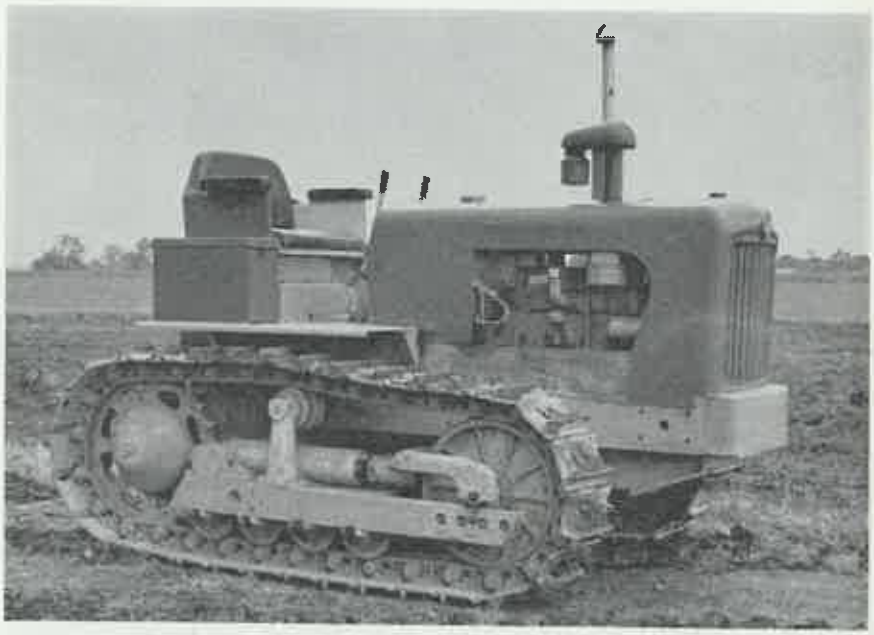
No. 403/O.E.C.D.

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

TRACK MARSHALL MODEL 55 DIESEL CRAWLER TRACTOR

Manufactured by: Marshall Sons and Company Limited,
Britannia Works, Gainsborough, Lincs.



Date of Tests: July/August 1964
Test No.: R.64050/O.E.C.D.

This report has been approved by the O.E.C.D. Coordinating Centre (C.N.E.E.M.A., France) as being in accordance with the O.E.C.D. Tractor Test Code
Date of Approval: 9th October 1964 *Serial No.:* 057

NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING
WREST PARK SILSOE BEDFORDSHIRE

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

APPENDIX

PART I

SPECIFICATION OF TRACTOR

Tractor:

Make:	Track Marshall
Model:	55
No.:	Serial No. 9301914

Engine:

Make:	F. Perkins Ltd., type Four-270D direct injection diesel, Serial No. 6251419
Cylinders:	4 cylinders, vertical in-line $4\frac{1}{4}$ in. (107·95 mm) bore × $4\frac{3}{4}$ in. (120·65 mm) stroke, compression ratio 16:1 replaceable cast iron wet cylinder liners, overhead valves
Rated speed:	1800 rev/min, governor setting—no load engine speed 1940 rev/min. (see Remarks, page 9)
Fuel system:	Fuel—Diesel oil C.A.V. type DPA 324–3750 injection pump. Serial No. R.14058 YE; C.A.V. type BDLL150SY 6225 injector nozzles, manufacturer's production setting for injection pump: 0·125 pt (71 ml) delivery for 258–270 pump revolutions at 750 rev/min pump speed, fuel temperature 70 °F (21 °C) (bench test figures). Injection pressure 170 atm (176 kp/sq. cm); A.C. type U fuel feed pump, sediment bowl and water trap on suction side of feed pump. Purolator and A.C.-Delco paper cartridge filters in series in pressure line. Capacity of fuel tank 21 UKgal (95·5 l)
Governor:	C.A.V. mechanical incorporated in injection pump, governed range of engine speed 750 rev/min to no-load speed of 1940 rev/min. (see Remarks, page 9)
Air cleaner:	Burgess oil bath, centrifugal pre-cleaner with dust collector bowl outside hood; oil capacity 1·75 pt (0·99 l)
Oiling system:	Forced feed from gear type pump, S.A.E. 20/20W oil; Tecalemit full flow paper element oil filter; recommended oil change period 250 h, oil capacity 16 pt (9·09 l)
Cooling system:	Water cooled, pressurized at 4 lb/sq in. (0·28 kp/sq cm); impeller assisted with $18\frac{1}{2}$ in. (470 mm) dia. 6-blade belt driven fan, thermostat for temperature control. Cooling water capacity $3\frac{3}{4}$ UKgal (17·0 l)

Transmission:

Clutch:	Borg and Beck 14 in. (356 mm) dia. single plate dry clutch; foot-pedal operated
Gearbox:	Own make sliding gear type, 6 forward speeds and 2 reverse
Differential:	Spur gear final drive from differential shafts; bevel wheel and pinion on input side of gearbox; oil capacities: gearbox 13 UKgal (59·1 l) final drives $6\frac{1}{4}$ UKgal (28·4 l) each

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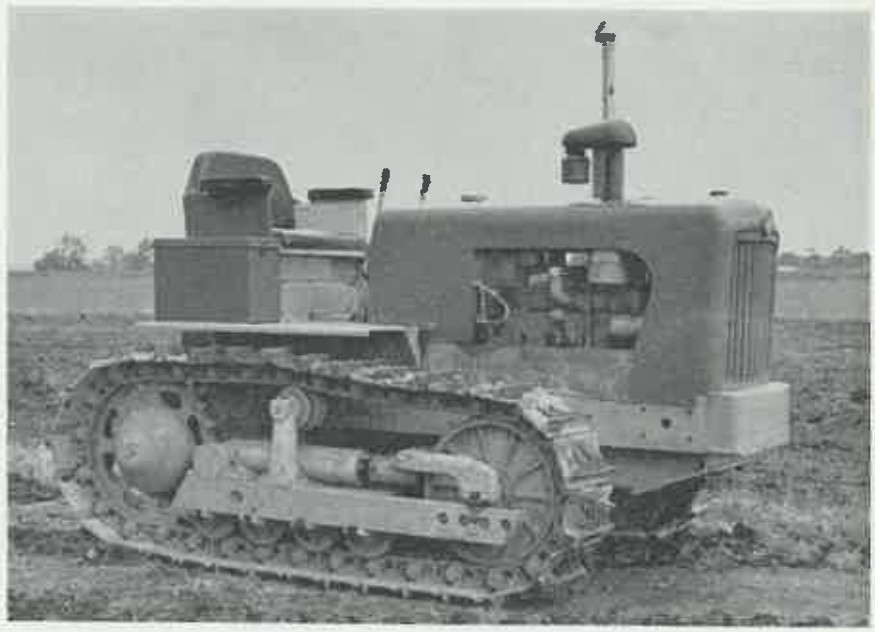

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Clutch:	Borg and Beck 14 in. (356 mm) dia. single plate dry clutch; foot-pedal operated
Gearbox:	Own make sliding gear type, 6 forward speeds and 2 reverse
Differential:	Spur gear final drive from differential shafts; bevel wheel and pinion on input side of gearbox; oil capacities: gearbox 13 UKgal (59·1 l) final drives $6\frac{1}{4}$ UKgal (28·4 l) each

Gear No.	*Number of engine revolutions for one revolution of driving sprocket*	*Theoretical travelling speed for 1800 rev/min rated speed of engine, mile/h (km/h)*
1	97·6	1·47 (2·37)
2	72·7	1·98 (3·19)
3	52·3	2·74 (4·41)
4	46·2	3·12 (5·02)
5	34·2	4·18 (6·73)
6	24·8	5·78 (9·30)
R. low	83·9	1·71 (2·75)
R. high	39·7	3·62 (5·82)

Steering device and brakes: Controlled differential steering with hand-lever operated band brakes on differential shafts, foot-pedal with ratchet engaging both band brakes for parking

Tracks: Non-girder, track pitch $6\frac{3}{4}$ in. (171 mm), $1\frac{5}{16}$ in. (33·3 mm) dia. track pins, 14 in. (356 mm) wide track plates with integral grousers $1\frac{7}{8}$ in. (47·6 mm) deep, 31 per track; track gauge 56 in. (1422 mm), total area of contact with ground 1782 sq. in. (11 497 sq. cm). Nominal pressure on ground 6·92 lb/sq. in. (0·49 kp/sq. cm)

Idler wheels and rollers: Front idler wheels $21\frac{1}{4}$ in. (540 mm) rolling dia, 4 bottom track rollers per track at $9\frac{9}{16}$ in. (243 mm) centres, rolling dia 8 in. (203 mm), one top carrier roller per track, rolling dia $6\frac{1}{2}$ in. (165 mm)

Sprockets: Pitch dia 27 in. (686 mm); No. of teeth 25, face width $2\frac{1}{4}$ in. (57 mm)

Suspension: Suspension by fixed rear crossbeam and patented articulating cranked front crossbeam; lubrication of track rollers by S.A.E. 140 oil at 1000 h intervals

Belt pulley: Not fitted

Power take-off: Manually engaged, proportional engine speed, 6 spline $1\frac{3}{8}$ in. (34·9 mm) dia at rear of tractor

Height above ground: $33\frac{15}{16}$ in. (862 mm)

Speeds: 615 rev/min at 1800 rev/min rated engine speed
540 rev/min at 1580 rev/min engine speed
Driven through main clutch

Direction of rotation: Clockwise viewed from tractor rear

Power lift: Not fitted

Drawbar: Swinging drawbar, radius of swing $44\frac{1}{8}$ in. (1121 mm), vertical adjustment none, lateral adjustment $22\frac{1}{2}$ in. (572 mm), height to centre of clevis 14 in. (356 mm) during test; position of pivot centre relative to sprocket centre $21\frac{3}{4}$ in. (552 mm) forward; width of clevis $2\frac{1}{2}$ in. (63·5 mm). Dia of pin $1\frac{3}{8}$ in. (34·9 mm)

Electrical equipment:

Voltage:	12
Generator:	Lucas type C40-A
Batteries:	2 Exide 6V in series, type 3XCS21L lead-acid, capacity 128 amp h
Starting device:	Lucas 12V type CA 45-D starter motor, C.A.V. inlet manifold flame type cold starting aid.

Overall dimensions:

Overall length:	10 ft 0¾ in. (3·07 m)
Overall width:	5 ft 10 in. (1·78 m)
Overall height:	5 ft 1 in. (1·55 m) to top of radiator 7 ft 3½ in. (2·22 m) to top of exhaust pipe
Minimum ground clearance:	12 in. (305 mm)

Weight: With full fuel tank, oil, cooling water, no driver: 12 338 lb (5597 kg)

Special remarks: None

PART II
LABORATORY TESTS

1. **Compulsory tests:** Power take-off test

Date and location of tests:	20th July 1964, N.I.A.E., Silsoe, Beds, U.K.
Type of dynamometer:	Water brake, Heenan and Froude
Fuel:	Diesel oil, density 0·831 at 60 °F (15·6 °C), Cetane No. 52
Engine oil	S.A.E. 20/20W
Transmission oil	S.A.E. 90

Horse-power (Metric h.p.)	*Speeds, rev/min*		*Equivalent crankshaft torque, lb ft (k.p.m.)*	*Fuel consumption*			*Temperature*			*Atmos. conditions*	
	Engine	*P.t.o.*		*UKgal/h (l/h)*	*Lb/h.p. h. (g/metric h.p. h.)*	*H.p. h/ UKgal (Metric h.p. h/l)*	*Coolant °F (°C)*	*Oil °F (°C)*	*Fuel °F (°C)*	*Air temp. °F (°C)*	*Atmos. press. in. Hg (mm Hg)*
A. Maximum power											
58·3 (59·1)	1811	619	169·1 (23·4)	2·97 (13·50)	0·423 (189)	19·7 (4·40)	189 (87)	172 (78)	73 (23)	70 (21)	29·84 (758)
B. Power at standard p.t.o. speed (540 rev/min)											
53·6 (54·4)	1580	540	178·2 (24·6)	2·61 (11·87)	0·404 (181)	20·6 (4·60)	190 (88)	168 (76)	83 (28)	75 (24)	29·84 (758)
C. Power at maximum torque											
35·9 (36·4)	1000	342	188·6 (26·1)	1·81 (8·23)	0·420 (188)	19·8 (4·42)	197 (92)	160 (71)	82 (28)	73 (23)	29·84 (758)
D. Power at rated speed											
58·1 (58·9)	1800	615	169·5 (23·4)	2·95 (13·41)	0·422 (189)	19·7 (4·40)	189 (87)	172 (78)	73 (23)	70 (21)	29·84 (758)

No load, maximum engine speed: 1989 rev/min

PART III

DRAWBAR TESTS

Date of tests:	30th July—4th August 1964
Type of track:	Grassland on clay
Position of governor control lever:	Fully open giving no-load engine speed of 1990 rev/min.
Fuel:	Diesel oil, density 0·831 at 60 °F (15·6 °C) Cetane No. 52
Engine oil:	S.A.E. 20/20W
Transmission oil:	S.A.E. 90

A. Tests with maximum additional weight Not applicable

B. Tests without ballast

Weight of tractor, without driver:	12 338 lb (5597 kg)
Height of drawbar above ground:	14 in. (356 mm)

(1) *Maximum powers and pulls*

Gear No.	*Maximum powers*						*Air temp, °F (°C)*	*Atmos. press, in. Hg (mm Hg)*	*Maximum pulls*	
	Horse-power (Metric c h.p.)	*Corres-ponding pull, lb (kp)*	*Track slip, %*	*Engine speed, rev/min*	*Speed, mile/h (km/h)*	*Engine coolant temp, °F (°C)*			*Pull, lb (kp)*	*Reason for stall*
1	46·9 (47·6)	12 750 (5783)	6·0	1771	1·38 (2·22)	179 (82)	73 (23)	29·81 (757)	14 600 (6623)	Engine stall and trackslip
2	47·3 (48·0)	9250 (4196)	3·5	1796	1·92 (3·09)	178 (81)	76 (24)	29·89 (759)	10 700 (4854)	Engine stall
3	46·0 (46·6)	6450 (2926)	2·0	1799	2·67 (4·30)	175 (79)	80 (27)	29·89 (759)	7800 (3538)	Engine stall
4	45·0 (45·6)	5550 (2517)	1·6	1763	3·04 (4·89)	183 (84)	80 (27)	29·89 (759)	6600 (2994)	Engine stall
5	42·4 (43·0)	3900 (1769)	1·1	1734	4·08 (6·56)	184 (84)	80 (27)	29·89 (759)	4700 (2132)	Engine stall
6	37·2 (37·7)	2550 (1157)	0·7	1700	5·47 (8·80)	190 (88)	73 (23)	29·98 (761)	3100 (1406)	Engine stall

(2) *Fuel consumption*

Gear No.	*Optimum fuel consumption*			*Range of pull, lb (kp) over which specific fuel consumption does not exceed optimum consumption by more than 10%*
	Specific fuel consumption, lb/drawbar h.p. h. (g/metric drawbar h.p. h.)	*Drawbar h.p. h/UKgal (drawbar metric h.p. h/l)*	*Corresponding pull, lb (kp)*	
1	0·520 (233)	16·0 (3·57)	12 750 (5783)	7900 –14 600 (M.S.P.) (3583) (6623)
2	0·515 (230)	16·1 (3·59)	9250 (4196)	6300 –10 700 (M.S.P.) (2858)– (4854)
3	0·526 (235)	15·8 (3·52)	6450 (2926)	4700 – 7800 (M.S.P.) (2132) (3538)
4	0·532 (238)	15·6 (3·48)	5600 (2540)	4200 – 6600 (M.S.P.) (1905)– (2994)
5	0·568 (254)	14·6 (3·26)	3900 (1769)	3300 – 4700 (M.S.P.) (1497)– (2132)
6	0·628 (281)	13·2 (2·94)	2550 (1157)	2300 – 3100 (M.S.P.) (1043)– (1406)

PART IV

1. Location of centre of gravity

	Test A, ballasted	*Test B, unballasted*
Height above ground	—	—
Distance forward from the vertical plane containing the axis of the rear sprockets	—	32 in. (833 mm)
Distance from the median plane parallel to the longitudinal axis of the tractor bisecting the track	—	0

2. Turning space

	With brakes		*Without brakes*	
	Right-hand	*Left-hand*	*Right-hand*	*Left-hand*
Radius of turning space	9 ft 2 in. (2·80 m)	9 ft 5 in. (2·87 m)	—	—

PART V

Repairs and adjustments during tests: None

Remarks:

1. The following modifications were made by the manufacturers (who state that they apply to all tractors manufactured after 1st July 1964) so that the tractor complies with the U.K. Safety Regulations

(a) a guard was supplied for the blades of the engine cooling fan

(b) the engine stop control was modified so that it would remain in the stop position after operation and a label showing the method of operation was added.

(c) a handle was provided to help the operator when mounting and dismounting

2. Throughout the tests the governor was set to give a no-load engine speed of 1990 rev/min which speed the manufacturers state will apply to all tractors manufactured after the 21st September 1964. The standard no-load speed prior to this date was 1940 rev/min.

Test Engineer: M. W. JESSON

Head of Tractor Performance Department: T. C. D. MANBY

Date: 23rd September 1964

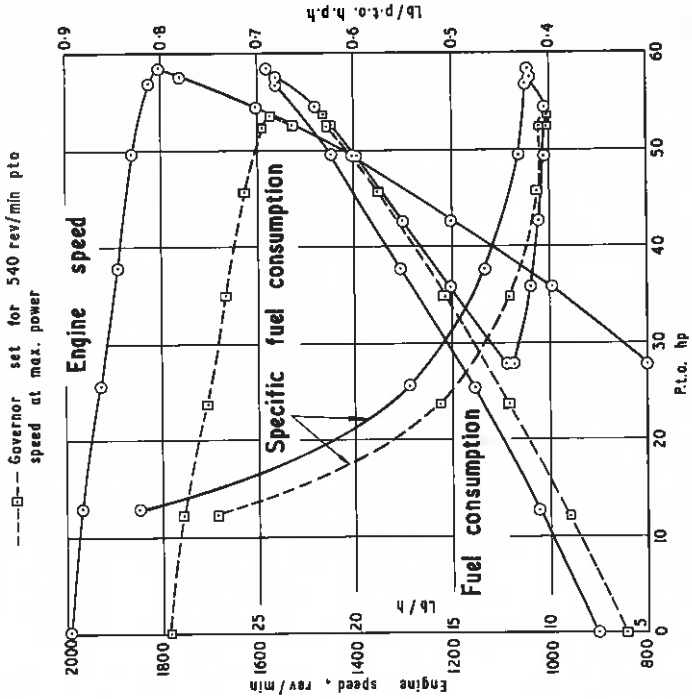

FIG. 2. Power take-off test

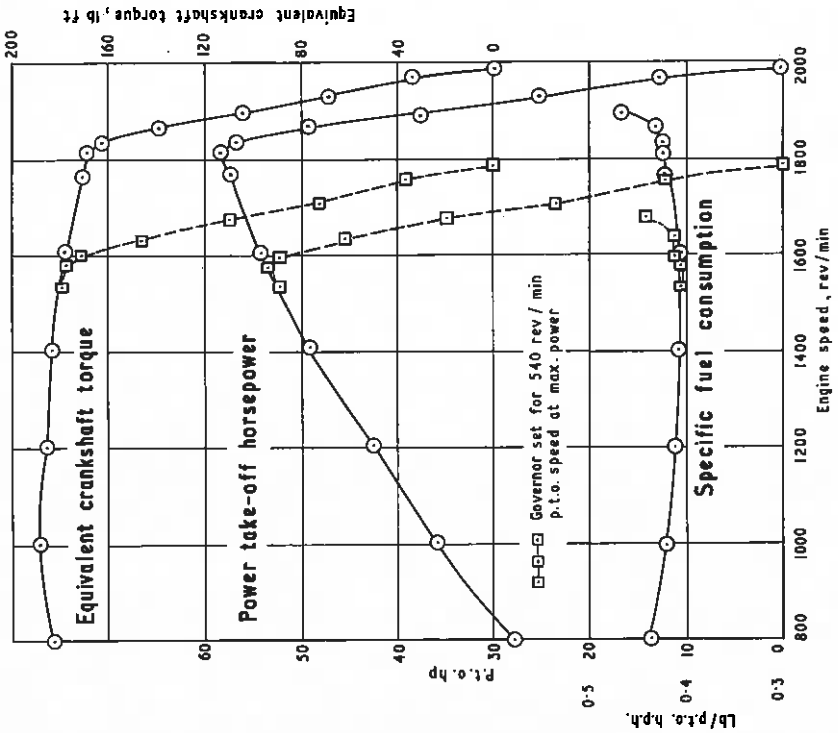

FIG. 1. Power take-off test

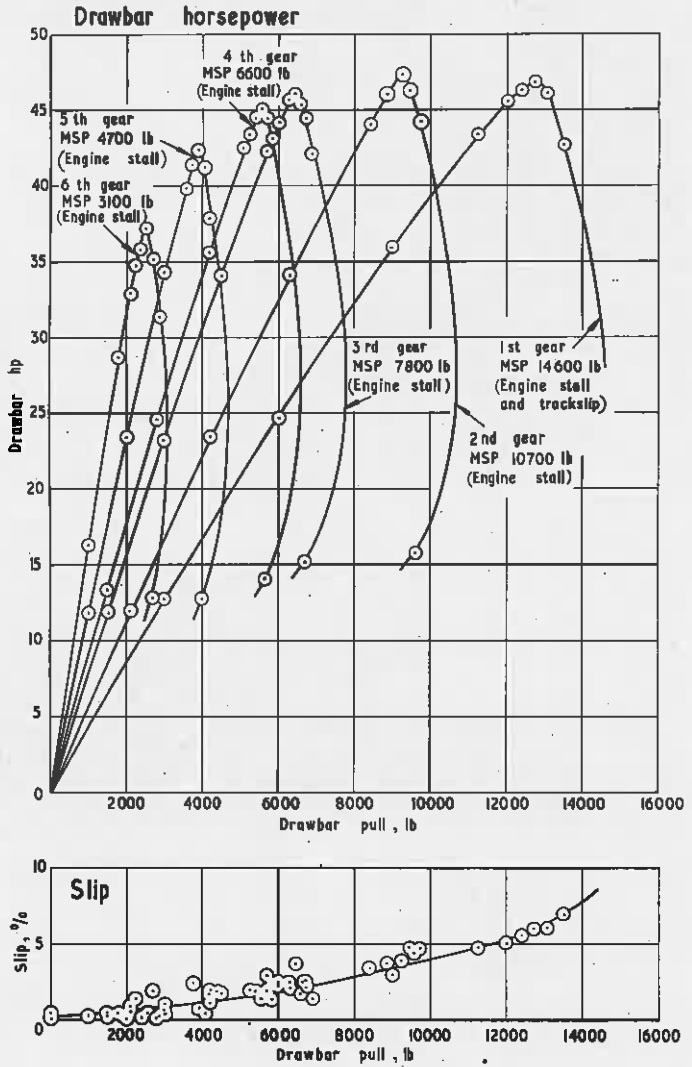

FIG. 3. Drawbar test on grassland on clay

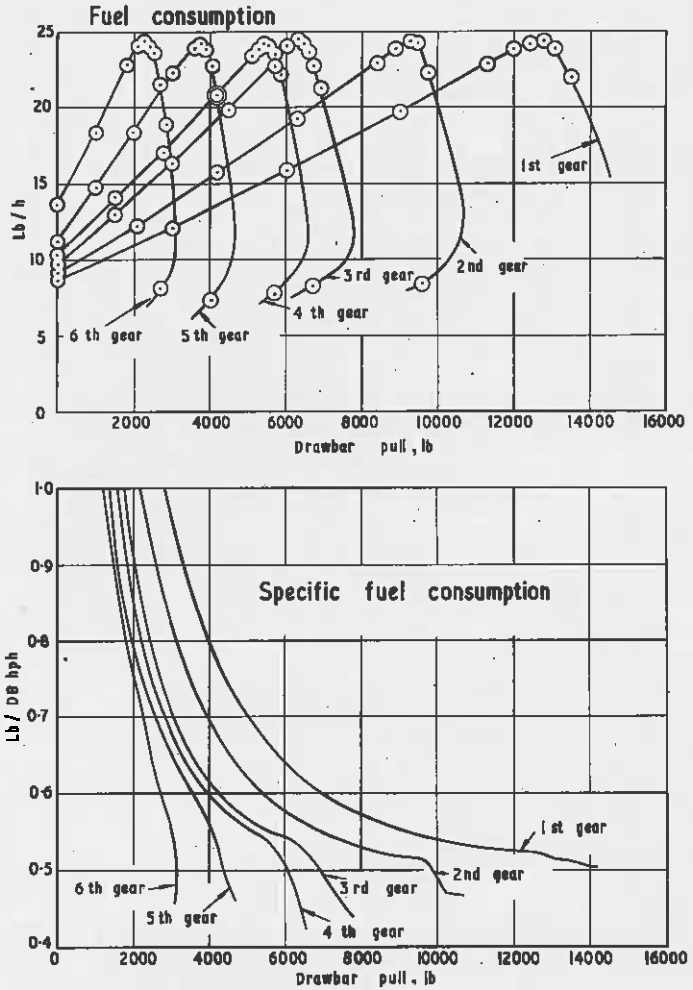

FIG. 4. Drawbar test on grassland on clay

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