

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

November 1957

Test 627: Ford 640-L

Tractor Test & Power Museum

University of Nebraska, jsteele4@unl.edu

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



Part of the [Applied Mechanics Commons](#)

Museum, Tractor Test & Power, "Test 627: Ford 640-L" (1957). *Nebraska Tractor Tests*. 19.
<http://digitalcommons.unl.edu/tractormuseumlit/19>

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: June 24, 1957 to July 12, 1957
Manufacturer: FORD MOTOR COMPANY,
BIRMINGHAM, MICHIGAN
Manufacturer's rating: Not rated

FORD 640-L (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										
28.45	2000	3.918	7.26	0.585	179	63	74	28.800		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
27.08	2001	3.602	7.52	0.565	175	63	72	28.802		
TEST D—RATED LOAD—ONE HOUR										
25.49	1999	3.485	7.31	0.581	170	62	68	28.790		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
25.38	2000	3.487	7.28	0.584	170	61	68	.....	
1.71	2197	1.779	0.96	4.421	150	63	70	.....	
13.65	2139	2.718	5.02	0.846	161	62	68	.....	
23.59	1746	3.035	7.77	0.547	167	62	68	.....	
6.99	2187	2.174	3.22	1.322	156	62	68	.....	
20.00	2092	3.141	6.37	0.668	163	62	68	.....	
15.22	2060	2.722	5.59	0.760	161	62	68	28.777		
TEST L—OPERATING MAXIMUM TORQUE										
% of rated rpm (engine)	100	95	90	85	80	75	70	65	60	56
% of rated-speed torque	100	100	100	99	96	91	85	84	85	85

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	Cooling med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
22.08	1802	4.60	1999	5.76	3.200	6.90	0.616	175	65	80	28.621
TEST F—100% MAXIMUM LOAD											
27.11	2276	4.47	2002	8.58	2nd gear	.....	.....	170	62	68	28.630
TEST G—OPERATING MAXIMUM LOAD											
24.69	2812	3.29	1999	13.19	1st gear	.....	.....	167	60	66	28.630
25.99	2171	4.49	1998	7.85	2nd gear	.....	.....	168	62	68	28.630
26.20	1546	6.36	1998	5.18	3rd gear	.....	.....	168	64	71	28.630
25.37	695	13.69	2000	2.12	4th gear	.....	.....	166	64	71	28.630
TEST J—OPERATING MAXIMUM LOAD											
25.74	2176	4.44	1999	9.37	2nd gear	.....	.....	164	66	75	28.630
TEST K—OPERATING MAXIMUM LOAD											
22.36	2125	3.95	2005	15.89	2nd gear (prt-thrtl)	.....	.....	190	72	86	28.730

FUEL, OIL, WATER and TIME Fuel Commercial Propane Weight per gallon 4.25 lb Oil SAE 20-20W To motor 1.224 gal Drained from motor 0.669 gal Water used 0.087 gal Total time motor was operated 66½ hours.

CHASSIS TYPE Standard Serial No. 640-L 129026 Tread width rear 52" to 76" front 52" and 80" Wheel base 74.5" Hydraulic control system direct engine drive Advertised speeds mph first 3.81 second 4.89 third 6.73 fourth 14.05 reverse 4.17 Belt pulley diam. 9" face 6½" rpm 1358 Belt speed 3198 fpm Belt flat Length 71' Width 6" Thickness 0.215" Maximum slip 0.61% Clutch single plate dry disc operated by foot pedal Seat pressed steel cushioned by rubber in torsion Brakes internal expanding shoes operated by two foot pedals located on right hand side of tractor Equalized by foot action Power take-off conventional type Steering aided by hydraulic power steering.

ENGINE Make Ford LPG Type 4 cylinder vertical Serial No. 640-L 129026 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3.4375" x 3.60" Rated rpm 2000 Compression ratio 6.6 to 1 Displacement 134 cu. in. Valve port diameter Inlet 1.46" Exhaust 1.26" Governor variable speed centrifugal Carburetor size 1" Ignition system battery Starting system 6 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter full flow with 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 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 95.0% of maximum belt horsepower.

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	200 lb each	None	None
Rear tires			
No. and size	Two 11-28	Two 11-28	Two 10-28
Ply	4	4	4
Air pressure	12 lb	12 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	23 inches	23 inches	22 inches
Static weight			
Rear end	2188 lb	1785 lb	1736 lb
Front end	1278 lb	1278 lb	1272 lb
Total weight as tested with operator	3641 lb	3238 lb	3183 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	28.55	29.95
2. Observed maximum horsepower (tests F and B)	27.11	28.45
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	21.41	25.46

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 627.

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.

