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Test 1041: Oliver 1655 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1041—OLIVER 1655 DIESEL (ALSO MINNEAPOLIS-MOLINE G750 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
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MAXIMUM POWER AND FUEL CONSUMPTION

Rated Engine Speed—Two Hours (PTO Speed—994 rpm)

70.57	2200	5.041	0.495	14.00	190	65	75	28.850
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VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

62.27	2284	4.213	0.469	14.78	182	65	75
0.00	2403	1.334	.....	.....	173	65	75	.....
32.04	2352	2.637	0.570	12.15	177	65	75	.....
70.97	2200	5.049	0.493	14.06	189	65	75	.....
16.22	2379	1.957	0.836	8.29	174	64	74	.....
47.42	2322	3.373	0.493	14.06	179	65	75	.....
Av 38.15	2323	3.094	0.562	12.33	179	65	75	28.890

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 Cool- ing med	Air wet bulb	Air dry bulb	Barometer inches of Mercury
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VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—7th Gear (3rd Direct)

60.07	5434	4.15	2199	7.63	4.874	0.562	12.32	179	56	71	28.990
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75% of Pull at Maximum Power—Ten Hours—7th Gear (3rd Direct)

49.42	4200	4.41	2285	5.40	3.942	0.553	12.54	182	70	86	28.798
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50% of Pull at Maximum Power—Two Hours—7th Gear (3rd Direct)

34.73	2839	4.59	2338	3.92	3.080	0.614	11.28	171	48	54	29.015
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MAXIMUM POWER WITH BALLAST

55.46	9097	2.29	2233	14.78	2nd Gear (1st Direct)	181	64	72	28.860
59.60	6604	3.38	2202	9.22	5th Gear (3rd Under)	179	50	58	29.050
60.47	6287	3.61	2201	9.02	6th Gear (2nd Direct)	178	50	59	29.050
61.90	5603	4.14	2201	7.70	7th Gear (3rd Direct)	180	52	62	29.050
59.87	4455	5.04	2195	6.12	9th Gear (3rd Over)	176	49	57	29.050
61.21	4363	5.26	2203	6.12	10th Gear (4th Under)	175	49	57	29.050
60.23	3518	6.42	2205	4.64	11th Gear (4th Direct)	181	64	72	28.860
60.07	2803	8.04	2198	3.70	14th Gear (5th Direct)	181	64	74	28.860

MAXIMUM PULL WITHOUT BALLAST

48.69	6284	2.91	2260	14.99	4th Gear (2nd Under)	183	71	90	28.850
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—7th Gear (3rd Direct)

Pounds Pull	5603	5835	5930	6133	6201	6210	6136
Horsepower	61.90	57.48	51.84	46.83	40.17	33.70	26.81
Crankshaft Speed rpm	2201	1971	1750	1535	1305	1093	879
Miles per Hour	4.14	3.69	3.28	2.86	2.43	2.04	1.64
Slip of Drivers %	7.70	8.23	8.23	8.50	8.76	8.76	8.63

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 18.4-34; 6; 16	Two 18.4-34; 6; 16
Ballast	—Liquid	1037 lb each	None
	—Cast iron	None	None
Front tires	—No, size, ply & psi	Two 7.50-16; 6; 40	Two 7.50-16; 6; 40
Ballast	—Liquid	None	None
	—Cast iron	23 lb each	None
Height of drawbar		20½ inches	22 inches
Static weight with operator—Rear		8835 lb	5850 lb
	Front	2265 lb	2220 lb
	Total	11100 lb	8070 lb

Department of Agricultural Engineering

Dates of Test: May 5 to May 22, 1970

Manufacturer: WHITE FARM EQUIPMENT, HOPKINS, MINNESOTA

FUEL, OIL and TIME Fuel No. 2 Diesel Cetane 50.8 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8322 Weight per gallon 6.928 lb Oil SAE 30 API service classification MS, DS To motor 2.004 gal Drained from motor 1.740 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 45 hours.

ENGINE Make Oliver Diesel Type 6 cylinder vertical Serial No 180739 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3⅞" x 4" Compression ratio 16 to 1 Displacement 283 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner dry type with automatic dust unloader Oil filter full flow replaceable cotton element Fuel filter primary filter with replaceable cotton cartridge and secondary filter with replaceable pleated paper cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 220-062-490 Tread width rear 56½" to 89¼" front 60" to 84" Wheel base 105½" 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 (3) range operator controlled power shifting Advertised speeds mph first 2.19 second 2.64 third 3.16 fourth 3.28 fifth 3.72 sixth 3.96 seventh 4.49 eighth 4.74 ninth 5.38 tenth 5.58 eleventh 6.73 twelfth 6.93 thirteenth 8.06 fourteenth 8.35 fifteenth 10.01 sixteenth 11.78 seventeenth 14.20 eighteenth 17.02 reverse 2.54, 3.06, 3.66, 4.31, 5.20, 6.23 Clutch single plate dry disc operated by foot pedal Brakes twin disc operated by two foot pedals that can be locked together Steering hydrostatic power 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 1035 rpm at 220 engine rpm diam 11¼" face 8" Belt speed 3106 fpm Power take-off 994 rpm at 2200 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. First gear was not run as it was necessary to limit the pull in second gear because of excessive slippage. The third, fourth, eighth, twelfth, thirteenth, fifteenth, sixteenth, seventeenth and eighteenth gears were not run as test procedure requires only eight gears.

We, the undersigned certify that this is a true and correct report of official Tractor Test 1041.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE

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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

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.

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.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 8 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.

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 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.

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



OLIVER 1655 DIESEL