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Test 556: Oliver Super 99

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The Experiment Station
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NEBRASKA TRACTOR TEST NO. 556

OLIVER SUPER 99 GM

Department of Agricultural Engineering
Dates of test: August 22 to August 27, 1955
Manufacturer: THE OLIVER CORPORATION, SOUTH BEND, INDIANA
Manufacturer's rating: Approximately 80 belt horsepower (corrected to standard conditions)

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hour	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TESTS B AND C—100% MAXIMUM LOAD—TWO HOURS								
78.74	1675	5.928	13.28	0.529	0.00	186	82	28.817
TEST D—RATED LOAD—ONE HOUR								
71.55	1675	5.198	13.76	0.510	0.00	173	80	28.800
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
71.80	1675	5.192	13.83	0.508	...	173	80	.....
1.74	1732	1.709	1.02	6.897	...	162	80	.....
36.39	1705	3.226	11.28	0.622	...	165	79	.....
77.89	1627	5.838	13.34	0.526	...	180	79	.....
18.46	1719	2.462	7.50	0.936	...	163	78	.....
54.03	1689	4.111	13.14	0.534	...	167	78	.....
43.39	1691	3.756	11.55	0.608	0.00	168	79	28.800

TORQUE (At Dynamometer)

Eng rpm	1678	1588	1493	1400	1309	1220	1133	1041	948	853
Lb-ft	488.8	495.1	496.7	500.0	504.2	493.2	482.1	480.9	487.4	491.9
Dyn rpm	864	815	769	721	674	627	583	536	488	439

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
58.69	5299	4.15	1675	6.10	4.740	12.38	0.567	0.00	179	92	28.778
TESTS F & G—100% MAXIMUM LOAD											
55.75	10075	2.08	1671	16.47	1st gear (part throttle)				176	91	28.860
69.66	8941	2.92	1677	10.79	2nd gear				176	80	28.860
73.31	6661	4.13	1676	6.92	3rd gear				176	80	28.860
71.75	4887	5.51	1674	5.16	4th gear				181	93	28.860
70.58	3773	7.01	1675	3.91	5th gear				183	94	28.850
64.58	1901	12.74	1677	1.91	6th gear				186	96	28.840
TEST J—OPERATING MAXIMUM LOAD											
64.06	6465	3.72	1678	16.12	3rd gear (part throttle)				174	84	28.790
TEST K—OPERATING MAXIMUM LOAD											
46.02	4420	3.90	1676	16.81	3rd gear (part throttle)				172	94	28.760

TIRES, WHEELS AND WEIGHT

	Tests F, G & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	1795 lbs each	None	None
Added cast iron	660 lb each	None	None
Rear tires			
No. and size	Two 18-26	Two 18-26	Two 15-34
Ply	8	8	6
Air pressure	16 lb	12 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 7.50-18	Two 7.50-18	Two 7.50-18
Ply	4	4	4
Air pressure	24 lb	24 lb	24 lb
Height of drawbar	15 inches	15½ inches	19 inches
Static weight			
Rear end	12100 lb	7190 lb	5340 lb
Front end	2780 lb	2790 lb	2780 lb
Weight with operator	15055 lb	10155 lb	8295 lb

FUEL, OIL and TIME Diesel fuel Cetane No. 50 (rating taken from oil company's typical inspection data) **weight per gallon** 7.020 lb **Oil** SAE 30 **to motor** 2.196 gal **drained from motor** 1.921 gal **Total time motor was operated** 47½ hours.

CHASSIS Type Standard **Serial No.** 520197-C **Tread width** rear 66" front 59 15/16" **Wheel Base** 79⅞" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 2.63 second 3.45 third 4.66 fourth 6.13 fifth 7.70 sixth 13.68 reverse 2.88 & 5.11 **Belt pulley diam** 12¼" face 9" rpm 1001 **Belt speed** 3210 fpm **Clutch** single plate dry disc clutch 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 General Motors 3-71 2 cycle Diesel **Type** 3 cylinder vertical with blower **Serial No.** 3A22194-RB **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 4¼" x 5" **Rated rpm** 1675 **Compression ratio** 17 to 1 **Displacement** 213 cu. in. **Port diameter valves** inlet multiple ports exhaust 1⅜" **Governor** variable speed centrifugal **Starting system** 12 volt (two 6 volt batteries) **Air cleaner** (two used) oil washed wire mesh **Muffler** was used **Oil filter** replaceable paper element **Fuel filter** two replaceable cotton spool filters **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 pumps as manufactured to develop approximately 80 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.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	77.44	83.46
2. Observed maximum horsepower (tests F and B)	73.31	78.74
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)	58.08	70.94

We, the undersigned, certify that this is a true and correct report of official tractor test No. 556.

L. F. LARSEN
Engineer-In-Charge

L. W. Hurlbut
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 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, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ 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.