

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

1-1-1962

Test 827: International B414 (Diesel)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 827: International B414 (Diesel)" (1962). *Nebraska Tractor Tests*. 1232. <https://digitalcommons.unl.edu/tractormuseumlit/1232>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

NEBRASKA TRACTOR TEST 827 - INTERNATIONAL B414 DIESEL

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
35.99	2000	2.513	0.485	14.32	198	62	75	28.835
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
31.14	2035	2.075	0.462	15.01	177	61	74	.....
0.00	2153	0.726	.....	.....	163	61	75	.....
16.07	2098	1.379	0.596	11.65	179	61	75	.....
36.05	2000	2.511	0.483	14.36	195	61	75	.....
8.14	2125	1.055	0.899	7.72	170	61	75	.....
23.66	2063	1.686	0.495	14.03	180	61	75	.....
Av 19.18	2079	1.572	0.569	12.20	177	61	75	28.810

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear Low Range											
31.73	2297	5.18	2004	5.04	2.616	0.572	12.13	206	70	78	28.718
75% of Pull at Maximum Power—Ten Hours—4th Gear Low Range											
25.39	1777	5.36	2039	3.52	2.031	0.555	12.50	181	70	77	28.643
50% of Pull at Maximum Power—Two Hours—4th Gear Low Range											
17.47	1179	5.56	2089	2.30	1.542	0.613	11.33	184	72	82	28.658
MAXIMUM POWER WITH BALLAST											
29.78	5089	2.19	2015	14.87	2nd Gear Low Range			190	69	72	28.740
32.02	3600	3.34	2002	8.65	3rd Gear Low Range			194	69	72	28.730
32.64	3009	4.07	2000	6.88	1st Gear High Range			190	69	72	28.730
32.57	2369	5.16	2001	5.33	4th Gear Low Range			192	69	72	28.730
32.48	1700	7.16	1997	3.89	2nd Gear High Range			189	69	72	28.730
31.44	1137	10.37	2004	2.54	3rd Gear High Range			180	70	74	28.720
MAXIMUM POWER WITHOUT BALLAST											
31.17	2333	5.01	2001	10.12	4th Gear Low Range			200	72	81	28.665
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST											
4th Gear Low Range											
Pounds pull			2369	2471	2561	2622	2530	2470			
Horsepower			32.57	30.61	28.00	24.97	20.92	16.69			
Miles per hour			5.16	4.65	4.10	3.57	3.10	2.53			
Slip of drivers, %			5.33	5.61	5.94	6.16	5.83	5.72			

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13.6-28; 4; 14	Two 13.6-28; 4; 14
Ballast	—Liquid	583 lbs each	None
	—Cast iron	625 lbs each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 4; 28	Two 6.00-16; 4; 28
Ballast	—Liquid	None	None
	—Cast iron	125 lbs each	None
Height of drawbar		19 1/2 inches	21 inches
Static weight	—Rear	4845 lb	2430 lb
	—Front	1695 lb	1445 lb
Total weight with operator		6715 lb	4050 lb

Department of Agricultural Engineering
 Dates of Test: September 27 to October 12, 1962
 Manufacturer: INTERNATIONAL HARVSTER COMPANY, CHICAGO, ILLINOIS
 Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 54.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8336 Weight per gallon 6.941 lb Oil SAE 10W-30 API service classification MS, DM To motor 1.236 gal Drained from motor 0.885 gal Transmission and final-drive lubricant SAE 80 Total time engine was operated 38 hours.

ENGINE Make International Diesel Type 4 cylinder vertical Serial No 8810 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3 1/2" x 4" Compression ratio 22.6 to 1 Displacement 154 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter radial fin replaceable paper element Fuel filter replaceable treated paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type Standard Serial No 5533 Tread width rear 48" to 76" front 48" to 76" Wheel base 76.5" 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 28.1" Vertical distance above roadway 26.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph (Low Range) first 1.5 second 2.5 third 3.6 fourth 5.3 reverse 2.2 (High Range) first 4.3 second 7.3 third 10.4 fourth 15.5 reverse 6.4 Clutch dry disc in combination with PTO clutch operated by single foot pedal Brakes disc brakes operated by hand lever or by two foot pedals which can be locked together Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 106" left 106" (on concrete surface without brake) right 133" left 133" Turning space diameter (on concrete surface with brake applied) right 226" left 226" (on concrete surface without brake) right 280" left 280" Belt pulley 1285 rpm at 2000 engine rpm diam 9.5" face 6.4" Belt speed 3190 fpm Power take-off 545 rpm at 2000 engine rpm.

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 low range was not run as it was necessary to limit the pull in second gear low range to avoid excessive wheel slippage. Fourth gear high range was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 827.

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 trans-

mission, 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 B414 Diesel