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Test 688: Case Model 211-B

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 688 - CASE 211-B

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director; Lincoln, Nebraska

BELT POWER 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								
30.84	1900	2.758	0.542	11.18	162	55	75	29.307
Standard Power Take-off Speed (540 rpm)—One Hour								
29.23	1750	2.615	0.543	11.18	162	54	74	29.310
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
27.32	1976	2.517	0.559	10.85	156	55	75	.....
1.01	2073	1.142	6.861	0.88	125	52	70	.....
14.08	2038	1.756	0.756	8.02	139	53	71	.....
30.69	1900	2.705	0.535	11.35	159	54	74	.....
7.12	2060	1.414	1.205	5.04	130	52	69	.....
20.52	1982	2.092	0.618	9.81	143	52	70	.....
A1 16.79	2005	1.938	0.700	8.66	142	53	71	29.305

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels	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—3rd Gear											
24.84	1742	5.35	1892	4.46	2.512	0.614	9.89	134	49	55	28.733
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
20.25	1341	5.66	1983	3.50	2.281	0.683	8.88	136	50	62	28.694
50% of Pull at Maximum Power—Two Hours—3rd Gear											
14.04	896	5.83	2032	2.31	2.028	0.876	6.92	118	40	42	28.693
MAXIMUM POWER WITH BALLAST											
24.93	3680	2.54	1901	12.77	1st Gear	.....	119	28	31	29.260	
26.09	2468	3.96	1896	7.01	2nd Gear	.....	120	29	32	29.260	
25.46	1790	5.33	1900	5.11	3rd Gear	.....	120	30	33	29.260	
19.68	536	13.77	1900	0.74	4th Gear	.....	141	55	71	28.625	
MAXIMUM POWER WITHOUT BALLAST											
25.24	1802	5.25	1902	7.97	3rd Gear	.....	148	56	60	28.720	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull		1800	1950	2050	2200	2150	2100				
Horsepower		25.5	25.0	23.0	21.7	18.3	14.6				
Miles per hour		5.3	4.8	4.2	3.7	3.2	2.6				

Department of Agricultural Engineering

Dates of Test: March 19 to March 25, 1959

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

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel Regular Gasoline Octane No ASTM 83 Research 91 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7285 Weight per gallon 6.066 lb Oil SAE 20-20W API service classification MS To motor 0.987 gal Drained from motor 0.953 gal Transmission and final-drive lubricant SAE No 90 Type EP Total time motor was operated 39 hours.

ENGINE Make Case Type 4 cylinder vertical Serial No 136P09838 Crankshaft mounted lengthwise Rated rpm 1900 Lubrication pressure Bore and stroke 3 1/8" x 4 1/8" Compression ratio 7.4 to 1 Displacement 126.5 cu in Carburetor size 3/8" Ignition system battery Cranking system 6 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter not used Cooling medium temperature control thermostat.

CHASSIS Type tricycle Serial No 6122893 Tread width rear 48" to 88" front 6 1/4" to 11 1/2" Wheel base 84 1/2" 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 42 1/4" Vertical distance above roadway 32" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive with throw out lever Advertised speeds mph first 2.8 second 4.1 third 5.4 fourth 13.4 Belt pulley diam 9 1/4" face 6 1/8" rpm 1292 Belt speed 3193 fpm Clutch single plate dry disc operated by foot pedal Brakes double disc operated by two foot pedals Power take-off 533 rpm at 1750 engine rpm Steering power assisted Turning radius (on concrete surface with brake applied) right 94" left 94" (on concrete surface without brake) 94" left 94" Turning space diameter (on concrete surface with brake applied) right 200" left 200" (on concrete surface without brake) right 200" left 200".

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 688.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT

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 11-28;4;14	Two 11-28;4;12
Ballast	—Liquid 345 lb each	None
	—Cast iron 576 lb each	None
Front tires	—No, size, ply & psi Two 5.00-15;4;28	Two 5.00-15;4;28
Ballast	—Liquid None	None
	—Cast iron None	None
Height of drawbar	13 1/2 inches	14 inches
Static weight	—Rear 4130 lb	2288 lb
	—Front 1190 lb	1192 lb
Total weight with operator	5495 lb	3655 lb

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common useage. 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 manufacturers published recommendations. The manufacturers 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 manufacturers 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 pully 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 useage.

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 211-B