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4-21-1958

Test 648: Oliver 770

Nebraska Tractor Test Lab

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Department of Agricultural Engineering
Dates of test: April 21, 1958 to May 7, 1958
Manufacturer: THE OLIVER CORPORATION,
CHARLES CITY, IOWA
Manufacturer's rating: Not Rated

OLIVER 770 GASOLINE

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 POWER—TWO HOURS								
50.04	1750	4.339	11.53	0.528	171	54	70	29.280
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
47.59	1750	3.826	12.44	0.489	167	54	70	29.300
TEST D—RATED POWER—ONE HOUR								
43.89	1800	3.772	11.64	0.523	164	54	71	29.290
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
43.84	1805	3.762	11.65	0.522	164	54	73
1.66	1939	1.435	1.16	5.259	157	54	72
22.79	1864	2.490	9.15	0.665	161	55	73
47.17	1749	3.817	12.36	0.492	167	52	68
11.65	1904	1.908	6.11	0.997	157	52	67
33.68	1841	3.052	11.04	0.551	164	54	71
26.80	1850	2.744	9.77	0.623	161	53	70	29.270

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 POWER—TEN HOURS—4th Gear											
34.80	2375	5.49	1813	3.11	3.329	10.45	0.582	162	52	63	29.039
TEST F—100% MAXIMUM POWER											
42.75	3063	5.23	1750	4.33	4th Gear			169	63	72	28.720
TEST G—OPERATING MAXIMUM POWER											
35.11	7000	1.88	1745	14.02	1st Gear (part throttle)			164	63	72	28.730
39.19	5083	2.89	1748	7.99	2nd Gear			166	63	72	28.730
40.15	4197	3.59	1754	6.29	3rd Gear			168	63	72	28.720
40.98	2930	5.24	1750	4.33	4th Gear			169	63	72	28.720
39.40	2387	6.19	1749	3.42	5th Gear			164	66	72	28.710
36.62	1257	10.93	1750	2.14	6th Gear			168	66	72	28.710
TEST J—OPERATING MAXIMUM POWER											
41.54	2991	5.21	1750	5.38	4th Gear			163	50	61	29.080
TEST K—SPEED-PULL CHARACTERISTIC											
Pounds Pull		2375		2930	3050		3050	3100		3150	3150
Horsepower		34.80		40.98	38.2		34.2	30.6		26.0	21.8
Miles per Hour		5.49		5.24	4.7		4.2	3.7		3.1	2.6

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 6.084 lb Oil SAE10W To motor 1.455 gal Drained from motor 1.381 gal Water Used 0.111 gal Total time motor was operated 42 hours.

CHASSIS Type Tricycle Serial No. 61956-721 Tread width rear 60" to 92½" front 8½" and 12½" Wheel base 92¾" Hydraulic control system direct engine drive Advertised speeds mph first 2.11 second 3.01 third 3.68 fourth 5.25 fifth 6.18 sixth 10.8 reverse first 2.44 second 4.21 Belt pulley diam. 10½" face 7¼" rpm 1085 Belt speed 3100 fpm Belt flat Length 72' Width 7" Thickness 0.216" Maximum slip 0.57% Clutch single plate dry disc operated by foot pedal Seat pressed steel cushioned by rubber in torsion Brakes double disc operated by two foot pedals Equalized by connecting bar which serves as a master brake pedal Power take-off direct engine drive with independent hand clutch Steering aided by hydraulic power steering.

ENGINE Make Oliver Type 6 cylinder vertical Serial No. 1055057 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3½" x 3¾" Rated rpm 1750 Compression ratio 7.3 to 1 Displacement 216.48 cu. in. Valves port diameter Inlet 1¼" Exhaust 1½" Governor variable speed centrifugal Carburetor size 1" Ignition system battery Starting system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable treated paper cartridge 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 95.0% of maximum belt horsepower.

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Cast iron	Cast iron
Liquid ballast	458 lb each	None
Added cast iron	1160 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	207 lb each	None
Front tires		
No. and size	Two 6.00-16	Two 6.00-16
Ply	4	4
Air pressure	32 lb	32 lb
Height of drawbar	20½ inches	21 inches
Static weight		
Rear end	7010 lb	3774 lb
Front end	1960 lb	1546 lb
Total weight as tested with operator	9145 lb	5495 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	45.05	51.63
2. Observed maximum horsepower (tests F and B)	42.75	50.04
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	33.79	43.89

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 648.

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 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 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, $\frac{1}{2}$ 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.

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.

