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Test 630: International TD-24 Diesel

Nebraska Tractor Test Lab

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INTERNATIONAL TD-24

Department of Agricultural Engineering

Dates of test: September 3, 1957 to September 14, 1957

Manufacturer: INTERNATIONAL HARVESTER
COMPANY, CHICAGO, ILLINOIS

Manufacturer's rating: 168 Maximum Drawbar Horsepower in 3rd
Gear (Corrected to standard conditions)

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
					Gal per hr	Hp-hr per gal	Lb per hp-hr	Cool- ing med	Air wet bulb	Air dry bulb	
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
131.96	20,767	2.38	1503	1.18	11.182	11.80	0.593	178	59	63	28.977
TESTS F & G—100% MAXIMUM LOAD											
163.27	41,130	1.49	1499	4.95	1st	Gear.....		179	58	62	28.870
157.63	32,237	1.95	1498	2.19	2nd	Gear.....		176	58	64	28.880
168.06	26,600	2.37	1500	1.56	3rd	Gear.....		175	59	66	28.885
164.14	20,287	3.03	1500	0.91	4th	Gear.....		178	58	64	28.880
161.22	14,560	4.08	1500	0.51	5th	Gear.....		181	58	64	28.880
151.72	10,980	5.18	1498	0.45	6th	Gear.....		182	58	64	28.880
140.88	8,777	6.02	1498	0.36	7th	Gear.....		183	58	62	28.870
131.08	6,393	7.69	1502	0.20	8th	Gear.....		182	58	62	28.870

FUEL, OIL, WATER and TIME Fuel Diesel
Cetane No. 50 (rating taken from oil company's typ-
ical inspection data) Weight per gallon 7.000 lb Oil
SAE 20 To motor 7.109 gal Drained from motor
5.607 gal Water used 0.261 gal Total time motor
was operated 31½ hours.

CHASSIS Type Tracklayer Serial No. TD-241
10125 Tread width 80" Wheel base 117¼" Meas-
ured length of track 357" Cleats integral with shoes
Cleats per track 42 Size of cleats 24" x 2¼" Ad-
vertised speeds forward mph first 1.5 second 2.0
third 2.4 fourth 3.0 fifth 4.1 sixth 5.2 seventh 6.0
eighth 7.7 reverse first 1.5 second 2.0 third 2.4
fourth 3.0 fifth 4.0 sixth 5.1 seventh 5.9 eighth
7.5 Clutch double plate overcenter dry disc oper-
ated by hand lever Seat upholstered Brakes disc
brakes operated by steering levers or foot pedals
Steering hand levers actuating hydraulic steering con-
trol Drawbar height 17 inches.

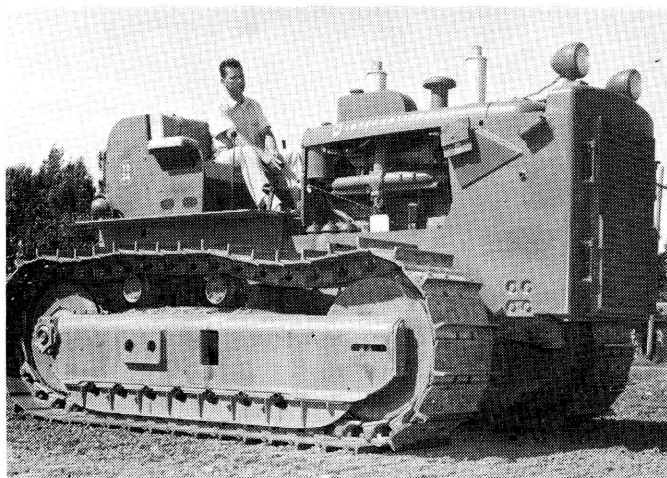
ENGINE Make International Diesel Type 6 cylin-
der vertical Serial No. TDEM-10164 Crankshaft
mounted lengthwise Head I Lubrication pressure
Bore and stroke 5¼" x 7" Rated rpm 1500 Com-
pression ratio 14.87 to 1 Displacement 1091 cu. in.
Valve port diameter Inlet 2 5/16" Exhaust 1½"
Governor variable speed centrifugal Carburetor size
1¼" (for starting only) Ignition system 24 volts
(for starting only) Starting system 24 volt battery
Air cleaner oil washed crimped wire screen Muffler
was 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)
46,375 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 pumps set
by the manufacturer to develop approximately 168
observed drawbar horsepower and data from this test
was used in determining the horsepower to be de-
veloped 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 horse-
power (based on 60° F and 29.92" Hg) 175.07
2. Observed maximum horsepower (test F) 168.06
3. Seventy-five per cent of calculated maxi-
mum drawbar horsepower (ASAE and
SAE ratings) 131.30

We, the undersigned, certify that this is a true and
correct report of official Tractor Test No. 630.

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

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 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 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.

TEST L: This torque test is run with wide open throttle. Loads are applied to reduce engine speed in approximately ten 5% increments. Rated speed equals 100%. The corresponding dynamometer torque is recorded as a per cent of torque at rated speed.

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. When rubber tires are used, all tests are made on the concrete test course. All crawler type tractors are tested on a 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.