OECD Approval No. 826

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

Report on test of David Brown 1390 Four-Wheel Drive Tractor



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

Test No. R81/2/7703/OECD

Report No. 676

Date October 1981

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

National Institute of Agricultural Engineering
Wrest Park Silsoe Bedford MK45 4HS

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POWER RATINGS

Horse power measurements in this report use Imperial units. In Sales and other literature, David Brown Tractors Limited, in common with other major manufacturers, quote DIN power measurements using Metric hp.

To convert:

Imperial hp to Metric hp
multiply by 1.014.

SPEC

COND

FUEL

COMPU

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SPECIFICATION OF TRACTOR

Manufacturer's name and address: David Brown Tractors Ltd.,
Meltham,
Huddersfield,
Yorks.

Submitted for test by: The manufacturer

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

Place of running-in: David Brown Factory

Duration of running-in: 50 hours

Tractor:

Make: David Brown

Model: 1390

Type: Four-wheel drive, unit construction, front wheel steering

Serial No.: 1390/38/11120559

Engine:

Make: David Brown

Model: 220002

Type: 4-stroke, direct injection diesel

Serial No.: 220002/11370942

Cylinders:

Number and disposition: 4, vertical, in-line

Bore: 100.1 mm (3.9 in)

Stroke: 114.3 mm (4.5 in)

Capacity: 3598 cm^3 (220 in^3)

Compression ratio: 17:1 (nominal)

Arrangement of valves: Overhead

Liners: None

Fuel system:

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

Make, type and model of filter(s): C.A.V., dual, paper element

Tank capacity: 94.0 l (20.7 UK gal)

Make, type and model of injection pump: C.A.V., distributor, D.P.A. 3342F740

Injection pump Serial No.: R36274PX

Manufacturer's production setting of injection pump: 10.9 l/h (2.40 UK gal/h) to 11.4 l/h (2.51 UK gal/h) at 1600 rev/min engine speed on full load and 15-20°C (59-68°F) temperature, using fuel of 0.8476 specific gravity at 15.6°C (60°F)

Fuel system (Cont'd)

Make, type and model of injectors: C.A.V., BKBL 9755153, BDLL 140S 6592 4 hole nozzles

Injection pressure: 17.7 MPa (175 atm)

Injection pump delivery starts: 17° before T.D.C.

Governor:

Make and type: C.A.V. mechanical

Governed range of engine speed: 700 rev/min to 2350 rev/min

Rated engine speed: 2200 rev/min

Air cleaner:

Make and type: Coopers, 3 stage, dry paper element

Model: -

Oil capacity: -

Position: Under bonnet, forward of radiator

Pre-cleaner:

Make and type: Coopers Stackcap, with wide mesh screen

Position: Left-hand side, above bonnet

Turbo-charger:

Make and type: -

Lubrication system:

Type of feed and pump: Forced feed, gear type pump

Type of filter(s): Purolator replaceable paper element, full flow

Total oil capacity including filter: 7.5 l (13.2 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 hours

Filter change period: 200 hours

Cooling system:

Coolant: Water

Type of pump: Impeller

Fan diameter: 406 mm (16 in)

Number of fan blades: 7

Type of temperature control: Thermostat

Coolant capacity: 14.0 l (24.6 pt)

System pressure: 69 kPa (10 lb/in^2)

Starting system:

Make, type and model: Lucas, electrical, M45, solenoid engaged starter moto

Starter motor power rating: 1.9 kW (2.5 hp)

Safety features: Operable only with gear selector lever in neutral position

Cold starting aid(s): Thermostart controlled by starter/isolator switch

Exhaust system

Make and construction: Burgess, oval, baffle type silencer

Dimensions of expansion chamber: 165 mm (6.5 in) x 89 mm (3.5 in) x 410 mm (16.1 in) long

Position: Vertical on left-hand side of bonnet

Electrical system

Voltage: 12

Earth polarity: Negative

Make and type of alternator: Lucas 15 ACR

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: Borg and Beck, dual, dry

Diameter of plates: Main 279 mm (11.0 in) Pto 279 mm (11.0 in)

Method of operation: Main, pedal hydraulic, Pto, hand-lever

Gearbox:

Make and type: David Brown, sliding gear and constant mesh

Number of speeds: 12 forward and 4 reverse

Arrangement: 3 forward and 1 reverse speed gearbox with four ranges

Rear axle and final drive(s):

Make and type: David Brown, crown wheel and pinion and differential with spur gear final drives

Type of differential lock and method of engagement: Pedal operated, self disengaging

Front axle and final drive(s):

Make and type: David Brown crown wheel and pinion and differential, epicyclic reduction gear final drives

Driven from: Front of gear box by fixed ratio gear train

Transmission oils

	Gearbox and rear axle	Final drives	Front axle
Capacity:	27.0 l (47.5 pt)	4.6 l (8.1 pt)	9.7 l (17.1 pt)
Recommended oil: S.A.E.	20W/30	140	90 EP
Viscosity at 50°C (122°F)	54 cSt	300 cSt	115 cSt
M.I.L. standard	MIL-L-2104B	MIL-L-2105B	MIL-L-2105
Oil change period	1000 hours	1000 hours	1000 hours
Filter change period	500 hours	-	-

Gear	Number of engine revolutions for one revolution of driving wheel	Nominal travelling speed for 2200 rev/min rated engine speed,* km/h	(mile/h)
Forward LS1	340.5	1.81	(1.12)
LS2	205.3	3.01	(1.87)
HS1	170.7	3.62	(2.25)
L1	134.1	4.61	(2.86)
LS3	118.9	5.20	(3.23)
HS2	102.9	6.00	(3.73)
L2	80.82	7.65	(4.75)
H1	67.21	9.19	(5.71)
HS3	59.61	10.37	(6.44)
L3	46.82	13.20	(8.20)
H2	40.52	15.25	(9.48)
H3	23.47	26.33	(16.36)
Reverse LS	206.70	2.99	(1.86)
HS	103.60	5.96	(3.70)
L	81.40	7.59	(4.72)
H	40.81	15.14	(9.41)

*Calculated with a tyre radius index of 745 mm (29.3 in)

Power take-off

Position: At rear, in vertical centre plane

Height above ground 540 rev/min: 722 mm (28.4 in)
1000 rev/min: 722 mm (28.4 in)

Distance behind rear axle 540 rev/min: 350 mm (13.8 in)
1000 rev/min: 350 mm (13.8 in)

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

Number of splines 540 rev/min: 6 to I.S.O. standard
1000 rev/min: 6

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: 587 rev/min
1000 rev/min: 1100 rev/min

Engine speed at standard pto speed of 540/1000 rev/min: 2025 and 2000 rev/min

Direction of rotation (viewed facing driving end): Clockwise

Belt pulley not fitted for tests

Power lift

Make and type of pump:	David Brown, live hydraulic gear type
Nominal working pressure:	13.8 MPa (2000 lb/in^2)
Pump drive:	Engine-driven from front of crankshaft
Oil supplied from:	Transmission housing
Oil capacity:	27.0 l (5.9 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 1 and 2, to I.S.O. standard
Controls:	Draught and position, selective response on drop

Drawbar

Type:	Swinging
Vertical height to centre of clevis:	max. 514 mm (20.2 in), min. 347 mm (13.7 in)
Changed by:	Raising and lowering support frame and inverting drawbar
Distance behind rear axle centre:	528 mm (20.8 in) 706 mm (27.8 in) 757 mm (29.8 in)
Distance behind pto:	178 mm (7.0 in) 356 mm (14.0 in) 406 mm (16.0 in)
Lateral adjustment:	135 mm (5.3 in) 168 mm (6.6 in) 170 mm (6.7 in)
Pivot position relative to rear axle:	51 mm (2.0 in) forward
Drawbar pin hole diameter:	26 mm (1.0 in) dia

Hitch

Type:	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 driven
Oil supplied from:	Tank incorporated in pump unit
Recommended oil:	Hydraulic mineral oil, viscosity 24.5 cSt at 50°C (122°F)
Oil change period:	500 hours
Filter change period:	500 hours

Brakes

Make and type of service brakes: David Brown, internal expanding, drum type, hydraulically actuated

Position: On spur pinion shafts

Method of operation: Independent or combined pedals

Type of parking brake: Cable actuation of service brakes

Method of operation: Hand-lever with ratchet

Wheels

Steering wheels:

Make and size: Goodyear Super Sure Grip Tractor, 11.2/10-24

Type: Cross-ply, 6 ply rating

Maximum mass on each tyre and pressure: 1045 kg (2304 lb) at 180 kPa (26 lb/in^2)

Track width: 1499 mm (59 in) by 102 mm (4 in) steps to 1805 mm (71 in)

Changed by: Reversing wheels and offset lug rims

Driving wheels:

Make and size: Goodyear Traction Sure Grip 16.9/14-34

Type: Cross-ply, 6 ply rating, rim size DW14 x 34

Maximum mass on each tyre and pressure: 2015 kg (4442 lb) at 130 kPa (19 lb/in^2)

Track width: 1422 mm (56 in) by 102 mm (4 in) steps to 2136 mm (84 in)

Changed by: Reversing wheels and offset lug rims

Wheelbase 2140 mm (84.3 in)

Safety Cab

Approval No.: CSD 0228/1-b(C)

Description: Sekura type S 80 SK 417/DB welded and bolted hollow section and sheet steel, anti-vibration mounts, door and mounting steps 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	1010	(39.8)	155 95	(6.1)x (3.7)	828	(32.6)
Side lights	1580	(62.2)	70 20	(2.8)x (0.8)	299	(11.8)
Rear lights	1448	(57.0)	75 70	(3.0)x (2.8)	198	(7.8)
Reflectors	1448	(57.0)	65 40	(2.6)x (1.6)	133	(5.2)

Number of grease points

Whole tractor: 30

Overall dimensions

	Length, m	(in)	Width, max. m	(in)	Width, min. m	(in)	Maximum height to top of exhaust m	(in)
Without ballast	3.68	(145)	2.56	(101)	1.85	(73)	2.60	(102)
With ballast	4.08	(161)	2.56	(101)	1.85	(73)	2.60	(102)

Minimum ground clearance 333 mm (13.1 in) to underside of front axle

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	1364 (3007)	1880 (4145)	3244 (7152)
With ballast	1499 (3305)	2004 (4418)	3503 (7723)

Ballast

	Number of weights	Total mass, kg (lb)	Water, kg (lb)
Front wheels	Nil	Nil	Nil
Rear wheels	4	154 (340)	Nil
Additional	3	105 (231)	Front frame and weights

Track setting during tests

Front - 1703 mm (67 in)

Rear - 1524 mm (60 in)

FUEL AND LUBRICANTS USED IN TESTS

Fuel

Diesel oil to Class A2 British Standard 2869:1970, specific gravity 0.848 at 15°C (59°F), viscosity 2.43 cSt at 50°C (122°F), Cetane No. 56.0

Oil

Engine, transmission and power lift:	Agricastrol M.P. S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F)
Final drives:	S.A.E. 140, viscosity 300 cSt at 50°C (122°F)
Front axle:	S.A.E. 90 EP, viscosity 115 cSt at 50°C (122°F)

COMPULSORY TESTS

1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 6th March 1981, NIAE, Silsoe, Bedford, UK.

Type of dynamometer: Water brake, Heenan and Froude

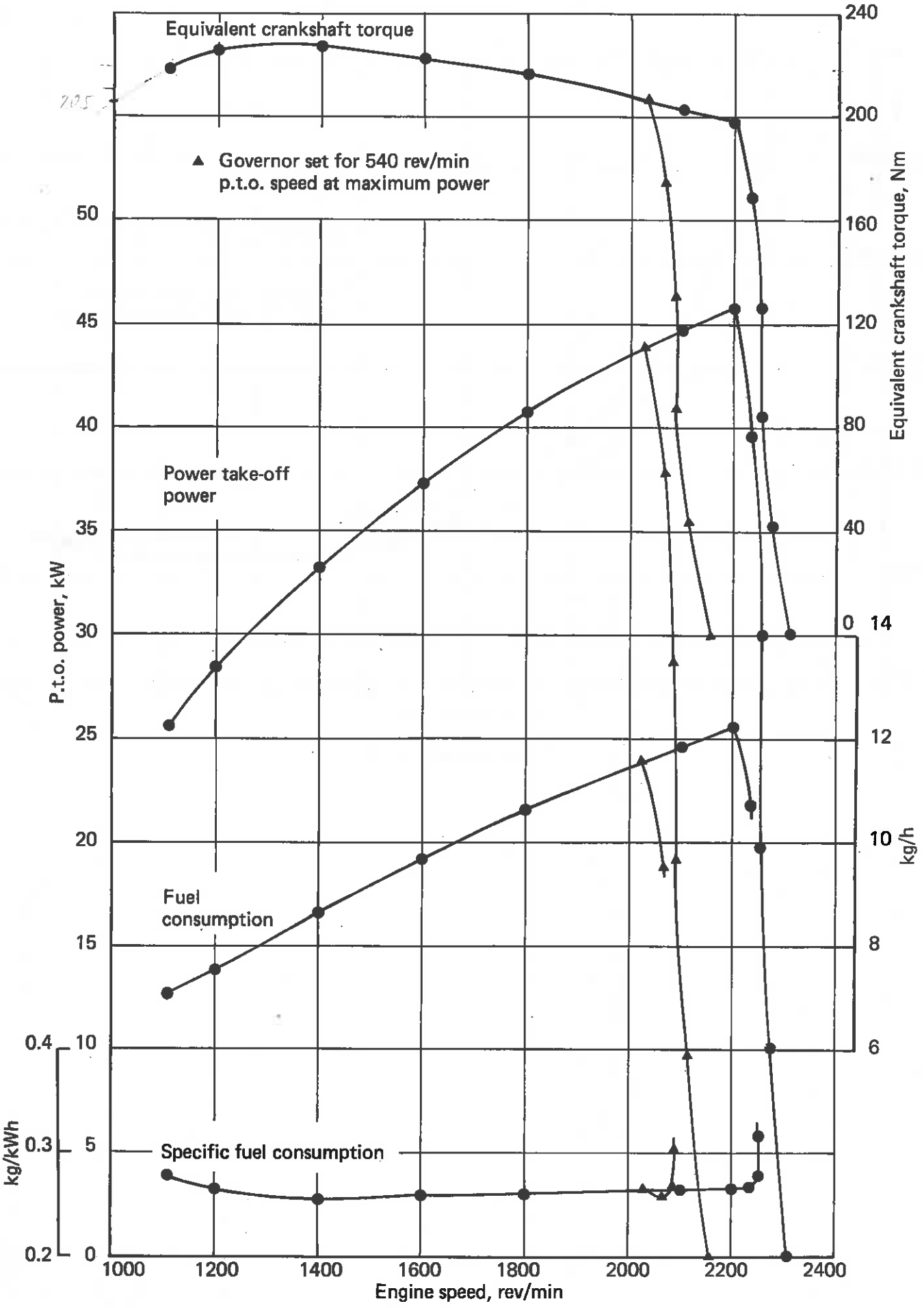
Power, kW (hp)	Speed, rev/min		Fuel consumption,			
	Engine	P.t.o.	l/h (UKgal/h)	kg/h (lb/h)	kg/kWh (lb/hph)	kWh/l (hph/UKgal)
Maximum power - 2 hour test						
45.7 (61.3)	2200	587	14.45 (3.18)	12.25 (27.01)	0.268 (0.440)	3.17 (19.3)
The speed recommended by the manufacturer for drawbar work						
45.7 (61.3)	2200	587	14.45 (3.18)	12.25 (27.01)	0.268 (0.440)	3.17 (19.3)
Part loads						
(1) 85% of the torque obtained at maximum power						
39.5 (53.0)	2237	597	12.58 (2.77)	10.67 (23.52)	0.270 (0.444)	3.14 (19.1)
(2) Unloaded						
-	2306	615	3.67 (0.81)	3.11 (6.86)	-	-
(3) 50% of the torque defined in (1)						
19.9 (26.7)	2252	601	7.45 (1.64)	6.31 (13.92)	0.317 (0.522)	2.67 (16.3)
(4) Maximum power						
45.7 (61.3)	2200	587	14.45 (3.18)	12.25 (27.01)	0.268 (0.440)	3.17 (19.3)
(5) 25% of the torque defined in (1)						
10.0 (13.5)	2273	606	5.49 (1.21)	4.65 (10.26)	0.463 (0.762)	1.83 (11.2)
(6) 75% of the torque defined in (1)						
29.9 (40.1)	2257	602	9.83 (2.16)	8.33 (18.37)	0.279 (0.458)	3.04 (18.6)

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 (540 rev/min)						
(1) 85% of the torque obtained at maximum power						
37.9 (50.8)	2061	550	11.49 (2.53)	9.75 (21.49)	0.257 (0.423)	3.29 (20.1)
(2) Unloaded						
-	2156	575	3.17 (0.70)	2.69 (5.93)	-	-
(3) 50% of the torque defined in (1)						
19.2 (25.7)	2086	556	6.88 (1.51)	5.83 (12.86)	0.304 (0.500)	2.79 (17.0)
(4) Maximum power						
43.8 (58.7)	2025	540	13.61 (2.99)	11.54 (25.45)	0.264 (0.434)	3.21 (19.6)
(5) 25% of the torque defined in (1)						
9.7 (13.0)	2116	564	4.92 (1.08)	4.17 (9.19)	0.429 (0.706)	1.97 (12.0)
(6) 75% of the torque defined in (1)						
28.7 (38.5)	2083	555	9.07 (2.00)	7.69 (16.96)	0.268 (0.441)	3.16 (19.3)

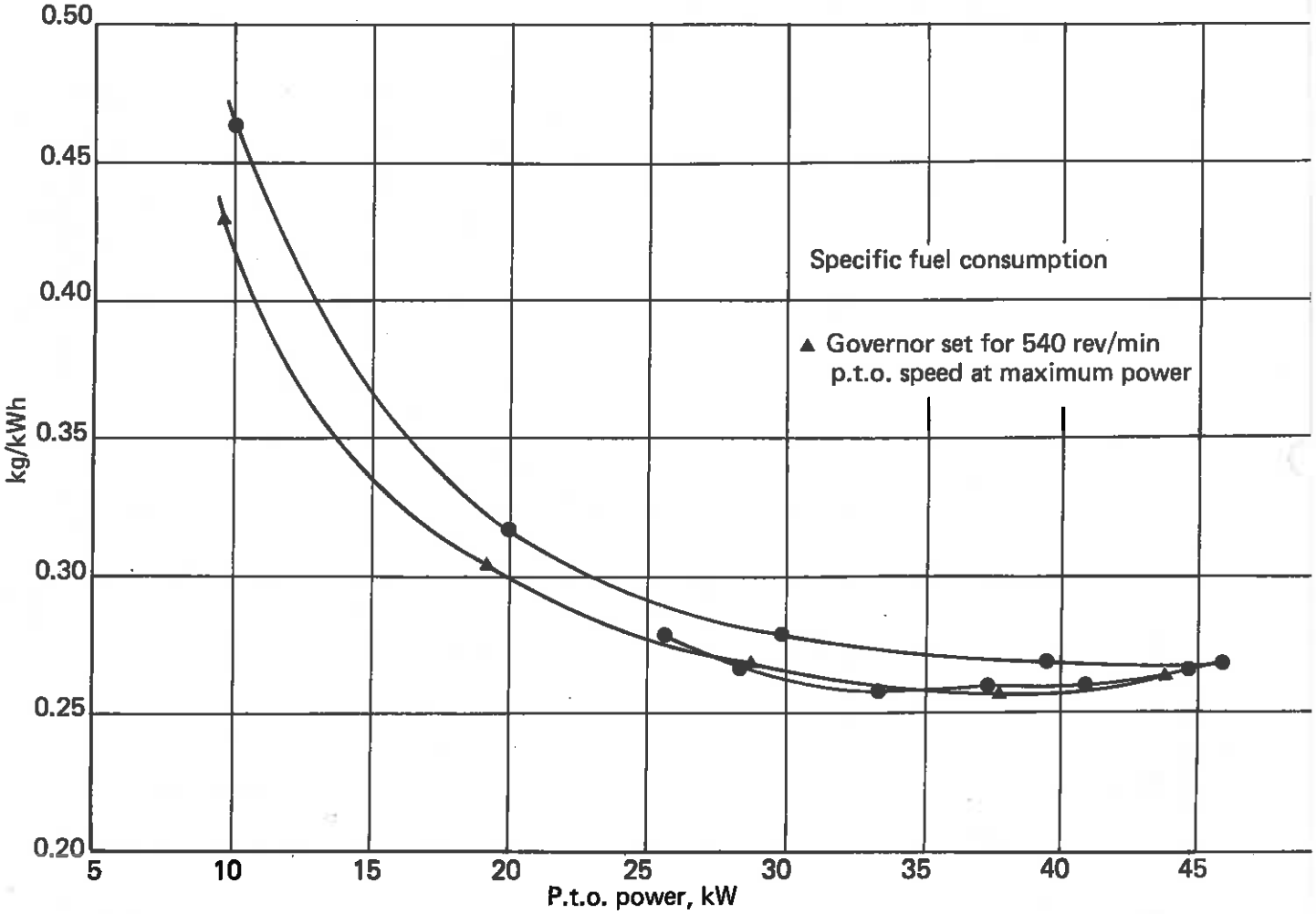
Standard specific fuel consumption, kg/kWh (lb/hph)

(a) 0.270 (0.444) (b) 0.317 (0.522) (c) 0.257 (0.423) (d) 0.304 (0.500)

No load, maximum engine speed		2306 rev/min
Equivalent crankshaft torque at maximum power		198.5 Nm (146.4 lb ft)
Maximum equivalent crankshaft torque		228.0 Nm (168.2 lb ft) at 1340 rev/min engine speed
Mean atmospheric conditions	temperature	22°C (72°F)
	pressure	1000 m bar (29.53 in Hg)
	relative humidity	39%
Maximum temperature	coolant	94°C (201°F)
	engine oil	108°C (226°F)
	fuel	27°C (81°F)
	air intake	26°C (79°F)



Power take-off test



Power take-off test

2 DRAWBAR PERFORMANCE

Date of tests: February 1981 — Height of drawbar above ground: Unballasted: 442 mm (17.4 in)

Type of track: Concrete — Ballasted: 363 mm (14.3 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 117 kPa (17 lb/in²), rear 80 kPa (12 lb/in²)													
HS1	3.06 (1.90)	*28.6 (38.4)	33.7 (7580)	2242	15.0	-	-	20 (68)	84 (183)	83 (181)	7 (45)	87	1005 (29.68)
L1	3.88 (2.41)	*36.3 (48.7)	33.7 (7580)	2226	15.0	-	-	24 (75)	86 (187)	87 (189)	7 (45)	87	1005 (29.68)
LS3	4.55 (2.83)	37.5 (50.3)	29.7 (6680)	2202	10.7	-	-	17 (63)	84 (183)	83 (181)	3 (37)	69	1025 (30.27)
HS2	5.36 (3.33)	38.3 (51.4)	25.7 (5780)	2208	8.5	-	-	19 (66)	86 (187)	85 (185)	3 (37)	84	1007 (29.74)
L2	6.97 (4.33)	40.1 (53.8)	20.7 (4650)	2198	6.4	-	-	20 (68)	86 (187)	87 (189)	3 (37)	84	1007 (29.74)
H1	8.52 (5.29)	40.7 (54.6)	17.2 (3870)	2200	5.0	-	-	23 (73)	87 (189)	88 (190)	3 (37)	84	1007 (29.74)
HS3	9.72 (6.04)	39.4 (52.8)	14.6 (3280)	2202	4.1	-	-	22 (72)	84 (183)	87 (189)	3 (37)	84	1007 (29.74)
(ii) MAXIMUM POWER (ballasted) Tyre inflation pressure: front 117 kPa (17 lb/in²), rear 80 kPa (12 lb/in²)													
LS1	1.53 (0.95)	*16.5 (22.1)	38.7 (8700)	2279	15.0	0.391 (0.643)	2.17 (13.2)	13 (55)	80 (176)	83 (181)	6 (43)	71	1013 (29.91)
LS2	2.55 (1.58)	*27.4 (36.7)	38.7 (8700)	2274	15.0	0.350 (0.576)	2.42 (14.8)	15 (59)	82 (180)	83 (181)	6 (43)	71	1013 (29.91)
HS1	3.03 (1.88)	*32.6 (43.7)	38.7 (8700)	2256	15.0	0.340 (0.559)	2.49 (15.2)	18 (64)	84 (183)	86 (187)	6 (43)	59	1013 (29.91)
L1	3.92 (2.44)	38.7 (51.9)	35.5 (7980)	2200	12.0	0.317 (0.521)	2.67 (16.3)	15 (59)	85 (185)	85 (185)	6 (43)	71	1013 (29.91)
LS3	4.53 (2.81)	38.6 (51.8)	30.7 (6900)	2200	9.3	0.318 (0.523)	2.67 (16.3)	19 (66)	85 (185)	85 (185)	6 (43)	71	1013 (29.91)
HS2	5.34 (3.32)	38.6 (51.8)	26.0 (5850)	2200	7.5	0.318 (0.523)	2.67 (16.3)	16 (61)	85 (185)	86 (187)	6 (43)	71	1021 (30.15)
L2	6.96 (4.32)	40.0 (53.6)	20.7 (4650)	2200	5.7	0.311 (0.512)	2.72 (16.6)	19 (66)	85 (185)	88 (190)	6 (43)	71	1021 (30.15)
H1	8.46 (5.26)	40.4 (54.2)	17.2 (3870)	2200	4.6	0.307 (0.505)	2.76 (16.8)	14 (57)	85 (185)	85 (185)	8 (46)	74	1023 (30.21)
HS3	9.61 (5.97)	38.7 (51.9)	14.5 (3260)	2200	3.9	0.321 (0.528)	2.64 (16.1)	15 (59)	85 (185)	84 (183)	8 (46)	74	1023 (30.21)
(iii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
L2	7.29 (4.53)	31.4 (42.1)	15.5 (3480)	2269	4.5	0.281 (0.462)	3.02 (18.4)	14 (57)	83 (181)	85 (185)	7 (45)	87	1027 (30.33)
(iv) ⁄FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (ii)													
HS1	3.22 (2.00)	-	38.7 (8700)	-	-	-	-	17 (63)	85 (185)	86 (187)	4 (39)	69	1022 (30.18)

Total oil consumption during ten hours duration of tests (iii) and (iv) 22.5 g/h (0.05 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 - 1703 mm (67 in)
rear - 1524 mm (60 in)

	With brakes		Without brakes	
	Left-hand	Right-hand	Left-hand	Right-hand
Radius of turning space, m (in)	3.81 (150)	3.81 (150)	5.02 (198)	4.95 (195)
Radius of turning circle, m (in)	3.67 (144)	3.67 (144)	4.88 (192)	4.81 (189)

4. LOCATION OF CENTRE OF GRAVITY

Height above ground, mm (in)	874 (34.4)
Distance forward from the vertical plane containing the axis of the rear wheels, mm (in)	888 (35.0)
Distance from the median plane of the tractor, mm (in)	0

5. BRAKING

Date of tests: 2nd and 4th June 1981

Type of track: Concrete

Masses during brake tests

	Front, kg (lb)	Rear, kg (lb)	Total, kg (lb)
Ballasted	2089 (4605)	2921 (6440)	5010 (11045)
Unballasted	1364 (3007)	1880 (4145)	3244 (7152)

Type 0 Service brakes (cold)

Travelling speed before application of brakes, 27.7 km/h (17.2 mile/h)

Ballasted	Force on brake pedal	N (lb)	135 (30)	180 (40)	225 (51)	270 (61)	310 (70)		
	Mean deceleration	m/s^2 (ft/s^2)	1.7 (5.6)	2.3 (7.5)	2.9 (9.5)	3.5 (11.5)	4.0 (13.1)		
Unballasted	Force on brake pedal	N (lb)	45 (10)	80 (18)	115 (26)	150 (34)	185 (42)		
	Mean deceleration	m/s^2 (ft/s^2)	1.5 (4.9)	2.2 (7.2)	2.9 (9.5)	3.6 (11.8)	4.3 (14.1)		

Type 1 Service brakes (hot)

Ballasted	Force on brake pedal	N (lb)	115 (26)	180 (40)	245 (55)	310 (70)	370 (83)		
	Mean deceleration	m/s^2 (ft/s^2)	2.7 (8.9)	3.0 (9.8)	3.3 (10.8)	3.6 (11.8)	3.9 (12.8)		

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)	290 (65)	290 (65)	290 (65)	290 (65)

6. MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests:	11th June 1981
Type of sound level meter:	Bruel and Kjaer 2209
Type of track:	Concrete
Results of tests:	
Gear:	H3
Travelling speed before acceleration:	20.8 km/h (12.9 mile/h)
Sound level:	87 dBA

7. NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests: 11th June 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			
*L2	20.0 (4500)	7.2 (4.5)	89
*L2	Light load	7.9 (4.9)	83
HS1	26.5 (5960)	3.4 (2.1)	90
L1	24.0 (5400)	4.4 (2.7)	90
H3	Light load	27.7 (17.2)	87

*The L2 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 of tests: 19th and 23rd June 1981

Hydraulic fluid:

Make and type: Shell Tractor Oil Universal S.A.E. 20W/30
Viscosity: 54 cSt at 50°C (122°F)

Type of linkage lock for transport: Mechanical and 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	283 (11.1)	668 (26.3)	17.7 (3980)	15.8 (2290)	17.3 (12760)	-
On the frame	283 (11.1)	806 (31.7)	13.3 (2990)	15.8 (2290)	21.1 (15563)	14

Hydraulic pump performance

Opening pressure of the relief valve:	15.0 MPa (2180 lb/in^2)
Sustained pressure with relief valve open:	17.6 MPa (2550 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:	32.9 l/min (7.2 gal/min)
Pressure specified by the manufacturer for an external hydraulic motor:	15.0 Mpa (2180 lb/in^2)
Hydraulic power at 15.0 MPa (2180 lb/in^2):	7.3 kW (9.8 hp)
Pump delivery rate at stated power:	29.2 l/min (6.4 gal/min)
Tapping point:	From three-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	498	(19.6)	
Top link	678	(26.7)	
Distance of lift rod connection point from pivot point of lower link	451	(17.8)	
The following dimensions are given relative to the rear wheel centre line, situated 745 mm (29.3 in) above the ground level			
Lower link pivot point	On centre line,	143 (5.6)	below
Top link pivot point	300 (11.8)	behind, 283 (11.1)	above
Lift arm pivot point	2 (0.1)	behind, 225 (8.9)	above
Maximum and minimum height of lower link hitch points	206 (8.1)	above, 462 (18.2)	below
Height of lower link hitch points when locked in transport position	Any height within lift range		

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

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

Officer in charge: D.W. Smith

Signed:  Head of Tractor Department

for the Director

Date: 11/12/81