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9-27-1956

## Test 596: Ferguson Model 40

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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

Department of Agricultural Engineering  
Dates of test: September 27, 1956 to October 2, 1956  
Manufacturer: MASSEY-HARRIS-FERGUSON,  
INC., DETROIT 32, MICHIGAN  
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 596

FERGUSON 40

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			
TEST B—100% MAXIMUM LOAD—TWO HOURS										
32.80	2000	3.095	10.60	0.580	169	51	68	28.903		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
31.14	2000	2.747	11.34	0.542	183	61	85	28.908		
TEST D—RATED LOAD—ONE HOUR										
29.37	2001	2.681	10.95	0.561	187	63	91	28.893		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
29.35	2002	2.661	11.03	0.557	188	64	92	.....		
1.49	2074	1.187	1.26	4.893	150	64	92	.....		
15.03	2058	1.948	7.72	0.796	168	64	92	.....		
21.56	1855	2.588	11.42	0.538	194	64	94	.....		
7.63	2084	1.523	5.01	1.227	161	64	93	.....		
22.15	2026	2.368	9.35	0.657	182	64	93	.....		
17.54	2017	2.046	8.57	0.717	174	64	93	28.883		
TEST L—OPERATING MAXIMUM TORQUE										
% of rated rpm (engine).....		100	93	86	79	72	65	58	51	44
% of rated-speed torque.....		100	102	105	108	112	114	117	116	110

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	Cool- ing med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—4th Gear											
24.31	1780	5.12	2001	4.48	2.457	9.89	0.621	175	59	81	28.616
TEST F—100% MAXIMUM LOAD											
30.84	2290	5.05	2007	6.08	4th gear.....			138	45	55	29.000
TEST G—OPERATING MAXIMUM LOAD											
11.22	3559	1.18	2009	12.17	1st gear (part throttle)			127	43	53	29.000
16.97	3613	1.76	2005	12.59	2nd gear (part throttle)			130	42	52	29.000
28.36	3184	3.34	1999	9.33	3rd gear.....			147	45	58	29.000
29.29	2172	5.06	2001	5.65	4th gear.....			140	45	58	29.000
27.53	1328	7.77	2005	3.56	5th gear.....			145	45	58	29.000
22.94	592	14.53	2005	1.25	6th gear.....			140	45	58	29.000
TEST J—OPERATING MAXIMUM LOAD											
26.82	2125	4.73	2002	13.48	4th gear.....			152	50	60	28.940

TIRES, WHEELS AND WEIGHT

Tests F, G, & H		Test J
Rear wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	256 lb each	None
Added cast iron	667 lb each	None
Rear tires		
No. and size	Two 11-28	Two 11-28
Ply	4	4
Air pressure	12 lb	12 lb
Front wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	None	None
Added cast iron	100 lb each	None
Front tires		
No. and size	Two 6.00-16	Two 6.00-16
Ply	4	4
Air pressure	28 lb	28 lb
Height of drawbar	22 inches	23 inches
Static weight		
Rear end	3776 lb	1930 lb
Front end	1510 lb	1314 lb
Total weight as tested with operator	5461 lb	3419 lb

FUEL, OIL, WATER and TIME Fuel Gasoline Octane No. ASTM 82 Research 87.2 (rating taken from oil company's typical inspection data) Weight per gallon 6.144 lb Oil 10W-20W-30 To motor 1.252 gal Drained from motor 1.252 gal Water used none Total time motor was operated 39 hours.

CHASSIS TYPE Standard Serial No. SGM 401451 Tread width rear 48" to 76" front 48" to 80" Wheel base 81.26" Hydraulic control system constant running—transmission drive Advertised speeds mph first 1.33 second 1.99 third 3.65 fourth 5.30 fifth 7.96 sixth 14.59 reverse 1.77 and 7.09 Belt pulley diam. 9" Face 6½" rpm 1356 Belt speed 3100 fpm Belt flat Length 71' Width 6" Thickness 0.215" Maximum slip 0.73% Clutch dual dry disc operated by single foot pedal Seat upholstered bucket seat Brakes expanding double shoe operated by two independent pedals on right hand side of tractor Equalized by pedal lock and balance springs Power take-off continuous running—controlled by secondary clutch.

ENGINE Make Continental Type 4 cylinder vertical Serial No. Z134-640289 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3 5/16" x 3¾" Rated rpm 2000 Compression ratio 6.60 to 1 Displacement 134 cu. in. Port diameter valves inlet 1½" exhaust 1" Governor variable speed centrifugal Carburetor size ¾" Ignition system 12 volt battery Starting system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable 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 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 & L were made with an operating setting of the carburetor (selected by the manufacturer) of 96.4% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	31.66	34.22
2. Observed maximum horsepower (tests F and B)	30.84	32.80
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings).	23.75	29.09

We, the undersigned certify that this is a true and correct report of official Tractor Test No. 596.

L. F. LARSEN  
Engineer-in-Charge

L. W. HURLBUT  
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.

