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4-29-1968

## Test 972: Oliver 1950-T Diesel 4WD

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 972 – OLIVER 1950-T DIESEL FOUR WHEEL DRIVE

## POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption		Temperature Degrees F				
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
105.11	2400	6.481	0.430	16.22	180	57	75	28.660
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
94.59	2538	6.207	0.457	15.24	179	57	75	.....
0.00	2642	2.100	.....	.....	167	57	74	.....
48.48	2602	4.123	0.593	11.76	171	57	76	.....
103.33	2398	6.422	0.433	16.09	181	57	76	.....
24.55	2621	3.069	0.871	8.00	168	57	75	.....
71.81	2572	5.161	0.501	13.91	174	57	75	.....
Av 57.13	2562	4.514	0.551	12.66	173	57	75	28.645

## 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	Cooling med	Air wet bulb	Air dry bulb

### VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

<b>Maximum Available Power—Two Hours—3rd Gear Direct Drive</b>											
89.10	7629	4.38	2390	3.89	6.577	0.514	13.55	161	52	62	28.940
<b>75% of Pull at Maximum Power—Ten Hours—3rd Gear Direct Drive</b>											
73.27	5835	4.71	2547	3.03	5.853	0.557	12.52	154	47	58	28.989
<b>50% of Pull at Maximum Power—Two Hours—3rd Gear Direct Drive</b>											
49.29	3850	4.80	2586	2.69	4.777	0.676	10.32	163	49	53	28.905

### MAXIMUM POWER WITH BALLAST

78.17	17692	1.66	2524	14.82	1st Gear Direct drive			155	57	67	28.620
90.87	10566	3.23	2400	5.67	2nd Gear Direct drive			160	60	71	28.630
89.17	9236	3.62	2398	4.52	3rd Gear Under drive			162	52	64	28.950
90.70	8663	3.93	2403	4.28	2nd Gear Over drive			163	52	64	28.950
91.30	7779	4.40	2404	3.81	3rd Gear Direct drive			165	52	64	28.950
89.55	6950	4.83	2402	3.57	4th Gear Under drive			161	52	64	28.950
89.17	6277	5.33	2406	3.09	3rd Gear Over drive			160	52	67	28.930
88.98	5685	5.87	2404	2.77	4th Gear Direct drive			150	65	81	28.630
86.06	4706	6.86	2402	2.44	5th Gear Under drive			150	65	81	28.630
86.00	3874	8.33	2409	2.04	5th Gear Direct drive			147	65	81	28.630
81.85	3074	9.99	2399	1.63	5th Gear Over drive			162	66	86	28.590
74.54	1894	14.76	2400	0.70	6th Gear Direct drive			150	66	86	28.590

### MAXIMUM PULL WITHOUT BALLAST

50.21	10944	1.72	2600	14.76	1st Gear Direct drive			150	54	62	28.780
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 3rd Gear Direct Drive

Pounds pull	7779	8374	8776	8829	8396	7510
Horsepower	91.30	88.10	81.62	71.89	58.70	44.13
Crankshaft speed rpm	2404	2163	1918	1678	1466	1202
Miles per hour	4.40	3.95	3.49	3.05	2.62	2.20
Slip of drivers, %	3.81	4.36	4.67	4.52	4.52	3.73

### 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
	—Liquid	1090 lb each	None
	Cast iron	1680 lb each	None
Front tire	—No, size, ply & psi	Two 14.9-26; 8; 24	Two 14.9-26; 8; 16
	—Liquid	675 lb each	None
	Cast iron	920 lb each	None
Height of drawbar		11½ inches	12½ inches
Static weight with operator—	Rear	12610 lb	7070 lb
	Front	7610 lb	4420 lb
	Total	20220 lb	11490 lb

## Department of Agricultural Engineering

Dates of Test: April 29 to May 7, 1968

Manufacturer: OLIVER CORPORATION,  
CHARLES CITY, IOWA

**FUEL, OIL and TIME** Fuel No 2 Diesel Cetane No 52.4 (rating taken from oil company's inspection data) Specific gravity converted to 60°/60° 0.8371 Weight per gallon 6.970 lb Oil SAE 30 API service classification MS, DS To motor 2.718 gal Drained from motor 1.811 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 47 hours.

**ENGINE** Make Oliver Diesel Type 6 cylinder vertical with Turbo charger Serial No 150090 Crankshaft mounted lengthwise Rated rpm 2400 Bore and stroke 3⅞" x 4⅜" Compression ratio 16 to 1 Displacement 310 cu in Cranking system 12 volt electric (two 12 volt batteries) Lubrication pressure Air cleaner two, dry type with precleaners and automatic unloaders Oil filter bypass and full flow replaceable cotton element Oil cooler engine coolant heat exchanger for crankcase 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 Four-wheel drive Serial No 202092-653 Tread width rear 74" to 82" front 66" to 70¾" Wheel base 85.25" 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 33.9" Vertical distance above roadway 34.8" 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 1.48 second 1.78 third 2.13 fourth 2.73 fifth 3.29 sixth 3.66 seventh 3.95 eighth 4.40 ninth 4.81 tenth 5.28 eleventh 5.80 twelfth 6.77 thirteenth 6.95 fourteenth 8.15 fifteenth 9.77 sixteenth 11.92 seventeenth 14.36 eighteenth 17.21 reverse first 1.78 second 2.15 third 2.58 fourth 4.42 fifth 5.32 sixth 6.38 Clutch single plate dry disc operated by foot pedal Brakes triple disc operated by two foot pedals that can be locked together 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 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 under was not run as it was necessary to limit the pull in first gear over to avoid excessive wheel slippage. Sixth gear over was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 972.

L. F. LARSEN

Engineer in Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

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

# 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,  $\frac{1}{2}$  of 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 transmission, 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 Pull without Ballast.** All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

**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-T DIESEL FOUR WHEEL DRIVE