)	4.25 (167)

4. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm (in)	953 (37.5)
Distance forward from the vertical plane containing the axis of the rear wheels, mm (in)	883 (34.8)
Distance from the median plane of the tractor, mm (in)	0

5. BRAKING

Date of tests: 28th August-4th September 1981

Type of track: Concrete

Masses during brake tests

	Front, kg (lb)	Rear, kg (lb)	Total, kg (lb)
Ballasted	2137 (4711)	3988 (8792)	6125 (13503)
Unballasted	1373 (3027)	2547 (5615)	3920 (8642)

Type 0 Service brakes (cold)

Travelling speed before application of brakes, 22.5 km/h (14.0 mile/h)

Ballasted	Force on brake pedal	N (lb)	110 (25)	135 (30)	180 (40)	220 (50)	265 (60)	290 (65)
	Mean deceleration	m/s^2 (ft/s^2)	0.7 (2.3)	1.3 (4.3)	2.0 (6.6)	2.7 (8.9)	3.6 (11.8)	4.0 (13.1)
Unballasted	Force on brake pedal	N (lb)	125 (28)	180 (40)	220 (50)	265 (60)	285 (64)	305 (69)
	Mean deceleration	m/s^2 (ft/s^2)	1.0 (3.3)	2.0 (6.6)	2.6 (8.5)	3.2 (10.5)	3.5 (11.5)	3.8 (12.5)

Type 1 Service brakes (hot)

Ballasted	Force on brake pedal	N (lb)	125 (28)	180 (40)	220 (50)	265 (60)	295 (66)	
	Mean deceleration	m/s^2 (ft/s^2)	1.2 (3.9)	2.1 (6.9)	2.7 (8.9)	3.3 (10.8)	3.7 (12.1)	

Brakes were heated by: The cycle of 20 brake applications

Comments on deviation and vibration: None

Parking brake

		Force applied on slope of 18%		Force applied on slope of 12% with trailer of 3 tonnes (6614 lb)	
		Up	Down	Up	Down
Pull on handbrake	N (lb)	560 (126)	560 (126)	560 (126)	560 (126)

6. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	13th May 1981
Type of sound level meter:	Bruel and Kjaer 2209
Type of track:	Concrete
Results of tests:	
Gear:	H3
Travelling speed before acceleration:	16.9 km/h (10.5 mile/h)
Sound level:	87 dBA

7. NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests: 13th May 1981
Type of sound level meter: Bruel and Kjaer 2209
Type of track: Concrete
Cab fitted: Yes

Results of tests

Gear	Drawbar pull at which the tractor develops maximum sound level, kN (lb)	Measured travelling speed, km/h (mile/h)		Sound level, dBA
All openings closed with cab fitted				
*M3	26.0 (5850)	6.6	(4.1)	86
*M3	Light load	8.1	(5.0)	84
H1	16.0 (3600)	10.0	(6.2)	87
H4	Light load	22.5	(14.0)	84

*The M3 gear corresponds to the nominal travelling speed nearest to 7.5 km/h (4.7 mile/h).

8. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of tests: 5th October 1981
Hydraulic fluid
Make and type: Shell Tractor Oil Universal, 20W/30
Viscosity: 54 cSt at 50°C (122°F)
Type of linkage lock for transport: Hydraulic

Power lift

	Height of lower hitch point above ground in down position, mm	(in)	Vertical movement, mm	(in)	Maximum force exerted through full range, kN	(lb)	Corresponding pressure of hydraulic fluid, Mpa	(lb/in^2)	Moment about rear axle, kNm	(lb ft)	Maximum tilt angle of mast over range of lift, degrees
At the hitch points	235	(9.3)	622	(24.5)	28.8	(6470)	15.8	(2290)	28.2	(20799)	-
On the frame	235	(9.3)	655	(25.8)	27.5	(6180)	15.8	(2290)	43.7	(32231)	4

The linkage could not be adjusted to give an angle of tilt of the mast of 10°.

Hydraulic pump performance

Opening pressure of the relief valve:	15.5 MPa (2250 lb/in^2)
Sustained pressure with relief valve open:	17.9 MPa (2600 lb/in^2)
Opening pressure of the unloading valve:	Not applicable
Closing pressure of the unloading valve:	Not applicable
Pump delivery rate at minimum pressure, the governor control lever set for maximum power:	42.6 l/min (9.4 gal/min)
Pressure specified by the manufacturer for an external hydraulic motor:	15.5 MPa (2250 lb/in^2)
Hydraulic power at 15.5 MPa (2250 lb/in^2):	10.3 kW (13.8 hp)
Pump delivery rate at stated power:	39.7 l/min (8.7 gal/min)
Tapping point:	From 3 way valve
Temperature of hydraulic fluid:	62°C (144°F)

Linkage geometry when connected to the standard frame, mm (in)

Projected length in side view				
Lower links			978 (38.5)	
Lift arms			241 (9.5)	
Lift rods			600 (23.6)	
Top link			670 (26.4)	
Distance of lift rod connection point from pivot point of lower link			489 (19.3)	
The following dimensions are given relative to the rear wheel centre line, situated 770 mm (30.3 in) above the ground level				
Lower link pivot point	On centre line		178 (7.0)	below
Top link pivot point	308 (12.1)	behind,	298 (11.7)	above
Lift arm pivot point	22 (0.9)	forward,	257 (10.1)	above
Maximum and minimum height of lower link hitch points	87 (3.4)	above,	535 (21.1)	below
Height of lower link hitch points when locked in transport position	Any height within lift range			

REPAIRS AND ADJUSTMENTS DURING TESTS:

During the pto test, the pipe on the pressure side of the main hydraulic pump fractured and was replaced.

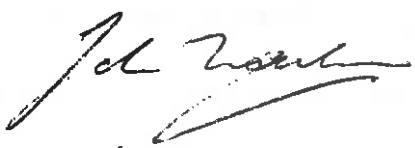
REMARKS:

None

Test carried out by: F. Thistlethwaite, J.P. Evans, P.C. Seward

Officer in charge: D.W. Smith

Signed:  Head of Tractor Department

 for the Director

Date: 5/1/82