10-3-1960

Test 768: Oliver 1900 Diesel

Nebraska Tractor Test Lab
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NEBRASKA TRACTOR TEST 768 - OLIVER 1900 DIESEL

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean and Acting Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cooling med	Temp Degrees F Air wet bulb	Temp Degrees F Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
89.35	2000	6.203	0.493	14.40	173	65	75	28.742
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
77.15	2032	5.446	0.501	14.17	163	65	75	.....
0.00	2154	1.986	....	....	145	64	73	.....
39.68	2090	3.523	0.631	11.26	146	65	76	.....
87.87	2000	6.088	0.492	14.43	169	65	75	.....
20.19	2125	2.957	1.040	6.83	145	65	75	.....
58.25	2045	4.330	0.528	13.45	152	65	75	.....
Av 47.19	**2074**	**4.055**	**0.610**	**11.64**	**153**	**65**	**75**	**28.713**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear											
82.85	6282	4.95	2003	3.77	6.353	0.544	13.04	154	54	64	29.045
75% of Pull at Maximum Power—Ten Hours—4th Gear											
62.89	4599	5.13	2060	2.99	5.024	0.567	12.52	150	52	62	29.071
50% of Pull at Maximum Power—Two Hours—4th Gear											
43.53	3092	5.28	2096	1.77	3.949	0.644	11.02	143	43	45	29.040
MAXIMUM POWER WITH BALLAST											
44.87	12475	1.35	2050	14.64	1st Gear.....			160	68	82	28.750
75.73	10545	2.69	2001	9.35	2nd Gear.....			170	68	82	28.750
78.21	7505	3.91	2003	5.93	3rd Gear.....			177	66	82	28.750
80.42	6162	4.89	2000	4.59	4th Gear.....			179	64	77	28.750
79.96	3850	7.79	2003	2.73	5th Gear.....			162	64	77	28.750
75.10	2057	13.69	2005	1.23	6th Gear.....			151	62	74	28.790
MAXIMUM POWER WITHOUT BALLAST											
83.51	6385	4.90	2001	6.18	4th Gear.....			149	56	64	28.900

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear					
Pounds pull	6150	6450	6600	6650	6700	6400
Horsepower	80.4	75.7	68.6	60.3	51.8	42.7
Miles per hour	4.9	4.4	3.9	3.4	2.9	2.5

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18-26;8;16	Two 18-26;8;16
Ballast	—Liquid	1294 lb each	None
	—Cast iron	1074 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-18;6;36	Two 7.50-18;6;36
Ballast	—Liquid	None	None
	—Cast iron	None	None
Height of drawbar		20 inches	21½ inches
Static weight	—Rear	13,175 lb	8440 lb
	—Front	3,315 lb	3310 lb
Total weight with operator		16,665 lb	11,925 lb

Department of Agricultural Engineering
Dates of Test: October 3 to October 8, 1960
Manufacturer: THE OLIVER CORPORATION, CHARLES CITY, IOWA
Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel No 2 Diesel **Cetane No** 47 (rating taken from oil company's typical inspection data **Specific gravity converted to 60°/60°** 0.8528 **Weight per gallon** 7.101 lb **Oil** SAE 30 **API service classification** DS **To motor** 3.184 gal **Drained from motor** 4.092 gal **Transmission and final-drive lubricant** SAE 10W-30 engine oil with Oliver special oil additive **Total time engine was operated** 44 hours.

ENGINE Make General Motors Diesel **Type** 2 cycle 4 cylinder vertical with blower **Serial No** 4D 1344 **Crankshaft mounted** lengthwise **Rated rpm** 2000 **Bore and stroke** 3⅞" x 4½" **Compression ratio** 17 to 1 **Displacement** 212.4 cu in **Cranking system** 12 volt electric (two 6 volt batteries) **Lubrication** pressure **Air cleaner** dual oil washed wire mesh with centrifugal precleaners **Oil filter** full flow replaceable pleated paper element **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** primary filter with cotton waste replaceable element secondary filter with replaceable paper element and final bronze filter **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type Standard **Serial No** 90 533-986 **Tread width** rear 74" to 82" front 69⁷/₁₆" **Wheel base** 97¼" **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.1" Vertical distance above roadway 30.9" Horizontal distance from center of rear wheel tread 0" to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** first 1.49 second 2.86 third 4.00 fourth 4.95 fifth 7.72 sixth 13.35 reverse 1.68 and 4.51 **Clutch** single plate dry disc operated by foot pedal **Brakes** double disc operated by foot pedals which can be locked **Steering** no power assistance **Turning radius** (on concrete surface with brake applied) right 165" left 165" (on concrete surface without brake) right 201" left 201" **Turning space diameter** (on concrete surface with brake applied) right 338" left 338" (on concrete surface without brake) right 410" left 410" **Belt pulley** 1053 rpm at 2000 engine rpm diam 11⁵/₁₆" face 8¾" **Belt speed** 3100 fpm **Power take-off** 1000 rpm at 2000 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 768.

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

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, ½ the 85% torque; maximum power; ¼ and ¾ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**

Oliver 1900 Diesel