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Test 899: Massey-Ferguson MF 135 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 899 - MASSEY-FERGUSON MF 135 GASOLINE

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury	
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
35.37	2000	3.156	0.544	11.21	200	57	75	28.910	
Standard Power Take-off Speed (540 rpm)—One Hour									
32.55	1705	2.886	0.540	11.28	204	57	75	28.905	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
31.70	2105	3.047	0.586	10.40	192	57	76	.....
0.00	2224	1.314	.....	.....	160	56	75	.....
16.20	2152	2.161	0.813	7.50	170	57	76	.....
35.41	2000	3.189	0.549	11.10	199	56	76	.....
8.22	2187	1.718	1.274	4.78	163	57	76	.....
24.11	2136	2.599	0.657	9.28	177	56	75	.....
Av	19.27	2134	2.338	0.739	8.24	177	56	75	28.900

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—7th Gear (1st Hi-Lo MP)											
30.45	2121	5.38	2000	5.06	3.376	0.676	9.02	200	72	85	28.680
75% of Pull at Maximum Power—Ten Hours—7th Gear (1st Hi-Lo MP)											
24.98	1620	5.78	2118	3.69	2.794	0.682	8.94	178	66	73	28.650
50% of Pull at Maximum Power—Two Hours—7th Gear (1st Hi-Lo MP)											
17.51	1111	5.91	2136	2.44	2.468	0.859	7.09	183	69	85	28.645
MAXIMUM POWER WITH BALLAST											
27.32	4105	2.50	2052	12.47	4th Gear (2nd Lo-Hi MP)			181	63	68	28.780
29.57	3091	3.59	2003	8.13	5th Gear (3rd Lo-Lo MP)			195	67	80	28.690
29.66	2311	4.81	2002	5.54	6th Gear (3rd Lo-Hi MP)			195	67	80	28.690
30.73	2144	5.38	2000	5.14	7th Gear (1st Hi-Lo MP)			198	65	78	28.690
29.53	1556	7.12	1999	3.81	8th Gear (1st Hi-Hi MP)			194	69	81	28.680
30.19	1375	8.23	2001	3.22	9th Gear (2nd Hi-Lo MP)			189	69	81	28.680
28.60	988	10.85	2002	2.32	10th Gear (2nd Hi-Hi MP)			185	70	82	28.680

MAXIMUM POWER WITHOUT BALLAST

30.23	2147	5.28	2001	7.82	7th Gear (1st Hi-Lo MP)			191	65	74	28.710
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—7th Gear (1st Hi-Lo MP)

Pounds pull	2144	2260	2377	2431	2450	2386
Horsepower	30.73	29.04	27.08	24.30	20.85	16.85
Crankshaft speed, rpm	2000	1797	1601	1406	1199	993
Miles per hour	5.38	4.82	4.27	3.75	3.19	2.65
Slip of drivers, %	5.14	5.43	5.77	5.99	6.22	5.99

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13.6-28; 4; 14	Two 13.6-28; 4; 14
	—Liquid	440 lb each	None
	—Cast iron	350 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 4; 28	Two 6.00-16; 4; 28
	—Liquid	None	None
	—Cast iron	140 lb each	None
Height of drawbar		22 1/2 inches	23 inches
Static weight	—Rear	3670 lb	2090 lb
	—Front	1580 lb	1300 lb
Total weight with operator		5425 lb	3565 lb

Department of Agricultural Engineering

Dates of Test: MAY 19 TO JUNE 9, 1965

Manufacturer: MASSEY-FERGUSON INC., DETROIT, MICHIGAN

FUEL, OIL and TIME Fuel regular gasoline Octane No Motor 85.2 Research 92.3 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7321 Weight per gallon 6.095 lb Oil SAE 30 API service classification MS DM To motor 1.367 gal Drained from motor 1.172 gal Transmission and final-drive lubricant Massey-Ferguson Oil M1101 Total time engine was operated 42 1/2 hours.

ENGINE Make Continental gasoline Type 4 cylinder vertical Serial No Z145-1708 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3.375" x 4.062" Compression ratio 7.1 to 1 Displacement 145 cu in Carburetor size 1 1/8" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable paper element Fuel filter sediment bowl and screen Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No SGW-641000181 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 29.2" Vertical distance above roadway 26.6" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running except when PTO foot clutch is disengaged Transmission selective gear fixed ratio with partial range operator controlled power shifting Advertised speeds mph first 1.38 second 1.80 third 2.07 fourth 2.70 fifth 3.79 sixth 4.96 seventh 5.51 eighth 7.20 ninth 8.28 tenth 10.81 eleventh 15.17 twelfth 19.82 reverse 1.88, 2.45, 7.51, and 9.81 Clutch single plate dry disc in combination with PTO clutch operated by single foot pedal Brakes expanding double shoe operated by two independent foot pedals that can be locked together Steering mechanical with power assist 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 1176 rpm at 1975 engine rpm diam 10 1/4" face 16 1/2" Belt speed 3117 fpm Power take-off 540 rpm at 1700 engine rpm.

REPAIRS and ADJUSTMENTS The manually operated governor control lever would not remain in maximum position without being held. During the drawbar runs it was necessary to fasten the muffler support more securely.

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

First, second and third gears were not run as it was necessary to limit the pull in fourth gear because of the stability formula. Eleventh and twelfth gears were not run as both exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 899.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

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, $\frac{1}{2}$ 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 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 trans-

mission, 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 135 Gasoline