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## Test 1203: Ford 3600 Diesel 6-Speed

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 1203 – FORD 3600 DIESEL – 6 SPEED

## POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Cooling medium	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of Mercury
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>								
<b>Rated Engine Speed—Two Hours (PTO Speed—597 rpm)</b>								
40.49	2001	2.734	.468	14.81	192	57	75	28.810
<b>Standard Power Take-off Speed (540 rpm)—One Hour</b>								
37.64	1809	2.457	.453	15.32	190	58	75	28.790
<b>VARYING POWER AND FUEL CONSUMPTION—Two Hours</b>								
35.82	2085	2.431	.471	14.74	179	58	75	.....
0.00	2252	0.891	.....	.....	161	58	75	.....
18.63	2165	1.605	.598	11.61	166	58	75	.....
40.71	2000	2.747	.468	14.82	189	59	75	.....
9.48	2205	1.220	.893	7.77	162	59	75	.....
27.39	2123	2.003	.507	13.68	169	60	76	.....
Av 22.00	2138	1.816	.572	12.12	171	59	75	28.767

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crankshaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Cooling med	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of Mercury
<b>VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST</b>											
<b>Maximum Available Power—Two Hours 3rd Gear</b>											
33.79	2960	4.28	2001	6.82	2.631	0.540	12.84	181	53	65	28.680
<b>75% of Pull at Maximum Power—Ten Hours 3rd Gear</b>											
27.89	2273	4.60	2106	4.87	2.260	0.562	12.34	168	53	63	28.870
<b>50% of Pull at Maximum Power—Two Hours 3rd Gear</b>											
18.68	1464	4.78	2158	3.37	1.874	0.696	9.97	167	57	71	28.695
<b>50% of Pull at Reduced Engine Speed—Two Hours 4th Gear</b>											
19.04	1495	4.78	1582	3.25	1.496	0.545	12.73	167	58	72	28.705
<b>MAXIMUM POWER WITH BALLAST</b>											
19.50	5114	1.43	2139	13.46	1st Gear			166	47	56	28.660
32.07	5017	2.40	2003	13.46	2nd Gear			177	54	68	28.830
34.46	3017	4.28	2001	6.76	3rd Gear			179	53	68	28.860
34.47	2169	5.96	2001	4.66	4th Gear			179	54	68	28.840
34.04	1605	7.96	2000	3.13	5th Gear			176	54	69	28.830

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 3rd Gear

Pounds Pull	3017	3097	3247	3406	3402	3422	3266
Horsepower	34.46	31.67	29.42	27.05	22.83	19.79	15.01
Crankshaft Speed rpm	2001	1795	1595	1408	1188	1027	811
Miles Per Hour	4.28	3.83	3.40	2.98	2.52	2.17	1.72
Slip of Drivers %	6.76	6.98	7.20	7.64	7.86	7.86	7.53

## TRACTOR SOUND LEVEL WITHOUT CAB

	dB(A)
Maximum Available Power 2 Hours	94.0
75% of Pull at Max. Power 10 Hours	93.5
50% of Pull at Max. Power 2 Hours	93.0
50% of Pull at Reduced Engine Speed 2 Hours	90.0
Bystander (in 6th gear)	87.5

## TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	Two 16.9-24; 6; 16	Two 16.9-24; 6; 16
Ballast	655 lb each	None
	Cast Iron	None
Front Tires	Two 6.00-16; 4; 32	Two 6.00-16; 4; 32
Ballast	60 lb each	None
	Liquid	None
	Cast Iron	None
Height of drawbar	22 inches	22 inches
Static weight with operator—rear	5000 lb	2765 lb
front	1860 lb	1650 lb
total	6860 lb	4415 lb

Department of Agricultural Engineering

Dates of Test: March 16 to April 7, 1976

Manufacturer: FORD MOTOR COMPANY,  
Tractor Operations, 2500 East Maple Road,  
Troy, Michigan 48084

**FUEL, OIL AND TIME** Fuel Premier Diesel Cetane No 51.7 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8330 Weight per gallon 6.936 lb Oil SAE 30 API service classification SB/SE CA/CD To motor 1.449 gal Drained from motor 1.155 gal Transmission and final drive lubricant Ford M2C53A Total time engine was operated 45.5 hours.

**ENGINE** Make Ford Type 3 cylinder diesel Serial No C001377 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 4.2" x 4.2" Compression ratio 16.3 to 1 Displacement 175 cu in Cranking system 12 volt Lubrication pressure Air cleaner oil bath wire mesh Oil filter full flow cotton blend spin-on cartridge Oil cooler radiator for hydraulic oil Fuel filter nylon gauze in bottom of tank and one paper element Muffler vertical Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No \*C-486241\* 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 center-line 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 Advertised speeds mph first 1.4 second 2.6 third 4.2 fourth 5.8 fifth 7.6 sixth 17.4 reverse 2.4 and 7.0 Clutch single plate dry disc operated by foot pedal Brakes internal expanding shoe operated by two foot pedals which can be locked together Steering 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 1113 rpm at 2000 engine rpm diam. 10.25" face 6.5" Belt speed 2986 fpm Power take-off 540 rpm at 1809 engine rpm.

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** During final inspection all exhaust valves were found to be pitted. All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 140°F. Five gears were chosen between stability limit and 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1203.

LOUIS I. LEVITICUS

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

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 may be disconnected only when the means for disconnecting can be reached from the operator station. 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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

## 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 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 use.

## DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests.

**Varying Power and Fuel Consumption With Ballast.** The varying power runs are made to show the effects of speed-control devices (engine, governor, automatic transmission, 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

**Maximum Power with Ballast.** Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. The maximum safe speed for the Nebraska Test Course has been set at 15 mph. The slip limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

**Varying Drawbar Pull 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.

## SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68583.



FORD 3600 DIESEL-6 SPEED