

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

January 1984

Test 1538: Massey-Ferguson 670 Diesel and Massy-Ferguson 270 Multipower Diesel 12-Speeds

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 1538: Massey-Ferguson 670 Diesel and Massy-Ferguson 270 Multipower Diesel 12-Speeds" (1984). *Nebraska Tractor Tests*. 1849.
<https://digitalcommons.unl.edu/tractormuseumlit/1849>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

NEBRASKA TRACTOR TEST 1538—MASSEY FERGUSON 670 DIESEL ALSO MASSEY FERGUSON 270 MULTIPOWER DIESEL 12 SPEED

POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption | | | Temperature °F (°C) | | | Barometer inch Hg (kPa) |
|--|--------------------------------|-------------------------|-------------------------|-------------------------|----------------------|---------------------|---------------------|-------------------------------|
| | | gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Cooling medium | Air wet bulb | Air dry bulb | |
| MAXIMUM POWER AND FUEL CONSUMPTION | | | | | | | | |
| Rated Engine Speed—Two Hours (PTO Speed—1182 rpm) | | | | | | | | |
| 55.62 (41.48) | 2001 | 3.579 (13.547) | 0.449 (0.273) | 15.54 (3.062) | 187 (86.1) | 63 (17.1) | 75 (23.9) | 28.69 (96.87) |
| Standard Power Take-off Speed (1000 rpm)—One Hour | | | | | | | | |
| 51.44 (38.36) | 1692 | 3.138 (11.879) | 0.426 (0.259) | 16.39 (3.229) | 187 (85.8) | 62 (16.4) | 75 (23.8) | 28.69 (96.88) |
| VARYING POWER AND FUEL CONSUMPTION—Two Hours | | | | | | | | |
| 48.82 (36.41) | 2062 | 3.239 (12.260) | 0.463 (0.281) | 15.07 (2.970) | 182 (83.1) | 63 (17.2) | 75 (23.6) | |
| 0.00 (0.00) | 2157 | 1.222 (4.624) | | | 175 (79.4) | 63 (17.2) | 75 (23.6) | |
| 25.02 (18.66) | 2115 | 2.146 (8.124) | 0.598 (0.364) | 11.66 (2.297) | 176 (80.0) | 64 (17.8) | 76 (24.2) | |
| 56.02 (41.78) | 2000 | 3.383 (13.562) | 0.446 (0.271) | 15.64 (3.080) | 186 (85.6) | 64 (17.8) | 74 (23.3) | |
| 12.64 (9.42) | 2138 | 1.673 (6.333) | 0.924 (0.562) | 7.55 (1.488) | 176 (80.0) | 64 (17.8) | 74 (23.3) | |
| 37.02 (27.61) | 2089 | 2.654 (10.045) | 0.500 (0.304) | 13.95 (2.748) | 176 (80.0) | 64 (17.5) | 74 (23.3) | |
| Av 29.92 Av (22.31) | 2093 | 2.419 (9.158) | 0.564 (0.343) | 12.37 (2.436) | 178 (81.3) | 64 (17.5) | 74 (23.6) | 28.71 (96.94) |

DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank- shaft speed rpm | Slip % | Fuel Consumption | | | Temp. °F (°C) | | | Barom. inch Hg (kPa) |
|---|--------------------------------|------------------------|---------------------------------|-----------|-------------------|-----------------------|-----------------------|---------------------|--------------------|--------------------|----------------------------|
| | | | | | gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Cool- ing med | Air wet bulb | Air dry bulb | |
| Maximum Available Power—Two Hours 7th (1LH) Gear | | | | | | | | | | | |
| 45.52 (33.94) | 3503 (15.58) | 4.87 (7.84) | 2002 | 6.44 | 3.520 (13.324) | 0.539 (0.328) | 12.93 (2.548) | 185 (85.0) | 61 (16.1) | 75 (23.6) | 28.83 (97.35) |
| 75% of Pull at Maximum Power—Ten Hours 7th (1LH) Gear | | | | | | | | | | | |
| 36.41 (27.15) | 2657 (11.82) | 5.14 (8.27) | 2065 | 4.40 | 3.009 (11.392) | 0.577 (0.351) | 12.10 (2.383) | 177 (80.5) | 63 (17.1) | 69 (20.8) | 28.69 (96.87) |
| 50% of Pull at Maximum Power—Two Hours 7th (1LH) Gear | | | | | | | | | | | |
| 24.93 (18.59) | 1772 (7.88) | 5.27 (8.49) | 2087 | 2.94 | 2.430 (9.199) | 0.680 (0.414) | 10.26 (2.021) | 177 (80.3) | 59 (14.7) | 64 (17.5) | 28.86 (97.46) |
| 50% of Pull at Reduced Engine Speed—Two Hours 9th (2LH) Gear | | | | | | | | | | | |
| 24.95 (18.61) | 1771 (7.88) | 5.28 (8.50) | 1392 | 2.77 | 1.921 (7.272) | 0.537 (0.327) | 12.99 (2.558) | 178 (81.1) | 61 (16.1) | 68 (19.7) | 28.86 (97.46) |
| MAXIMUM POWER IN SELECTED GEARS | | | | | | | | | | | |
| 36.10 (26.92) | 6382 (28.39) | 2.12 (3.41) | 2060 | 14.81 | 4th (2HL) Gear | | | 177 (80.6) | 59 (15.0) | 62 (16.7) | 28.76 (97.12) |
| 44.78 (33.39) | 5422 (24.12) | 3.10 (4.98) | 1997 | 11.34 | 5th (3LL) Gear | | | 180 (81.9) | 60 (15.6) | 66 (18.9) | 28.80 (97.25) |
| 45.56 (33.97) | 4196 (18.66) | 4.07 (6.55) | 1999 | 8.11 | 6th (3HL) Gear | | | 181 (82.5) | 60 (15.6) | 66 (18.9) | 28.80 (97.25) |
| 46.05 (34.34) | 3543 (15.76) | 4.87 (7.84) | 2000 | 6.41 | 7th (1LH) Gear | | | 184 (84.2) | 60 (15.6) | 72 (22.2) | 28.84 (97.39) |
| 45.70 (34.08) | 2735 (12.17) | 6.27 (10.08) | 1999 | 4.77 | 8th (1HH) Gear | | | 181 (82.8) | 59 (15.0) | 67 (19.4) | 28.81 (97.29) |
| 44.97 (33.53) | 2250 (10.01) | 7.49 (12.06) | 2001 | 3.99 | 9th (2LH) Gear | | | 181 (82.5) | 59 (15.0) | 68 (20.0) | 28.82 (97.32) |
| 43.92 (32.75) | 1718 (7.64) | 9.59 (15.43) | 1999 | 3.00 | 10th (2HH) Gear | | | 180 (81.9) | 58 (14.4) | 68 (20.0) | 28.82 (97.32) |

Department of Agricultural Engineering

Dates of Test: September 5-20, 1984

Manufacturer: MASSEY FERGUSON S.A. Avenue Blaise Pascal, 60026 Beauvais, France

FUEL, OIL AND TIME: Fuel No. 2 Diesel Cetane No. 46.8 (rating taken from oil company's inspection data) Specific gravity converted to 60°/60°F (15/15°C) 0.8377 Fuel weight 6.975 lbs/gal (0.836 kg/l) Oil SAE 15W-40 API service classification SE, CC, CD To motor 1.911 gal (7.232 l) Drained from motor 1.580 gal (5.980 l) Transmission and final drive lubricant Massey Ferguson Permatran III fluid Total time engine was operated 42.5 hours.

ENGINE: Make Perkins Diesel Type four cylinder vertical Serial No. LD31110U932519K Crankshaft lengthwise Rated rpm 2000 Bore and stroke 3.875" × 5.0" (98.4 mm × 127 mm) Compression ratio 16 to 1 Displacement 236 cu in (3863 ml) Starting system 12 volt Lubrication pressure Air cleaner two paper elements Oil filter one full flow cartridge Oil cooler radiator for hydraulic and transmission oil, radiator for power steering fluid Fuel filter one paper element and sediment bowl Muffler vertical Cooling medium temperature control one thermostat.

CHASSIS: Type front wheel assist Serial No. Δ670RUK 323002 Δ Tread width rear 56" (1422 mm) to 90" (2286 mm) front 58" (1484 mm) to 70" (1790 mm) Wheel base 90" (2286 mm) Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 34.1" (867 mm) Vertical distance above roadway 37.7" (958 mm) Horizontal distance from center of rear wheel tread 0" (0 mm) to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph (km/h) first 1.3 (2.1) second 1.6 (2.6) third 1.9 (3.1) fourth 2.4 (3.9) fifth 3.5 (5.7) sixth 4.5 (7.2) seventh 5.3 (8.5) eighth 6.7 (10.7) ninth 7.9 (12.7) tenth 10.0 (16.1) eleventh 14.5 (23.3) twelfth 18.3 (29.5) reverse 1.9 (3.1), 2.4 (3.9), 7.9 (12.7), 10.0 (16.1) Clutch single dry disc operated by foot pedal Brakes multiple wet disc hydraulically operated by two foot pedals which can be locked together and mechanically by hand lever Steering hydrostatic Turning radius (on concrete surface with brake applied) right 165" (4.19 m) left 163" (4.14 m) (on concrete surface without brake) right 195" (4.95 m) left 192.5" (4.89 m) Turning space diameter (on concrete surface with brake applied) right 341" (8.66 m) left 337" (8.56 m) (on concrete surface without brake) right 401" (10.19 m) left 396" (10.06 m) Power take-off 540 rpm at 1686 engine rpm and 1000 rpm at 1692 engine rpm Unladen tractor mass 8545 lb (3876 kg).

LUGGING ABILITY IN 7th (1LH) GEAR

| Crankshaft Speed rpm | 2000 | 1802 | 1604 | 1392 | 1195 | 993 |
|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Pull—lbs (kN) | 3543 (15.76) | 3801 (16.91) | 4009 (17.83) | 4225 (18.79) | 4359 (19.39) | 4241 (18.86) |
| Increase in Pull % | 0 | 7 | 13 | 19 | 23 | 20 |
| Power—Hp (kW) | 46.05 (34.34) | 44.27 (33.01) | 41.26 (30.76) | 37.55 (28.00) | 33.12 (24.70) | 26.84 (20.01) |
| Speed—Mph (km/h) | 4.87 (7.84) | 4.37 (7.03) | 3.86 (6.21) | 3.33 (5.36) | 2.85 (4.59) | 2.37 (3.82) |
| Slip % | 6.41 | 6.78 | 7.51 | 8.11 | 8.35 | 8.11 |

Front Wheel Drive

| TRACTOR SOUND LEVEL WITH CAB | Engaged dB(A) | Disengaged dB(A) |
|---|---------------|------------------|
| Maximum Available Power—Two Hours | 79.5 | 80.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 80.0 |
| 50% of Pull at Maximum Power—Two Hours | | 80.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 78.0 |
| Bystander in 11th (3HL) gear | | 84.0 |

DRAWBAR PERFORMANCE (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank- shaft speed rpm | Slip % | Fuel Consumption | | | Temp. °F (°C) | | | Barom. inch Hg (kPa) |
|---|--------------------------------|------------------------|---------------------------------|-----------|-------------------|-----------------------|-----------------------|---------------------|--------------------|--------------------|----------------------------|
| | | | | | gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Cool- ing med | Air wet bulb | Air dry bulb | |
| Maximum Available Power—Two Hours 7th (1LH) Gear | | | | | | | | | | | |
| 46.28 (34.51) | 3459 (15.38) | 5.02 (8.08) | 2001 | 4.45 | 3.534 (13.378) | 0.533 (0.324) | 13.10 (2.580) | 187 (86.1) | 62 (16.7) | 78 (25.3) | 28.82 (97.30) |

MAXIMUM POWER IN SELECTED GEARS

| | | | | | | | | | |
|------------------|-----------------|----------------|------|-------|----------------|---------------|--------------|--------------|------------------|
| 35.87 (26.73) | 7966 (35.43) | 1.69 (2.72) | 2061 | 14.81 | 3rd (2LL) Gear | 177 (80.6) | 60 (15.6) | 64 (17.8) | 28.78 (97.19) |
| 46.11 (34.38) | 4105 (18.26) | 4.21 (6.78) | 1999 | 5.70 | 6th (3HL) Gear | 181 (82.5) | 60 (15.6) | 67 (19.4) | 28.81 (97.29) |
| 47.13 (35.14) | 3524 (15.67) | 5.02 (8.07) | 2000 | 4.42 | 7th (1LH) Gear | 187 (86.1) | 62 (16.7) | 77 (25.0) | 28.82 (97.32) |

TIRES, BALLAST AND WEIGHT

| | With Ballast | Without Ballast |
|---|--------------------------|--------------------------|
| Rear Tires | Two 16.9-30; 6; 18 (125) | Two 16.9-30; 6; 18 (125) |
| Ballast | 200 lb (91 kg) | None |
| | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| Front Tires | Two 11.2-24; 6; 26 (180) | Two 11.2-24; 6; 26 (180) |
| Ballast | None | None |
| | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| Height of Drawbar | 17 in (430 mm) | 17 in (430 mm) |
| Static Weight with Operator—Rear | 5880 lb (2667 kg) | 5480 lb (2485 kg) |
| —Front | 3320 lb (1506 kg) | 3240 lb (1470 kg) |
| —Total | 9200 lb (4173 kg) | 8720 lb (3955 kg) |

THREE POINT HITCH PERFORMANCE

| | | |
|-------------------------------------|----------------------------|-------|
| Observed Maximum Pressure psi (kPa) | 3000 | 20680 |
| Location | trailer tipping connection | |
| Hydraulic oil temperature °F (°C) | 178 | 81 |
| Location | sump | |

| | Maximum Lift Capacity | Lift Capacity for Transport |
|-------------------------------------|-----------------------|--------------------------------|
| QUICK ATTACH CATEGORY | no II | *not measured |
| LOAD lbs (kg) | 3592 | 1629 |
| TIME sec | 2.31 | |
| HITCH POINT MOVEMENT in (mm) | | |
| Lowest position | 12.6 | 321 |
| Top of timed range | 36.6 | 930 |
| Highest position | 36.9 | 937 |
| LOAD CG MOVEMENT in (mm) | | |
| Lowest position | 11.9 | 302 |
| Top of timed range | 40.2 | 1021 |
| Highest position | 40.4 | 1027 |

*Implement load capacity for transport purposes not specified by manufacturer.

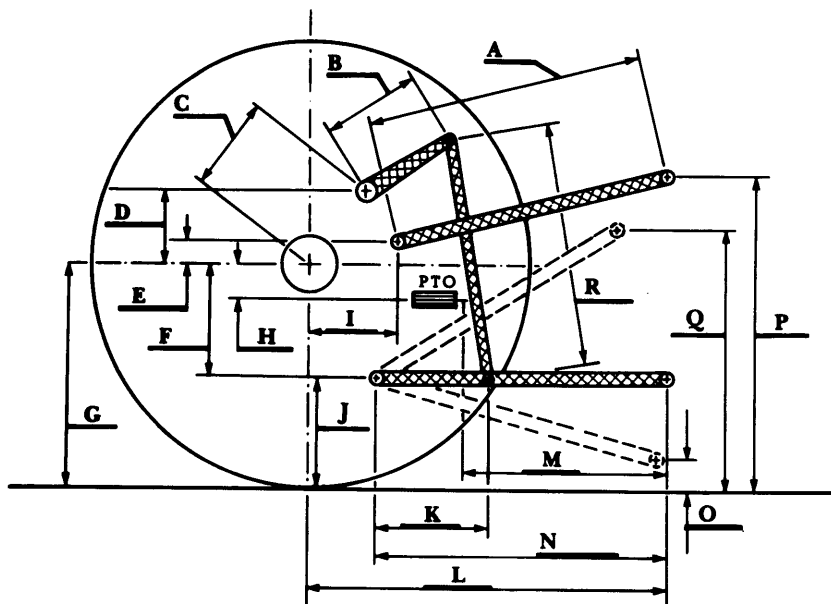
REPAIRS and ADJUSTMENTS: An auxiliary hydraulic valve gasket was replaced after the limber up run.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 146°F (63.4°C). Seven gears were chosen between 15% slip and 10 mph (16.1 km/h).

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1538, November 26, 1984.

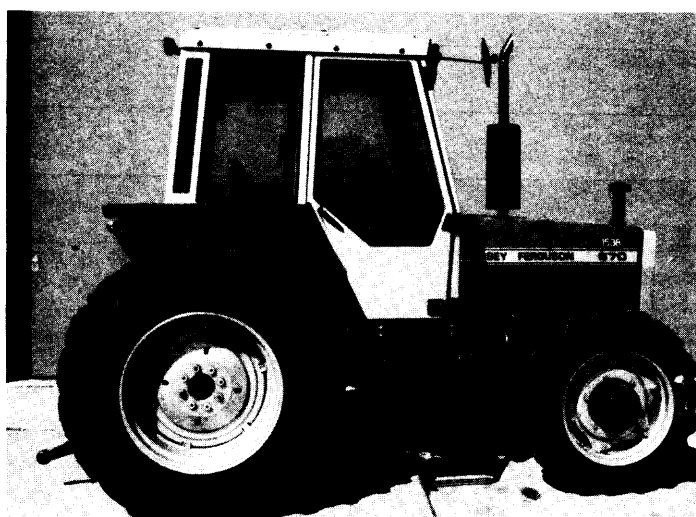
LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Hitch Dimensions as Tested — No Load

| | inch | mm |
|---|------|-----|
| A | 28.6 | 726 |
| B | 10.5 | 267 |
| C | 11.9 | 302 |
| D | 9.2 | 234 |
| E | 8.1 | 206 |
| F | 8.4 | 213 |
| G | 26.9 | 683 |
| H | 5.0 | 127 |
| I | 7.3 | 185 |
| J | 18.5 | 470 |
| K | 19.8 | 503 |
| L | 36.7 | 933 |
| M | 27.4 | 696 |
| N | 38.0 | 965 |
| O | 8.0 | 203 |
| P | 37.5 | 953 |
| Q | 33.0 | 838 |
| R | 26.3 | 667 |



Massey Ferguson 670 Diesel

The Agricultural Experiment Station
 Institute of Agriculture and Natural Resources
 University of Nebraska—Lincoln
 Irvin T. Omtvedt, Dean and Director