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Test 693: Case Model 701-B (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 693 - CASE 701-B DIESEL

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								
51.20	1500	3.390	0.464	15.10	186	56	74	28.927
Standard Power Take-off Speed (540 rpm)—One Hour								
50.27	1451	3.313	0.462	15.17	190	56	73	28.889
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
45.14	1556	2.786	0.433	16.20	174	57	76
0.72	1660	0.719	7.000	1.00	140	56	73
23.48	1616	1.733	0.517	13.55	166	57	76
51.18	1500	3.339	0.457	15.33	190	58	78
11.86	1634	1.216	0.718	9.75	161	56	74
34.52	1585	2.213	0.449	15.60	170	56	73
Av 27.82	1592	2.001	0.504	13.90	167	57	75	28.898

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	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											
46.44	3624	4.81	1511	5.02	3.472	0.524	13.38	168	45	45	28.750
75% of Pull at Maximum Power—Ten Hours—5th Gear											
34.82	2577	5.07	1573	3.75	2.529	0.509	13.77	170	49	52	28.890
50% of Pull at Maximum Power—Two Hours—5th Gear											
24.77	1780	5.22	1600	2.51	2.068	0.585	11.98	160	46	47	28.595
MAXIMUM POWER WITH BALLAST											
32.85	7090	1.74	1571	14.82	2nd Gear.....		156	76	80		28.640
41.84	6778	2.31	1503	13.53	3rd Gear.....		185	76	80		28.600
47.48	4949	3.60	1506	7.10	4th Gear.....		167	49	56		28.730
47.24	3716	4.77	1501	5.08	5th Gear.....		169	45	46		28.565
46.13	2504	6.91	1502	3.48	6th Gear.....		168	49	56		28.730
44.36	1739	9.57	1503	2.48	7th Gear.....		171	49	56		28.730
39.72	1067	13.96	1504	1.67	8th Gear.....		166	49	56		28.730
MAXIMUM POWER WITHOUT BALLAST											
45.06	3640	4.64	1506	7.79	5th Gear.....		185	74	76		28.675
VARYING DRDAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear											
Pounds pull		3700	3750	3800	3800	3550	3300				
Horsepower		47.2	42.0	39.5	33.4	27.5	21.1				
Miles per hour		4.8	4.2	3.9	3.3	2.9	2.4				

Department of Agricultural Engineering

Dates of Test: April 20 to April 29, 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 SAE10W API service classification MM, MS, and DG To motor 2.226 gal Drained from motor 1.909 gal Transmission and final-drive lubricant SAE No 90 Type MP Total time motor was operated 46 hours.

ENGINE Make Case Diesel Type 4 cylinder vertical Serial No 8125663 Crankshaft mounted lengthwise Rated rpm 1500 Lubrication pressure Bore and stroke 4 1/8" x 5" Compression ratio 15.0 to 1 Displacement 267 cu in Cranking system 12 volts (two 6 volt batteries) Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable wood cellulose element Fuel filter one edge wound metal filter removable for cleaning, one filter with replaceable element and one replaceable sealed filter Cooling medium temperature control thermostat.

CHASSIS Type tricycle Serial No 8125663 Tread width rear 52" to 88" front 9 1/8" to 15 1/8" Wheel base 92 1/4" 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 1/2" Vertical distance above roadway 35 1/2" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Advertised speeds mph first 1.4 second 1.9 third 2.7 fourth 3.8 fifth 4.8 sixth 6.9 seventh 9.4 eighth 13.7 reverse 1.7 and 6.2 Belt pulley diam 10 1/2" face 7 1/4" rpm 1166 Belt speed 3205 fpm Clutch single plate dry disc operated by foot pedal Brakes double disc operated by two foot pedals, Power take-off 540 rpm at 1451 engine rpm Steering power assisted Turning radius (on concrete surface with brake applied) right 100 1/2" left 101" (on concrete surface without brake) right 103 1/2" left 103" Turning space diameter (on concrete surface with brake applied) right 221" left 221 1/2" (on concrete surface without brake) right 226" left 226".

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. The first gear was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 693.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT, Chairman

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 15.5-38;6;18	Two 15.5-38;6;14
Ballast	—Liquid	635 lb each	None
	—Cast iron	685 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16;6;36	Two 6.00-16;6;36
Ballast	—Liquid	None	None
	—Cast iron	None	None
Height of drawbar		17 inches	18 inches
Static weight	—Rear	7020 lb	4380 lb
	—Front	2030 lb	2035 lb
Total weight with operator		9225 lb	7590 lb

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

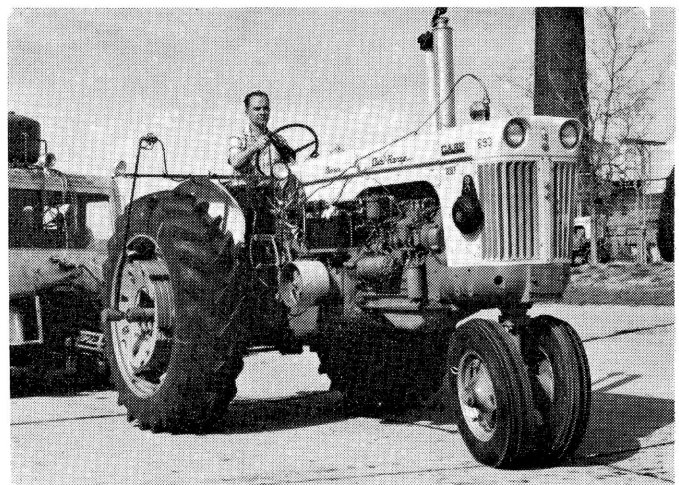
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum 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 701-B Diesel