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## Test 542: Oliver Super 77

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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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: May 18 to May 24, 1955  
Manufacturer: THE OLIVER CORPORATION,  
CHARLES CITY, IOWA  
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 542

OLIVER SUPER 77 HC

**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			
TEST B—100% MAXIMUM LOAD—TWO HOURS										
43.98	1600	4.060	10.83	0.559	0.00	188	73	28.851		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
41.48	1600	3.553	11.67	0.518	0.00	184	68	28.850		
TEST D—RATED LOAD—ONE HOUR										
39.30	1600	3.480	11.29	0.536	0.00	182	71	28.848		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
39.35	1602	3.485	11.29	0.536	...	182	70	.....		
1.51	1719	1.299	1.16	5.205	...	171	70	.....		
20.60	1672	2.350	8.77	0.690	...	177	71	.....		
40.36	1572	3.480	11.60	0.522	...	185	71	.....		
10.47	1697	1.765	5.93	1.020	...	174	71	.....		
30.40	1647	2.865	10.61	0.570	...	181	70	.....		
23.78	1651	2.540	9.36	0.647	0.00	178	70	28.844		
TORQUE (At Dynamometer)										
Eng rpm	1597	1498	1396	1297	1199	1096	997	899	796	704
Lb-ft	256.6	260.6	261.5	263.2	266.5	266.5	266.7	269.9	266.4	261.6
Dyn rpm	836	784	730	679	628	573	522	470	416	369

**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		Cooling med	Air	
TEST H—RATED LOAD—TEN HOURS—4th Gear											
30.24	2006	5.65	1599	4.32	3.088	9.79	0.618	0.00	183	79	28.767
TEST F—100% MAXIMUM LOAD											
37.61	2516	5.61	1602	5.35	4th gear . . . . .				189	87	28.740
TEST G—OPERATING MAXIMUM LOAD											
30.67	5366	2.14	1603	17.10	1st gear (part throttle) . . . . .				188	88	28.770
34.89	4253	3.08	1602	9.52	2nd gear . . . . .				188	86	28.770
35.60	3174	4.21	1603	6.75	3rd gear . . . . .				182	73	28.660
35.71	2378	5.63	1601	4.80	4th gear . . . . .				189	82	28.790
35.11	1987	6.63	1601	4.38	5th gear . . . . .				188	88	28.750
32.69	1039	11.80	1601	2.39	6th gear . . . . .				188	85	28.750
TEST J—OPERATING MAXIMUM LOAD											
35.65	2405	5.56	1601	6.48	4th gear . . . . .				183	74	28.710
TEST K—OPERATING MAXIMUM LOAD											
35.35	2514	5.27	1600	8.12	4th gear . . . . .				173	65	28.720

**TIRES, WHEELS AND WEIGHT**

	Tests F, G, & H	Test J	Test K
<b>Rear wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	586 lb each	None	None
Added cast iron	1120 lb each	None	None
<b>Rear tires</b>			
No. and size	Two 12-38	Two 12-38	Two 11-38
Ply	6	6	4
Air pressure	20 lb	12 lb	12 lb
<b>Front wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
<b>Front tires</b>			
No. and size	Two 6.00-16	Two 6.00-16	Two 6.00-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
<b>Height of drawbar</b>	21 inches	22 inches	20½ inches
<b>Static weight</b>			
Rear end	6934 lb	3522 lb	3440 lb
Front end	1455 lb	1434 lb	1434 lb
<b>Total weight as tested with operator</b>	8564 lb	5131 lb	5049 lb

**FUEL, OIL and TIME** Gasoline Octane No. ASTM 80.8 Research 85.9 (rating taken from oil company's typical inspection data): weight per gallon 6.052 lb Oil SAE 10 to motor 1.235 gal drained from motor 1.168 gal Total time motor was operated 47½ hours.

**CHASSIS** Type Tricycle Serial No. 8871-702 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 Type 6 cylinder vertical Serial No. 957685 Crankshaft mounted lengthwise Head I Compression ratio 7.00 to 1 Displacement 216 cu in Lubrication pressure Bore and stroke 3½" x 3¾" Rated rpm 1600 Port diameter valves inlet 1¼" exhaust 1½" Governor variable speed centrifugal Carburetor size 1" Ignition system battery Starting system 6 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable waste packed 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 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 & K were made with an operating setting of the carburetor (selected by the manufacturer) of 93.9% of maximum belt horsepower.

**HORSEPOWER SUMMARY**

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	40.16	46.18
2. Observed maximum horsepower (tests F and B)	37.61	43.98
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)	30.12	39.25

We, the undersigned, certify that this is a true and correct report of official tractor test No. 542.

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.

