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Test 679: Case Model 811-B

Nebraska Tractor Test Lab
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The Experiment Station
University of Nebraska College of Agriculture
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Department of Agricultural Engineering

NEBRASKA TRACTOR TEST NO. 679

Dates of test: October 27, 1958 to November 17, 1958
Manufacturer: J. I. CASE COMPANY, RACINE, WISCONSIN
Manufacturer's rating: Not Rated

CASE 811-B

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hr	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Temp. Deg. F.: Cooling medium	Temp. Deg. F.: Air wet bulb	Temp. Deg. F.: Air dry bulb	Barometer inches of mercury
TEST B—100% MAXIMUM POWER—TWO HOURS								
53.90	1800	5.153	10.46	0.588	175	55	71	29.277
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
51.45	1800	4.704	10.94	0.562	173	55	71	29.288
TEST D—RATED POWER—ONE HOUR								
47.38	1859	4.517	10.49	0.586	172	55	71	29.295
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
47.32	1862	4.538	10.43	0.590	172	55	71	
1.27	1954	2.035	0.62	9.850	165	53	68	
24.11	1885	3.133	7.70	0.799	167	52	68	
47.72	1798	4.455	10.71	0.574	171	55	70	
12.38	1928	2.596	4.77	1.289	166	52	66	
35.41	1848	3.743	9.46	0.650	168	53	69	..
28.04	1879	3.417	8.21	0.749	168	53	68	29.318

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hr	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Temp. Deg. F.: Cooling med	Temp. Deg. F.: Air wet bulb	Temp. Deg. F.: Air dry bulb	Barometer inches of mercury
TEST H—OBSERVED MAXIMUM HORSEPOWER—2 HOURS—4th Gear											
43.83	3990	4.12	1690	4.32	4.502	9.74	0.632	175	53	72	28.410
*41.47	4481	3.47	1786	4.76	4.645	8.93	0.689	164	36	42	28.880
TEST H—75% OF PULL AT OBSERVED MAXIMUM HORSEPOWER—10 HOURS 4th Gear											
37.73	3041	4.65	1895	3.46	4.246	8.89	0.692	168	44	53	29.114
**33.25	3298	3.78	1881	3.48	4.402	7.55	0.814	165	39	49	28.928
TEST H—50% OF PULL AT OBSERVED MAXIMUM HORSEPOWER—2 HOUR 4th Gear											
25.32	1978	4.80	1923	1.84	3.534	7.17	0.858	166	52	69	28.470
*23.31	2232	3.92	1926	2.20	3.656	6.38	0.964	168	40	52	28.895
TEST F—100% MAXIMUM POWER											
49.29	4293	4.31	1800	5.94	4th Gear			172	46	58	29.320
43.90	5051	3.26	1785	5.88	4th Gear (Torq. Conv.)			173	50	58	28.929
TEST G—OPERATING MAXIMUM POWER											
38.18	7207	1.99	1805	14.27	2nd Gear(part throttle)			168	45	53	29.350
45.53	5944	2.87	1798	9.16	3rd Gear			171	46	58	29.320
46.44	4028	4.32	1801	5.61	4th Gear			171	46	58	29.320
44.51	2894	5.77	1799	3.20	5th Gear			166	33	38	28.960
43.09	1941	8.33	1802	1.98	6th Gear			166	33	38	28.960
39.91	1303	11.49	1801	1.25	7th Gear			166	36	41	28.955
32.16	7167	1.68	1867	13.54	2nd Gear(Torq. Conv.)			170	45	53	29.350
40.90	6807	2.25	1782	9.41	3rd Gear(Torq. Conv.)			173	50	58	28.900
41.73	4503	3.48	1791	5.07	4th Gear(Torq. Conv.)			171	50	58	28.920
41.24	3933	3.93	1727	4.32	5th Gear(Torq. Conv.)			173	44	54	28.855
40.36	2629	5.76	1733	2.63	6th Gear(Torq. Conv.)			174	50	66	28.790
40.14	1906	7.90	1726	1.84	7th Gear(Torq. Conv.)			174	50	66	28.790
37.59	1459	9.66	1677	1.33	8th Gear(Torq. Conv.)			175	50	66	28.790
TEST J—OPERATING MAXIMUM POWER											
44.40	3833	4.34	1798	5.28	4th Gear			166	37	43	28.980
39.40	4828	3.05	1729	7.66	4th Gear(Torq. Conv.)			169	37	43	28.980

* Torque converter drive ** 2 Hours—Torque converter drive

TEST K—SPEED-PULL CHARACTERISTIC—4th Gear

Pounds Pull	3041	4028	4250	4400	4500	4600	4700
Horsepower	37.73	46.44	44.2	39.9	36.0	31.9	26.3
Miles Per Hour	4.65	4.32	3.9	3.4	3.0	2.6	2.1
Pounds Pull (Torq. Conv.)	3298	4503	4900	5450	6000	6700	7400
Horsepower (Torq. Conv.)	33.25	41.73	41.8	40.7	38.4	35.7	33.5
Miles Per Hour (Torq. Conv.)	3.78	3.48	3.2	2.8	2.4	2.0	1.7

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test I
Rear wheels Type	Cast iron	Cast iron
Liquid ballast	717 lb each	None
Added cast iron	441 lb each	None
Rear tires No. and size	Two 15.5-38	Two 15.5-38
Ply	6	6
Air pressure	18 lb	14 lb
Front wheels Type	Cast iron	Cast iron
Liquid ballast	None	None
Added cast iron	162 lb each	None
Front tires No. and size	Two 6.00-16	Two 6.00-16
Ply	6	6
Air pressure	24 lb	24 lb
Height of drawbar	20 inches	20 inches
Static weight Rear end	6990 lb	4675 lb
Front end	2245 lb	1922 lb
Total weight as tested with operator	9410 lb	6772 lb

FUEL, OIL, WATER and TIME **Fuel** Gasoline **Octane No.** ASTM 83.6 **Research** 90.4 (rating taken from oil company's typical inspection data) **Weight per gallon** 6.148 lb **Oil** SAE 20-20W **To motor** 2.732 gal **Drained from motor** 1.830 gal **Water used** 0.803 gal **Total time motor was operated** 79½ hours.

CHASSIS **Type** Tricycle **Serial No.** 8124770 **Tread width rear** 52" to 88" **front** 9⅛" and 15⅛" **Wheel base** 92¼" **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 first 2.06 second 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 first 0 to 1.9 second 0 to 7.0 **Belt pulley diam.** 10½" **Face** 7¼" **rpm** 1128 **Belt speed** 3105 fpm **Belt** flat **Length** 72' **Width** 7" **Thickness** 0.216" **Maximum slip** 0.98% **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 **Seat** upholstered seat with back rest cushioned by rubber in torsion **Brakes** double disc brakes operated by two foot pedals **Equalized** by locking pedals together **Power take-off** direct engine drive with independent clutch **Steering** aided by hydraulic power steering.

ENGINE **Make** Case **Type** 4 cylinder vertical **Serial No.** 8124770 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 4" x 5" **Rated rpm** 1800 **Compression ratio** 6.5 to 1 **Displacement** 251 cu. in. **Valves port diameter Inlet** 1.438" **Exhaust** 1.400" **Governor** variable speed centrifugal **Carburetor size** 1¼" **Ignition system** battery **Starting system** 12 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable wood cellulose element **Cooling medium temperature control** thermostat.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H respectively. Tests C, D, E, G, H, J and K were made with an operating setting of the carburetor (selected by the manufacturer) of 95.4% of maximum belt horsepower.

This tractor is equipped with a hydraulic torque converter which automatically loads the engine and controls the forward travel speed with changing drawbar load, the converter can also be locked out.

HORSEPOWER SUMMARY

	Drawbar: Direct Drive	Drawbar: Torque Converter	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	50.21	45.33	55.66
2. Observed maximum horsepower (tests F & B)	49.29	43.90	53.90
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	37.66	....	47.31

We, the undersigned, certify that this a true and correct report of official Tractor Test No. 679.

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

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissable include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The manual throttle control lever is set so that the throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The manual throttle control lever is set the same as for tests B and C allowing the governor to control engine speed at part throttle. Load is applied until 85% of maximum corrected horsepower found in test B is obtained.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E: Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each; rated load, no load, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. When rubber tires are used, all tests are made on the concrete test course. The same tires, wheels and weights are used for all tests except J. All crawler type tractors are tested on an earthen test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same for each test.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in the test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The manual throttle control lever is set so that the throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 15%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated horsepower the manual throttle control lever is set the same as in tests F and G allowing the governor to maintain engine speed at part throttle. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: This is intended to show the pull, horsepower, and travel speed of the tractor at rated horsepower (taken from test H); maximum horsepower (taken from test G); and at least four other conditions obtained by reducing travel speed in 10% increments by overload.