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Test 714: Case Model 610 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST NO. 714 - CASE 610 DIESEL

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									
38.58	2100	4.151	0.754	9.29	190	74	84	28.920	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
38.09	2293	4.310	0.793	8.84	193	73	83	
1.36	2434	2.234	11.515	0.61	159	72	81	
22.03	2387	3.116	0.991	7.07	168	72	81	
38.82	2099	4.139	0.747	9.38	192	72	81	
11.57	2412	2.705	1.639	4.28	161	72	80	
31.21	2362	3.548	0.797	8.80	178	72	81	
Av	23.85	2331	3.342	0.982	7.14	175	72	81	28.910

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—2nd Gear											
32.40	4277	2.84	2097	1.84	4.085	0.884	7.93	199	72	84	28.735
75% of Pull at Maximum Power—Ten Hours—2nd Gear											
29.33	3336	3.30	2271	0.99	4.161	0.994	7.05	204	75	87	28.693
50% of Pull at Maximum Power—Two Hours—2nd Gear											
21.63	2280	3.56	2342	1.06	3.625	1.175	5.97	193	72	87	28.715
MAXIMUM POWER WITH BALLAST											
32.80	8801	1.40	2078	6.05	1st Gear.....			196	74	94	28.730
32.95	4400	2.81	2083	1.90	2nd Gear.....			187	70	80	28.740
33.65	4197	3.01	2097	1.69	3rd Gear.....			179	70	80	28.740
28.60	1830	5.86	2096	0.91	4th Gear.....			189	70	80	28.740
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—2nd Gear											
Pounds pull		4400	4950	5850	6900	7950	8900				
Horsepower		33.0	31.7	32.8	29.4	25.4	19.0				
Miles per hour		2.8	2.4	2.1	1.6	1.2	0.8				

Department of Agricultural Engineering

Dates of Test: August 19 to August 28, 1959

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

Manufacturer's Power Rating: Not Rated

FUEL, OIL and Time Fuel No 2 Diesel Cetane No 51 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8418 **Weight per gallon** 7.009 lb **Oil SAE 10W-30** API service classification MS, DG and DM **To motor** 2.674 gal **Drained from motor** 1.848 gal **Transmission lubricant type "C"** torque converter oil **Final-drive lubricant** SAE No 140 **Type transmission gear lube** **Total time motor was operated** 40½ hours.

ENGINE Make Continental diesel **Type** 4 cylinder vertical **Serial No** 3437 **Crankshaft mounted lengthwise** **Rated rpm** 2250 **Lubrication pressure** **Bore and stroke** 3¹¹/₁₆" x 4⁷/₈" **Compression ratio** 16.0 to 1 **Displacement** 208 cu in **Cranking system** 12 volts (two 6 volt batteries) **Air cleaner** oil washed wire screen **Muffler** was used **Oil filter** replaceable paper element **Fuel filter** one primary filter with replaceable pleated paper element and one secondary replaceable paper disc filter **Cooling medium temperature control** thermostat.

CHASSIS Type tracklayer **Serial No** 7061472 **Tread width** 49" **Wheel base** 62³/₈" **Drawbar height** 11" **Measured length of track** 16.6 feet **Cleats integral with shoes** **Cleats per track** 34 **Size of cleats** 14" x 1½" **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** 33⁹/₁₆" **Vertical distance above roadway** 24¼" **Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system** direct engine drive **Transmission** two range fixed ratio with eight hydraulically controlled multiple disc clutches **Advertised speeds mph** first 0 to 1.67 second 0 to 3.22 third 0 to 3.40 fourth 0 to 6.56 reverse first 0 to 1.83 second 0 to 3.51 third 0 to 3.74 fourth 0 to 7.20 **Belt pulley diam** 10½" **face** 7¼" **rpm** 940 **Belt speed** 3100 fpm **Clutches** multiple disc operated hydraulically by hand levers or brake pedals **Brakes** foot pedals operating shoe brakes hydraulically and hand lever for parking **Steering** by clutch levers controlling power shifting in two speed ranges for each track independently or by brake pedals **Power take-off** 533 rpm at 2100 engine rpm (PTO speed varies as load is changed) **Turning space diameter** (with brake applied) (right 137" left 137").

Total weight with operator 9,510 pounds including rock guards 240 lbs, heavy duty drawbar assembly 110 lbs & counter weight 1,200 lbs.

REPAIRS AND ADJUSTMENTS A fitting in the fuel line broke during the limber up run. A new fitting was installed and the test continued.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code. This tractor is equipped with an operator controlled power shifting partial range transmission with torque multiplier.

We, the undersigned, certify that this a true and correct report of official Tractor Test No 714.

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

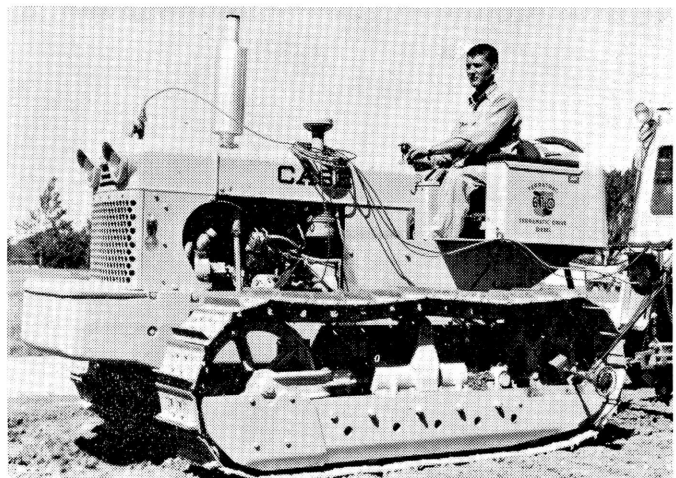
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum 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 610 Diesel