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6-25-1951

Test .461: International TD-9

Nebraska Tractor Test Lab

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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: June 25 to July 10, 1951.
Manufacturer: INTERNATIONAL HARVESTER
CO., CHICAGO, ILLINOIS
Manufacturer's rating: Drawbar 40.5, Belt
48.5 (corrected max.).

NEBRASKA TRACTOR TEST NO. 461

INTERNATIONAL TD-9

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air	
TESTS B and C—100% MAXIMUM LOAD—TWO HOURS								
46.69	1400	3.279	14.24	0.483	0.00	183	73	28.920
TEST D—RATED LOAD—ONE HOUR								
41.59	1400	2.948	14.11	0.487	0.00	185	74	28.920
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
41.60	1400	2.933	14.18	0.485	...	185	74
1.70	1498	1.135	1.50	4.588	...	159	74
22.14	1483	2.003	11.05	0.622	...	185	72
43.84	1362	3.064	14.31	0.480	...	186	69
11.22	1498	1.554	7.22	0.952	...	183	64
32.41	1450	2.475	13.09	0.525	...	187	65
25.49	1448	2.194	11.62	0.592	0.00	181	70	28.920

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 mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool- ing med	Air	
TESTS F and G—100% MAXIMUM LOAD											
39.40	9909	1.49	1397	4.17	—Not Recorded—				179	77	28.750
39.50	6872	2.16	1402	2.67	—Not Recorded—				180	70	28.880
37.83	4752	2.99	1401	1.92	—Not Recorded—				181	77	28.875
37.20	3626	3.85	1399	1.13	—Not Recorded—				179	77	28.870
34.19	2419	5.30	1401	0.36	—Not Recorded—				182	75	28.870
TEST H—RATED LOAD—TEN HOURS—2nd GEAR											
31.32	5440	2.16	1402	2.45	2.703	11.59	0.593	0.00	170	76	28.865

FUEL, OIL and TIME Diesel fuel cetane No 47 (rating taken from oil company's typical inspection data); weight per gallon 6.873 lb Oil SAE 20; to motor 2.774 gal; drained from motor 2.376 gal
Total time motor was operated 47½ hours.

CHASSIS Type tracklayer Serial No TDCB42012
Tread width 60" **Measured length of track** 63 7/16"
Cleats integral with shoes **Cleats per track** 33 **Size of cleats** 20"x6½" **Advertised speeds mph** first 1.5 second 2.2 third 3.0 fourth 3.9 fifth 5.3 reverse 1.7
Belt pulley diam 12½" **face** 8½" **rpm** 878 **Belt speed** 2528 fpm **Clutch** single plate over center operated by hand lever **Seat** upholstered **Brakes** contracting band operated by two foot pedals **Steering** hand levers controlling multiple disk clutches.

ENGINE Make International Diesel **Type** 4 cylinder vertical Serial No T 33359 **Crankshaft** mounted lengthwise **Head I Lubrication** pressure **Bore and Stroke** 4.4"x5.5" **Rated rpm** 1400 **Compression ratio** 15.7 to 1 **Displacement** 334.5 cu in **Port Diameter** **Valves** inlet 1 21/32" exhaust 1 15/32" **Governor** fly ball variable speed **Carburetor** Size ¾" (for starting only) **Ignition System** magneto (for starting only) **Starting System** 12 volt **Air Cleaner** oil washed crimped wire screen **Muffler** was used **Oil Filter** one by-pass replaceable radial fin paper elements **Fuel Filter** auxiliary and final replaceable paper elements **Cooling medium temperature control** thermostat and shutter.

TOTAL WEIGHT AS TESTED (with operator)—11,660 lbs.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with fuel pump set by manufacturer to develop approximately 49 corrected maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, and H were made with the same setting.

HORSEPOWER SUMMARY

	Draw- bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	41.31	48.91
2. Observed maximum horsepower (tests F & B)	39.50	46.69
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	30.98	41.57

We, the undersigned, certify that this is a true and correct report of official tractor test No. 461.

L. F. Larsen
Engineer in Charge

C. W. Smith
F. D. Yung
L. W. Hurlbut
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 preliminary period for limber up, general observation and adjustments. No data are recorded during this preliminary run.

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 as near as practical to the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

TEST C: The manufacturer has an opportunity to select a more practical carburetor setting which may slightly lower the power output but give better fuel economy. As in test B, the throttle valve is held wide open and the load is adjusted to give the rated engine speed. Tests B and C may be the same, as in the case of a diesel engine where the manufacturer wants to use the same setting as in test B. The same setting is used for tests D, E, G, H, J and K.

TEST D: The throttle control lever is set so 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.

TEST E: This test serves to show how well the governor controls the engine speed when the following loads are applied: rated load, no load, $\frac{1}{2}$ load, maximum load at wide-open throttle, $\frac{1}{4}$ load and $\frac{3}{4}$ load. This test also shows some significant fuel consumption results for these loads. The average fuel consumption given for this test is quite significant. The average farm tractor is subjected to a varying load condition throughout the year.

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: The tractor is operated in the gear designated by the manufacturer as rated gear (the gear recommended as most suitable for plowing). The carburetor is set as in test B. The throttle valve is held wide open and the drawbar load adjusted to maintain rated engine speed. Results of this test are used to determine the rated load for test H.

TEST G: The tractor is tested for maximum drawbar horsepower in each gear, using the more efficient carburetor setting as determined 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 the lower gears the tractor often is unable to develop maximum horsepower because of excessive wheel slippage. Then the load is reduced until slippage approaches 16%.

TEST H: This test lasts 10 hours and is the only drawbar test where fuel consumption is measured. The load applied is 75% of 100% maximum drawbar horsepower (test F) corrected to standard conditions. The throttle lever is set so that the governor gives rated engine speed.

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.

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

