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

LEYLAND MODEL 270 TRACTOR



Test No: R.74/7786/O.E.C.D.

Manufacturer: British Leyland (U.K.) Limited,
Bathgate,
West Lothian, Scotland.

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:	British Leyland (U.K.) Limited, Bathgate, West Lothian, Scotland
Selected and submitted for test by:	The manufacturer with the agreement of the testing station.
Place of running-in:	Leyland Scottish Plant
Duration of running-in:	50 hours

Tractor

Make:	Leyland
Model:	270
Type:	Four-wheel, rear wheel driven, unit construction
Serial No:	270N/306147/183311

Engine

Manufacturer:	Leyland
Model:	498NT
Type:	4-stroke, direct injection diesel
Serial No:	4/98-1624
Cylinders:	4 cylinders, vertical, in-line, 3.858 in (98 mm) bore x 4.921 in (125 mm) stroke, capacity 230.1 in^3 (3.771 l), compression ratio 16.8:1 (nominal), overhead valves, replaceable wet cylinder liners
Fuel system:	A.C. type U fuel feed pump, gauze filters in feed pump and tank, C.A.V. dual paper element filters incorporating sediment bowls in series on delivery side of feed pump; fuel tank capacity 15.0 UK gal (68.2 l); C.A.V. distributor type DPA 349F 850 injection pump, Serial number 10702YP; manufacturer's production setting: 25.75 pt/h (14.63 l/h) to 27.25 pt/h (15.48 l/h) at 2200 rev/min engine speed, C.A.V. type BDLL 150S 6582 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 550 to 2430 rev/min, rated engine speed 2200 rev/min

Air cleaner:	Burgess, 2-stage, under hood at rear of engine, centrifugal pre-cleaner incorporated in cleaner body and dry paper element. Inlet incorporated in bonnet cowl.
Lubrication system:	Forced feed from eccentric rotor type pump with metal strainer in sump, Purolator replaceable paper element full flow filter, oil capacity 16 pt (9.1 l), recommended oil change period 200 hours
Cooling system:	Water cooled, impeller assisted with 16 in (406 mm) dia, 4-blade belt driven fan, thermostat for temperature control, cooling water capacity 24 pt (13.6 l), radiator pressurised at 10 lb/in^2 (0.70 kg/cm^2) no loss system fitted with expansion bottle
Starting system:	Electrical, 12v Lucas type M50G solenoid engaged starter motor, operable only with gear selector lever in neutral position, manual operated retarding device on fuel injection pump for cold starting
Electrical system:	Voltage: 12, negative earth Alternator: Lucas type 16 A.C.R Battery: Lucas type ATV 17T lead acid, capacity 128 Ah
Transmission:	Borg and Beck dual dry clutch, two 11 in (279 mm) dia plates, one pedal operated for gearbox drive and one hand lever operated for p.t.o. drive
Gearbox:	Own make, sliding gear type, 10 forward and 2 reverse speeds, with gear selector and high-low range selector lever
Rear axle and final drives:	Own make, crown wheel and bevel pinion with spur gear final drives, pedal operated mechanical differential lock
Oil capacity:	Gearbox, rear axle and final drives 100 pt (56.8 l). Recommended oil change period 1200 hours

Gear	Number of engine revolutions for one revolution of driving wheel	*Nominal travelling speed for 2200 rev/min rated speed of engine, mile/h	(km/h)
Forward			
1	225.2	1.60	(2.57)
2	177.6	2.03	(3.27)
3	142.4	2.53	(4.07)
4	112.3	3.21	(5.16)
5	89.1	4.04	(6.50)
6	70.3	5.12	(8.24)
7	49.5	7.27	(11.70)
8	39.0	9.23	(14.85)
9	23.3	15.45	(24.86)
10	18.4	19.56	(31.47)
Reverse			
1	76.9	4.68	(7.53)
2	60.7	5.93	(9.54)

*Calculated with tyre rolling radius of 27.5 in (699 mm)

Power take-off — Hand lever engaged, independent of main clutch, 6-spline, $1\frac{3}{8}$ in (34.9 mm) dia, to I.S.O. Standard, at rear of tractor in vertical centre plane, height above ground $30\frac{1}{2}$ in (775 mm). Proportional engine speed giving 655 rev/min at 2200 rev/min rated engine speed, 540 rev/min standard p.t.o. speed at 1813 rev/min engine speed, direction of rotation clockwise viewed facing driving end

Belt pulley: — Available, not fitted for test

Power lift: — Own make, hydraulic, Plessey double chamber gear pump, driven independently from main clutch, operated either together with or independently of the power take-off by selection lever, supplies oil from transmission to a ram cylinder and external tappings. Category 2 implement linkage with position and draught control with top link sensing

Drawbar: — Extended drawbar as fitted for test, vertical height to centre of clevis $17\frac{3}{8}$ in (441 mm) and $20\frac{5}{8}$ in (524 mm) changed by inverting clevis, distance behind rear axle centre $35\frac{3}{4}$ in (908 mm), position relative to p.t.o. $13\frac{3}{4}$ in (349 mm) to rear, lateral adjustment 24 in (610 mm), pivot position relative to rear wheel centre $8\frac{3}{8}$ in (213 mm) to rear

Hitch

Rear:	Automatic pick up hitch, available, not fitted for test
Front:	Towing hitch combined with front weight carrier, height above ground to centre of clevis 30 $\frac{3}{8}$ in (772 mm)
Steering	Cam Gears, worm and peg type with single drag link, power assisted with Plessey gear type pump supplying oil to double acting ram cylinder
Brakes	Girling multi-disc type mounted on final drive pinion shafts, independently or combined pedal operated, hand lever with ratchet operating both brakes for parking

Wheels

Steering wheels:	Two at front, Dunlop T81 7.50-16 tyres, 8-ply rating, maximum permissible weight on each tyre 1951 lb (885 kg) at 50 lb/in^2 (3.5 kg/cm^2), track width 52 in (1321 mm) by 2 in (51 mm) steps to 76 in (1930 mm) changed by extending front axle and reversing wheels
Driving wheels:	Two at rear, Goodyear Traction Sure Grip 18.4/15-30 tyres, 10-ply rating, maximum permissible weight on each tyre 6206 lb (2815 kg) at 25.5 lb/in^2 (1.8 kg/cm^2), track width 62 in (1575 mm) and 70 in (1778 mm) changed by reversing wheels
Wheelbase:	6 ft 8$\frac{1}{4}$ in (2038 mm)

Lighting

	Height above ground of centre, in	(cm)	Size, in	(cm)	Distance from outside edge of tractor at 62 in (1575 mm) wheel track, to centre, in	(cm)
Headlights	41¾	(106.0)	4	(10.2) dia	33⅜	(84.8)
Side lights	61¼	(155.6)	3½ x 1½	(8.9) x (3.8)	11	(27.9)
Rear lights	55½	(141.0)	4½ x 1¾	(11.4) x (4.4)	13	(33.0)
Reflectors	52¼	(132.7)	2½ x 1¼	(6.4) x (3.2)	20⅜	(51.8)

Number of grease points

Whole tractor: 15

CONDITIONS DURING TEST

Weights

Tractor (without driver but with tanks full)

	Front, lb	(kg)	Rear, lb	(kg)	Total, lb	(kg)
Without ballast	2307	(1046)	4127	(1872)	6434	(2918)
With ballast	3350	(1520)	8291	(3761)	11641	(5280)

Ballast

	Number of weights	Total weight, lb	(kg)	Water, lb	(kg)
Front wheels	4	396	(180)	Nil	
Rear wheels	24	2487	(1128)	1837	(833)
Additional	8	487	(221)	Front frame weights	

Track setting during tests

Front: 52 in (1321 mm)
Rear: 62 in (1575 mm)

Overall dimensions

	Length	Width	Height
With ballast	12 ft 7 in (3.84 m)	8 ft 8¼ in (2.65 m)	7 ft 10¼ in (2.39 m)
Without ballast	12 ft 1 in (3.68m)	6 ft 8¼ in (2.04 m)	7 ft 10¾ in (2.41 m)

Overall height measured to top of safety cab

Seat	Bostrom, upholstered pan, tension coil spring suspension with hydraulic damping, adjustable for driver's weight, range of adjustment 3 in (76 mm) fore and aft
Cab	Own make, all steel welded and bolted construction with integral mudguards, bolted to tractor rear axle, top frame extends over steering wheel and can be pivoted rearwards, sheet steel cladding with two doors and toughened safety glass windows, detachable steel roof lined with foam rubber, electric windscreen wiper

FUELS AND LUBRICANTS USED IN TESTS

Fuel:	Diesel oil to Class A British Standard 2869: 1970
Laboratory tests:	Specific gravity 0.839 at 60°F (15.6°C), viscosity 2.46 cSt at 122°F (50°C), Cetane No. 56.5
Track tests:	Specific gravity 0.842 at 60°F (15.6°C), viscosity 2.30 cSt at 122°F (50°C), Cetane No. 51.0
Engine oil:	Tractor Oil Universal, S.A.E. 20W/30, viscosity 54 cSt at 122°F (50°C)
Transmission oil:	Tractor Oil Universal, S.A.E. 20W/30, viscosity 54 cSt at 122°F (50°C)

COMPULSORY TESTS

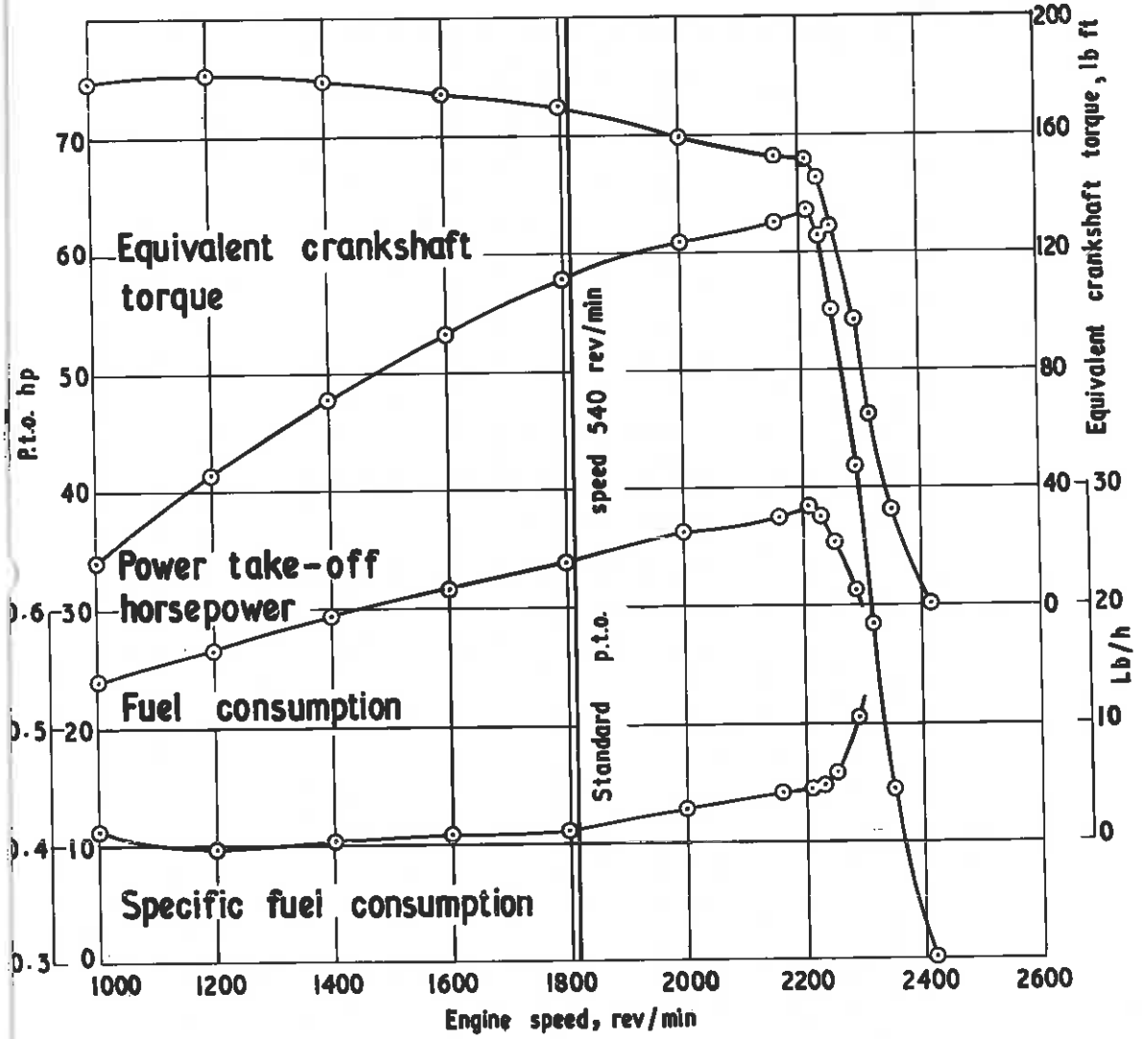
1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 25th April 1974, N.I.A.E., Silsoe, Bedford, U.K.

Type of dynamometer: Water brake, Heenan and Froude.

Horsepower (metric hp)	Speed, 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					
63.5 (64.4)	2210	658	3.35 (15.23)	0.443 (198)	19.0 (4.24)
Standard p.t.o. speed (540 rev/min)					
58.1 (58.9)	1813	540	2.85 (12.96)	0.411 (184)	20.4 (4.55)
The speed recommended by the manufacturer for drawbar work					
63.2 (64.1)	2200	655	3.33 (15.14)	0.442 (198)	19.0 (4.24)
Part loads					
55.0 (55.8)	2252	671	3.00 (13.64)	0.458 (205)	18.3 (4.08)
0	2417	720	1.06 (4.82)	-	-
28.3 (28.7)	2317	690	2.00 (9.09)	0.594 (266)	14.1 (3.15)
63.5 (64.4)	2210	658	3.35 (15.23)	0.443 (198)	19.0 (4.24)
14.3 (14.5)	2348	699	1.52 (6.91)	0.891 (399)	9.4 (2.10)
42.0 (42.6)	2290	682	2.53 (11.50)	0.504 (225)	16.6 (3.70)

No load, maximum engine speed		2417 rev/min
Equivalent crankshaft torque at maximum power		151.0 lb ft (20.9 kgm)
Maximum equivalent crankshaft torque		180.6 lb ft (25.0 kgm) at 1220 rev/min engine speed
Mean atmospheric conditions	temperature	62 °F (17 °C)
	pressure	29.88 in Hg (759 mm Hg)
	relative humidity	54%
Maximum temperature	coolant	204 °F (96 °C)
	engine oil	240 °F (116 °C)
	fuel	77 °F (25 °C)
	air intake	90 °F (32 °C)



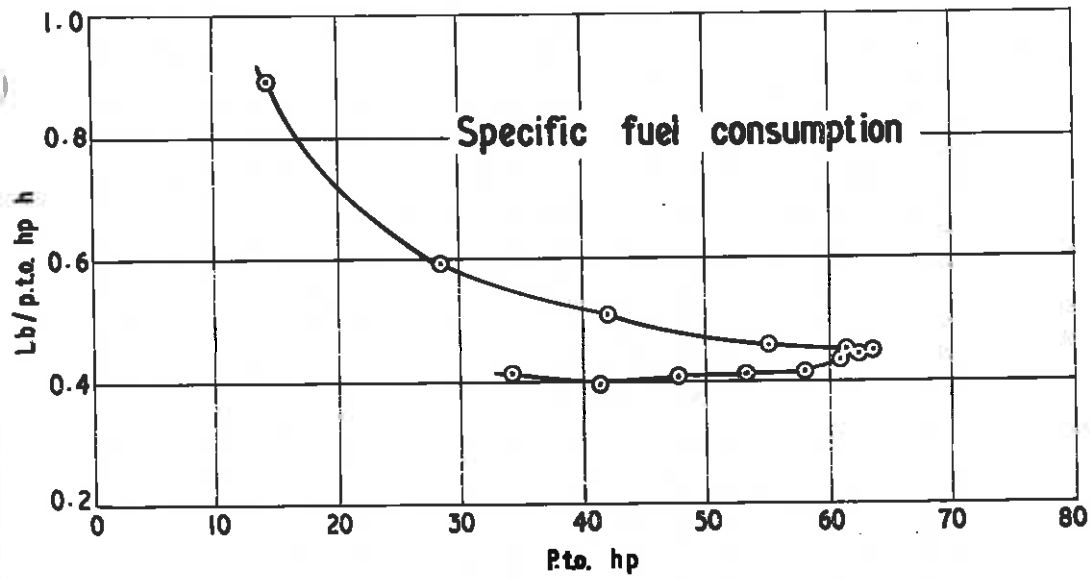


Fig. 1. Power take off test

2. DRAWBAR PERFORMANCE

Date of tests: 20th August - 14th October 1974 **Type of Track:** Concrete **Height of drawbar above ground:** 17¾ in (451 mm)

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)	Drawbar hp h/ UKgal (metric drawbar hp h/l)	Temperature °F (°C)			Atmospheric conditions		
								Coolant	Fuel	Engine oil	Temperature, °F (°C)	Relative humidity, %	Pressure, in Hg (mm Hg)
(i) MAXIMUM POWER (ballasted)													
1	*36.1 (36.6)	9200 (4175)	1.47 (2.37)	2288	15.0	0.631 (282)	13.3 (2.97)	180 (82)	84 (29)	204 (96)	74 (23)	50	30.12 (765)
2	*43.7 (44.3)	9200 (4175)	1.78 (2.86)	2256	15.0	0.572 (256)	14.7 (3.28)	182 (83)	83 (28)	212 (100)	69 (21)	63	30.12 (765)
3	52.5 (53.2)	8850 (4015)	2.22 (3.57)	2205	13.2	0.553 (247)	15.2 (3.39)	189 (87)	73 (23)	205 (96)	67 (19)	66	30.12 (765)
4	53.9 (54.7)	6800 (3085)	2.97 (4.78)	2217	9.0	0.545 (244)	15.4 (3.44)	182 (83)	68 (20)	176 (80)	65 (18)	75	30.12 (765)
5	56.5 (57.3)	5500 (2495)	3.85 (6.19)	2206	7.0	0.502 (225)	16.8 (3.75)	194 (90)	77 (25)	203 (95)	67 (19)	66	30.33 (770)
6	57.3 (58.1)	4350 (1975)	4.94 (7.94)	2200	5.5	0.516 (231)	16.3 (3.64)	188 (87)	65 (18)	176 (80)	60 (16)	83	30.33 (770)
7	56.9 (57.7)	2950 (1340)	7.23 (11.63)	2216	3.5	0.538 (241)	15.7 (3.49)	179 (82)	77 (25)	172 (78)	52 (11)	87	30.33 (770)
8	56.9 (57.7)	2400 (1090)	8.89 (14.30)	2141	2.7	0.534 (239)	15.8 (3.52)	180 (82)	63 (17)	172 (78)	57 (14)	87	30.33 (770)
(ii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
5	43.8 (44.4)	4125 (1870)	3.98 (6.40)	2262	5.0	0.549 (246)	15.3 (3.41)	188 (87)	74 (23)	215 (102)	65 (18)	70	30.15 (766)
+(iii) FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (i)													
2	-	9200 (4175)	1.85 (2.98)	-	-	-	-	196 (91)	78 (26)	229 (109)	66 (19)	57	29.80 (757)

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)	Drawbar hp h/ UKgal (metric drawbar hp h/l)	Temperature, °F (°C)			Atmospheric conditions		
								Coolant	Fuel	Engine oil	Temperature, °F (°C)	Relative humidity, %	Pressure, in Hg (mm Hg)
(iv) MAXIMUM POWER (unballasted)													
2	*34.4 (34.9)	7000 (3175)	1.84 (2.96)	2292	15.0	-	-	185 (85)	70 (21)	195 (91)	52 (11)	75	30.12 (765)
3	*41.9 (42.5)	7000 (3175)	2.24 (3.60)	2265	15.0	-	-	187 (86)	76 (24)	209 (98)	56 (13)	76	29.71 (755)
4	51.3 (52.0)	6900 (3130)	2.79 (4.49)	2205	14.6	-	-	190 (88)	72 (22)	203 (95)	55 (13)	82	29.71 (755)
5	55.5 (56.3)	5500 (2495)	3.78 (6.08)	2200	9.4	-	-	184 (84)	59 (15)	215 (102)	48 (9)	93	30.12 (765)
6	56.3 (57.1)	4300 (1950)	4.91 (7.90)	2197	6.4	-	-	183 (84)	65 (18)	207 (97)	55 (13)	70	30.12 (765)
7	57.6 (58.4)	3000 (1360)	7.20 (11.58)	2200	4.0	-	-	193 (89)	71 (22)	186 (86)	60 (16)	83	29.94 (760)
8	57.1 (57.9)	2300 (1045)	9.31 (14.98)	2208	2.9	-	-	174 (79)	74 (23)	175 (79)	57 (14)	66	30.12 (765)

Total oil consumption during ten hours duration of tests (ii) and (iii) 0.125 lb/h (56.7 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. TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: As in specification, without ballast

Track of wheels: front - 52 in (1321 mm)
rear - 62 in (1575 mm)

	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
Radius of turning space	11 ft 0 in (3.35 m)	11 ft 0 in (3.35 m)	12 ft 5 in (3.78 m)	12 ft 5 in (3.78 m)
Radius of turning circle	10 ft 5 in (3.18 m)	10 ft 5 in (3.18 m)	11 ft 9 in (3.58 m)	11 ft 9 in (3.58 m)

4. LOCATION OF CENTRE OF GRAVITY

Height above ground	36.2 in (919 mm)
Distance forward from the vertical plane containing the axis of the rear wheels	28.2 in (716 mm)
Distance from the median plane of the tractor	0

5. BRAKING

Date of tests: 20th and 24th September 1974

Type of track: Concrete

Type of decelerometer: Moto Meter, recording type

Weight of ballasted tractor: 11641 lb (5280 kg)

Cold brakes

	Tractor without ballast		Tractor ballasted	
Travelling speed of tractor, mile/h (km/h)	15.5	(25.0)	15.5	(25.0)
Maximum deceleration, ft/s^2 (m/s^2)	15.5	(4.7)	17.0	(5.2)
Stopping distance, ft (m)	18.3	(5.6)	17.5	(5.3)
Force on brake pedal, lb (kg)	130	(59)	160	(73)
Force exerted on the brake pedal to achieve a deceleration of 8.2 ft/s^2 (2.5 m/s^2),	38	(17)	56	(25)

Brake fade characteristics (hot tests, ballasted tractor)

Maximum deceleration hot/maximum deceleration cold x 100: 94%

Stopping distance cold/stopping distance hot x 100: 95%

Force on pedal cold/force on pedal hot x 100: 96%

Efficacy of handbrake: Satisfactory, facing up and down slope

Pull on handbrake: 64 lb (29 kg)

6. MEASUREMENT OF AMBIENT NOISE EMITTED BY THE TRACTOR

Date of tests:	15th October 1974
Type of sound level meter:	Bruel and Kjaer 2204
Type of track:	Concrete
Results of tests	
Gear:	10th
Travelling speed before acceleration:	17.0 mile/h (27.4 km/h)
Sound level:	89 dBA

7. NOISE MEASUREMENT AT THE DRIVER'S EAR LEVEL

Date of tests:	15th October 1974
Type of sound level meter:	Bruel and Kjaer 2204
Type of track:	Concrete

Gear	Travelling speed, mile/h (km/h)		dBA
6th	4.6	(7.4)	104

8. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date of tests:	18th and 22nd October 1974
Hydraulic fluid	
Make and type:	Tractor Oil Universal 20W/30
Viscosity:	54 cSt at 120°F (50°C)
Type of linkage lock for transport:	Hydraulic
Opening pressure of the cylinder over pressure relief valve (manufacturer's figures):	Not applicable
Pump characteristics	
i) Opening pressure of relief valve:	2100 lb/in^2 (148 kg/cm^2)
Sustained pressure of the open relief valve:	2520 lb/in^2 (177 kg/cm^2)
ii) Pump delivery rate at minimum pressure and rated engine speed:	6.7 gal/min (30.5 l/min)
iii) Pump delivery rate at maximum hydraulic power:	7.1 gal/min (32.3 l/min)
Delivery pressure:	2100 lb/in^2 (148 kg/cm^2)
Power:	10.5 h.p. (10.6 metric h.p.)

Linkage geometry when connected to the standard frame

	Maximum mechanical advantage		Minimum mechanical advantage	
Projected length in side view				
lower links, in (mm)	33.0	(838)	33.0	(838)
lift arms, in (mm)	9.0	(229)	9.0	(229)
lift rods, in (mm)	28.0	(711)	22.6	(574)
top link, in (mm)	22.9	(582)	23.0	(584)
Distance of lift rod connection point from pivot point of lower link, in (mm)	18.4	(467)	18.4	(467)
The following dimensions are given relative to the rear wheel centre line, situated 27.5 in (699 mm) above the ground level				
Lower link pivot point, in (mm)	8.3 (211) behind,	6.5 (165) below	8.3 (211) behind,	6.5 (165) below
Top link pivot point, in (mm)	18.5 (470) behind,	9.8 (249) above	18.5 (470) behind,	8.3 (211) above
Lift arm pivot point, in (mm)	13.0 (330) behind,	18.8 (478) above	13.0 (330) behind,	18.8 (478) above
Maximum and minimum height of lower link hitch points, in (mm)	3.4 (86) above,	17.2 (437) below	13.3 (338) above,	7.8 (198) below
Height of lower link hitch points when locked in transport position, in (mm)	4.4 (112) above,		13.2 (335) above,	

Lifting forces in relation to a horizontal line through the lower link pivoting point

	in (cm)	−11 (279)	−8 (203)	−4 (102)	−2 (51)	−1 (25)	0	+4 (102)	+8 (203)	+11 (279)	+12 (305)	+16 (406)	+17 (432)	+20 (508)	+24 (610)	+26 (660)
Lifting force at the hitch points, lb(kg) (Values for the pressure at maximum hydraulic horsepower, calculated from measurements made at maximum pressure)	*max. mech advantage	+3635 (1649)	4000 (1814)	4240 (1923)			4340 (1969)	4380 (1987)	4479 (2032)							
	°min. mech. advantage					+3997 (1813)	4139 (1877)	4450 (2019)	4505 (2043)		4553 (2065)	4620 (2096)	4754 (2156)			
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of the measured values.															
	Pressure 2100 lb/in^2 (148 kg/cm^2)															
Lifting force at the frame, lb(kg) (Values for the pressure at maximum hydraulic horsepower, calculated from measurements made at maximum pressure)	*max. mech. advantage	4263 (1934)	4275 (1939)	4100 (1860)			3850 (1746)	3595 (1631)	3385 (1535)	3356+ (1522)						
	°min. mech. advantage				3397 (1541)		3400 (1542)	3435 (1558)	3300 (1497)		3153 (1430)	2980 (1352)		2745 (1245)	2653+ (1203)	2667 (1210)
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of the measured values.															
	Pressure 2100 lb/in^2 (148 kg/cm^2)															

+Maximum force exerted throughout whole range

*Lift rod length 28.0 in (711 mm)

°Lift rod length 22.6 in (574 mm)

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Officer in charge: D.W. Smith

Head of Tractor and Cultivation Division: J. Matthews

Date: 20th November 1974

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