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## Test 739: Case 940 (LPG)

Nebraska Tractor Test Lab

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

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# NEBRASKA TRACTOR TEST 739 - CASE 940 LPG

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

## POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F	Air wet bulb	Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
79.64	1600	8.711	0.465	9.14	190	68	78	28.822
Standard Power Take-off Speed (540 rpm)—One Hour								
74.60	1476	8.028	0.457	9.29	190	70	80	28.700
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
69.61	1647	8.033	0.490	8.67	187	70	81	.....
0.00	1779	2.661	.....	.....	166	68	78	.....
36.19	1715	5.428	0.637	6.67	177	67	75	.....
80.12	1600	8.718	0.462	9.19	120	67	75	.....
18.45	1747	4.087	0.941	4.51	168	68	76	.....
53.24	1681	6.798	0.543	7.83	184	68	76	.....
Av 42.94	1695	5.954	0.589	7.21	178	68	77	28.678

## 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	Temperature 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—3rd Gear											
69.99	5552	4.73	1597	4.38	8.492	0.516	8.24	196	61	83	28.590
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
56.48	4242	4.99	1657	2.70	7.491	0.564	7.54	194	68	83	28.531
50% of Pull at Maximum Power—Two Hours—3rd Gear											
39.71	2888	5.16	1698	1.94	6.045	0.647	6.57	192	62	84	28.563
MAXIMUM POWER WITH BALLAST											
65.50	11016	2.23	1599	14.60	1st Gear	.....	.....	192	53	68	28.620
71.75	7225	3.72	1607	6.67	2nd Gear	.....	.....	192	53	68	28.620
71.16	5667	4.71	1602	5.06	3rd Gear	.....	.....	191	53	68	28.620
71.20	4544	5.88	1604	3.69	4th Gear	.....	.....	191	56	72	28.610
69.45	3610	7.21	1599	3.12	5th Gear	.....	.....	191	56	72	28.610
62.52	1634	14.35	1604	1.17	6th Gear	.....	.....	191	56	72	28.610
MAXIMUM POWER WITHOUT BALLAST											
69.38	5642	4.61	1602	8.45	3rd Gear	.....	.....	195	70	86	28.600
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull			5650	5850	5900	5900	5950	5950			
Horsepower			71.2	65.5	58.2	51.9	44.4	38.1			
Miles per hour			4.7	4.2	3.7	3.3	2.8	2.4			

Department of Agricultural Engineering

Dates of Test: April 5 to April 23, 1960

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

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel commercial propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 10W API service classification MS, DG To motor 2.610 gal Drained from motor 2.239 gal Transmission and final-drive lubricant SAE 90 Type transmission oil Total time engine was operated 41 hours.

ENGINE Make Case LPG Type 6 cylinder vertical Serial No 8161061 Crankshaft mounted lengthwise Rated rpm 1600 Bore and stroke 4" x 5" Compression ratio 8.0 to 1 Displacement 377 cu in Carburetor size 1½" Ignition system battery Cranking system 12 volt electrical (two 6 volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter replaceable pleated paper element Fuel filter replaceable pleated paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 8161061 Tread width rear 67½" front 57" Wheel base 83½" 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 25¾" Vertical distance above roadway 35½" 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 2.5 second 3.7 third 4.7 fourth 5.7 fifth 7.0 sixth 13.6 reverse 3.1 Clutch single plate operated by hand lever Brakes double disc operated independently by foot pedals which can be locked together Steering power assisted Turning radius (on concrete surface with brake applied) right 113" left 115" (on concrete surface without brake) right 187" left 170" Turning space diameter (on concrete surface with brake applied) right 238" left 243" (on concrete surface without brake) right 385" left 342" Belt pulley 1007 rpm at 1600 engine rpm Diam 11¼" face 8¼" Belt speed 3099 fpm Power take-off 531 rpm at 1450 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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 739.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT, Chairman

G. W. STEINBRUEGGE

J. J. SULEK

Board of Tractor

Test Engineers

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18-26;8;18	Two 18-26;8;16
Ballast	—Liquid	1575 lb each	None
	—Cast iron	1440 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-18;6;32	Two 7.50-18;6;20
Ballast	—Liquid	129 lb each	None
	—Cast iron	146 lb each	None
Height of drawbar		17½ inches	19 inches
Static weight	—Rear	12,020 lb	5990 lb
	—Front	3140 lb	2590 lb
Total weight with operator		15,335 lb	8755 lb

# 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 transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

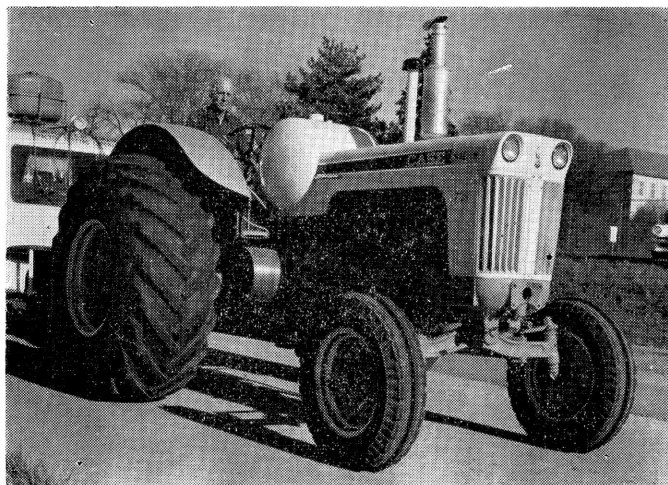
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum 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 940 LPG