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Test 750: International TD-15 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 750 - INTERNATIONAL TD-15 DIESEL

University of Nebraska Agricultural Experiment Station

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

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption			Temperature Degrees F			Barometer inches of mercury
					Gal per hr	Lb hp hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—2nd Gear											
76.97	15431	1.87	1651	2.18	7.825	0.713	9.84	211	76	87	28.770
75% of Pull at Maximum Power—Ten Hours—2nd Gear											
62.76	12014	1.96	1709	1.50	6.329	0.707	9.92	205	75	86	28.879
50% of Pull atMaximum Power—Two Hours—2nd Gear											
46.78	8678	2.02	1749	0.60	5.446	0.816	8.59	190	78	91	28.740

MAXIMUM POWER WITH BALLAST

79.75	21275	1.41	1648	5.44	1st Gear	212	74	92	28.760
84.22	16915	1.87	1646	2.62	2nd Gear	210	71	82	28.850
83.20	12317	2.53	1651	1.27	3rd Gear	210	85	95	28.735
79.37	8948	3.33	1649	0.75	4th Gear	212	85	95	28.735
76.11	6726	4.24	1646	0.45	5th Gear	210	73	92	28.860
70.01	4521	5.81	1647	0.23	6th Gear	210	73	92	28.860

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—2nd Gear

Pounds pull	16900	17000	17850	18450	17700	16500
Horsepower	84.2	77.1	71.4	64.0	51.9	39.6
Miles per hour	1.9	1.7	1.5	1.3	1.1	0.9

Department of Agricultural Engineering

Dates of Test: July 30 to August 17, 1960

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

Manufacturer's Power Rating: 85 Drawbar Horsepower (corrected to standard conditions)

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 50 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8419 Weight per gallon 7.010 lb Oil SAE 30 API service classification DS To motor 4.491 gal Drained from motor 4.102 gal Transmission and final-drive lubricant SAE 140 Type multi-purpose gear lubricant Total time engine was operated 54 hours.

ENGINE Make International Harvester Diesel Type 6 cylinder vertical Serial No TD150M3132 Crankshaft mounted lengthwise Rated rpm 1650 Bore and stroke 4 7/8" x 5 1/2" Compression ratio 15.95 to 1 Displacement 554 cu in Ignition system 12 volt (for starting only) Cranking system 12 volt electric (two 6 volt batteries Lubrication pressure Air cleaner oil washed wire pack Oil filter 2 replaceable paper elements Fuel filter one diesel fuel water trap, one auxiliary fuel filter with replaceable paper element, and one final fuel filter with replaceable paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type tracklayer Serial No TD150 2989 Tread width 74" Wheel base 89" Drawbar height 15" Measured length of track 22.75 feet Cleats integral with shoes Cleats per track 39 Size of cleats 20" x 2 1/4" 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 44 1/16" Vertical distance above roadway 25 5/16" Horizontal distance from center of rear wheel tread 0" to the right/left Cable control system direct engine drive Transmission selective gear fixed-ratio Advertised speeds mph first 1.5 second 1.9 third 2.6 fourth 3.3 fifth 4.3 sixth 5.8 reverse first 1.8 second 2.3 third 3.2 fourth 4.1 fifth 5.3 sixth 7.1 Clutch dry single plate operated by hand lever Brakes contracting bands operated by two foot pedals which can be locked Steering hand levers with hydraulic booster controlling multiple disc clutches Turning space diameter (with brake applied) right 228" left 228" Power take-off 1650 rpm at 1650 engine rpm.

TOTAL WEIGHT WITH OPERATOR 24,555 lb including crankcase guard 215 lb, track roller guards 458 lb, and front cable control unit 560 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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 750.

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-15 Diesel