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Test 631: Wagner TR-9 Diesel

Nebraska Tractor Test Lab

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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: September 24, 1957 to October 3, 1957
Manufacturer: WAGNER TRACTOR, INC.,
PORTLAND, OREGON
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 631

WAGNER TR-9 DIESEL

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
					Gal per hr	Hp-hr per gal	Lb per hp-hr	Cool- ing med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—5th Gear											
68.93	6013	4.30	1798	2.68	5.487	12.56	0.557	158	58	71	28.973
TESTS F & G—100% MAXIMUM LOAD											
51.99	15975	1.22	1795	14.58	1st Gear (Part Throttle)			163	58	71	28.930
68.32	15921	1.61	1800	14.38	2nd Gear (Part Throttle)			166	59	72	28.930
82.70	13618	2.28	1801	8.17	3rd Gear			169	60	74	28.920
85.49	10426	3.08	1800	5.50	4th Gear			166	60	75	28.910
87.45	7729	4.24	1798	3.85	5th Gear			157	55	64	29.020
86.86	5772	5.64	1800	2.74	6th Gear			163	59	72	28.955
84.39	4737	6.68	1798	2.14	7th Gear			161	58	70	29.005
83.60	3548	8.84	1801	1.60	8th Gear			165	59	72	29.005
80.25	2627	11.46	1803	1.13	9th Gear			167	59	72	29.005
72.40	1811	14.99	1798	0.99	10th Gear			171	61	74	28.909
TEST J—OPERATING MAXIMUM LOAD											
88.66	7859	4.23	1801	4.58	5th Gear			144	51	58	29.240

FUEL, OIL, WATER and TIME Fuel Diesel Cetane No. 50 (rating taken from oil company's typical inspection data) Weight per gallon 7.000 lb Oil SAE 30 To motor 4.518 gal Drained from motor 4.202 gal Water used 0.860 gal Total time motor was operated 44 hours.

CHASSIS Type 4-wheel drive Serial No. 357 Tread width rear 74" front 74" Wheel base 107 3/4" Hydraulic control system belt driven from crankshaft Advertised speeds mph first 1.22 second 1.61 third 2.28 fourth 3.08 fifth 4.24 sixth 5.64 seventh 6.68 eighth 8.84 ninth 11.46 tenth 14.99 Reverse first 1.57 second 2.07 Clutch dry disc operated by foot pedal Seat upholstered Brakes hydraulic with internal expanding shoes for all four wheels Equalized yes Power-take-off direct engine drive from front of tractor Steering center hinge joint controlled by hydraulic cylinder.

ENGINE Make Cummins Diesel Type 4 cylinder vertical Serial No. 186757 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 5 1/8" x 6" Rated rpm 1800 Compression ratio 15.5 to 1 Displacement 495 cu in Valve port diameter Inlet two-1.284" Exhaust two-1.284" Governor variable speed centrifugal Starting system 24 volt (two 12 volt batteries) Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable cotton bag Fuel filter replaceable paper element Cooling medium temperature control thermostat.

REPAIRS AND ADJUSTMENTS No repairs or adjustments

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests F, G, H and J were made with fuel pump as set by manufacturer.

No belt pulley available for this tractor.

The agricultural type R-1 tractor tires were not available in the recommended ply rating.

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J
Rear wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	860 lb each	None
Added cast iron	None	None
Rear tires		
No. and size	Two 15-26	Two 15-26
Ply	10	10
Air pressure	16 lb	14 lb
Front wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	465 lb each	None
Added cast iron	None	None
Front tires		
No. and size	Two 15-26	Two 15-26
Ply	10	10
Air pressure	26 lb	24 lb
Height of drawbar	14 1/2 inches	15 inches
Static weight		
Rear end	6,550 lb	4,630 lb
Front end	11,570 lb	10,640 lb
Total weight as tested with operator	18,295 lb	15,445 lb

HORSEPOWER SUMMARY

	Drawbar
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	90.50
2. Observed maximum horsepower (test F)	87.45
3. Seventy-five per cent of calculated maximum drawbar horsepower (ASAE and SAE ratings)	67.88

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 631.

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

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each; rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

TEST L: This torque test is run with wide open throttle. Loads are applied to reduce engine speed in approximately ten 5% increments. Rated speed equals 100%. The corresponding dynamometer torque is recorded as a per cent of torque at rated speed.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. When rubber tires are used, all tests are

made on the concrete test course. All crawler type tractors are tested on a dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

