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## Test 831: Oliver 1800 Diesel

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 831 - OLIVER 1800 SERIES B 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								
77.04	2200	5.531	0.499	13.93	191	55	75	29.060
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
69.41	2331	5.274	0.528	13.16	182	54	74	
0.00	2402	1.784			159	51	68	
35.31	2372	3.464	0.681	10.19	172	52	69	
75.78	2203	5.456	0.500	13.89	187	54	74	
17.75	2388	2.557	1.001	6.94	165	52	70	
52.55	2355	4.406	0.582	11.93	176	53	72	
Av 41.80	2342	3.824	0.635	10.93	173	53	71	29.043

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear Hydra-Power											
64.53	6479	3.74	2202	6.80	5.452	0.587	11.84	182	50	67	28.993
75% of Pull at Maximum Power—Ten Hours—4th Gear Hydra-Power											
53.19	5004	3.99	2304	4.91	4.723	0.617	11.26	178	45	54	28.770
50 of Pull at Maximum Power—Two Hours—4th Gear Hydra-Power											
37.39	3351	4.18	2380	3.38	3.974	0.738	9.41	174	39	43	29.060
MAXIMUM POWER WITH BALLAST											
58.55	10783	2.04	2267	14.69	2nd Gear Hydra-Power			182	44	53	28.840
63.77	8331	2.87	2201	9.11	2nd Gear			184	48	62	29.065
64.24	8163	2.95	2202	8.91	3rd Gear Hydra-Power			182	48	62	29.065
66.35	6671	3.73	2203	6.97	4th Gear Hydra-Power			188	48	63	29.080
65.37	5913	4.15	2203	6.07	3rd Gear			185	48	62	29.065
65.85	4759	5.19	2199	4.87	4th Gear			184	48	62	29.065
67.27	4207	6.00	2198	3.71	5th Gear Hydra-Power			180	50	56	28.760
64.18	2923	8.23	2196	2.82	5th Gear			187	49	62	29.065
62.29	2218	10.53	2200	2.14	6th Gear Hydra-Power			187	47	59	29.070
54.88	1429	14.40	2195	1.46	6th Gear			187	47	59	29.070
MAXIMUM POWER WITHOUT BALLAST											
60.92	6209	3.68	2319	14.74	4th Gear Hydra-Power			180	42	46	28.710
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST											
4th Gear Hydra-Power											
Pounds pull			6671	7239	7626	7696	7744	7591			
Hors. power			6635	64.36	59.81	52.64	45.29	37.08			
Miles per hour			3.73	3.33	2.94	2.56	2.19	1.83			
Slip of Drivers, %			6.97	7.58	8.25	8.52	8.38	8.25			

Department of Agricultural Engineering  
Dates of Test: November 6 to November 15, 1962  
Manufacturer: OLIVER CORPORATION,  
CHARLES CITY, IOWA  
Manufacturer's Power Rating: Not rated

**FUEL, OIL and TIME** Fuel No 2 Diesel Cetane No 54.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8341 Weight per gallon 6.945 lb Oil SAE 10W API service classification DS To motor 2.508 gal Drained from motor 1.766 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 54 hours.

**ENGINE** Make Oliver Diesel Type 6 cylinder vertical Serial No 30926 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3 7/8" x 4 3/8" Compression ratio 16.25 to 1 Displacement 310 cu in Cranking system 12 volt electric (two 6-volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter full flow replaceable paper element Oil cooler engine coolant heat exchanger for Hydra-Power oil Fuel filter primary filter with replaceable cotton element and secondary filter with replaceable pleated paper element Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 124924-844 Tread-width rear 68" to 89 1/2" front 60" to 84" Wheel base 109 1/4" 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 31.5" Vertical distance above roadway 35.3" 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 1.60 second 3.09 third 4.31 fourth 5.34 fifth 8.32 sixth 14.37 reverse 1.81 and 4.87 (using Hydra-Power drive) first 1.17 second 2.27 third 3.16 fourth 3.92 fifth 6.11 sixth 10.55 reverse 1.33 and 3.57 Clutch single plate dry discs operated by foot pedal Brakes double disc operated by two foot pedals which can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 152" left 152" (on concrete surface without brake) right 172" left 172" Turning space diameter (on concrete surface with brake applied) right 312" left 312" (on concrete surface without brake) right 352" left 352" Belt pulley 1056 rpm at 2200 engine rpm diam 11 5/16" face 8 3/4" Belt speed 3111 fpm Power take-off 1004 rpm at 2200 engine rpm.

**REPAIRS and ADJUSTMENTS** A new secondary fuel filter was installed during preliminary PTO run.

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

First gear and first gear Hydra-Power drive were not run as it was necessary to limit the pull in 2nd 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 831.

L. F. LARSEN  
Engineer-in-Charge

L. W. HURLBUT, Chairman  
G. W. STEINBRUEGGE  
J. J. SULEK  
Board of Tractor Test Engineers

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18.4-34; 8; 20	Two 18.4-34; 8; 16
Ballast	—Liquid	923 lb each	None
	—Cast iron	1500 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-15; 8; 40	Two 7.50-15; 8; 40
Ballast	—Liquid	None	None
	—Cast iron	148 lb each	None
Height of drawbar		21 inches	23 inches
Static weight	—Rear	11210 lb	6365 lb
	—Front	2960 lb	2665 lb
Total weight with operator		14345 lb	9205 lb

## 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-

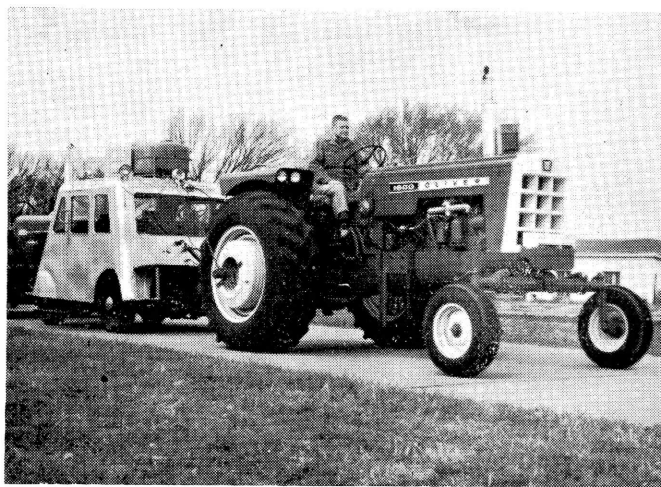
mission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the 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 1800 Series B Diesel