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Test 1021: Massey-Ferguson MF 180 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1021 – MASSEY-FERGUSON MF 180 GASOLINE

POWER TAKE-OFF PERFORMANCE

POWER TAKE-OFF PERFORMANCE								
Hp	Crank- shaft speed rpm	Fuel Consumption		Temperature Degrees F				
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
62.33	2000	5.613	0.554	11.10	187	70	75	29.105
Standard Power Take-off Speed (540 rpm)—One Hour								
56.72	1684	4.891	0.530	11.60	189	70	75	29.100
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
55.67	2101	5.526	0.610	10.07	180	69	75
0.95	2229	2.836	18.347	0.33	168	69	76
28.81	2175	4.169	0.889	6.91	173	70	76
62.33	2000	5.599	0.552	11.13	188	70	77
14.61	2207	3.466	1.458	4.22	170	70	76
42.39	2135	4.837	0.701	8.76	176	70	76
Av 34.13	2141	4.405	0.793	7.75	176	70	76	28.783

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption		Temp Degrees F				Barometer inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling 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)											
51.92	3798	5.13	2001	5.90	5.438	0.644	9.55	171	59	68	29.175
75% of Pull at Maximum Power—Ten Hours—7th Gear (1st Hi-Lo MP)											
44.12	3036	5.45	2094	4.43	5.348	0.745	8.25	170	67	72	28.793
50% of Pull at Maximum Power—Two Hours—7th Gear (1st Hi-Lo MP)											
30.57	2041	5.62	2132	3.27	4.535	0.912	6.74	168	55	60	29.180
MAXIMUM POWER WITH BALLAST											
44.37	7053	2.36	2088	14.87	4th Gear (2nd Lo-Hi MP)	170	57	65	29.160		
51.95	5761	3.38	1996	9.60	5th Gear (3rd Lo-Lo MP)	173	58	67	29.160		
53.29	4403	4.54	2000	6.70	6th Gear (3rd Lo-Hi MP)	172	58	67	29.160		
54.88	4013	5.13	2000	5.70	7th Gear (1st Hi-Lo MP)	172	57	67	29.160		
53.55	2976	6.75	1999	4.60	8th Gear (1st Hi-Hi MP)	172	57	65	29.160		
53.72	2567	7.85	2004	4.11	9th Gear (2nd Hi-Lo MP)	171	58	63	29.240		
52.58	1919	10.28	2001	3.19	10th Gear (2nd Hi-Hi MP)	170	61	73	29.240		
49.63	1271	14.64	2000	2.11	11th Gear (3rd Hi-Lo MP)	171	61	73	29.240		
MAXIMUM PULL WITHOUT BALLAST											
45.22	5126	3.31	2051	14.98	5th Gear (3rd Lo-Lo MP)	170	60	72	28.940		
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST											
7th Gear (1st Hi-Lo MP)											
Pounds Pull				4013	4235	4373	4447	4461	4234		
Horsepower				54.88	51.80	47.12	42.22	36.32	29.03		
Crankshaft speed rpm				2000	1797	1586	1401	1202	1008		
Miles per hour				5.13	4.59	4.04	3.56	3.05	2.57		
Slip of drivers, %				5.70	6.24	6.50	6.64	6.77	6.24		

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38; 6; 16	Two 15.5-38; 6; 14
Ballast	—Liquid	725 lb each	None
	Cast iron	300 lb each	None
Front tires	—No, size, ply & psi	Two 7.5L-15; 6; 32	Two 7.5L-15; 6; 32
Ballast	—Liquid	None	None
	Cast iron	23 lb each	None
Height of drawbar		21½ inches	22½ inches
Static weight with operator—Rear		6630 lb	4580 lb
	Front	2150 lb	2105 lb
	Total	8780 lb	6685 lb

Department of Agricultural Engineering

Dates of Test: September 11 to September 24, 1969

Manufacturer: MASSEY-FERGUSON, INC., DETROIT, MICHIGAN

FUEL, OIL and TIME Fuel regular gasoline Octane No Motor 85 Research 93 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7383 Weight per gallon 6.146 lb Oil SAE 20-20W API service classification MS-DM To motor 1.797 gal Drained from motor 1.636 gal Transmission and final-drive lubricant Massey-Ferguson oil M-1129A Total time engine was operated 42.5 hours.

ENGINE Make Perkins gasoline Type 4 cylinder vertical Serial No 236VA 1193A Crankshaft mounted transverse Rated rpm 2000 Bore and stroke 3⅞" x 5" Compression ratio 7 to 1 Displacement 236 cu in Carburetor size 1¼" 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 Oil cooler radiator for transmission and hydraulic oil Fuel filter sediment bowl and screen Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 9A 66229 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 direct drive 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 4.77 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 operated by foot pedal Brakes double disc operated by two foot pedals which can be locked together Steering hydrostatic 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 1021.

L. F. LARSEN

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 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

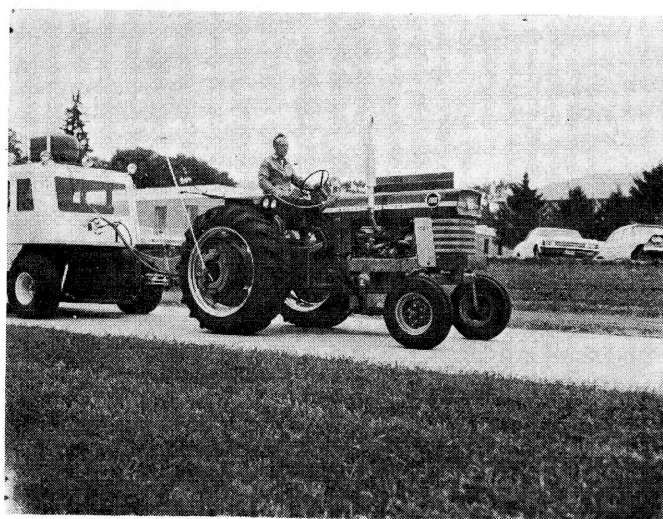
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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 Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

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 GASOLINE