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Test 842: Ford 6000 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 842 - FORD 6000 GASOLINE

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercurv	
		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									
62.25	2300	5.942	0.585	10.48	189	71	79	28.945	
Standard Power Take-off Speed (1000 rpm)—One hour									
60.98	2227	5.780	0.581	10.55	192	72	81	28.955	
Standard Power Take-off Speed (1000 rpm)—One hour									
49.35	1731	4.614	0.573	10.70	199	77	92	29.000	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
57.23	2487	6.229	0.667	9.19	185	73	84	.....
0.00	2646	2.388	.....	.....	170	74	85	.....
29.57	2569	3.983	0.826	7.42	182	75	86	.....
61.64	2300	5.945	0.591	10.37	196	75	88	.....
14.99	2608	3.112	1.273	4.82	180	76	90	.....
43.79	2537	5.015	0.702	8.73	191	76	89	.....
Av	34.54	2524	4.445	0.789	7.77	184	75	87	28.983

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft 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	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—6th Gear											
53.56	4307	4.66	2300	7.33	5.915	0.677	9.05	189	68	73	29.078
75% of Pull at Maximum Power—Ten Hours—6th Gear											
45.22	3259	5.20	2512	5.29	5.683	0.771	7.96	197	74	88	29.012
50% of Pull at Maximum Power—Two Hours—6th Gear											
30.86	2145	5.40	2565	3.82	4.405	0.875	7.01	184	70	74	29.030
MAXIMUM POWER WITH BALLAST											
43.76	7326	2.24	2467	14.89	4th Gear			178	66	73	28.930
52.62	5555	3.55	2304	9.40	5th Gear			183	67	74	28.940
53.90	4347	4.65	2292	7.30	6th Gear			189	68	73	29.080
51.86	3567	5.45	2298	5.71	7th Gear			183	67	74	28.940
52.27	2758	7.11	2299	4.41	8th Gear			182	67	74	28.940
50.65	1618	11.74	2304	2.79	9th Gear			183	67	74	28.940

MAXIMUM POWER WITHOUT BALLAST

52.15	4263	4.59	2300	8.86	6th Gear	.....	.....	193	72	84	28.960
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—6th Gear											
Pounds pull	4347	4417	4552	4617	4611	4652	4525				
Horsepower	53.90	49.32	45.02	39.96	34.15	28.73	22.16				
Crankshaft speed rpm	2292	2062	1829	1604	1373	1146	907				
Miles per hour	4.65	4.19	3.71	3.25	2.78	2.32	1.84				
Slip of drivers %	7.30	7.10	7.49	7.62	7.62	7.75	7.62				

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38; 6; 18	Two 15.5-38; 6; 14
Ballast	—Liquid	880 lb each	None
	Cast iron	390 lb each	None
Front tires	—No, size, ply & psi	Two 6.50-16; 6; 32	Two 6.50-16; 6; 28
Ballast	—Liquid	None	None
	Cast iron	47 lb each	None
Height of drawbar		21½ inches	22½ inches
Static weight	—Rear	7290 lb	4750 lb
	Front	2155 lb	2060 lb
Total weight with operator		9620 lb	6985 lb

Department of Agricultural Engineering

Dates of Test: June 17 to July 3, 1963

Manufacturer: FORD MOTOR COMPANY, BIRMINGHAM, MICHIGAN

Manufacturer's Power Rating: 64.5 PTO Horsepower (corrected to standard conditions)

FUEL OIL and TIME Fuel regular gasoline Octane No Motor 84.4 Research 92.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7365 Weight per gallon 6.131 lb Oil SAE 20-20W API service classification MS, DG To motor 1.474 gal Drained from motor 0.817 gal Transmission and final-drive lubricant Ford hydraulic oil M-2C-41 Total time engine was operated 47½ hours.

ENGINE Make Ford gasoline Type 6 cylinder vertical Serial No 18524 Crankshaft mounted lengthwise Rated rpm 2300 Bore and stroke 3.62" x 3.60" Compression ratio 8.4 to 1 Displacement 223 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh with centrifugal pre-cleaner Oil filter treated paper element in replaceable cartridge Oil cooler heat exchanger in lower radiator tank for transmission oil Fuel filter screen in sediment bowl Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type tricycle Serial No 18524 Tread width rear 56" to 84" front 8.3" to 16.3" Wheel base 95.5" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.0" Vertical distance above roadway 35.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive with accumulator Transmission fixed ratio operator controlled full range power shifting Advertised speeds mph first 1.2 second 1.6 third 1.7 fourth 2.4 fifth 3.8 sixth 5.0 seventh 5.7 eighth 7.3 ninth 11.9 tenth 17.5 reverse 3.4 and 5.0 Clutch four multiple disc wet clutches within transmission hydraulically operated Brakes wet disc hydraulically power actuated Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 109" left 109" (on concrete surface without brake) right 131" left 131" Turning space diameter (on concrete surface with brake applied) right 238" left 238" (on concrete surface without brake) right 281" left 281" Power take-off 540 or 1000 rpm at 1730 or 2225 engine rpm.

REPAIRS and ADJUSTMENTS Preliminary PTO runs indicated a loss of power. The cylinder head was removed and combustion chamber cleaned. Head was replaced and test continued with improved performance.

A crack in exhaust manifold made it necessary to install a new exhaust manifold.

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 to avoid excessive wheel slippage. 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 842.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT, Chairman

G. W. STEINBRUEGGE

J. J. SULEK

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 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 Model 61106