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Test 527: Oliver Super 88 Diesel

Nebraska Tractor Test Lab

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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: October 4 to October 13, 1954
Manufacturer: THE OLIVER CORPORATION,
CHARLES CITY, IOWA
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 527

OLIVER SUPER 88 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 & C—100% MAXIMUM LOAD—TWO HOURS										
* 54.88	1600	3.603	15.23	0.463	0.00	164	53	29.322		
TEST D—RATED LOAD—TWO HOURS										
47.70	1608	3.104	15.37	0.459	0.00	157	51	29.300		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
48.00	1611	3.107	15.45	0.456	...	156	51	.....	
2.00	1721	0.855	2.34	3.015	...	140	52	.....	
24.52	1651	1.856	13.21	0.533	...	148	52	.....	
52.99	1506	3.507	15.11	0.467	...	164	54	.....	
12.36	1660	1.315	9.40	0.750	...	143	51	.....	
36.38	1635	2.485	14.64	0.482	...	152	53	.....	
29.38	1630	2.188	13.43	0.525	0.00	151	52	29.300		
TORQUE (At Dynamometer)										
Eng rpm.	1589	1490	1391	1297	1203	1101	992	894	794	698
Lb-ft.	343.2	349.3	355.3	363.8	364.4	367.5	360.3	356.1	333.2	315.0
Dyn rpm.	821	769	715	665	617	562	506	454	407	358

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	
TESTS F & G—100% MAXIMUM LOAD											
37.26	6287	2.22	1601	15.69	.....	Not Recorded	.....	157	62	28.625
45.81	5700	3.01	1603	11.72	.....	Not Recorded	.....	170	68	28.610
47.20	4220	4.19	1602	7.22	.....	Not Recorded	.....	167	65	28.620
49.32	3338	5.54	1602	5.43	.....	Not Recorded	.....	166	65	28.610
49.17	2677	6.89	1600	4.30	.....	Not Recorded	.....	173	67	28.610
45.91	1427	12.06	1597	2.33	.....	Not Recorded	.....	176	68	28.620
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
37.93	3319	4.29	1601	5.23	2.829	13.41	0.526	0.00	156	65	28.595
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
37.72	3673	3.85	1607	15.68	.....	Not Recorded	.....	141	54	29.050
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
32.66	3287	3.73	1607	15.16	.....	Not Recorded	.....	143	56	29.010

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	800 lb each	None	None
Added cast iron	1120 lb each	None	None
Rear tires			
No. and size	Two 13-38	Two 13-38	Two 12-38
Ply	6	6	6
Air pressure	18 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 6.00-16	Two 6.00-16	Two 6.00-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	21½ inches	22 inches	21 inches
Static weight			
Rear end	7670 lb	3829 lb	3792 lb
Front end	1620 lb	1602 lb	1606 lb
Total weight as tested with operator	9465 lb	5606 lb	5573 lb

FUEL, OIL and TIME Diesel Fuel Cetane No. 50 (rating taken from oil company's typical inspection data): weight per gallon 7.049 lb OIL SAE 10; to motor 1.550 gal; drained from motor 1.164 gal Total time motor was operated 37 hours.

CHASSIS Type Tricycle Serial No. 6671-800 Tread width rear 60" to 92½" front 8½, 10½ and 12½ inches Wheel base 93¾" Hydraulic control system direct engine drive Advertised speeds mph first 2.49 second 3.22 third 4.28 fourth 5.55 fifth 6.82 sixth 11.75 reverse 2.55 & 4.38 Belt pulley diam. 11½" face 7¼" rpm 992 Belt speed 3080 fpm Clutch single plate dry disc operated by foot pedal Seat pressed steel and cushioned by rubber in torsion Brakes disc brakes operated by two foot pedals Equalized by a connecting bar which serves as a master brake pedal Power take-off direct engine drive with independent hand clutch.

ENGINE Make Oliver Diesel Type 6 cylinder vertical Serial No. 949310 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3¾" x 4" Rated rpm 1600 Compression ratio 15.5 to 1 Displacement 265 cu. in Port diameter valves inlet 1½" exhaust 1 11/64" Governor variable speed centrifugal Starting system 12 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable waste packed cartridge Cooling medium temperature control thermostat Fuel filters two sediment bowls with strainers, one replaceable treated paper element and one replaceable treated paper sealed filter.

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 approx. 55.5 correct 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.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" HG)	49.58	55.63
2. Observed maximum horsepower (tests F and B)	47.20	54.88
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)	37.19	47.29

We, the undersigned, certify that this is a true and correct report of official tractor test No. 527.

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.

