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Test 1202: Ford 4100 Diesel 8-Speed

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 1202 – FORD 4100 DIESEL – 8 SPEED

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Cooling medium	Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—660 rpm)								
45.46	2200	3.106	0.474	14.64	183	59	78	28.683
Standard Power Take-off Speed (540 rpm)—One Hour								
41.13	1800	2.638	0.445	15.59	184	59	79	28.615
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
41.68	2373	2.976	0.495	14.01	165	57	75	.....
0.00	2163	1.107	.....	.....	160	57	75	.....
21.13	2407	1.938	0.636	10.91	163	56	75	.....
46.50	2201	3.136	0.468	14.83	176	56	75	.....
10.68	2433	1.514	0.983	7.06	162	56	74	.....
31.30	2377	2.409	0.534	12.99	165	55	72	.....
Av 25.22	2376	2.180	0.600	11.57	165	56	74	28.597

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Cool- ing med	Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours 4th Gear											
39.18	3856	3.81	2197	8.45	3.118	0.552	12.57	169	43	53	28.910
75% of Pull at Maximum Power—Ten Hours 4th Gear											
32.33	2853	4.25	2392	6.23	2.703	0.580	11.96	163	41	47	28.892
50% of Pull at Maximum Power—Two Hours 4th Gear											
22.22	1923	4.33	2399	4.70	2.145	0.670	10.36	160	46	47	28.485
50% of Pull at Reduced Engine Speed—Two Hours 5th Gear											
22.34	1931	4.34	2007	4.73	1.874	0.582	11.92	165	46	47	28.465
MAXIMUM POWER WITH BALLAST											
21.16	5557	1.63	2401	14.40	2nd Gear			161	41	48	28.960
38.35	5398	2.66	2197	12.92	3rd Gear			168	43	53	28.950
39.89	3929	3.81	2199	8.61	4th Gear			170	43	52	28.960
41.14	3330	4.63	2199	7.21	5th Gear			170	43	53	28.950
41.12	2625	5.87	2199	5.70	6th Gear			170	43	53	28.950
38.42	1362	10.58	2199	3.14	7th Gear			169	43	53	28.910

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear

Pounds Pull	3929	4075	4233	4406	4538	4517	4283
Horsepower	39.89	36.98	34.07	30.82	27.23	22.82	17.06
Crankshaft Speed rpm	2199	1975	1759	1536	1323	1115	873
Miles Per Hour	3.81	3.40	3.02	2.62	2.25	1.89	1.49
Slip of Drivers %	8.61	8.98	9.40	9.82	10.23	10.23	9.72

TRACTOR SOUND LEVEL WITHOUT CAB

	dB(A)
Maximum Available Power 2 Hours	96.0
75% of Pull at Max. Power 10 Hours	97.5
50% of Pull at Max. Power 2 Hours	95.5
50% of Pull at Reduced Engine Speed 2 Hours	93.5
Bystander (in 8th gear)	88.0

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi	Two 16.9-24; 6; 16
Ballast	—Liquid	655 lb each
	Cast Iron	640 lb each
Front Tires	—No., size, ply & psi	Two 7.50-16; 6; 36
Ballast	—Liquid	None
	Cast Iron	None
Height of drawbar	19.5 inches	19.5 inches
Static weight with operator—rear	5720 lb	3130 lb
	front	1780 lb
	total	7500 lb
		4910 lb

Department of Agricultural Engineering

Dates of Test: March 16 to April 5, 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 con-
verted to 60°/60° 0.8330 Weight per gallon
6.936 lb Oil SAE 30 API service classification
SB/SE CA/CD To motor 1.701 gal Drained
from motor 1.393 gal Transmission and final
drive lubricant Ford M2C53A Total time en-
gine was operated 49.0 hours.

ENGINE Make Ford Type 3 cylinder diesel
Serial No *K019219* Crankshaft mounted
lengthwise Rated rpm 2200 Bore and stroke
4.2" x 4.4" Compression ratio 16.3 to 1 Dis-
placement 183 cu in Cranking system 12 volt
Lubrication pressure Air cleaner oil bath wire
mesh Oil filter full flow cotton blend spin-on
cartridge Fuel filter nylon gauze at bottom of
tank and one paper element Muffler vertical
Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No *C-
483090* Tread width rear 56" to 80" front
52" to 80" Wheel base 77.3" 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 30.7" Vertical dis-
tance above roadway 28.3" 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 1.8 third
3.1 fourth 4.2 fifth 5.0 sixth 6.3 seventh 11.0
eighth 15.0 reverse 2.0 and 7.2 Clutch single
plate dry disc operated by foot pedal Brakes
oil cooled multiple disc operated by two foot
pedals which can be locked together Steering
power assist Turning radius (on concrete sur-
face with brake applied) right 115" left 115" (on
concrete surface without brake) right 136" left
136" Turning space diameter (on concrete
surface with brake applied) right 233" left 233"
(on concrete surface without brake) right 275"
left 275" Belt pulley 1208 rpm at 2200 engine
rpm diam. 10.25" face 6.5" Belt speed 3241 fpm
Power take-off 540 rpm at 1800 engine rpm.

REPAIRS AND ADJUSTMENTS: No repairs
or adjustments.

REMARKS: Fuel tank level indicator on dash
did not function during test. 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 147°F. Six gears
were chosen between 15% slip and 15 mph.

We, the undersigned, certify that this is a true
and correct report of official Tractor Test 1202.

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 4100 DIESEL-8 SPEED