

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F.
Larsen

4-6-1970

Test 1035: Case 1070 Manual Diesel (Also Case 1090 Manual)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, 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 1035: Case 1070 Manual Diesel (Also Case 1090 Manual)" (1970).
Nebraska Tractor Tests. 1372.

<https://digitalcommons.unl.edu/tractormuseumlit/1372>

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 1035 - CASE 1070 MANUAL DIESEL (ALSO CASE 1090 MANUAL)

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1070 rpm)								
100.73*	2000	6.507	0.447	15.48	188	55	75	28.963
Standard Power Take-off Speed (1000 rpm)—One Hour								
96.50	1870	6.148	0.441	15.70	189	56	75	29.005
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
87.64	2048	5.770	0.456	15.19	186	57	75	.....
0.00	2190	1.992	.....	.....	179	55	76	.....
45.44	2124	3.721	0.567	12.21	184	56	76	.....
97.99	1999	6.354	0.449	15.42	185	56	74	.....
23.09	2159	2.815	0.845	8.20	178	55	75	.....
67.11	2092	4.656	0.481	14.41	185	55	76	.....
Av 53.55	2102	4.218	0.546	12.70	183	56	75	29.027

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Fuel Consumption				Temp Cool- ing med	Degrees F		Barometer inches of Mercury
				Slip of drivers %	Gal per hr	Lb per hp-hr	Hp-hr per gal		Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											

VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—4th Gear (4th Lo)											
84.53	6444	4.92	2001	5.94	6.170	0.506	13.70	184	42	50	28.780
75% of Pull at Maximum Power—Ten Hours—4th Gear (4th Lo)											
67.29	4894	5.16	2064	4.42	5.250	0.540	12.82	183	55	70	28.692
50% of Pull at Maximum Power—Two Hours—4th Gear (4th Lo)											
46.33	3253	5.34	2105	2.90	4.148	0.620	11.17	182	62	66	28.425
MAXIMUM POWER WITH BALLAST											
78.18	11203	2.62	1998	14.84	2nd Gear (2nd Low)			187	55	77	28.860
83.10	7817	3.99	2001	7.92	3rd Gear (3rd Low)			188	55	76	28.830
85.18	6522	4.90	2001	6.27	4th Gear (4th Low)			186	55	76	28.830
85.05	4942	6.45	1999	4.78	5th Gear (1st Hi)			188	54	75	28.830
81.10	3289	9.25	2005	3.09	6th Gear (2nd Hi)			183	55	75	28.830
MAXIMUM PULL WITHOUT BALLAST											
60.34	8270	2.74	2078	14.98	2nd Gear (2nd Low)			178	39	43	29.030

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear (4th Lo)

Pounds Pull	6522	6969	7280	7386	7300	7230
Horsepower	85.18	81.22	75.14	66.70	56.41	46.49
Crankshaft Speed rpm	2001	1796	1594	1397	1196	994
Miles Per Hour	4.90	4.37	3.87	3.39	2.90	2.41
Slip of drivers %	6.27	6.85	6.99	7.42	7.42	7.28

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18.4-38; 8; 20	Two 18.4-38; 8; 16
Ballast	—Liquid	1163 lb each	None
	Cast iron	1160 lb each	None
Front tires	—No, size, ply & psi	Two 10.00-16; 8; 40	Two 10.00-16; 8; 40
Ballast	—Liquid	None	None
	Cast iron	20 lb each	None
Height of drawbar		18 inches	19 inches
Static weight with operator—Rear		11885 lb	7240 lb
	Front	3110 lb	3070 lb
	Total	14995 lb	10310 lb

Department of Agricultural Engineering

Dates of Test: April 6, 1970 to May 2, 1970

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

FUEL, OIL and TIME Fuel No 2 Diesel Cetane 50.8 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8319 Weight per gallon 6.926 lb Oil SAE 30 API service classification MS-DS To motor 7.902 gal Drained from motor 2.950 gal Transmission and final-drive lubricant Case TCH oil Total time engine was operated 76 hours.

ENGINE Make Case Diesel Type 6 cylinder vertical Serial No 2311689 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 4 3/8" x 5" Compression ratio 16.5 to 1 Displacement 451 cu in Cranking system 12 volt electric (2 12-volt batteries) Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable cartridge Oil cooler radiator for transmission and hydraulic oil Fuel filter replaceable primary and secondary filter cartridges Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type Standard Serial No 8658515 Tread width rear 62" to 88" front 62" to 90" Wheel base 108" 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 32.3" Vertical distance above roadway 38.2" 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 1.9 second 2.8 third 3.9 fourth 4.8 fifth 6.0 sixth 8.5 seventh 12.0 eighth 15.0 reverse 2.4 and 7.6 Clutch Single plate dry disc operated by foot pedal Brakes Dry double disc hydraulically power actuated by two foot pedals which can be locked together Steering Hydrostatic Turning radius (on concrete surface with brake applied) right 163" left 163" (on concrete surface without brake) right 182" left 182" Turning space diameter (on concrete surface with brake applied) right 338" left 338" (on concrete surface without brake) right 378" left 378" Belt pulley 1104 rpm at 1900 engine rpm diam 10.5" face 7.25" Power take-off 1016 rpm at 1900 engine rpm.

REPAIRS and ADJUSTMENTS: Due to loss in PTO horsepower it was necessary to replace all fuel injectors with new ones. The Stop cable for fuel shut-off was replaced with a new cable.

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 because of excessive slippage. Seventh and eighth gears were not run as test procedure permits a maximum of eight travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1035.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, 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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

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.

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-

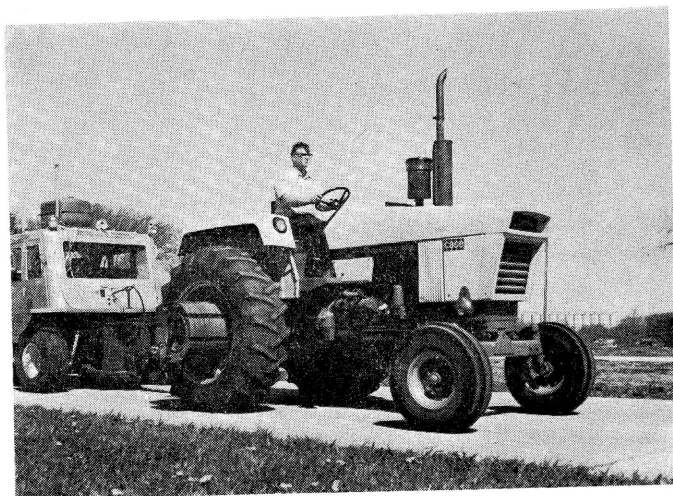
mission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the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

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 8 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 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 Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

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.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



CASE 1070 MANUAL DIESEL