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Test 1073: John Deere 4620 Syncro Range

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 1073 – JOHN DEERE 4620 SYNCRO RANGE DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Cooling medium	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1155 rpm)								
135.76	2200	9.235	0.472	14.70	194	67	75	28.813
Standard Power Take-off Speed (1000 rpm)—One Hour								
130.27	1904	8.365	0.446	15.57	195	67	75	28.835
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
118.60	2257	8.448	0.495	14.04	193	68	78	.....
0.00	2388	2.941	.....	.....	183	68	77	.....
60.70	2311	5.684	0.650	10.68	189	69	78	.....
133.51	2200	9.117	0.474	14.64	196	70	80	.....
30.90	2354	4.397	0.988	7.03	185	70	80	.....
89.85	2282	7.083	0.548	12.69	192	71	81	.....
Av 72.26	2298	6.278	0.604	11.51	189	69	79	28.845

DRAWBAR PERFORMANCE

Hp	Drawbar pull lbs	Speed miles per hr	Crankshaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Cool- ing med	Degrees F Air wet bulb	Degrees F Air dry bulb	Barometer inches of Mercury
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VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—4th Gear											
115.75	8594	5.05	2197	6.69	9.141	0.548	12.66	188	66	77	28.860
75% of Pull at Maximum Power—Ten Hours—4th Gear											
91.74	6473	5.31	2268	4.91	7.734	0.585	11.86	187	66	83	29.013
50% of Pull at Maximum Power—Two Hours—4th Gear											
62.93	4285	5.51	2316	3.36	6.352	0.701	9.91	188	72	88	28.770
50% of Pull at Reduced Engine Speed—Two Hours—5th Gear											
62.81	4251	5.54	1863	2.91	5.218	0.577	12.04	186	70	93	28.860

MAXIMUM POWER WITH BALLAST

103.86	13916	2.80	2263	14.78	2nd Gear			186	68	77	28.780
113.71	11197	3.81	2200	9.72	3rd Gear			190	68	78	28.780
117.38	8662	5.08	2204	6.30	4th Gear			193	72	92	28.840
115.53	6837	6.39	2204	5.37	5th Gear			184	70	81	28.780
115.22	5084	8.50	2202	4.02	6th Gear			185	70	81	28.780

MAXIMUM PULL WITHOUT BALLAST

108.30	11051	3.68	2252	14.91	3rd Gear			190	68	86	28.780
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear

Pounds Pull		8662	9477	9998	10005	9511	8686
Horsepower		117.38	114.78	106.62	93.47	76.72	59.06
Crankshaft Speed rpm		2204	1985	1755	1543	1324	1108
Miles Per Hour		5.08	4.54	4.00	3.50	3.03	2.55
Slip of Drivers %		6.30	7.22	7.37	7.82	7.22	6.30

TRACTOR SOUND LEVEL

	dB(A)
Maximum Available Power 2 Hours	93.0
75% of Pull Max. Power 10 Hours	93.0
50% of Pull at Max. Power 2 Hours	93.5
50% of Pull at Reduced Engine Speed 2 Hours	92.0
Bystander (8th gear)	86.2

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size ply & psi	Two 20.8-38; 10; 20	Two 20.8-38; 10; 16
Ballast	—Liquid	900 lb each	None
	—Cast iron	1000 lb each	None
Front tires	—No, size, ply & psi	Two 14L-16.1; 6; 24	Two 14L-16.1; 6; 24
Ballast	—Liquid	None	None
	—Cast iron	20 lb each	None
Height of drawbar		24½ inches	25 inches
Static weight with operator—rear		14280 lb	10480 lb
	front	4360 lb	4320 lb
	total	18640 lb	14800 lb

Department of Agricultural Engineering

Dates of Test: June 16 to June 22, 1971

Manufacturer: John Deere Waterloo Tractor Works, Waterloo, Iowa

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 53.5 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8342 Weight per gallon 6.946 lb Oil SAE 30 API Service classification MS, DG, DM, DS To motor 4.393 gal Drained from motor 4.242 gal Transmission and final drive lubricant SAE John Deere special 303 oil Total time engine was operated 44 hours.

ENGINE Make John Deere Diesel Type 6 cylinder vertical with turbo-charger and inter-cooler Serial No 297220R Crankshaft Mounted lengthwise Rated rpm 2200 Bore and stroke 4¼" x 4¾" Compression ratio 15.7 to 1 Displacement 404 cu in Cranking system 12 volt electric (two 6-volt batteries) Lubrication pressure Air cleaner pre-cleaner and two dry type in parallel with replaceable paper elements Oil filter full flow replaceable paper cartridge Oil Cooler engine coolant heat exchanger for crankcase oil and radiator for transmission and hydraulic system Fuel filter sediment bowl and screen with replaceable paper primary and secondary filter elements Muffler was used Cooling medium temperature control thermostat.

CHASSIS type standard Serial No 0121858R Tread width rear 63.0" to 107.5" front 59.25" to 83.25" Wheel base 106.25" 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 33.02" Vertical distance above roadway 40.66" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial range synchro-mesh Advertised speeds mph first 2.0 second 3.1 third 4.1 fourth 5.3 fifth 6.6 sixth 8.7 seventh 11.2 eighth 18.3 reverse 4.0 and 6.4 Clutch single plate dry disc operated by foot pedal Brakes wet disc hydraulically power actuated by two foot pedals that can be locked together Steering hydrostatic Turning radius (on concrete surface with brake applied) right 151" left 151" (on concrete surface without brake) right 171" left 171" Turning space diameter (on concrete surface with brake applied) right 302" left 302" (on concrete surface without brake) right 342" left 342" Power take-off 1156 rpm at 2200 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data in accordance with SAE and ASAE test code or official Nebraska test procedure. First gear was not run as it was necessary to limit the pull in second gear because of excessive slippage. Seventh and eighth gears were not run as test procedure permits only one gear over eight miles per hour. We, the undersigned, certify that this is a true and correct report of official Tractor Test 1073.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, 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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

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 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.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine, governor, automatic transmission, 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. 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 Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

Varying Drawbar Pull 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.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



JOHN DEERE 4620 SYNCRO RANGE DIESEL