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Test 689: Case Model 411-B

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 689 - CASE 411-B

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, 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								
37.12 [*]	2000	3.468	0.567	10.70	162	56	75	29.130
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
32.71	2074	3.121	0.579	10.48	156	56	75	.....
0.79	2145	1.464	11.241	0.54	122	56	75	.....
16.55	2098	2.240	0.821	7.39	139	56	75	.....
36.34	2002	3.368	0.562	10.79	158	56	75	.....
8.38	2124	1.810	1.310	4.63	131	56	75	.....
24.66	2085	2.666	0.656	9.25	146	56	75	.....
Av 19.91	2088	2.445	0.745	8.14	142	56	75	29.130

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	Air wet bulb	Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—5th Gear											
29.72	2374	4.69	2000	4.30	3.301	0.674	9.00	138	48	62	28.875
25.62	3032	3.17	1943	5.43	3.178	0.753	8.06	132	45	51	torq conv
75% of Pull at Maximum Power—Ten Hours and Two Hours—5th Gear											
24.04	1858	4.85	2049	3.52	3.025	0.763	7.95	133	50	65	28.647
23.62	2277	3.89	2038	4.05	3.147	0.808	7.51	155	55	74	torq conv
50% of Pull at Maximum Power—Two Hours—5th Gear											
16.46	1224	5.04	2102	2.39	2.477	0.913	6.65	122	43	53	28.908
16.72	1555	4.03	2099	2.77	2.737	0.993	6.11	123	44	49	torq conv
MAXIMUM POWER WITH BALLAST											
28.72	5920	1.82	2009	12.69	1st Gear	.....	124	36	46	29.205	
31.15	4191	2.79	2000	8.43	2nd Gear	.....	135	38	45	28.930	
31.37	3818	3.08	2001	7.98	3rd Gear	.....	136	47	55	28.955	
31.34	3133	3.75	1998	6.35	4th Gear	.....	140	47	55	28.955	
30.67	2470	4.66	1998	5.10	5th Gear	.....	139	45	58	28.920	
30.50	1842	6.21	2000	4.05	6th Gear	.....	133	48	58	28.920	
23.19	5947	1.46	2052	14.69	1st Gear (Torq Conv)	.....	140	42	51	28.955	
27.41	5074	2.03	2017	11.12	2nd Gear (Torq Conv)	.....	145	47	55	28.955	
27.71	4483	2.32	2019	9.49	3rd Gear (Torq Conv)	.....	148	46	59	28.910	
27.50	3581	2.88	2023	7.35	4th Gear (Torq Conv)	.....	147	46	59	28.910	
27.61	3087	3.35	1989	6.12	5th Gear (Torq Conv)	.....	150	44	58	28.915	
26.59	2227	4.48	1983	4.05	6th Gear (Torq Conv)	.....	129	36	46	29.205	
MAXIMUM POWER WITHOUT BALLAST											
29.71	2438	4.57	2006	8.46	5th Gear	.....	126	38	45	29.200	
25.85	2903	3.34	2006	11.50	5th Gear (Torq Conv)	.....	124	38	45	29.200	

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear											
Pounds pull	2450	2500	2550	2650	2800	2700	.....	.....	.....	.....	.....
Horsepower	30.7	28.0	25.2	23.3	20.9	16.6	.....	.....	.....	.....	.....
Miles per hour	4.7	4.2	3.7	3.3	2.8	2.3	.....	.....	.....	.....	.....
Pounds pull (Torq Conv)	3100	3400	3700	4000	4350	4750	5000	5200	.....	.....	.....
Horsepower (Torq Conv)	27.6	27.2	26.6	24.5	23.2	20.3	17.3	12.5	.....	.....	.....
Miles per hour (Torq Conv)	3.4	3.0	2.7	2.3	2.0	1.6	1.3	0.9	.....	.....	.....

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13-28;6;18	Two 13-28;6;14
Ballast	—Liquid	559 lb each	None
	—Cast iron	1290 lb each	None
Front tires	—No, size, ply & psi	Two 5.50-16;4;28	Two 5.50-16;4;28
Ballast	—Liquid	None	None
	—Cast iron	73 lb	None
Height of drawbar		16 inches	17 inches
Static weight	—Rear	6548 lb	2850 lb
	—Front	1470 lb	1324 lb
Total weight with operator		8193 lb	4349 lb

Department of Agricultural Engineering

Dates of Test: March 20 to April 16, 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 0.974 gal Drained from motor 0.843 gal Transmission and final-drive lubricant SAE No 90 Type EP Total time motor was operated 60 hours.

ENGINE Make Case Type 4 cylinder vertical Serial No 152R098 Crankshaft mounted lengthwise Rated rpm 2000 Lubrication pressure Bore and stroke 3 3/8" x 4 1/8" Compression ratio 7.1 to 1 Displacement 148 cu in Carburetor size 1 1/4" Ignition system battery Cranking system 12 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 6122895 Tread width rear 48" to 88" front 6 1/4" and 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 30 3/4" Vertical distance above roadway 32 3/4" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Advertised speeds mph (direct drive) first 1.57 second 2.30 third 2.52 fourth 3.02 fifth 3.71 sixth 4.88 seventh 7.18 eighth 11.60 reverse 2.24 and 3.00 (Torque Converter Drive) first 0 to 1.57 second 0 to 2.30 third 0 to 2.52 fourth 0 to 3.02 fifth 0 to 3.71 sixth 0 to 4.88 seventh 0 to 7.18 eighth 0 to 11.60 reverse 0 to 2.24 and 0 to 3.00 Belt pulley diam 10 1/4" face 6" rpm 1140 Belt speed 3060 fpm Clutch multiple disc main hydraulic power-clutch operated by piston thru foot pedal control valve and single disc direct drive hydraulic clutch, locking turbine to engine thru hand operated control valve Brakes double disc operated by two foot pedals Power take-off 549 rpm at 2000 engine rpm Steering power assisted Turning radius (on concrete surface with brake applied) right 94" left 94" (on concrete surface without brake) right 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. Only 12 gears, as selected by manufacturer's representative, were used in making the maximum power runs with ballast.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 689.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT

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 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 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 611-B