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Test 1194: Massey-Ferguson MF 235 Gasoline

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1194 – MASSEY-FERGUSON MF 235 GASOLINE

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—722 rpm)								
41.13	2250	3.918	0.577	10.50	192	57	75	29.107
Standard Power Take-off Speed (540 rpm)—One Hour								
33.87	1683	3.230	0.578	10.49	193	56	75	29.055
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
36.14	2326	3.644	0.611	9.92	186	56	75	.....
0.00	2536	1.545	.....	.....	161	57	76	.....
18.96	2438	2.520	0.805	7.52	176	57	76	.....
41.18	2251	3.926	0.578	10.49	188	56	74	.....
9.79	2524	2.099	1.299	4.67	167	57	75	.....
27.58	2366	2.986	0.656	9.24	180	55	75	.....
Av 22.28	2406	2.787	0.758	7.99	176	56	75	29.040

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool- ing med	Air wet bulb	Air dry bulb	Barometer inches of Mercury
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VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours 4th (4 L) Gear											
33.90	2666	4.77	2250	7.91	3.899	0.697	8.69	178	45	54	29.190
75% of Pull at Maximum Power—Ten Hours 4th (4 L) Gear											
27.60	2041	5.07	2342	5.91	3.421	0.751	8.07	179	60	68	28.610
50% of Pull at Maximum Power—Two Hours 4th (4 L) Gear											
18.77	1306	5.39	2432	3.74	2.806	0.906	6.69	167	56	62	28.605
50% of Pull at Reduced Engine Speed—Two Hours 6th (2 H) Gear											
18.96	1323	5.37	1364	3.71	2.290	0.732	8.28	173	55	61	28.629

MAXIMUM POWER WITH BALLAST

24.45	4294	2.14	2393	12.86	2nd Gear (2 L)			150	34	37	29.380
34.54	3413	3.79	2249	10.01	3rd Gear (3 L)			179	44	53	29.160
34.60	2719	4.77	2250	7.76	4th Gear (4 L)			179	44	53	29.160
35.29	2256	5.86	2249	6.48	5th Gear (1 H)			176	45	54	29.160
34.93	1487	8.81	2251	4.27	6th Gear (2 H)			178	45	54	29.160

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th (4 L) Gear

Pounds Pull	2719	2866	2971	3056	3090	3037
Horsepower	34.60	32.66	29.89	26.81	23.21	18.89
Crankshaft Speed rpm	2250	2026	1795	1570	1345	1112
Miles Per Hour	4.77	4.27	3.77	3.29	2.82	2.33
Slip of Drivers %	7.76	8.38	8.69	8.89	9.00	8.79

TRACTOR SOUND LEVEL WITHOUT CAB

	dB(A)
Maximum Available Power 2 Hours	97.5
75% of Pull at Max. Power 10 Hours	94.5
50% of Pull at Max. Power 2 Hours	92.5
50% of Pull at Reduced Engine Speed 2 Hours	92.5
Bystander in 8th (4 H) gear	84.5

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi	Two 13.6-28; 4; 14
Ballast	—Liquid	448 lb each
	Cast Iron	372 lb each
Front Tires	—No., size, ply & psi	Two 6.00-16; 4; 32
Ballast	—Liquid	None
	Cast Iron	None
Height of drawbar	19.5 inches	19.5 inches
Static weight with operator—rear	4260 lb	2620 lb
front	1525 lb	1510 lb
total	5785 lb	4130 lb

Department of Agricultural Engineering

Dates of Test: October 23 to November 3, 1975

Manufacturer: MASSEY-FERGUSON INC., 1901
Bell Avenue, Des Moines, Iowa 50315

FUEL, OIL AND TIME Fuel unleaded gasoline Octane No Motor 82.2 Research 91.8 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7279 Weight per gallon 6.059 lb Oil SAE 20-20W API service classification SB/SE-CA/CC To motor 1.484 gal Drained from motor 1.383 gal Transmission and final drive lubricant Massey-Ferguson Permatran Oil Total time engine was operated 45.5 hours.

ENGINE Make Continental Type 4 cylinder Serial No 50042 Crankshaft Mounted lengthwise Rated rpm 2250 Bore and stroke 3.375" x 4.062" Compression ratio 7.4 to 1 Displacement 145 cu in Carburetor size 1.18" Ignition system battery Cranking system 12 volt Lubrication pressure Air cleaner dry dual pleated paper element with dust evacuator Oil filter paper screw-on cartridge Fuel filter paper in-line cartridge Muffler vertical Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 9A 225 827 Tread width rear 48" to 76" front 48" to 72" Wheel base 74.5" 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 27.75" Vertical distance above roadway 37.75" Horizontal distance from center of rear wheel tread 0.47" to the left Hydraulic control system constant running except when PTO clutch is disengaged Transmission selective gear fixed ratio Advertised speeds mph first 1.6 second 2.3 third 4.2 fourth 5.2 fifth 6.3 sixth 9.2 seventh 16.9 eighth 20.8 reverse 2.2 and 8.6 Clutch single plate dry disc operated by foot pedal Brakes drum and shoes, operated by two pedals which can be locked together Steering mechanical Turning radius (on concrete surface with brake applied) right 102" left 105" (on concrete surface without brake) right 113" left 114" Turning space diameter (on concrete surface with brake applied) right 211" left 217" (on concrete surface without brake) right 232" left 234" Power take-off 540 rpm at 1683 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Five gears were chosen between tangential pull limit of driving tires and 15 mph (only one gear permitted over 8 mph).

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1194.

LOUIS I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
D. E. LANE
Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories may be disconnected only when the means for disconnecting can be reached from the operator station. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ of the 85% torque; maximum power, $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general use.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effects of speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 4 different runs as follows: (1) as near to the pull at maximum power as

possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe limit for the test course. The manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. The maximum safe speed for the Nebraska Test Course has been set at 15 mph. The slip limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Varying Drawbar Pull and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68583.



MASSEY-FERGUSON MF 235 GASOLINE