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## Test 892: Ford 4000 Select-O-Speed (Diesel)

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 892 - FORD 4000 SELECT-O-SPEED DIESEL

## (ALSO FORD 4000 SELECT-O-SPEED ROW CROP DIESEL)

### POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft 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								
• 45.62	2200	3.281	0.498	13.90	202	59	79	29.033
Standard Power Take-off Speed (540 rpm)—One Hour								
41.68	1809	2.744	0.456	15.19	207	61	84	29.005
Standard Power Take-off Speed (1000 rpm)—One Hour								
43.43	1960	2.928	0.466	14.83	211	61	88	28.955
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
40.52	2301	3.061	0.523	13.24	200	61	87	.....
0.00	2412	1.127	.....	.....	182	61	86	.....
20.91	2373	2.085	0.690	10.03	191	62	88	.....
46.09	2200	3.290	0.494	14.01	210	62	88	.....
10.54	2393	1.569	1.030	6.72	185	62	88	.....
30.94	2343	2.601	0.582	11.90	196	62	88	.....
Av 24.83	2337	2.289	0.638	10.85	194	62	87	28.983

### DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	Barom- eter inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—6th Gear											
38.22	3242	4.42	2191	5.85	3.262	0.591	11.72	194	62	73	28.780
75% of Pull at Maximum Power—Ten Hours—6th Gear											
31.58	2491	4.75	2313	4.12	2.955	0.648	10.69	190	65	77	28.511
50% of Pull at Maximum Power—Two Hours—6th Gear											
22.38	1712	4.90	2353	2.84	2.434	0.752	9.19	184	63	74	28.760
MAXIMUM POWER WITH BALLAST											
33.26	6060	2.06	2253	12.51	4th	Gear .....	190	69	84	28.670	
39.40	4390	3.37	2202	8.37	5th	Gear .....	189	55	61	28.760	
39.43	3334	4.44	2201	6.03	6th	Gear .....	194	55	61	28.760	
37.73	2742	5.16	2202	5.00	7th	Gear .....	194	56	64	28.765	
37.07	2076	6.70	2196	3.82	8th	Gear .....	193	56	64	28.765	
35.73	1205	11.12	2211	2.03	9th	Gear .....	190	61	72	28.780	

### MAXIMUM POWER WITHOUT BALLAST

38.35	3320	4.33	2201	9.46	6th Gear	.....	.....	194	67	85	28.550
<b>VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—6th Gear</b>											
Pounds pull	3334	3575	3848	3999	4102	4156	4201				
Horsepower	39.43	37.67	35.90	32.61	28.52	23.90	19.58				
Crankshaft speed, rpm	2201	1972	1755	1541	1317	1092	886				
Miles per hour	4.44	3.95	3.50	3.06	2.61	2.16	1.75				
Slip of drivers, %	6.03	6.51	6.98	7.56	7.80	7.91	8.03				

### 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	730 lb each	None
	Cast iron	805 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 4; 24	Two 7.50-16; 4; 24
Ballast	—Liquid	None	None
	Cast iron	125 lb each	None
Height of drawbar		22 inches	22½ inches
Static weight	—Rear	6060 lb	2990 lb
	Front	1980 lb	1730 lb
Total weight with operator		8215 lb	4895 lb

### Department of Agricultural Engineering

Dates of Test: APRIL 23 TO MAY 6, 1965

Manufacturer: FORD MOTOR COMPANY, BIRMINGHAM, MICHIGAN

**FUEL, OIL and TIME** Fuel No 2 diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8312 Weight per gallon 6.920 lb Oil SAE 10W API service classification DS To motor 1.704 gal Drained from motor 1.280 gal Transmission lubricant Ford Oil ESN-M2C-41A Final drive lubricant ESN-M2C-77A Total time engine was operated 51½ hours.

**ENGINE** Make Ford Diesel Type 3 cylinder vertical Serial No PD011460B5 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 4.4" x 4.4" Compression ratio 16.5 to 1 Displacement 201 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner Oil washed wire mesh Oil filter replaceable cotton blend element Oil Cooler engine coolant heat exchanger in lower radiator tank for transmission oil Fuel filter one replaceable nylon gauze element and one replaceable paper element Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No C100956 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 with operator controlled full range power shifting Advertised speeds first 1.1 second 1.5 third 1.8 fourth 2.4 fifth 4.0 sixth 5.1 seventh 5.7 eighth 7.5 ninth 12.1 tenth 17.6 reverse 3.4 and 5.1 Clutch multiple disc wet clutches within transmission hydraulically operated Brakes wet multiple disc 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 and 995 rpm at 1950 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, second, and third gears were not run as it was necessary to limit the pull in fourth gear because of the stability formula. Tenth gear was not run because it exceeded 15 mph. The maximum drawbar pull obtained in the varying drawbar pull and travel speed run was limited by decision of the manufacturer's representative because transmission low pressure warning light came on intermittently due to the low engine speed.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 892.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station  
E. F. Frolik, Dean; H. H. Kramer, 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,  $\frac{1}{2}$  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 4000 Select-O-Speed Diesel