O.E.C.D. Approval 539
Report 644
September 1976

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

FORD 6600 TRACTOR



Test No.: R/76/7921/O.E.C.D.

Manufacturer: Ford Motor Company Limited,
Basildon,
Essex.

NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING

Wrest Park . Silsoe . Bedford MK45 4HS

TABLE OF CONTENTS

	PAGE
Specification of tractor	4
Fuel and lubricants used in tests	7
Compulsory tests	
1. Main power take-off performance	8
2. Drawbar performance	11
3. Turning space and turning circle	12
4. Location of centre of gravity	12
5. Braking	12
6. Measurement of ambient noise emitted by the tractor	13
7. Noise measurement at the driver's ear level	13
8. Power lift and hydraulic pump performance	13
Repairs and adjustments during tests	16
Remarks	16

SPECIFICATION OF TRACTOR

Manufacturer:	Ford Motor Company Limited, Basildon, Essex.
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with the agreement of the testing station
Place of running-in:	Basildon
Duration of running-in:	135 hours

Tractor

Make:	Ford
Model:	6600
Type:	Four wheel, rear wheel driven, unit construction
Serial No.:	B271155

Engine

Make:	Ford
Model:	6600
Type:	4-stroke, direct injection diesel
Serial No.:	E0250325L20
Cylinders:	4 cylinders, vertical, in-line 111·8 mm (4·4 in) dia bore × 106·7 mm (4·2 in) stroke, capacity 4190 cm^3 (256 in^3) compression ratio 16·3:1 (nominal), monobloc construction, overhead valves
Fuel system:	A.C. type P mechanical fuel feed pump with hand primer; C.A.V. single paper element fuel filter with sediment bowl and water trap on pressure side of feed pump; fuel tank capacity 75·5 l (16·6 UK gal); Simms type 4862/5 in-line injection pump, serial No. 7771; manufacturer's production setting for injection pump: 14·7 kg/h (32·4 lb/h) maximum at 2100 rev/min rated engine speed 29–35°C (84–95°F) fuel temperature, using fuel of 0·821–0·842 specific gravity at 32°C (90°F); C.A.V. BDLL 150S 6666 injector nozzles, injection pressure 19·4–20·0 MPa (191–197 atm)
Governor:	Simms mechanical, incorporated in fuel injection pump, governed range of engine speed 600–2375 rev/min, rated engine speed 2100 rev/min
Air cleaner:	Burgess, oil bath, oil capacity 1·76 l (3·1 pt), situated forward of radiator, centrifugal pre-cleaner above bonnet
Lubrication system:	Forced feed from eccentric rotor pump with metal strainer in sump, full flow replaceable element filter, total oil capacity 8·5 l (15 pt); recommended oil Series 3 quality, viscosity 65 cSt at 50°C (122°F), change period 150 hours
Cooling system:	Water cooled, pressurised at 50·0 kPa (7 lb/in^2) impeller assisted with 406 mm (16·0 in) dia, belt driven 4-blade fan, thermostat for temperature control, cooling water capacity 12·3 l (21·6 pt)
Starting system:	Electrical, 12V Lucas M50G solenoid-engaged starter motor, operable only when high-low gear selector lever is in neutral position, manually operated excess fuel device on fuel injection pump for cold starting

Electrical system

Voltage:	12, negative earth
Generator:	Lucas alternator, type 15 ACR
Battery:	Ford type C5NN 10655G lead acid, 120–128 Ah at 20-hour rating

Transmission

Clutch:	Borg and Beck single plate dry clutch, pedal-operated, 330 mm (13·0 in) dia
Gearbox:	Ford constant mesh, 8 forward and 2 reverse speeds, comprising 4 forward and 1 reverse speed gearbox with high-low range selector
Rear axle and final drive	Ford, crown wheel and pinion with differential and epicyclic reduction gear final drives, pedal-operated differential lock; oil cooler fitted in front of radiator
Oil capacity:	Gearbox and final drive common, total oil capacity 56·4 l (99·3 pt); recommended oil Mild E.P. S.A.E. 80, change period 1200 hours

Gear	*Number of engine revolutions for one revolution of driving wheel*	**Nominal travelling speed for 2100 rev/min rated speed of engine, km/h*	*(mile/h)*
Forward			
Low 1	217·18	2·59	(1·61)
2	174·02	3·23	(2·01)
3	99·15	5·68	(3·53)
4	72·84	7·73	(4·80)
High 1	60·79	9·26	(5·75)
2	48·70	11·56	(7·18)
3	27·75	20·28	(12·60)
4	20·39	27·61	(17·16)
Reverse			
1	151·08	3·73	(2·32)
2	42·29	13·31	(8·27)

*Calculated with tyre rolling radius of 711 mm (28·0 in)

Power take-off At rear of tractor in vertical centre plane, 6 spline, 34·9 mm (1⅜ in) dia, to I.S.O. standard, manually engaged by hand lever, hydraulic clutch independent of main clutch, height above ground 689 mm (27·1 in), proportional engine speed giving 596 rev/min at 2100 rev/min rated engine speed, 540 rev/min (standard p.t.o. speed) at 1902 rev/min engine speed, direction of rotation clockwise viewed facing driving end

Power lift Ford, hydraulic, gear pump driven from power take-off shaft, independent of main clutch, oil supplied from rear axle housing to ram cylinder and one external tapping; Category 2 implement linkage with top link sensing, draught or position control with auxiliary service control and flow control device

Drawbar Swinging drawbar, vertical height to centre of clevis 400 mm (15·8 in) and 495 mm (19·5 in) changed by inverting clevis, distance from rear axle centre 660 mm (26·0 in), 813 mm (32·0 in) and 864 mm (34·0 in) to rear, position relative to p.t.o. 206 mm (8·1 in), 359 mm (14·1 in) and 410 mm (16·1 in) to rear, lateral adjustment 391 mm (15·4 in), 483 mm (19·0 in) and 514 mm (20·2 in), pivot position in line with rear wheel centre. Drawbar pin hole 27 mm (1·1 in) dia

Steering Power steering, single drop arm and drag link, oil supplied from Plessey gear-driven pump

Brakes Oil-immersed multi-plate disc brakes mounted on planetary shafts, independent or combined pedal-operated, hand lever with ratchet operating both brakes for parking.

Wheels

Steering wheels: Two at front, Goodyear Super Rib Tractor cross-ply 7·50-18 tyres, 8-ply rating, maximum permissible mass on each tyre 948 kg (2090 lb) at 290 kPa (42 lb/in²), track width 1352 mm (53·2 in) by 102 mm (4·0 in) steps to 2066 mm (81·3 in), changed by extending axle and reversing wheels

Driving wheels: Two at rear, Goodyear Traction Sure Grip cross-ply 16·9/14-34 tyres, 6-ply rating, maximum permissible mass on each tyre 1870 kg (4120 lb) at 110 kPa (16 lb/in²), track width 1625 mm (64·0 in) by 102 mm (4·0 in) steps to 2033 mm (80·0 in), changed by reversing wheels and offset lug rims

Wheelbase: 2223 mm (87·5 in)

Lighting

	Height above ground of centre,		*Size,*		*Distance from outside edge of tractor at* 1625 *mm* (64·0 *in*) *wheel track, to centre,*	
	mm	(*in*)	*mm*	(*in*)	*mm*	(*in*)
Headlights	1413	(55·6)	127	(5·0)dia	654	(25.7)
Side lights	1597	(62·9)	70 × 70	(2·8) × (2·8)	367	(14·4)
Rear lights	1553	(61·1)	70 × 70	(2·8) × (2·8)	322	(12·7)
Reflectors	1553	(61·1)	70 × 57	(2·8) × (2·2)	392	(15·4)

Number of grease points

Whole tractor: 12

CONDITIONS DURING TEST

Masses

Tractor (without driver but with tanks full)

	Front,		*Rear,*		*Total,*	
	kg	(*lb*)	*kg*	(*lb*)	*kg*	(*lb*)
Without ballast	944	(2081)	1678	(3699)	2622	(5780)
With ballast	944	(2081)	2890	(6371)	3834	(8453)

Ballast

	Number of weights	*Total weight,*		*Water,*	
		kg	(*lb*)	*kg*	(*lb*)
Front wheels	Nil	Nil		Nil	
Rear wheels	10	494	(1089)	718	(1582)
Additional	Nil	Nil		Nil	

Track setting during tests

Front: 1353 mm (53·3 in)
Rear: 1625 mm (64·0 in)

Overall dimensions

	Length	*Width*	*Height*
With ballast	3·651 m (143·7 in)	2·210 m (87·0 in)	2·524 m (99·4 in)
Without ballast	3·651 m (143.7 in)	2·045 m (80·5 in)	2·521 m (99·3 in)

Overall height measured to top of exhaust pipe

Seat Grammer, upholstered cushion and back rest, coil spring suspension with pneumatic damping, adjustable for driver's weight, range of adjustment 124 mm (4·88 in) forwards and backwards

FUEL AND LUBRICANTS USED IN TESTS

Fuel: Diesel oil to class A2 British Standard 2869: 1970, specific gravity 0·843 at 15·6°C (60°F), viscosity 2·36 cSt at 50°C (122°F), Cetane No. 54

Engine oil: Series 3 quality, viscosity 65 cSt at 50°C (122°F)

Transmission oil: Mild E.P. S.A.E. 80 viscosity 54 cSt at 50°C (122°F)

COMPULSORY TESTS

1. Main power take-off performance

Date and location of tests: 18th March 1976, N.I.A.E. Silsoe, Bedford, U.K.

Type of dynamometer: Water brake, Heenan and Froude

Power,	*Speed, rev/min*		*Fuel consumption,*			
kW (hp)	*Engine*	*P.t.o.*	*l/h (UKgal/h)*	*kg/h (lb/h)*	*g/kWh (lb/hp h)*	*kWh/l (hp h/UKgal)*
Maximum power—2 hour test						
51·8 (69·5)	2120	602	16·70 (3·67)	14·08 (31·04)	272 (0·447)	3·10 (18·9)
Standard p.t.o. speed (540 rev/min)						
49·4 (66·2)	1902	540	15·29 (3·36)	12·89 (28·42)	261 (0·429)	3·23 (19·7)
The speed recommended by the manufacturer for drawbar work						
51·8 (69·5)	2100	596	16·60 (3·65)	13·99 (30·84)	270 (0·444)	3·12 (19·0)
Part loads						
(1) 85% of the torque obtained at maximum power						
45·2 (60·6)	2180	619	14·65 (3·22)	12·35 (27·23)	273 (0·449)	3·09 (18·8)
(2) Unloaded						
0	2360	670	4·53 (1·00)	3·82 (8·42)	—	—
(3) 50% of the load defined in (1)						
23·4 (31·4)	2254	640	9·37 (2·06)	7·90 (17·42)	338 (0·556)	2·50 (15·2)
(4) Maximum power						
51·8 (69·5)	2120	602	16·70 (3·67)	14·08 (31·04)	272 (0·447)	3·10 (18·9)
(5) 25% of the load defined in (1)						
11·9 (16·0)	2296	652	6·87 (1·51)	5·79 (12·76)	487 (0·801)	1·73 (10·5)
(6) 75% of the load defined in (1)						
34·6 (46·4)	2226	632	11·91 (2·62)	10·04 (22·13)	290 (0·477)	2·91 (17·7)

No load, maximum engine speed 2360 rev/min

Equivalent crankshaft torque at maximum power: 233·2 Nm (172·0 lb ft)

Maximum equivalent crankshaft torque: 264·6 Nm (195·2 lb ft) at 1200 rev/min engine speed

Mean atmospheric conditions:	temperature	17°C (63°F)
	pressure	1014 m bar (29·94 in Hg)
	relative humidity	55%
Maximum temperature:	coolant	93°C (199°F)
	engine oil	113°C (235°F)
	fuel	36°C (97°F)
	air intake	27°C (81°F)

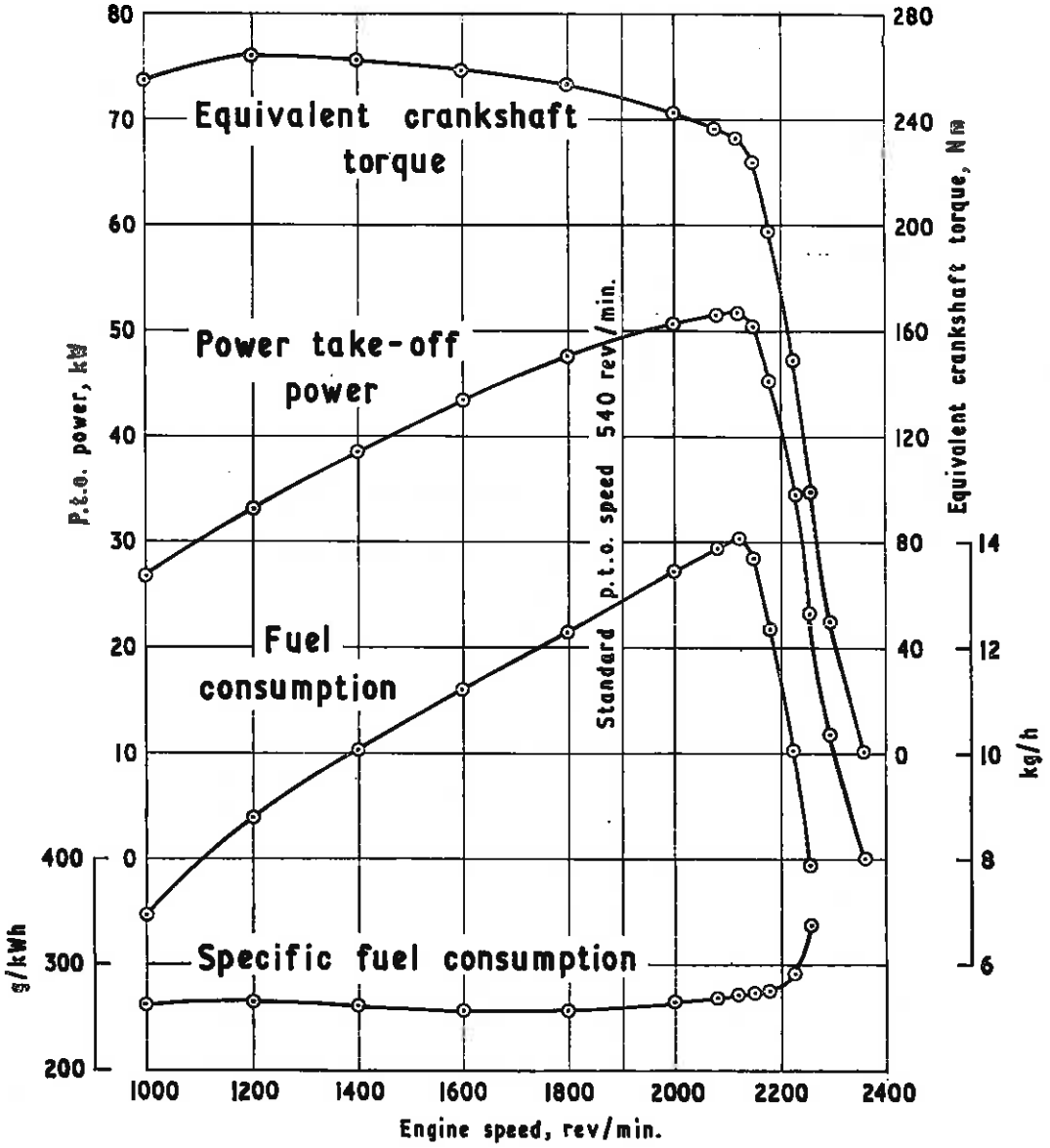


Fig 1. Power take-off test

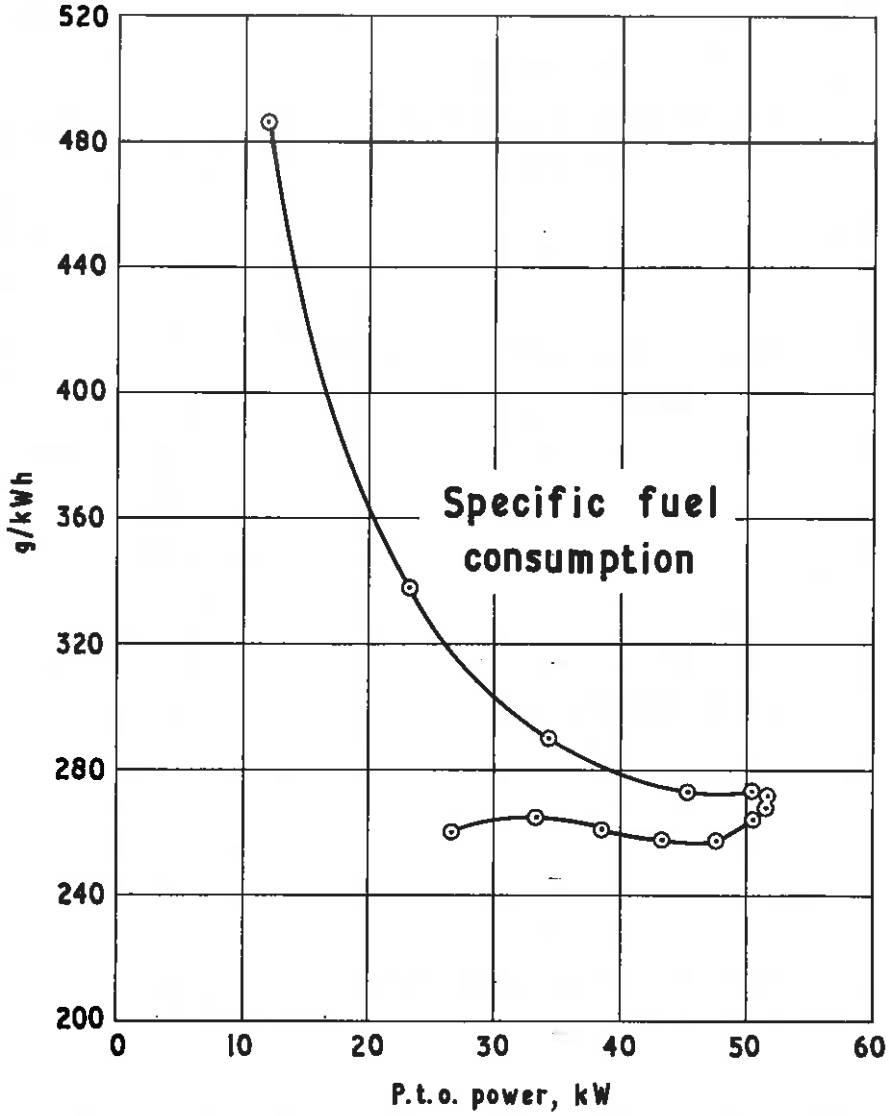


Fig 2. Power take-off test

Date of tests: 14th May—16th June 1976 Type of track: Concrete Height of drawbar above ground: 419 mm (16·5 in)

Gear	Power, kW (hp)	Drawbar pull, kN (lb)	Speed, km/h (mile/h)	Engine speed, rev/min	Wheel-slip, %	Specific fuel consumption, g/kWh (lb/hph)	kWh/l (hph/UKgal)	Temperature, °C(°F) Coolant	Fuel	Engine oil	Atmospheric conditions Temperature, °C (°F)	Relative humidity, %	Pressure, mbar (in Hg)
(i) Maximum power (ballasted)													
L1	21·4* (28·7)	31·9 (7170)	2·42 (1·50)	2250	15·0	410 (0·674)	2·06 (12·6)	76 (169)	25 (77)	93 (199)	14 (57)	77	1013 (29·91)
L2	26·2* (35·1)	31·9 (7170)	2·96 (1·84)	2227	15·0	377 (0·620)	2·24 (13·7)	77 (171)	29 (84)	99 (210)	14 (57)	77	1013 (29·91)
L3	41·3 (55·4)	28·9 (6500)	5·15 (3·20)	2138	12·4	333 (0·547)	2·53 (15·4)	80 (176)	32 (90)	103 (217)	16 (61)	58	1013 (29·91)
L4	42·7 (57·3)	20·9 (4700)	7·35 (4·57)	2123	7·6	339 (0·557)	2·49 (15·2)	79 (174)	27 (81)	91 (196)	15 (59)	78	1012 (29·88)
H1	43·4 (58·2)	17·6 (3960)	8·87 (5·51)	2108	6·3	321 (0·528)	2·63 (16·0)	81 (178)	33 (91)	98 (208)	16 (61)	78	1012 (29·88)
H2	42·9 (57·5)	13·8 (3100)	11·22 (6·97)	2104	4·7	325 (0·534)	2·59 (15·8)	87 (189)	34 (93)	98 (208)	19 (66)	58	1013 (29·91)
(ii) Five hour test at 75% of pull at maximum power													
L4	33·9 (45·5)	15·7 (3530)	7·78 (4·83)	2199	5·7	324 (0·533)	2·60 (15·9)	78 (172)	36 (97)	104 (219)	14 (57)	72	1012 (29·88)
(iii) †Five hour test at pull corresponding to 15% wheelslip in test (i)													
L2	—	31·9 (7170)	3·03 (1·88)	—	—	—	—	78 (172)	40 (104)	105 (221)	22 (72)	45	1013 (29·91)
(iv) Maximum power (unballasted)													
L2	19·0* (25·5)	22·7 (5100)	3·01 (1·87)	2248	15·0	—	—	77 (171)	32 (90)	97 (207)	17 (63)	74	1017 (30·03)
L3	32·7* (43·9)	22·7 (5100)	5·19 (3·22)	2198	15·0	—	—	78 (172)	32 (90)	88 (190)	16 (61)	78	1017 (30·03)
L4	41·1 (55·1)	21·4 (4810)	6·92 (4·30)	2103	11·6	—	—	80 (176)	33 (91)	104 (219)	16 (61)	78	1017 (30·03)
H1	43·3 (58·1)	17·8 (4000)	8·76 (5·44)	2120	7·6	—	—	79 (174)	29 (84)	100 (212)	15 (59)	89	1017 (30·03)
H2	43·9 (58·9)	14·2 (3190)	11·14 (6·92)	2115	5·3	—	—	81 (178)	32 (90)	104 (219)	15 (59)	89	1017 (30·03)

Total oil consumption during ten hours duration of tests (ii) and (iii) 10·8 g/h (0·024 lb/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—1352 mm (53·2 in)
rear—1625 mm (64·0 in)

	With brakes		*Without brakes*	
	Right-hand	*Left-hand*	*Right-hand*	*Left-hand*
Radius of turning space m (in)	3·22 (127)	3·33 (131)	3·54 (139)	3·63 (143)
Radius of turning circle m (in)	3·17 (125)	3·28 (129)	3·49 (137)	3·58 (141)

4. Location of centre of gravity

Height above ground	927 mm (36·5 in)
Distance forward from the vertical plane containing the axis of the rear wheels	782 mm (30·8 in)
Distance from the median plane of the tractor	0

5. Braking

Date of tests: 2nd-3rd June 1976
Type of track: Concrete
Type of decelerometer: Moto Meter, recording type
Mass of ballasted tractor: 3834 kg (8453 lb)

Cold brakes

	Tractor without ballast		*Tractor ballasted*	
Travelling speed of tractor, km/h (mile/h)	25·0	(15·5)	25·0	(15·5)
Maximum deceleration, m/s² (ft/s²)	4·6	(15·1)	5·0	(16·4)
Stopping distance, m (ft)	6·1	(20)	5·2	(17)
Force on brake pedal, N (lb)	270	(60)	360	(80)
Force exerted on the brake pedal to achieve a deceleration of 2·5 m/s² (8·2 ft/s²), N (lb)	140	(30)	200	(40)

Brake fade characteristics (hot tests, ballasted tractor)

Maximum deceleration hot/maximum deceleration cold × 100: 103%
Stopping distance cold/stopping distance hot × 100: 100%
Force on pedal cold/force on pedal hot × 100: 100%
Efficacy of handbrake: Satisfactory facing up and down slope
Pull on handbrake: 182 N (41 lb)

6. Measurement of ambient noise emitted by the tractor

Date of tests:	4th June 1976
Type of sound level meter:	Bruel and Kjaer 2204
Type of track:	Concrete
Results of tests:	
Gear:	H4
Travelling speed before acceleration:	22·8 km/h (14·2 mile/h)
Sound level:	88 dBA

7. Noise measurement at the driver's ear level

Date of tests:	4th June 1976
Type of sound level meter:	Bruel and Kjaer 2204
Type of track:	Concrete

Gear	*Travelling speed, km/h (mile/h)*		*dBA*
L4	7·1	(4·4)	95

8. Power lift and hydraulic pump performance

Date of tests:	18th and 21st June 1976
Hydraulic fluid	
Make and type:	Ford S.A.E. 80 Mild E.P.
Viscosity:	54 cSt at 50°C (122°F)
Type of linkage lock for transport:	Hydraulic
Opening pressure of the cylinder over pressure relief valve (manufacturer's figures):	19·65–20·34 MPa (2850–2950 lb/in²)

Pump characteristics

(i)	Opening pressure of relief valve:	15·2 MPa (2200 lb/in²)
	Sustained pressure of the open relief valve:	17·9 MPa (2600 lb/in²)
(ii)	Pump delivery rate at minimum pressure and rated engine speed:	35·0 l/min (7·7 gal/min)
(iii)	Pump delivery rate at maximum hydraulic power:	34·1 l/min (7·5 gal/min)
	Delivery pressure:	15·2 MPa (2200 lb/in²)
	Power:	8·6 kW (11·5 hp)

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

	Maximum mechanical advantage		*Minimum mechanical advantage*	
Projected length in side view				
lower links	864	(34·0)	864	(34·0)
lift arms	229	(9·0)	229	(9·0)
lift rods	734	(28·9)	734	(28·9)
top link	681	(26·8)	697	(27·4)
Distance of lift rod connection point from pivot point of lower link	444	(17·5)	392	(15·4)
The following dimensions are given relative to the rear wheel centre line, situated 711 mm (28·0 in) above the ground level				
lower link pivot point	102 (4·0) behind,	229 (9·0) below	102 (4·0) behind,	229 (9·0) below
top link pivot point	286 (11·3) behind,	197 (7·8) above	286 (11·3) behind,	108 (4·3) above
lift arm pivot point	102 (4·0) forward,	340 (13·4) above	102 (4·0) forward,	340 (13·4) above
maximum and minimum height of lower link hitch points	216 (8·5) above,	368 (14·5) below	197 (7·8) above,	457 (18·0) below
height of lower link hitch points when locked in transport position	Any height within lift range		Any height within lift range	

Power lift performance

Lifting heights in relation to a horizontal line through the lower link pivoting point	mm (in)	−280 (−11·0)	−240 (−9·4)	−200 (−7·9)	−130 (−5·1)	−100 (−3·9)	0	+100 (+3·9)	+200 (+7·9)	+300 (+11·8)	+400 (+15·7)	+430 (+16·9)	+460 (+18·1)	+500 (+19·7)	+530 (+20·9)	+610 (+24·0)
Lifting force at the hitch points, kN (lb) (Values for the pressure at maximum hydraulic horsepower, calculated from measurements made at maximum pressure)	max. mech. advantage				*19·5 (4380)	20·5 (4610)	22·1 (4970)	23·3 (5240)	24·0 (5400)	24·3 (5460)	24·4 (5490)		24·5 (5510)			
	min. mech. advantage		*15·8 (3550)	16·8 (3780)		18·6 (4180)	19·7 (4430)	20·9 (4700)	21·5 (4830)	21·8 (4900)	22·2 (4990)	22·6 (5080)				
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of measured values															
	Pressure 15·2 MPa (2200 lb/in²)															
Lifting force at the frame, kN (lb) (Values for the pressure at maximum hydraulic horsepower, calculated from measurements made at maximum pressure)	max. mech. advantage				20·5 (4610)	20·6 (4630)	21·4 (4810)	21·3 (4790)	20·6 (4630)	19·7 (4430)	18·7 (4200)				*17·0 (3820)	
	min. mech. advantage	14·2 (3190)		14·8 (3330)		15·4 (3460)	15·7 (3530)	15·8 (3550)	15·6 (3510)	15·1 (3390)	14·6 (3280)			14·0 (3150)		*13·5 (3030)
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of measured values															
	Pressure 15·2 MPa (2200 lb/in²)															

*Maximum force exerted throughout whole range

Repairs and adjustments during tests None

Remarks None

Officer in charge: D. W. Smith

Head of Tractor and Cultivation Division: J. Matthews

Date: 23rd September 1976

Copyright, The British Society for Research in Agricultural Engineering

Henry Burt & Son Ltd, College Street, Kempston, Bedford