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Test 882: Ford 3000 Select-O-Speed (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 882 - FORD 3000 SELECT-O-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								
38.06	2000	2.531	0.459	15.04	195	58	75	29.237
Standard Power Take-off Speed (540 rpm)—One Hour								
35.96	1811	2.321	0.446	15.49	195	58	75	29.195
Standard Power Take-off Speed (1000 rpm)—One Hour								
37.85	1961	2.522	0.460	15.01	196	58	75	29.165
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
33.93	2098	2.332	0.475	14.55	192	58	75	.....
0.00	2199	0.856	.....	.....	180	57	72	.....
17.29	2139	1.529	0.611	11.31	186	59	76	.....
38.32	2000	2.593	0.467	14.78	196	58	74	.....
8.87	2192	1.186	0.923	7.48	182	60	76	.....
25.95	2139	1.946	0.518	13.34	189	58	75	.....
Av 20.73	2128	1.740	0.580	11.91	187	58	74	29.173

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Fuel Consumption			Temp Degrees F					Barom- eter inches of Mercury
				Slip of drivers %	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—6th Gear												
30.60	2577	4.45	2000	5.34	2.476	0.559	12.36	197	59	73	28.680	
75% of Pull at Maximum Power—Ten Hours—6th Gear												
25.44	2051	4.65	2061	4.00	2.139	0.581	11.89	190	57	63	28.573	
50% of Pull at Maximum Power—Two Hours—6th Gear												
18.12	1420	4.79	2100	3.13	1.754	0.669	10.33	185	54	55	28.525	
MAXIMUM POWER WITH BALLAST												
27.48	5016	2.05	2037	11.87	4th Gear		189	52	55	28.740		
33.35	3696	3.38	2002	7.54	5th Gear		191	52	55	28.740		
33.24	2815	4.43	2000	5.91	6th Gear		191	52	55	28.740		
32.62	2386	5.13	1995	5.10	7th Gear		191	52	55	28.740		
31.02	1733	6.71	2004	3.61	8th Gear		195	58	74	28.720		
28.97	982	11.06	2008	2.12	9th Gear		195	58	74	28.720		
MAXIMUM POWER WITHOUT BALLAST												
32.38	2828	4.29	1998	9.60	6th Gear		195	53	60	28.680		
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—6th Gear												
Pounds pull				2815	2990	3181	3209	3318	3235			
Horsepower				33.24	31.50	29.90	26.31	23.32	18.95			
Crankshaft speed, rpm				2000	1789	1602	1402	1201	1001			
Miles per hour				4.43	3.95	3.53	3.08	2.64	2.20			
Slip of drivers, %				5.91	6.34	6.55	7.28	6.76	6.97			

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-24; 4; 14	Two 14.9-24; 4; 12
Ballast	—Liquid	575 lb each	None
	Cast iron	770 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		20 inches	21½ inches
Static weight	—Rear	4990 lb	2300 lb
	Front	1680 lb	1710 lb
Total weight with operator		6845 lb	4185 lb

Department of Agricultural Engineering

Dates of Test: MARCH 24 TO APRIL 9, 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 1.932 gal Drained from motor 1.147 gal Transmission lubricant Ford M2C41-A Final Drive M2C 77A Total time engine was operated 58½ hours.

ENGINE Make Ford Diesel Type 3 cylinder vertical Serial No ND003437M4 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 cotton element Oil cooler heat exchanger in lower radiator tank for transmission oil 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 C100955 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 with operator controlled full range power shifting Advertised speeds mph first 1.0 second 1.4 third 1.6 fourth 2.2 fifth 3.6 sixth 4.6 seventh 5.4 eighth 6.8 ninth 11.0 tenth 16.4 reverse 3.2 and 4.6 Clutch multiple disc wet clutches within transmission hydraulically operated Brakes internal expanding shoe operated by two foot pedals that can be locked together 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 1085 rpm at 1950 engine rpm diam 10.25" face 6.5" Belt speed 2911 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 as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 882.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

*During drawbar runs one rear tire slipped on the rim causing a slight leakage.

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 3000 Select-O-Speed Diesel