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## Test 543: Oliver Super 77 Diesel

Nebraska Tractor Test Lab

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Department of Agricultural Engineering  
Dates of test: May 16 to May 26, 1955  
Manufacturer: THE OLIVER CORPORATION,  
CHARLES CITY, IOWA  
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 543

OLIVER SUPER 77 DIESEL

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury		
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air			
TESTS B AND C—100% MAXIMUM LOAD—TWO HOURS										
44.05	1600	2.981	14.78	0.475	0.00	173	68	28.910		
TEST D—RATED LOAD—ONE HOUR										
39.14	1600	2.594	15.09	0.466	0.00	163	68	28.910		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
39.21	1603	2.592	15.13	0.464	...	164	70	.....		
1.55	1692	0.705	2.20	3.194	...	129	72	.....		
20.16	1645	1.580	12.76	0.551	...	142	69	.....		
39.92	1537	2.656	15.03	0.467	...	170	71	.....		
10.31	1660	1.085	9.50	0.739	...	137	70	.....		
29.87	1627	2.058	14.51	0.484	...	161	73	.....		
23.50	1627	1.779	13.21	0.532	0.00	150	71	28.910		
TORQUE (At Dynamometer)										
Eng rpm	1601	1500	1398	1298	1215	1096	1000	895	800	698
Lb-ft	272.3	282.8	292.8	294.5	294.9	292.3	281.8	275.5	257.3	235.4
Dyn rpm	840	786	732	680	636	574	524	453	418	366

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool- ing med	Air	
TEST H—RATED LOAD—TEN HOURS—4th Gear											
30.20	2006	5.65	1600	4.23	2.286	13.21	0.532	0.00	171	65	28.765
TESTS F AND G—100% MAXIMUM LOAD											
32.81	5659	2.17	1601	15.74	1st gear (part throttle) . . . . .				175	71	28.690
37.04	4570	3.04	1600	10.17	2nd gear. . . . .				181	72	28.700
37.65	3381	4.18	1599	6.94	3rd gear. . . . .				185	73	28.700
38.13	2562	5.58	1599	5.26	4th gear. . . . .				180	68	28.710
38.00	2158	6.60	1600	4.37	5th gear. . . . .				181	68	28.680
35.34	1130	11.73	1601	2.60	6th gear . . . . .				181	68	28.680
TEST J—OPERATING MAXIMUM LOAD											
36.78	2515	5.48	1601	7.61	4th gear. . . . .				187	74	28.210
TEST K—OPERATING MAXIMUM LOAD											
36.17	2597	5.22	1600	8.68	4th gear. . . . .				185	74	28.240

TIRES, WHEELS AND WEIGHT

Tests F, G, & H		Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	561 lb each	None	None
Added cast iron	1120 lb each	None	None
Rear tires			
No. and size	Two 12-38	Two 12-38	Two 11-38
Ply	6	6	4
Air pressure	20 lb	12 lb	12 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
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	28 lb	28 lb	28 lb
Height of drawbar	21 inches	22 inches	20½ inches
Static weight			
Rear end	6939 lb	3578 lb	3507 lb
Front end	1496 lb	1500 lb	1487 lb
Total weight as tested with operator	8610 lb	5253 lb	5169 lb

FUEL, OIL and TIME Diesel fuel Cetane No. 50 (rating taken from oil company's typical inspection data); weight per gallon 7.025 lb Oil SAE 10 to motor 1.242 gal drained from motor 0.866 gal Total time motor was operated 45 hours.

CHASSIS Type Tricycle Serial No. 15361-702 Tread width rear 60" to 92½" front 8½" to 12½" Wheel base 90¾" Hydraulic control system direct engine drive Advertised speeds mph first 2½ second 3¼ third 4¼ fourth 5½ fifth 6½ sixth 11½ reverse 2½ and 4½ Belt pulley diam 11½" face 7¼" rpm 992 Belt speed 3080 fpm Clutch single plate dry disc operated by foot pedal Seat pressed steel cushioned by rubber in torsion Brakes double disc brakes operated by two foot pedals Equalized by connecting bar which serves as master brake pedal Power take-off direct drive with independent hand clutch.

ENGINE Make Oliver Diesel Type 6 cylinder vertical Serial No. 965948 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3½" x 3¾" Rated rpm 1600 Compression ratio 16.0 to 1 Displacement 216 cu in Port diameter valves inlet 1½" exhaust 1" Governor variable speed centrifugal Starting system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter two replaceable waste packed filters Fuel filter one permanent edge type fuel strainer, one replaceable filter element and one replaceable 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 46 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 & K were made with the same setting (selected by the manufacturer).

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	40.04	45.94
2. Observed maximum horsepower (tests F and B)	38.13	44.05
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	30.03	39.05

We, the undersigned, certify that this is a true and correct report of official tractor test No. 543.

L. F. LARSEN  
Engineer-In-Charge

C. W. SMITH  
L. W. HURLBUT  
F. D. YUNG  
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 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 held 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.

**Torque, lb-ft at dynamometer,** is obtained with wide open throttle and sufficient load is applied to give several readings.

### 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. All tests are made on the same 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 lightest wheels offered by the manufacturer are used.

