

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

1-1-1955

Test 566: Case Model 411

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 566: Case Model 411" (1955). *Nebraska Tractor Tests*. 1052.
<https://digitalcommons.unl.edu/tractormuseumlit/1052>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Department of Agricultural Engineering
Dates of test: October 17 to October 26, 1955
Manufacturer: J. I. CASE COMPANY, RACINE,
WISCONSIN
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 566

CASE 411

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury		
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air			
TEST B—100% MAXIMUM LOAD—TWO HOURS										
53.25	1499	4.491	11.86	0.517	0.00	179	58	29.050		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
50.49	1500	3.969	12.72	0.481	0.00	177	58	29.030		
TEST D—RATED LOAD—ONE HOUR										
46.70	1502	3.667	12.74	0.481	0.00	175	56	29.000		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
46.93	1503	3.664	12.81	0.478	...	175	54		
1.66	1605	1.269	1.31	4.681	...	173	65		
24.36	1559	2.439	9.99	0.613	...	175	58		
47.34	1420	3.649	12.97	0.472	...	178	61		
12.55	1595	1.822	6.89	0.889	...	174	64		
35.83	1531	3.042	11.78	0.520	...	175	60		
28.11	1535	2.647	10.62	0.577	0.00	175	60	28.970		
TORQUE (At Dynamometer)										
Eng rpm	1495	1406	1337	1262	1178	1114	1006	932	858	801
Lb-ft	291.9	303.5	303.8	304.0	305.0	303.6	303.6	304.2	306.6	309.6
Dyn rpm	855	804	764	721	672	637	575	533	490	457

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool- ing med	Air	
TEST H—RATED LOAD—TEN HOURS—5th Gear											
35.80	2764	4.86	1501	4.41	3.298	10.86	0.564	0.00	180	50	29.145
TEST F—100% MAXIMUM LOAD											
44.89	3489	4.83	1505	5.30	5th gear				182	72	28.780
TEST G—OPERATING MAXIMUM LOAD											
20.06	6147	1.22	1507	14.69	1st gear (part throttle) ...				179	69	28.870
27.46	6045	1.70	1501	16.49	2nd gear (part throttle) ...				178	71	28.870
37.30	6022	2.32	1503	16.92	3rd gear (part throttle) ...				181	74	28.870
41.80	4183	3.75	1505	7.50	4th gear				182	76	28.860
41.00	3208	4.79	1502	5.58	5th gear				184	77	28.860
40.16	2160	6.97	1503	3.80	6th gear				183	78	28.860
37.55	1456	9.67	1504	2.70	7th gear				183	81	28.850
32.98	875	14.13	1505	1.79	8th gear				184	81	28.840
TEST J—OPERATING MAXIMUM LOAD											
38.85	3249	4.48	1502	11.23	5th gear ..				184	81	28.820
TEST K—OPERATING MAXIMUM LOAD											
36.62	3321	4.14	1504	16.42	5th gear (part throttle)				180	78	28.820

TIRES, WHEELS AND WEIGHT

	Tests F, G & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	768 lb each	None	None
Added cast iron	875 lb each	None	None
Rear tires			
No. and size	Two 13-38	Two 13-38	Two 12-38
Ply	6	6	6
Air pressure	18 lb	14 lb	14 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 6.00-16	Two 6.00-16	Two 6.00-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	22 inches	23 inches	21½ inches
Static weight			
Rear end	7600 lb	4314 lb	4100 lb
Front end	1835 lb	1830 lb	1825 lb
Total weight as tested with operator	9610 lb	6319 lb	6100 lb

FUEL, OIL and TIME Gasoline Octane No. ASTM 80.3 Research 85.9 (rating taken from oil company's typical inspection data) **Weight per gallon** 6.125 lb **OIL** SAE 10 **To motor** 1.970 gal **Drained from motor** 1.685 gal **Total time motor was operated** 48½ hours.

CHASSIS Type Tricycle Serial No. 8067066 **Tread** width rear 52" to 88" front 9½" to 15½" **Wheel base** 91½" **Hydraulic control system** direct engine drive with independent throw out lever **Advertised speeds mph** first 1.36 second 1.94 third 2.66 fourth 3.85 fifth 4.84 sixth 6.89 seventh 9.44 eighth 13.66 reverse 1.75 and 6.22 **Belt pulley** diam 10½" face 7¼" rpm 1166 **Belt speed** 3205 fpm **Clutch** single plate dry disc clutch operated by foot pedal **Seat** weatherproof cushion seat which can be tilted upward, suspended by adjustable rubber in torsion **Brakes** double disc on differential shaft operated by two foot pedals **Equalized** brake pedals can be locked together **Power take-off** continuous running with independent clutch.

ENGINE Make J. I. CASE COMPANY Type 4 cylinder vertical Serial No. 8067066 **Crankshaft** mounted lengthwise **Head I Lubrication** pressure **Bore and stroke** 4" x 5" **Rated rpm** 1500 **Compression ratio** 6.5 to 1 **Displacement** 251 cu. in. **Port diameter valves** inlet 1 7/16" exhaust 1 3/8" **Governor** variable speed centrifugal **Carburetor** size 1¼" **Ignition system** battery **Starting system** 6 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable treated paper 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 94.9% of maximum belt horsepower.

Rapid variations in engine speed occurred intermittently during the early morning part of test H.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" Hg)	47.21	54.74
2. Observed maximum horsepower (tests F and B)	44.89	53.25
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	35.41	46.53

We, the undersigned, certify that this is a true and correct report of official tractor test No. 566.

L. F. LARSEN
Engineer-In-Charge

L. W. HURLBUT
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 permissible 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 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 held 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 throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

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, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ 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.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

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. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling

so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

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 this 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 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 16%. 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 load the throttle control lever is set to maintain rated engine speed. 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: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

