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6-11-1968

## Test 980: Minneapolis-Moline G900 Gasoline (Also G950 Gasoline)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 980 – MINNEAPOLIS-MOLINE G900 GASOLINE (ALSO MINNEAPOLIS-MOLINE G950 GASOLINE)

## POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Temperature Degrees F					Barometer inches of Mercury
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
97.81	1801	8.403	0.531	11.64	184	66	75	28.923	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
87.62	1897	8.243	0.581	10.63	181	67	76	.....	
0.00	2046	3.235	.....	.....	168	67	75	.....	
44.79	1946	5.251	0.724	8.53	174	67	75	.....	
97.60	1800	8.389	0.531	11.63	186	67	76	.....	
22.97	1985	4.105	1.104	5.60	172	67	76	.....	
66.41	1920	6.713	0.624	9.89	176	67	76	.....	
Av 53.23	1932	5.989	0.695	8.89	176	67	76	28.900	

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crankshaft 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

<b>Maximum Available Power—Two Hours—5th Gear (2nd-DD)</b>											
87.78	6585	5.00	1799	5.49	8.399	0.591	10.45	182	56	64	29.085
<b>75% of Pull at Maximum Power—Ten Hours—5th Gear (2nd-DD)</b>											
72.02	5048	5.35	1896	4.10	7.812	0.670	9.22	186	66	74	28.981
<b>50% of Pull at Maximum Power—Two Hours—5th Gear (2nd-DD)</b>											
50.14	3385	5.55	1936	2.45	6.347	0.782	7.90	188	68	85	28.850

### MAXIMUM POWER WITH BALLAST

67.84	11808	2.15	1907	14.34	1st Gear (1st-AT)			180	58	68	29.030
85.98	10329	3.12	1800	9.80	2nd Gear (1st-DD)			185	54	58	29.080
87.31	9922	3.30	1802	9.13	3rd Gear (2nd-AT)			184	54	58	29.080
87.69	7245	4.54	1800	6.00	4th Gear (3rd-AT)			181	54	58	29.080
89.53	6724	4.99	1800	5.64	5th Gear (2nd-DD)			182	54	58	29.110
89.33	5978	5.60	1799	5.05	6th Gear (4th-AT)			182	53	59	29.110
88.76	4921	6.76	1798	3.94	7th Gear (3rd-DD)			182	53	59	29.110
87.87	3958	8.33	1801	3.26	8th Gear (4th-DD)			183	53	59	29.110
82.11	2398	12.84	1799	2.10	9th Gear (5th-AT)			181	55	62	29.100

### MAXIMUM PULL WITHOUT BALLAST

65.81	7583	3.25	1876	14.83	3rd Gear (2nd-AT)			182	71	79	28.880
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 5th Gear (2nd-DD)

Pounds pull	6724	7017	7225	7311	7387	7395	7215
Horsepower	89.53	83.71	76.28	67.37	58.18	48.56	38.24
Crankshaft speed rpm	1800	1617	1433	1251	1070	893	719
Miles per hour	4.99	4.47	3.96	3.46	2.95	2.46	1.99
Slip of drivers, %	5.64	5.93	6.07	6.07	6.22	6.22	6.22

### TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No. size, ply & psi	Two 23.1-30; 8; 16	Two 23.1-30; 8; 16
Ballast	—Liquid	935 lb each	None
	Cast iron	1533 lb each	None
Front tires	—No. size, ply & psi	Two 7.50-16; 6; 36	Two 7.50-16; 6; 36
Ballast	—Liquid	None	None
	Cast iron	25 lb each	None
Height of drawbar		16 inches	17½ inches
Static weight with operator—Rear		11995 lb	7060 lb
	Front	3080 lb	3030 lb
	Total	15075 lb	10090 lb

Department of Agricultural Engineering

Dates of Test: June 11 to June 20, 1968

Manufacturer: MINNEAPOLIS-MOLINE, INC., HOPKINS, MINNESOTA

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 84.2 Research 93.3 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.742 Weight per gallon 6.176 lb Oil SAE 30 API service classification MS DG To motor 2.440 gal Drained from motor 1.727 gal Transmission and final-drive lubricant EP80 Gear oil Mil-L-2105A Total time engine was operated 41½ hours.

**ENGINE** Make Minneapolis-Moline Type 6 cylinder vertical Serial No 32800328 Crankshaft mounted lengthwise Rated rpm 1800 Bore and stroke 4.25" x 5.00" Compression ratio 7.1 to 1 Displacement 425 cu in Carburetor size 1¾" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable paper element with pre-cleaner Oil filter full flow replaceable pleated paper element Fuel filter replaceable pleated paper cartridge Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 33000186 Tread width rear 64" to 96" front 56" to 80" Wheel base 103¼" 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 28" Vertical distance above roadway 35" 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 2.16 second 3.16 third 3.31 fourth 4.43 fifth 4.82 sixth 5.42 seventh 6.45 eighth 7.87 ninth 11.77 tenth 17.44 reverse 3.31 and 4.82 Clutch single plate dry disc operated by foot pedal Brakes dry dual disc operated by two foot pedals which can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 129" left 129" (on concrete surface without brake) right 147" left 147" Turning space diameter (on concrete surface with brake applied) right 266" left 266" (on concrete surface without brake) right 302" left 302" Power take-off 995 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 the SAE and ASAE test code.

Tenth 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 980.

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. 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. 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.



MINNEAPOLIS-MOLINE G900 GASOLINE