O.E.C.D. Approval 486
Report 639
January 1975

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

FORD ESCORT 3000 TRACTOR



Test No: R75/7760/O.E.C.D.

Manufacturer: Escort Tractors Limited,
Sector 13, Faridabad—121001,
Haryana, India.

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.

TABLE OF CONTENTS

	Page	Fig.
Specification of tractor	4	
Fuels and lubricants used in tests	7	
Compulsory tests		
1. Power take-off performance	8	1 and 2
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:	Escort Tractors Limited, Sector 13, Faridabad—121001, Haryana, India
Selected and submitted for test by:	The manufacturer with the agreement of the testing station
Place of running-in:	Ford Motor Company, Basildon, Essex
Duration of running-in:	120 hours

Tractor

Make:	Ford and Escort
Model:	3000
Type:	Four wheel, rear wheel driven, unit construction
Serial No:	BSN–4717R NXB 659355

Engine

Make:	Ford and Escort
Model:	3000
Type:	4-stroke, direct injection diesel
Serial No.:	C456126
Cylinders:	3 cylinders, vertical, in-line, 4·2 in (106·7 mm) bore × 4·2 in (106·7 mm) stroke, capacity 174·6 in³ (2·862 l), compression ratio 16·5:1, monobloc construction, overhead valves
Fuel system:	Mico Bosch mechanical type fuel feed pump, Mico Bosch pre-filter and micro filter with sediment bowl; gauze strainer in fuel tank; fuel tank capacity 10·8 UK gal (49·1 l); Mico Bosch in-line injection pump, Serial No. 3263382; manufacturer's production setting for injection pump: 36·5–37·5 cm³ for 500 injections at 1000 rev/min pump speed (test bench figures); Mico Bosch type 0·433 270 084 multi-hole injector nozzles, injection pressure 189–198 atm (195–205 kg/cm²)
Governor:	Mico Bosch pneumatic, governed range of engine speed 600 to 2250 rev/min, rated engine speed 2000 rev/min
Air cleaner:	Luna, oil bath type under hood forward of radiator with centrifugal pre-cleaner above hood; oil capacity 1·9 pt (1·1 l)
Lubrication system:	Forced feed from eccentric rotor type pump with metal strainer in sump; full flow replaceable element filter; total oil capacity 11·4 pt (6·5 l), recommended oil; Series III quality, change period 300 hours
Cooling system:	Water cooled, pressurised at 13 lb/in² (0·9 kg/cm²), impeller assisted with 16 in (406 mm) dia, belt driven 6-blade fan, thermostat for temperature control, coolant capacity 23 pt (13·1 l)
Starting system:	Electrical, 12V Lucas type 45PE solenoid engaged starter motor, operable only when high-low gear selector lever is in neutral position

Electrical system: Voltage: 12, negative earth
Generator: Lucas type C40 AQT
Battery: Ford AMCO type 6 AEL15 lead acid, capacity 80 Ah at 20-hour rating

Transmission

Clutch: Automobile Products of India, single plate, dry, 11 in (279 mm) dia, pedal operated

Gearbox: Ford, constant mesh type, 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 and differential, pedal operated differential lock

Oil capacities: Gearbox 22 pt (12·5 1); final drive 42 pt (23·9 1); recommended oil: Mild E.P. SAE 80, change period 1200 hours

Gear	*Number of engine revolutions for one revolution of driving wheel*	**Nominal travelling speed for 2000 rev/min rated speed of engine, mile/h*	(*km/h*)
Forward			
1	165·90	1·69	(2·72)
2	132·90	2·11	(3·39)
3	75·78	3·71	(5·97)
4	55·68	5·04	(8·11)
5	46·49	6·04	(9·72)
6	37·18	7·56	(12·15)
7	21·21	13·24	(21·30)
8	15·60	18·00	(28·96)
Reverse			
1	115·40	2·43	(3·91)
2	32·31	8·69	(13·98)

*Calculated with tyre rolling radius of 23·6 in (599 mm)

Power take-off At rear of tractor in vertical centre plane, 6-spline, 1⅜ in (34·9 mm) dia, to I.S.O. Standard, manually engaged by hand lever, driven through main clutch, height above ground 19 in (483 mm). Proportional engine speed giving 679 rev/min at 2000 rev/min rated engine speed, 540 rev/min (standard p.t.o. speed) at 1591 rev/min engine speed, direction of rotation clockwise viewed facing driving end

Belt pulley Available but not fitted for test

Power lift Ford, hydraulic, engine driven piston pump type Y4A18B, independent of main clutch, oil from transmission supplied to ram cylinder and external tapping; Category 2 implement linkage with top link sensing and draught or position control, controls for external supply and flow

Drawbar Swinging drawbar, vertical height to centre of clevis 13⅛ in (333 mm) and 13¾ in (349 mm) changed by inverting drawbar, distance behind rear axle centre 20 in (508 mm) and 26 in (660 mm), position relative to p.t.o. 8 in (203 mm) and 14 in (356 mm) to rear, lateral adjustment 15 in (381 mm) and 18⅜ in (467 mm), pivot position relative to rear wheel centre 2 in (51 mm) to rear

Hitch None fitted

Steering Cam Gears, recirculating ball type, with double drop arms and drag links

Brakes Indian Girling, internal expanding drum type mounted on differential half shafts, independent or combined pedal operated, parking latch operating on both brakes

Wheels

Steering wheels: Two at front, Goodyear Super Rib 6·00–16 tyres, 4-ply rating, maximum permissible weight on each tyre 1080 lb (490 kg) at 28 lb/in² (2·0 kg/cm²), track width 49¼ in (1251 mm) by 4 in (102 mm) steps to 81¼ in (2064 mm), changed by extending front axle and reversing wheels

Driving wheels: Two at rear, Goodyear Traction Sure Grip 13·6/12–28 tyres, 4-ply rating, maximum permissible weight on each tyre 2450 lb (1111 kg) at 14 lb/in² (1·0 kg/cm²), track width 53¼ in (1353 mm) by 4 in (102 mm) steps to 77¼ in (1962 mm), changed by reversing wheels and offset lug type rims

Wheelbase: 6 ft 4 in (1930 mm)

Lighting

	Height above ground of centre,		*Diameter,*		*Distance from outside edge of tractor at 53¼ in (1353 mm) wheel track, to centre,*	
	in	*(cm)*	*in*	*(cm)*	*in*	*(cm)*
Headlights	45¼	(114·9)	4⅞	(12·4)	18⅜	(46·7)
Side lights	Not fitted					
Rear lights	46¾	(118·7)	3	(7·6)	4¾	(12·1)
Reflectors	Not fitted					

Number of grease points

Whole tractor: 14

CONDITIONS DURING TEST

Weights

Tractor (without driver but with tanks full)

	Front,		*Rear,*		*Total,*	
	lb	*(kg)*	*lb*	*(kg)*	*lb*	*(kg)*
Without ballast	1599	(725)	2413	(1095)	4012	(1820)
With ballast	2038	(924)	4739	(2150)	6777	(3074)

Ballast

	Number of weights	*Total weight,*		*Water,*	
		lb	*(kg)*	*lb*	*(kg)*
Front wheels	2	173	(78)	—	
Rear wheels	24	1668	(757)	707	(321)
Additional	3	217	(98)	Front frame and weights	

Track setting during tests

Front: 53¼ in (1353 mm)
Rear: 53¼ in (1353 mm)

Overall dimensions

	Length	*Width*	*Height*
With ballast	11 ft 3½ in (3·44 m)	8 ft 6 in (2·59 m)	7 ft 1½ in (2·17 m)
Without ballast	10 ft 7 in (3·23 m)	5 ft 7 in (1·70 m)	7 ft 2 in (2·18 m)

Overall height measured to top of exhaust pipe

Seat Escort, upholstered pan type, single leaf spring suspension, range of adjustment 2 in (51 mm) fore and aft.

FUEL 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: Series III Quality, viscosity 65 cSt at 122° F (50° C)

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

COMPULSORY TESTS

1. Main power take-off performance

Date and location of tests: 10th 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					
40·9 (41·5)	2022	686	2·28 (10·34)	0·467 (209)	18·0 (4·02)
Standard p.t.o. speed (540 rev/min)					
35·5 (36·0)	1591	540	1·89 (8·59)	0·447 (200)	18·8 (4·19)
The speed recommended by the manufacturer for drawbar work					
40·6 (41·2)	2000	679	2·27 (10·34)	0·470 (210)	17·9 (3·99)
Part loads					
35·9 (36·4)	2084	707	2·01 (9·16)	0·471 (211)	17·8 (3·97)
0	2250	763	0·65 (2·96)	—	—
18·4 (18·7)	2140	726	1·24 (5·63)	0·564 (252)	14·9 (3·32)
40·9 (41·5)	2022	686	2·28 (10·34)	0·467 (209)	18·0 (4·02)
9·5 (9·6)	2205	748	0·95 (4·34)	0·843 (377)	10·0 (2·23)
27·3 (27·7)	2114	717	1·59 (7·21)	0·488 (218)	17·2 (3·84)

No load, maximum engine speed 2250 rev/min

Equivalent crankshaft torque at maximum power: 106·3 lb ft (14·7 kgm)

Maximum equivalent crankshaft torque: 123·5 lb ft (17·1 kgm) at 1180 rev/min engine speed

Mean atmospheric conditions:	temperature	70°F (21°C)
	pressure	29·49 in Hg (749 mm Hg)
	relative humidity	51%
Maximum temperature:	coolant	189°F (87°C)
	engine oil	233°F (112°C)
	fuel	103°F (39°C)
	air intake	78°F (26°C)

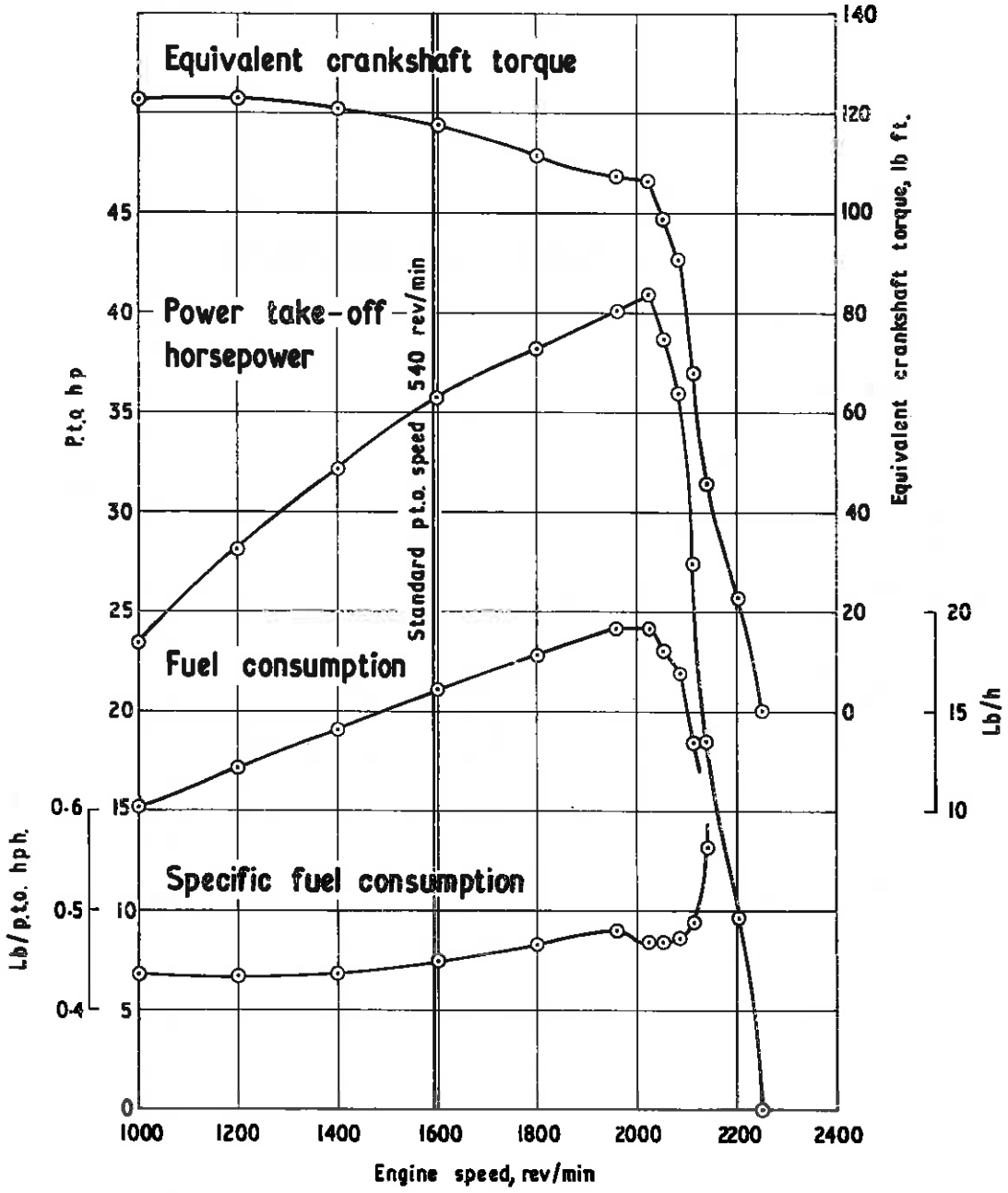


Fig.1. Power take-off test

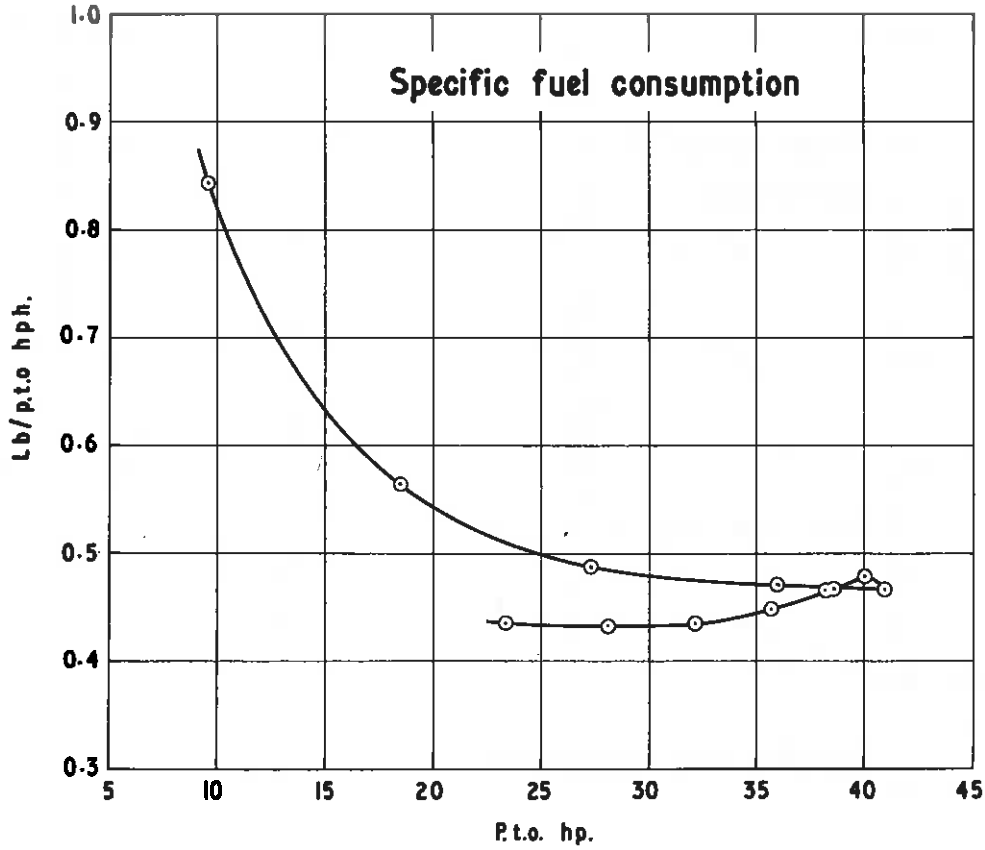


Fig. 2. Power take – off test

2. Drawbar performance

Date of tests: October—December 1974 Type of track: Concrete Height of drawbar above ground: 12½ in (318 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)	Specific fuel consumption, drawbar hp h/UKgal (metric drawbar hp h/l)	Temperature, °F(°C) Coolant	Fuel	Engine oil	Atmospheric conditions Temperature, °F (°C)	Relative humidity, %	Pressure, in Hg (mm Hg)
(i) Maximum power (ballasted)													
1	20·7* (21·0)	5000 (2268)	1·55 (2·50)	2135	15·0	0·781 (349)	10·8 (2·41)	167 (75)	64 (18)	185 (85)	52 (11)	75	30·12 (765)
2	25·6* (26·0)	5000 (2268)	1·92 (3·09)	2110	15·0	0·693 (310)	12·2 (2·71)	167 (75)	64 (18)	196 (91)	49 (9)	80	30·12 (765)
3	34·3 (34·8)	3800 (1724)	3·38 (5·44)	2000	9·8	0·638 (285)	13·2 (2·95)	170 (77)	62 (17)	200 (93)	49 (9)	80	30·12 (765)
4	37·2 (37·7)	2900 (1315)	4·81 (7·74)	2024	7·0	0·569 (255)	14·8 (3·30)	170 (77)	67 (19)	186 (86)	52 (11)	87	30·12 (765)
5	37·5 (38·0)	2450 (1111)	5·74 (9·24)	2002	5·9	0·571 (255)	14·7 (3·29)	167 (75)	68 (20)	183 (84)	50 (10)	79	30·12 (765)
6	38·4 (38·9)	2000 (907)	7·20 (11·58)	1992	5·0	0·537 (240)	15·7 (3·50)	170 (77)	73 (23)	197 (92)	50 (10)	80	29·86 (758)
(ii) Five hour test at 75% of pull at maximum power													
4	29·4 (29·8)	2175 (987)	5·07 (8·16)	2102	5·4	0·570 (255)	14·8 (3·30)	166 (74)	72 (22)	202 (94)	52 (11)	69	30·29 (769)
(iii) †Five hour test at pull corresponding to 15% wheelslip in test (i)													
2	—	5000 (2268)	2·00 (3·22)	—	—	—	—	165 (74)	69 (21)	210 (99)	48 (9)	86	29·87 (759)
(iv) Maximum power (unballasted)													
2	16·6* (16·8)	3150 (1429)	1·98 (3·19)	2150	15·0	—	—	165 (74)	71 (22)	185 (85)	46 (8)	79	29·93 (760)
3	28·4* (28·8)	3150 (1429)	3·38 (5·44)	2118	15·0	—	—	167 (75)	74 (23)	204 (96)	48 (9)	73	29·93 (760)
4	35·3 (35·8)	2900 (1315)	4·56 (7·34)	1997	11·5	—	—	170 (77)	68 (20)	187 (86)	48 (9)	66	29·93 (760)
5	37·2 (37·7)	2450 (1111)	5·69 (9·16)	2000	8·0	—	—	170 (77)	76 (24)	207 (97)	46 (8)	72	29·93 (760)
6	38·9 (39·4)	2000 (907)	7·29 (11·73)	1991	5·8	—	—	170 (77)	68 (20)	197 (92)	46 (8)	72	29·93 (760)

Total oil consumption during ten hours of tests (ii) and (iii) 0·01 lb/h (4·5 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—53¼ in (1353 mm)
rear—53¼ in (1353 mm)

	With brakes		*Without brakes*	
	Right-hand	*Left-hand*	*Right-hand*	*Left-hand*
Radius of turning space	9 ft 11 in (3·02 m)	10 ft 0½ in (3·06 m)	10 ft 10 in (3·30 m)	10 ft 9½ in (3·29 m)
Radius of turning circle	9 ft 7 in (2·92 m)	9 ft 8½ in (2·96 m)	10 ft 6 in (3·20 m)	10 ft 5½ in (3·19 m)

4. Location of centre of gravity

Height above ground	28·0 in (711 mm)
Distance forward from the vertical plane containing the axis of the rear wheels	29·6 in (752 mm)
Distance from the median plane of the tractor	0

5. Braking

Date of tests: November and December 1974
Type of track: Concrete
Type of decelerometer: Moto Meter, recording type
Weight of ballasted tractor: 6777 lb (3074 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/s² (m/s²)	14·5	(4·4)	17·0	(5·2)
Stopping distance, ft (m)	18·7	(5·7)	18·0	(5·6)
Force on brake pedal, lb (kg)	62	(28)	100	(45)
Force exerted on the brake pedal to achieve a deceleration of 8·2 ft/s² (2·5 m/s²), lb (kg)	33	(15)	34	(15)

Brake fade characteristics (hot test, ballasted tractor)

Maximum deceleration hot/maximum deceleration cold × 100: 100%
Stopping distance cold/stopping distance hot × 100: 100%
Force on pedal cold/force on pedal hot × 100: 100%
Efficacy of parking latch: Satisfactory facing up and down slope

6. Measurement of ambient noise

Date of tests:	10th December 1974	
Type of sound level meter:	Bruel and Kjaer 2204	
Type of track:	Concrete	
Results of tests:		
	gear:	8th
	travelling speed before acceleration:	14·6 mile/h (23·5 km/h)
	sound level:	88 dBA

7. Noise measurement at the driver's ear level

Date of tests:	10th December 1974
Type of sound level meter:	Bruel and Kjaer 2204
Type of track:	Concrete

Gear	*Travelling speed, mile/h*	*(km/h)*	*dBA*
4	4·6	(7·4)	98
5	5·8	(9·4)	99

8. Power lift and hydraulic pump performance

Date of tests: 16th and 17th December 1974

Hydraulic fluid

Make and type:	Ford, SAE 80 Mild E.P.
Viscosity:	54 cSt at 122°F (50°C)
Type of linkage lock for transport:	Hydraulic

Opening pressure of the cylinder over pressure relief valve (manufacturer's figures): 2750–2850 lb/in² (193–200 kg/cm²)

Pump characteristics

(i)	Opening pressure of relief valve:	2000 lb/in² (141 kg/cm²)
	Sustained pressure of the open relief valve:	2500 lb/in² (176 kg/cm²)
(ii)	Pump delivery rate at minimum pressure and rated engine speed:	4·5 gal/min (20·5 l/min)
(iii)	Pump delivery rate at maximum hydraulic power:	4·5 gal/min (20·5 l/min)
	Delivery pressure:	2000 lb/in² (141 kg/cm²)
	Power:	6·3 hp (6·4 metric hp)

Linkage geometry when connected to the standard frame

	Maximum mechanical advantage		*Minimum mechanical advantage*	
Projected length in side view				
lower links, in (mm)	31·5	(800)	31·5	(800)
lift arms, in (mm)	9·0	(229)	9·0	(229)
lift rods, in (mm)	22·2	(564)	22·2	(564)
top link, in (mm)	24·8	(630)	24·9	(632)
Distance of lift rod connection point from pivot point of lower link, in (mm)	17·2	(437)	17·2	(437)
The following dimensions are given relative to the rear wheel centre line, situated 23·6 in (599 mm) above ground level				
Lower link pivot point, in (mm)	0·8 (20) forward,	4·2 (107) below	0·8 (20) forward,	4·2 (107) below
Top link pivot point, in (mm)	6·0 (152) behind,	12·4 (315) above	6·0 (152) behind,	10·6 (209) above
Lift arm pivot point, in (mm)	8·0 (203) forward,	9·0 (229) above	8·0 (203) forward,	9·0 (229) above
Maximum and minimum height of lower link hitch points, in (mm)	10·3 (262) above,	14·0 (356) below	10·3 (262) above,	14·0 (356) below
Height of lower link hitch points when locked in transport position, in (mm)	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	in (cm)	−10 (25·4)	−9 (22·9)	−6 (15·2)	−3 (7·6)	0	+3 (7·6)	+6 (15·2)	+9 (22·9)	+12 (30·5)	+14 (35·6)	+15 (38·1)	+18 (45·7)	+19 (48·3)
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		*1750 (794)	1988 (902)	2175 (987)	2310 (1048)	2400 (1089)	2455 (1114)	2498 (1133)	2515 (1141)	2523 (1144)			
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of the measured values.													
	Pressure 2000 lb/in² (141 kg/cm²)													
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		1871 (849)	2015 (914)	2159 (979)	2223 (1008)	2223 (1008)	2215 (1005)	2207 (1001)	2119 (961)		1998 (906)	*1845 (837)	
	min. mech. advantage	*1630 (739)	1680 (762)	1822 (826)	1931 (876)	1975 (896)	1993 (904)	1990 (903)	1972 (894)	1906 (865)		1830 (830)	1750 (794)	1715 (778)
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of the measured values.													
	Pressure 2000 lb/in² (141 kg/cm²)													

*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: 31st January 1975

Copyright, The British Society for Research in Agricultural Engineering

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