

November 1957

Test 608: McCormick Farmall 450 Diesel

Tractor Test & Power Museum
University of Nebraska, jsteele4@unl.edu

Follow this and additional works at: <http://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Applied Mechanics Commons](#)

Museum, Tractor Test & Power, "Test 608: McCormick Farmall 450 Diesel" (1957). *Nebraska Tractor Tests*. 2.
<http://digitalcommons.unl.edu/tractormuseumlit/2>

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.

Department of Agricultural Engineering
Dates of test: March 18, 1957 to April 1, 1957
Manufacturer: INTERNATIONAL HARVESTER
COMPANY, CHICAGO 1, ILLINOIS
Manufacturer's rating: Not Rated

McCORMICK FARMALL 450 DIESEL

BELT HORSEPOWER 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										
48.78	1450	3.594	13.57	0.516	187	51	65	28.888		
TEST D—RATED LOAD—ONE HOUR										
43.16	1450	3.061	14.10	0.497	180	55	69	28.853		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
43.16	1451	3.058	14.11	0.496	180	55	70		
1.10	1557	1.045	1.05	6.655	151	55	68		
22.57	1507	1.949	11.58	0.605	166	55	68		
45.26	1356	3.328	13.60	0.515	190	56	71		
11.46	1527	1.448	7.91	0.885	161	55	69		
33.27	1485	2.467	13.49	0.519	172	56	70		
26.14	1480	2.216	11.80	0.594	170	55	69	28.849		
TEST L—OPERATING MAXIMUM TORQUE										
% of rated rpm (engine)	100	95	90	85	80	74	70	65	61	55
% of rated-speed torque	100	102	102	103	103	101	97	95	93	91

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	Cooling med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
34.68	2750	4.73	1450	3.80	2.721	12.75	0.550	163	36	40	29.158
TESTS F & G—100% MAXIMUM LOAD											
38.08	6617	2.16	1453	15.45	1st gear (part throttle)			166	44	47	29.110
44.37	4567	3.64	1448	7.64	2nd gear.....			169	36	38	28.700
45.17	3623	4.68	1453	5.76	3rd gear.....			170	37	40	28.700
44.57	2536	6.59	1447	4.17	4th gear.....			162	36	38	28.705
39.38	881	16.76	1445	1.11	5th gear.....			170	42	48	29.080
25.93	6634	1.47	1455	14.96	1st gear TA (prt-thrtl)			150	40	44	29.110
39.50	6606	2.24	1457	15.51	2nd gear TA (prt-thrtl)			172	40	46	29.090
42.75	5292	3.03	1451	9.50	3rd gear torc amplifier.			170	37	39	28.705
44.07	3784	4.37	1450	6.17	4th gear torc amplifier.			166	37	39	28.700
42.72	1424	11.25	1451	2.07	5th gear torc amplifier.			170	42	48	29.080
TEST J—OPERATING MAXIMUM LOAD											
43.15	3582	4.52	1453	9.16	3rd gear.....			170	43	48	28.720
TEST K—OPERATING MAXIMUM LOAD											
45.47	4061	4.20	1449	10.94	3rd gear.....			169	37	40	29.000

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast Iron	Cast Iron	Cast Iron
Liquid ballast	773 lb each	None	None
Added cast iron	420 lb each	None	None
Rear tires			
No. and size	Two 15.5-38	Two 15.5-38	Two 11-38
Ply	6	6	4
Air Pressure	18 lb	14 lb	14 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 6.00-16	Two 6.00-16	Two 6.00-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	23 inches	23 inches	22 inches
Static weight			
Rear end	7016 lb	4630 lb	4434 lb
Front end	2066 lb	2072 lb	2060 lb
Total weight as tested with operator	9257 lb	6877 lb	6669 lb

FUEL, OIL, WATER and TIME Fuel Diesel Cetane No. ASTM 50 (rating taken from oil company's typical inspection data) **Weight per gallon** 7.005 lb **Oil SAE 20-20W To Motor** 1.986 gal **Drained from motor** 1.672 gal **Water used** 0.251 gal **Total time motor was operated** 45 hours.

CHASSIS TYPE Tricycle Serial No. 6558 **Tread** width rear 50" to 94" front 8 3/4" to 17 1/2" **Wheel base** 95 3/4" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 2.5 second 3.8 third 4.8 fourth 6.7 fifth 16.6 reverse 3.3 (using torque amplifier) first 1.7 second 2.6 third 3.2 fourth 4.5 fifth 11.2 reverse 2.2 **Belt pulley diam.** 11" **face** 7 1/2" **rpm** 899 **Belt speed** 2588 fpm **Belt flat Length** 72" **Width** 7" **Thickness** 0.216" **Maximum slip** 1.04% **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 **Steering** hydraulically aided.

ENGINE Make International **Type** 4 cylinder vertical Diesel Serial No. D281-505 **Crankshaft** mounted lengthwise **Head I Lubrication** pressure **Bore and stroke** 4 1/8" x 5 1/4" **Rated rpm** 1450 **Compression ratio** 17.45 to 1 **Displacement** 281 cu. in. **Port diameter valves** Inlet 1.500" Exhaust 1.316" **Governor** variable speed centrifugal **Carburetor** size 3/4" (for starting only) **Ignition system** battery (for starting only) **Starting system** 12 volt battery **Air cleaner** oil washed wire screen **Muffler** was used **Oil filter** replaceable treated paper element **Fuel filter** one cotton auxiliary filter and one treated paper element **Cooling medium temperature control** thermostat.

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 a fuel pump setting selected by the manufacturer to develop approximately 50.8 corrected 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.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	46.18	50.77
2. Observed maximum horsepower (tests F and B)	45.17	48.78
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	34.64	43.15

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 608.

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 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.

