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## Test 529: International Model TD-24

Nebraska Tractor Test Lab

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

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Department of Agricultural Engineering  
Dates of test: October 22 to October 29, 1954  
Manufacturer: INTERNATIONAL HARVESTER  
COMPANY, CHICAGO, ILLINOIS  
Manufacturer's rating: 155 Drawbar HP in 3rd Gear  
(Corrected)

NEBRASKA TRACTOR TEST NO. 529

INTERNATIONAL TD-24

# DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercur
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool- ing med	Air	
TESTS F & G—100% MAXIMUM LOAD											
146.28	37160	1.48	1411	9.93	.....	Not Recorded	.....	180	42	28.980	
151.61	28492	2.00	1404	3.74	.....	Not Recorded	.....	180	40	28.980	
154.05	23416	2.47	1406	1.56	.....	Not Recorded	.....	186	70	28.890	
153.30	18178	3.16	1404	0.68	.....	Not Recorded	.....	173	71	28.880	
144.09	13124	4.12	1401	0.29	.....	Not Recorded	.....	180	75	28.880	
135.35	9689	5.24	1400	0.19	.....	Not Recorded	.....	180	70	28.860	
122.19	7318	6.26	1401	0.17	.....	Not Recorded	.....	175	70	28.860	
117.19	5488	8.01	1407	0.13	.....	Not Recorded	.....	175	66	28.860	
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
120.72	18282	2.48	1403	0.98	9.577	12.61	0.559	0.00	179	52	28.793

FUEL, OIL and TIME Diesel Fuel Cetane No. 50 (rating taken from oil company's typical inspection data): weight per gallon 7.045 lbs OIL SAE 30 to motor 6.125 gal; drained from motor 5.027 gal Total time motor was operated 32½ hours.

CHASSIS Type Tracklayer Serial No. TDE 6318 Tread width 80" Measured length of track 331.5" Cleats integral with shoes Cleats per track 39 Size of cleats 24" x 2¼" Advertised speeds forward mph first 1.6 second 2.0 third 2.5 fourth 3.2 fifth 4.1 sixth 5.3 seventh 6.3 eighth 8.0 Reverse first 1.6 second 2.0 third 2.5 fourth 3.1 fifth 4.0 sixth 5.1 seventh 6.1 eighth 7.8 Clutch double plate spring loaded dry disc operated by foot pedal with spring booster Seat upholstered Brakes disc brakes operated by steering levers or foot pedal Steering hand levers actuating hydraulic steering control.

ENGINE Make International Diesel Type 6 cylinder vertical Serial No. TDEM 6623 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 5¼" x 7" Rated rpm 1400 Compression ratio 15.22 to 1 Displacement 1090.6 cu. in. Port diameter valves inlet 2 5/16" exhaust 1⅞" Governor fly ball variable speed Carburetor size 1¼" (for starting only) Ignition system 12 volt battery (for starting only) Starter 24 volt Air cleaner oil washed crimped wire screen Muffler two used Oil filter full flow with three radial fin replaceable paper elements Fuel filter auxiliary and final replaceable paper elements Cooling medium temperature control thermostat and shutter.

TOTAL WEIGHT AS TESTED (with operator, 42,211 lbs.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Test F was made with fuel pump set by the manufacturer to develop approximately 155 corrected drawbar horsepower and data from this test was used in determining the horsepower to be developed in test H.

No belt tests were made on this tractor due to the limited capacity of the dynamometer.

## HORSEPOWER SUMMARY

	Drawbar
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" HG)	161.07
2. Observed maximum horsepower (Test F)	154.05
3. Seventy-five per cent of calculated maximum drawbar horsepower (formerly ASAE and SAE ratings)	120.80

We, the undersigned, certify that this is a true and correct report of official tractor test No. 529.

L. F. LARSEN  
Engineer-in-charge

C. W. SMITH  
L. W. HURLBUT  
F. D. YUNG  
Board of Tractor Test  
Engineers



## EXPLANATION OF TEST REPORT

**TEST A:** The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

### BELT HORSEPOWER TESTS

**TEST B:** The throttle valve is held wide open, and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

**TEST C:** For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

**TEST D:** The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

### TEST E:

**Varying load** serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load,  $\frac{1}{2}$  rated load, maximum load at wide open throttle valve,  $\frac{1}{4}$  and  $\frac{3}{4}$  rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

### DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

**TEST F:** A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

**TEST G:** Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

**TEST H:** Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

**TEST J:** The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

**TEST K:** Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.