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Test 647: Oliver 880

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

Department of Agricultural Engineering
Dates of test: April 21, 1958 to May 1, 1958
Manufacturer: THE OLIVER CORPORATION, CHARLES CITY, IOWA
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 647

OLIVER 880 GASOLINE

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** SAE 10W **To motor** 1.498 gal **Drained from motor** 1.410 gal **Water used** 0.060 gal **Total time motor was operated** 50 hours.

CHASSIS **Type** Tricycle **Serial No.** 60852-824 **Tread width rear** 60" to 92½" **front** 8⅛" and 12⅛" **Wheel base** 94" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 2.07 second 2.94 third 3.57 fourth 5.06 fifth 6.22 sixth 10.7 reverse first 2.32 second 4.00 **Belt pulley diam.** 10⅞" **face** 7¼" **rpm** 1085 **Belt speed** 3100 fpm **Belt** flat **Length** 72' **Width** 7" **Thickness** 0.216" **Maximum slip** 0.91% **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.** 1054145 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 3¾" x 4" **Rated rpm** 1750 **Compression ratio** 7.3 to 1 **Displacement** 265.07 cu. in. **Valves port diameter Inlet** 1⅜" **Exhaust** 1¼" **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 treated paper cartridge **Cooling medium temperature control** thermostat.

REPAIRS AND ADJUSTMENTS Two fan pulleys were replaced, one during Test A and one during Test E.

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 92.5% of maximum belt horsepower.

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								
61.86	1750	5.391	11.47	0.530	180	54	70	29.100
TEST C—OPERATING MAXIMUM POWER—ONE HOUR								
57.43	1750	4.709	12.20	0.499	167	53	68	29.140
TEST D—RATED POWER—ONE HOUR								
54.68	1828	4.530	12.07	0.504	170	56	74	29.195
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
54.67	1829	4.536	12.05	0.505	170	56	73	.....
1.75	1904	1.741	1.01	6.051	156	56	74	.....
28.27	1883	3.077	9.19	0.662	162	57	77	.....
58.20	1752	4.719	12.33	0.493	169	54	69	.....
14.14	1881	2.352	6.01	1.012	157	55	72	.....
41.52	1848	3.807	10.91	0.558	164	56	75	.....
33.09	1849	3.372	9.81	0.620	163	56	73	29.200

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											
42.89	3103	5.18	1855	3.52	4.202	10.21	0.596	156	44	52	28.907
TEST F—100% MAXIMUM POWER											
54.92	4279	4.79	1752	5.62	4th Gear.....			164	47	56	29.080
TEST G—OPERATING MAXIMUM POWER											
38.22	7998	1.79	1756	14.11	1st Gear (part throttle)			148	46	54	29.040
48.65	7110	2.57	1749	12.94	2nd Gear.....			154	45	52	29.160
50.02	5753	3.26	1746	8.53	3rd Gear.....			160	46	53	29.125
51.42	4025	4.79	1752	5.62	4th Gear.....			161	47	55	29.125
51.30	3244	5.93	1745	4.61	5th Gear.....			158	46	53	29.140
48.00	1728	10.42	1750	2.87	6th Gear.....			157	45	52	29.160
TEST J—OPERATING MAXIMUM POWER											
51.44	4184	4.61	1753	10.90	4th Gear.....			164	52	64	28.950

TEST K—SPEED-PULL CHARACTERISTIC

Pounds Pull	3103	4025	4200	4300	4350	4400	4550	4500
Horsepower	42.89	51.42	48.2	43.6	38.3	32.9	29.1	22.8
Miles Per Hour	5.18	4.79	4.3	3.8	3.3	2.8	2.4	1.9

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Cast iron	Cast iron
Liquid ballast	641 lb each	None
Added cast iron	1595 lb each	None
Rear tires		
No. and size	Two 14-34	Two 14-34
Ply	6	6
Air pressure	16 lb	16 lb
Front wheels		
Type	Cast iron	Cast iron
Liquid ballast	79 lb each	None
Added cast iron	269 lb each	None
Front tires		
No. and size	Two 6.50-16	Two 6.50-16
Ply	6	6
Air pressure	36 lb	36 lb
Height of drawbar	21½ inches	23 inches
Static weight		
Rear end	8320 lb	3848 lb
Front end	2304 lb	1608 lb
Total weight as tested with operator	10,799 lb	5631 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	56.29	64.21
2. Observed maximum horsepower (tests F and B)	54.92	61.86
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	42.22	54.58

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 647.

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 tratcor 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.