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Test 873: Oliver 1650 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 873 - OLIVER 1650 DIESEL

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
* 66.28	2200	4.963	0.521	13.35	183	63	75	28.977
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
58.68	2292	4.552	0.539	12.89	178	63	74	.....
0.00	2425	1.864	.....	.....	164	63	74	.....
30.30	2364	3.318	0.761	9.13	170	63	74	.....
66.57	2202	4.996	0.522	13.32	182	63	75	.....
15.36	2396	2.572	1.164	5.97	163	62	73	.....
44.77	2330	3.952	0.614	11.33	172	62	72	.....
Av 35.95	2335	3.542	0.685	10.15	171	63	74	28.960

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom-eter inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											

MAXIMUM POWER WITH BALLAST

52.46	8136	2.42	2206	14.55	2nd Gear Hydra-Pwr	181	56	65	28.830
55.10	7201	2.87	2203	10.44	3rd Gear Hydra-Pwr	180	57	66	28.830
55.78	5892	3.55	2202	7.76	2nd Gear	183	57	66	28.830
56.56	5198	4.08	2203	6.65	3rd Gear	187	57	66	28.830
57.16	4750	4.51	2200	5.92	4th Gear Hydra-Pwr	190	57	66	28.830
57.82	3820	5.68	2199	4.63	5th Gear Hydra-Pwr	194	57	66	28.830
57.32	3447	6.24	2193	4.29	4th Gear	195	57	66	28.830
56.46	2698	7.85	2204	3.31	5th Gear	195	57	66	28.830
56.42	2152	9.83	2197	2.67	6th Gear Hydra-Pwr	192	54	61	28.830
53.60	1484	13.54	2205	1.95	6th Gear	191	54	61	28.830

MAXIMUM POWER WITHOUT BALLAST

58.95	4956	4.46	2201	6.42	4th Gear Hydra_Pwr	172	37	40	29.230
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear Hydra-Power

Pounds pull	4750	5130	5406	5580	5569	5471
Horsepower	57.16	55.17	51.62	46.25	39.93	32.74
Crankshaft Speed rpm	2200	1979	1762	1536	1327	1106
Miles per hour	4.51	4.03	3.58	3.11	2.69	2.24
Slip of drivers %	5.92	6.59	6.85	7.11	7.24	7.11

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38; 8; 22	Two 15.5-38; 8; 14
Ballast	—Liquid	773 lb each	None
	Cast iron	560 lb each	None
Front tires	—No, size, ply & psi	Two 6.50-16; 6; 44	Two 6.50-16; 6; 32
Ballast	—Liquid	None	None
	Cast iron	277 lb each	None
Height of drawbar		19½ inches	19½ inches
Static weight	—Rear	8145 lb	5480 lb
	Front	2715 lb	2160 lb
Total weight with operator		11035 lb	7815 lb

Department of Agricultural Engineering

Dates of Test: NOVEMBER 4 to NOVEMBER 16, 1964

Manufacturer: OLIVER CORPORATION, CHARLES CITY, IOWA

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8346 Weight per gallon 6.953 lb Oil SAE 10W API service classification MS, DM To motor 2.175 gal Drained from motor 1.714 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 44½ hours.

ENGINE Make Oliver Diesel Type 6 cylinder vertical Serial No 75551 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 37/8" x 4" Compression ratio 16 to 1 Displacement 283 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner dry type with built-in precleaner and automatic dust unloader using replaceable pleated paper element Oil filter full flow replaceable paper element Oil cooler engine coolant heat exchanger for Hydra-Power oil and radiator for hydraulic oil Fuel filter Primary filter with replaceable cotton element, secondary filter with replaceable pleated paper element and brass screen in sediment bowl Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type Standard Serial No 150291-452 Tread width rear 56½" to 897/16" front 60" to 84" Wheel base 1057/16" 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 28.2" Vertical distance above roadway 32.4" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial range operator controlled power shifting Advertised speeds mph first 2.54 second 3.81 third 4.32 fourth 6.47 fifth 8.03 sixth 13.66 reverse 2.94 and 5.00 (using Hydra-Power drive) first 1.86 second 2.79 third 3.17 fourth 4.75 fifth 5.90 sixth 10.02 reverse 2.16 and 3.67 Clutch single plated dry disc operated by foot pedal Brakes double disc operated by two foot pedals that can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 146" left 146" (on concrete surface without brake) right 166" left 166" Turning space diameter (on concrete surface with brake applied right 300" left 300" (on concrete surface without brake) right 340" left 340" Belt pulley 1035 rpm at 2200 engine rpm diam 117/16" face 8" Belt Speed 3106 fpm Power take-off 550 or 994 rpm at 2200 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.

First gear Hydra-Power drive and first gear direct drive were not run as it was necessary to limit the pull in second gear Hydra-Power drive to avoid excessive wheel slippage.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 873.

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, $\frac{1}{2}$ the 85% torque; maximum power, $\frac{1}{4}$ and $\frac{3}{4}$ 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 trans-

mission, 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 1650 Diesel