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Test 840: Oliver 1600 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 840 - OLIVER 1600 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 (PTO 1008 rpm)								
57.95	1900	4.175	0.497	13.88	186	69	76	28.680
Standard Power Take-off Speed (540 rpm)—One Hour								
54.79	1740	3.892	0.490	14.08	187	74	88	28.800

VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

50.76	1960	3.892	0.529	13.04	183	69	76	.....
0.00	2056	1.409	.....	.....	173	70	77	.....
26.00	2006	2.636	0.699	9.86	177	70	78	.....
57.34	1901	4.179	0.503	13.72	186	70	78	.....
13.13	2029	1.927	1.012	6.81	176	71	79	.....
38.78	1995	3.305	0.588	11.73	180	71	80	.....
Av 31.00	1991	2.891	0.643	10.72	179	70	78	28.673

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			Barometer 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											
46.90	3915	4.49	1896	4.63	3.987	0.586	11.76	192	79	92	28.650
75% of Pull at Maximum Power—Ten Hours—4th Gear Hydra-Power											
38.65	3087	4.70	1964	3.63	3.591	0.641	10.76	188	77	90	28.641
50% of Pull at Maximum Power—Two Hours—4th Gear Hydra-Power											
27.10	2095	4.85	2005	2.44	3.018	0.768	8.98	183	75	82	28.665

MAXIMUM POWER WITH BALLAST

36.74	8401	1.64	1971	14.67	1st Gear Hydra-Power	189	74	90	28.640
46.87	7831	2.24	1900	11.04	1st Gear	195	75	95	28.560
47.03	7019	2.51	1902	9.47	2nd Gear Hydra-Power	195	75	95	28.560
47.32	6138	2.89	1898	8.17	3rd Gear Hydra-Power	200	75	95	28.560
48.17	5098	3.54	1902	6.30	2nd Gear	199	75	95	28.560
48.02	4451	4.05	1898	5.51	3rd Gear	193	74	90	28.615
48.78	4087	4.48	1901	5.11	4th Gear Hydra-Power	196	74	90	28.640
48.83	3258	5.62	1897	3.88	5th Gear Hydra-Power	195	75	95	28.560
48.18	2908	6.21	1902	3.25	4th Gear	195	75	95	28.560
48.42	2338	7.77	1902	2.69	5th Gear	195	75	95	28.560
47.65	1832	9.75	1902	1.97	6th Gear Hydra-Power	195	75	96	28.515
42.75	1199	13.37	1899	1.10	6th Gear	195	75	96	28.515

MAXIMUM POWER WITHOUT BALLAST

48.44	4060	4.47	1898	5.99	4th Gear Hydra-Power	193	76	88	28.690
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST

4th Gear Hydra-Power

Pounds pull	4087	4492	4654	4603	4484	4036
Horsepower	48.78	47.63	44.02	38.19	31.71	24.07
Crankshaft speed rpm	1901	1698	1516	1330	1133	950
Miles per hour	4.48	3.98	3.55	3.11	2.65	2.24
Slip of drivers %	5.11	5.57	5.84	5.84	5.71	5.17

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 16.9-34; 6; 16	Two 16.9-34; 6; 16
Ballast	—Liquid	838 lb each	None
	Cast iron	725 lb each	None
Front tires	—No, size, ply & psi	Two 6.50-16; 6; 40	Two 6.50-16; 6; 32
Ballast	—Liquid	None	None
	Cast iron	208 lb each	None
Height of drawbar		19½ inches	20½ inches
Static weight	—Rear	8325 lb	5200 lb
	—Front	2520 lb	2105 lb
Total weight with operator		11020 lb	7480 lb

Department of Agricultural Engineering

Dates of Test: May 29 to June 13, 1963

Manufacturer: OLIVER CORPORATION,
CHARLES CITY, IOWA

Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 56.7 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8285 **Weight per gallon** 6.898 lb **Oil SAE 10W API service classification** MS, DM **To motor** 2.475 gal **Drained from motor** 1.773 gal **Transmission and final-drive lubricant** SAE 80 **Total time engine was operated** 37 hours.

ENGINE Make OLIVER DIESEL Type 6 cylinder vertical Serial No 44139 Crankshaft mounted lengthwise **Rated rpm** 1900 **Bore and stroke** 3¾" x 4" **Compression ratio** 16.25 to 1 **Displacement** 265 cu in **Cranking system** 12 volt electric (two 6 volt batteries) **Lubrication pressure** Air cleaner oil washed wire screen **Oil filter** full flow replaceable paper element **Oil cooler** engine coolant heat exchanger for Hydra-Power 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 standard Serial No 124-822-607 **Tread width rear** 56½" to 89⅞" **front** 60" to 84" **Wheel base** 105⅞" **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 28.2" Vertical distance above roadway 32.4" 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 2.52 second 3.78 third 4.29 fourth 6.43 fifth 7.98 sixth 13.57 reverse 2.92 and 4.97 (using Hydra-Power drive) first 1.85 second 2.77 third 3.15 fourth 4.72 fifth 5.86 sixth 9.96 reverse 2.14 and 3.65 **Clutch** single plate dry disc operated by foot pedal **Brakes** double 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 146" left 146" (on concrete surface without brake) right 166" left 166" **Turning space diameter** (on concrete surface with brake applied) right 300" left 300" (on concrete surface without brake) right 340" left 340" **Belt pulley** 1000 rpm at 1750 engine rpm diam 11⅞" face 8" Belt speed 3000 fpm Power take-off 1008 rpm at 1900 engine rpm and 543 PTO rpm at 1750 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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 840.

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 1600 Diesel