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## Test 1140: Oliver 2255 Diesel

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 1140 – OLIVER 2255 DIESEL

## POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>								
<b>Rate Engine Speed—Two Hours (PTO Speed—1023 rpm)</b>								
146.72	2600	9.414	0.446	15.59	195	61	75	28.997
<b>Standard Power Take-Off Speed (1000 rpm)—One Hour</b>								
147.65	2542	9.431	0.444	15.66	195	62	75	28.980
<b>VARYING POWER AND FUEL CONSUMPTION—Two Hours</b>								
128.12	2671	8.445	0.458	15.17	191	62	75	.....
0.00	2876	3.132	.....	.....	178	61	73	.....
66.93	2790	5.637	0.585	11.87	185	61	72	.....
146.37	2600	9.413	0.447	15.55	195	62	75	.....
34.16	2850	4.415	0.898	7.74	182	62	75	.....
98.33	2734	6.968	0.492	14.11	188	63	75	.....
Av 78.99	2753	6.335	0.557	12.47	186	62	74	28.980

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cooling med	Air wet bulb	Air dry bulb	Barometer inches of Mercury
<b>Maximum Available Power—Two Hours—11th Gear (4 DD)</b>											
123.72	8143	5.70	2596	5.98	9.215	0.517	13.43	192	61	67	28.970
<b>75% of Pull at Maximum Power—Ten Hours—11th Gear (4 DD)</b>											
100.53	6245	6.04	2699	4.16	7.761	0.536	12.95	187	60	65	29.040
<b>50% of Pull at Maximum Power—Two Hours—11th Gear (4 DD)</b>											
70.49	4214	6.27	2769	2.98	6.263	0.617	11.25	185	63	73	28.980
<b>50% of Pull at Reduced Engine Speed—Two Hours—14th Gear (5 DD)</b>											
70.19	4176	6.30	2029	2.85	5.238	0.518	13.40	187	64	75	28.950
<b>MAXIMUM POWER WITH BALLAST</b>											
115.35	14770	2.93	2596	14.79	5th Gear (2 DD) ...	191	69	75	28.910		
115.18	13258	3.26	2601	12.71	6th Gear (3 UD) ...	194	71	78	28.960		
122.46	9848	4.66	2600	7.53	9th Gear (4 UD) ...	194	73	80	28.940		
126.13	8299	5.70	2599	5.98	11th Gear (4 DD) ...	194	73	80	28.960		
122.36	6622	6.93	2599	4.62	13th Gear (4 OD) ...	193	72	79	28.960		
126.05	5936	7.96	2600	4.23	14th Gear (5 DD) ...	193	71	78	28.960		

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 11th Gear (4 DD)

Pounds Pull	8299	9264	9541	9739	9966	10097	9557
Horsepower	126.13	125.55	114.55	102.41	89.56	75.21	57.30
Crankshaft Speed rpm	2599	2338	2078	1824	1563	1298	1039
Miles Per Hour	5.70	5.08	4.50	3.94	3.37	2.79	2.25
Slip of Drivers %	5.98	6.87	7.16	7.31	7.60	7.88	7.16

## TRACTOR SOUND LEVEL (with cab) db (A)

Maximum Available Power 2 Hours	88.0
75% of Pull at Max. Power 10 Hours	89.0
50% of Pull at Max. Power 2 Hours	87.0
50% of Pull at Reduced Engine Speed 2 Hours	84.5
Bystander 18th Gear (6 OD)	91.5

## TIRES, BALLAST AND WEIGHT

		With Ballast	Without Ballast
Rear Tires	No., size, ply & psi	Four 18.4-38;8;14	Four 18.4-38;8;14
Ballast	—Liquid	None	None
	Cast Iron	350 lb each	None
Front Tires	—No., size, ply & psi	Two 11.00-16;8;32	Two 11.00-16;8;32
Ballast	—Liquid	None	None
	Cast Iron	93 lb	None
Height at drawbar		22 inches	22½ inches
Static weight with operator—rear		14060 lb	12662 lb
front		3930 lb	3745 lb
total		17990 lb	16407 lb

## Department of Agricultural Engineering

Dates of Test: September 4 to September 17, 1973

Manufacturer: WHITE FARM EQUIPMENT COMPANY, CHARLES CITY, IOWA

**FUEL, OIL AND TIME** Fuel No 2 Diesel Cetane No 50.1 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8341 Weight per gallon 6.945 lb Oil SAE 30 API service classification SB/SE-CA/CD (formerly MS-DS) To motor 2.878 gal Drained from motor 2.482 gal Transmission and final drive lubricant SAE 80 Total time engine was operated 46 hours.

**ENGINE** Make Caterpillar Diesel Type eight cylinder vee Serial No 97M-3277 Crankshaft Mounted lengthwise Rated rpm 2600 Bore and stroke 4.5" x 4.5" Compression ratio 17.0 to 1 Displacement 573 cu in Cranking system 12 volt electric (two 12 volt batteries) Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow with two replaceable screw-on paper cartridges Oil cooler engine coolant heat exchanger Fuel filter replaceable pleated paper screw-on cartridge Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No. 235998-705 Tread width rear 61" to 91" front 63" to 83" Wheel base 108.4" 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 23.8" Vertical distance above ground 40.1" Horizontal distance forward from center-line 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 1.5 second 1.8 third 2.2 fourth 2.8 fifth 3.4 sixth 3.6 seventh 4.0 eighth 4.4 ninth 4.9 tenth 5.3 eleventh 5.9 twelfth 6.7 thirteenth 7.1 fourteenth 8.1 fifteenth 9.7 sixteenth 11.9 seventeenth 14.3 eighteenth 17.1 reverse 1.8, 2.2, 2.6, 4.4, 5.3 and 6.3 Clutch single dry disc operated by foot pedal Brakes dry triple disc operated by two foot pedals Steering hydrostatic Turning radius (on concrete surface with brake applied) right 140.5" left 140.5" (on concrete surface without brake) right 170.3" left 170.3" Turning space diameter (on concrete surface with brake applied) right 297" left 297" (on concrete surface without brake) right 356.5" left 356.5" Belt pulley none Power take-off 1023 rpm at 2600 engine rpm.

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure.

First, second, third and fourth gears were not run as it was necessary to limit the pull in fifth gear due to excessive slippage.

Seventh, eighth, tenth, twelfth, fifteenth, sixteenth, seventeenth and eighteenth gears were not run as test procedure requires only six travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1140. 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  
H. W. Ottoson, Director & Acting Dean; 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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

## 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 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.

**Varying Power and Fuel Consumption With Ballast.** The varying power runs are made to show the effects 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

**Maximum Power with Ballast.** Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. 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.

**Varying Drawbar Pull 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.

## SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



OLIVER 2255 DIESEL