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Test 1184: White Field Boss 4-180 Diesel 12-Speed

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1184 – WHITE FIELD BOSS 4-180 DIESEL 12 SPEED

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
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1022 rpm)								
181.07	2801	12.983	0.496	13.95	183	63	75	28.937
Standard Power Take-off Speed (1000 rpm)—One Hour								
182.30	2739	12.845	0.487	14.19	183	62	75	28.955
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
158.83	2892	11.260	0.490	14.11	174	62	74	.....
0.00	3058	4.180	.....	.....	172	62	73	.....
82.42	2999	7.549	0.633	10.92	173	62	74	.....
181.04	2799	12.932	0.494	14.00	182	63	75	.....
41.59	3029	5.865	0.975	7.09	172	63	75	.....
121.72	2955	9.255	0.525	13.15	176	63	76	.....
Av 97.60	2955	8.507	0.602	11.47	175	62	74	28.967

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
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITHOUT BALLAST											
Maximum Available Power—Two Hours—6th Gear (3-H)											
150.52	10131	5.57	2800	3.52	12.769	0.586	11.79	191	73	80	29.075
75% of Pull at Maximum Power—Ten Hours—6th Gear (3-H)											
122.98	7853	5.87	2929	2.75	10.639	0.598	11.56	177	73	78	28.915
50% of Pull at Maximum Power—Two Hours—6th Gear (3-H)											
84.30	5240	6.03	2978	1.70	8.447	0.692	9.98	179	73	87	29.055
50% of Pull at Reduced Engine Speed—Two Hours—8th Gear (4-H)											
83.86	5207	6.04	2161	1.67	6.421	0.529	13.06	178	75	91	29.010
MAXIMUM POWER WITHOUT BALLAST											
116.99	20469	2.14	2932	14.44	2nd Gear (1-H)	177	69	75	28.800		
155.86	16649	3.51	2792	6.38	3rd Gear (2-L)	180	72	75	29.080		
156.12	13581	4.31	2799	4.82	4th Gear (2-H)	182	72	75	29.080		
156.54	12796	4.59	2800	4.29	5th Gear (3-L)	182	71	74	29.080		
155.43	10464	5.57	2799	3.52	6th Gear (3-H)	181	70	72	29.060		
151.57	5297	10.73	2799	1.79	10th Gear (5-H)	181	72	77	29.080		

VARYING DRAWBAR PULL AND TRAVEL SPEED WITHOUT BALLAST— 6th Gear (3-H)											
Pounds Pull			10464	11470	12246	13039	13657	13954	13782		
Horsepower			155.43	153.25	144.73	133.49	120.03	101.60	80.38		
Crankshaft Speed rpm			2799	2527	2242	1950	1679	1394	1116		
Miles Per Hour			5.57	5.01	4.43	3.84	3.30	2.73	2.19		
Slip of Drivers %			3.52	3.76	4.06	4.52	4.67	4.97	4.82		

TRACTOR SOUND LEVEL WITH CAB										dB(A)
Maximum Available Power 2 Hours										81.5
75% of Pull at Max. Power 10 Hours										83.5
50% of Pull at Max. Power 2 Hours										82.5
50% of Pull at Reduced Engine Speed 2 Hours										82.5
Bystander in 12th Gear (6-H)										95.5

TIRES, BALLAST AND WEIGHT

Rear Tires	—No., size, ply & psi
Ballast	—Liquid
Front Tires	Cast Iron
Ballast	—No., size, ply & psi
	—Liquid
	Cast Iron
Height of drawbar	
Static weight with operator—rear	
front	
total	

Tested Without Ballast

Inner two 18.4-38; 8; 12
Outer two 18.4-38; 8; 10
None
None
Inner two 18.4-38; 8; 12
Outer two 18.4-38; 8; 10
None
None
21 inches
7360 lb
13240 lb
20600 lb

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska – Lincoln
H. W. Ottoson, Director

Department of Agricultural Engineering

Dates of Test: August 20 to August 29, 1975

Manufacturer: WHITE FARM EQUIPMENT
CO., Charles City, Iowa

FUEL, OIL AND TIME Fuel No. 2 Diesel
Cetane No. 51.7 (rating taken from oil company's
typical inspection data) Specific gravity con-
verted to 60°/60° 0.830 Weight per gallon 6.911
lbs Oil SAE 30 API service classification
SB/SE-CA/CD To motor 3.156 gal Drained
from motor 1.918 gal Transmission and final
drive lubricant SAE 80-90 Total time engine
was operated 49.5 hours.

ENGINE Make Caterpillar Diesel Type eight
cylinder vee Serial No 90N13907 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 for crankcase oil Fuel filter re-
placeable pleated paper screw-on cartridge Muf-
fler underhood Exhaust vertical Cooling me-
dium temperature control two thermostats.

CHASSIS Type four wheel drive with
duals Serial No. 256-709-405 Tread width
rear 62" to 113" front 62" to 113" Wheel base
115.625" 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 74.3" Vertical distance above roadway
36.5" Horizontal distance from center of rear
wheel tread 0" to the right/left Hydraulic con-
trol system direct engine drive Transmission
selective gear, fixed ratio Advertised speeds mph
first 1.9 second 2.4 third 3.7 fourth 4.5 fifth 4.7
sixth 5.7 seventh 6.5 eighth 7.8 ninth 8.9 tenth
10.7 eleventh 15.7 twelfth 18.9 reverse 2.4; 2.8;
5.7; 6.9 Clutch two dry plates operated by foot
pedal Brakes dry multiple disc operated by
foot pedal Steering hydrostatic and articulated
Turning radius (on concrete surface without
brake) right 211" left 217" Turning space di-
ameter (on concrete surface without brake) right
442" left 453" Power take-off 1000 rpm at 2739
engine rpm.

REPAIRS AND ADJUSTMENTS: During pre-
liminary PTO runs the alternator fan guard
was found to be cracked and was replaced.
During the 2 hour maximum PTO run an air-
conditioner line was melted off and freon was
lost.

REMARKS: All test results were determined
from observed data obtained in accordance with
SAE and ASAE test code or official Nebraska test
procedure. Fuel return temperature was 159°F.
Six gears were chosen between 15% slip and
15 MPH.

We, the undersigned, certify that this is a true
and correct report of official Tractor Test 1184.

LOUIS I. LEVITICUS

Engineer-in-charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories may be disconnected only when the means for disconnecting can be reached from the operator station. 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 use.

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 mph. The slip 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 4-180 DIESEL