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Test 668: International 240 Utility

Nebraska Tractor Test Lab
University of Nebraska-Lincoln, tractortestlab@unl.edu

The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: September 6, 1958 to September 20, 1958
Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 668

INTERNATIONAL 240 UTILITY

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** 6.150 lb **Oil** SAE 10W-30 **To motor** 1.219 gal **Drained from motor** 0.945 gal **Water used** 0.149 gal **Total time motor was operated** 41½ hours.

CHASSIS Type Standard **Serial No.** 528 J **Tread width rear** 48" to 76" **front** 48" to 76" **Wheel base** 75" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 1.8 second 3.4 third 4.5 fourth 11.8 reverse 2.8 **Belt pulley diam.** 8" **face** 6" **rpm** 1652 **Belt speed** 3028 fpm **Belt** flat **Length** 71' **Width** 6" **Thickness** 0.215" **Maximum slip** 0.56% **Clutch** single plate dry disc operated by foot pedal **Seat** upholstered seat with back rest **Brakes** double disc operated by two foot pedals **Equalized** by locking pedals together **Power take-off** conventional type **Steering** power steering not available.

ENGINE Make International **Type** 4 cylinder vertical **Serial No.** 65157 **Crankshaft mounted** lengthwise **Head I Lubrication** pressure **Bore and stroke** 3⅛" x 4" **Rated rpm** 2000 **Compression ratio** 6.94 to 1 **Displacement** 122.7 cu. in. **Valves port diameter Inlet** 1¼" **Exhaust** 1 5/32" **Governer** variable speed centrifugal **Carburetor size** ⅞" **Ignition system** battery **Starting system** 6 volt battery **Air cleaner** oil washed wire screen **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 92.7% of maximum belt horsepower.

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								
30.82	2000	2.654	11.61	0.530	173	62	70	28.878
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
28.55	2000	2.340	12.20	0.504	168	62	70	28.855
TEST D—RATED POWER—ONE HOUR								
27.45	2061	2.309	11.89	0.517	167	61	70	28.848
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
27.48	2067	2.312	11.89	0.517	167	62	70	.....
2.08	2207	1.015	2.05	3.000	151	61	70	.....
14.32	2144	1.624	8.82	0.698	161	61	70	....
28.42	2001	2.341	12.14	0.507	170	62	71	.....
7.32	2183	1.278	5.73	1.074	154	61	70	.....
21.06	2104	1.976	10.66	0.577	165	62	71	.....
16.78	2118	1.758	9.54	0.644	161	61	70	28.847

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—RATED POWER—TEN HOURS—3rd Gear											
21.93	1709	4.81	2096	3.69	2.178	10.07	0.611	168	58	66	28.992
TEST F—100% MAXIMUM POWER											
28.07	2340	4.50	2002	5.71	3rd Gear.....			166	55	60	29.055
TEST G—OPERATING MAXIMUM POWER											
19.60	4384	1.68	1999	12.32	1st Gear (part throttle)			155	54	56	28.935
25.33	2832	3.35	1999	7.23	2nd Gear.....			161	55	60	29.055
25.27	2093	4.53	1999	4.98	3rd Gear.....			163	55	60	29.055
22.40	674	12.46	2007	1.23	4th Gear.....			159	55	60	29.055
TEST J—OPERATING MAXIMUM POWER											
25.28	2225	4.26	1999	11.94	3rd Gear.....			157	64	74	28.880

TEST K—SPEED-PULL CHARACTERISTIC							
Pounds Pull	1709	2093	2200	2250	2300	2450	2450
Horsepower	21.93	25.27	23.5	21.6	19.0	17.6	14.4
Miles Per Hour	4.81	4.53	4.0	3.6	3.1	2.7	2.2

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	508 lb each	None
Added cast iron	456 lb each	None
Rear tires		
No. and size	Two 12-24	Two 12-24
Ply	6	6
Air pressure	14 lb	14 lb
Front wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	None	None
Added cast iron	90 lb each	None
Front tires		
No. and size	Two 5.50-16	Two 5.50-16
Ply	4	4
Air pressure	28 lb	28 lb
Height of drawbar	20 inches	21½ inches
Static weight		
Rear end	4080 lb	2152 lb
Front end	1490 lb	1310 lb
Total weight as tested with operator	5745 lb	3637 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	28.91	32.24
2. Observed maximum horsepower (tests F and B)	28.07	30.82
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	21.68	27.40

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 668.

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.