OECD Approval No. 638

Report No. 661

**Test in accordance with the OECD standard code for the official testing of agricultural tractors**

Report on test of Massey-Ferguson 550 Tractor




**Manufactured by** Massey-Ferguson Manufacturing Co.,
Banner Lane,
Coventry, Warwickshire.

**Test No.** R79/2/7016/O.E.C.D.

**Date** March, 1979.

THE BRITISH SOCIETY FOR RESEARCH IN AGRICULTURAL ENGINEERING

**National Institute of Agricultural Engineering**
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# SPECIFICATION OF TRACTOR

| | |
|---|---|
| Manufacturer: | Massey-Ferguson Manufacturing Company, Banner Lane, Coventry, Warwickshire. |
| Submitted for test by: | The manufacturer |
| Selected for test by: | The manufacturer with the agreement of the testing station |
| Place of running-in: | Coventry |
| Duration of running-in: | 60 hours |

## Tractor

| | |
|---|---|
| Make: | Massey-Ferguson |
| Model: | M.F. 550 |
| Type: | Four wheel, rear wheel driven, unit construction |
| Serial number: | 615847M |

## Engine

| | |
|---|---|
| Make: | Perkins |
| Model: | AD3.152 DSL |
| Type: | 4-stroke, direct injection diesel |
| Serial number: | 152UA 43663 DSL |
| Cylinders: | 3 cylinders, vertical, in-line, 91.4 mm (3.6 in) dia bore x 127.0 mm (5.0 in) stroke, capacity 2500 $cm^3$ (153 $in^3$), compression ratio 16.5:1 (nominal), replaceable dry cylinder liners, overhead valves |

| | |
|---|---|
| Fuel system: | A.C. Delco mechanical fuel feed pump with hand-primer, C.A.V. paper element filter with transparent sediment bowl on pressure side of feed pump; fuel tank capacity 67.3 l (14.8 UK gal); C.A.V. distributor type DPA3233F521 injection pump, Serial No. R615200V, manufacturer's production setting 9.89-10.40 l/h (17.4-18.3 pt/h) at 2250 rev/min engine speed and 63°C (145°F) cambox temperature; C.A.V. type BDLL 150S6602 injector nozzles, injection pressure 17.73 MPa (175 atm), pump delivery starts 17° before T.D.C. |
| Governor: | C.A.V. mechanical, incorporated in fuel injection pump, governed range of engine speed 700 to 2470 rev/min, rated engine speed 2250 rev/min |
| Air cleaner: | Lautrette, 3-stage dry paper element filter, situated forward of radiator, centrifugal pre-cleaner above bonnet |
| Lubrication system: | Forced feed from rotor type pump with metal strainer in sump; full flow replaceable element filter; total oil capacity 6.8 l (12.0 pt), recommended oil S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F), oil and filter change period 250 hours |
| Cooling system: | Water cooled, pressurised at 69 kPa (10 lb/in$^2$), thermosyphon assisted by centrifugal pump, 394 mm (15.5 in) dia 4-blade belt driven fan, thermostat for temperature control, cooling water capacity 10.2 l (18.0 pt) |
| Starting system: | Electrical, Lucas M45G solenoid-engaged starter motor, operable only when high-low gear selector lever is in neutral position, C.A.V. Thermostart MKIIIC manifold flame-type cold starting aid |
| Exhaust: | Silencer vertical above bonnet on left-hand side |

Electrical system

| | |
|---|---|
| Voltage: | 12, negative earth |
| Generator: | Lucas type 23 ACR alternator |

Battery: Lucas AVM17T8, lead-acid, 90 Ah at 20-hour rating

## Transmission

Clutch: Laycock, dual, dry, pedal-operated, 254 mm (10.0 in) dia plate for p.t.o. drive, and 305 mm (12.0 in) dia plate for gearbox drive

Gearbox: Own make, 8 forward and 2 reverse speeds, comprising 4 forward and 1 reverse speed sliding gear gearbox with high-low range epicyclic gear at output end

Rear axle and final drives: Own make, crown wheel and pinion and differential, pedal-operated self-disengaging differential lock

Oil capacities: Common gearbox and final drive housing 28 l (49.3 pt), recommended oil S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F); oil change period 500 hours, filter change period 250 hours

| Gear | Number of engine revolutions for one revolution of driving wheel | Nominal travelling speed for 2250 rev/min rated engine speed,* km/h | (mile/h) |
|---|---|---|---|
| Forward | | | |
| L1 | 226.35 | 2.21 | (1.37) |
| L2 | 154.33 | 3.24 | (2.01) |
| L3 | 112.99 | 4.43 | (2.75) |
| L4 | 84.18 | 5.95 | (3.70) |
| H1 | 55.33 | 9.04 | (5.62) |
| H2 | 37.73 | 13.26 | (8.24) |
| H3 | 27.62 | 18.12 | (11.26) |
| H4 | 20.58 | 24.32 | (15.11) |
| Reverse | | | |
| L1 | 166.20 | 3.01 | (1.87) |
| H1 | 40.63 | 12.32 | (7.66) |

*Calculated with a tyre rolling radius of 590 mm (23.2 in)

| | |
|---|---|
| Power take-off | At rear of tractor in vertical centre plane, height above ground 454 m/m (17.9 in), distance behind rear axle centre 296 m/m (11.7 in), 6-spline, 34.9 m/m (1 3/8 in) dia to I.S.O. Standard, engaged by hand-lever, proportional engine speed or proportional ground speed, proportional engine speed driven through second plate of main clutch 722 rev/min at 2250 rev/min rated engine speed, 540 rev/min (standard p.t.o. speed) at 1684 rev/min engine speed, direction of rotation clockwise viewed facing driving end, proportional ground speed driven through the gearbox and pinion input shaft, 1 revolution of p.t.o. for nominal 506 m/m (19.9 in) of travel, direction of rotation clockwise viewed facing driving end in forward gear |
| Power lift | Own make, live hydraulic, 4-cylinder scotch yoke pump with suction side control, driven from forward end of p.t.o. shaft; oil supplied from transmission housing to ram cylinder and external tapping; Category 1 or 2 implement linkage with interchangeable ball ends, top link sensing, draught, position and pressure control, selective response on drop |
| Drawbar | Swinging drawbar, vertical height to centre of clevis 234 m/m (9.2 in) and 386 m/m (15.2 in), changed by inverting drawbar, distance behind rear axle centre 537 m/m (21.1 in) and 651 m/m (25.6 in), distance behind p.t.o. 241 m/m (9.5 in) and 355 m/m (14.0 in), lateral adjustment 440 m/m (17.3 in) and 513 m/m (20.2 in), pivot position 130 m/m (5.1 in) forward of rear wheel centre, drawbar pin hole 26 m/m (1.0 in) dia |
| Steering | Danfoss hydrostatic, incorporating manual control for emergency, oil supplied from engine driven D.B.A. gear pump with integral reservoir |
| Brakes | Girling, internal expanding with drums on differential half-shafts; independent or combined pedal-operated, hand lever with ratchet operating both brakes for parking |
| Wheels | |
| Steering wheels: | Two at front; Firestone Ribbed Tractor, 6.00-16 cross-ply tyres, 6-ply rating, maximum permissible mass on each tyre 560 kg (1235 lb) 330 kPa (48 lb/in$^2$), track width 1320 m/m (52.0 in) by 102 m/m (4.0 in) steps to |

Steering wheels continued ... 1830 mm (72.0 in), changed by extending axle

Driving wheels: Two at rear, Goodyear Traction Sure Grip, 12.4/11-28 cross-ply tyres, 6-ply rating, maximum permissible mass on each tyre 1275 kg (2810 lb) at 170 kPa (25 lb/in$^2$), track width 1320 mm (52.0 in) by 102 mm (4.0 in) steps to 1932 mm (76.0 in), changed by reversing wheels and off set lug rims

Wheelbase: 2110 mm (83.1 in)

Seat: Bostrom, upholstered pan, adjustable spring suspension with hydraulic damping, range of adjustment 213 mm (8.4 in) forwards and backwards

Safety Cab (CS 1216): Massey-Ferguson, welded pressed plate and sheet steel, anti-vibration mounts, door and mounting step on left-hand side, heating, ventilating and demisting system in roof

Lighting

Unrestricted beam angle of headlight in plan view 144°

| | Height above ground of centre mm | (in) | Size, mm | (in) | Distance from outside edge of tractor at 1320 mm (52.0 in) wheel track to centre, mm | (in) |
|---|---|---|---|---|---|---|
| Headlights | 705 | (27.8) | 124 | (4.9)dia | 673 | (26.5) |
| Side lights | 1293 | (50.9) | 115<br>38 | (4.5)x<br>(1.5) | 247 | (9.7) |
| Rear lights | 1346 | (53.0) | 90<br>75 | (3.5)x<br>(3.0) | 251 | (9.9) |
| Reflectors | 1285 | (50.6) | 70<br>32 | (2.8)x<br>(1.3) | 211 | (8.3) |

Number of grease points

Whole tractor: 8

## CONDITIONS DURING TEST

### Masses

Tractor (without driver but with tanks full)

| | Front, kg (lb) | Rear, kg (lb) | Total, kg (lb) |
|---|---|---|---|
| Without ballast | 881 (1942) | 1290 (2844) | 2171 (4786) |
| With ballast | 1095 (2414) | 2449 (5399) | 3544 (7813) |

Ballast

| | Number of weights | Total mass, kg (lb) | Water, kg (lb) |
|---|---|---|---|
| Front wheels | Nil | Nil | Nil |
| Rear wheels | 16 | 900 (1984) | 337 (743) |
| Additional | 4 | 136 (300) | Front frame and weights |

### Track setting during tests

Front - 1320 m/m (52.0 in)

Rear - 1320 m/m (52.0 in)

### Overall dimensions

| | Length, m (in) | Width, m (in) | Height, m (in) To top of exhaust pipe | Height, m (in) To top of cab |
|---|---|---|---|---|
| With ballast | 3.89 (153.1) | 2.28 (89.8) | 2.36 (92.9) | 2.29 (90.2) |
| Without ballast | 3.44 (135.4) | 1.62 (63.8) | 2.36 (92.9) | 2.29 (90.2) |

Minimum ground clearance 226 m/m (8.9 in) to underside of drawbar frame

## FUEL AND LUBRICANTS USED IN TESTS

| | |
|---|---|
| Fuel | Diesel oil to Class A2 British Standard 2869: 1970 specific gravity 0.849 at 15°C (59°F), viscosity 2.90 cSt at 50°C (122°F), Cetane No. 55.0 |
| Oil | |
| Engine: | Agricastrol M.P. S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F) |
| Transmission: | Agricastrol M.P. S.A.E. 20W/30, viscosity 54 cSt at 50°C (122°F) |

## COMPULSORY TESTS

### 1. MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests: 22nd August 1978, N.I.A.E., Silsoe, Bedford, UK.

Type of dynamometer: Water brake, Heenan and Froude

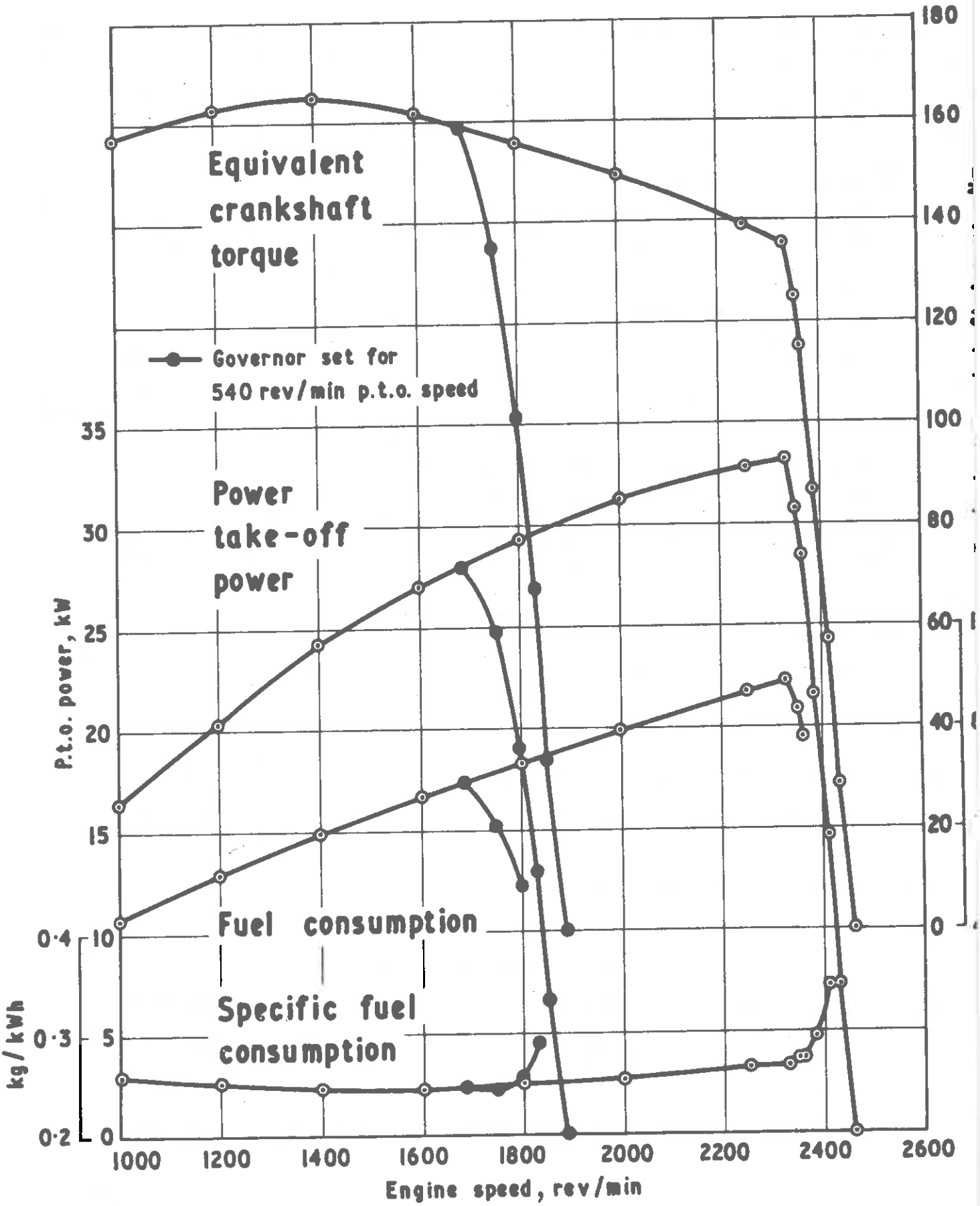
| Power, kW (hp) | Speed, rev/min | | Fuel consumption, | | | |
|---|---|---|---|---|---|---|
| | Engine | P.t.o. | l/h (UKgal/h) | kg/h (lb/h) | kg/kWh (lb/hph) | kWh/l (hph/UKgal) |
| Maximum power - 2 hour test | | | | | | |
| 33.1 (44.4) | 2330 | 747 | 10.45 (2.30) | 8.87 (19.55) | 0.268 (0.441) | 3.17 (19.3) |
| The speed recommended by the manufacturer for drawbar work | | | | | | |
| 32.8 (44.0) | 2250 | 722 | 10.24 (2.25) | 8.69 (19.16) | 0.265 (0.436) | 3.20 (19.5) |
| Part loads | | | | | | |
| (1) 85% of the torque obtained at maximum power | | | | | | |
| 28.5 (38.2) | 2360 | 757 | 9.20 (2.02) | 7.81 (17.22) | 0.274 (0.450) | 3.10 (18.9) |
| (2) Unloaded | | | | | | |
| 0 | 2460 | 789 | 3.10 (0.68) | 2.63 (5.80) | - | - |
| (3) 50% of the load defined in (1) | | | | | | |
| 14.6 (19.6) | 2412 | 774 | 5.94 (1.31) | 5.04 (11.11) | 0.345 (0.567) | 2.46 (15.0) |
| (4) Maximum power | | | | | | |
| 33.1 (44.4) | 2330 | 747 | 10.45 (2.30) | 8.87 (19.55) | 0.268 (0.441) | 3.17 (19.3) |
| (5) 25% of the load defined in (1) | | | | | | |
| 7.3 (9.8) | 2435 | 781 | 4.46 (0.98) | 3.79 (0.36) | 0.519 (0.853) | 1.64 (10.0) |
| (6) 75% of the load defined in (1) | | | | | | |
| 21.6 (29.0) | 2382 | 764 | 7.50 (1.65) | 6.37 (14.04) | 0.295 (0.485) | 2.88 (17.6) |

| Power, kW (hp) | Speed, rev/min | | Fuel consumption, | | | |
|---|---|---|---|---|---|---|
| | Engine | P.t.o. | l/h (UKgal/h) | kg/h (lb/h) | kg/kWh (lb/hph) | kWh/l (hph/UKgal) |
| Part loads, the governor hand lever in the position corresponding to the standard p.t.o. speed at full load (540 rev/min). | | | | | | |
| (1) 85% of the torque obtained at maximum power | | | | | | |
| 24.7 (33.1) | 1752 | 562 | 7.13 (1.57) | 6.05 (13.34) | 0.245 (0.403) | 3.46 (21.1) |
| (2) Unloaded | | | | | | |
| 0 | 1886 | 605 | 1.84 (0.40) | 1.56 (3.44) | - | - |
| (3) 50% of the load defined in (1) | | | | | | |
| 12.9 (17.3) | 1830 | 587 | 4.42 (0.97) | 3.75 (8.27) | 0.291 (0.479) | 2.92 (17.8) |
| (4) Maximum power | | | | | | |
| 27.9 (37.4) | 1684 | 540 | 8.19 (1.80) | 6.95 (15.32) | 0.249 (0.410) | 3.41 (20.8) |
| (5) 25% of the load defined in (1) | | | | | | |
| 6.5 (8.7) | 1850 | 593 | 3.07 (0.68) | 2.61 (5.75) | 0.401 (0.660) | 2.12 (12.9) |
| (6) 75% of the load defined in (1) | | | | | | |
| 19.0 (25.5) | 1797 | 576 | 5.71 (1.26) | 4.85 (10.69) | 0.255 (0.419) | 3.33 (20.3) |

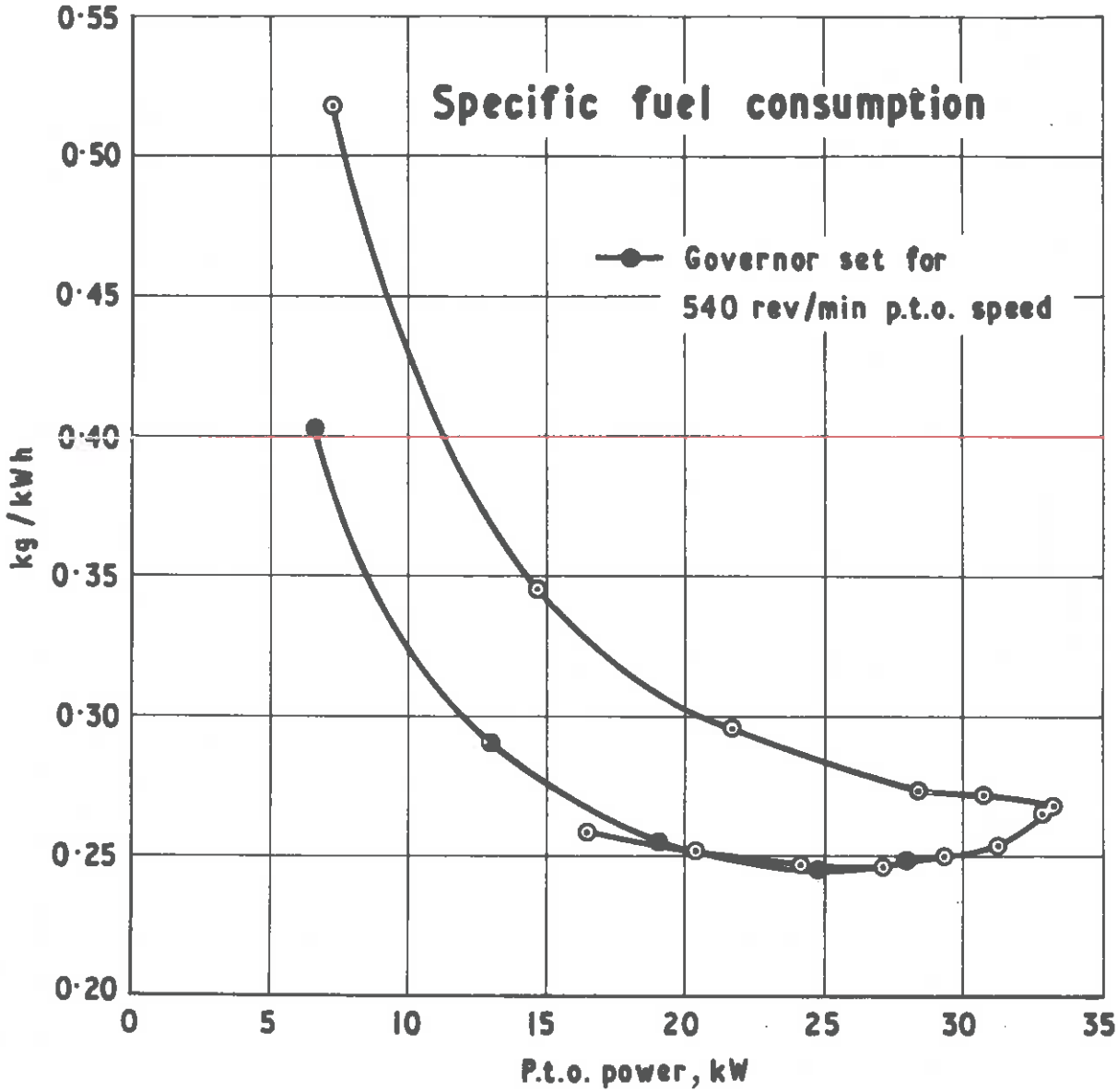
Standard specific fuel consumption, kg/kWh (lb/hph)

(a) 0.274 (0.450) (b) 0.345 (0.567) (c) 0.245 (0.403) (d) 0.291 (0.479)

| | | | |
|---|---|---|---|
| No load, maximum engine speed | | 2460 rev/min | |
| Equivalent crankshaft torque at maximum power | | 135.6 Nm | (100.0 lb ft) |
| Maximum equivalent crankshaft torque | | 164.7 Nm | (121.5 lb ft) at 1390 rev/min engine speed |
| Mean atmospheric conditions | temperature | 23 °C | ( 73 °F) |
| | pressure | 1017 m bar | (30.03 in Hg) |
| | relative humidity | 76 % | |
| Maximum temperature | coolant | 97 °C | (207 °F) |
| | engine oil | 117 °C | (243 °F) |
| | fuel | 38 °C | (100 °F) |
| | air intake | 28 °C | ( 82 °F) |




Power take-off test




Power take-off test

DRAWBAR PERFORMANCE Date of tests: 27th September - 25th October 1978 Type of track: Concrete Height of drawbar above ground: 337 mm (13.3 in)

| Gear | Power, kW (hp) | Drawbar pull, kN (lb) | Speed, km/h (mile/h) | Engine speed, rev/min | Wheel-slip, % | Specific fuel consumption, kg/kWh (lb/hph) | kWh/l (hph/UKgal) | Temperature, °C (°F) Coolant | Fuel | Engine oil | Atmospheric conditions Temperature, °C (°F) | Relative humidity, % | Pressure, m bar (in Hg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) MAXIMUM POWER (ballasted) | | | | | | | | | | | | | |
| L1 | *12.7 (17.0) | 23.0 (5170) | 1.99 (1.24) | 2411 | 15.0 | 0.390 (0.641) | 2.18 (13.3) | 83 (181) | 23 (73) | 98 (208) | 17 (63) | 80 | 1008 (29.77) |
| L2 | *18.5 (24.8) | 23.0 (5170) | 2.90 (1.80) | 2388 | 15.0 | 0.349 (0.574) | 2.43 (14.8) | 82 (180) | 27 (81) | 90 (194) | 16 (61) | 80 | 1008 (29.77 |
| L3 | *25.0 (33.5) | 23.0 (5170) | 3.91 (2.43) | 2358 | 15.0 | 0.319 (0.524) | 2.66 (16.2) | 85 (185) | 22 (72) | 92 (198) | 17 (63) | 90 | 1008 (29.77) |
| L4 | 28.7 (38.5) | 19.0 (4270) | 5.44 (3.38) | 2330 | 11.5 | 0.289 (0.475) | 2.94 (17.9) | 86 (187) | 18 (64) | 88 (190) | 16 (61) | 80 | 1008 (29.77) |
| H1 | 29.3 (39.3) | 12.2 (2740) | 8.65 (5.38) | 2333 | 7.3 | 0.297 (0.488) | 2.86 (17.4) | 87 (189) | 23 (73) | 103 (217) | 16 (61) | 80 | 1008 (29.77) |
| H2 | 28.4 (38.1) | 8.0 (1800) | 12.78 (7.94) | 2306 | 5.0 | 0.291 (0.478) | 2.92 (17.8) | 83 (181) | 21 (70) | 83 (181) | 16 (61) | 80 | 1008 (29.77) |
| (ii) FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER | | | | | | | | | | | | | |
| L4 | 22.9 (30.7) | 14.3 (3210) | 5.77 (3.59) | 2379 | 8.5 | 0.311 (0.511) | 2.73 (16.6) | 82 (180) | 25 (77) | 105 (221) | 14 (57) | 80 | 1020 (30.12) |
| (iii) †FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST (i) | | | | | | | | | | | | | |
| L3 | - | 23.0 (5170) | 4.10 (2.55) | 2356 | - | - | - | 83 (181) | 26 (79) | 88 (190) | 7 (45) | 88 | 1006 (29.71) |
| (iv) MAXIMUM POWER (unballasted) | | | | | | | | | | | | | |
| L3 | *18.0 (24.1) | 16.5 (3710) | 3.93 (2.44) | 2383 | 15.0 | - | - | 79 (174) | 23 (73) | 82 (180) | 19 (66) | 73 | 1023 (30.21) |
| L4 | *23.7 (31.8) | 16.5 (3710) | 5.17 (3.21) | 2350 | 15.0 | - | - | 83 (181) | 23 (73) | 98 (208) | 15 (59) | 90 | 1023 (30.21) |
| H1 | 29.4 (39.4) | 12.5 (2810) | 8.47 (5.26) | 2338 | 8.5 | - | - | 86 (187) | 21 (70) | 96 (205) | 15 (59) | 90 | 1023 (30.21) |
| H2 | 28.6 (38.4) | 8.0 (1800) | 12.87 (8.00) | 2340 | 4.9 | - | - | 87 (189) | 22 (72) | 93 (199) | 15 (59) | 90 | 1023 (30.21) |

Total oil consumption during ten hours duration of tests (ii) and (iii) 12.0 g/h (0.026 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 - 1320 mm (52.0 in)

rear - 1320 mm (52.0 in)

| | With brakes | | Without brakes | |
|---|---|---|---|---|
| | Right-hand | Left-hand | Right-hand | Left-hand |
| Radius of turning space, m (in) | 3.53 (139) | 3.56 (140) | 3.97 (156) | 3.98 (157) |
| Radius of turning circle, m (in) | 3.41 (134) | 3.44 (135) | 3.85 (152) | 3.86 (152) |

## 4. LOCATION OF CENTRE OF GRAVITY

| | |
|---|---|
| Height above ground, mm (in) | 738 (29.1) |
| Distance forward from the vertical plane containing the axis of the rear wheels, mm (in) | 841 (33.1) |
| Distance from the median plane of the tractor, mm (in) | 0 |

## 5. BRAKING

Date of tests: 13th and 19th October 1978

Type of track: Concrete

Type of decelerometer: Moto Meter, recording type

Mass of ballasted tractor: 3544 kg (7813 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, $m/s^2$ ($ft/s^2$) | 4.6 (15.1) | 5.3 (17.4) |
| Stopping distance, m (ft) | 5.8 (19.0) | 6.3 (20.7) |
| Force on brake pedal, N (lb) | 450 (101) | 520 (117) |
| Force exerted on the brake pedal to achieve a deceleration of 2.5 $m/s^2$ (8.2 $ft/s^2$), N (lb) | 275 (62) | 275 (62) |

Brake fade characteristics (hot tests)

| | | Tractor without ballast | Tractor ballasted |
|---|---|---|---|
| Maximum deceleration hot/cold, | % | 101 | 100 |
| Stopping distance cold/hot, | % | 100 | 109 |
| Force on pedal cold/hot, | % | 105 | 102 |

Parking brake

Efficacy of handbrake: Satisfactory facing up and down slope of 16%

Pull on handbrake: 338 N (76 lb)

6. MEASUREMENT OF AMBIENT NOISE EMITTED BY THE TRACTOR

Date of tests: 26th October 1978

Type of sound level meter: Bruel and Kjaer 2209

Type of track: Concrete

Results of tests:

Gear: H4

Travelling speed before acceleration: 19.7 km/h (12.2 mile/h)

Sound level: 84 dBA

7. NOISE MEASUREMENT AT THE DRIVER'S EAR LEVEL

Date of tests: 26th October 1978

Type of sound level meter: Bruel and Kjaer 2209

Type of track: Concrete

| Gear | Travelling speed, km/h (mile/h) | dBA |
|---|---|---|
| H1 | 8.6 (5.3) | 85 |

## 8. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

| | | |
|---|---|---|
| Date of tests: | 30th October and 1st September 1978 | |
| Hydraulic fluid | | |
| Make and type: | Agricastrol MP SAE 20 W/30 | |
| 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): | 19.3 MPa | (2800 lb/in$^2$) |
| Pump characteristics | | |
| i) Opening pressure of relief valve | 16.3 MPa | (2360 lb/in$^2$) |
| Sustained pressure of the open relief valve | 19.1 MPa | (2770 lb/in$^2$) |
| ii) Pump delivery rate at minimum pressure and rated engine speed: | 20.1 l/min | (4.4 gal/min) |
| iii) Pump delivery rate at maximum hydraulic power: | 20.8 l/min | (4.6 gal/min) |
| Delivery pressure: | 16.3 MPa | (2360 lb/in$^2$) |
| Power: | 5.6 kW | (7.5 hp) |

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

| | Maximum mechanical advantage | Minimum mechanical advantage |
|---|---|---|
| Projected length in side view | | |
| Lower links | 873 (34.4) | 873 (34.4) |
| Lift arms | 267 (10.5) | 267 (10.5) |
| Lift rods | 572 (22.5) | 572 (22.5) |
| Top link | 639 (25.1) | 639 (25.1) |
| Distance of lift rod connection point from pivot point of lower link | 448 (17.6) | 448 (17.6) |
| The following dimensions are given relative to the rear wheel centre line, situated 590 mm (23.2 in) above the ground level | | |
| Lower link pivot point | 44 (1.7) forward, 114 (4.5) below | 44 (1.7) forward, 114 (4.5) below |
| Top link pivot point | 194 (7.6) behind, 277 (10.9) above | 201 (7.9) behind, 228 (9.0) above |
| Lift arm pivot point | 196 (7.7) forward, 233 (9.2) above | 196 (7.7) forward, 233 (9.2) above |
| Maximum and minimum height of lower link hitch points | 265 (10.4) above, 459 (18.1) below | 265 (10.4) above, 459 (18.1) 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 height in relation to a horizontal line through the lower link pivoting point | | mm<br>(in) | -370<br>(14.6) | -340<br>(13.4) | -320<br>(12.6) | -280<br>(11.0) | -200<br>(7.9) | -100<br>(3.9) | 0 | +100<br>(3.9) | +200<br>(7.9) | +300<br>(11.8) | +360<br>(14.2) | +400<br>(15.7) | +480<br>(18.9) | +520<br>(20.5) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lifting force with the pressure at maximum hydraulic power (16.3 MPa (2360 lb/in$^2$)) calculated from measurements made at maximum pressure (19.1 MPa(2770 lb/in$^2$)), kN (lb) | At the hitch points | | | | *11.3<br>(2540) | 12.1<br>(2720) | 12.7<br>(2860) | 13.3<br>(2990) | 13.8<br>(3100) | 14.2<br>(3190) | 14.6<br>(3280) | 15.0<br>(3370) | 15.3<br>(3440) | | | |
| | On the frame | max. mech. advantage | | 10.8<br>(2430) | 10.9<br>(2450) | 11.0<br>(2470) | 11.2<br>(2520) | 11.3<br>(2540) | 11.3<br>(2540) | 11.2<br>(2520) | 10.9<br>(2450) | 10.5<br>(2360) | 10.3<br>(2320) | 10.1<br>(2270) | 9.8<br>(2200) | *9.7<br>(2180) |
| | | min. mech. advantage | 10.3<br>(2320) | 10.3<br>(2320) | 10.3<br>(2320) | 10.4<br>(2340) | 10.5<br>(2360) | 10.6<br>(2380) | 10.5<br>(2360) | 10.4<br>(2340) | 10.3<br>(2320) | 9.9<br>(2230) | 9.7<br>(2180) | 9.5<br>(2140) | 9.2<br>(2070) | *9.0<br>(2020) |

* Maximum force exerted throughout whole range

Force at which front of tractor is calculated to lift with maximum allowable front ballast is in excess of measured values

## OPTIONAL TESTS

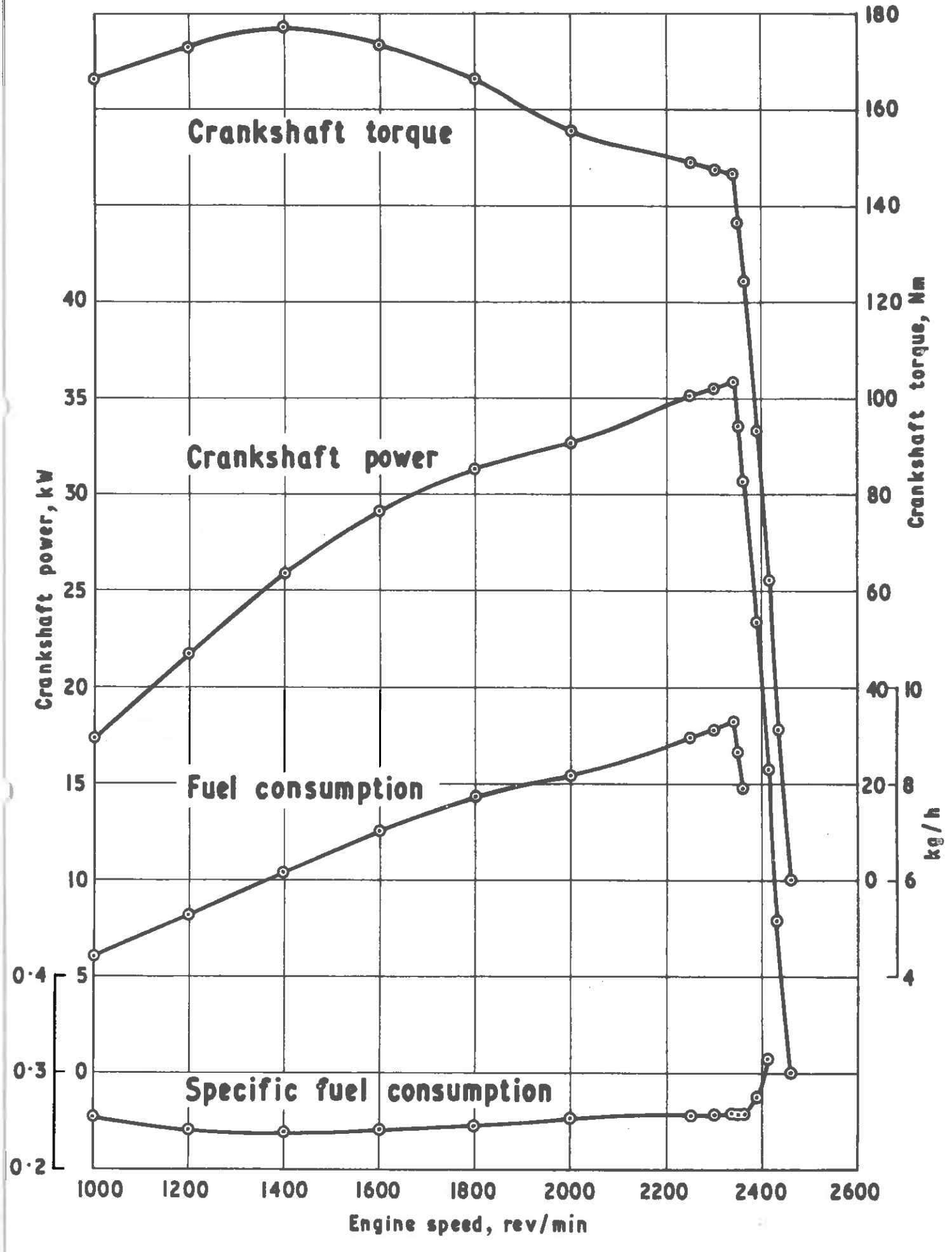
### 9. PERFORMANCE AT ENGINE CRANKSHAFT

Date and location of tests: 4th August 1978, N.I.A.E., Silsoe, Bedford, U.K.

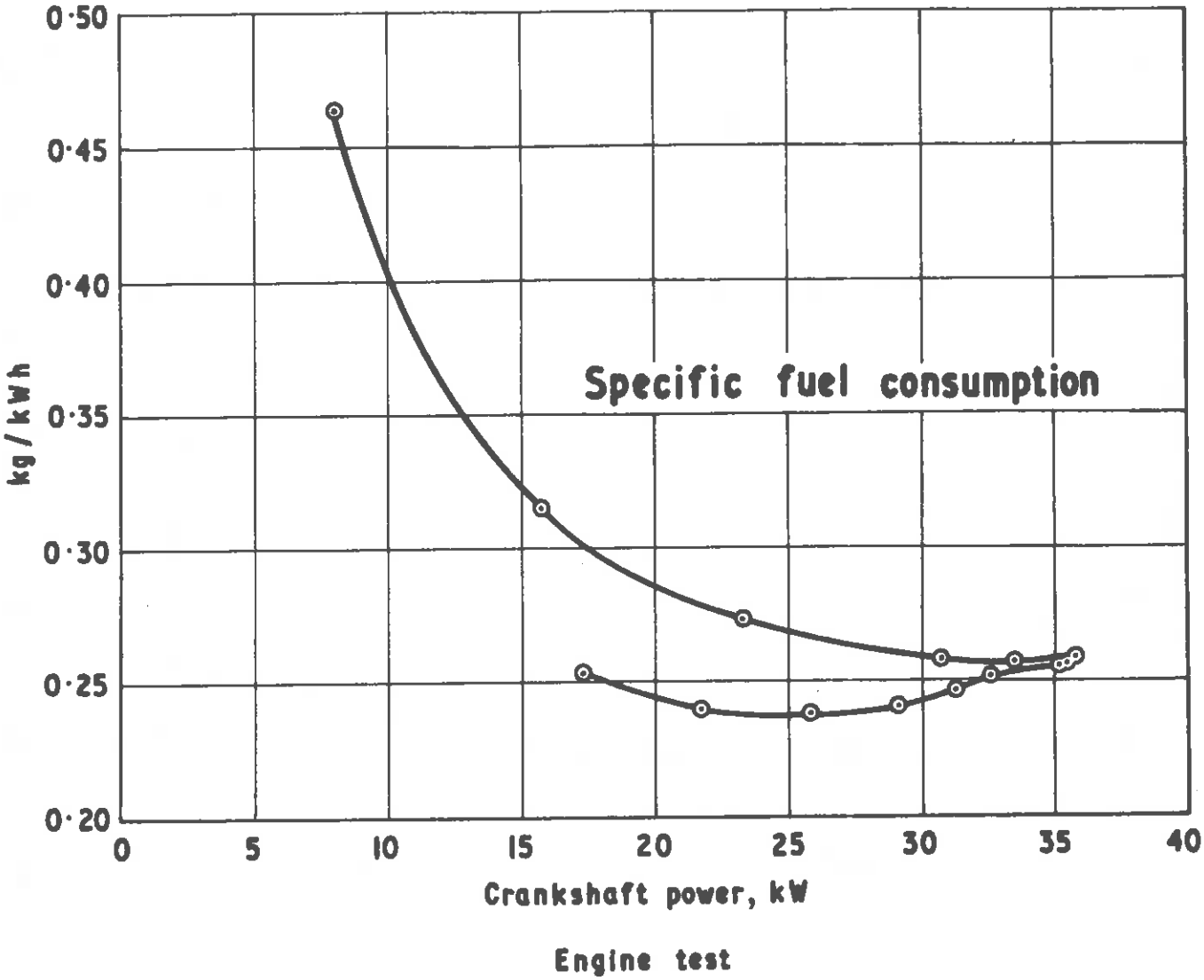
Type of dynamometer: Water brake, Heenan and Froude

| Power, kW (hp) | Speed, rev/min | Fuel consumption, l/h (UKgal/h) | kg/h (lb/h) | kg/kWh (lb/hph) | kWh/l (hph/UKgal) |
|---|---|---|---|---|---|
| Maximum power - 2 hour test | | | | | |
| 35.8 (48.0) | 2340 | 10.92 (2.40) | 9.27 (20.44) | 0.259 (0.426) | 3.28 (20.0) |
| The speed recommended by the manufacturer for drawbar work | | | | | |
| 35.1 (47.1) | 2250 | 10.54 (2.32) | 8.95 (19.73) | 0.255 (0.419) | 3.33 (20.3) |
| Part loads | | | | | |
| (1) 85% of the torque obtained at maximum power | | | | | |
| 30.7 (41.2) | 2361 | 9.33 (2.05) | 7.92 (17.46) | 0.258 (0.424) | 3.29 (20.1) |
| (2) Unloaded | | | | | |
| 0 | 2460 | 3.06 (0.67) | 2.60 (5.73) | - | - |
| (3) 50% of the load defined in (1) | | | | | |
| 15.7 (21.1) | 2416 | 5.83 (1.28) | 4.95 (10.91) | 0.315 (0.518) | 2.69 (16.4) |
| (4) Maximum power | | | | | |
| 35.8 (48.0) | 2340 | 10.92 (2.40) | 9.27 (20.44) | 0.259 (0.426) | 3.28 (20.0) |
| (5) 25% of the load defined in (1) | | | | | |
| 7.9 (10.6) | 2436 | 4.32 (0.95) | 3.67 (8.09) | 0.465 (0.764) | 1.83 (11.2) |
| (6) 75% of the load defined in (1) | | | | | |
| 23.3 (31.2) | 2390 | 7.51 (1.65) | 6.38 (14.07) | 0.274 (0.451) | 3.10 (18.9) |

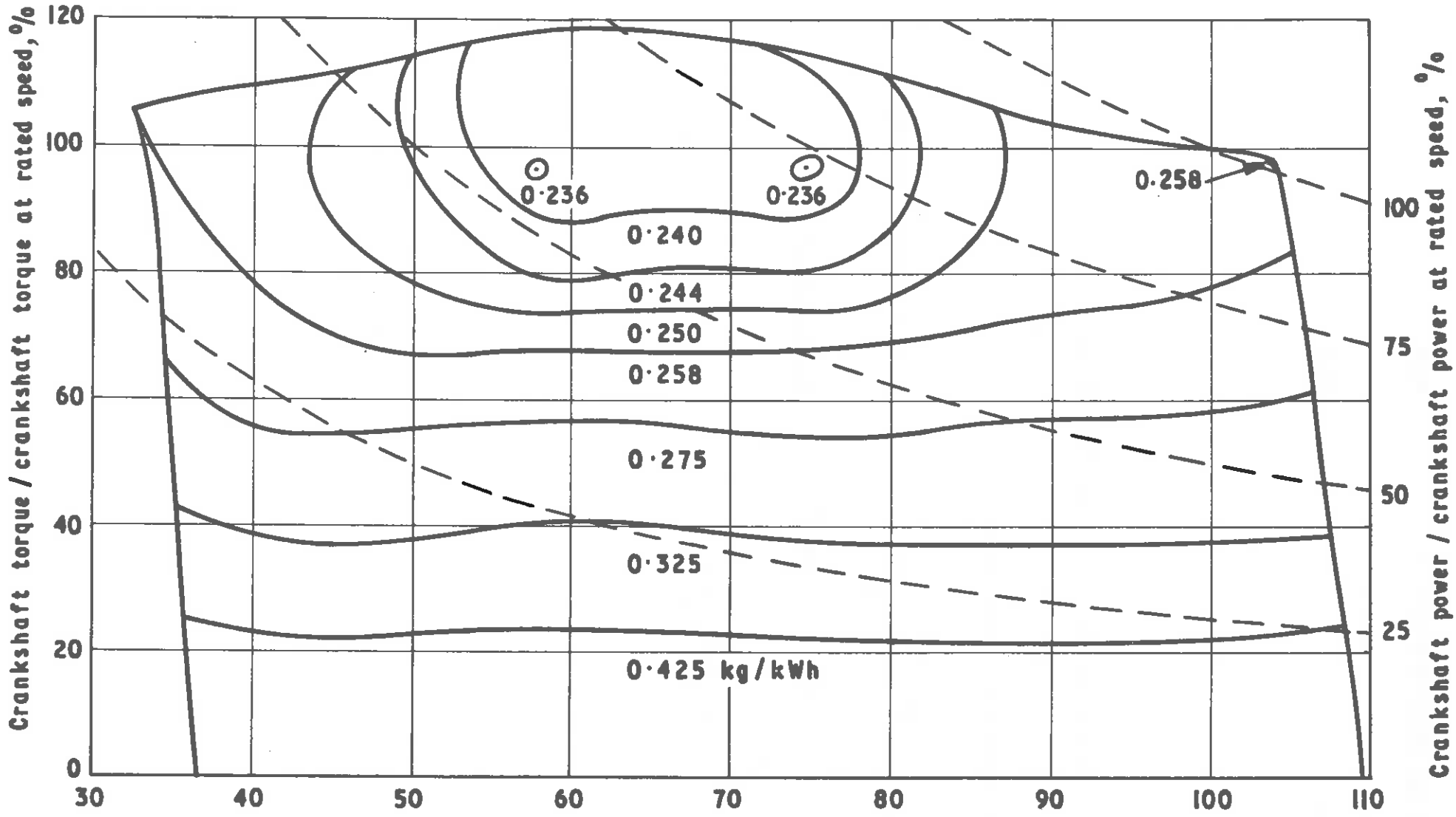
| | | | |
|---|---|---|---|
| No load, maximum engine speed | | 2460 rev/min | |
| Crankshaft torque at maximum power | | 146.1 Nm | (107.8 lb ft) |
| Maximum crankshaft torque | | 176.8 Nm | (130.4 lb ft) at 1390 rev/min engine speed |
| Mean atmospheric conditions | temperature | 20 °C | ( 68 °F) |
| | pressure | 1011 m bar | (29.85 in Hg) |
| | relative humidity | 75 % | |
| Maximum temperature | coolant | 91 °C | (196 °F) |
| | engine oil | 115 °C | (239 °F) |
| | fuel | 31 °C | ( 88 °F) |
| | air intake | 26 °C | ( 79 °F) |


Crankshaft torque
Crankshaft power
Fuel consumption
Specific fuel consumption
Crankshaft power, kW
Crankshaft torque, Nm
kg/h
Engine speed, rev/min
1000
1200
1400
1600
1800
2000
2200
2400
2600
40
35
30
25
20
15
10
5
0
180
160
140
120
100
80
60
40
20
0
10
8
6
4
0·4
0·3
0·2

Engine test


0·50
0·45
0·40
0·35
0·30
0·25
0·20
kg / kWh
Specific fuel consumption
0
5
10
15
20
25
30
35
40
Crankshaft power, kW

Engine test


Crankshaft torque / crankshaft torque at rated speed, %
120
100
80
60
40
20
0
0·236
0·236
0·240
0·244
0·250
0·258
0·275
0·325
0·425 kg/kWh
0·258
100
75
50
25
Crankshaft power / crankshaft power at rated speed, %
30
40
50
60
70
80
90
100
110
Engine speed / rated engine speed, %

Engine test

REPAIRS AND ADJUSTMENTS DURING TESTS: None

REMARKS: None

Test carried out by: N.R. Baker and P.C. Seward

Officer in charge: D.W. Smith

Signed: M J Dwyer Head of Tractor Department

for the Director

Date: 5/4/79