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Test 954: Minneapolis-Moline G1000 LPG (Also G1050 LPG)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 954 - MINNEAPOLIS-MOLINE G1000 LPG

(ALSO MINNEAPOLIS-MOLINE G1050 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									
110.76	1800	11.411	0.438	9.71	185	52	74	28.673	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
98.64	1889	10.638	0.458	9.27	180	52	76	.....
0.00	2060	3.889	.....	.....	170	51	72	.....
51.88	1981	7.525	0.616	6.89	176	51	73	.....
110.75	1800	11.414	0.438	9.70	184	52	75	.....
26.29	2018	5.732	0.927	4.59	173	53	77	.....
75.99	1938	9.042	0.506	8.40	179	54	77	.....
Av 60.59	1948	8.040	0.564	7.54	177	52	75	28.680	

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Temp Degrees F				Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—6th Gear (2nd DD)											
97.37	6828	5.35	1806	4.87	11.529	0.503	8.45	166	37	41	28.795
75% of Pull at Maximum Power—Ten Hours—6th Gear (2nd DD)											
80.71	5270	5.74	1914	3.63	10.318	0.543	7.82	174	33	36	29.004
50% of Pull at Maximum Power—Two Hours—6th Gear (2nd DD)											
56.58	3540	5.99	1972	2.33	8.706	0.654	6.50	177	28	30	29.160
MAXIMUM POWER WITH BALLAST											
65.40	14006	1.75	1926	14.95	1st Gear (1st AT)		171	26	29	29.230	
92.05	13459	2.56	1795	12.55	2nd Gear (2nd AT)		166	26	29	29.230	
98.25	10980	3.36	1799	8.28	3rd Gear (1st DD)		162	38	43	28.760	
93.01	9565	3.65	1799	7.05	4th Gear (3rd AT)		159	39	45	28.770	
96.33	8011	4.51	1802	5.78	5th Gear (4th AT)		160	39	45	28.770	
99.18	7001	5.31	1800	5.20	6th Gear (2nd DD)		164	39	45	29.770	
98.41	5118	7.21	1801	3.50	7th Gear (3rd DD)		166	38	43	28.780	
97.67	4132	8.86	1805	2.90	8th Gear (4th DD)		165	38	43	28.780	
89.08	3219	10.38	1804	2.60	9th Gear (5th AT)		165	38	43	28.780	
MAXIMUM POWER WITHOUT BALLAST											
97.90	7026	5.23	1800	7.97	6th Gear (2nd DD)		180	50	54	28.950	

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—6th Gear (2nd DD)

Pounds pull	7001	7425	7795	8000	8087	8032
Horsepower	99.18	94.55	87.35	79.90	68.15	56.30
Crankshaft speed, rpm	1800	1620	1430	1276	1078	896
Miles per hour	5.31	4.78	4.20	3.75	3.16	2.63
Slip of drivers, %	5.20	5.42	5.56	5.70	5.85	5.70

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
	—Liquid	1415 lb each	None
	Cast iron	1920 lb each	None
Front tires	—No, size, ply & psi	Two 10.00-16; 6; 28	Two 10.00-16; 6; 28
	—Liquid	None	None
	Cast iron	None	None
Height of drawbar		14 inches	16 inches
Static weight with operator—Rear		13980 lb	7310 lb
	Front	3190 lb	3165 lb
	Total	17170 lb	10475 lb

Department of Agricultural Engineering

Dates of Test: NOVEMBER 4 TO NOVEMBER 15, 1966

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, DM To motor 2.314 gal Drained from motor 1.689 gal Transmission and final-drive lubricant EP80 Gear oil Mil-L-2105A Total time engine was operated 50 hours.

ENGINE Make Minneapolis-Moline LPG Type 6 cylinder vertical Serial No 29801097 Crankshaft mounted lengthwise Rated rpm 1800 Bore and stroke 4 5/8" x 5" Compression ratio 9.1 to 1 Displacement 504 cu in Carburetor size 1 1/2" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable paper element Oil filter replaceable pleated paper element Fuel filter screen Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 30500829 Tread width rear 64" to 96" front 56" to 80" Wheel base 103 1/4" 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 29.4" Vertical distance above roadway 34.9" 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 1.84 second 2.81 third 3.50 fourth 3.74 fifth 4.57 sixth 5.35 seventh 7.13 eighth 8.70 ninth 10.16 tenth 19.35 reverse 2.81 and 5.35 Clutch single plate dry disc operated by foot pedal Brakes wet type multi-disc operated by two foot pedals 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" Belt pulley none Power take-off 536 or 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 954.

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. H. Kramer, 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 trans-

mission, 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 Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

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 G1000 LPG