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Test 878: Ford Commander 6000 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 878 - FORD COMMANDER 6000 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									
66.93	2430	5.292	0.546	12.65	184	53	74	29.408	
Standard Power Take-off Speed (1000 rpm)—One Hour									
65.21	2228	4.970	0.526	13.12	185	53	74	29.385	
54.49	1731	4.005	0.508	13.61	187	54	75	29.310	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
59.48	2541	4.391	0.510	13.55	178	55	76	.....
0.00	2685	1.468	.....	.....	144	53	74	.....
30.55	2611	2.710	0.613	11.27	158	54	75	.....
66.94	2432	5.316	0.549	12.59	183	55	77	.....
15.56	2658	2.033	0.902	7.65	151	54	75	.....
45.30	2581	3.418	0.521	13.25	172	54	76	.....
Av	36.31	2584	3.223	0.613	11.27	164	54	75	29.337

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—5th Gear											
61.71	5489	4.22	2434	6.58	5.358	0.600	11.52	185	38	39	28.765
75% of Pull at Maximum Power—Ten Hours—5th Gear											
50.60	4211	4.51	2564	5.15	4.089	0.558	12.37	186	36	39	28.848
50% of Pull at Maximum Power—Two Hours—5th Gear											
35.28	2820	4.69	2629	3.45	3.082	0.603	11.45	141	38	40	28.840
MAXIMUM POWER WITH BALLAST											
50.37	7427	2.54	2539	13.60	4th Gear		150	27	29	29.035	
63.02	5619	4.21	2431	6.67	5th Gear		190	37	38	28.720	
62.77	4271	5.51	2429	4.80	6th Gear		190	37	38	28.720	
61.80	3622	6.40	2434	4.11	7th Gear		190	37	38	28.740	
61.74	2789	8.30	2435	3.27	8th Gear		190	37	38	28.740	
58.29	1610	13.58	2428	1.91	9th Gear		190	37	38	28.740	
MAXIMUM POWER WITHOUT BALLAST											
58.84	5553	3.97	2437	11.51	5th Gear		180	42	47	29.000	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear											
Pounds pull				5619	5973	6217	6385	6408	6291		
Horsepower				63.02	59.86	54.71	49.09	42.04	34.31		
Crankshaft Speed, rpm				2431	2183	1933	1691	1452	1202		
Miles per hour				4.21	3.76	3.30	2.88	2.46	2.05		
Slip of drivers, %				6.67	7.00	8.03	8.16	8.41	8.16		

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	882 lb each	None
Front tires	—Liquid	330 lb each	None
	Cast iron	.....	.....
Height of drawbar	—No, size, ply & psi	Two 6.50-16; 6; 32	Two 6.50-16; 6; 32
	Ballast	None	None
Static weight	—Liquid	15 lb each	None
	Cast iron	22 inches	22 inches
Total weight with operator	—Rear	7260 lb	4835 lb
	Front	2150 lb	2120 lb
		9585 lb	7130 lb

Department of Agricultural Engineering

Dates of Test: MARCH 15 TO MARCH 31, 1965

Manufacturer: FORD MOTOR COMPANY,
BIRMINGHAM, MICHIGAN

FUEL, OIL and TIME Fuel No 2 diesel Cetane 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 MS, DS To motor 0.982 gal Drained from motor 0.764 gal Transmission lubricant Ford Oil ESNM2C 41-A Final drive lubricant Ford Oil ESNM2C 53-A Total time engine was operated 46 hours.

ENGINE Make Ford Diesel Type 6 cylinder vertical Serial No TD000006M4 Crankshaft mounted lengthwise Rated rpm 2430 Bore and stroke 3.62" x 3.90" Compression ratio 16.5 to 1 Displacement 241.7 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh with centrifugal pre-cleaner Oil filter treated paper element Oil cooler heat exchanger in lower radiator tank for transmission oil Fuel filter one edge type filter and one replaceable paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type tricycle Serial No C100007 Tread width rear 56" to 84" front 8.3" or 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 1.3 second 1.9 third 2.0 fourth 2.8 fifth 4.4 sixth 5.7 seventh 6.6 eighth 8.5 ninth 13.7 tenth 19.9 reverse 3.3 and 4.9 Clutch four multiple disc wet clutches within transmission hydraulically operated Brakes wet disc hydraulically power actuated operated by two foot pedals which can be locked Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 109" left 109" (on concrete surface without brake applied) 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" Belt pulley none Power take-off 540 or 1000 rpm at 1730 or 2225 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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 878.

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 Commander 6000 Diesel