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Test 1159: White Field Boss 4-150 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1159 – WHITE FIELD BOSS 4-150 DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Cooling medium	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1022 rpm)								
151.87	2800	10.247	0.468	14.82	178	63	75	29.063
Standard Power Take-off Speed (1000 rpm)—One Hour								
152.45	2739	10.102	0.460	15.09	178	62	75	29.075
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
131.24	2849	9.196	0.486	14.27	178	62	76	.....
0.00	2968	3.750	.....	.....	171	62	77	.....
67.32	2921	6.393	0.659	10.53	175	61	75	.....
152.57	2800	10.225	0.465	14.92	179	62	77	.....
34.04	2945	5.056	1.030	6.73	173	61	75	.....
99.78	2885	7.751	0.539	12.87	177	62	76	.....
Av 80.83	2894	7.062	0.606	11.45	175	62	76	29.090

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 Cool- ing med	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITHOUT BALLAST											
Maximum Available Power—Two Hours—8th Gear (3-DD)											
125.79	10141	4.65	2798	4.43	10.092	0.556	12.46	180	67	78	28.920
75% of Pull at Maximum Power—Ten Hours—8th Gear (3-DD)											
100.60	7849	4.81	2853	3.13	8.870	0.612	11.34	178	71	82	28.620
50% of Pull at Maximum Power—Two Hours—8th Gear (3-DD)											
68.52	5205	4.94	2902	2.16	7.443	0.753	9.21	176	59	68	28.810
50% of Pull at Reduced Engine Speed—Two Hours—11th Gear (4-DD)											
68.87	5232	4.94	2164	2.28	5.803	0.584	11.87	174	61	65	28.815
MAXIMUM POWER WITHOUT BALLAST											
92.76	16925	2.06	2856	14.52	3rd Gear (1-OD)			178	66	76	28.750
129.99	10454	4.66	2802	4.31	8th Gear (3-DD)			178	65	73	28.940
131.13	9403	5.23	2801	3.70	9th Gear (4-UD)			178	63	70	28.940
126.72	8431	5.64	2797	3.23	10th Gear (3-OD)			178	63	70	28.955
133.34	7885	6.34	2800	3.15	11th Gear (4-DD)			178	64	73	28.960
121.36	5038	9.03	2800	1.80	14th Gear (5-DD)			179	65	73	28.730
VARYING DRAWBAR PULL AND TRAVEL SPEED WITHOUT BALLAST 8th Gear (3-DD)											
Pounds Pull			10454	11020	11894	12478	12905	13669	13842	11539	
Horsepower			129.99	122.86	117.48	106.76	94.14	82.84	65.18	43.90	
Crankshaft Speed rpm			2802	2520	2244	1951	1671	1398	1106	863	
Miles Per Hour			4.66	4.18	3.70	3.21	2.74	2.27	1.79	1.43	
Slip of Drivers %			4.31	4.47	5.22	5.97	5.82	6.56	6.71	5.37	

TRACTOR SOUND LEVEL (with cab)

	dB (A)
Maximum Available Power 2 Hours	81.0
75% of Pull at Max. Power 10 Hours	81.0
50% of Pull at Max. Power 2 Hours	81.0
50% of Pull at Reduced Engine Speed 2 Hours	81.0
Bystander—18th gear (6-OD)	91.5

TIRES, BALLAST AND WEIGHT

Rear Tires —No., size, ply & psi	Four 18.4-38;8;12
Ballast —Liquid	None
Cast iron	None
Front Tires —No., size, ply & psi	Four 18.4-38;8;12
Ballast —Liquid	None
Cast iron	None
Height of drawbar	25½ inches
Static weight with operator—rear	5910 lb
front	11050 lb
total	16960 lb

Department of Agricultural Engineering

Dates of Test: May 21 to May 29, 1974

Manufacturer: WHITE FARM EQUIPMENT CO., CHARLES CITY, IOWA

FUEL, OIL AND TIME Fuel No 2 Diesel Cetane No 51.9 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8330 Weight per gallon 6.936 lb Oil SAE 30 API service classification SB/SE-CA/CD To motor 3.305 gal Drained from motor 2.185 gal Transmission and final drive lubricant SAE 80-90 Total time engine was operated 54 hours.

ENGINE Make Caterpillar Diesel Type eight cylinder Vee Serial No 90N1893 Crankshaft Mounted lengthwise Rated rpm 2800 Bore and stroke 4.5" x 5.0" Compression ratio 16.5 to 1 Displacement 636 cu in Cranking system 12 volt electric 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 vertical Cooling medium temperature control thermostat.

CHASSIS Type four-wheel drive Serial No 246 136-403 Tread width rear 60" to 108" front 60" to 108" Wheel base 115.6" 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 76" Vertical distance above roadway 37" 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 shift Advertised speeds mph first 1.6 second 1.9 third 2.3 fourth 3.0 fifth 3.7 sixth 4.0 seventh 4.4 eighth 4.8 ninth 5.4 tenth 5.8 eleventh 6.5 twelfth 7.5 thirteenth 7.7 fourteenth 9.1 fifteenth 10.9 sixteenth 13.3 seventeenth 16.0 eighteenth 19.2 reverse 1.9, 2.3, 2.8, 4.8, 5.8 and 7.0 Clutch single dry button disc operated by foot pedal Brakes dry triple disc operated by a foot pedal Steering hydrostatic Turning radius (on concrete surface without brake) right 211" left 217" Turning space diameter (on concrete surface without brake) right 442" left 453" Power take-off 1022 rpm at 2800 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 and second gears were not run as it was necessary to limit the pull in third gear due to excessive slippage.

Fourth, fifth, sixth, seventh, 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 1159.

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 and Acting Dean

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.



WHITE FIELD BOSS 4-150 DIESEL