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Test 979: Minneapolis-Moline G900 LPG (Also G950 LPG)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 979 – MINNEAPOLIS-MOLINE G900 LPG

(ALSO MINNEAPOLIS-MOLINE G950 LPG)

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F				Barometer inches of Mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
97.57	1800	10.036	0.437	9.72	178	67	76	28.702	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
87.42	1899	9.755	0.474	8.96	175	68	78	.....
0.00	2026	3.579	.....	.....	171	72	84	.....
53.29	1966	7.242	0.578	7.36	176	70	80	.....
96.78	1801	10.038	0.441	9.64	181	70	81	.....
27.11	2000	5.605	0.879	4.84	173	71	82	.....
77.62	1910	8.901	0.487	8.72	179	72	84	.....
Av 57.04	1933	7.520	0.560	7.59	176	70	81	28.733	

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—5th Gear (2nd-DD)												
84.12	6319	4.99	1792	4.83	9.853	0.498	8.54	183	65	76	28.823	
75% of Pull at Maximum Power—Ten Hours—5th Gear (2nd-DD)												
69.98	4898	5.36	1899	3.63	8.906	0.541	7.86	185	67	80	28.865	
50% of Pull at Maximum Power—Two Hours—5th Gear (2nd-DD)												
48.47	3245	5.60	1959	2.27	7.324	0.642	6.62	180	67	80	28.820	
MAXIMUM POWER WITH BALLAST												
68.18	12006	2.13	1903	14.65	1st Gear (1st-AT)		179	64	81	28.810		
84.26	10053	3.14	1799	8.64	2nd Gear (1st-DD)		187	62	67	28.795		
84.66	9565	3.32	1800	8.16	3rd Gear(2nd-AT)		186	62	67	28.795		
85.28	7032	4.55	1800	5.49	4th Gear (3rd-AT)		184	62	72	28.770		
86.88	6522	5.00	1799	4.98	5th Gear (2nd-DD)		180	62	72	28.770		
85.96	5747	5.61	1800	4.31	6th Gear (4th-AT)		187	62	70	28.810		
85.18	4728	6.76	1795	3.56	7th Gear (3rd-DD)		190	62	70	28.825		
85.04	3828	8.33	1804	2.81	8th Gear (4th-DD)		185	62	70	28.810		
78.50	2295	12.83	1804	2.03	9th Gear (5th-AT)		185	59	74	28.810		
MAXIMUM PULL WITHOUT BALLAST												
67.78	7794	3.26	1880	14.62	3rd Gear (2nd-AT)		184	71	79	28.880		

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST							
5th Gear (2nd-DD)							
Pounds pull	6522	6773	6987	7163	7267	7263	6995
Horsepower	86.88	81.50	74.34	66.27	57.56	47.89	37.05
Crankshaft speed rpm	1799	1627	1440	1255	1075	895	718
Miles per hour	5.00	4.51	3.99	3.47	2.97	2.47	1.99
Slip of drivers, %	4.98	5.34	5.34	5.49	5.49	5.63	5.49

Department of Agricultural Engineering

Dates of Test: June 4 to June 20, 1968

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

FUEL, OIL and TIME Fuel HD-5 Propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 30 API service classification MS DG To motor 2.454 gal Drained from motor 1.529 gal Transmission and final-drive lubricant EP 80 Gear oil Mil-L-2105A Total time engine was operated 42 hours.

ENGINE Make Minneapolis-Moline LPG Type 6 cylinder vertical Serial No 32800158 Crankshaft mounted lengthwise Rated rpm 1800 Bore and stroke 4.250" x 5.00" Compression ratio 9 to 1 Displacement 425 cu in Carburetor size 1½" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable paper element and precleaner Oil filter full flow replaceable pleated paper element Fuel filter sediment bowl screen chamois Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 33000120 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 Following the PTO tests the distributor drive shaft support bushing shifted out of position making it necessary to replace the distributor drive shaft, distributor support and distributor assembly before the test could be continued.

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 979.

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 LPG