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Larsen

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November 1957

## Test 616: McCormick Farmall 230 Gasoline

Tractor Test & Power Museum

University of Nebraska, [jsteele4@unl.edu](mailto:jsteele4@unl.edu)

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Department of Agricultural Engineering  
Dates of test: April 25, 1957 to May 7, 1957  
Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS  
Manufacturer's rating: Not Rated

McCORMICK FARMALL 230

**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			
<b>TEST B—100% MAXIMUM LOAD—TWO HOURS</b>										
28.06	1800	2.350	11.94	0.510	194	55	72	29.060		
<b>TEST C—OPERATING MAXIMUM LOAD—ONE HOUR</b>										
26.71	1800	2.197	12.16	0.501	199	57	70	29.012		
<b>TEST D—RATED LOAD—ONE HOUR</b>										
24.95	1800	2.102	11.87	0.513	197	58	72	29.015		
<b>TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)</b>										
24.87	1801	2.102	11.83	0.515	200	60	74	.....		
1.36	1955	0.911	1.49	4.081	207	60	73	.....		
13.22	1899	1.472	8.98	0.679	198	60	74	.....		
25.92	1749	2.112	12.27	0.497	190	60	73	.....		
6.71	1935	1.157	5.80	1.051	191	59	72	.....		
19.40	1870	1.802	10.77	0.566	195	58	70	.....		
15.25	1868	1.593	9.57	0.636	197	59	73	29.015		
<b>TEST L—OPERATING MAXIMUM TORQUE</b>										
% of rated rpm (engine)	100	95	90	85	80	75	70	65	60	55
% of rated-speed torque	100	102	103	104	105	106	109	111	111	109

**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	
<b>TEST H—RATED LOAD—TEN HOURS—2nd Gear</b>											
20.05	1835	4.10	1801	4.40	1.890	10.61	0.574	182	64	75	28.913
<b>TEST F—100% MAXIMUM LOAD</b>											
25.00	2319	4.04	1804	5.77	2nd gear.....			200	57	65	29.055
<b>TEST G—OPERATING MAXIMUM LOAD</b>											
23.14	3574	2.43	1802	10.21	1st gear.....			189	59	68	29.055
23.94	2222	4.04	1797	5.65	2nd gear.....			193	58	65	29.055
23.80	1648	5.42	1801	4.11	3rd gear.....			192	58	65	29.055
21.94	716	11.49	1802	2.00	4th gear.....			187	59	68	29.055
<b>TEST J—OPERATING MAXIMUM LOAD</b>											
23.89	2300	3.89	1801	10.13	2nd gear.....			179	49	58	29.040
<b>TEST K—OPERATING MAXIMUM LOAD</b>											
22.41	2367	3.55	1799	13.82	2nd gear (prt-thrtl)....			154	49	58	29.150

**TIRES, WHEELS AND WEIGHT**

	Tests F, G, & H	Test J	Test K
<b>Rear wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	353 lb each	None	None
Added cast iron	572 lb each	None	None
<b>Rear tires</b>			
No. and size	Two 11.2-36	Two 11.2-36	Two 9-36
Ply	4	4	4
Air pressure	16 lb	12 lb	12 lb
<b>Front wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
<b>Front tires</b>			
No. and size	Two 5.00-15	Two 5.00-15	Two 5.00-15
Ply	4	4	4
Air pressure	20 lb	20 lb	20 lb
<b>Height of drawbar</b>	18½ inches	20 inches	18 inches
<b>Static weight</b>			
Rear end	4200 lb	2350 lb	2314 lb
Front end	956 lb	956 lb	954 lb
<b>Total weight as tested with operator</b>	5331 lb	3481 lb	3443 lb

**FUEL, OIL, WATER and TIME** Fuel Gasoline Octane No. ASTM 82 Research 88 (rating taken from oil company's typical inspection data) Weight per gallon 6.094 lb Oil SAE 20-20W To motor 1.205 gal Drained from motor 1.126 gal Water used 0.130 gal Total time motor was operated 42 hours.

**CHASSIS TYPE** Tricycle Serial No. 813J Tread width rear 48" to 80" front 6¾" to 12¾" Wheel base 82¼" Hydraulic control system direct engine drive Advertised speeds mph first 2.7 second 4.3 third 5.6 fourth 11.7 reverse 3.4 Belt pulley diam. 8" face 6" rpm 1487 Belt speed 3114 fpm Belt flat Length 57" Width 5" Thickness 0.210" Maximum slip 0.76% Clutch single plate dry 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 power steering not available.

**ENGINE** Make International Type 4 cylinder vertical Serial No. C-123 36826 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3½" x 4" Rated rpm 1800 Compression ratio 6.8 to 1 Displacement 123 cu. in. Port diameter valves Inlet 1.250" Exhaust 1.156" Governor variable speed centrifugal Carburetor size ¾" Ignition system battery Starting system 6 volt battery Air cleaner oil washed wire screen Muffler was used Oil filter replaceable treated paper element Cooling medium temperature control thermostat and radiator shutter.

**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 95.2% of maximum belt horsepower.

**HORSEPOWER SUMMARY**

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	25.87	29.22
2. Observed maximum horsepower (tests F and B)	25.00	28.06
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	19.40	24.84

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 616.

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.

