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## Test 1161: Minneapolis-Moline G955 Diesel

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 1161 – MINNEAPOLIS-MOLINE G955 DIESEL

## POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Temperature Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
<b>Rated Engine Speed—Two Hours (PTO Speed—1015 rpm)</b>								
98.38	1800	7.122	0.503	13.81	185	69	75	29.057
<b>Standard Power Take-off Speed (1000 rpm)—One Hour</b>								
98.82	1774	7.097	0.499	13.92	185	68	75	29.070
<b>VARYING POWER AND FUEL CONSUMPTION—Two Hours</b>								
86.83	1871	6.174	0.494	14.06	177	68	76	.....
0.00	1958	1.891	.....	.....	164	66	72	.....
44.61	1921	3.756	0.585	11.88	173	67	74	.....
98.60	1800	7.107	0.501	13.87	185	68	75	.....
22.67	1942	2.863	0.877	7.92	167	68	75	.....
66.17	1904	4.940	0.519	13.39	175	68	77	.....
53.15	1899	4.455	0.582	11.93	173	67	75	29.093

## 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
<b>VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITHOUT BALLAST</b>											
<b>Maximum Available Power—Two Hours—11th Gear (4-DD)</b>											
80.19	5531	5.44	1797	7.60	7.124	0.617	11.26	188	65	80	29.100
<b>75% of Pull at Maximum Power—Ten Hours—11th Gear (4-DD)</b>											
67.23	4317	5.84	1885	5.42	5.717	0.591	11.76	176	65	74	29.073
<b>50% of Pull at Maximum Power—Two Hours—11th Gear (4-DD)</b>											
46.29	2875	6.04	1917	3.85	4.498	0.675	10.29	172	60	67	29.165
<b>50% of Pull at Reduced Engine Speed—Two Hours—13th Gear (4-OD)</b>											
46.67	2898	6.04	1598	3.74	4.102	0.611	11.38	173	63	73	29.175
<b>MAXIMUM POWER WITHOUT BALLAST</b>											
66.31	8374	2.97	1873	14.76	5th Gear (2-DD)			176	63	79	29.110
79.67	7671	3.89	1800	12.26	8th Gear (3-DD)			179	67	79	29.160
80.60	6806	4.41	1800	9.96	9th Gear (4-UD)			185	67	79	29.100
83.40	5746	5.44	1799	7.67	11th Gear (4-DD)			185	67	79	29.100
80.92	4558	6.65	1799	5.93	13th Gera (4-OD)			183	71	83	29.100
82.11	3940	7.82	1801	4.96	14th Gear (5-DD)			184	72	84	29.100
<b>VARYING DRAWBAR PULL AND TRAVEL SPEED WITHOUT BALLAST 11th Gear (4-DD)</b>											
Pounds Pull			5746		6055		6239		6321		6518
Horsepower			83.40		78.61		71.46		63.38		55.86
Crankshaft Speed rpm			1799		1620		1436		1259		1081
Miles Per Hour			5.44		4.87		4.29		3.76		3.21
Slip of Drivers %			7.67		8.23		8.79		8.79		9.48

## TRACTOR SOUND LEVEL

	db(A)
Maximum Available Power 2 Hours	94.5
75% of Pull at Max. Power 10 Hours	95.0
50% of Pull at Max. Power 2 Hours	93.5
50% of Pull at Reduced Engine Speed 2 Hours	91.0
Bystander (18th Gear 6-OD)	86.5

## TIRES, BALLAST AND WEIGHT

**Rear Tires** No., size, ply & psi  
**Ballast** —Liquid  
 Cast Iron

**Front Tires** No., size, ply & psi  
**Ballast** —Liquid  
 Cast Iron

**Height of drawbar**

**Static weight with operator**—rear  
 front,  
 total

## Without Ballast

Two 18.4-38;8;16

None

None

Two 10.00-16;6;28

None

None

20 inches

7990 lb

4070 lb

12060 lb

## Department of Agricultural Engineering

Dates of Test: June 26 to August 26, 1974

Manufacturer: WHITE FARM EQUIPMENT,  
 HOPKINS, MINNESOTA

**FUEL, OIL AND TIME** Fuel No 2 Diesel Cetane No 51.9 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8345 Weight per gallon 6.948 lb Oil SAE 30 API service classification SB-SE/CA-CD To motor 2.371 gal Drained from motor 1.841 gal Transmission and final drive lubricant SAE 80 Total time engine was operated 54½ hours.

**ENGINE** Make Minneapolis-Moline Diesel Type 6 cylinder vertical Serial No 44702666 Crankshaft Mounted lengthwise Rated rpm 1800 Bore and Stroke 4.375" x 5.00" Compression ratio 15.4 to 1 Displacement 451 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with internal precleaner Oil filter full flow with replaceable cotton element Fuel filter sediment bowl and replaceable two-stage paper cartridge Muffler vertical Cooling medium temperature control dual thermostats.

**CHASSIS** Type standard Serial No 248153-402 Tread width rear 61" to 95" front 61" to 85" Wheel base 111" 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 39.1" Vertical distance above roadway 34.3" 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 (3) 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 4.4 ninth 4.8 tenth 5.2 eleventh 5.8 twelfth 6.7 thirteenth 6.9 fourteenth 8.1 fifteenth 9.7 sixteenth 11.8 seventeenth 14.2 eighteenth 17.0 reverse, 1.8 2.1, 2.6, 4.4, 5.3, and 6.3 Clutch single disc with dry buttons operated by foot pedal Brakes twin disc operated by two foot pedals that can be locked together Steering hydrostatic Turning radius (on concrete surface with brake applied) right 146" left 146" (on concrete surface without brake) right 177" left 177" Turning space diameter (on concrete surface with brake applied) right 304" left 304" (on concrete surface without brake) right 365" left 365" Power take-off 545 or 1015 rpm at 1800 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 gear to avoid excessive wheel slippage.

Sixth, seventh, 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 1161.

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. 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 G 955 DIESEL