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## Test 1158: International Hydro 100 Diesel

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 1158 – INTERNATIONAL HYDRO 100 DIESEL

## 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								
104.17	Rated Engine Speed—Two Hours (PTO Speed—1159 rpm)							
	2400	7.633	0.507	13.65	201	61	75	28.870
101.30	Standard Power Take-off Speed (1000 rpm)—One Hour							
	2072	6.832	0.467	14.83	205	62	75	28.905
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
91.75	2487	6.920	0.522	13.26	190	63	76	.....
0.00	2621	2.973	.....	.....	165	61	75	.....
47.05	2558	4.823	0.710	9.76	173	61	74	.....
104.91	2400	7.657	0.505	13.70	200	61	75	.....
23.87	2596	3.969	1.151	6.01	168	62	75	.....
69.95	2524	5.807	0.575	12.05	180	62	75	.....
Av 56.26	2531	5.358	0.659	10.50	179	62	75	28.917

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Cool- ing med	Degrees F		Barometer inches of Mercury
					Gal per hr	Lb per hp-hr			Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—Speed Setting—5.5 MPH Hi Range											
78.31	5287	5.55	2399	5.81	7.565	0.669	10.35	195	51	66	28.560
75% of Pull at Maximum Power—Ten Hours—Speed Setting—5.5 MPH Hi Range											
67.68	4127	6.15	2498	4.21	6.641	0.679	10.19	180	53	66	28.680
50% of Pull at Maximum Power—Two Hours—Speed Setting—5.5 MPH Hi Range											
50.72	2838	6.70	2538	2.83	5.670	0.774	8.95	172	56	60	28.540

## 50% of Pull at Reduced Engine Speed Speed Setting—11.6 MPH Hi Range at 2400 engine RPM

50.48	2812	6.73	1453	2.63	4.388	0.602	11.50	190	63	71	28.630
<b>MAXIMUM POWER WITH BALLAST</b>											
74.59	9801	2.85	2392	14.72	The infinitely	L. Rng.	185	59	67	28.830	
77.34	7425	3.91	2399	8.66	variable drive	L. Rng.	190	49	62	28.590	
76.96	6349	4.55	2400	6.97	control was set	L. Rng.	192	49	64	28.590	
80.72	5488	5.52	2400	5.81	by mfg. to give	H. Rng.	188	47	59	28.590	
82.13	4798	6.42	2402	4.93	the travel	H. Rng.	182	45	55	28.580	
81.28	3739	8.15	2399	3.72	speeds shown	H. Rng.	189	50	64	28.590	

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST Speed Setting—5.5 MPH Hi Range

Pounds Pull	5488	6073	6329	6753	7074	6987
Horsepower	80.72	78.72	72.54	66.05	57.04	45.57
Crankshaft Speed rpm	2400	2155	1919	1685	1440	1194
Miles Per Hour	5.52	4.86	4.30	3.67	3.02	2.45
Slip of Drivers %	5.81	6.54	6.97	7.54	7.97	7.97

## TRACTOR SOUND LEVEL (with Deluxe Cab)

	dB (A)
Maximum Available Power 2 Hours	89.5
75% of Pull at Max. Power 10 Hours	91.5
50% of Pull at Max. Power 2 Hours	89.5
50% of Pull at Reduced Engine Speed 2 Hours	87.5
Bystander (17 MPH Hi Range)	90.0

## TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
<b>Rear Tires</b>		
Ballast	Two 18.4-38;8;16	Two 18.4-38;8;16
	285 lb each	None
	None	None
<b>Front Tires</b>		
Ballast	Two 11L-15;6;28	Two 11L-15;6;28
	None	None
	33 lb each	None
<b>Height of drawbar</b>	20 inches	20½ inches
<b>Static weight with operator—rear</b>	9270 lb	8700 lb
<b>front</b>	3495 lb	3430 lb
<b>total</b>	12765 lb	12130 lb

## Department of Agricultural Engineering

Dates of Test: May 7 to May 18, 1974

Manufacturer: INTERNATIONAL HARVEST-  
ER, CHICAGO, ILLINOIS

**FUEL, OIL AND TIME** Fuel No 2 Diesel  
Cetane No 51.9 (rating taken from oil company's  
typical inspection data) Specific gravity con-  
verted to 60°/60° 0.8315 Weight per gallon  
6.923 lb Oil SAE 30 API service classification  
I.H. No 1 engine oil SAE 30 recommended or  
series 3 (CD, CC, CB, CA, SE, SD, SC) To  
motor 4.353 gal Drained from motor 2.260 gal  
Transmission and final drive lubricant I.H. Hy-  
Tran Fluid Total time engine was operated 59  
hours.

**Engine** Make International Diesel Type 6  
cylinder vertical Serial No 436DT2U013518\*  
Crankshaft Mounted lengthwise Rated rpm  
2400 Bore and stroke 4.30" x 5.00" Compre-  
ssion ratio 15.8 to 1 Displacement 436 cu in  
Cranking system 12 volt electric Lubrication  
pressure Air cleaner two stage dry type with  
replaceable pleated paper primary and safety  
elements with automatic dust unloader Oil  
filter two full flow pleated paper screw-on  
cartridges Oil Cooler engine coolant heat ex-  
changer for engine oil and radiator for transmis-  
sion and hydraulic oil Fuel filter one primary  
and one final using replaceable pleated paper  
screw-on cartridges Muffler vertical Cooling  
medium temperature control thermostat.

**CHASSIS** Type standard Serial No  
2690003U00754\* Tread width rear 60" to 104"  
front 60" to 84" Wheel base 104.8" Center of  
gravity (without operator or ballast, with mini-  
mum tread, with fuel tank filled and tractor  
serviced for operation) Horizontal distance  
forward from center-line of rear wheels 29.6"  
Vertical distance above roadway 42.7" Hor-  
izontal distance from center of rear wheel tread  
0" to the right/left Hydraulic control system  
direct engine drive Transmission infinitely vari-  
able hydrostatic using variable displacement  
pump and motor. A range transmission provides  
Hi and Lo range Advertised speeds mph Lo  
range—0 to 7; Hi range—0 to 17; reverse Lo  
range—0 to 3.2; reverse Hi range—0 to 7 Clutch  
none—hydrostatic drive can be controlled by  
foot pedal Brakes dry double disc hydraulically  
power actuated by two foot pedals that can be  
locked together with automatic equalizing Steer-  
ing hydrostatic Turning radius (on concrete  
surface with brake applied) right 144" left 144"  
(on concrete surface without brake) right 165"  
left 165" Turning space diameter (on concrete  
surface with brake applied) right 295" left 295"  
(on concrete surface without brake) right 338"  
left 338" Power take-off 1000 rpm at 2172  
engine rpm and 539 rpm at 2100 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.

Slower travel speeds were not run as the  
maximum drawbar pull was limited to avoid  
excessive slippage. Other travel speeds 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 1158.

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. Ottosen, 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.



INTERNATIONAL HYDRO 100 DIESEL