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Test 1141: Minneapolis-Moline G1355 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1141 – MINNEAPOLIS-MOLINE G1355 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
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1007 rpm)								
142.62	2200	9.379	0.457	15.21	198	70	75	28.843
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
124.51	2258	8.294	0.463	15.01	191	68	74	.....
0.00	2352	2.881	.....	.....	187	67	72	.....
63.33	2307	5.292	0.580	11.97	194	68	72	.....
143.62	2200	9.335	0.451	15.38	199	69	75	.....
32.04	2334	4.156	0.901	7.71	189	69	74	.....
94.32	2278	6.747	0.497	13.98	195	69	74	.....
Av 76.30	2288	6.117	0.557	12.47	192	68	73	28.850

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

Maximum Available Power—Two Hours—11th Gear (4 DD)											
125.66	8491	5.55	2198	5.96	9.233	0.510	13.61	197	49	54	29.220
75% of Pull at Maximum Power—Ten Hours—11th Gear (4 DD)											
101.89	6573	5.81	2266	4.49	7.927	0.540	12.85	197	59	60	28.830
50% of Pull at Maximum Power—Two Hours—11th Gear (4 DD)											
68.72	4328	5.95	2297	3.51	6.120	0.618	11.23	195	59	61	28.820
50% of Pull at Reduced Engine Speed—Two Hours—14th Gear (5 DD)											
68.98	4342	5.96	1651	3.59	5.094	0.513	13.54	195	57	57	28.800

MAXIMUM POWER WITH BALLAST

109.44	14178	2.89	2230	14.94	5th Gear (2 DD)			193	47	52	29.220
115.93	13589	3.20	2202	13.51	6th Gear (3 UD) ...			197	55	60	28.860
123.98	10290	4.52	2201	7.93	9th Gear (4 UD) ...			197	57	62	28.860
128.55	8722	5.53	2199	6.41	11th Gear (4 DD)....			197	56	61	28.860
125.27	6986	6.72	2198	5.06	13th Gear (4 OD)			197	58	63	28.870
128.95	6132	7.89	2201	4.13	14th Gear (5 DD)....			197	58	64	28.870

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 11th Gear (4 DD)

Pounds Pull	8722	9325	9591	9941	10121	10110
Horsepower	128.55	122.96	112.04	101.36	88.38	74.11
Crankshaft Speed rpm	2199	1979	1759	1541	1323	1110
Miles Per Hour	5.53	4.95	4.38	3.82	3.27	2.75
Slip of Drivers %	6.41	6.99	7.28	7.57	8.00	7.86

TRACTOR SOUND LEVEL (with cab) dB (A)

Maximum Available Power 2 Hours	87.0
75% of Pull at Max. Power 10 Hours	87.0
50% of Pull at Max. Power 2 Hours	86.0
50% of Pull at Reduced Engine Speed 2 Hours	83.0
Bystander 18th Gear (6 OD)	89.5

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	Four 18.4-38;8;14	Four 18.4-38;8;14
Ballast	None	None
Cast Iron	221 lb each	None
Front Tires	Two 11.00-16;8;32	Two 11.00-16;8;32
Ballast	None	None
Cast Iron	45 lb each	None
Height at drawbar	24½ inches	25 inches
Static weight with operator—rear	13600 lb	12716 lb
front	4470 lb	4380 lb
total	18070 lb	17096 lb

Department of Agricultural Engineering

Dates of Test: September 4 to Sept 17, 1973

MANUFACTURER: WHITE FARM EQUIPMENT COMPANY, CHARLES CITY, IOWA

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° 0.8341 Weight per gallon 6.945 lb Oil SAE 30 API service classification MS-DG-DM To motor 3.201 gal Drained from motor 2.134 gal Transmission and final drive lubricant SAE 80 Total time engine was operated 45 hours.

ENGINE Make White Farm Equipment Diesel Type 6 cylinder vertical Serial No 45202094 Crankshaft Mounted lengthwise Rated rpm 2200 Bore and stroke 4.75" x 5.50" Compression ratio 15.3 to 1 Displacement 585 cu in Cranking system 12 volt electric (two 12 volt batteries) Lubrication pressure Air cleaner dry primary element and dry inner safety element Oil filter replaceable pleated paper element Oil cooler engine coolant heat exchanger Fuel filter replaceable paper cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 237972 Tread width rear 61" to 91" front 61" to 85" Wheel base 111.2" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 27.8" Vertical distance above roadway 38.7" 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 1.5 second 1.8 third 2.1 fourth 2.7 fifth 3.3 sixth 3.6 seventh 3.9 eighth 4.3 ninth 4.8 tenth 5.2 eleventh 5.8 twelfth 6.7 thirteenth 6.9 fourteenth 8.0 fifteenth 9.6 sixteenth 11.7 seventeenth 14.1 eighteenth 16.9 reverse 1.8, 2.1, 2.6, 4.3, 5.2 and 6.3 Clutch single dry disc operated by foot pedal Brakes dry triple disc operated by two foot pedals Steering hydrostatic Turning radius (on concrete surface with brake applied) right 146.0" left 146.0" (on concrete surface without brake) right 176.5" left 176.5" Turning space diameter (on concrete surface with brake applied) right 304.0" left 304.0" (on concrete surface without brake) right 365" left 365" Belt pulley none Power take-off 1007 rpm at 2200 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.

First, second, third and fourth gears were not run as it was necessary to limit the pull in fifth due to excessive wheel slippage.

Seventh, eighth, tenth, twelfth, fifteenth, sixteenth, seventeenth and eighteenth gears were not run as test procedure requires only six travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1141.

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
H. W. Ottoson, Director & Acting Dean; 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.



MINNEAPOLIS-MOLINE G1355 DIESEL