6-16-1958

Test 658: Massey-Ferguson MF-50 (LPG)

Nebraska Tractor Test Lab
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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: June 16 to 27, 1958
Manufacturer: MASSEY-FERGUSON INCORPORATED, DETROIT, MICHIGAN
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 658

MASSEY-FERGUSON MF-50 LPG

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hr	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Temp. Deg. F.: Cooling medium	Temp. Deg. F.: Air wet bulb	Temp. Deg. F.: Air dry bulb	Barometer inches of mercury
TEST B—100% MAXIMUM POWER—TWO HOURS								
32.12	2000	3.733	8.60	0.494	183	62	70	28.990
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
31.30	1998	3.515	8.90	0.477	180	63	70	29.015
TEST D—RATED POWER—ONE HOUR								
28.44	2256	3.565	7.98	0.533	178	63	70	29.000
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
28.42	2251	3.593	7.91	0.537	178	63	70	. . .
1.82	2344	1.793	1.02	4.187	158	62	69	
14.43	2283	2.696	5.35	0.794	169	63	70	. . .
30.91	1999	3.508	8.81	0.482	183	63	70	
7.32	2313	2.188	3.35	1.270	162	63	70	
21.46	2266	3.176	6.76	0.629	175	64	71	. . .
17.39	2243	2.826	6.15	0.691	171	63	70	28.992

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hr	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Temp. Deg. F.: Cooling med	Temp. Deg. F.: Air wet buib	Temp. Deg. F.: Air dry bulb	Barometer inches of mercury
TEST H—RATED POWER—TEN HOURS—4th Gear											
23.16	1440	6.03	2266	3.13	3.376	6.86	0.620	173	53	63	28.940
TEST F—100% MAXIMUM POWER											
29.44	2098	5.26	1996	4.00	4th Gear			185	58	70	28.930
TEST G—OPERATING MAXIMUM POWER											
16.80	5314	1.19	1998	13.67	1st Gear (part throttle)			176	54	61	28.960
25.28	5297	1.79	2007	13.39	2nd Gear (part throttle)			180	54	61	28.960
26.96	2864	3.53	2001	6.61	3rd Gear			189	67	83	28.515
27.31	1954	5.24	1997	4.39	4th Gear			185	67	83	28.515
26.54	1243	8.01	2000	2.84	5th Gear			184	67	83	28.515
22.39	560	14.99	2003	0.86	6th Gear			180	67	83	28.515
TEST J—OPERATING MAXIMUM POWER											
27.31	2053	4.99	2000	10.64	4th Gear			185	64	79	29.060

TEST K—SPEED-PULL CHARACTERISTIC

Pounds Pull	1440	1954	2100	2150	2200	2200	2250	2000
Horsepower	23.16	27.31	26.3	24.1	21.7	18.2	15.6	11.2
Miles Per Hour	6.03	5.24	4.7	4.2	3.7	3.1	2.6	2.1

FUEL, OIL, WATER and TIME Fuel Commercial Propane **Weight per gallon** 4.25 lb **Oil** SAE 10-30 **To motor** 1.236 gal **Drained from motor** 1.071 gal **Water used** 0.119 gal **Total time motor was operated** 42½ hours.

CHASSIS Type Standard **Serial No.** SBM 518702 **Tread width rear** 48" to 76" **front** 50" to 82" **Wheel base** 81.26" **Hydraulic control system** constant running-transmission driven **Advertised speeds mph** first 1.33 second 1.99 third 3.65 fourth 5.30 fifth 7.96 sixth 14.59 reverse first 1.79 second 7.19 **Belt pulley diam.** 9" **Face** 6½" **rpm** 1398 **Belt speed** 3195 fpm **Belt** flat **Length** 71' **Width** 6" **Thickness** 0.215" **Maximum slip** 0.53% **Clutch** dual dry disc operated by single foot pedal **Seat** upholstered bucket seat **Brakes** expanding double shoe operated by two independent pedals on right hand side of tractor **Equalized** by pedal lock and balance springs **Power take-off** continuous running—controlled by secondary clutch **Steering** power steering not used.

ENGINE Make Continental LPG **Type** 4 cylinder vertical **Serial No.** ZB 134-667063 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 3 5/16" x 3⅞" **Rated rpm** 2000 **Compression ratio** 8.00 to 1 **Displacement** 134 cu. in. **Valves port diameter Inlet** 1⅛" **Exhaust** 1" **Governor** variable speed centrifugal **Carburetor size** ⅞" **Ignition system** battery **Starting system** 12 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable paper element **Cooling medium temperature control** thermostat.

REPAIRS AND ADJUSTMENTS Following Tests "F" and "G" the mountings for the rear-wheel weights were modified to make the weights more secure.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J and K were made with an operating setting of the carburetor (selected by the manufacturer) of 97.4% of maximum belt horsepower.

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Cast Steel	Cast Steel
Liquid ballast	530 lb each	None
Added cast iron	1470 lb each	None
Rear tires		
No. and size	Two 13-24	Two 13-24
Ply	6	6
Air pressure	18 lb	14 lb
Front wheels		
Type	Pressed Steel	Pressed Steel
Liquid ballast	None	None
Added cast iron	100 lb each	None
Front tires		
No. and size	Two 6.00-16	Two 6.00-16
Ply	6	6
Air pressure	28 lb	28 lb
Height of drawbar	20 inches	21 inches
Static weight		
Rear end	6140 lb	2140 lb
Front end	1680 lb	1460 lb
Total weight as tested with operator	7995 lb	3775 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F 29.92" Hg)	30.74	33.47
2. Observed maximum horsepower (tests F and B)	29.44	32.12
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	23.06	28.45

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 658.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
G. W. STEINBRUEGGE
J. J. SULEK
Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissable include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The manual throttle control lever is set so that the throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The manual throttle control lever is set the same as for tests B and C allowing the governor to control engine speed at part throttle. Load is applied until 85% of maximum corrected horsepower found in test B is obtained.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E: Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each; rated load, no load, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. When rubber tires are used, all tests are made on the concrete test course. The same tires, wheels and weights are used for all tests except J. All crawler type tractors are tested on an earthen test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same for each test.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in the test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The manual throttle control lever is set so that the throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 15%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated horsepower the manual throttle control lever is set the same as in tests F and G allowing the governor to maintain engine speed at part throttle. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: This is intended to show the pull, horsepower, and travel speed of the tractor at rated horsepower (taken from test H); maximum horsepower (taken from test G); and at least four other conditions obtained by reducing travel speed in 10% increments by overload.