O.E.C.D. Approval No. 471
Report 637
November 1974

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

MASSEY-FERGUSON MODEL 1200 TRACTOR



Test No: R.74/7775/O.E.C.D.

Manufacturer: Massey-Ferguson Manufacturing Company,
Barton Dock Road,
Stretford,
Manchester.

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		
Power take-off performance	8	1 and 2
Drawbar performance	11	
Turning space and turning circle	13	
Location of centre of gravity	13	
Braking	13	
Measurement of ambient noise emitted by the tractor	14	
Noise measurement at the driver's ear level	14	
Power lift and hydraulic pump performance	14	
Optional test		
Performance at engine crankshaft	18	3, 4 and 5
Repairs and adjustments during tests	22	
Remarks	22	

SPECIFICATION OF TRACTOR

Manufacturer:	Massey-Ferguson Manufacturing Company, Barton Dock Road, Stretford, Manchester
Selected and submitted for test by:	The manufacturer with the agreement of the testing station
Place of running-in:	Massey-Ferguson premises
Duration of running-in:	100 hours

Tractor

Make:	Massey-Ferguson
Model:	M.F. 1200
Type:	Four-wheel drive, articulated construction
Serial No.:	H129FG

Engine

Manufacturer:	Perkins
Model:	A6-3541
Type:	4-stroke, direct injection diesel
Serial No.:	354 UA 41593
Cylinders:	6 cylinders, vertical, in-line 3·876 in (98·5 mm) bore × 5·000 in (127·0 mm) stroke, capacity 354 in^3 (5·801 1), compression ratio 16:1, overhead valves, replaceable cast iron dry cylinder liners
Fuel system:	A.C. type U fuel feed pump with hand primer, two C.A.V. filters in series, paper replacement elements with transparent sediment bowls and drain taps, gauze strainers in fuel tank, lift pump and fuel injection pump, capacity of fuel tank 70 U.K. gal (318 1), C.A.V. distributor type D.P.A. 3268 F 470 injection pump, Serial No. 23519 OP; manufacturer's production setting 39·4 pt/h (22·4 1/h) to 41·5 pt/h (23·6 1/h) at 2200 rev/min engine speed and 126°F (52°C) pump temperature, C.A.V. type BDLL 150S6472 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 500 to 2600 rev/min, rated engine speed 2400 rev/min
Air cleaner:	Donaldson three-stage, situated on the left-hand side of the bonnet, comprising centrifugal pre-cleaner incorporated in cleaner body, main and safety dry paper elements. Inlet stack pipe with cover and gauze filter above tractor bonnet
Lubrication system:	Forced feed from eccentric rotor type pump; A.C. full flow replaceable element filter, total oil capacity 18 pt (10·2 1), recommended oil S.A.E. 20W/30, change period 250 hours

Cooling system: Water cooled, pressurised at 7 lb/in² (0·5 kg/cm²), impeller assisted with 18 in (457 mm) dia, belt driven 6-blade fan, twin thermostats for temperature control, cooling water capacity 26 pt (14·8 l)

Starting system: Electrical, 12V Lucas type M50G solenoid engaged starter motor, operable only when high-low range gear selector lever is in the neutral position, C.A.V. Mark 111C Thermostart cold starting aid

Electrical system: Voltage: 12, negative earth
Alternator: Lucas type 18 ACR
Batteries: Exide Supreme type 251, lead-acid, capacity 95 Ah at 20 hour rating

Transmission

Clutch: Borg and Beck single plate dry clutch, 12·8 in (325 mm) dia, pedal operated

Gearbox: Own make, sliding gear type, 3 forward and 1 reverse speed gearbox with dual range hydraulically operated overdrive gears at input end and dual epicyclic reduction gear at output end giving 12 forward and 4 reverse speeds

Final drives: Own make, transfer box with propeller shaft drives to front and rear crown wheel and pinion and epicyclic reduction gear final drives. Hydraulically operated differential locks on both front and rear axles

Oil capacities: Gearbox 32 pt (18·2 l), rear axle 32 pt (18·2 l), front axle 15 pt (8·5 l), final drives 3 pt (1·7 l) each; recommended oil S.A.E. 20W/30, change period 500 hours

Gear	*Number of engine revolutions for one revolution of driving wheel*	**Nominal travelling speed for 2400 rev/min rated speed of engine, mile/h (km/h)*
Forward		
1	340·94	1·17 (1·89)
2	262·11	1·53 (2·45)
3	232·46	1·72 (2·77)
4	178·71	2·24 (3·60)
5	126·80	3·15 (5·07)
6	97·48	4·10 (6·60)
7	83·34	4·80 (~~7·22~~) 7,72
8	64·07	6·24 (10·04)
9	56·82	7·04 (11·32)
10	43·68	9·15 (14·73)
11	31·00	12·90 (20·75)
12	23·83	16·78 (27·00)
Reverse		
1	250·34	1·60 (2·57)
2	192·46	2·08 (3·34)
3	61·19	6·53 (10·51)
4	47·05	8·50 (13·67)

*Calculated from a tyre rolling radius of 28 in (711 mm)

Power take-off

Main: Engaged by hydraulically actuated wet type multiplate clutch manually operated by handle, independent of main clutch, 21-involute splines, $1\frac{3}{8}$ in (34·9 mm) dia to I.S.O. Standard, at rear of tractor in vertical centre plane, height above ground 24 in (610 mm); proportional engine speed: 1083 rev/min at 2400 rev/min rated engine speed, 1000 rev/min (standard p.t.o. speed) at 2216 rev/min engine speed, direction of rotation clockwise viewed facing driving end

Power lift Own make, live hydraulic, 4 cylinder piston type pump with Ferguson suction side control. Oil from rear transmission supplied to single acting internal and external, ram cylinders. Category 2 heavy duty implement linkage with telescopic ends on lower links. Draught control with top link sensing and controls for position and selective response on drop

Auxiliary hydraulics Own make, gear pump belt driven from clutch input shaft supplying oil from 8.0 U.K. gal (36·4 1) capacity tank to two spool valves and thence to four rear mounted quick release couplers

Drawbar Swinging drawbar, vertical height to centre of clevis $16\frac{1}{4}$ in (413 mm) and $19\frac{3}{4}$ in (502 mm) changed by inverting drawbar, distance behind rear axle 30 in (762 mm) and 35 in (889 mm), position relative to p.t.o. $12\frac{1}{4}$ in (311 mm) and $17\frac{1}{4}$ in (438 mm) to rear, lateral adjustment $14\frac{1}{8}$ in (359 mm) and $17\frac{1}{2}$ in (445 mm), pivot position relative to rear wheel centre 33 in (838 mm) forward, coupling pin hole $1\frac{1}{2}$ in (38·1 mm) dia.

Steering Centre pivot articulation actuated by hydrostatic double acting ram, orbital hand pump controlled by the steering wheel fed from gear type hydraulic pump belt driven from clutch input shaft.

Brakes Ausco Girling dry double disc type on intermediate axle shafts hydraulically operated and compensated. Hand lever with ratchet operating on front brakes only for parking

Wheels Goodyear Traction Sure Grip 16·9/14-34 tyres, 8-ply rating on W13 rims, maximum permissible weight on each tyre 5247 lb (2380 kg) at 24 lb/in² (1·7 kg/cm²), track width 56 in (1422 mm) by 4 in (102 mm) steps to 84 in (2134 mm) changed by reversing wheel centres and offset lug type rims

Wheelbase 8 ft $4\frac{3}{4}$ in (2559 mm)

Lighting

	Height above ground of centre, in	(cm)	*Size,* in (cm)	*Distance from outside edge of tractor at 60 in (1524 mm) wheel track, to centre,* in	(cm)
Headlights	$37\frac{1}{2}$	(95·3)	5 (12·7) dia	$28\frac{1}{8}$	(71·4)
Side lights	$48\frac{1}{2}$	(123·2)	3 (7·6) dia	$11\frac{7}{8}$	(30·2)
Rear lights	$46\frac{1}{2}$	(118·1)	3 (7·6) dia	$16\frac{1}{4}$	(41·3)
Reflectors	$46\frac{1}{2}$	(118·1)	$2\frac{3}{4}$ (7·0) × $1\frac{3}{4}$ (4·4)	$12\frac{1}{2}$	(31·8)

Number of grease points

Whole tractor: 21

CONDITIONS DURING TEST

Weights

Tractor (without driver but with tanks full)

	Front,		*Rear,*		*Total,*	
	lb	*(kg)*	*lb*	*(kg)*	*lb*	*(kg)*
Without ballast	8275	(3754)	4094	(1857)	12369	(5611)
With ballast	10475	(4751)	7002	(3176)	17477	(7928)

Ballast

	Number of weights	*Total weight,*		*Water,*	
		lb	*(kg)*	*lb*	*(kg)*
Front wheels	6	634	(288)	1566	(710)
Rear wheels	12	1308	(593)	1600	(726)

Track setting during tests

Front: 60 in (1524 mm)

Rear: 60 in (1524 mm)

Overall dimensions

	Length	*Width*	*Height*
With ballast	**17 ft 3½ in** (5·27 m)	**7 ft 6½ in** (2·30 m)	**10 ft 7¾ in** (3·24 m)
Without ballast	17 ft 3½ in (5·27 m)	6 ft 6¾ in (2·00 m)	10 ft 8¼ in (3·26 m)

Overall height measured to top of exhaust pipe

Seat — Own make, sprung upholstered type, range of adjustment 4 in (102 mm) fore and aft, 3½ in (89 mm) vertical

Safety cab (CS 263) — Own make, all steel welded and bolted construction with integral floor and mudguards, anti-vibration mounts, sheet steel cladding with P.V.C.-faced foam rubber on the inside, toughened glass windows, door on left-hand side, floor covered by rubber mat with foam underlay, air conditioner-heater, electric windscreen wiper

FUELS AND LUBRICANTS USED IN TESTS

Fuel: Diesel oil Class A British Standard 2869: 1970, Specific gravity 0·839 at 60°F (15·6°C), Viscosity 2·46 cSt at 122°F (50°C), Cetane No. 56·5

Engine oil: Shell Tractor Oil Universal 20W/30, viscosity 54 cSt at 122°F (50°C)

Transmission and auxiliary hydraulics oil: Mobil 422 20W/30, viscosity 54 cSt at 122°F (50°C)

COMPULSORY TESTS

1. Main power take-off performance

Date and location of tests: 22nd May, 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					
91·2 (92·5)	2460	1110	5·59 (25·39)	0·514 (230)	16·3 (3·64)
Standard p.t.o. speed (1000 rev/min)					
89·3 (90·6)	2216	1000	5·11 (23·24)	0·480 (215)	17·5 (3·90)
The speed recommended by the manufacturer for drawbar work					
90·8 (92·1)	2400	1083	5·49 (24·97)	0·508 (227)	16·5 (3·68)
Part loads					
78·3 (79·4)	2485	1121	4·98 (22·65)	0·534 (239)	15·7 (3·50)
0	2560	1155	2·11 (9·59)	—	—
39·8 (40·4)	2526	1140	3·52 (15·99)	0·741 (331)	11·3 (2·52)
91·2 (92·5)	2460	1110	5·59 (25·39)	0·514 (230)	16·3 (3·64)
20·0 (20·3)	2544	1148	2·84 (12·90)	1·190 (532)	7·0 (1·56)
59·3 (60·1)	2507	1131	4·25 (19·34)	0·602 (269)	13·9 (3·10)

No load, maximum engine speed: 2560 rev/min

Equivalent crankshaft torque at maximum power: 194·7 lb ft (26·9 kg m)

Maximum equivalent crankshaft torque: 247·9 lb ft (34·3 kg m) at 1140 rev/min engine speed

Mean atmospheric conditions:	temperature	68°F (20°C)
	pressure	29·78 in Hg (756 mm Hg)
	relative humidity	46%
Maximum temperature:	coolant	173°F (78°C)
	engine oil	258°F (126°C)
	fuel	78°F (26°C)
	engine air intake	78°F (26°C)

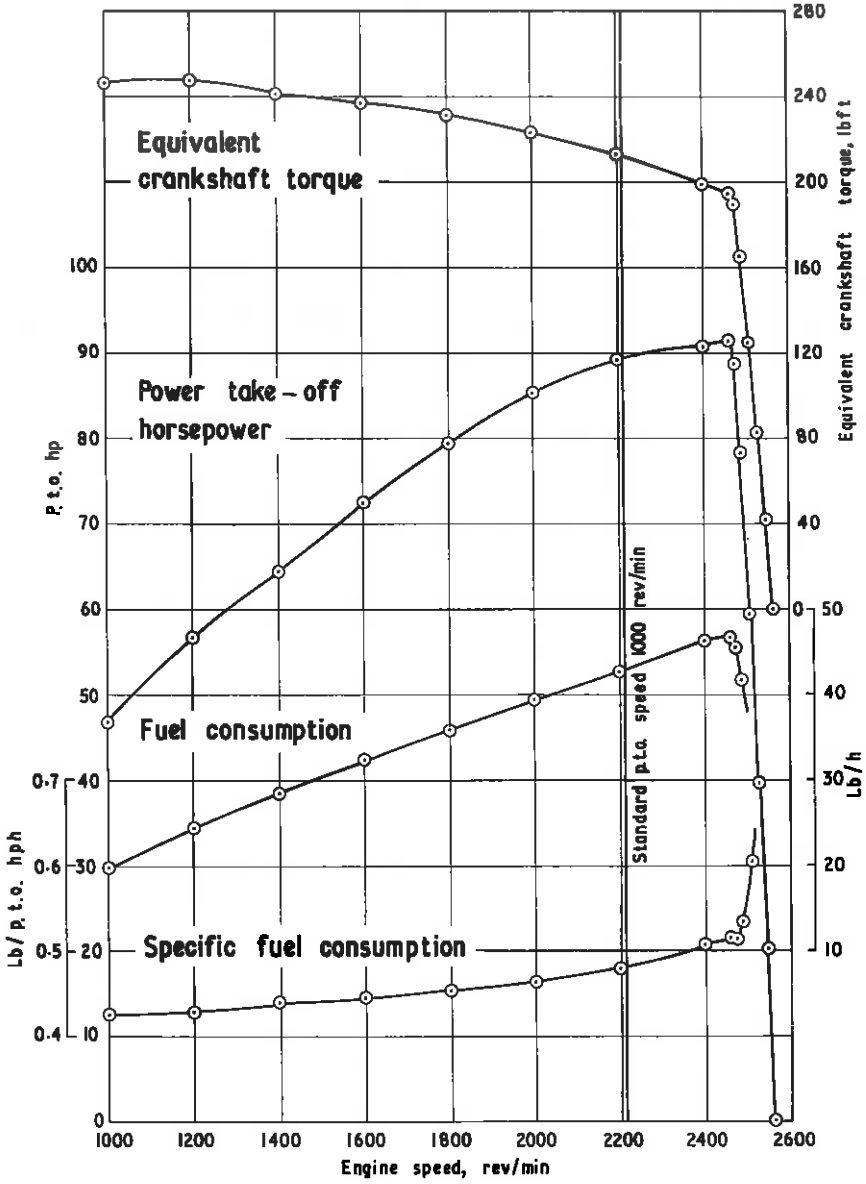


Fig.1. Power take-off test

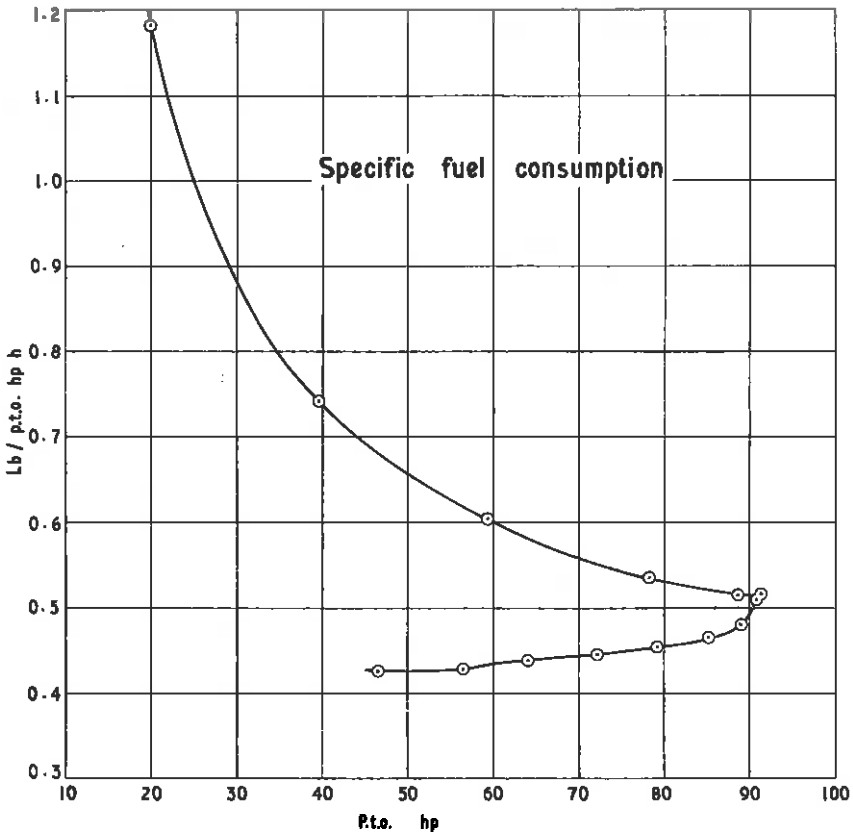


Fig. 2. Specific fuel consumption, power take off test

2. Drawbar performance

Date of tests: July and August 1974 Type of track: Concrete Height of drawbar above ground: 18½ in (470 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 hph)	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	42·6* (43·2)	15000 (6804)	1·07 (1·72)	2505	15·0	0·803 (359)	10·4 (2·33)	134 (57)	72 (22)	218 (103)	63 (17)	64	29·91 (760)
2	55·0* (55·8)	15000 (6804)	1·38 (2·21)	2499	15·0	0·724 (324)	11·6 (2·59)	139 (59)	68 (20)	212 (100)	65 (18)	85	30·03 (763)
3	62·0* (62·9)	15000 (6804)	1·55 (2·49)	2495	15·0	0·673 (301)	12·5 (2·78)	148 (64)	68 (20)	222 (106)	65 (18)	85	30·03 (763)
4	72·2 (73·2)	13000 (5897)	2·08 (3·35)	2466	10·9	0·652 (297)	12·9 (2·87)	167 (75)	78 (26)	230 (110)	69 (21)	85	30·00 (762)
5	76·1 (77·2)	9400 (4264)	3·04 (4·88)	2436	7·1	0·620 (277)	13·5 (3·02)	166 (74)	75 (24)	224 (107)	71 (22)	60	30·00 (762)
6	77·8 (78·9)	7300 (3311)	4·00 (6·43)	2459	5·3	0·608 (272)	13·8 (3·08)	157 (69)	70 (21)	212 (100)	67 (19)	66	30·00 (762)
7	79·4 (80·5)	6200 (2812)	4·80 (7·73)	2435	4·3	0·582 (260)	14·4 (3·21)	162 (72)	84 (29)	226 (108)	75 (24)	70	30·06 (764)
8	78·3 (79·4)	4600 (2087)	6·38 (10·27)	2460	3·1	0·602 (269)	13·8 (3·08)	162 (72)	84 (29)	228 (109)	74 (23)	65	30·06 (764)
9	77·9 (79·0)	4050 (1837)	7·21 (11·61)	2440	2·8	0·613 (274)	13·7 (3·06)	152 (67)	85 (29)	206 (97)	74 (23)	65	30·06 (764)
10	76·0 (77·1)	3000 (1361)	9·50 (15·29)	2438	2·0	0·615 (275)	13·7 (3·06)	140 (60)	72 (22)	204 (96)	64 (18)	47	29·91 (760)
(ii) Five hour test at 75% of pull at maximum power													
5	60·3 (61·1)	7050 (3198)	3·21 (5·16)	2493	4·5	0·583 (261)	14·4 (3·21)	145 (63)	78 (26)	223 (106)	68 (20)	62	29·85 (758)
†(iii) Five hour test at pull corresponding to 15% wheelslip in test (i)													
3	—	15000 (6804)	1·60 (2·58)	—	—	—	—	154 (68)	83 (28)	238 (114)	71 (22)	72	30·00 (762)

Total oil consumption during ten hours duration of tests (ii) and (iii) 0·134 lb/h (60·7 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

2. Drawbar performance continued

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)													
1	34·8* (35·3)	12000 (5443)	1·09 (1·75)	2521	15·0	—	—	136 (58)	77 (25)	200 (93)	73 (23)	65	30·21 (767)
2	44·5* (45·1)	12000 (5443)	1·39 (2·24)	2510	15·0	—	—	141 (61)	75 (24)	214 (101)	70 (21)	68	30·21 (767)
3	50·7 (51·4)	12000 (5443)	1·58 (2·55)	2502	15·0	—	—	145 (63)	75 (24)	224 (107)	71 (22)	64	30·21 (767)
4	67·9 (68·9)	12000 (5443)	2·12 (3·41)	2485	15·0	—	—	146 (63)	74 (23)	211 (99)	72 (22)	61	30·15 (766)
5	78·3 (79·4)	9700 (4400)	3·03 (4·87)	2440	8·0	—	—	160 (71)	75 (24)	242 (117)	72 (22)	57	30·15 (766)
6	79·4 (80·5)	7500 (3402)	3·97 (6·39)	2404	5·2	—	—	155 (68)	68 (20)	227 (108)	66 (19)	61	30·15 (766)
7	81·0 (82·1)	6400 (2903)	4·75 (7·64)	2414	4·0	—	—	160 (71)	72 (22)	237 (114)	72 (22)	53	29·97 (761)
8	82·8 (84·0)	5000 (2268)	6·21 (9·99)	2406	3·0	—	—	152 (67)	69 (21)	219 (104)	67 (19)	71	29·83 (758)
9	83·0 (84·2)	4400 (1996)	7·07 (11·38)	2406	2·6	—	—	152 (67)	70 (21)	214 (101)	67 (19)	80	29·83 (758)
10	79·8 (80·9)	3150 (1429)	9·50 (15·29)	2430	1·7	—	—	145 (63)	68 (20)	205 (96)	64 (18)	79	29·83 (758)

*Maximum power available at 15% wheelslip

3. Turning space and turning circle

Details of wheel equipment: As in specification, without ballast

Track of wheels: front—60 in (1524 mm)

rear—60 in (1524 mm)

	Right hand	*Left hand*
Radius of turning space	14 ft 7 in (4·45 m)	14 ft 2½ in (4·33 m)
Radius of turning circle	13 ft 10 in (4·22 m)	13 ft 6½ in (4·13 m)

4. Location of centre of gravity

Height above ground	41·0 in (1041 mm)
Distance forward from the vertical plane containing the axis of the rear wheels	67·0 in (1702 mm)
Distance from the median plane of the tractor	0

5. Braking

Dates of tests: 25th and 30th July 1974

Type of surface: Concrete

Weight of ballasted tractor: 17477 lb (7928 kg)

Type of decelerometer and pedal pressure recorder: Moto Meter, recording type

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)	*23·0	(7·0)	23·5	(7·2)
Stopping distance, ft (m)	22·5	(6·9)	16·0	(4·9)
Force on brake pedal, lb (kg)	136	(62)	160	(73)
Force exerted on the pedal to achieve a deceleration of 8·2 ft/s² (2·5 m/s²), lb (kg)	42	(19)	50	(23)

*Limit of rear wheel contact with the ground

Brake fade characteristics (hot tests, ballasted tractor)

Deceleration hot/deceleration cold × 100:	86%
Stopping distance cold/stopping distance hot × 100:	84%
Force on pedal cold/force on pedal hot × 100:	94%

Parking brake

Efficacy of handbrake:	Satisfactory, facing up and down slope
Pull on handbrake:	85 lb (39 kg)

6. Measurement of ambient noise emitted by the tractor

Date of tests:	7th August 1974	
Type of sound level meter:	Bruel and Kjaer 2204	
Type of track:	Concrete	
Results of tests:		
	Gear:	12th
	Travelling speed before acceleration:	13·8 mile/h (22·2 km/h)
	Sound level:	88 dBA

7. Noise measurement at the driver's ear level

Date of tests:	7th August 1974
Type of sound level meter:	Bruel and Kjaer 2204
Type of track:	Concrete

Gear	*Travelling speed,* * *mile/h*	*(km/h)*	*dBA*
6th	4·2	(6·8)	86
8th	6·5	(10·5)	87

* The first gear tested corresponds to a travelling speed nearest to 4½ mile/h (7·25 km/h)

8. Power lift and hydraulic pump performance

Date of tests:	15th, 16th and 17th September 1974

Hydraulic fluid

Make and type:	Mobilfluid 422, S.A.E. 20W/30
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):	3000 lb/in² (211 kg/cm²)

Pump characteristics

(i) Opening pressure of relief valve:	3000 lb/in² (211 kg/cm²)
Sustained pressure of the open relief valve:	3140 lb/in² (221 kg/cm²)
(ii) Pump delivery rate at minimum pressure and rated engine speed:	6·4 gal/min (29·1 l/min)
(iii) Pump delivery rate at maximum hydraulic power:	6·4 gal/min (29·1 l/min)
Delivery pressure:	3000 lb/in² (211 kg/cm²)
Power:	13·4 hp (13·6 metric hp)

Auxiliary hydraulic system

Hydraulic fluid

Make and type:	Mobilfluid 422, S.A.E. 20W/30
Viscosity:	54 cSt at 122°F (50°C)

Pump characteristics

(i) Opening pressure of relief valve:	2200 lb/in² (155 kg/cm²)
Sustained pressure of the open relief valve:	2360 lb/in² (166 kg/cm²)
(ii) Pump delivery rate at minimum pressure and rated engine speed:	7·4 gal/min (33·6 l/min)
(iii) Pump delivery rate at maximum hydraulic power:	7·6 gal/min (34·5 l/min)
Delivery pressure:	2200 lb/in² (155 kg/cm²)
Power:	11·7 hp (11·9 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)	39·8	(1011)	39·8	(1011)
lift arms, in (mm)	10·5	(267)	10·5	(267)
lift rods, in (mm)	26·0	(660)	26·0	(660)
top link, in (mm)	29·3	(744)	28·5	(724)
Distance of lift rod connection point from pivot point of lower link, in (mm)	21·5	(546)	21·5	(546)
The following dimensions are given relative to the rear wheel centre line, situated 28 in (711 mm) above the ground level				
Lower link pivot point, in (mm)	1·3 (33) forward,	8·4 (213) below	1·3 (33) forward,	8·4 (213) below
Top link pivot point, in (mm)	9·3 (236) behind,	8·4 (213) above	10·4 (264) behind,	5·4 (137) above
Lift arm pivot point, in (mm)	7·7 (196) forward,	9·2 (234) above	7·7 (196) forward,	9·2 (234) above
Maximum and minimum height of lower link hitch points, in (mm)	14·1 (358) above,	10·5 (267) below	14·1 (358) above	10·5 (267) below
Height of lower link hitch points when locked in transport position, in (mm)	Any height within lift range		Any height within lift range	

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

	in (cm)	−2 (5·1)	−1 (2·5)	0	+3 (7·6)	+6 (15·2)	+9 (22·9)	+12 (30·5)	+15 (38·1)	+18 (45·7)	+21 (53·3)	+24 (61·0)	+27 (68·6)	+30 (76·2)
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	*7290 (3307)		7490 (3397)	7785 (3531)	8035 (3645)	8280 (3756)	8460 (3837)	8600 (3901)	8700 (3946)	8730 (3960)			
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of measured values													
	Pressure 3000 lb/in² (211 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		7255 (3291)	7230 (3280)	7170 (3252)	7090 (3216)	6990 (3171)	6840 (3103)	6655 (3019)	6395 (2901)	6105 (2769)	5810 (2635)	*5500 (2495)	
	min. mech. advantage		6210 (2817)	6200 (2812)	6150 (2790)	6085 (2760)	6010 (2726)	5935 (2692)	5800 (2631)	5655 (2565)	5490 (2490)	5295 (2402)	5100 (2313)	*4865 (2207)
	Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of measured values													
	Pressure 3000 lb/in² (211 kg/cm²)													

*Maximum force exerted throughout whole range

OPTIONAL TEST

9. Performance at engine crankshaft

Date and location of tests: 7th February 1974, Massey-Ferguson Manufacturing Limited, Banner Lane, Coventry, U.K.

Type of dynamometer: Heenan and Froude, Dynamatic

Horsepower (Metric hp)	*Speed, rev/min*	*Fuel consumption, UKgal/h (l/h)*	*lb/hp h (g/metric hp h)*	*hp h/UKgal (metric hp h/l)*
Maximum power—2 hour test				
104·6 (106·1)	2460	5·74 (26·09)	0·460 (206)	18·2 (4·06)
The speed recommended by the manufacturer for drawbar work				
104·2 (105·7)	2400	5·67 (25·78)	0·456 (204)	18·4 (4·11)
Part loads				
90·1 (91·4)	2494	5·05 (22·96)	0·470 (210)	17·9 (3·99)
0	2575	1·84 (8·36)	—	—
45·9 (46·5)	2541	3·20 (14·55)	0·584 (261)	14·4 (3·21)
104·6 (106·1)	2460	5·74 (26·09)	0·460 (206)	18·2 (4·06)
23·1 (23·4)	2559	2·44 (11·09)	0·885 (396)	9·5 (2·12)
68·3 (69·3)	2520	4·12 (18·73)	0·506 (226)	16·6 (3·70)

No load, maximum engine speed: 2575 rev/min

Crankshaft torque at maximum power: 223·2 lb ft (30·9 kg m)

Maximum crankshaft torque: 272·1 lb ft (37·6 kg m) at 1180 rev/min engine speed

Mean atmospheric conditions: temperature 62°F (17°C)
pressure 29·31 in Hg (744 mm Hg)
relative humidity 36%

Maximum temperature: coolant 161°F (72°C)
engine oil 239 °F (115°C)
fuel 55°F (13°C)
engine air intake 83°F (28°C)

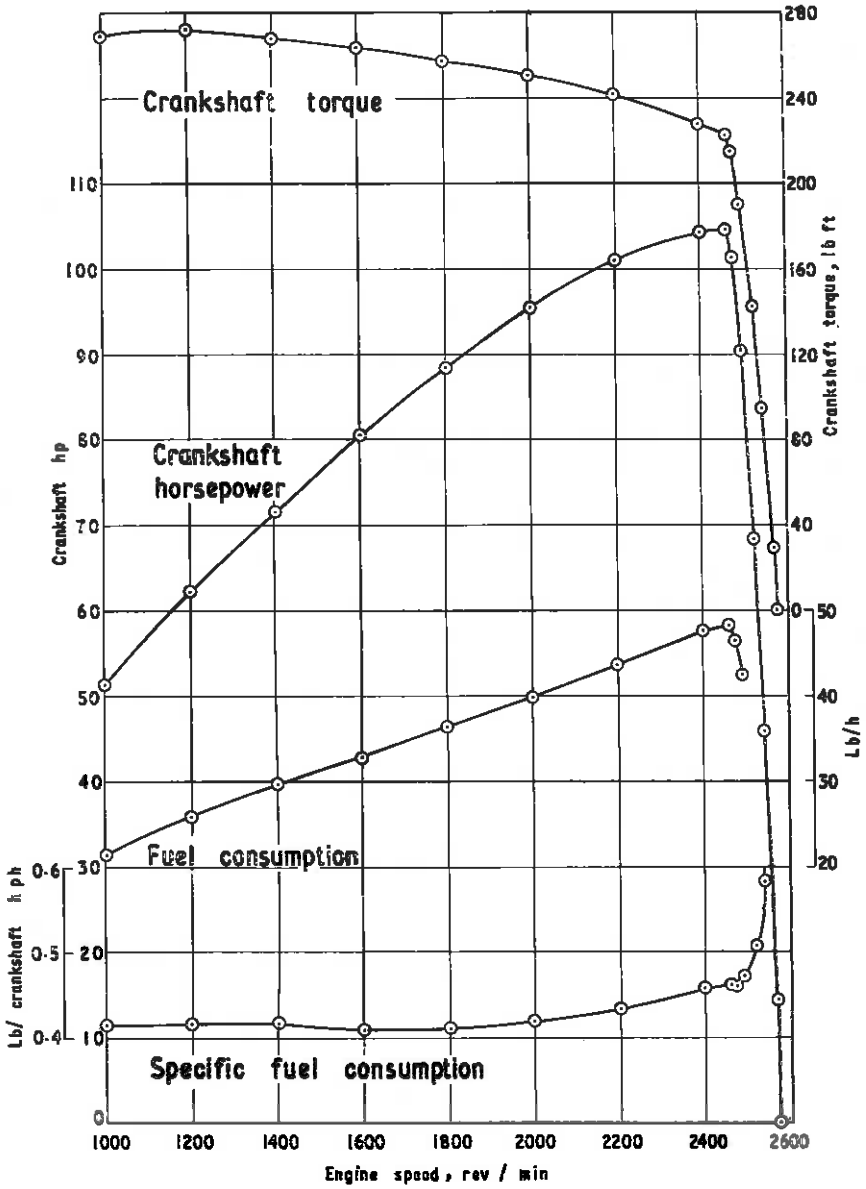


Fig. 3. Engine test

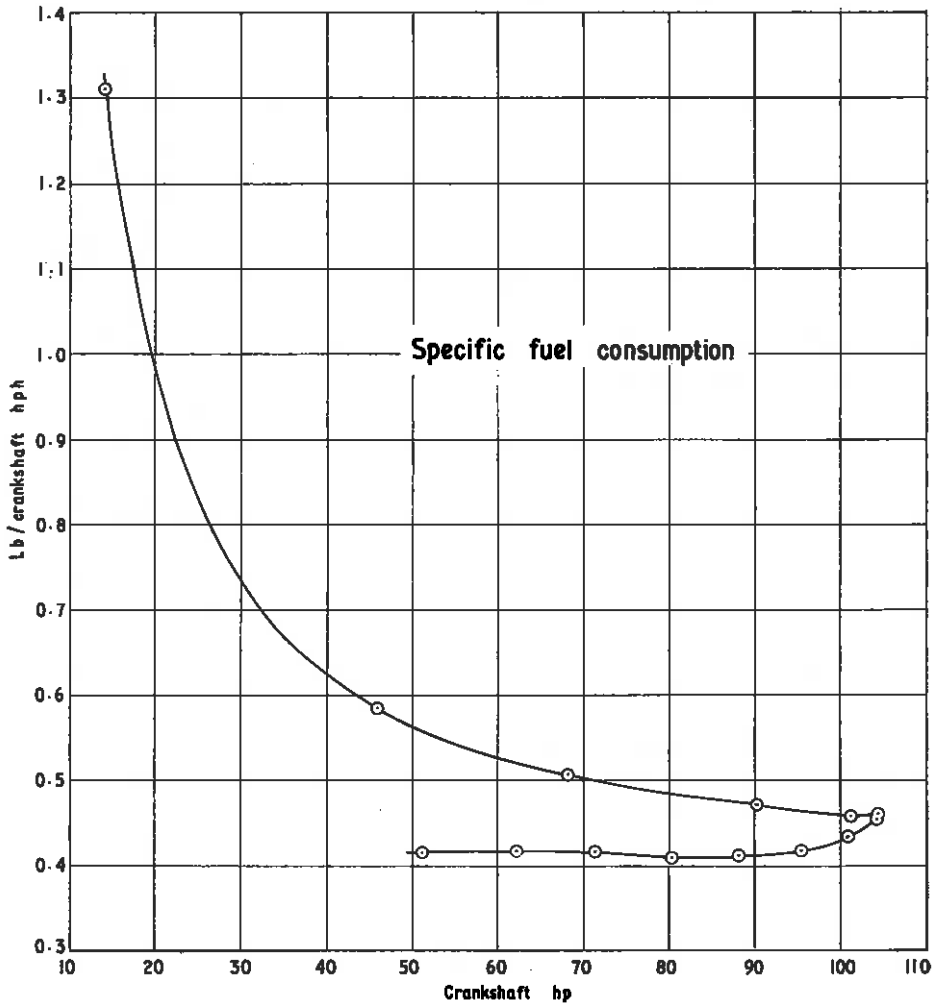


Fig.4 - Specific fuel consumption, engine test

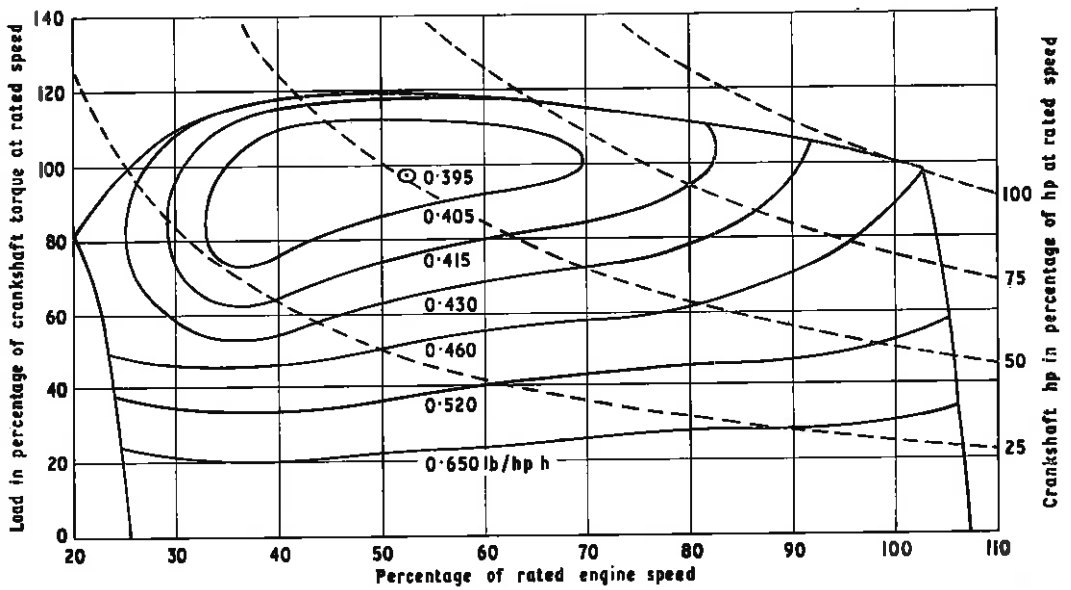


Fig. 5. Specific fuel consumption, engine test

Repairs and adjustments during tests	1. Prior to the drawbar tests, oil leaks from offside axles were rectified by fitting new outer axle oil seals 2. During hydraulic lift tests, modifications were made to prevent the assister ram from fouling a plate on the rear chassis housing
Remarks	None

Officer in charge: D. W. SMITH

Head of Tractor and Cultivation Division: J MATTHEWS

Date: 1st November 1974

Copyright, The British Society for Research in Agricultural Engineering

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