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Test 900: Massey-Ferguson MF 180 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 900 - MASSEY-FERGUSON MF 180 DIESEL

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								
63.68	2000	3.800	0.413	16.76	191	57	76	29.023	
Standard Power Take-off Speed (540 rpm)—One Hour									
57.11	1684	3.309	0.401	17.26	195	58	75	28.990	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
56.27	2079	3.347	0.412	16.81	177	58	75	.....
0.00	2145	1.010	.....	.....	146	58	75	.....
28.74	2123	2.072	0.499	13.87	164	58	74	.....
63.74	2000	3.832	0.416	16.63	192	58	74	.....
14.45	2136	1.487	0.712	9.72	154	57	73	.....
42.58	2100	2.605	0.423	16.35	173	57	73	.....
Av	34.30	2097	2.392	0.483	14.34	167	58	74	28.980

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)											
53.84	3973	5.08	1996	6.40	3.649	0.469	14.75	199	68	81	28.765
75% of Pull at Maximum Power—Ten Hours—7th Gear (1st Hi-Lo MP)											
42.95	3059	5.26	2029	4.55	2.906	0.468	14.78	190	67	75	28.695
50% of Pull at Maximum Power—Two Hours—7th Gear (1st Hi-Lo MP)											
29.66	2055	5.41	2057	3.20	2.306	0.538	12.86	191	72	86	28.660
MAXIMUM POWER WITH BALLAST											
38.07	6092	2.34	2077	14.92	4th Gear (2nd Lo-Hi MP)		188	68	73	28.790	
50.88	5897	3.24	2002	13.58	5th Gear (3rd Lo-Lo MP)		195	68	73	28.790	
52.05	4341	4.50	2002	7.56	6th Gear (3rd Lo-Hi MP)		198	68	73	28.790	
54.99	4078	5.06	1998	6.90	7th Gear (1st Hi-Lo MP)		191	68	73	28.790	
53.94	3005	6.73	2000	4.74	8th Gear (1st Hi-Hi MP)		191	67	79	28.760	
54.96	2637	7.82	2000	4.19	9th Gear (2nd Hi-Lo MP)		187	67	79	28.760	
52.34	1907	10.29	2005	3.13	10th Gear (2nd Hi-Hi MP)		192	67	79	28.760	
50.71	1302	14.61	1997	2.19	11th Gear (3rd Hi-Lo MP)		192	67	79	28.760	
MAXIMUM POWER WITHOUT BALLAST											
56.48	4229	5.01	1998	7.89	7th Gear (1st Hi-Lo MP)		198	56	65	28.960	

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—7th Gear (1st Hi-Lo MP)

Pounds pull	4078	4255	4347	4509	4411	4178
Horsepower	54.99	51.50	46.64	42.25	35.53	27.93
Crankshaft speed, rpm	1998	1797	1597	1398	1200	992
Miles per hour	5.06	4.54	4.02	3.51	3.02	2.51
Slip of drivers, %	6.90	7.23	7.36	7.75	7.62	7.10

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38; 6; 14	Two 15.5-38; 6; 14
	—Liquid	625 lb each	None
	Cast iron	180 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-15; 6; 28	Two 7.50-15; 6; 28
	—Liquid	None	None
	Cast iron	150 lb each	None
Height of drawbar		21 inches	21½ inches
Static weight	—Rear	6040 lb	4430 lb
	—Front	2450 lb	2150 lb
Total weight with operator		8665 lb	6755 lb

Department of Agricultural Engineering

Dates of Test: MAY 25 TO JUNE 9, 1965

Manufacturer: MASSEY-FERGUSON INC., DETROIT, MICHIGAN

FUEL, OIL and TIME Fuel No 2 diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8312 Weight per gallon 6.920 lb Oil SAE 20-20W API service classification MS, DC To motor 2.082 gal Drained from motor 1.557 gal Transmission and final-drive lubricant Massey-Ferguson Oil M1101 Total time engine was operated 40½ hours.

ENGINE Make Perkins Diesel Type 4 cylinder vertical Serial No 4803348 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3.875" x 5.0" Compression ratio 16 to 1 Displacement 236 cu in 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 primary and secondary filters with replaceable paper elements and sediment bowl with screen Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No CDW-645000096 Tread width rear 56" to 90" front 52" to 80" Wheel base 93" 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 30.4" Vertical distance above roadway 31.3" 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 1.34 second 1.74 third 2.01 fourth 2.61 fifth 3.68 sixth 4.79 seventh 5.35 eighth 6.95 ninth 8.02 tenth 10.43 eleventh 14.73 twelfth 19.15 reverse 1.82, 2.37, 7.28, and 9.46 Clutch single plate dry disc in combination with pto clutch operated by single foot pedal Brakes double disc operated by two foot pedals which can be locked Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 124" left 132" (on concrete surface without brake) right 142" left 148" Turning space diameter (on concrete surface with brake applied) right 248" left 264" (on concrete surface without brake) right 283" left 295" Belt pulley 1176 rpm at 1975 engine rpm diam 10¼" face 6½" Belt speed 3117 fpm Power take-off 540 rpm at 1684 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, second, and third gears were not run as it was necessary to limit the pull in fourth gear to avoid excessive wheel slippage. Twelfth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 900.

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 180 Diesel