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Test 666: McCormick-Farmall Model 140

Nebraska Tractor Test Lab
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The Experiment Station
University of Nebraska College of Agriculture
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Department of Agricultural Engineering
Dates of test: September 3, 1958 to September 18, 1958
Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 666

MC CORMICK FARMALL 140

FUEL, OIL, WATER and TIME **Fuel** Gasoline **Octane No.** ASTM 83.6 **Research** 90.4 (rating taken from oil company's typical inspection data) **Weight per gallon** 6.150 lb **Oil** SAE 10W-30 **To motor** 1.229 gal **Drained from motor** 1.133 gal **Water used** 0.264 gal **Total time motor was operated** 49½ hours.

CHASSIS **Type** Standard **Serial No.** 504 J **Tread width rear** 40" to 68" **front** 44" to 70" **Wheel base** 71" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 1.9 second 3.7 third 4.8 fourth 12.8 reverse 3.1 **Belt pulley diam.** 8½" **face** 6" **rpm** 1157 **Belt speed** 2574 fpm **Belt** flat **Length** 71' **Width** 6" **Thickness** 0.215" **Maximum slip** 0.56% **Clutch** single plate dry disc operated by foot pedal **Seat** upholstered seat with back rest **Brakes** contracting band 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.** 65044 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 3⅛" x 4" **Rated rpm** 1400 **Compression ratio** 6.94 to 1 **Displacement** 122.7 cu. in. **Valves port diameter Inlet** 1¼" **Exhaust** 1 5/32" **Governor** variable speed centrifugal **Carburetor size** ⅞" **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.

REPAIRS AND ADJUSTMENTS During preliminary belt test the carburetor was dismantled and cleaned. A new high speed jet and load needle were installed to replace original parts.

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, and K were made with an operating setting of the carburetor (selected by the manufacturer) of 92.3% of maximum belt horsepower.

During Test "H" the engine surged at each end of the test course as the pull changed.

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hr	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Temp. Deg. F.: Cooling medium	Temp. Deg. F.: Air wet bulb	Temp. Deg. F.: Air dry bulb	Barometer inches of mercury
TEST B—100% MAXIMUM POWER—TWO HOURS								
23.02	1400	2.021	11.39	0.540	170	70	78	28.870
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
21.16	1400	1.722	12.29	0.500	167	72	81	28.850
TEST D—RATED POWER—ONE HOUR								
20.61	1527	1.741	11.84	0.520	165	74	85	28.840
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
20.62	1528	1.751	11.78	0.522	167	75	86	
1.29	1645	0.776	1.66	3.698	140	75	86	.....
10.90	1610	1.234	8.83	0.696	156	75	86	.....
21.17	1400	1.756	12.06	0.510	171	76	88	.....
5.57	1643	0.980	5.68	1.083	147	76	89	.....
15.92	1569	1.488	10.70	0.575	167	76	90	....
12.58	1566	1.331	9.45	0.651	158	75	87	28.840

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hr	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Temp. Deg. F.: Cooling med	Temp. Deg. F.: Air wet bulb	Temp. Deg. F.: Air dry bulb	Barometer inches of mercury
TEST H—RATED POWER—TEN HOURS—2nd Gear											
16.41	1486	4.14	1489	3.62	1.546	10.61	0.579	151	60	68	29.043
TEST F—100% MAXIMUM POWER											
21.25	2083	3.83	1402	5.39	2nd Gear.....			165	62	72	28.995
TEST G—OPERATING MAXIMUM POWER											
17.77	3611	1.84	1406	13.89	1st Gear.....			149	52	54	29.070
19.39	1894	3.84	1404	5.25	2nd Gear.....			158	62	72	28.995
19.20	1406	5.12	1400	3.70	3rd Gear			160	62	72	28.995
16.12	431	14.03	1405	0.62	4th Gear			162	62	72	28.995
TEST J—OPERATING MAXIMUM POWER											
18.14	1851	3.68	1402	11.47	2nd Gear			158	56	68	28.790
TEST K—SPEED-PULL CHARACTERISTIC											
Pounds Pull		1486	1894	2000	2000	2000	1950	1900			
Horsepower		16.41	19.39	18.1	16.0	14.4	12.0	9.6			
Miles Per Hour		4.14	3.84	3.4	3.0	2.7	2.3	1.9			

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels Type	Pressed steel and cast iron	Pressed steel and cast iron
Liquid ballast	358 lb each	None
Added cast iron	460 lb each	None
Rear tires No. and size	Two 11-24	Two 11-24
Ply	4	4
Air pressure	12 lb	12 lb
Front wheels Type	Pressed steel	Pressed steel
Liquid ballast	None	None
Added cast iron	95 lb each	None
Front tires No. and size	Two 5.00-15	Two 5.00-15
Ply	4	4
Air pressure	28 lb	28 lb
Height of drawbar	17½ inches	18½ inches
Static weight Rear end	3500 lb	1865 lb
Front end	1150 lb	960 lb
Total weight as tested with operator	4825 lb	3000 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	22.18	24.27
2. Observed maximum horsepower (tests F and B)	21.25	23.02
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	16.64	20.63

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 666.

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 permissable 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 manual throttle control lever is set so that 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 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 manual throttle control lever is set the same as for tests B and C allowing the governor to control engine speed at part throttle. Load is applied until 85% of maximum corrected horsepower found in test B is obtained.

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, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ 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.

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. When rubber tires are used, all tests are made on the concrete test course. The same tires, wheels and weights are used for all tests except J. All crawler type tractors are tested on an earthen test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same for each test.

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 the 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 manual throttle control lever is set so that 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 15%. 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 horsepower the manual throttle control lever is set the same as in tests F and G allowing the governor to maintain engine speed at part throttle. 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: This is intended to show the pull, horsepower, and travel speed of the tractor at rated horsepower (taken from test H); maximum horsepower (taken from test G); and at least four other conditions obtained by reducing travel speed in 10% increments by overload.