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## Test 1151: International 666 and 686 Diesel

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 1151 – INTERNATIONAL 666 DIESEL (ALSO INTERNATIONAL 686 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	Air dry bulb	Barometer inches of Mercury
<b>Rated Engine Speed—Two Hours—(PTO Speed—543 rpm)</b>								
66.29	1999	4.654	0.486	14.24	187	70	75	28.977
<b>VARYING POWER AND FUEL CONSUMPTION—Two Hours</b>								
58.21	2067	4.071	0.484	14.30	181	70	74	.....
0.00	2212	1.487	.....	.....	168	70	73	.....
30.21	2142	2.792	0.640	10.82	172	69	72	.....
66.48	2001	4.634	0.482	14.35	187	71	74	.....
15.35	2179	2.146	0.967	7.15	169	71	74	.....
44.60	2108	3.377	0.524	13.21	177	70	74	.....
Av 35.81	2118	3.085	0.596	11.60	175	70	73	28.990

## 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	Air dry bulb	Barometer inches of Mercury
<b>VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST</b>											
<b>Maximum Available Power—Two Hours—7th Gear (3 DD)</b>											
58.01	4240	5.13	2001	5.73	4.606	0.549	12.60	168	30	31	29.200
<b>75% of Pull at Maximum Power—Ten Hours—7th Gear (3 DD)</b>											
46.80	3208	5.47	2100	4.15	3.905	0.577	11.98	166	30	32	29.430
<b>50% of Pull at Maximum Power—Two Hours—7th Gear (3 DD)</b>											
33.05	2184	5.67	2149	2.80	3.251	0.681	10.16	167	31	36	29.150
<b>50% of Pull at Reduced Engine Speed—Two Hours—8th Gear (4 DD)</b>											
32.59	2161	5.66	1503	2.87	2.655	0.564	12.27	169	30	31	29.170

## MAXIMUM POWER WITH BALLAST

55.44	8012	2.60	2036	15.00	3rd Gear (2 TA)	168	32	36	29.290
56.03	6283	3.34	2001	8.95	4th Gear (3 TA)	168	40	43	29.010
58.34	5308	4.12	2002	7.35	5th Gear (2 DD)	168	39	41	29.010
57.50	4412	4.89	2000	5.83	6th Gear (4 TA)	168	40	43	29.040
58.34	4274	5.12	1993	5.48	7th Gear (3 DD)	169	42	46	29.010
58.13	2947	7.40	2001	3.76	8th Gear (4 DD)	168	39	40	29.040

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 7th Gear (3 DD)

Pounds Pull	4274	4686	4970	5083	4992	4784
Horsepower	58.34	56.57	54.21	47.65	40.34	32.10
Crankshaft Speed rpm	1993	1776	1612	1388	1196	990
Miles Per Hour	5.12	4.53	4.09	3.52	3.03	2.52
Slip of Drivers %	5.48	6.25	6.67	6.81	6.81	6.53

## TRACTOR SOUND LEVEL WITHOUT CAB

	dB (A)
Maximum Available Power 2 Hours	93.0
75% of Pull at Max. Power 10 Hours	94.5
50% of Pull at Max. Power 2 Hours	94.5
50% of Pull at Reduced Engine Speed 2 Hours	91.0
Bystander 10th Gear (5 DD)	89.5

## TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
<b>Rear Tires</b>		
Ballast	Two 18.4-34;6;16	Two 18.4-34;6;16
	1020 lb each	None
	35 lb each	None
<b>Front Tires</b>		
Ballast	Two 9.5L-15;6;28	Two 9.5L-15;6;28
	None	None
	None	None
<b>Height of Drawbar</b>	18½ inches	19 inches
<b>Static weight with operator—rear</b>	7780 lb	5670 lb
<b>front</b>	2550 lb	2530 lb
<b>total</b>	10330 lb	8200 lb

## Department of Agricultural Engineering

**Dates of Test:** November 3 to November 14, 1973

**Manufacturer:** INTERNATIONAL HAR-  
VESTER, CHICAGO, ILLINOIS

**FUEL, OIL AND TIME** Fuel No 2 Diesel  
Cetane No 50.1 (rating taken from oil company's  
typical inspection data) **Specific gravity** con-  
verted to 60°/60° 0.8311 **Weight per gallon**  
6.920 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) (Formerly  
DS, DM, DG, MS) **To motor** 2.671 gal **Drained**  
from motor 1.655 gal **Transmission and final**  
**drive lubricant** I.H. Hy-Tran **Total time**  
engine was operated 42½ hours.

**ENGINE** Make International Diesel **Type**  
6 cylinder vertical **Serial** No 312DT2U002624  
**Crankshaft** Mounted lengthwise **Rated rpm**  
2000 **Bore and stroke** 3.875" x 4.410" **Com-  
pression ratio** 17 to 1 **Displacement** 312 cu in  
**Cranking system** 12 volt electric **Lubrication**  
pressure **Air cleaner** dual stage type with re-  
placeable pleated paper element and automatic  
dust unloader **Oil filter** two full flow pleated  
paper screw-on cartridges **Oil cooler** engine  
coolant heat exchanger for engine oil and ra-  
diator for transmission and hydraulic oil **Fuel**  
**filter** one primary and one final using replace-  
able pleated paper screw-on cartridges **Muffler**  
was used **Cooling medium** temperature control  
thermostat.

**CHASSIS** **Type** standard **Serial** No 2450147  
U010660 **Tread width** rear 60" to 98" front  
58" to 82" **Wheel base** 103" **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 31.2" Vertical distance  
above roadway 35.7" 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 par-  
tial range operator controlled power shifting  
**Advised speeds mph** first 1.8, second 2.5,  
third 2.8, fourth 3.5, fifth 4.3, sixth 5.0, seventh  
5.1, eighth 7.3, ninth 11.0, tenth 16.5, reverse  
2.0 and 3.0 **Clutch** single plate dry disc operated  
by foot pedal **Brakes** double dry disc operated  
by individual foot pedals that can be locked  
together **Steering** 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 ap-  
plied) right 298" left 298" (on concrete surface  
without brake) right 339" left 339" **Power**  
**take-off** 543 rpm at 2000 engine rpm.

**REPAIRS AND ADJUSTMENTS:** No re-  
pairs 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.

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 1151.  
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.



INTERNATIONAL 666 DIESEL