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Test 775: McCormick-Farmall 340 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 775 - MC CORMICK FARMALL 340 DIESEL

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean and Acting Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of mercury
		Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
38.93	2000	2.819	0.514	13.81	196	57	75	28.993
Standard Power Take-off Speed (540 rpm)—One Hour								
37.39	1776	2.783	0.528	13.44	203	56	75	29.023
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
34.29	2072	2.480	0.514	13.83	186	56	75	.....
0.00	2156	0.963	.....	.....	158	54	71	.....
17.57	2126	1.597	0.645	11.00	166	54	71	.....
39.98	2000	2.877	0.511	13.90	197	56	74	.....
8.85	2144	1.196	0.959	7.40	160	54	70	.....
26.13	2104	1.994	0.542	13.10	168	55	71	.....
Av 21.14	2100	1.851	0.622	11.42	173	55	72	29.025

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temperature Degrees F		Barometer inches of mercury	
					Gal per hr	Lb per hp hr		Cooling medium	Air wet bulb		Air dry bulb
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
36.14	2666	5.08	1996	4.79	2.762	0.543	13.08	183	46	54	29.113
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
27.95	1959	5.35	2075	3.60	2.348	0.596	11.90	193	44	49	28.889
50% of Pull at Maximum Power—Two Hours—3rd Gear											
19.69	1345	5.49	2105	2.42	1.825	0.658	10.79	190	50	60	29.068
MAXIMUM POWER WITH BALLAST											
24.64	5559	1.66	2087	14.26	1st Gear	.....	205	30	30		29.090
36.25	3672	3.70	2000	6.67	2nd Gear	.....	187	33	36		29.100
35.48	2617	5.08	1996	4.79	3rd Gear	.....	170	43	45		28.740
35.02	1790	7.34	2004	3.29	4th Gear	.....	217	37	40		29.110
31.60	5091	2.33	2001	13.15	2nd Gear	Torq. Amp.	173	43	45		28.740
35.15	3935	3.35	2002	7.28	3rd Gear	Torq. Amp.	187	30	31		29.090
35.23	2714	4.87	2003	4.98	4th Gear	Torq. Amp.	195	33	36		29.100
33.16	1126	11.04	2006	2.29	5th Gear	Torq. Amp.	173	37	40		29.110
MAXIMUM POWER WITHOUT BALLAST											
35.49	2634	5.05	1997	7.78	3rd Gear	.....	180	49	58		28.990
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull			2600	2650	2800			2850	2700		
Horsepower			35.5	32.5	30.6			26.6	18.0		
Miles per hour			5.1	4.6	4.1			3.5	2.5		

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13.9-36;4;14	Two 13.9-36;4;14
Ballast	—Liquid	575 lb each	None
	—Cast iron	255 lb each	None
Front tires	—No, size, ply & psi	Two 5.50-16;6;48	Two 5.50-16;6;28
Ballast	—Liquid	None	None
	—Cast iron	362 lb each	None
Height of drawbar		20 inches	20 inches
Static weight	—Rear	5224 lb	3564 lb
	—Front	2180 lb	1456 lb
Total weight with operator		7579 lb	5195 lb

Department of Agricultural Engineering

Dates of Test: October 26 to November 3, 1960

Manufacturer: INTERNATIONAL HARVESTER

COMPANY, CHICAGO, ILLINOIS

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 47 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8528 Weight per gallon 7.101 lb Oil SAE 10W API service classification DS To motor 1.776 gal Drained from motor 1.380 gal Transmission and final-drive lubricant IH Hy Tran fluid Total time engine was operated 45 hours.

ENGINE Make International Diesel Type 4 cylinder vertical Serial No D166-516 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3¹¹/₁₆" x 3³/₈" Compression ratio 19.7 to 1 Displacement 166 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire screen Oil filter replaceable treated paper element Fuel filter replaceable radial fin treated paper element Muffler was used Cooling medium temperature control thermostat and radiator shutter.

CHASSIS Type standard Serial No 5957S-Y Tread width rear 48" to 92" front 50" to 88" Wheel base 80.2" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 23.4" Vertical distance above roadway 29.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio partial range power shifting Advertised speeds mph first 1.2 second 1.8 third 2.7 fourth 3.6 fifth 3.9 sixth 5.1 seventh 5.3 eighth 7.5 ninth 11.2 tenth 16.6 reverse 1.5 and 2.3 Clutch single plate dry disc operated by foot pedal Brakes double disc operated by two foot pedals which can be locked together Steering power assisted Turning radius (on concrete surface with brake applied) right 144" left 144" (on concrete surface without brake) right 164" left 164" Turning space diameter (on concrete surface with brake applied) right 304" left 304" (on concrete surface without brake) right 346" left 346" Belt pulley 1063 rpm at 2000 engine rpm diam 11" face 7¹/₂" Belt speed 3062 fpm Power take-off 608 rpm at 2000 engine rpm.

REPAIRS and ADJUSTMENTS During limber up run, the planet carrier assembly was replaced due to failure of needle rollers in one of the planet gears.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First gear torque amplifier drive was not run as it was necessary to limit the pull in first gear direct drive to avoid excessive wheel slippage. Fifth gear direct drive was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 775.

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

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ the 85% torque; maximum power; $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.



McCormick Farmall 340 Diesel