

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

5-27-1957

Test 621: International 650 LPG

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, 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 621: International 650 LPG" (1957). *Nebraska Tractor Tests*. 13.
<https://digitalcommons.unl.edu/tractormuseumlit/13>

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 21, 1957 to May 27, 1957
Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 621

INTERNATIONAL 650 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												
63.91	1500	7.281	8.78	0.484	170	59	75	28.942				
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR												
61.33	1500	6.864	8.94	0.476	167	60	78	28.955				
TEST D—RATED LOAD—ONE HOUR												
56.80	1501	6.515	8.72	0.488	162	59	74	28.960				
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)												
56.15	1500	6.487	8.66	0.491	161	59	72				
0.95	1640	2.492	0.38	11.147	147	57	67				
29.68	1551	4.638	6.40	0.664	155	60	73				
60.36	1452	6.664	9.06	0.469	165	61	77				
15.30	1598	3.579	4.27	0.994	153	61	75				
43.54	1523	5.527	7.88	0.540	162	63	81				
34.33	1544	4.898	7.01	0.606	157	60	74	28.960				
TEST L—OPERATING MAXIMUM TORQUE												
% of rated rpm (engine)		100	95	90	85	80	75	70	65	60	55	50
% of rated-speed torque		100	101	102	100	99	97	97	98	99	99	97

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											
46.22	3841	4.51	1500	3.95	5.968	7.74	0.549	165	61	75	28.503
TEST F—100% MAXIMUM LOAD											
58.22	4880	4.47	1501	4.52	3rd gear.....			165	58	70	28.970
TEST G—OPERATING MAXIMUM LOAD											
51.35	8867	2.17	1498	11.92	1st gear.....			160	64	67	28.520
55.79	6761	3.09	1498	7.03	2nd gear.....			166	60	74	28.960
56.18	4703	4.48	1501	4.45	3rd gear.....			162	58	71	28.970
55.94	3817	5.50	1502	3.82	4th gear.....			166	62	75	28.935
48.48	1112	16.35	1499	0.45	5th gear.....			162	62	75	28.935
TEST J—OPERATING MAXIMUM LOAD											
56.07	4748	4.43	1505	7.40	3rd gear.....			145	54	69	29.055
TEST K—OPERATING MAXIMUM LOAD											
46.99	4351	4.05	1502	14.16	3rd gear (prt-thrtl)			155	54	69	29.055

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	1545 lb each	None	None
Added cast iron	140 lb each	None	None
Rear tires			
No. and size	Two 18-26	Two 18-26	Two 14-34
Ply	8	8	6
Air pressure	16 lb	16 lb	16 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	4	4	4
Air pressure	24 lb	24 lb	24 lb
Height of drawbar	18½ inches	20 inches	20 inches
Static weight			
Rear end	9560 lb	6190 lb	4620 lb
Front end	2620 lb	2620 lb	2630 lb
Total weight as tested with operator	12,355 lb	8985 lb	7425 lb

FUEL, OIL, WATER and TIME Fuel Commercial Propane Weight per gallon 4.25 lb Oil SAE 20-20W To motor 2.671 gal Drained from motor 1.606 gal Water used 0.241 gal Total time motor was operated 47 hours.

CHASSIS Type Standard Serial No. 1275 L Tread width rear 60" front 52" Wheel base 83.4" Hydraulic control system direct engine drive Advertised speeds mph first 2.4 second 3.2 third 4.5 fourth 5.5 fifth 15.7 reverse 2.9 Belt pulley diam. 14" Face 8½" rpm 707 Belt speed 2593 fpm Belt flat Length 75' Width 8" Thickness 0.216" Maximum slip 1.18% Clutch single plate dry disc operated by foot pedal Seat upholstered seat on conical spring with shock absorber Brakes double disc operated by two foot pedals Equalized by locking pedals together Power take-off conventional type Steering hydraulically aided.

ENGINE Make International LPG Type 4 cylinder vertical Serial No. C 350 579 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 4½" x 5½" Rated rpm 1500 Compression ratio 8.25 to 1 Displacement 350 cu. in. Valve port diameter Inlet 1½" Exhaust 1 11/16" Governor variable speed centrifugal Carburetor size 1½" Ignition system battery Starting system 12 volt battery Air cleaner oil washed wire screen 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 96.2% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" Hg)	60.71	67.02
2. Observed maximum horsepower (tests F and B)	58.22	63.91
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	45.53	56.97

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 621.

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 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.

