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Test 872: Oliver 1950 Diesel 4WD

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 872 - OLIVER 1950 FOUR - WHEEL DRIVE 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								
*105.78	2400	7.104	0.467	14.89	184	59	75	29.243
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
91.77	2450	6.213	0.471	14.77	176	59	74	.....
0.00	2574	2.282	.....	.....	168	58	72	.....
47.00	2510	4.047	0.599	11.61	172	58	73	.....
105.87	2400	7.033	0.462	15.05	184	59	75	.....
23.82	2542	3.214	0.938	7.41	171	59	75	.....
69.56	2475	4.983	0.498	13.96	173	59	74	.....
Av 56.34	2492	4.629	0.571	12.17	174	58	74	29.273

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			Bar-ometer 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											

Maximum Available Power—Two Hours—4th Gear Hydra-Power											
93.24	8368	4.18	2397	4.45	7.335	0.547	12.71	188	50	56	28.645

75% of Pull at Maximum Power—Ten Hours—4th Gear Hydra-Power											
76.05	6596	4.32	2454	3.36	6.080	0.556	12.51	183	53	61	28.705

50% of Pull at Maximum Power—Two Hours—4th Gear Hydra-Power											
51.78	4327	4.49	2520	2.32	4.938	0.663	10.49	169	37	41	28.750

MAXIMUM POWER WITH BALLAST

73.55	17575	1.57	2467	14.65	1st Gear	.....	184	51	54	28.540
93.01	15233	2.29	2397	9.68	2nd Gear	Hydra-Pwr	185	48	52	28.570
93.95	10875	3.24	2396	5.95	2nd Gear	.....	184	49	54	28.570
95.46	10722	3.34	2403	5.72	3rd Gear	Hydra-Pwr	182	49	55	28.600
97.48	8746	4.18	2402	4.64	4th Gear	Hydra-Pwr	181	50	56	28.600
93.71	7602	4.62	2397	3.93	3rd Gear	.....	182	50	56	28.600
94.46	6147	5.76	2396	3.21	4th Gear	.....	182	50	56	28.600
94.43	5360	6.61	2393	2.81	5th Gear	Hydra-Pwr	185	50	56	28.600
88.19	3635	9.10	2399	1.90	5th Gear	.....	186	51	57	28.610
86.26	2801	11.55	2394	1.65	6th Gear	Hydra-Pwr	185	51	57	28.610

MAXIMUM POWER WITHOUT BALLAST

96.00	8637	4.17	2401	5.62	4th Gear	Hydra-Pwr	185	46	52	29.000
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST

4th Gear Hydra-Power

Pounds pull	8746	9015	8973	8783	8213	7808
Horsepower	97.48	90.34	79.78	68.16	54.80	43.80
Crankshaft speed rpm	2402	2163	1918	1674	1435	1203
Miles per hour	4.18	3.76	3.33	2.91	2.50	2.10
Slip of drivers %	4.64	4.72	4.87	4.87	4.56	4.56

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	1730 lb each	None
	Cast iron	840 lb each	None
Front tires	—No, size, ply & psi	Two 13.6-24; 8; 28	Two 13.6-24; 8; 28
Ballast	—Liquid	510 lb each	None
	Cast iron	395 lb each	None
Height of drawbar		13½ inches	15½ inches
Static weight	—Rear	13190 lb	8050 lb
	Front	6560 lb	4750 lb
Total weight with operator		19925 lb	12975 lb

Department of Agricultural Engineering

Dates of Test: OCTOBER 30 TO NOVEMBER 23, 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 30 API service classification MS, DM To motor 3.641 gal Drained from motor 2.675 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 56 hours.

ENGINE Make General Motors Diesel Type 2 cycle 4 cylinder vertical with blower Serial No 4D 17022 Crankshaft mounted lengthwise Rated rpm 2400 Bore and stroke 3⅞" x 4½" Compression ratio 21 to 1 Displacement 212.4 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner dual dry type with built-in precleaner and automatic dust unloader using replaceable pleated paper elements Oil filter full flow replaceable pleated paper element Oil cooler engine coolant heat exchangers for crankcase and Hydra-Power oil and radiator for hydraulic oil Fuel filter Primary filter with replaceable cotton element, secondary filter with replaceable paper element and final compressed wire filter Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type 4-wheel drive Serial No 39-8210 Tread width rear 74" or 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 33.6" Vertical distance above roadway 31.4" 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 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 During the drawbar runs it became apparent that the gear ratio in the front axle was not correct for this tractor. Another front axle, with a more suitable gear ratio, was installed and test continued.

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 Tractor Test 872.

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 1950 Four-Wheel Drive Diesel