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Test 911: International 424 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 911 - INTERNATIONAL 424 DIESEL

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									
*	36.91	2000	2.643	0.496	13.97	200	60	75	28.990
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
	32.40	2066	2.306	0.493	14.05	188	60	74	.....
	0.00	2214	0.828	.....	.....	163	61	75	.....
	16.81	2145	1.543	0.635	10.89	178	60	75	.....
	36.93	2000	2.679	0.502	13.78	198	61	76	.....
	8.53	2178	1.158	0.939	7.37	164	61	75	.....
	24.80	2110	1.873	0.523	13.24	180	61	75	.....
Av	19.91	2119	1.731	0.602	11.50	178	61	75	29.007

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom- eter 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—5th Gear											
31.90	2317	5.16	1998	4.31	2.762	0.599	11.55	194	52	59	28.768
75% of Pull at Maximum Power—Ten Hours—5th Gear											
25.81	1749	5.53	2118	3.27	2.231	0.598	11.57	192	50	54	28.738
50% of Pull at Maximum Power—Two Hours—5th Gear											
18.54	1223	5.69	2159	2.59	1.837	0.686	10.09	182	55	65	28.815
MAXIMUM POWER WITH BALLAST											
19.72	5374	1.38	2169	14.74	1st Gear			182	54	63	28.840
31.01	5229	2.22	1998	12.21	2nd Gear			182	49	52	28.780
32.23	3591	3.37	1999	6.84	3rd Gear			181	49	52	28.780
32.87	3002	4.11	2004	5.41	4th Gear			181	49	52	28.780
32.57	2359	5.18	2000	4.16	5th Gear			188	50	52	28.780
32.02	1677	7.16	1995	2.83	6th Gear			187	50	52	28.780
30.88	1119	10.35	2002	1.75	7th Gear			186	51	55	28.780
MAXIMUM POWER WITHOUT BALLAST											
32.27	2460	4.92	2000	10.47	5th Gear			180	40	46	29.140

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

Pounds pull	2359	2474	2580	2616	2558	2487
Horsepower	32.57	30.70	28.36	25.23	21.15	17.12
Crankshaft speed, rpm	2000	1802	1601	1406	1204	1001
Miles per hour	5.18	4.65	4.12	3.62	3.10	2.58
Slip of drivers, %	4.16	4.45	4.79	4.79	4.68	4.57

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	508 lb each	None
	Cast iron	700 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 4; 32	Two 6.00-16; 4; 28
Ballast	—Liquid	None	None
	Cast iron	178 lb each	None
Height of drawbar		18 inches	19½ inches
Static weight	—Rear	4760 lb	2345 lb
	Front	1890 lb	1535 lb
Total weight with operator		6825 lb	4055 lb

Department of Agricultural Engineering

Dates of Test: SEPTEMBER 16 to SEPTEMBER 23, 1965

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8312 Weight per gallon 6.920 lb Oil SAE 30 API service classification MS, DG, DM, DS To motor 1.639 gal Drained from motor 1.400 gal Transmission and final-drive lubricant IH Hy-Tran Fluid Total time engine was operated 361½ hours.

ENGINE Make International Diesel Type 4 cylinder vertical Serial No 51858 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3.500" x 4" Compression ratio 23.1 to 1 Displacement 154 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh with centrifugal precleaner Oil filter replaceable paper element Fuel filter replaceable paper cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 2824 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 26.8" Vertical distance above roadway 27.6" 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 single plate dry disc in combination with pto clutch operated by single foot pedal Brakes 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 101½" left 101½" (on concrete surface without brake applied) 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 911.

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 Diesel