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Test 650: Oliver 880 Diesel

Nebraska Tractor Test Lab
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The Experiment Station
University of Nebraska College of Agriculture
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Department of Agricultural Engineering
Dates of test: April 23, 1958 to May 7, 1958
Manufacturer: THE OLIVER CORPORATION, CHARLES CITY, IOWA
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 650

OLIVER 880 DIESEL

FUEL, OIL, WATER and TIME **Fuel** Diesel **Cetane** No. ASTM 52 (rating taken from oil company's typical inspection data) **Weight per gallon** 7.012 lb **Oil** SAE 10W **To motor** 1.502 gal **Drained from motor** 1.150 gal **Water used** 0.056 gal **Total time motor was operated** 41½ hours.

CHASSIS **Type** Tricycle **Serial No.** 62475-822 **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** 0.69% **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 Diesel **Type** 6 cylinder vertical **Serial No.** 1051012 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 3¾" x 4" **Rated rpm** 1750 **Compression ratio** 16 to 1 **Displacement** 265.07 cu. in. **Valves port diameter Inlet** 1⅜" **Exhaust** 1 1/32" **Governor** variable speed centrifugal **Starting system** 12 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable treated paper cartridge **Fuel filter** one sediment bowl with metal edge type strainer, one replaceable treated paper element and one replacable treated paper sealed filter **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 fuel pump set to develop approximately 61.5 corrected 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 the same setting.

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
TESTS B & C—100% MAXIMUM POWER—TWO HOURS								
59.48	1750	4.032	14.75	0.475	166	52	70	29.050
TEST D—RATED POWER—ONE HOUR								
52.63	1868	3.662	14.37	0.488	160	52	70	29.093
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
52.80	1872	3.667	14.40	0.487	160	52	70	.....
1.78	1983	1.420	1.25	5.596	146	50	67	.....
27.42	1945	2.392	11.46	0.612	152	51	68	.....
39.80	1753	4.077	14.67	0.478	165	52	71	.....
13.80	1949	1.848	7.47	0.939	150	51	68	.....
40.64	1913	3.008	13.51	0.519	156	51	68	.....
32.71	1902	2.735	11.96	0.586	155	51	69	29.103

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—4th Gear											
41.74	3014	5.19	1862	3.02	3.275	12.75	0.550	163	57	72	28.899
TESTS F& G—100% MAXIMUM POWER											
38.92	8118	1.80	1748	12.64	1st Gear (part throttle)			159	56	71	28.870
51.89	7403	2.63	1748	10.13	2nd Gear			164	56	71	28.870
52.17	5967	3.28	1748	7.54	3rd Gear			169	55	68	28.870
52.64	4124	4.79	1749	4.79	4th Gear			168	55	68	28.870
52.65	3325	5.94	1742	3.70	5th Gear			166	55	68	28.870
50.92	1818	10.50	1762	1.94	6th Gear			165	55	68	28.870
TEST J—OPERATING MAXIMUM POWER											
50.88	4268	4.47	1750	13.83	4th Gear (part throttle)			155	36	44	29.180

TEST K—SPEED-PULL CHARACTERISTIC

Pounds Pull	3014	4124	4600	4750	4800	4650	4500
Horsepower	41.74	52.64	52.7	48.1	42.2	34.7	31.2
Miles per Hour	5.19	4.79	4.3	3.8	3.3	2.8	2.6

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Cast iron	Cast iron
Liquid ballast	620 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	71 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	23½ inches
Static weight		
Rear end	8320 lb	3890 lb
Front end	2350 lb	1670 lb
Total weight as tested with operator	10,845 lb	5735 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	54.97	61.85
2. Observed maximum horsepower (tests F and B)	52.64	59.48
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	41.23	52.57

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 650.

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.