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Test 890: Ford 4000 Select-O-Speed (Gasoline)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 890 - FORD 4000 SELECT-O-SPEED GASOLINE

(ALSO FORD 4000 SELECT-O-SPEED ROW CROP GASOLINE)

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								
* 45.41	2200	4.133	0.554	10.99	192	67	75	28.867
Standard Power Take-off Speed (540 rpm)—One Hour								
41.65	1811	3.531	0.516	11.80	193	66	75	28.860
Standard Power Take-off Speed (1000 rpm)—One Hour								
43.00	1960	3.699	0.523	11.62	192	64	74	28.885
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
39.74	2264	3.645	0.558	10.90	189	65	75	.....
0.00	2382	1.603	.....	.....	178	64	73	.....
20.47	2332	2.663	0.791	7.69	186	64	72	.....
45.46	2201	4.128	0.552	11.01	193	65	74	.....
10.33	2357	2.126	1.252	4.86	182	64	74	.....
30.23	2295	3.151	0.634	9.59	188	64	73	.....
Av 24.37	2305	2.886	0.720	8.44	186	64	73	28.860

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			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—6th Gear											
39.20	3308	4.44	2198	5.88	4.097	0.636	9.57	189	51	62	28.905
75% of Pull at Maximum Power—Ten Hours—6th Gear											
31.50	2518	4.69	2285	4.43	3.532	0.682	8.92	182	44	54	29.183
50% of Pull at Maximum Power—Two Hours—6th Gear											
22.25	1749	4.77	2288	2.94	2.935	0.802	7.58	182	52	64	28.880
MAXIMUM POWER WITH BALLAST											
33.80	6006	2.11	2280	11.44	4th Gear		183	39	41	29.080	
33.84	4305	3.38	2204	8.06	5th Gear		188	49	58	28.910	
39.90	3364	4.45	2200	5.94	6th Gear		189	51	63	28.900	
37.28	2707	5.16	2198	4.97	7th Gear		188	49	58	28.910	
36.55	2037	6.73	2199	3.67	8th Gear		185	50	60	28.910	
33.67	1140	11.08	2199	2.06	9th Gear		188	50	60	28.930	
MAXIMUM POWER WITHOUT BALLAST											
38.34	3319	4.33	2203	9.40	6th Gear		190	58	62	28.800	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—6th Gear											
Pounds pull				3364	3487	3698	3838	3979	3875		
Horsepower				39.90	36.97	34.60	31.41	27.79	22.63		
Crankshaft speed, rpm				2200	1978	1753	1539	1318	1099		
Miles per hour				4.45	3.98	3.51	3.07	2.62	2.19		
Slip of drivers, %				5.94	6.42	6.78	7.13	7.48	7.37		

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
	—Liquid	725 lb each	None
	—Cast iron	840 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 4; 24	Two 7.50-16; 4; 24
	—Liquid	75 lb each	None
	—Cast iron	80 lb each	None
Height of drawbar		22½ inches	23 inches
Static weight	—Rear	6130 lb	3000 lb
	—Front	2020 lb	1710 lb
Total weight with operator		8325 lb	4885 lb

Department of Agricultural Engineering

Dates of Test: APRIL 21 TO MAY 4, 1965

Manufacturer: FORD MOTOR COMPANY, BIRMINGHAM, MICHIGAN

FUEL, OIL and TIME Fuel Regular gasoline Octane No 85.2 Research 92.3 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7308 Weight per gallon 6.083 lb Oil SAE 10W API service classification MS, DM To motor 1.472 gal Drained from motor 1.398 gal Final-drive lubricant Ford ESN-M2C-77A Transmission ESN-M2C-41A Total time engine was operated 42 hours.

ENGINE Make Ford gasoline Type 3 cylinder vertical Serial No PG001910L4 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 4.4" x 4.2" Compression ratio 8 to 1 Displacement 192 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter replaceable cotton blend element Oil cooler heat exchanger in radiator lower tank for transmission oil Fuel filter edge type in sediment bowl Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No C101531 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 mph 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 fuel gauge was inoperative during the drawbar runs.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 890.

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, $\frac{1}{2}$ 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 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 Gasoline