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## Test 994: Ford 4000 Diesel 8-Speed (Also Ford 4000 Diesel 8-Speed Row Crop and Ford 4000 SU Diesel 8-Speed

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 994 – FORD 4000 DIESEL 8-SPEED (ALSO FORD 4000 DIESEL 8-SPEED ROW CROP)

## (ALSO FORD 4000 SU DIESEL 8-SPEED)

### POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Temperature Degrees F					Barometer inches of Mercury
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
52.65	2200	3.421	0.448	15.39	206	60	75	29.133	
Standard Power Take-off Speed (540 rpm)—One Hour									
45.94	1810	2.870	0.431	16.01	207	60	75	29.125	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
46.51	2288	3.006	0.446	15.47	202	61	77	.....	
0.00	2424	0.944	.....	.....	188	59	73	.....	
24.19	2379	1.905	0.543	12.70	195	59	74	.....	
52.47	2201	3.441	0.452	15.25	206	60	74	.....	
12.22	2406	1.401	0.791	8.72	189	59	74	.....	
35.69	2342	2.445	0.472	14.60	197	59	74	.....	
Av	28.51	2340	2.190	0.530	13.02	196	74	29.113	

### 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

<b>Maximum Available Power—Two Hours—4th Gear</b>											
47.57	4502	3.96	2199	8.22	3.493	0.506	13.62	211	33	37	29.170
<b>75% of Pull at Maximum Power—Ten Hours—4th Gear</b>											
38.31	3360	4.28	2332	6.62	2.949	0.531	12.99	204	37	38	29.016
<b>50% of Pull at Maximum Power—Two Hours—4th Gear</b>											
26.38	2216	4.46	2377	4.43	2.323	0.607	11.36	199	32	34	29.163

### MAXIMUM POWER WITH BALLAST

46.74	6080	2.88	2267	11.96	3rd Gear	.....	200	33	37	29.150
47.64	4502	3.97	2200	8.17	4th Gear	.....	203	34	37	29.150
47.94	3726	4.83	2201	6.87	5th Gear	.....	210	34	37	29.140
47.27	2909	6.09	2198	5.65	6th Gear	.....	207	34	39	29.140
44.40	1524	10.93	2200	3.54	7th Gear	.....	198	35	40	29.130

### MAXIMUM PULL WITHOUT BALLAST

42.59	4107	3.89	2307	14.98	4th Gear	.....	199	32	36	28.870
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	4502	4673	4797	4899	4955	4817
Horsepower	47.64	44.17	40.00	35.72	30.99	25.03
Crankshaft speed rpm	2200	1973	1748	1529	1315	1087
Miles per hour	3.97	3.54	3.13	2.73	2.35	1.95
Slip of drivers %	8.17	8.61	9.05	9.05	9.27	8.83

### TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-30; 6; 16	Two 14.9-30; 6; 14
Ballast	—Liquid	514 lb each	None
	Cast iron	1016 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 4; 24	Two 7.50-16; 4; 24
Ballast	—Liquid	88 lb each	None
	Cast iron	82 lb each	None
Height of drawbar		22½ inches	22½ inches
Static weight with operator—Rear		6200 lb	3140 lb
	Front	2050 lb	1710 lb
	Total	8250 lb	4850 lb

### Department of Agricultural Engineering

Date of Test: October 30 to November 13, 1968

Manufacturer: FORD MOTOR COMPANY,  
FORD TRACTOR OPERATIONS, BIRMINGHAM, MICHIGAN

**FUEL, OIL and TIME** Fuel No 2 Diesel Cetane 54.3 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8283 Weight per gallon 6.896 lb Oil SAE 10W API service classification MS DS To motor 1.723 gal Drained from motor 1.203 gal Transmission lubricant Ford oil ESN-M2C77A Final drive lubricant Ford oil ESN-M2C53-A or M-2C53-B Total time engine was operated 45½ hours.

**ENGINE** Make Ford Diesel Type 3 cylinder vertical Serial No D003852 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 4.4" x 4.4" Compression ratio 16½ to 1 Displacement 201 cu in Cranking system 12-volt electric Lubrication pressure Air cleaner oil washed wire mesh Oil filter full flow replaceable cotton blend element Fuel filter one nylon gauze element in bottom of tank and dual replaceable paper elements with water traps Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No C209842 Tread width rear 52" to 80" front 52" to 80" Wheel base 84.5" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 30.7" Vertical distance above roadway 29.8" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph first 1.5 second 2.0 third 3.5 fourth 4.7 fifth 5.6 sixth 7.0 seventh 12.3 eighth 16.8 reverse 2.3 and 8.1 Clutch single plate dry disc operated by foot pedal Brakes oil cooled multiple disc mechanically operated by two foot pedals which can be locked Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 120" left 120" (on concrete surface without brake) right 138" left 138" Turning space diameter (on concrete surface with brake applied) right 252" left 252" (on concrete surface without brake) right 291" left 291" Belt pulley 1208 rpm at 2200 engine rpm diam 10.25" face 6.5" Belt speed 3241 fpm Power take-off 537 rpm at 1800 engine rpm.

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with the SAE and ASAE test code. First and second gears were not run as it was necessary to limit the pull in third gear because of the stability formula. Eighth gear was not run because it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 994.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station  
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

# 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,  $\frac{1}{2}$  of 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 transmission, 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 Pull without Ballast.** All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

**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 4000 DIESEL 8-SPEED