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## Test 755: International TD-5 (Diesel)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 755 - INTERNATIONAL TD-5 DIESEL

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean and Acting Director, Lincoln, Nebraska

## POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of mercury
		Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed— Two Hours								
35.25	2000	2.507	0.505	14.06	195	77	84	28.813
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
31.37	2094	2.197	0.497	14.28	184	79	88	.....
0.00	2187	0.760	.....	.....	143	78	87	.....
16.06	2145	1.411	0.624	11.38	160	78	87	.....
35.18	2000	2.535	0.512	13.88	206	80	90	.....
8.12	2164	1.048	0.916	7.75	159	80	90	.....
23.80	2120	1.791	0.534	13.29	175	80	90	.....
Av 19.09	2118	1.624	0.604	11.75	171	79	89	28.787

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temperature Degrees F		Barometer inches of mercury	
					Gal per hr	Lb hp hr		Cooling medium	Air wet bulb		Air dry bulb
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—2nd Gear											
29.61	5006	2.22	2000	1.45	2.491	0.597	11.89	207	80	91	28.900
75% of Pull at Maximum Power—Ten Hours—2nd Gear											
23.49	3759	2.34	2104	1.32	2.047	0.619	11.48	178	79	89	28.987
50% of Pull at Maximum Power—Two Hours—2nd Gear											
15.97	2518	2.38	2131	1.13	1.579	0.702	10.11	171	81	94	28.905
MAXIMUM POWER WITH BALLAST											
27.29	7574	1.35	2026	6.82	1st Gear.....		180	74	84	29.070	
30.21	5097	2.22	2002	1.48	2nd Gear.....		190	74	82	28.915	
27.82	2943	3.54	2004	1.02	3rd Gear.....		200	80	90	28.930	
26.61	2111	4.73	1999	1.14	4th Gear.....		190	80	90	28.930	
25.47	1480	6.45	1998	0.84	5th Gear.....		185	80	90	28.930	
28.13	7396	1.43	2001	3.82	2nd Gear Torque-Amp		180	71	81	29.070	
29.01	4566	2.38	2006	1.42	3rd Gear Torque-Amp		180	78	86	28.900	
27.79	3271	3.19	1998	1.21	4th Gear Torque-Amp		200	80	90	28.930	
27.12	2338	4.35	2002	1.14	5th Gear Torque-Amp		187	80	92	28.930	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—2nd Gear											
Pounds pull			5100	5050	5350	5250	5250	5000			
Horsepower			30.2	26.9	25.7	21.0	18.2	14.7			
Miles per hour			2.2	2.0	1.8	1.5	1.3	1.1			

Department of Agricultural Engineering

Dates of Test: August 24 to September 3, 1960

Manufacturer: INTERNATIONAL HARVESTER  
COMPANY OF CANADA LTD., HAMILTON,  
ONTARIO, CANADA

Manufacturer's Power Rating: Not Rated

**FUEL, OIL and TIME** Fuel No 2 Diesel Cetane No 47 (rating taken from oil company's typical inspection data Specific gravity converted to 60°/60° 0.8528 Weight per gallon 7.101 lb Oil SAE 10W-30 API service classification MS, DM To motor 1.100 gal Drained from motor 0.750 gal Transmission lubricant IH Hy Tran Final-drive lubricant SAE 90 Type gear lube Total time engine was operated 47½ hours.

**ENGINE** Make International Harvester Diesel Type 4 cylinder vertical Serial No 1988C Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3⅝" x 4" Compression ratio 21.1 to 1 Displacement 144 cu in Cranking system 12 volt (two 6 volt batteries) Lubrication pressure Air cleaner oil washed wire screen oil filter replaceable treated paper element Fuel filter replaceable treated paper element Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type tracklayer Serial No 2344ADT Tread width 48" Wheel base 68" drawbar height 13" Measured length of track 17½" ft Cleats integral with shoes Cleats per track 35 Size of cleats 12" x 2" 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 31.91" Vertical distance above roadway 18.95" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission fixed ratio operator controlled partial range power shifting Advertised speeds mph first 1.48 second 2.26 third 3.58 fourth 4.79 fifth 6.54 reverse 2.12 (using torque amplifier) first 1.00 second 1.53 third 2.42 fourth 3.23 fifth 4.31 reverse 1.43 Clutch single plate dry disc operated by foot pedal Brakes contracting bands operated independently by two hand levers or by one foot pedal Steering hand levers controlling multiple disc clutches and brakes Turning space diameter (with brake applied) right 153" left 153" Belt pulley 1270 rpm at 2000 engine rpm diam 9½" face 6⅝" Belt speed 3160 fpm Power take-off 980 rpm at 2000 engine rpm.

**TOTAL WEIGHT** with operator 7155 lb including front end weights 375 lbs, and crankcase guard 100 lbs.

**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 torque amplifier drive was not run as it was necessary to limit the pull in first gear direct drive to avoid excessive slippage.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 755.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT, Chairman

G. W. STEINBRUEGGE

J. J. SULEK

Board of Tractor

Test Engineers

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

## 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,  $\frac{1}{2}$  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. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

**Varying Power and Fuel Consumption With Ballast.** The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, 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. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

**Maximum Power with Ballast.** Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 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 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 Power Without Ballast.** All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

**Varying Power 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.



International TD-5 Diesel