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5-18-1956

## Test 575: McCormick Farmall Cub

Nebraska Tractor Test Lab

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

NEBRASKA TRACTOR TEST NO. 575

Department of Agricultural Engineering

Dates of test: May 18 to June 3, 1956

Manufacturer: INTERNATIONAL HARVESTER  
COMPANY, CHICAGO, ILLINOIS

Manufacturer's rating: 10.5 belt horsepower and  
9.4 drawbar horsepower (corrected to stand-  
ard conditions)

MCCORMICK FARMALL CUB

**BELT HORSEPOWER TESTS**

TEST TORQUE-POWER 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			
TESTS B & C—100% MAXIMUM LOAD—TWO HOURS										
10.39	1800	1.108	9.38	0.656	215	53	63	29.007		
TEST D—RATED LOAD—ONE HOUR										
9.19	1799	1.004	9.15	0.672	212	51	62	29.023		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
9.21	1799	1.004	9.17	0.671	214	51	63	.....		
0.54	1950	0.531	1.02	6.056	191	51	62	.....		
4.81	1888	0.765	6.29	0.979	211	53	65	.....		
9.86	1719	1.072	9.20	0.669	215	52	63	.....		
2.45	1910	0.614	3.99	1.543	202	52	63	.....		
7.09	1855	0.897	7.90	0.779	216	54	66	.....		
5.66	1853	0.814	6.95	0.885	208	52	64	29.038		
TEST L—OPERATING MAXIMUM TORQUE										
% of rated rpm (engine)	100	95	90	84	79	75	70	65	60	54
% of rated-speed torque	100	103	104	105	104	104	102	101	99	96

**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—2nd Gear											
7.86	957	3.08	1792	4.01	0.920	8.54	0.721	210	52	66	29.122
TESTS F & G—100% MAXIMUM LOAD											
9.64	1605	2.25	1799	6.73	1st gear . . . . .			213	56	66	29.060
9.87	1211	3.06	1799	5.13	2nd gear . . . . .			210	48	56	29.180
8.73	462	7.09	1800	2.04	3rd gear . . . . .			208	50	61	29.060
TEST J—OPERATING MAXIMUM LOAD											
9.28	1159	3.00	1801	7.73	2nd gear . . . . .			212	52	63	29.050
TEST K—OPERATING MAXIMUM LOAD											
8.57	1212	2.65	1806	15.09	2nd gear . . . . .			212	53	66	29.060

**FUEL, OIL, WATER AND TIME** Fuel Gasoline Octane No. ASTM 82.0 Research 87.2 (rating taken from oil company's typical inspection data) **Weight** per gallon 6.157 lb **OIL** SAE 20-20W **To motor** 0.732 gal **Drained from motor** 0.550 gal **Water used none** **Total time motor was operated** 35½ hours.

**CHASSIS** Type Standard Serial No. 192845 **Tread** width rear 40" to 56" front 40" to 56" **Wheel base** 69.3" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 2.44 second 3.25 third 7.30 reverse 2.71 **Belt pulley diam** 9" **face** 4½" **rpm** 1485 **Belt speed** 3504 fpm **Belt flat Length** 49' **Width** 4" **Thickness** 0.193" **Maximum slip** 0.38% **Clutch** single plate dry disc operated by foot pedal **Seat** upholstered **Brakes** contracting bands operated by two foot pedals **Equalized** pedals can be locked together **Power take-off** conventional type.

**ENGINE** Make International Type 4 cylinder vertical Serial No. 192845 **Crankshaft** mounted lengthwise **Head L Lubrication** pressure **Bore and stroke** 2½" x 2¾" **Rated rpm** 1800 **Compression ratio** 6.5 to 1 **Displacement** 59.5 cu. in. **Port diameter valves** inlet 63/64" exhaust 51/64" **Governor** variable speed centrifugal **Carburetor size** ¾" **Ignition system** battery **Starting system** 6 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable treated paper element **Cooling medium** temperature control thermosiphon.

**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 the same setting of the carburetor. (Selected by the manufacturer.)

**TIRES, WHEELS AND WEIGHTS**

	Tests F, G, & H	Test J	Test K
<b>Rear wheels</b>			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	138 lb each	None	None
Added cast iron	360 lb each	None	None
<b>Rear tires</b>			
No. and size	Two 8-24	Two 8-24	Two 7-24
Ply	4	4	4
Air pressure	14 lb	12 lb	12 lb
<b>Front wheels</b>			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
<b>Front tires</b>			
No. and size	Two 4.00 -12	Two 4.00-12	Two 4.00-12
Ply	4	4	4
Air pressure	24 lb	24 lb	24 lb
<b>Height of drawbar</b>	20 inches	21 inches	19½ inches
<b>Static weight</b>			
Rear end	2104 lb	1108 lb	1090 lb
Front end	612 lb	612 lb	612 lb
<b>Total weight as tested with operator</b>	2891 lb	1895 lb	1877 lb

**HORSEPOWER SUMMARY**

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	10.08	10.75
2. Observed maximum horsepower (tests F and B)	9.87	10.39
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	7.56	9.14

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 575.

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.

