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Test 536: McCormick Farmall Model 200

Nebraska Tractor Test Lab

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Department of Agricultural Engineering
Dates of test: April 18 to April 29, 1955
Manufacturer: INTERNATIONAL HARVESTER
COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Drawbar 22 Hp, Belt 25 Hp
(Corrected to standard conditions)

McCORMICK FARMALL 200

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 B—100% MAXIMUM LOAD—TWO HOURS											
24.11	1650	2.424	9.95	0.608	0.00	174	75	28.947			
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR											
22.09	1650	2.039	10.83	0.559	0.00	179	75	28.760			
TEST D—RATED LOAD—ONE HOUR											
20.76	1649	2.006	10.35	0.585	0.00	194	79	28.775			
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)											
20.66	1643	1.988	10.39	0.582	...	195	81			
1.75	1773	0.922	1.90	3.189	...	202	81			
10.76	1703	1.393	7.72	0.783	...	189	82			
21.20	1544	1.968	10.77	0.562	...	171	82			
5.53	1753	1.100	5.03	1.204	...	195	82			
15.83	1674	1.705	9.28	0.652	...	197	83			
12.62	1681	1.513	8.34	0.725	0.00	191	82	28.780			
TORQUE (At Dynamometer)											
Eng rpm	1651	1572	1497	1418	1341	1273	1198	1125	1054	978	901
Lb-ft	140.0	142.8	145.6	149.3	152.8	156.1	157.5	159.1	159.6	158.6	155.9
Dyn rpm	824	785	747	708	669	635	598	561	526	488	449

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											
16.85	1675	3.77	1649	4.97	1.920	8.78	0.690	0.00	194	71	28.550
TEST F—100% MAXIMUM LOAD											
20.92	2112	3.71	1648	6.37	2nd Gear				180	82	28.700
TEST G—OPERATING MAXIMUM LOAD											
19.05	3166	2.26	1651	9.85	1st Gear				193	74	28.090
20.24	2033	3.73	1652	6.00	2nd Gear				176	82	28.665
20.20	1515	5.00	1652	4.47	3rd Gear				174	81	28.665
18.45	651	10.63	1651	2.08	4th Gear				175	80	28.665
TEST J—OPERATING MAXIMUM LOAD											
19.38	1987	3.66	1656	8.25	2nd Gear				186	74	28.070
TEST K—OPERATING MAXIMUM LOAD											
19.01	2106	3.39	1655	11.38	2nd Gear				188	60	28.860

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	475 lb each	None	None
Added cast iron	420 lb each	None	None
Rear tires			
No. and size	Two 10-36	Two 10-36	Two 9-36
Ply	4	4	4
Air pressure	16 lb	12 lb	12 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 5.00-15	Two 5.00-15	Two 5.00-15
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	20 inches	20½ inches	18½ inches
Static weight			
Rear end	4156 lb	2366 lb	2332 lb
Front end	994 lb	1000 lb	974 lb
Total weight as tested with operator	5325 lb	3541 lb	3481 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 1.228 gal; drained from motor 1.046 gal. Total time motor was operated 49½ hours.

CHASSIS Type Tricycle Serial No. 1907 J Tread width rear 48" to 80" front 6¾" 9¾" & 12¾" Wheel base 82¼" Hydraulic control system direct engine drive Advertised speeds mph first 2½ second 3¾ third 5¼ fourth 10¾ reverse 3¾ Belt pulley diam 8½" face 6" rpm 1363 Belt speed 3033 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 together Power take-off conventional type.

ENGINE Make International Harvester Type 4 cylinder vertical Serial No. 1892 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3¾" x 4" Rated rpm 1650 Compression ratio 6.5 to 1 Displacement 123 cu. in. Port diameter valves inlet 1 3/16" exhaust 1" 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 radial fin treated paper element Cooling medium temperature control thermostat and shutters.

REPAIRS AND ADJUSTMENTS Following completion of drawbar tests engine head was removed and combustion chambers cleaned. Test "B" was then rerun with improved performance.

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 92.2% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" HG)	22.27	25.28
2. Observed maximum horsepower (tests F and B)	20.92	24.11
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)	16.70	21.49

We, the undersigned, certify that this is a true and correct report of official tractor test No. 536.

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.

