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Test 847: Oliver 1900 Series B Diesel 4WD

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 847 - OLIVER 1900 SERIES B 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									
100.62	2200	7.465	0.512	13.48	188	66	75	29.007	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
88.09	2266	6.368	0.499	13.83	176	68	77	.....
0.00	2407	2.381	.....	.....	165	67	75	.....
45.71	2352	4.201	0.635	10.88	168	68	78	.....
98.76	2199	7.428	0.519	13.30	191	68	78	.....
23.17	2385	3.275	0.976	7.07	167	68	78	.....
67.58	2317	5.226	0.534	12.93	169	68	76	.....
Av	53.89	2321	4.813	0.617	11.20	173	68	77	28.997

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	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear Hydra-Power											
88.27	7905	4.19	2195	3.76	7.204	0.564	12.25	182	68	72	28.925
75% of Pull at Maximum Power—Ten Hours—4th Gear Hydra-Power											
70.66	6007	4.41	2294	2.86	5.876	0.574	12.03	178	72	79	28.978
50% of Pull at Maximum Power—Two Hours—4th Gear Hydra-Power											
48.91	4030	4.55	2333	1.64	4.721	0.667	10.36	178	72	85	28.905
MAXIMUM POWER WITH BALLAST											
71.26	16991	1.57	2272	14.59	1st Gear		181	73	80		29.040
87.47	14170	2.31	2203	8.24	2nd Gear Hydra-Power		182	72	79		29.020
88.09	10143	3.26	2204	5.25	2nd Gear		190	72	79		29.020
88.26	9886	3.35	2206	5.25	3rd Gear		192	72	79		29.000
90.16	8087	4.18	2200	4.07	4th Gear Hydra-Power		185	71	78		29.000
87.92	7115	4.63	2202	3.52	3rd Gear		190	71	78		29.020
88.93	5776	5.77	2201	2.87	4th Gear		185	72	74		29.020
87.40	4932	6.65	2204	1.97	5th Gear Hydra-Power		184	71	78		28.920
83.25	3423	9.12	2202	1.22	5th Gear		175	70	76		28.920
80.36	2599	11.60	2200	1.05	6th Gear Hydra-Power		175	71	78		28.930
MAXIMUM POWER WITHOUT BALLAST											
91.08	8208	4.16	2201	5.39	4th Gear Hydra-Power		180	63	65		28.970

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear Hydra-Power

Pounds pull	8087	7935	7461	7581	7705	7703	7337
Horsepower	90.16	79.57	66.45	59.45	51.56	42.76	32.64
Crankshaft speed rpm	2200	1978	1754	1544	1318	1095	874
Miles per hour	4.18	3.76	3.34	2.94	2.51	2.08	1.67
Slip of drivers %	4.07	4.00	3.84	3.84	4.00	4.00	3.68

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 24.5-32; 10; 16	Two 24.5-32; 10; 16
	—Liquid	1885 lb each	None
Ballast	—Cast iron	980 lb each	None
Front tires	—No, size, ply & psi	Two 13.6-24; 8; 28	Two 13.6-24; 8; 28
	—Liquid	515 lb each	None
Ballast	—Cast iron	410 lb each	None
Height of drawbar		12 inches	13½ inches
Static weight	—Rear	13560 lb	7930 lb
	—Front	6650 lb	4800 lb
Total weight with operator		20385 lb	12905 lb

Department of Agricultural Engineering
Dates of Test: September 13 to September 20, 1963

Manufacturer: OLIVER CORPORATION,
CHARLES CITY, IOWA
Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel No 2 diesel Cetane No 57.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8294 Weight per gallon 6.906 lb Oil SAE 30 API service classification MS, DM To motor 3.565 gal Drained from motor 2.990 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 44½ hours.

ENGINE Make General Motors Diesel Type 2 cycle 4 cylinder vertical with blower Serial No 4D 11561 Crankshaft mounted lengthwise Rated rpm 2200 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 oil washed wire mesh with centrifugal precleaners Oil filter full flow replaceable paper element Oil cooler engine coolant heat exchangers for crankcase and Hydra-Power oil Fuel filter primary filter with replaceable cotton element, secondary filter with replaceable paper element and final bronze element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type 4-wheel drive Serial No 129540-946 Tread width rear 74" to 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 1.71 second 3.30 third 4.61 fourth 5.70 fifth 8.88 sixth 15.34 reverse 1.93 and 5.19 (using Hydra-Power drive) first 1.26 second 2.42 third 3.38 fourth 4.18 fifth 6.51 sixth 11.26 reverse 1.42 and 3.81 Clutch single plate dry disc operated by foot pedal Brakes double 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 494" left 494" Belt pulley 1056 rpm at 2200 engine rpm diam 11⅝" face 8¾" Belt speed 3111 fpm Power take-off 1004 rpm at 2200 engine rpm.

REPAIRS and ADJUSTMENTS The governor control ball joint failed during maximum drawbar horsepower runs. A new governor control ball joint 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 official Tractor Test 847.

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 1900 Series B Four-Wheel Drive Diesel