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## Test 876: Oliver 1850 4WD

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 876 - OLIVER 1850 FOUR - WHEEL DRIVE GASOLINE

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									
•	92.92	2400	8.099	0.543	11.47	177	56	75	29.123
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
	81.83	2487	7.682	0.585	10.65	176	55	75	.....
	0.00	2607	3.085	.....	.....	166	55	73	.....
	41.99	2551	5.391	0.800	7.79	171	55	73	.....
	93.53	2402	8.091	0.539	11.56	178	55	74	.....
	21.23	2581	4.288	1.259	4.95	168	55	74	.....
	61.92	2510	6.560	0.660	9.44	173	54	72	.....
Av	50.08	2523	5.850	0.728	8.56	172	55	73	29.133

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr		Cooling med	Air wet bulb	Air dry bulb	

### VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

<b>Maximum Available Power—Two Hours—4th Gear Hydra-Power</b>											
84.52	7534	4.21	2405	4.31	8.150	0.601	10.37	182	33	37	28.905

<b>75% of Pull at Maximum Power—Ten Hours—4th Gear Hydra-Power</b>											
66.93	5756	4.36	2465	3.25	7.256	0.676	9.22	180	31	32	28.809

<b>50% of Pull at Maximum Power—Two Hours—4th Gear Hydra-Power</b>											
46.44	3831	4.55	2542	2.17	6.014	0.807	7.45	182	27	29	28.820

<b>MAXIMUM POWER WITH BALLAST</b>											
59.88	14227	1.58	2480	14.82	1st Gear	.....	177	31	35	29.080	.....
80.83	13317	2.28	2409	10.69	2nd Gear	Hydra-Pwr	178	31	35	29.080	.....
83.37	9579	3.26	2410	6.05	2nd Gear	.....	177	33	36	29.080	.....
84.23	9441	3.35	2404	5.83	3rd Gear	Hydra-Pwr	172	33	36	29.030	.....
86.26	7708	4.20	2404	4.43	4th Gear	Hydra-Pwr	173	33	36	29.030	.....
83.07	6689	4.66	2403	3.71	3rd Gear	.....	180	35	39	28.950	.....
82.80	5366	5.79	2397	3.07	4th Gear	.....	180	35	39	28.950	.....
82.47	4656	6.64	2399	2.66	5th Gear	Hydra-Pwr	180	35	39	28.950	.....
78.71	3231	9.14	2402	1.92	5th Gear	.....	180	35	39	28.950	.....
75.37	2435	11.61	2398	1.51	6th Gear	Hydra-Pwr	180	35	39	28.930	.....

<b>MAXIMUM POWER WITHOUT BALLAST</b>											
83.93	7543	4.17	2392	5.33	4th Gear	Hydra-Pwr	178	26	27	29.020	.....

<b>VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST</b>											
<b>4th Gear Hydra-Power</b>											
Pounds pull	7708	8075	8303	8486	8570	8630	8489				
Horsepower	86.26	81.51	73.52	65.63	57.11	47.86	34.70				
Crankshaft Speed rpm	2404	2172	1911	1671	1441	1199	884				
Miles per hour	4.20	3.79	3.32	2.90	2.50	2.08	1.53				
Slip of drivers %	4.43	4.66	4.98	4.98	4.98	5.29	5.13				

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 23.1-34; 8; 16	Two 23.1-34; 8; 16
Ballast	—Liquid	1670 lb each	None
	Cast iron	420 lb each	None
Front tires	—No, size, ply & psi	Two 13.6-24; 8; 28	Two 13.6-24; 8; 28
Ballast	—Liquid	500 lb each	None
	Cast iron	220 lb each	None
Height of drawbar		12½ inches	13½ inches
Static weight	—Rear	10470 lb	6290 lb
	Front	5580 lb	4140 lb
Total weight with operator		16225 lb	10605 lb

Department of Agricultural Engineering

Dates of Test: NOVEMBER 16 to NOVEMBER 24, 1964

Manufacturer: OLIVER CORPORATION, CHARLES CITY, IOWA

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 83.4 Research 91.8 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7487 Weight per gallon 6.233 lb Oil SAE 10W API service classification MS, DM To motor 1.875 gal Drained from motor 1.281 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 40 hours.

**ENGINE** Make Oliver gasoline Type 6 cylinder vertical Serial No 76525 Crankshaft mounted lengthwise Rated rpm 2400 Bore and stroke 3⅞" x 4⅜" Compression ratio 8.5 to 1 Displacement 310 cu in Carburetor size 1½" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with built-in precleaner and automatic dust unloader using replaceable 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 Sediment bowl with screen Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type 4-wheel drive Serial No 147 587-099 Tread width rear 74" to 82" front 66" or 70¾" Wheel base 85¼" 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 36.8" Vertical distance above roadway 31.6" 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 1.74 second 3.36 third 4.69 fourth 5.80 fifth 9.04 sixth 15.62 reverse 1.96 and 5.29 (using Hydra-Power drive) first 1.28 second 2.46 third 3.44 fourth 4.26 fifth 6.63 sixth 11.46 reverse 1.44 and 3.88 Clutch single plate dry disc operated by foot pedal Brakes triple disc operated by two foot pedals which can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 160" left 160" (on concrete surface without brake) right 240" left 240" Turning space diameter (on concrete surface with brake applied) right 335" left 335" (on concrete surface without brake) right 495" left 495" Belt pulley 1035 rpm at 2400 engine rpm diam 11⅝" face 8¾" Belt Speed 3049 fpm Power take-off 549 or 984 rpm at 2400 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 was not run as it was necessary to limit the pull in first gear direct drive to avoid excessive wheel slippage. Sixth gear direct drive was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 876.

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 1850 Four-Wheel Drive Gasoline