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## Test 824: Oliver 1900 Series B Diesel

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 824 - OLIVER 1900 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								
98.54	2200	6.582	0.464	14.97	188	58	75	29.163
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
*86.10	2264	5.838	0.471	14.75	178	57	75	.....
0.00	2389	2.198	.....	.....	171	57	73	.....
44.11	2317	3.864	0.609	11.42	173	57	74	.....
98.71	2200	6.585	0.463	14.99	185	57	75	.....
22.47	2361	3.014	0.932	7.46	171	56	74	.....
65.26	2287	4.780	0.509	13.65	173	57	75	.....
Av 52.78	2303	4.380	0.577	12.05	175	57	74	29.167

## 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											
84.44	6409	4.94	2195	4.21	6.518	0.536	12.95	175	58	61	29.070
75% of Pull at Maximum Power—Ten Hours—4th Gear											
67.27	4876	5.17	2277	3.29	5.510	0.569	12.21	174	56	59	28.978
50% of Pull at Maximum Power—Two Hours—4th Gear											
45.64	3239	5.28	2301	2.46	4.385	0.668	10.41	172	56	58	29.055
MAXIMUM POWER WITH BALLAST											
69.56	13471	1.94	2270	14.58	2nd Gear	Hydra-Power	165	50	60	29.250	
84.31	11651	2.71	2202	9.48	2nd Gear	.....	170	50	62	29.250	
85.01	11422	2.79	2198	8.98	3rd Gear	Hydra-Power	169	50	62	29.250	
86.68	9156	3.55	2204	6.62	4th Gear	Hydra-Power	172	50	62	29.230	
85.39	8137	3.94	2200	5.90	3rd Gear	.....	182	52	64	29.200	
85.43	6499	4.93	2200	4.69	4th Gear	.....	181	52	62	29.150	
85.67	5662	5.67	2198	3.86	5th Gear	Hydra-Power	182	52	65	29.150	
83.64	4019	7.80	2194	2.81	5th Gear	.....	182	52	65	29.150	
82.67	3107	9.98	2198	2.17	6th Gear	Hydra-Power	178	52	65	29.150	
78.76	2152	13.72	2205	1.59	6th Gear	.....	178	52	65	29.150	
MAXIMUM POWER WITHOUT BALLAST											
85.21	6521	4.90	2202	5.77	4th Gear	.....	180	62	69	28.950	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear											
Pounds pull			6499	6544	6669	6727	6776		6771		6291
Horsepower			85.43	77.58	70.23	62.11	53.14		43.97		32.79
Miles per hour			4.93	4.45	3.95	3.46	2.94		2.44		1.95
Slip of drivers, %			4.69	4.62	5.03	5.03	4.76		5.03		4.48

## TIRES, BALLAST and WEIGHT

	With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 23.1-26; 10; 20
Ballast	—Liquid	1470 lb each
	—Cast iron	1755 lb each
Front tires	—No, size, ply & psi	Two 7.50-18; 6; 36
Ballast	—Liquid	None
	—Cast iron	None
Height of drawbar	17 1/2 inches	19 inches
Static weight	—Rear	14930 lbs
	—Front	3250 lbs
Total weight with operator	18355 lbs	11955 lbs

Department of Agricultural Engineering  
Dates of Test: September 17 to September 23, 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° 0.8344 Weight per gallon 6.948 lb Oil SAE 30 API service classification DS To Motor 3.378 gal. Drained from motor 2.591 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 39 hours.

**ENGINE** Make General Motors Diesel Type 2 cycle 4 cylinder vertical with blower Serial No 4D 7891 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3 7/8" x 4 1/2" Compression ratio 21 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 paper element Oil cooler engine coolant heat exchangers for crank case and Hydra-Power oil Fuel filter primary filter with replaceable cotton element, secondary filter with replaceable paper element, and final bronze element Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 123983-950 Tread width rear 74" to 82" front 69 7/16" Wheel base 97 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 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 with partial range operator controlled power shifting Advertised speeds mph first 1.47 second 2.84 third 3.96 fourth 4.90 fifth 7.63 sixth 13.19 reverse 1.66 and 4.47 (using Hydra-Power drive) first 1.08 second 2.08 third 2.91 fourth 3.60 fifth 5.60 sixth 9.68 reverse 1.22 and 3.28 Clutch single plate dry disc operated by foot pedal Brakes double disc operated by two foot pedals which can be locked Steering power assisted 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 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** During the limber-up and preliminary PTO runs hydraulic oil leakage occurred from the remote cylinder couplings. All four couplings were replaced with pipe plugs.

**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 824.

L. F. LARSEN  
Engineer-in-Charge

L. W. HURLBUT, Chairman  
GEORGE 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 1900 Series B Diesel