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Test 574: International 300 Utility LPG

Nebraska Tractor Test Lab

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Department of Agricultural Engineering
Dates of test: May 16 to June 1, 1956
Manufacturer: INTERNATIONAL HARVESTER
COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Not rated

INTERNATIONAL 300 UTILITY LPG

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury			
		Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling medium	Air wet bulb	Air dry bulb				
TEST B—100% MAXIMUM LOAD—TWO HOURS											
42.68	2000	4.698	9.08	0.468	180	53	65	28.897			
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR											
40.77	2000	4.327	9.42	0.451	175	52	63	28.908			
TEST D—RATED LOAD—ONE HOUR											
37.76	1999	4.087	9.24	0.460	173	53	63	28.938			
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)											
37.76	1999	4.101	9.21	0.462	173	54	64	.....		
1.72	2133	1.567	1.10	3.872	162	56	65	.....		
19.85	2097	3.007	6.60	0.644	168	56	66	.....		
39.47	1936	4.207	9.38	0.453	176	56	67	.....		
10.03	2116	2.153	4.66	0.912	167	57	69	...			
29.15	2056	3.664	7.96	0.534	173	58	70	.....		
23.00	2056	3.116	7.38	0.576	170	56	67	28.948			
TEST L—OPERATING MAXIMUM TORQUE											
% of rated rpm (engine)		100	95	90	85	80	76	70	66	60	56
% of rated-speed torque		100	101	102	103	104	104	105	106	105	105

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
					Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
30.39	2193	5.20	2002	5.11	3.771	8.06	0.527	175	69	81	28.698
TEST F— 100% MAXIMUM LOAD											
38.32	2803	5.13	2005	6.52	3rd gear	.....	.....	169	63	68	28.815
TEST G—OPERATING MAXIMUM LOAD											
26.99	4467	2.27	1993	14.24	1st gear (part throttle)	.....	.....	170	66	76	28.785
36.11	3582	3.68	1999	9.26	2nd gear	.....	.....	164	63	68	28.820
37.14	2699	5.16	2000	6.24	3rd gear	.....	.....	162	62	67	28.810
37.37	2094	6.69	2007	5.06	4th gear	.....	.....	155	64	74	28.785
31.97	711	16.86	2003	1.44	5th gear	.....	.....	169	64	74	28.785
18.26	4473	1.53	2000	14.43	1st gear T.A.(prt-thrtl)	.....	.....	170	66	76	28.785
27.56	4413	2.34	2003	14.62	2nd gear T.A.(prt-thrtl)	.....	.....	170	65	75	28.785
34.41	3917	3.29	2003	10.90	3rd gear torque amp.	.....	.....	169	63	68	28.820
36.15	3098	4.38	2002	7.62	4th gear torque amp.	.....	.....	167	63	68	28.820
34.85	1172	11.15	1992	2.90	5th gear torque amp.	.....	.....	169	64	74	28.785
TEST J—OPERATING MAXIMUM LOAD											
33.03	2557	4.84	1991	12.03	3rd gear	.....	.....	169	71	81	28.785
TEST K—OPERATING MAXIMUM LOAD											
30.21	2566	4.41	2011	12.90	3rd gear part throttle	.....	.....	135	48	58	29.050

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	485 lb each	None	None
Added cast iron	560 lb each	None	None
Rear tires			
No. and size	Two 12-28	Two 12-28	Two 10-28
Ply	4	4	4
Air pressure	14 lb	14 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	32 lb	32 lb	32 lb
Height of drawbar	22 inches	23 inches	20 inches
Static weight			
Rear end	4856 lb	2766 lb	2670 lb
Front end	1718 lb	1712 lb	1690 lb
Total weight as tested with operator	6749 lb	4653 lb	4535 lb

FUEL, OIL, WATER and TIME Fuel Commercial Propane Weight per gallon 4.25 lb OIL SAE 20-20W To motor 1.462 gal Drained from motor 0.990 gal Water used None Total time motor was operated 40 hours.

CHASSIS Type Standard Serial No. 16154SJ Tread width rear 48" to 76" front 48" to 76" Wheel base 75" Hydraulic control system direct engine drive Advertised speeds mph first 2.6 second 4.0 third 5.4 fourth 6.9 fifth 16.7 reverse 3.2 Using torque amplifier (planetary underdrive) first 1.8 second 2.7 third 3.6 fourth 4.6 fifth 11.3 reverse 2.2 Belt pulley diam 11" face 7½" rpm 1082 Belt speed 3115 fpm Belt flat Length 72" Width 7" Thickness 0.216" Maximum slip 0.53% 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 together Power take-off direct engine drive with independent clutch.

ENGINE Make International Type 4 cylinder vertical Serial No. 36443 Crankshaft mounted Lengthwise Head 1 Lubrication pressure Bore and stroke 3 9/16" x 4¼" Rated rpm 2000 Compression ratio 8.75 to 1 Displacement 169 cu. in. Port diameter valves inlet 1 11/32" exhaust 1 7/32" 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 radial fin treated paper element Cooling medium temperature control thermostat.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data 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, K and L were made with an operating setting of the carburetor (selected by the manufacturer) of 95.3% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	40.09	44.40
2. Observed maximum horsepower (tests F and B)	38.32	42.68
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	30.07	37.74

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 574.

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 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 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.

TEST L: This torque test is run with wide open throttle. Loads are applied to reduce engine speed in approximately ten 5% increments. Rated speed equals 100%. The corresponding dynamometer torque is recorded as a per cent of torque at rated speed.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instru-

ment in the test car. When rubber tires are used, all tests are made on the concrete test course. All crawler type tractors are tested on a 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 highest wheels offered by the manufacturer are used.

