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## Test 1134: Massey-Ferguson 1155 Diesel

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 1134 – MASSEY-FERGUSON 1155 DIESEL

## 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
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>								
<b>Rated Engine Speed—Two Hours (PTO Speed—1100 rpm)</b>								
140.97	2200	9.055	0.451	15.57	188	70	78	28.943
<b>Standard Power Take-off Speed (1000 rpm)—One Hour</b>								
134.11	2000	8.566	0.448	15.66	192	71	80	28.955
<b>VARYING POWER AND FUEL CONSUMPTION—Two Hours</b>								
124.15	2277	7.965	0.450	15.59	182	72	82	.....
0.00	2486	2.903	.....	.....	167	72	83	.....
64.20	2359	5.280	0.577	12.16	172	73	84	.....
139.99	2200	8.961	0.449	15.62	192	74	86	.....
32.84	2409	4.049	0.865	8.11	167	75	86	.....
94.89	2317	6.567	0.486	14.45	176	75	87	.....
Av. 76.01	2341	5.954	0.550	12.77	176	73	85	28.950

## 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

<b>Maximum Available Power—Two Hours—5th Gear (3 Lo Lo MP)</b>											
117.80	10051	4.40	2200	7.08	8.960	0.533	13.15	191	72	81	28.960
<b>75% of Pull at Maximum Power—Ten Hours—5th Gear (3 Lo Lo MP)</b>											
98.75	8002	4.63	2268	5.19	7.595	0.539	13.00	178	73	80	28.830
<b>50% of Pull at Maximum Power—Two Hours—5th Gear (3 Lo Lo MP)</b>											
68.30	5274	4.86	2337	3.32	5.967	0.613	11.45	172	75	86	28.920
<b>50% of Pull at Reduced Engine Speed—Two Hours—7th Gear (1 Hi Lo MP)</b>											
68.68	5314	4.85	1739	3.32	5.059	0.516	13.58	174	78	89	28.700

## MAXIMUM POWER WITH BALLAST

101.13	15630	2.43	2254	14.72	2nd Gr. (1 Lo Hi MP)	174	77	84	28.580
117.30	14319	3.07	2198	11.56	3rd Gr. (2 Lo Lo MP)	186	77	85	28.570
120.20	11126	4.05	2199	7.45	4th Gr. (2 Lo Hi MP)	174	68	75	28.960
124.90	10654	4.40	2200	7.01	5th Gr. (3 Lo Lo MP)	174	65	70	28.960
122.31	7608	6.03	2201	4.94	7th Gr. (1 Hi Lo MP)	183	71	79	28.960
120.51	4657	9.70	2199	2.93	9th Gr. (2 Hi Lo MP)	182	71	79	28.960

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 5th Gear (3 Lo Lo MP)

Pounds Pull	10654	11366	11562	11433	11163	10613
Horsepower	124.90	118.93	106.62	92.73	77.66	61.44
Crankshaft Speed rpm	2200	1979	1749	1538	1316	1089
Miles Per Hour	4.40	3.92	3.46	3.04	2.61	2.17
Slip of Drivers %	7.01	7.80	8.09	7.94	7.94	7.37

## TRACTOR SOUND LEVEL (with cab)

	dB(A)
Maximum Available Power 2 Hours	84.5
75% of Pull at Max. Power 10 Hours	84.5
50% of Pull at Max. Power 2 Hours	85.0
50% of Pull at Reduced Engine Speed 2 Hours	87.5
Bystander 12th Gear (3 Hi Hi MP)	91.5

## TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
<b>Rear Tires</b>	Four 18.4-38;10;18	Four 18.4-38;10;18
<b>Ballast</b>	886 lb each	None
	500 lb each	None
<b>Front Tires</b>	Two 14L-16.1;6;24	Two 14L-16.1;6;24
<b>Ballast</b>	None	None
	None	None
<b>Height of drawbar</b>	21 inches	22 inches
<b>Static weight with operator—rear</b>	16100 lb	10556 lb
<b>front</b>	4360 lb	4350 lb
<b>total</b>	20460 lb	14906 lb

## Department of Agricultural Engineering

Dates of Test: June 5 to June 15, 1973

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

**FUEL, OIL AND TIME** Fuel No 2 Diesel Cetane No 50.1 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8427 Weight per gallon 7.017 lb Oil SAE 20-20W API service classification SB/SE-CA/CC (Formerly MS DM) To motor 5.078 gal Drained from motor 4.370 gal Transmission and final drive lubricant Massey-Ferguson oil M-1127 Total time engine was operated 45½ hours.

**ENGINE** Make Perkins Diesel Type eight cylinder Vee Serial No AV8.540UA392 Crankshaft Mounted lengthwise Rated rpm 2200 Bore and stroke 4.25" x 4.75" Compression ratio 17.5 to 1 Displacement 540 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dual dry type with replaceable pleated paper element Oil filter dual full flow with replaceable pleated paper elements Oil cooler radiator for transmission and hydraulic oil, engine coolant heat exchange for crankcase oil Fuel filter primary and secondary filters with replaceable pleated paper elements Muffler was used Cooling medium temperature control two thermostats.

**CHASSIS** Type Standard with duals Serial No 9B37854 Tread width rear 60" to 120" front 60" to 88" Wheel base 109" 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 28" Vertical distance above roadway 37" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial range operator controlled power shifting Advertised speeds mph first 2.2 second 2.7 third 3.4 fourth 4.3 fifth 4.6 sixth 5.8 seventh 6.2 eighth 7.8 ninth 9.8 tenth 12.3 eleventh 13.3 and twelfth 16.7 reverse 1.7, 2.2, 5.1 and 6.4 Clutch single plate dry disc operated by a foot pedal Brakes double disc hydraulically power actuated by two foot pedals which can be locked together Steering hydrostatic Turning radius (on concrete surface with brake applied) right 144" left 144" (on concrete surface without brake) right 168" left 168" Turning space diameter (on concrete surface with brake applied) right 288" left 288" (on concrete surface without brake) right 336" left 336" Power take-off 1000 rpm at 2000 engine rpm and 540 rpm at 2000 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.

Six gears were chosen between 15% slip and 10 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1134.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station  
E. F. Frolik, Dean; H. W. Ottoson, 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. 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 usage.

## 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 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.

**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 68503.



MASSEY-FERGUSON 1155 DIESEL