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Test 883: Ford 3000 4-Speed (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 883 FORD 3000 4-SPEED 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								
39.46	2000	2.531	0.443	15.59	193	59	75	29.027
Standard Power Take-off Speed (540 rpm)—One Hour								
31.81	1484	1.936	0.420	16.43	192	59	75	29.015
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
34.94	2084	2.293	0.453	15.24	188	60	76	.....
0.00	2197	0.773	.....	.....	176	59	74	.....
17.90	2135	1.494	0.577	11.98	182	59	73	.....
39.89	2000	2.545	0.441	15.67	194	59	75	.....
9.16	2185	1.134	0.855	8.08	178	59	74	.....
26.75	2129	1.907	0.492	14.03	186	59	73	.....
Av 21.44	2122	1.691	0.545	12.68	184	59	74	29.013

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Temp Degrees F					Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb		
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST												
Maximum Available Power—Two Hours—5th Gear (2nd direct)												
35.43	2876	4.62	1999	5.62	2.606	0.508	13.60	192	45	45	28.865	
75% of Pull at Maximum Power—Ten Hours—5th Gear (2nd direct)												
28.97	2188	4.97	2113	4.03	2.246	0.536	12.90	191	42	44	28.940	
50% of Pull at Maximum Power—Two Hours—5th Gear (2nd direct)												
20.48	1502	5.11	2151	2.92	1.856	0.626	11.03	185	41	41	28.815	
MAXIMUM POWER WITH BALLAST												
30.86	4629	2.50	2106	10.81	1st Gear (1st under)		188	43	46	28.750		
34.61	4439	2.92	2002	9.70	2nd Gear (2nd under)		190	47	48	28.820		
36.36	3622	3.76	2005	6.86	3rd Gear (1st direct)		192	47	48	28.820		
35.67	3009	4.45	1998	5.54	4th Gear (3rd under)		191	47	48	28.820		
36.29	2937	4.63	1999	5.27	5th Gear (2nd direct)		191	47	48	28.820		
35.26	2292	5.77	2000	4.18	6th Gear (1st over)		184	46	46	28.785		
35.12	1919	6.86	1994	3.57	7th Gear (3rd direct)		185	46	46	28.785		
34.70	1840	7.07	2001	3.23	8th Gear (2nd over)		186	46	46	28.785		
34.27	1340	9.59	1997	2.20	9th Gear (4th under)		185	47	48	28.800		
33.49	1199	10.47	2004	1.86	10th Gear (3rd over)		187	47	48	28.800		
31.99	816	14.70	1990	0.51	11th Gear (4th direct)		185	47	48	28.800		
MAXIMUM POWER WITHOUT BALLAST												
34.63	2938	4.42	1998	10.81	5th Gear (2nd direct)		190	51	57	28.840		

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear (2nd direct)

Pounds pull	2937	3116	3139	3246	3282	3086
Horsepower	36.29	34.26	30.71	27.19	23.90	15.18
Crankshaft speed, rpm	1999	1787	1593	1387	1202	803
Miles per hour	4.63	4.12	3.67	3.19	2.76	1.84
Slip of drivers, %	5.27	5.81	6.02	6.02	6.23	6.23

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-24; 4; 12	Two 14.9-24; 4; 12
Ballast	—Liquid	614 lb each	None
	Cast iron	420 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 4; 28	Two 6.00-16; 4; 28
Ballast	—Liquid	None	None
	Cast iron	None	None
Height of drawbar		21 inches	22 inches
Static weight	—Rear	4453 lb	2385 lb
	Front	1610 lb	1630 lb
Total weight with operator		6238 lb	4190 lb

Department of Agricultural Engineering

Dates of Test: MARCH 27 TO APRIL 7, 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° 0.8295 Weight per gallon 6.907 lb Oil SAE 10W API service classification DS To motor 1.474 gal Drained from motor 1.172 gal Transmission and final-drive lubricant SAE 80 EP Total time engine was operated 44 hours.

ENGINE Make Ford Diesel **Type** 3 cylinder vertical **Serial No** ND000768K4 **Crankshaft** mounted lengthwise **Rated rpm** 2000 **Bore and stroke** 4.2" x 4.2" **Compression ratio** 16.5 to 1 **Displacement** 175 cu in **Cranking system** 12 volt electric **Lubrication pressure** Air cleaner oil washed wire mesh **Oil filter** full flow replaceable paper cartridge **Fuel filter** one filter with replaceable nylon gauze element and one filter with replaceable paper element **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type standard **Serial No** C100605 **Tread** width rear 52" to 76" front 52" to 80" **Wheel base** 75.8" **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 32.8" Vertical distance above roadway 25.2" Horizontal distance from center of rear wheel tread 0" to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advised speeds mph** first 4.0 second 4.8 third 7.0 fourth 14.8 reverse 4.2 **Clutch** single plate dry disc operated by foot pedal **Brakes** internal expanding shoe operated by two foot pedals which can be locked **Steering** mechanical with power assist **Turning radius** (on concrete surface with brake applied) right 117" left 117" (on concrete surface without brake) right 129" left 129" **Turning space diameter** (on concrete surface with brake applied) right 240" left 240" (on concrete surface without brake) right 267" left 267" **Belt pulley** 1323 rpm at 1950 engine rpm diam 9.00" face 6.5" Belt speed 3117 fpm Power take-off 546 rpm at 1500 engine rpm.

REPAIRS and ADJUSTMENTS A nut was lost from the starter solenoid during the drawbar runs causing the tractor to fail to start. This was replaced and test continued.

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

It was necessary to limit the pull in first gear because of the stability formula. This tractor was equipped with the standard 4-speed transmission plus an optional auxiliary overdrive-underdrive transmission. Standard PTO speed can be obtained with only the four direct drive gears.

Twelfth 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 883.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

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 35% 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 3000 4-Speed Diesel