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4-23-1958

## Test 649: Oliver 770 Diesel

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: April 23, 1958 to May 7, 1958  
Manufacturer: THE OLIVER CORPORATION,  
CHARLES CITY, IOWA  
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 649

OLIVER 770 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								
48.80	1750	3.411	14.31	0.490	180	52	70	29.070
TEST D—RATED POWER—ONE HOUR								
43.00	1792	3.045	14.12	0.497	170	53	71	29.083
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
43.03	1794	3.046	14.13	0.496	170	53	72	.....
1.46	1895	0.988	1.48	4.747	150	51	68	.....
21.86	1819	1.900	11.51	0.609	161	52	70	.....
48.59	1747	3.350	14.50	0.483	179	53	72	.....
11.18	1857	1.489	7.51	0.934	158	53	69	.....
32.48	1803	2.409	13.48	0.520	165	53	70	.....
26.43	1819	2.197	12.03	0.583	164	52	70	29.076

**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											
34.92	2442	5.36	1767	2.55	2.717	12.85	0.546	164	52	61	28.800
TESTS F & G—100% MAXIMUM POWER											
35.32	7137	1.86	1747	14.87	1st Gear (part throttle)			165	53	68	29.070
43.35	5610	2.90	1746	7.27	2nd Gear . . . . .			172	53	68	29.070
44.01	4571	3.61	1756	5.42	3rd Gear . . . . .			172	53	68	29.060
44.38	3163	5.26	1750	3.57	4th Gear . . . . .			173	53	68	29.060
43.97	2658	6.20	1749	2.79	5th Gear . . . . .			172	56	69	29.040
41.53	1424	10.94	1750	1.50	6th Gear . . . . .			171	56	69	29.040
TEST J—OPERATING MAXIMUM POWER											
44.26	3207	5.18	1748	6.09	4th Gear . . . . .			173	55	67	28.940
TEST K—SPEED-PULL CHARACTERISTIC											
Pounds Pull		2442	3163	3450	3450	3350	3200				
Horsepower		34.92	44.38	43.2	38.6	33.1	26.5				
Miles Per Hour		5.36	5.26	4.7	4.2	3.7	3.1				

**TIRES, WHEELS AND WEIGHT**

	Tests F, G, H & K	Test J
<b>Rear wheels</b>		
Type	Cast iron	Cast iron
Liquid ballast	435 lb each	None
Added cast iron	1160 lb each	None
<b>Rear tires</b>		
No. and size	Two 15.5-38	Two 15.5-38
Ply	6	6
Air pressure	18 lb	14 lb
<b>Front wheels</b>		
Type	Cast iron	Cast iron
Liquid ballast	64 lb each	None
Added cast iron	116 lb each	None
<b>Front tires</b>		
No. and size	Two 6.00-16	Two 6.00-16
Ply	6	6
Air pressure	32 lb	32 lb
<b>Height of drawbar</b>	20 inches	21 inches
<b>Static weight</b>		
Rear end	6980 lb	3790 lb
Front end	1960 lb	1600 lb
<b>Total weight as tested with operator</b>	9115 lb	5565 lb

**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 1.500 gal Drained from motor 1.258 gal Water used 0.085 gal Total time motor was operated 44 hours.

**CHASSIS** Type Tricycle Serial No. 61957-721 Tread width rear 60" to 92½" front 8½" and 12½" Wheel base 92¾" Hydraulic control system direct engine drive Advertised speeds mph first 2.11 second 3.01 third 3.68 fourth 5.25 fifth 6.18 sixth 10.8 reverse first 2.44 second 4.21 Belt pulley diam. 10½" face 7¼" rpm 1085 Belt speed 3100 fpm Belt flat Length 72' Width 7" Thickness 0.216" Maximum slip 0.54% 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. 1055620 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3½" x 3¾" Rated rpm 1750 Compression ratio 16.0 to 1 Displacement 216 cu. in. Valves port diameter Inlet 1½" Exhaust 1" 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 replaceable 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 50.5 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.

**HORSEPOWER SUMMARY**

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	46.04	50.71
2. Observed maximum horsepower (tests F and B)	44.38	48.80
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	34.53	43.10

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 649.

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.

