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Test 1147: John Deere 1530 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1147 - JOHN DEERE 1530 DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—651 rpm)								
45.38	2500	3.282	0.500	13.83	187	65	75	29.037
Standard Power Take-off Speed (540 rpm)—One Hour								
41.36	2074	2.896	0.484	14.28	188	65	75	29.065
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
40.18	2604	2.871	0.494	14.00	181	65	75	.....
0.00	2730	1.201	.....	.....	179	66	78	.....
20.62	2673	1.900	0.637	10.85	177	66	76	.....
45.46	2500	3.327	0.506	13.66	189	67	78	.....
10.44	2704	1.527	1.011	6.84	178	67	78	.....
30.55	2640	2.329	0.527	13.12	181	67	78	.....
Av 24.54	2642	2.192	0.618	11.20	181	66	77	29.100

DRAWBAR PERFORMANCE

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

Maximum Available Power—Two Hours—10th Gear (5H)											
38.07	2556	5.59	2501	5.43	3.162	0.575	12.04	181	45	58	29.220
75% of Pull at Maximum Power—Ten Hours—10th Gear (5H)											
31.20	1967	5.95	2619	3.87	2.722	0.603	11.47	184	53	60	29.110
50% of Pull at Maximum Power—Two Hours—10th Gear (5H)											
21.55	1318	6.13	2658	2.24	2.205	0.708	9.78	181	64	68	29.060
50% of Pull at Reduced Engine Speed—Two Hours—13th Gear (7L)											
20.73	1268	6.13	1595	2.46	1.735	0.579	11.95	179	51	54	29.080

MAXIMUM POWER WITH BALLAST

30.36	5139	2.22	2592	14.87	5th Gear (3L)	.....	177	42	51	29.310
38.50	3517	4.11	2500	8.11	8th Gear (4H)	.....	185	42	51	29.310
37.90	3309	4.29	2498	7.50	9th Gear (5L)	.....	182	42	52	29.300
38.86	2612	5.58	2500	5.69	10th Gear (5H)	.....	182	42	52	29.300
38.29	2276	6.31	2498	4.87	11th Gear (6L)	.....	182	43	54	29.290
37.39	1722	8.14	2499	3.62	12th Gear (6H)	.....	182	44	55	29.290

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—10th Gear (5H)

Pounds Pull	2612	2820	2986	3227	3311	3304
Horsepower	38.86	37.45	35.02	33.01	29.08	24.02
Crankshaft Speed rpm	2500	2245	1991	1747	1504	1246
Miles Per Hour	5.58	4.98	4.40	3.84	3.29	2.73
Slip of Drivers %	5.69	6.26	6.60	7.17	7.28	7.28

TRACTOR SOUND LEVEL

	DB (A)
Maximum Available Power 2 Hours	97.0
75% of Pull at Max. Power 10 Hours	98.5
50% of Pull at Max. Power 2 Hours	97.5
50% of Pull at Reduced Engine Speed 2 Hours	92.5
Bystander 16th Gear (8H)	86.5

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	—No, size, ply & psi	Two 14.9-28;6;18
Ballast	—Liquid	374 lb each
	Cast Iron	540 lb each
Front Tires	—No, size, ply & psi	Two 6.50-16;6;28
Ballast	—Liquid	None
	Cast Iron	40 lb each
Height of drawbar	17 inches	17½ inches
Static weight with operator—Rear	4907 lb	3078 lb
Front	1956 lb	1876 lb
Total	6863 lb	4954 lb

Department of Agricultural Engineering

Dates of Test: October 13 to October 18, 1973

Manufacturer: JOHN DEERE WERKE MANN-HEIM, MANNHEIM, WEST GERMANY

FUEL, OIL AND TIME Fuel No 2 Diesel Cetane No 50.1 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8308 Weight per gallon 6.917 lb Oil SAE 30 API service classification CD CC SD To motor 1.447 gal Drained from motor 1.095 gal Transmission and final drive lubricant John Deere type 303 oil Total time engine was operated 45½ hours.

ENGINE Make John Deere Diesel Type 3 cylinder vertical Serial No 142912CD Crankshaft Mounted lengthwise Rated rpm 2500 Bore and stroke 4.02" x 4.33" Compression ratio 16.7 to 1 Displacement 164 cu in Crank-ing system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable pleated paper screw-on cartridge Oil cooler radiator for transmission and hydraulic oil Fuel filter replaceable two-stage paper cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 112279L Tread width rear 52" to 76" Front 49" to 79" Wheel base 74" 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 28.9" Vertical distance above roadway 31.0" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial range operator controlled power shifting Advertised speeds mph first 1.2 second 1.5 third 1.7 fourth 2.1 fifth 2.5 sixth 3.2 seventh 3.5 eighth 4.4 ninth 4.6 tenth 5.8 eleventh 6.5 twelfth 8.3 thirteenth 9.7 fourteenth 12.4 fifteenth 13.6 sixteenth 17.3 reverse 1.4, 1.7, 1.9, 2.5, 2.9, 3.7, 4.0 and 5.1 Clutch single plate dry disc in combination with PTO clutch operated by single foot pedal Brakes wet disc hydraulically operated by two foot pedals which can be locked together Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 110" left 110" (on concrete surface without brake) right 122" left 122" Turning space diameter (on concrete surface with brake applied) right 244" left 244" (on concrete surface without brake) right 268" left 268" Belt pulley 967 rpm at 2100 engine rpm diam 12" face 8½" Belt speed 3038 fpm Power take-off 546 rpm at 2100 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, second, third and fourth gears were not run as it was necessary to limit the pull in fifth gear to avoid excessive wheel slippage.

Sixth, seventh, thirteenth, fourteenth, fifteenth and sixteenth gears were not run as test procedure requires only six travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1147. 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

H. W. Ottoson, Director and Acting Dean

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 effects 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.

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 1530 DIESEL