

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.  
Larsen

---

11-2-1966

## Test 952: Case 1031 (Diesel)

Nebraska Tractor Test Lab

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

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

---

Nebraska Tractor Test Lab, "Test 952: Case 1031 (Diesel)" (1966). *Nebraska Tractor Tests*. 1316.  
<https://digitalcommons.unl.edu/tractormuseumlit/1316>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

# NEBRASKA TRACTOR TEST 952 - CASE 1031 DIESEL

## POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption			Temperature Degrees F				Barometer inches of Mercury
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
401.79	2000	7.688	0.522	13.24	199	49	75	28.997	
Standard Power Take-off Speed (1000 rpm)—One Hour									
93.15	1691	6.784	0.504	13.73	205	49	74	28.960	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
88.52	2048	6.353	0.496	13.93	191	50	74	.....	
0.00	2170	2.021	.....	.....	180	48	71	.....	
45.76	2110	4.059	0.614	11.27	185	50	75	.....	
101.26	2000	7.641	0.522	13.25	204	51	76	.....	
23.14	2134	3.040	0.909	7.61	182	49	73	.....	
67.47	2082	5.052	0.518	13.36	188	51	76	.....	
Av 54.36	2091	4.694	0.597	11.58	188	50	74	28.930	

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom- eter 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—4th Gear											
88.34	6376	5.20	2001	5.59	7.548	0.591	11.70	185	39	50	28.905
75% of Pull at Maximum Power—Ten Hours—4th Gear											
73.03	5043	5.43	2060	4.03	6.079	0.576	12.01	184	36	44	29.124
50% of Pull at Maximum Power—Two Hours—4th Gear											
50.32	3376	5.59	2091	2.59	4.829	0.664	10.42	188	38	49	28.890
MAXIMUM POWER WITH BALLAST											
83.44	12056	2.60	2027	14.94	2nd Gear .....			186	34	43	28.940
91.11	9871	3.46	1999	9.02	3rd Gear .....			186	30	35	28.940
92.62	6697	5.19	1998	5.52	4th Gear .....			187	30	35	28.940
92.25	5446	6.35	2002	4.04	5th Gear .....			190	30	35	28.940
91.20	3771	9.07	2003	2.90	6th Gear .....			186	30	35	28.940
87.78	2865	11.49	1996	2.13	7th Gear .....			186	32	38	28.940
MAXIMUM POWER WITHOUT BALLAST											
91.24	6715	5.10	2004	8.59	4th Gear .....			190	41	50	29.060

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	6697	7156	7493	7733	7616	7521
Horsepower	92.62	88.52	82.26	74.49	62.91	51.87
Crankshaft speed, rpm	1998	1798	1598	1406	1205	1005
Miles per hour	5.19	4.64	4.12	3.61	3.10	2.59
Slip of drivers, %	5.52	5.95	6.09	6.52	6.38	6.38

## TIRES, BALLAST, and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 23.1-30; 8; 16	Two 23.1-30; 8; 16
	—Liquid	1575 lb each	None
	Cast iron	1655 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 6; 32	Two 7.50-16; 6; 32
	—Liquid	None	None
	Cast iron	212 lb each	None
Height of drawbar		17 inches	18 inches
Static weight with operator—	Rear	13370 lb	6910 lb
	Front	2850 lb	2425 lb
	Total	16220 lb	9335 lb

## Department of Agricultural Engineering

Dates of Test: NOVEMBER 2 TO NOVEMBER 5, 1966

Manufacturer: J. I. CASE COMPANY, RACINE, WISCONSIN

**FUEL, OIL and TIME** Fuel No 2 diesel Cetane No 54.7 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8309 Weight per gallon 6.918 lb Oil SAE 20-20W API service classification DS To motor 3.412 gal Drained from motor 2.718 gal Transmission and final-drive lubricant Case TCH oil Total time engine was operated 39 hours.

**ENGINE** Make Case diesel Type 6 cylinder vertical Serial No 2139777 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 4.375" x 5.000" Compression ratio 15.0 to 1 Displacement 451 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter replaceable pleated paper element Oil cooler radiator for transmission and hydraulic oil Fuel filter two replaceable cotton elements and one replaceable pleated paper cartridge Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 8294030 Tread width rear 76" to 92" front 56" to 81" Wheel base 109" 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 28.9" Vertical distance above roadway 36.1" 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 2.0 second 2.9 third 3.6 fourth 5.2 fifth 6.3 sixth 8.9 seventh 11.2 eighth 16.2 Reverse 2.6 and 8.0 Clutch single plate dry disc operated by foot pedal Brakes triple disc operated by two foot pedals which can be locked together Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 135" left 135" (on concrete surface without brake) right 160" left 160" Turning space diameter (on concrete surface with brake applied) right 284" left 284" (on concrete surface without brake) right 333" left 333" Belt pulley 1128 rpm at 1755 engine rpm diam 10.5" face 7.25" Belt speed 3100 fpm Power take-off 1005 rpm at 1700 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 gear was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage. Eighth 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 952.

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-

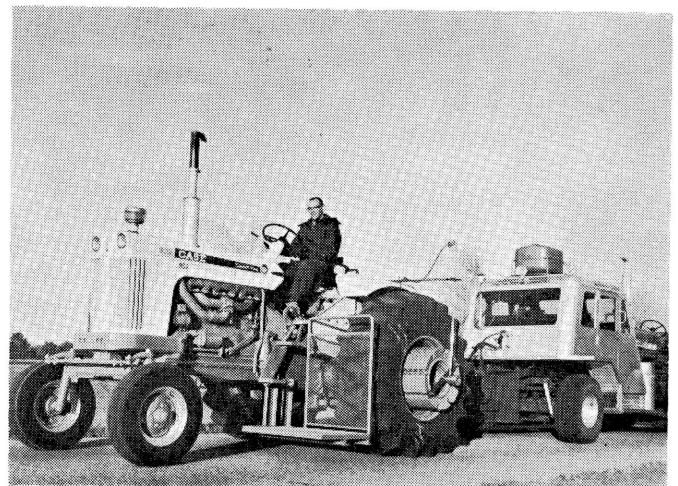
mission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the 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.



Case 1031 Diesel