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Test 700: Wagner Model TR-14A (Diesel)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 700 – WAGNER TR-14A DIESEL

University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Cool-ing med	Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
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VARYING DRAWBAR POWER & FUEL CONSUMPTION WITHOUT BALLAST

Maximum Available Power—Two Hours—5th Gear											
148.56	10749	5.18	2104	4.47	10.992	0.519	13.52	172	74	88	28.700
75% of Pull at Maximum Power—Ten Hours—5th Gear											
122.29	8469	5.41	2177	3.39	9.486	0.544	12.89	173	71	85	28.863
50% of Pull at Maximum Power—Two Hours—5th Gear											
83.62	5641	5.56	2202	1.97	7.063	0.592	11.84	160	73	88	28.860

MAXIMUM POWER WITHOUT BALLAST

116.96	19357	2.27	2158	14.46	2nd Gear	.....	170	70	75	28.720
142.31	18028	2.96	2099	10.42	3rd Gear	.....	170	70	75	28.720
150.11	14069	4.00	2101	6.59	4th Gear	.....	172	73	85	28.930
155.04	11287	5.15	2097	4.75	5th Gear	.....	172	73	85	28.910
155.25	8618	6.76	2098	3.56	6th Gear	.....	172	73	85	28.910
154.18	6502	8.89	2103	2.55	7th Gear	.....	174	73	86	28.900
152.81	4972	11.53	2112	1.75	8th Gear	.....	174	73	86	28.900
144.85	3628	14.97	2105	1.23	9th Gear	.....	174	73	86	28.900

VARYING DRAWBAR PULL AND TRAVEL SPEED WITHOUT BALLAST—5th Gear

Pounds pull	11300	11750	12200	12150	11800	11500
Horsepower	155.0	144.1	123.6	113.4	94.4	76.7
Miles per hour	5.2	4.6	3.8	3.5	3.0	2.5

TIRES, BALLAST and WEIGHT

		Without Ballast
Rear tires	—No, size, ply & psi	Two 18-26;10;20
Ballast	—Liquid	None
	—Cast iron	None
Front tires	—No, Size, ply & psi	Two 18-26;10;20
Ballast	—Liquid	None
	—Cast iron	None
Height of drawbar		19½ inches
Static weight	—Rear	7,950 lb
	—Front	13,100 lb
Total weight with operator		21,225 lb

Department of Agricultural Engineering

Dates of Test: June 4 to June 10, 1959

Manufacturer: THE WAGNER TRACTOR COMPANY, PORTLAND, OREGON

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 51 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8418 **Weight per gallon** 7.009 lb **Oil** SAE 30 **API service classification** MS and DG **To motor** 6.808 gal **Drained from motor** 6.412 gal **Transmission lubricant** SAE No 90 Type straight mineral transmission oil **Final-drive lubricant** SAE No 90 Type E. P. **Total time motor was operated** 41 hours.

ENGINE Make Cummins Diesel Type 6 cylinder vertical **Serial No** 227570 **Crankshaft mounted lengthwise** **Rated rpm** 2100 **Lubrication pressure** **Bore and stroke** 5½" x 6" **Compression ratio** 15.5 to 1 **Displacement** 743 cu in **Cranking system** 24 volt (two 12 volt batteries) **Air cleaner** oil washed shredded foil **Muffler** was used **Oil filter** replaceable cotton bag **Fuel filter** replaceable paper element **Cooling medium temperature control** thermostat.

CHASSIS Type 4-wheel drive **Serial No** 1980 **Tread width rear** 79" **front** 79" **Wheel base** 131" **Center of gravity** (not available) **Hydraulic control system** belt driven from crankshaft **Advertised speeds** mph first 2.1 second 2.7 third 3.5 fourth 4.5 fifth 5.8 sixth 7.5 seventh 9.8 eighth 12.5 ninth 16.3 tenth 20.9 reverse 1.8 and 6.4 **Clutch** dry disc operated by foot pedal **Brakes** hydraulic with internal expanding shoes for all four wheels **Steering** center hinge joint controlled by hydraulic cylinder **Turning radius** (on concrete surface with brake applied) brakes cannot be used for turning (on concrete surface without brake) right 246" left 237" **Turning space diameter** (on concrete surface without brake) right 518" left 500".

REPAIRS AND ADJUSTMENTS The water pump developed a leak during the maximum power runs and continued to leak throughout the remainder of the test.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code. The first gear was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage. The tenth gear was over 15 mph and therefore was not run. There is no PTO or belt pulley for this tractor.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 700.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
G. W. STEINBRUEGGE
J. J. SULEK
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. 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.



Wagner TR-14A Diesel Test 700