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Test 845: Ford 5000 (Diesel)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 845 - FORD 5000 DIESEL

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	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	

MAXIMUM POWER AND FUEL CONSUMPTION

Rated Engine Speed—Two Hours								
47.53	1700	3.075	0.447	15.46	200	65	75	29.008

Standard Power Take-off Speed (540 rpm)—One Hour								
42.89	1473	2.759	0.444	15.55	201	65	75	29.010

VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

42.06	1769	2.591	0.425	16.23	182	66	75	.....
0.00	1934	0.652	.....	.....	155	67	76	.....
21.93	1846	1.552	0.488	14.13	166	66	75	.....
47.30	1701	3.095	0.452	15.28	201	66	75	.....
11.21	1886	1.126	0.693	9.96	156	66	75	.....
32.12	1802	2.025	0.435	15.86	168	66	75	.....
Av 25.77	1823	1.840	0.493	14.01	171	66	75	29.007

DRAWBAR PERFORMANCE

Hp	Drawbar pull lbs	Speed miles per hr	Crankshaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling med	Air wet bulb	Air dry bulb	

VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—3rd Gear											
40.21	4385	3.44	1700	6.63	2.997	0.514	13.42	195	70	77	28.920

75% of Pull at Maximum Power—Ten Hours—3rd Gear											
33.61	3432	3.67	1782	4.83	2.400	0.493	14.00	184	71	77	28.848

50% of Pull at Maximum Power—Two Hours—3rd Gear											
22.80	2239	3.82	1823	3.31	1.765	0.534	12.92	185	70	74	28.970

MAXIMUM POWER WITH BALLAST

35.98	8128	1.66	1750	13.89	1st Gear	.....	195	68	68	28.960
39.81	6992	2.14	1700	12.36	2nd Gear	.....	200	66	73	29.030
41.19	4495	3.44	1702	6.69	3rd Gear	.....	198	65	70	29.030
41.82	3478	4.51	1702	5.38	4th Gear	.....	200	69	74	29.030
40.29	1985	7.61	1700	2.91	5th Gear	.....	200	70	75	29.020

MAXIMUM POWER WITHOUT BALLAST

39.59	4488	3.31	1701	8.91	3rd Gear	200	69	71	28.970
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear

Pounds pull	4495	4641	4749	4796	4741	4648
Horsepower	41.19	38.06	34.51	30.45	25.73	21.03
Crankshaft speed rpm	1702	1529	1357	1187	1014	844
Miles per hour	3.44	3.08	2.73	2.38	2.04	1.70
Slip of drivers %	6.69	7.00	7.24	7.48	7.24	7.24

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 16.9-30; 6; 16	Two 16.9-30; 6; 16
Ballast	—Liquid	724 lb each	None
	Cast iron	1456 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 6; 32	Two 7.50-16; 6; 32
Ballast	—Liquid	115 lb each	None
	Cast iron	350 lb each	None
Height of drawbar		22½ inches	24 inches
Static weight	—Rear	7800 lb	3440 lb
	Front	2870 lb	1940 lb
Total weight with operator		10845 lb	5555 lb

Department of Agricultural Engineering

Dates of Test: September 3 to September 7, 1963

Manufacturer: FORD MOTOR COMPANY, LTD., DAGENHAM, ESSEX, ENGLAND

Manufacturer's Power Rating: Not rated

FUEL, OIL and Time Fuel No 2 Diesel Cetane No 56.7 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8289 Weight per gallon 6.902 lb Oil SAE 30 API service classification MS, DM To motor 1.574 gal Drained from motor 1.449 gal Transmission and final-drive lubricant Ford hydraulic oil M-4864-B Total time engine was operated 43½ hours.

ENGINE Make Ford Motor Company Ltd Diesel Type 4 cylinder vertical Serial No 08C957106 Crankshaft mounted lengthwise Rated rpm 1700 Bore and stroke 3.937" x 4.524" Compression ratio 16 to 1 Displacement 220 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter replaceable treated paper element Fuel filter one replaceable paper element and one edge type filter Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 08C957106 Tread width rear 58" or 62" front 54" to 78" Wheel base 80.0" 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 30.3" Vertical distance above roadway 34.4" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running except when PTO foot clutch is disengaged Transmission selective gear fixed ratio Advertised speeds mph first 1.87 second 2.41 third 3.65 fourth 4.72 fifth 7.77 sixth 15.23 reverse 2.52 and 4.92 Clutch double plate dry disc in combination with PTO clutch operated by single foot pedal Brakes double disc operated by two foot pedals Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 145" left 145" (on concrete surface without brake) right 168" left 168" Turning space diameter (on concrete surface with brake applied) right 302" left 302" (on concrete surface without brake) right 350" left 350" Belt pulley 946 or 1700 rpm at 1700 engine rpm diam 8.5" face 6.38" Belt speed 2105 or 3783 fpm Power take-off 540 rpm at 1473 engine rpm.

REPAIRS and ADJUSTMENTS Two fuel injection nozzles were replaced during preliminary PTO run.

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

Sixth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 845.

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 trans-

mission, 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.



Ford 5000 Diesel