University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

9-3-1958

Test 665: McCormick-Farmall Model 340

Nebraska Tractor Test Lab
University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: https://digitalcommons.unl.edu/tractormuseumlit

 Part of the Energy Systems Commons, History of Science, Technology, and Medicine Commons, Other Mechanical Engineering Commons, Physical Sciences and Mathematics Commons, Science and Mathematics Education Commons, and the United States History Commons

Nebraska Tractor Test Lab, "Test 665: McCormick-Farmall Model 340" (1958). *Nebraska Tractor Tests*. 1094.
https://digitalcommons.unl.edu/tractormuseumlit/1094

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

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

Department of Agricultural Engineering
Dates of test: September 3, 1958 to September 25, 1958
Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 665

MC CORMICK FARMALL 340

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** 10W-30 **To motor** 1.225 gal **Drained from motor** 0.935 gal **Water used** 0.202 gal **Total time motor was operated** 59 hours.

CHASSIS **Type** Tricycle **Serial No.** 850S **Tread Width rear** 48" to 92" **front** 7.7" and 13.6" **Wheel base** 80.2" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 1.8 second 3.9 third 5.3 fourth 7.5 fifth 16.6 reverse 2.3 (using torque amplifier) first 1.2 second 2.7 third 3.6 fourth 5.1 fifth 11.2 reverse 1.5 **Belt pulley diam.** 11" **face** 7½" **rpm** 1082 **Belt speed** 3115 fpm **Belt** flat **Length** 72' **Width** 7" **Thickness** 0.216" **Maximum slip** 0.79% **Clutch** single plate dry disc operated by foot pedal **Seat** upholstered seat with back rest **Brakes** double disc brakes operated by two foot pedals **Equalized** by locking together **Power take-off** direct engine drive with independent clutch **Steering** power steering not available.

ENGINE **Make** International **Type** 4 cylinder vertical **Serial No.** 6356 **Crankshaft mounted** lengthwise **Head I Lubrication** pressure **Bore and stroke** 3¼" x 4 1/16" **Rated rpm** 2000 **Compression ratio** 7.52 to 1 **Displacement** 135 cu. in. **Valves port diameter Inlet** 1¼" **Exhaust** 1 15/32" **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 Following belt test the generator voltage regulator failed to function properly, discharging the battery. After recharging the battery test was continued. Soon after starting Test "H' the differential casting failed, damaging the right and left differential bearings, differential bevel gear, differential bevel pinion, right and left bull pinions and bull pinion bearings, and right bull gear. The complete differential and all damaged parts were replaced and test completed.

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, respectivly. Tests C, D, E, G, H, J, and K were made with an operating setting of the carburetor (selected by the manufacturer) of 92.9% of maximum belt horsepower.

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hr	Hp-hr per gal	Lb per hp-hr	Temp. Deg. F.: Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of mercury
TEST B—100% MAXIMUM POWER—TWO HOURS								
34.74	2000	2.889	12.02	0.512	167	64	70	29.050
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
32.30	2000	2.595	12.45	0.494	157	63	70	29.065
TEST D—RATED POWER—ONE HOUR								
30.70	2113	2.551	12.03	0.511	157	65	72	29.055
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
30.71	2112	2.541	12.09	0.509	156	66	74	.....
1.70	2195	1.020	1.67	3.688	147	66	75	.....
15.76	2159	1.746	9.03	0.681	154	66	74	.....
32.34	2002	2.590	12.49	0.493	161	66	73	.....
7.96	2176	1.312	6.07	1.014	148	66	73	.....
23.45	2145	2.166	10.83	0.568	159	68	76	.....
18.65	2131	1.896	9.84	0.625	154	66	74	29.080

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	Hp-hr per gal	Lb per hp-hr	Temp. Deg. F.: Cooling med	Air wet bulb	Air dry bulb	Barometer inches of mercury
TEST H—RATED POWER—TEN HOURS—3rd Gear											
24.87	1695	5.50	2108	2.94	2.313	10.75	0.572	155	65	69	28.819
TEST F—100% MAXIMUM POWER											
31.76	2320	5.13	1999	4.52	3rd Gear.....			158	54	60	29.075
TEST G—OPERATING MAXIMUM POWER											
22.55	5142	1.64	2002	12.10	1st Gear (part throttle)			149	55	59	28.950
29.15	2894	3.78	2001	5.36	2nd Gear.....			157	58	64	28.940
28.85	2089	5.18	2001	3.74	3rd Gear.....			158	63	74	28.920
28.17	1425	7.41	1997	2.53	4th Gear.....			159	63	74	28.920
23.59	531	16.66	1997	0.60	5th Gear.....			158	63	74	28.920
15.18	5137	1.11	1996	11.94	1st Gear T.A.(prt thrtl)			152	64	74	28.910
27.97	4258	2.46	2000	8.44	2nd Gear Torq-Amp.			156	58	64	28.940
28.54	3133	3.42	2000	5.86	3rd Gear Torq-Amp.			155	58	64	28.940
28.53	2166	4.94	2000	3.87	4th Gear Torq-Amp.			160	63	74	28.920
27.05	907	11.19	2004	1.51	5th Gear Torq-Amp.			160	63	74	28.920
TEST J—OPERATING MAXIMUM POWER											
28.97	2112	5.14	2003	5.95	3rd Gear.....			138	56	64	28.970

TEST K—SPEED-PULL CHARACTERISTIC

Pounds Pull	1695	2089	2200	2200	2300	2400	2400
Horsepower	24.87	28.85	27.6	24.1	22.1	19.8	16.6
Miles Per Hour	5.50	5.18	4.7	4.1	3.5	3.1	2.5

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test F
Rear wheels Type	Cast Iron	Cast Iron
Liquid ballast	580 lb each	None
Added cast iron	290 lb each	None
Rear tires No. and size	Two 13.9-36	Two 13.9-36
Ply	4	4
Air pressure	14 lb	14 lb
Front wheels Type	Pressed Steel	Pressed Steel
Liquid ballast	None	None
Added cast iron	143 lb each	None
Front tires No. and size	Two 5.00-15	Two 5.00-15
Ply	4	4
Air pressure	36 lb	36 lb
Height of drawbar	18½ inches	19 inches
Static weight Rear end	5080 lb	3340 lb
Front end	1505 lb	1220 lb
Total weight as tested with operator	6760 lb	4735 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	32.68	36.12
2. Observed maximum horsepower (tests F and B)	31.76	34.74
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	24.51	30.70

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 665.

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.