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## Test 921: Case 841 CK (LPG)

Nebraska Tractor Test Lab

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

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# NEBRASKA TRACTOR TEST 921 - CASE 841 CK LPG

(ALSO CASE 840 CK LPG) - (ALSO CASE 842 CK LPG)

## POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	

### MAXIMUM POWER AND FUEL CONSUMPTION

Rated Engine Speed—Two Hours								
64.08	1900	7.466	0.495	8.58	183	59	75	29.023
Standard Power Take-off Speed (540 rpm)—One Hour								
61.26	1683	6.553	0.455	9.35	185	58	75	29.030

### VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

56.37	1967	6.678	0.503	8.44	182	59	75	.....
0.00	2070	2.301	.....	.....	180	58	75	.....
28.72	2004	4.433	0.656	6.48	183	58	75	.....
64.17	1901	7.504	0.497	8.55	186	59	76	.....
14.61	2037	3.311	0.963	4.41	182	58	75	.....
42.71	1987	5.534	0.551	7.72	184	58	75	.....
Av 34.43	1994	4.960	0.612	6.94	183	58	75	29.020

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr		Cooling med	Air wet bulb	Air dry bulb	

### VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—4th Gear											
58.24	4741	4.61	1903	5.55	7.529	0.549	7.74	190	48	55	29.130
75% of Pull at Maximum Power—Ten Hours—4th Gear											
47.04	3645	4.84	1967	3.91	6.288	0.568	7.48	187	44	52	28.941
50% of Pull at Maximum Power—Two Hours—4th Gear											
32.27	2454	4.93	1981	2.83	5.000	0.659	6.45	192	49	60	29.115

### MAXIMUM POWER WITH BALLAST

47.56	8278	2.15	1960	14.99	2nd Gear	.....	190	46	52	29.160
58.35	7132	3.07	1902	8.88	3rd Gear	.....	185	39	42	29.170
59.82	4862	4.61	1903	5.21	4th Gear	.....	186	41	45	29.170
58.48	3595	6.10	1904	3.89	5th Gear	.....	192	41	45	29.170
56.89	2431	8.78	1901	2.69	6th Gear	.....	190	41	45	29.170
54.90	1701	12.10	1900	2.04	7th Gear	.....	190	41	45	29.170

### MAXIMUM POWER WITHOUT BALLAST

57.83	4834	4.49	1899	7.22	4th Gear	.....	188	49	58	29.000
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	4862	5210	5334	5477	5807	6257	5823
Horsepower	59.82	57.07	52.31	46.75	42.41	37.64	27.97
Crankshaft speed, rpm	1903	1704	1528	1334	1146	952	754
Miles per hour	4.61	4.11	3.68	3.20	2.74	2.26	1.80
Slip of drivers, %	5.21	5.89	5.89	6.29	6.82	7.47	6.82

### TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38; 8; 24	Two 15.5-38; 8; 14
Ballast	—Liquid	758 lb each	None
	Cast iron	725 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 4; 24	Two 7.50-16; 4; 24
Ballast	—Liquid	None	None
	Cast iron	25 lb each	None
Height of drawbar		15½ inches	15½ inches
Static weight	—Rear	8615 lb	5650 lb
	Front	2265 lb	2215 lb
Total weight with operator		11055 lb	8040 lb

## Department of Agricultural Engineering

Dates of Test: OCTOBER 9 TO OCTOBER 25, 1965

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

**FUEL, OIL and TIME** Fuel HD5 propane (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 20-20W API service classification MS, DM To motor 2.169 gal Drained from motor 1.847 gal Transmission and final-drive lubricant SAE 10W Type Case TCH oil Total time engine was operated 47 hours.

**ENGINE** Make Case LPG Type 4 cylinder vertical Serial No 2103951 Crankshaft mounted lengthwise Rated rpm 1900 Bore and stroke 4¼" x 5" Compression ratio 8.4 to 1 Displacement 284 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric 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 8257686 Tread width rear 56" to 88" front 53" to 82" Wheel base 102" 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 29.8" Vertical distance above roadway 37.6" 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 1.7 second 2.4 third 3.3 fourth 4.8 fifth 6.2 sixth 8.9 seventh 12.1 eighth 17.6 reverse 2.2 and 8.0 Clutch single plate dry disc operated by foot pedal Brakes double disc operate by two foot pedals which can be locked together Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 126" left 126" (on concrete surface without brake) right 142" left 142" Turning space diameter (on concrete surface with brake applied) right 259" left 259" (on concrete surface without brake) right 294" left 294" Belt pulley 920 rpm at 1700 engine rpm diam 10.5" face 7.25" Belt speed 2523 fpm Power take-off 545 rpm at 1700 engine rpm (1000 rpm Power Take-off is also available).

**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 as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 921.

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 841 CK LPG