

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

---

5-9-1956

## Test 572: International Model W-400 LPG

Nebraska Tractor Test Lab

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

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

---

Nebraska Tractor Test Lab, "Test 572: International Model W-400 LPG" (1956). *Nebraska Tractor Tests*. 1055.

<https://digitalcommons.unl.edu/tractormuseumlit/1055>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Department of Agricultural Engineering  
Dates of test: May 9 to May 25, 1956  
Manufacturer: INTERNATIONAL HARVESTER  
COMPANY, CHICAGO, ILLINOIS  
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 572

INTERNATIONAL W-400 LPG

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury		
		Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling medium	Air wet bulb	Air dry bulb			
TEST B—100% MAXIMUM LOAD—TWO HOURS										
50.72	1451	5.657	8.97	0.474	172	56	68	28.937		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
48.58	1450	5.038	9.64	0.441	170	54	65	28.940		
TEST D—RATED LOAD—ONE HOUR										
44.97	1449	4.748	9.47	0.449	170	54	66	28.940		
TEST E—VARYING LOAD—TWO HOURS— (20 minute runs; last line average)										
44.93	1450	4.751	9.46	0.449	170	54	66	.....		
1.37	1565	1.602	0.86	4.971	154	54	66	.....		
23.56	1509	3.261	7.22	0.588	165	54	66	.....		
46.87	1397	4.913	9.54	0.445	170	54	67	.....		
12.06	1545	2.379	5.07	0.838	162	54	66	.....		
34.39	1473	4.031	8.53	0.498	167	55	67	.....		
27.20	1490	3.489	8.00	0.545	164	54	66	28.945		
TEST L—OPERATING MAXIMUM TORQUE										
% of rated rpm (engine)	100	95	90	85	80	75	70	65	60	55
% of rated-speed torque	100	100	101	102	104	106	107	107	106	104

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—3rd Gear											
37.73	2820	5.02	1446	3.66	4.495	8.39	0.506	170	62	76	29.025
TEST F—100% MAXIMUM LOAD											
47.30	3574	4.96	1451	4.89	3rd gear.....			164	54	64	29.080
TEST G—OPERATING MAXIMUM LOAD											
41.58	6684	2.33	1447	13.50	1st gear.....			161	50	61	28.990
44.72	4304	3.90	1447	6.25	2nd gear.....			162	50	61	28.990
45.45	3424	4.98	1451	4.68	3rd gear.....			163	54	62	29.085
44.58	2379	7.03	1452	3.35	4th gear.....			164	56	67	28.850
34.34	714	18.04	1454	0.27	5th gear.....			163	58	69	28.950
28.28	6787	1.56	1450	14.37	1st gear T.A. (prt-thrtl)			159	50	61	28.990
42.17	6358	2.49	1450	11.43	2nd gear torque amp.			162	50	61	28.990
43.42	5007	3.25	1449	7.57	3rd gear torque amp.			164	55	64	28.850
43.96	3544	4.65	1447	4.89	4th gear torque amp.			165	53	63	29.085
40.86	1281	11.96	1452	1.91	5th gear torque amp.			166	58	69	28.850
TEST J—OPERATING MAXIMUM LOAD											
42.61	3401	4.70	1447	10.08	3rd gear.....			164	58	66	28.990
TEST K—OPERATING MAXIMUM LOAD											
40.27	3704	4.08	1451	13.28	3rd gear.....			162	63	71	28.990

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	1178 lb each	None	None
Added cast iron	700 lb each	None	None
Rear tires			
No. and size	Two 15-30	Two 15-30	Two 13-30
Ply	6	6	6
Air pressure	16 lb	16 lb	14 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 7.50-18	Two 7.50-18	Two 7.50-18
Ply	6	6	6
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	19½ inches	21 inches	17 inches
Static weight			
Rear end	7660 lb	3904 lb	3730 lb
Front end	2520 lb	2540 lb	2490 lb
Total weight as tested with operator	10355 lb	6619 lb	6395 lb

FUEL, OIL, WATER and TIME Fuel Commercial Propane Weight per gallon 4.25 lb OIL SAE 20-20W To motor 1.951 gal Drained from motor 1.493 gal Water used None Total time motor was operated 40 hours.

CHASSIS Type Standard Serial No. 1971S Tread width rear 60¼" front 50¼" Wheel base 82" Hydraulic control system direct engine drive Advertised speeds mph first 2.42 second 3.72 third 4.67 fourth 6.49 fifth 16.15 reverse 3.22 Using torque amplifier (planetary underdrive) first 1.63 second 2.51 third 3.15 fourth 4.38 fifth 10.90 reverse 2.17 Belt pulley diam 11" face 7½" rpm 899 Belt speed 2588 fpm Belt flat Length 72' Width 7" Thickness 0.216" Maximum slip 0.97% Clutch single plate dry disc operated by foot pedal Seat upholstered seat on conical spring with shock absorber Brakes double disc brakes operated by two foot pedals Equalized by locking pedals together Power take-off direct engine drive with independent clutch Steering hydraulically aided. ENGINE Make International Type 4 cylinder vertical Serial No. 159279E Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 4" x 5¼" Rated rpm 1450 Compression ratio 8.35 to 1 Displacement 264 cu. in. Port diameter valves Inlet 1 19/32" Exhaust 1 7/16" Governor variable speed centrifugal Carburetor size 1¼" Ignition system battery Starting system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable treated 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 B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J, K and L were made with an operating setting of the carburetor (selected by the manufacturer) of 95.5% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated maximum horsepower (based on 60° F and 29.92" Hg)	48.85	52.85
2. Observed maximum horsepower (tests F and B)	47.30	50.72
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	36.64	44.92

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 572.

L. F. LARSEN  
Engineer-in-charge

L. W. HURLBUT  
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 instru-

ment 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.

