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## Test 732: Bradley Handiman (Gasoline)

Nebraska Tractor Test Lab

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

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# NEBRASKA TRACTOR TEST 732 - BRADLEY HANDIMAN GASOLINE

University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

## BELT 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									
2.19	3600	0.324	0.897	6.76	Air Cooled	69	75	29.210	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
2.03	3893	0.336	1.005	6.04	Air Cooled	69	74	.....	
0.03	4513	0.252	.....	.....	Air Cooled	71	75	.....	
1.10	4054	0.257	1.418	4.28	Air Cooled	70	75	.....	
2.25	3600	0.341	0.920	6.60	Air Cooled	70	74	.....	
0.58	4239	0.272	2.845	2.13	Air Cooled	71	75	.....	
1.61	4021	0.292	1.099	5.51	Air Cooled	70	74	.....	
Av	1.27	4053	0.292	1.394	4.35	Air Cooled	70	74	29.193

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption		Hp-hr per gal	Temp. Degrees F			Barometer inches of mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
DRAWBAR PERFORMANCE											
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours											
0.69	115	2.24	4285	14.18	0.240	2.109	2.88	Air Cooled	39	49	28.740
75% of Pull at Maximum Power—Ten Hours											
0.55	88	2.35	4327	10.36	0.217	2.398	2.53	Air Cooled	33	39	29.064
50% of Pull at Maximum Power—Two Hours											
0.42	61	2.55	4468	8.48	0.225	3.250	1.87	Air Cooled	44	59	28.703
MAXIMUM POWER WITH BALLAST											
0.65	114	2.15	4192	14.62	.....			Air Cooled	31	33	28.770
MAXIMUM POWER WITHOUT BALLAST											
0.52	90	2.16	4172	14.43	.....			Air Cooled	31	33	28.770

Department of Agricultural Engineering

Dates of Test: November 30 to December 9, 1959

Manufacturer: DAVID BRADLEY MANUFACTURING WORKS, BRADLEY, ILLINOIS

Manufacturer's Power Rating: Engine rated at 3 horsepower by its manufacturer.

**FUEL, OIL and TIME** Fuel regular gasoline Octane No ASTM 84 Research 92 ( rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7292 Weight per gallon 6.070 lb Oil SAE 30 API service classification ML, MM, MS, DG To motor 0.289 gal Drained from motor 0.055 gal Total time motor was operated 37 hours.

**ENGINE** Make Briggs & Stratton Type 1 cylinder vertical air cooled Serial No 910200 Crankshaft mounted crosswise Rated rpm 3600 Lubrication splash Bore and stroke 2 3/4" x 1 3/4" Compression ratio 6.2 to 1 Displacement 7.75 cu in Carburetor size 1/2" Ignition system magneto Cranking system 110 volt electrical or rope Air cleaner oil washed wire mesh Muffler was used Oil filter none Cooling medium temperature control air cooled.

**CHASSIS** Type 2 wheel Serial No 26553 Tread width 15 1/2" Transmission fixed sheave V-belt drive plus planetary gear set Advertised speeds mph forward 0.60 and 2.5 reverse 0.30 and 1.4 Belt pulley 2 1/2" pitch diameter A section V-belt rpm 3600 Belt speed 2355 fpm Belt A section V-belt length 75" Clutch V-belt tightener operated by hand lever Brakes none Steering manual.

**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. This tractor is equipped with rubber non-pneumatic tires. Varying drawbar pull and travel speed with ballast was not run as it was necessary to limit the pull in the maximum power with ballast run because of excessive wheel slippage. Similarly, the special slow speed of the planetary gear set was not used because of the excessive slippage at the higher ground speed.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 732.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT

G. W. STEINBRUEGGE

J. J. SULEK

Boar of Tractor

Test Engineers

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Drive tires	—No, size	Two 12-3.00	Two 12-3.00
Ballast	—Liquid	None	None
	—Cast iron	11 1/2 lb each	None
Height of drawbar		9 inches	9 inches
Total weight as tested without operator		175 lb	152 lb

# 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,  $\frac{1}{2}$  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 transmissions, 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.



Bradley Handiman Gasoline