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Test 744: Massey-Ferguson MF 35 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 744 - MASSEY-FERGUSON MF 35 DIESEL

University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	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
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
37.04	2000	2.361	0.447	15.69	181	64	76	28.867
Standard Power Take-off Speed (540 rpm)—One Hour								
29.84	1499	1.876	0.441	15.91	183	64	75	28.835
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
32.19	2045	2.033	0.443	15.83	164	64	75	.....
0.00	2080	0.659	.....	.....	147	64	76	.....
16.27	2065	1.275	0.549	12.76	165	64	76	.....
37.41	1999	2.328	0.436	16.07	182	64	77	.....
8.16	2074	0.937	0.805	8.71	156	64	76	.....
24.23	2053	1.618	0.468	14.98	174	64	75	.....
Av 19.71	2053	1.475	0.525	13.36	165	64	76	28.793

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temperature Cooling medium	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear											
32.13	2410	5.00	1996	6.52	2.337	0.510	13.75	186	68	75	28.500
75% of Pull at Maximum Power—Ten Hours—4th Gear											
25.82	1855	5.22	2 044	4.75	1.860	0.505	13.88	178	63	69	28.658
50% of Pull at Maximum Power—Two Hours— 4th Gear											
17.81	1257	5.31	2062	3.88	1.489	0.586	11.96	167	59	64	28.605
MAXIMUM POWER WITH BALLAST											
18.62	3965	1.76	2055	14.73	2nd Gear.....			169	66	72	28.530
30.18	3423	3.31	2001	10.33	3rd Gear.....			181	63	69	28.500
33.02	2466	5.02	2000	6.36	4th Gear.....			164	63	69	28.555
32.86	1592	7.74	2005	4.02	5th Gear.....			178	63	69	28.555
30.84	803	14.40	1997	2.03	6th Gear.....			186	63	69	28.555
MAXIMUM POWER WITHOUT BALLAST											
30.84	2461	4.70	2013	13.71	4th Gear.....			181	61	77	28.720
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear											
Pounds pull			2450	2550	2600	2650	2650	2650	2600		
Horsepower			33.0	30.6	27.7	24.0	20.5	16.6			
Miles per hour			5.0	4.5	4.0	3.4	2.9	2.4			

Department of Agricultural Engineering

Dates of Test: May 16 to May 23, 1960

Manufacturer: MASSEY-FERGUSON INC., DETROIT, MICHIGAN

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 50 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8419 Weight per gallon 7.010 lb Oil SAE 20-20W API Service classification MS, DG To motor 1.697 gal Drained from motor 1.180 gal Transmission and final-drive lubricant SAE 80 Type transmission oil Total time engine was operated 40 hours.

ENGINE Make Perkins Diesel Type 3 cylinder vertical Serial No CL 1802819 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3.6" x 5" Compression ratio 17.4 to 1 Displacement 152.7 cu in Cranking system 12 electrical Lubrication pressure Air cleaner oil washed crimped wire Oil filter replaceable paper element Fuel filter one replaceable treated paper element and one replaceable special CAV paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No SNM 204182 Tread width rear 48" to 76" front 48" to 80" Wheel base 72" 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 31.3" Vertical distance above roadway 27" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running-transmission driven Transmission selective gear fixed-ratio Advertised speeds mph first 1.33 second 1.99 third 3.64 fourth 5.32 fifth 7.96 sixth 14.57 reverse 1.77 and 7.09 Clutch dual dry disc operated by single foot pedal Brakes expanding double shoe operated by two independent foot pedals which can be locked together Steering power assisted Turning radius (on concrete surface with brake applied) right 108" left 108" (on concrete surface without brake) right 118" left 118" Turning space diameter (on concrete surface with brake applied) right 223" left 223" (on concrete surface without brake) right 241" left 241" Belt pulley 1356 rpm at 2000 engine rpm diam 9" face 6½" Belt speed 3200 fpm Power take-off 540 rpm at 1500 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First gear was not run as it was necessary to limit the pull in second gear to avoid excessive slippage.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 744.

L. F. LARSEN
Engineer-in-Charge

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

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 11-28;4;14	Two 11-28;4;12
Ballast	—Liquid	315 lb each	None
	—Cast iron	685 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16;4;28	Two 6.00-16;4;28
Ballast	—Liquid	65 lb each	None
	—Cast iron	110 lb each	None
Height of drawbar		20 inches	20½ inches
Static weight	—Rear	3994 lb	1994 lb
	—Front	1740 lb	1390 lb
Total weight with operator		5909 lb	3559 lb

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. 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. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR 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 belt pulley or 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, $\frac{1}{2}$ 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 usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, 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 3 different levels 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; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 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 maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power 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.

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



Massey-Ferguson MF 35 Diesel