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Test 987: Oliver 2050 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 987 - OLIVER 2050 ROW CROP DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F				
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury	
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
118.78	2400	7.746	0.455	15.33	188	63	76	29.022	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
106.11	2524	7.117	0.468	14.91	188	63	77	.....
0.00	2656	2.791	.....	.....	189	61	75	.....
54.62	2591	4.799	0.613	11.38	193	62	78	.....
118.84	2400	7.762	0.456	15.31	187	62	78	.....
27.59	2619	3.776	0.955	7.31	181	63	79	.....
80.67	2561	5.909	0.511	13.65	186	63	80	.....
Av	64.64	2558	5.359	0.578	12.06	187	62	78	29.005

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom- eter 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 Underdrive											
96.36	7718	4.68	2392	6.72	7.649	0.554	12.60	189	52	64	29.115
75% of Pull at Maximum Power—Ten Hours—4th Gear Underdrive											
80.85	6050	5.01	2519	5.21	6.653	0.574	12.15	190	64	77	28.590
50% of Pull at Maximum Power—Two Hours—4th Gear Underdrive											
56.94	4110	5.20	2571	3.70	5.471	0.670	10.41	180	47	57	29.193
MAXIMUM POWER WITH BALLAST											
71.08	13222	2.02	2548	14.89	1st Gear Overdrive			185	56	63	28.900
97.94	12051	3.05	2405	11.76	2nd Gear Direct drive			189	45	59	29.250
98.32	11111	3.32	2401	10.21	3rd Gear Underdrive			185	45	55	29.260
100.71	10016	3.77	2402	8.89	2nd Gear Overdrive			183	45	56	29.260
100.94	9243	4.10	2404	7.89	3rd Gear Direct drive			186	46	59	29.260
103.81	8307	4.69	2400	6.94	4th Gear Underdrive			185	44	55	29.260
99.05	7427	5.00	2402	6.42	3rd Gear Overdrive			186	45	56	29.260
104.52	6846	5.73	2401	5.74	4th Gear Direct drive			188	46	58	29.260
101.07	5833	6.50	2399	4.91	5th Gear Underdrive			189	46	58	29.260
101.47	4825	7.89	2402	4.21	5th Gear Direct drive			188	47	59	29.260
96.37	3794	9.53	2399	3.34	5th Gear Overdrive			187	45	57	29.260
95.32	2526	14.15	2406	2.46	6th Gear Direct drive			188	46	60	29.255

MAXIMUM PULL WITHOUT BALLAST

85.19	10589	3.02	2509	14.88	2nd Gear Direct drive			189	64	76	28.610	
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear Underdrive

Pounds pull	8307	8757	8703	8976	8909	8451
Horsepower	103.81	98.64	86.82	78.06	66.17	52.63
Crankshaft speed rpm	2400	2173	1924	1683	1436	1199
Miles per hour	4.69	4.22	3.74	3.26	2.79	2.34
Slip of drivers, %	6.94	7.31	7.31	7.60	7.74	7.31

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18.4-38; 12; 30	Two 18.4-38; 12; 16
Ballast	—Liquid	918 lb each	None
	Cast iron	1135 lb each	None
Front tires	—No, size, ply & psi	Two 11.00-16; 8; 36	Two 11.00-16; 8; 32
Ballast	—Liquid	None	None
	Cast iron	123 lb each	None
Height of drawbar		22½ inches	22½ inches
Static weight with operator—Rear		14115 lb	10010 lb
Front		4775 lb	4530 lb
Total		18890 lb	14540 lb

Department of Agricultural Engineering

Date of Test: September 23 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 5.108 gal Drained from motor 4.328 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 55½ hours.

ENGINE Make Oliver Diesel Type 6 cylinder vertical Serial No 4000347 Crankshaft mounted lengthwise Rated rpm 2400 Bore and stroke 4⁰/₁₆" x 4⁷/₈" 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 replaceable cotton element and secondary replaceable paper disc cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 207635-657 Tread width rear 61" to 91" front 60" to 80" Wheel base 97¹¹/₁₆" 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 30.6" 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 1.49 second 1.79 third 2.15 fourth 2.75 fifth 3.31 sixth 3.55 seventh 3.97 eighth 4.28 ninth 4.85 tenth 5.13 eleventh 5.84 twelfth 6.57 thirteenth 7.00 fourteenth 7.92 fifteenth 9.49 sixteenth 11.58 seventeenth 13.95 eighteenth 16.72 reverse 1.80, 2.16, 2.59, 4.29, 5.17 and 6.20 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 149½" left 149" (on concrete surface without brake) right 166¼" left 166¼" Turning space diameter (on concrete surface with brake applied) right 311" left 311" (on concrete surface without brake) right 344½" left 344½" Belt pulley 1035 rpm at 2400 engine rpm diam 11⁵/₁₆" face 8¾" Belt speed 3049 fpm Power take-off 984 rpm at 2400 engine rpm.

REPAIRS and ADJUSTMENTS During drawbar testing, the injector for Number 4 cylinder was replaced and 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 987.

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

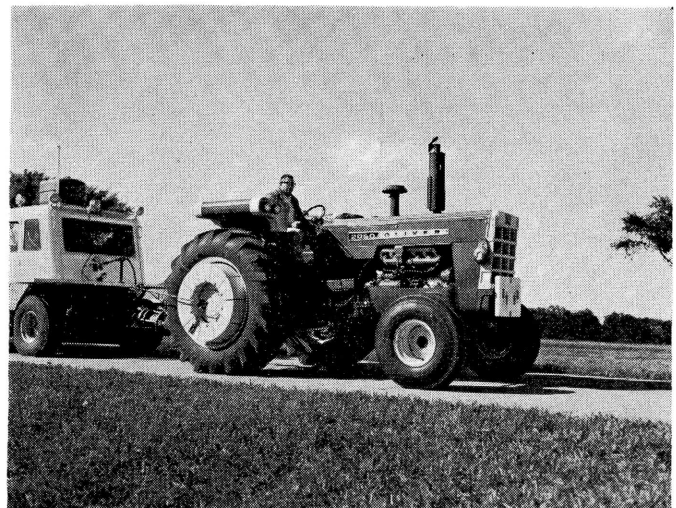
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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 2050 ROW CROP DIESEL