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Test 908: International 424 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 908 - INTERNATIONAL 424 GASOLINE

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								
36.97	2000	2.996	0.500	12.34	180	62	75	29.070
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
33.06	2109	2.797	0.522	11.82	180	63	74	.....
0.00	2268	1.153	.....	.....	156	62	71	.....
17.17	2189	1.989	0.715	8.63	172	62	71	.....
36.88	2001	2.967	0.496	12.43	180	62	71	.....
8.81	2251	1.571	1.100	5.61	166	61	70	.....
25.51	2168	2.412	0.583	10.58	174	61	70	.....
Av	20.24	2.148	0.655	9.42	171	62	71	28.980

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Fuel Consumption			Temp Degrees F				
				Slip of drivers %	Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	Barom- eter inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—5th Gear											
31.44	2290	5.15	1999	4.76	2.983	0.585	10.54	184	59	67	29.100
75% of Pull at Maximum Power—Ten Hours—5th Gear											
26.07	1756	5.57	2137	3.64	2.723	0.644	9.57	180	58	67	29.048
50% of Pull at Maximum Power—Two Hours—5th Gear											
18.61	1212	5.76	2179	2.26	2.242	0.743	8.30	182	64	76	28.970
MAXIMUM POWER WITH BALLAST											
19.32	5282	1.37	2160	14.63	1st Gear			178	58	66	29.150
29.73	5024	2.22	1999	12.63	2nd Gear			180	58	63	29.150
31.35	3519	3.34	1997	7.57	3rd Gear			182	58	66	29.150
31.63	2907	4.08	2005	6.16	4th Gear			182	59	67	29.130
32.13	2340	5.15	2002	4.88	5th Gear			180	59	67	29.130
31.89	1666	7.18	2009	3.32	6th Gear			180	59	67	29.130
30.80	1122	10.29	2002	2.38	7th Gear			184	59	68	29.110
MAXIMUM POWER WITHOUT BALLAST											
30.27	2286	4.96	2002	9.76	5th Gear			180	51	52	28.840

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear

Pounds pull	2340	2398	2573	2629	2587	2491
Horespower	32.13	29.61	28.23	25.23	21.09	16.94
Crankshaft speed, rpm	2002	1804	1609	1407	1195	995
Miles per hour	5.15	4.63	4.11	3.60	3.06	2.55
Slip of drivers, %	4.88	5.10	5.44	5.33	5.44	5.33

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
	—Liquid	510 lb each	None
	Cast iron	700 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 4; 28	Two 6.00-16; 4; 28
	—Liquid	None	None
	Cast iron	170 lb each	None
Height of drawbar		18 inches	20 inches
Static weight	—Rear	4710 lb	2290 lb
	Front	1830 lb	1490 lb
Total weight with operator		6715 lb	3955 lb

Department of Agricultural Engineering

Dates of Test: SEPTEMBER 8 to SEPTEMBER 15, 1965

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

FUEL, OIL and TIME Fuel Regular gasoline Octane No Motor 85.2 Research 92.3 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7410 Weight per gallon 6.168 lb Oil SAE 30 API service classification MS, DM To motor 1.681 gal Drained from motor 1.248 gal Transmission and final-drive lubricant IH HY-Tran Fluid Total time engine was operated 44 hours.

ENGINE Make International gasoline Type 4 cylinder vertical Serial No 0539 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3³/₈" x 4¹/₁₆" Compression ratio 7.60 to 1 Displacement 145.3 cu in Carburetor size 7/8" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable paper element Oil filter replaceable treated paper element Fuel filter sediment bowl with strainer Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 2827 Tread width rear 52" to 80" front 52" to 76" Wheel base 70.0" 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 27.4" Vertical distance above roadway 28.0" 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 first 1.5 second 2.5 third 3.5 fourth 4.3 fifth 5.3 sixth 7.3 seventh 10.4 eighth 15.5 reverse 2.2 and 6.5 Clutch dry disc in combination with PTO clutch operated by single foot pedal Brakes dry double disc operated by two foot pedals which can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 98" left 98" (on concrete surface without brake) right 127" left 127" Turning space diameter (on concrete surface with brake applied) right 101¹/₂" left 101¹/₂" (on concrete surface without brake) right 130" left 130" Belt pulley 1285 rpm at 2000 engine rpm diam 9.5" face 6.75" 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.

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 908.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

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, $\frac{1}{2}$ of 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 424 Gasoline