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Test 695: Case Model 811-B (LPG)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 695 – CASE 811-B LPG

University of Nebraska Agricultural Experiment Station
W. V. Lambert, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

| Hp | Crank shaft speed rpm | Fuel Consumption Gal per hr | Lb per hp-hr | Hp-hr per gal | Temperature Degrees F | | | Barometer inches of Mercury | |
|--|--------------------------------|-----------------------------------|-----------------|------------------|-----------------------|--------------------|--------------------|-----------------------------------|--------|
| | | | | | Cooling medium | Air wet bulb | Air dry bulb | | |
| MAXIMUM POWER AND FUEL CONSUMPTION | | | | | | | | | |
| Rated Engine Speed—Two Hours | | | | | | | | | |
| 55.58 | 1800 | 6.188 | 0.473 | 8.98 | 204 | 62 | 75 | 29.305 | |
| Standard Power Take-off Speed (540 rpm)—One Hour | | | | | | | | | |
| 48.88 | 1452 | 5.188 | 0.451 | 9.42 | 202 | 62 | 74 | 29.320 | |
| VARYING POWER AND FUEL CONSUMPTION—TWO HOURS | | | | | | | | | |
| 48.75 | 1858 | 5.696 | 0.497 | 8.56 | 194 | 62 | 74 | ..... |  |
| 1.19 | 1991 | 2.287 | 8.168 | 0.52 | 184 | 61 | 74 | ..... |  |
| 25.37 | 1931 | 4.009 | 0.672 | 6.33 | 191 | 61 | 73 | ..... |  |
| 56.01 | 1800 | 6.240 | 0.473 | 8.98 | 202 | 62 | 75 | ..... |  |
| 12.89 | 1962 | 3.071 | 1.012 | 4.20 | 187 | 62 | 76 | ..... |  |
| 37.22 | 1890 | 4.744 | 0.542 | 7.85 | 194 | 62 | 75 | ..... |  |
| Av | 30.24 | 1905 | 4.341 | 0.610 | 6.97 | 192 | 62 | 74 | 29.322 |

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 | Temp Degrees F | | | Barometer inches of Mercury |
|----|-----------------------------|-----------------------------|--------------------------------|------------------------------------|---|--------------------|---------------------|---------------------|--------------------|--------------------|-----------------------------------|
| | | | | | | | | Cool- ing med | Air wet bulb | Air dry bulb | |

VARYING DRAWBAR POWER & FUEL CONSUMPTION WITH BALLAST

| | | | | | | | | | | | |
|---|------|------|------|------|-------|-------|------|-----|----|----|-------------|
| Maximum Available Power—Two Hours—4th Gear | | | | | | | | | | | |
| 50.62 | 4309 | 4.41 | 1800 | 5.11 | 6.175 | 0.518 | 8.20 | 184 | 42 | 49 | 29.150 |
| 45.06 | 5465 | 3.09 | 1790 | 6.76 | 6.126 | 0.578 | 7.36 | 189 | 47 | 57 | (Torq Conv) |
| 75% of Pull at Maximum Power—Ten Hours and Two Hours—4th Gear | | | | | | | | | | | |
| 40.64 | 3268 | 4.66 | 1886 | 4.06 | 5.494 | 0.575 | 7.40 | 182 | 46 | 54 | 29.139 |
| 41.37 | 4115 | 3.77 | 1850 | 4.76 | 6.668 | 0.685 | 6.20 | 185 | 44 | 53 | (Torq Conv) |
| 50% of Pull at Maximum Power—Two Hours—4th Gear | | | | | | | | | | | |
| 28.78 | 2257 | 4.78 | 1910 | 2.86 | 4.509 | 0.666 | 6.38 | 177 | 39 | 43 | 29.168 |
| 28.52 | 2718 | 3.94 | 1910 | 3.25 | 4.836 | 0.721 | 5.90 | 182 | 51 | 62 | (Torq Conv) |

MAXIMUM POWER WITH BALLAST

| | | | | | | | | | | |
|-------|------|-------|------|-------|----------------------|-------|-----|----|----|--------|
| 39.31 | 7135 | 2.07 | 1857 | 14.38 | 2nd Gear | ..... | 184 | 50 | 58 | 29.165 |
| 48.82 | 6301 | 2.91 | 1798 | 9.28 | 3rd Gear | ..... | 185 | 47 | 53 | 29.185 |
| 50.81 | 4370 | 4.36 | 1797 | 5.69 | 4th Gear | ..... | 184 | 46 | 52 | 29.200 |
| 49.44 | 3200 | 5.79 | 1804 | 4.17 | 5th Gear | ..... | 191 | 47 | 53 | 29.185 |
| 48.19 | 2166 | 8.34 | 1802 | 3.03 | 6th Gear | ..... | 187 | 50 | 58 | 29.165 |
| 44.81 | 1458 | 11.53 | 1799 | 2.02 | 7th Gear | ..... | 188 | 50 | 58 | 29.165 |
| 32.26 | 7159 | 1.69 | 1863 | 14.66 | 2nd Gear (Torq Conv) | ..... | 182 | 50 | 58 | 29.165 |
| 41.22 | 6895 | 2.24 | 1833 | 13.70 | 3rd Gear (Torq Conv) | ..... | 187 | 46 | 52 | 29.200 |
| 46.09 | 5419 | 3.19 | 1817 | 7.29 | 4th Gear (Torq Conv) | ..... | 187 | 47 | 53 | 29.185 |
| 44.79 | 4227 | 3.97 | 1792 | 5.48 | 5th Gear (Torq Conv) | ..... | 188 | 47 | 53 | 29.185 |
| 44.53 | 2973 | 5.62 | 1781 | 3.82 | 6th Gear (Torq Conv) | ..... | 193 | 50 | 58 | 29.165 |
| 43.57 | 2282 | 7.16 | 1757 | 2.96 | 7th Gear (Torq Conv) | ..... | 190 | 50 | 58 | 29.165 |

MAXIMUM POWER WITHOUT BALLAST

| | | | | | | | | | | |
|-------|------|------|------|------|----------------------|-------|-----|----|----|--------|
| 49.07 | 4338 | 4.24 | 1795 | 7.43 | 4th Gear | ..... | 186 | 52 | 60 | 28.910 |
| 42.87 | 4866 | 3.30 | 1810 | 9.27 | 4th Gear (Torq Conv) | ..... | 184 | 52 | 60 | 28.910 |

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

| | | | | | | | |
|----------------------------|------|------|------|------|------|------|------|
| Pounds pull | 4350 | 4700 | 4800 | 4750 | 4800 | 5100 | 4900 |
| Horsepower | 50.8 | 48.9 | 44.8 | 39.3 | 33.3 | 29.9 | 23.5 |
| Miles per hour | 4.4 | 3.9 | 3.5 | 3.1 | 2.6 | 2.2 | 1.8 |
| Pounds pull (Torq Conv) | 5400 | 5950 | 6400 | 7000 | | | |
| Horsepower (Torq Conv) | 46.1 | 44.4 | 42.7 | 41.1 | | | |
| Miles per hour (Torq Conv) | 3.2 | 2.8 | 2.5 | 2.2 | | | |

| 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 | | 647 lb each | None |
| | —Cast iron | | 548 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 | 17½ inches |
| Static weight | —Rear | | 7008 lb | 4640 lb |
| | —Front | | 1982 lb | 1960 lb |
| Total weight with operator | | | 9165 lb | 6775 lb |

Department of Agricultural Engineering

Dates of Test: April 27 to May 16, 1959

Manufacturer: J. I. Case Company,
Racine, Wisconsin

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel commercial propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb. Oil SAE 10W API service classification MM, MS and DG To motor 2.701 gal Drained from motor 1.801 gal Transmission and final-drive lubricant SAE No 90 Type MP Total time motor was operated 56½ hours.

ENGINE Make Case LPG Type 4 cylinder vertical Serial No 8130940 Crankshaft mounted lengthwise Rated rpm 1800 Lubrication pressure Bore and stroke 4" x 5" Compression ratio 8.0 to 1 Displacement 251 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable wood cellulose element Cooling medium temperature control thermostat.

CHASSIS Type tricycle Serial No 8130940 Tread width rear 57" to 88" front 9½" to 15½" Wheel base 92¼" 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 27½" Vertical distance above roadway 35" 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 1.60 second 2.29 third 3.13 fourth 4.53 fifth 5.89 sixth 8.40 seventh 11.51 eighth 16.64 reverse 2.06 and 7.58 (Torque Converter drive) first 0 to 1.9 second 0 to 2.1 third 0 to 2.9 fourth 0 to 4.1 fifth 0 to 5.4 sixth 0 to 7.7 seventh 0 to 9.0 eighth 0 to 14.0 reverse 0 to 1.9 and 0 7.0 Belt pulley not available Clutch multiple disc main hydraulic power-clutch operated by piston thru 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 540 rpm at 1450 engine rpm Steering power assisted Turning radius (on concrete surface with brake applied) right 100½" left 101" (on concrete surface without brake) right 103½" left 103" Turning space diameter (on concrete surface with brake applied) right 221" left 221½" (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. Only 12 gears, as selected by the 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 695.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
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 811-B LPG Test 695