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Test 660: Oliver 950 Diesel

Nebraska Tractor Test Lab

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Department of Agricultural Engineering
Dates of test: July 7 to 17, 1958
Manufacturer: THE OLIVER CORPORATION,
CHARLES CITY, IOWA
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 660

OLIVER 950 DIESEL

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	
TESTS B & C—100% MAXIMUM POWER—TWO HOURS								
67.23	1800	4.802	14.00	0.500	165	68	72	28.932
TEST D—RATED POWER—ONE HOUR								
59.75	1945	4.444	13.45	0.521	155	71	76	28.980
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
59.85	1941	4.467	13.40	0.522	157	72	78
1.62	2012	1.363	1.19	5.889	127	71	75
30.25	1961	2.675	11.31	0.619	136	71	76
67.01	1800	4.806	13.94	0.502	163	70	74
15.41	1994	1.993	7.73	0.905	129	70	73
44.86	1943	3.447	13.01	0.538	140	72	76
36.50	1942	3.125	11.68	0.599	142	71	75	29.010

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—3rd Gear											
48.76	4062	4.50	1920	2.83	3.958	12.32	0.568	153	74	84	28.649
TESTS F & G—100% MAXIMUM POWER											
57.79	10011	2.16	1797	11.26	1st Gear			151	67	72	28.870
59.90	7516	2.99	1794	6.62	2nd Gear			155	68	72	28.860
61.53	5563	4.15	1803	4.66	3rd Gear			154	70	75	28.870
60.66	4124	5.52	1800	3.27	4th Gear			153	70	75	28.870
60.02	3224	6.98	1797	2.56	5th Gear			147	70	78	28.875
54.60	1627	12.58	1804	1.39	6th Gear			155	70	78	28.875
TEST J—OPERATING MAXIMUM POWER											
61.45	5547	4.15	1803	5.01	3rd Gear			160	63	73	28.910
TEST K—SPEED-PULL CHARACTERISTIC											
Pounds Pull		4062	5563	6000	6100	6030		5900	5500		
Horsepower		48.76	61.53	59.2	53.7	46.4		39.3	30.8		
Miles per Hour		4.50	4.15	3.7	3.3	2.9		2.5	2.1		

FUEL, OIL, WATER and TIME Fuel Diesel Cetane No. 52 (rating taken from oil company's typical inspection data) **Weight per gallon** 6.998 lb **Oil** SAE 10W **To motor** 1.878 gal **Drained from motor** 0.933 gal **Water used** 0.110 gal **Total time motor was operated** 41 hours.

CHASSIS Type Standard Serial No. 530272 **Tread** width rear 62" front 59¹³/₁₆" **Wheel base** 79⁷/₈" **Hydraulic control system** direct engine drive with throw out control **Advertised speeds mph** first 2.435 second 3.200 third 4.324 fourth 5.683 fifth 7.144 sixth 12.688 reverse first 2.666 second 4.736 **Belt pulley diam.** 12¹/₄" **face** 9" **rpm** 1021 **Belt speed** 3277fpm **Belt flat Length** 75' **Width** 8" **Thickness** 0.216" **Maximum slip** 0.87% **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 master brake pedal **Power take-off** direct drive with independent hand clutch **Steering** aided by hydraulic power steering.

ENGINE Make Oliver Diesel **Type** 6 cylinder vertical **Serial No.** 1063693 **Crankshaft** mounted lengthwise **Head I Lubrication** pressure **Bore and stroke** 4" x 4" **Rated rpm** 1800 **Compression ratio** 16.0 to 1 **Displacement** 302 cu. in. **Valves** port diameter **Inlet** 1.375" **Exhaust** 1.172" **Governor** variable speed centrifugal **Starting system** 12 volt (two 6-volt batteries) **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable pleated paper element **Fuel filter** two replaceable treated paper elements **Cooling medium temperature control** thermostat.

REPAIRS AND ADJUSTMENTS During Test "H" the flexible oil line leading to the engine oil filter started to leak. This was replaced with a new line and test continued.

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 70 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.

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Cast iron	Cast iron
Liquid ballast	1,485 lb each	None
Added cast iron	None	None
Rear tires		
No. and size	Two 18-26	Two 18-26
Ply	8	8
Air pressure	16 lb	16 lb
Front wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	117 lb each	None
Added cast iron	None	None
Front tires		
No. and size	Two 7.50-18	Two 7.50-18
Ply	6	6
Air pressure	28 lb	28 lb
Height of drawbar	17 inches	18 inches
Static weight		
Rear end	10,730 lb	7,760 lb
Front end	2,715 lb	2,480 lb
Total weight as tested with operator	13,620 lb	10,415 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	64.68	70.32
2. Observed maximum horsepower (tests F and B)	61.53	67.23
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	48.51	59.77

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 660.

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.

