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Test 709: Case Model 310-C (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST NO. 709 - CASE 310-C GASOLINE

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									
33.32	1850	2.949	0.538	11.30	168	72	76	28.817	
Standard Power Take-off Speed (540 rpm)—One Hour									
31.43	1727	2.694	0.521	11.67	166	71	74	28.810	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
29.40	1921	2.699	0.558	10.89	158	70	75	
0.94	2007	1.189	7.691	0.79	140	70	75	
15.31	1999	1.905	0.756	8.04	152	71	76	
32.91	1852	2.842	0.525	11.58	166	71	76	
7.69	2011	1.485	1.174	5.18	146	72	78	
22.48	1958	2.235	0.605	10.06	158	72	78	
Av	18.12	1958	2.059	0.691	8.80	153	71	76	28.812

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		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—2nd Gear											
26.75	3706	2.71	1867	3.33	3.150	0.716	8.49	188	70	89	29.075
75% of Pull at Maximum Power—Ten Hours—2nd Gear											
21.68	2895	2.81	1927	2.74	2.589	0.726	8.37	172	73	88	29.029
50% of Pull at Maximum Power—Two Hours—2nd Gear											
14.57	1857	2.94	1986	1.22	2.151	0.898	6.77	173	80	97	28.860
MAXIMUM POWER WITH BALLAST											
26.22	5815	1.69	1905	6.30	1st Gear.....		174	83	92		29.075
27.74	3863	2.69	1848	2.78	2nd Gear.....		174	65	79		29.075
26.50	2203	4.51	1845	0.89	3rd Gear.....		170	65	79		29.070
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—2nd Gear											
Pounds pull			3850	4050	4100	4200	4350	4450			4050
Horsepower			27.7	25.9	24.1	21.3	18.6	15.4			11.9
Miles per hour			2.7	2.4	2.2	1.9	1.6	1.3			1.1

Department of Agricultural Engineering

Dates of Test: July 14 to July 31, 1959

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

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel regular gasoline Octane No ASTM 85 Research 92 (rating taken from oil company's typical inspection data) **Specific gravity** converted to 60°/60° 0.7304 **Weight per gallon** 6.080 lb Oil SAE 30 API service classification MS and DG To motor 1.221 gal Drained from motor 1.113 gal Transmission and final-drive lubricant SAE No 80 Type straight mineral gear oil Total time motor was operated 56 hours.

ENGINE Make Case Type 4 cylinder vertical Serial No 199R06533 Crankshaft mounted length-wise **Rated rpm** 1850 **Lubrication** pressure **Bore and stroke** 3 3/8" x 4 1/8" **Compression ratio** 7.1 to 1 **Displacement** 148 cu in **Carburetor** size 3/8" **Ignition** system battery **Cranking system** 12 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** one replaceable waste pack cartridge **Cooling medium** temperature control thermostat.

CHASSIS Type track layer Serial No 3008915 **Tread** width 48 1/4" **Wheel base** 54" **Drawbar height** 13" **Measured length of track** 17.6 feet **Cleats** integral with shoes **Cleats per track** 30 **Size of cleats** 12" x 1 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 29 3/4" **Vertical distance** above roadway 21 1/4" **Horizontal distance** from center of rear wheel tread 0" to the right or left **Hydraulic control system** direct engine drive **Advertised speeds** mph first 1.74 second 2.75 third 4.52 reverse 2.01 **Belt pulley diam** 8 1/2" **face** 6 1/2" **rpm** 1193 **Belt speed** 2650 fpm **Clutch** single plate dry disc operated by foot pedal **Brakes** contracting bands operated by two hand levers that can be locked by latches **Power take-off** 540 rpm at 1727 engine rpm **Steering** hand levers controlling brakes **Turning space diameter** (with brake applied) right 204" left 204".

Total weight with operator 6145 pounds including front counter weight 550 lbs, trunnions 35 lbs, rub shoes 45 lbs, lift brackets 60 lbs, rock guards 125 lbs, and full length crankcase guard 335 lbs.

REPAIRS AND ADJUSTMENTS During limber up test the voltage regulator failed. This was replaced with a new one and the test continued.

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 709.

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 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 310-C Gasoline