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Test 815: International 4300 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 815 - INTERNATIONAL 4300 DIESEL

The University of Nebraska Agricultural Experiment Station

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

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	Cooling med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION											
Maximum Available Power—Two Hours—4th Gear											
203.32	14013	5.44	2099	5.68	14.762	0.504	13.77	180	72	87	28.760
75% of Pull at Maximum Power—Ten Hours—4th Gear											
165.90	10998	5.66	2141	3.89	12.769	0.534	12.99	176	71	85	28.647
50% of Pull at Maximum Power—Two Hours—4th Gear											
117.44	7546	5.84	2181	2.75	10.382	0.613	11.31	175	74	90	28.735
MAXIMUM POWER											
188.67	22798	3.10	2109	14.85	1st Gear			175	60	73	28.860
204.69	19908	3.86	2101	9.57	2nd Gear			175	57	71	28.860
208.50	17167	4.55	2099	7.37	3rd Gear			174	56	67	28.860
212.76	14701	5.43	2098	5.82	4th Gear			174	56	67	28.860
214.23	12464	6.45	2099	4.92	5th Gear			176	68	77	28.785
213.45	10671	7.50	2100	4.08	6th Gear ..			176	69	80	28.780
199.17	5153	14.49	2112	1.82	7th Gear			176	70	81	28.795
VARYING DRAWBAR PULL AND TRAVEL SPEED—4th Gear											
Pounds pull			14701		15735	17564	17990	17186		16081	
Horsepower			212.76		204.98	199.80	177.12	147.02		114.27	
Miles per hour			5.43		4.89	4.27	3.69	3.21		2.66	
Slip of Drivers %			5.82		6.36	7.70	7.83	7.57		6.90	

TIRES, BALLAST and WEIGHT

		Without Ballast	
Rear tires	—No, size, ply & psi	Two 23.1-26; 12; 20	
Ballast	—Liquid	None	
	—Cast iron	None	
Front tires	—No, size, ply & psi	Two 23.1-26; 12; 24	
Ballast	—Liquid	None	
	—Cast iron	None	
Height of drawbar		15 inches	
Static weight	—Rear	12110 lb	
	—Front	17530 lb	
Total weight with operator		29815 lb	

Department of Agricultural Engineering

Dates of Test: April 30 to May 14, 1962

Manufacturer: THE FRANK G. HOUGH COMPANY, LIBERTYVILLE, ILLINOIS

Manufacturer's Power Rating: 180 Drawbar Horsepower

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° 0.8328 Weight per gallon 6.935 lb Oil SAE 20-20W API service classification MS, DG, DM, DS To motor 6.069 gal Drained from motor 4.428 gal Transmission and final-drive lubricant SAE 90 gear lube Total time engine was operated 35 hours.

ENGINE Make International Diesel Type 6 cylinder vertical with turbocharger Serial No 817TM1111 Crankshaft mounted lengthwise Rated rpm 2100 Bore and stroke 5 $\frac{3}{8}$ " x 6" Compression ratio 16.5 to 1 Displacement 817 cu in Cranking system 12 volt electric (four 6-volt batteries) Lubrication pressure Air cleaner dry type with replaceable paper element Oil filter 3 replaceable paper elements Oil cooler engine coolant heat exchanger for crankcase oil Fuel filter one auxiliary and one final fuel filter with replaceable paper elements Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type 4-wheel drive Serial No 87AH1012 Tread width rear 88" front 88" Wheel base 120" 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 75.8" Vertical distance above roadway not available Horizontal distance from center of rear wheel tread not available to the right/left Hydraulic control system direct engine drive with throwout lever Transmission selective gear fixed ratio Advertised speeds mph first 3.5 second 4.1 third 4.7 fourth 5.6 fifth 6.6 sixth 7.6 seventh 14.3 eighth 22.7 reverse 2.7, 3.2, 3.7 and 11.2 Clutch 17 inch single plate operated by foot pedal with air power assist Brakes expanding shoe operated by air power on all four wheels Steering power assisted Turning radius (on concrete surface with front wheel steering) right 367" left 367" (on concrete surface with four wheel steering) right 204" left 204" Turning space diameter (on concrete surface with front wheel steering) right 778" left 778" (on concrete surface with four wheel steering) right 414" left 414".

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.

Eighth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 815.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT
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 4300 Diesel