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Test 986: Oliver 2150 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 986 - OLIVER 2150 ROW CROP DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption		Temperature Degrees F					Barometer inches of Mercury
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
131.48*	2400	8.625	0.458	15.24	187	62	75	29.048	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
115.90	2490	8.016	0.482	14.46	186	62	75	.....
0.00	2634	3.260	.....	.....	177	61	73	.....
59.52	2552	5.513	0.646	10.80	181	62	75	.....
129.91	2401	8.532	0.458	15.23	188	62	76	.....
30.12	2594	4.404	1.020	6.84	179	61	73	.....
87.97	2517	6.670	0.529	13.19	182	62	75	.. .....
Av 70.57	2531	6.066	0.600	11.63	182	62	74	29.038	

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											

MAXIMUM POWER WITH BALLAST

86.85	16509	1.97	2497	14.98	1st Gear Overdrive		181	58	74		29.020
111.83	13284	3.16	2402	8.43	2nd Gear Direct drive		187	45	59		29.230
109.28	11965	3.43	2403	7.35	3rd Gear Underdrive		187	46	60		29.230
111.46	10809	3.87	2401	6.32	2nd Gear Overdrive		188	41	47		29.250
112.29	10053	4.19	2404	5.95	3rd Gear Direct drive		188	42	49		29.250
114.63	8981	4.79	2404	5.04	4th Gear Underdrive		185	41	47		29.250
108.38	7994	5.08	2403	4.73	3rd Gear Overdrive		186	42	50		29.250
114.32	7387	5.80	2402	4.42	4th Gear Direct drive		188	42	50		29.250
111.58	6366	6.57	2401	3.79	5th Gear Underdrive		188	43	51		29.250
110.68	5208	7.97	2400	3.08	5th Gear Direct drive		188	43	51		29.250
104.92	4072	9.66	2410	2.36	5th Gear Overdrive		185	43	52		29.240
103.23	2715	14.26	2402	1.46	6th Gear Direct drive		185	44	52		29.240

MAXIMUM PULL WITHOUT BALLAST

100.97	9611	3.94	2467	14.87	3rd Gear Direct drive		190	64	76		28.610
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear Underdrive

Pounds pull	8981	9697	9900	10374	9795	9461
Horsepower	114.63	111.49	99.93	91.83	74.38	59.69
Crankshaft speed rpm	2404	2176	1914	1683	1440	1193
Miles per hour	4.79	4.31	3.79	3.32	2.85	2.37
Slip of drivers, %	5.04	5.72	5.72	6.02	5.72	5.57

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 24.5-32; 10; 18	Two 24.5-32; 10; 16
	—Liquid	2090 lb each	None
	Cast iron	1650 lb each	None
Front tires	—No, size, ply & psi	Two 11.00-16; 8; 32	Two 11.00-16; 8; 32
	—Liquid	None	None
	Cast iron	328 lb each	None
Height of drawbar		22½ inches	24 inches
Static weight with operator—Rear		15950 lb	8470 lb
	Front	5175 lb	4520 lb
	Total	21125 lb	12990 lb

Department of Agricultural Engineering

Date of Test: September 27 to October 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 typical inspection data) **Specific gravity converted to 60°/60°** 0.8378 **Weight per gallon** 6.976 lb **Oil SAE 30** **API service classification** MS, DM **To motor** 4.315 gal **Drained from motor** 3.040 gal **Transmission and final-drive lubricant** SAE 80 **Total time engine was operated** 61½ hours.

ENGINE Make Oliver Diesel **Type** 6 cylinder vertical with turbo-charger **Serial No** 4000588 **Crankshaft mounted lengthwise** **Rated rpm** 2400 **Bore and stroke** 4½" x 4⅞" **Compression ratio** 18.0 to 1 **Displacement** 478 cu in **Cranking system** 12-volt electric (four 6-volt batteries) **Lubrication pressure** **Air cleaner** two dry type with automatic dust unloader **Oil filter** full flow 2 pleated paper elements **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** primary filter with replaceable cotton element and secondary filter with replaceable paper disc cartridge **Muffler** was used **Cooling medium** temperature control thermostat.

CHASSIS **Type** standard **Serial No** 207861-657 **Tread** **Width** rear 86" front 60" to 80" **Wheel base** 97½" **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 29.7" **Vertical distance** above roadway 47.0" **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 1.50 second 1.80 third 2.16 fourth 2.77 fifth 3.34 sixth 3.57 seventh 4.00 eighth 4.31 ninth 4.88 tenth 5.16 eleventh 5.88 twelfth 6.61 thirteenth 7.04 fourteenth 7.97 fifteenth 9.55 sixteenth 11.65 seventeenth 14.04 eighteenth 16.83 reverse 1.81, 2.18, 2.61, 4.32, 5.20 **Clutch** single plate dry disc operated by foot pedal **Brakes** triple disc operated by two foot pedals that can be locked together **Steering** hydrostatic power **Turning radius** (on concrete surface with brake applied) right 136" left 136" (on concrete surface without brake) right 164½" left 164½" **Turning space diameter** (on concrete surface with brake applied) right 284" left 284" (on concrete surface without brake) right 341" left 341" **Belt pulley** 1035 rpm at 2400 engine rpm diam 11½" face 8¾" **Belt speed** 3049 fpm **Power take-off** 984 rpm at 2400 engine rpm.

REPAIRS and ADJUSTMENTS: Due to loss of power during drawbar testing it was necessary to replace the fuel injector for number 5 cylinder. The other injectors were also replaced and the test continued.

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

We, the undersigned, certify that this is a true and correct report of official Tractor Test 986.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

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

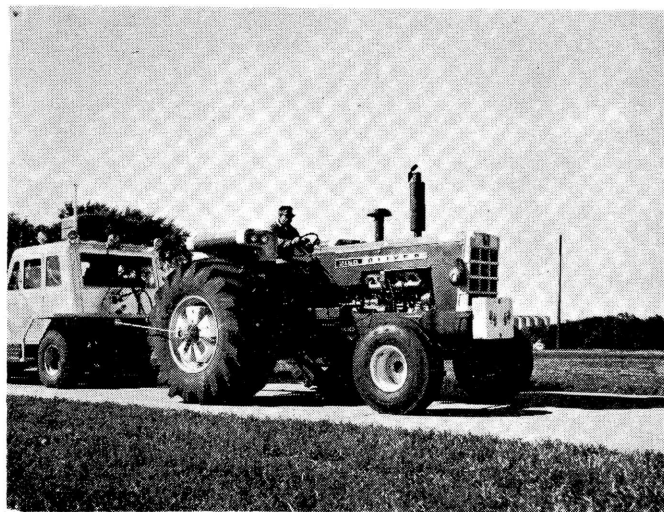
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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 2150 ROW CROP DIESEL