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## Test 868: Case 1200 (Diesel)

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 868 - CASE 1200 DIESEL

The University of Nebraska Agricultural Experiment Station  
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

## 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

119.90	2000	8.195	0.478	14.63	186	61	75	28.700
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### VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

105.20	2063	7.386	0.491	14.24	180	62	76	.....
0.00	2187	2.446	.....	.....	168	63	77	.....
54.10	2122	4.824	0.623	11.21	175	62	77	.....
119.58	2000	8.219	0.480	14.55	187	64	78	.....
27.43	2154	3.597	0.917	7.63	172	64	79	.....
79.95	2092	6.034	0.528	13.25	180	64	80	.....
Av 64.38	2103	5.418	0.588	11.88	177	63	78	28.697

## 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			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	

### VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—3rd Gear											
106.20	8681	4.59	1998	3.74	8.190	0.539	12.97	183	41	44	29.263
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
84.84	6622	4.80	2071	2.76	7.182	0.592	11.81	187	51	59	28.944
50% of Pull at Maximum Power—Two Hours—3rd Gear											
57.81	4414	4.91	2099	1.96	5.647	0.683	10.24	175	62	81	28.810

### MAXIMUM POWER WITH BALLAST

98.57	15860	2.33	2000	12.11	1st Gear	.....	178	44	55	29.150
106.96	11245	3.57	2005	5.57	2nd Gear	.....	180	44	55	29.150
106.86	8759	4.58	1998	4.03	3rd Gear	.....	185	44	54	29.170
103.97	5342	7.30	2000	2.36	4th Gear	.....	180	43	52	29.170
100.42	3582	10.51	2011	1.40	5th Gear	.....	175	43	52	29.170
95.16	2685	13.29	2000	1.10	6th Gear	.....	175	43	52	29.170

### MAXIMUM POWER WITHOUT BALLAST

109.02	8874	4.61	2006	4.18	3rd Gear	.....	195	49	55	29.270
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear

Pounds pull	8759	9303	9937	9934	9246	9006
Horsepower	106.86	102.14	96.90	84.65	67.72	54.75
Crankshaft Speed, rpm	2002	1804	1609	1400	1204	998
Miles per hour	4.58	4.12	3.66	3.20	2.75	2.28
Slip of drivers, %	4.03	4.38	4.52	4.66	4.24	4.24

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 23.1-26; 8; 16	Two 23.1-26; 8; 16
Ballast	—Liquid	695 lb each	None
	Cast iron	None	None
Front tires	—No, size, ply & psi	Two 23.1-26; 8; 16	Two 23.1-26; 8; 16
Ballast	—Liquid	685 lb each	None
	Cast iron	None	None
Height of drawbar		15½ inches	16 inches
Static weight	—Rear	8640 lb	7250 lb
	Front	10530 lb	9160 lb
Total weight with operator		19345 lb	16585 lb

Department of Agricultural Engineering

Dates of Test: October 14 to 23, 1964

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

**FUEL, OIL and TIME** Fuel No 2 diesel Cetane No 57.0 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** 0.8394 **Weight per gallon** 6.990 lb **Oil** SAE 20-20W API service classification DS **To motor** 2.965 gal **Drained from motor** 2.281 gal **Transmission** type A transmission fluid **Final Drive Lubricant** SAE 90 EP **Total time engine was operated** 43½ hours.

**ENGINE** Make Case Diesel Type 6 cylinder vertical with turbo-charger **Serial No** 2084739 **Crankshaft mounted lengthwise** **Rated rpm** 2000 **Bore and stroke** 4¾" x 5" **Compression ratio** 15 to 1 **Displacement** 451 cu in **Cranking system** 24 volt electric (two 12 volt batteries) **Lubrication pressure** Air cleaner oil washed wire mesh **Oil filter** full-flow replaceable paper element **Oil cooler** engine coolant heat exchanger for crank-case oil **Fuel filter** primary and secondary filters with replaceable rayon elements and final filter with replaceable paper cartridge **Muffler** was not used **Cooling medium temperature control** thermostat.

**CHASSIS** Type 4-wheel drive **Serial No** 8229490 **Tread width** rear 77" front 77" **Wheel base** 100½" **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 58" Vertical distance above roadway 41" 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 2.48 second 3.52 third 4.46 fourth 7.00 fifth 9.95 sixth 12.60 (reverse) first 2.78 second 3.95 third 5.00 fourth 7.85 fifth 11.16 sixth 14.13 **Clutch** dry disc operated by foot pedal **Brakes** vacuum power boost hydraulic brakes with internal expanding shoes for all four wheels operated by single foot pedal **Steering** hydraulic with power assist **Turning radius** (on concrete surface without brake) right 183" left 183" **Turning space diameter** (on concrete surface without brake) right 395" left 395" **Belt pulley** none **Power take-off** 1000 rpm at 2000 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 868.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT, Chairman

G. W. STEINBRUEGGE

J. J. SULEK

Board of Tractor Test Engineers

# 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 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 1200 Diesel