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Test 864: Wagner FWD WA4 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 864 FWD WAGNER WA4 DIESEL

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr		Cooling med	Air wet bulb	Air dry bulb	

VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—4th Gear											
93.87	6598	5.34	2498	4.40	7.507	0.553	12.50	171	62	76	28.723
75% of Pull at Maximum Power—Ten Hours—4th Gear											
76.98	5109	5.65	2621	3.49	6.415	0.576	12.00	163	57	61	28.960
50% of Pull at Maximum Power—Two Hours—4th Gear											
53.18	3425	5.82	2674	2.49	5.184	0.674	10.26	159	72	77	28.720

MAXIMUM POWER WITH BALLAST

74.39	14968	1.86	2606	14.87	1st Gear	164	62	76	28.400
87.82	12390	2.66	2506	9.85	2nd Gear	172	62	76	28.400
93.76	9087	3.87	2507	6.15	3rd Gear	173	62	78	28.490
97.30	6820	5.35	2507	4.40	4th Gear	174	62	78	28.490
97.63	4900	7.47	2505	3.31	5th Gear	173	63	78	28.660
93.96	3330	10.58	2507	2.26	6th Gear	171	63	78	28.660
87.45	2199	14.91	2499	1.19	7th Gear	172	63	78	28.660

MAXIMUM POWER WITHOUT BALLAST

97.37	7034	5.19	2502	6.30	4th Gear	184	74	88	28.760
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	6820	7234	7237	7246	6826	6519
Horsepower	97.30	92.49	81.95	71.67	58.04	46.21
Crankshaft speed rpm	2507	2253	1996	1743	1495	1244
Miles per hour	5.35	4.79	4.25	3.71	3.19	2.66
Slip of drivers %	4.40	4.72	4.85	4.72	4.59	4.34

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18.4-26; 10; 22	Two 18.4-26; 10; 12
	—Liquid	850 lb each	None
	Cast iron	1355 lb each	None
Front tires	—No, size, ply & psi	Two 18.4-26; 10; 22	Two 18.4-26; 10; 12
	—Liquid	840 lb each	None
	Cast iron	835 lb each	None
Height of drawbar		11 inches	12 inches
Static weight	—Rear	8160 lb	3750 lb
	Front	10460 lb	7110 lb
Total weight with operator		18795 lb	11035 lb

Department of Agricultural Engineering

Dates of Test: June 6 to June 12, 1964

Manufacturer: FWD WAGNER INC., PORTLAND, OREGON

FUEL, OIL and TIME: Fuel No 2 Diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8304 Weight per gallon 6.914 lb Oil SAE 30 API service classification MS, DG, DM To motor 3.007 gal Drained from motor 2.594 gal Transmisison lubricant SAE 90 mineral oil Final drive lubricant SAE 90 SCL Total time engine was operated 33½ hours.

ENGINE: Make General Motors Diesel Type 2 cycle 4 cylinder vertical with blower Serial No 4D14510 Crankshaft mounted lengthwise Rated rpm 2500 Bore and stroke 3⅞" x 4½" Compression ratio 21 to 1 Displacement 212.3 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable paper element Oil filter replaceable paper element Oil cooler engine coolant heat exchanger for crankcase oil Fuel filter primary and secondary filters with replaceable paper elements Muffler was used Cooling medium temperature control thermostat.

CHASSIS: Type 4-Wheel drive Serial No A44051 Tread width Rear 72" to 80" Front 72" to 80" Wheel base 90" Center of gravity (without operator or ballast, with medium tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 61⅓/16" Vertical distance above roadway 41½" Hydraulic control system direct engine drive Transmission selective gear fixed ratio synchro-mesh except between high and low range Advertised speeds mph first 1.61 second 2.39 third 3.44 fourth 4.79 fifth 6.70 sixth 9.48 seventh 13.38 eighth 18.29 reverse 1.69 and 6.21 Clutch dry disc operated by foot pedal Brakes hydraulic with internal expanding shoes for all four wheels Steering hydraulic with power assist Turning radius (on concrete surface without brake) right 165" left 170" Turning space diameter (on concrete surface without brake) right 356" left 360" Belt pulley None Power take-off None.

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.

Eighth gear was not run as it exceeded 15 mph.

The manually operated governor control lever would not remain in maximum position at all times, making it necessary to use the foot control pedal.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 864.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT, Chairman

G. W. STEINBRUEGGE

J. J. SULEK

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 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.



FWD Wagner WA4 Diesel