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## Test 538: McCormick Farmall Model 300

Nebraska Tractor Test Lab

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Department of Agricultural Engineering  
Dates of Test: April 29 to May 2, 1955  
Manufacturer: INTERNATIONAL HARVESTER  
COMPANY, CHICAGO, ILLINOIS  
Manufacturer's rating: Drawbar 33 Hp, Belt 37.5 Hp  
(Corrected to standard conditions)

**McCORMICK FARMALL 300**

**BELT HORSEPOWER TESTS**

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury		
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air			
TEST E—100% MAXIMUM LOAD—TWO HOURS										
58.16	1750	3.372	11.32	0.535	0.00	179	76	29.100		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
55.99	1750	3.047	11.81	0.512	0.00	189	83	29.085		
TEST D—RATED LOAD—ONE HOUR										
33.89	1750	2.923	11.59	0.522	0.00	198	86	29.060		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
53.86	1749	2.920	11.60	0.522	0.00	197	88	.....		
1.25	1841	1.205	1.04	5.832	...	189	86	.....		
17.59	1808	2.062	8.53	0.709	...	193	86	.....		
34.42	1657	2.885	11.93	0.507	...	186	86	.....		
8.94	1835	1.675	5.34	1.134	...	187	86	.....		
25.90	1780	2.479	10.45	0.579	...	186	88	.....		
20.33	1778	2.204	9.22	0.656	0.00	190	87	29.050		
TORQUE (At Dynamometer)										
Eng rpm	1752	1656	1552	1449	1348	1252	1150	1050	949	851
Lb-ft	243.6	253.9	256.4	260.2	267.2	276.5	281.8	283.2	278.6	272.5
Dyn rpm	751	709	664	620	577	536	491	449	406	364

**DRAWBAR HORSEPOWER TESTS**

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cooling med	Air	
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
26.97	1933	5.23	1749	3.43	2.816	9.58	0.632	0.00	189	85	28.662
TEST F—100% MAXIMUM LOAD											
33.73	2450	5.16	1749	4.73	3rd gear.....				185	83	28.750
TEST G—OPERATING MAXIMUM LOAD											
30.01	4852	2.32	1748	11.67	1st gear.....				189	80	28.730
31.99	3187	3.76	1750	6.36	2nd gear.....				188	82	28.750
32.14	2331	5.17	1748	4.60	3rd gear.....				196	82	28.750
31.77	1775	6.71	1751	3.52	4th gear.....				190	83	28.730
27.25	606	16.86	1757	0.73	5th gear.....				176	84	28.730
22.67	5650	1.51	1749	15.12	1st gear T. A. (Part Throttle)				179	80	28.730
30.13	4681	2.41	1747	10.89	2nd gear Torque Amplifier..				195	81	28.750
31.52	3468	3.41	1754	6.96	3rd gear Torque Amplifier..				188	80	28.730
31.52	2663	4.44	1750	5.27	4th gear Torque Amplifier..				195	82	28.750
30.87	1030	11.24	1753	1.78	5th gear Torque Amplifier..				186	83	28.730
TEST J—OPERATING MAXIMUM LOAD											
32.14	2373	5.08	1748	6.16	3rd gear.....				189	79	28.760
TEST K—OPERATING MAXIMUM LOAD											
31.57	2572	4.60	1749	8.84	3rd gear.....				192	82	28.740

**TIRES, WHEELS AND WEIGHT**

	Tests F, G, & H	Test J	Test K
<b>Rear wheels (Type)</b>	Cast iron	Cast iron	Cast iron
Liquid ballast	748 lb each	None	None
Added cast iron	700 lb each	None	None
<b>Rear tires</b>	Two 12-38	Two 12-38	Two 10-38
Ply	6	6	6
Air pressure	20 lb	12 lb	14 lb
<b>Front wheels (Type)</b>	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
<b>Front tires</b>	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
<b>Height of drawbar</b>	20½ inches	21 inches	18½ inches
<b>Static weight</b>			
Rear end	6722 lb	3827 lb	3746 lb
Front end	1358 lb	1359 lb	1350 lb
<b>Total weight as tested with operator</b>	8255 lb	5361 lb	5271 lb

**FUEL, OIL and TIME** Gasoline Octane No. ASTM 80.8 Research 85.9 (rating taken from oil company's typical inspection data); weight per gallon 6.052 lb OIL SAE 20; to motor 1.495 gal; drained from motor 1.480 gal; Total time motor was operated 38½ hours.

**CHASSIS** Type Tricycle Serial No. 2910 SJ Tread width rear 48" to 93" front 8½" to 16¾" Wheel base 92¼" Hydraulic control system direct engine drive Advertised speeds mph first 2.50 second 3.82 third 5.15 fourth 6.60 fifth 16.11 reverse 3.12 Using torque amplifier (planetary underdrive) first 1.68 second 2.58 third 3.48 fourth 4.46 fifth 10.87 reverse 2.10 Belt pulley diam 9¾" face 7½" rpm 1081 Belt speed 2759 fpm 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.

**ENGINE** Make International Harvester Type 4 cylinder vertical Serial No. 2913 Crankshaft mounted lengthwise Head 1 Lubrication pressure Bore and stroke 3 9/16" x 4¼" Rated rpm 1750 Compression ratio 6.8 to 1 Displacement 169 cu. in. Port diameter valves inlet 1 11/32" exhaust 1 7/32" Governor variable speed centrifugal Carburetor size 1¼" Ignition system battery Starting system 6 volt battery Air cleaner oil washed wire screen Muffler was used Oil filter replaceable radial fin treated paper element Cooling medium temperature control thermostat and 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 were made with an operating setting of the carburetor (selected by the manufacturer) of 95.0% of maximum belt horsepower.

**HORSEPOWER SUMMARY**

- |  |                |             |
|--|----------------|-------------|
|  | <b>Drawbar</b> | <b>Belt</b> |
| 1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" HG)   | 35.87          | 39.84       |
| 2. Observed maximum horsepower (tests F and B)   | 33.73          | 38.16       |
| 3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings) | 26.90          | 33.86       |

We, the undersigned, certify that this is a true and correct report of official tractor test No. 538.

L. F. LARSEN  
Engineer-in-Charge

C. W. SMITH  
L. W. HURLBUT  
F. D. YUNG  
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 held 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 held 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.

**Torque, lb-ft at dynamometer,** is obtained with wide open throttle and sufficient load is applied to give several readings.

### DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same 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.

