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NEBRASKA TRACTOR TEST 1110 JOHN DEERE 4430 QUAD-RANGE DIESEL

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NEBRASKA TRACTOR TEST 1110 – JOHN DEERE 4430 QUAD-RANGE DIESEL

Department of Agricultural Engineering
Dates of Test: October 5 to October 13th, 1972
Manufacturer: JOHN DEERE WATERLOO TRACTOR WORKS, WATERLOO, IOWA

FUEL, OIL AND TIME Fuel No 2 Diesel
Cetane No 54.5 (rating taken from company’s typical inspection data) Specific gravity converted to 60°/60° 0.8942 Weight per gallon 0.946 Oil SAE 90 API service classification B John Deere Torq-Guard or CD-SD To Motor 0.423 gal Drained from motor 3.735 gal Transmission and final drive lubricant John Deere Special 303 Oil Total two hour time was operated at 15 hours

ENGINE Make John Deere Diesel Engine Type 6 cylinder vertical with turbo-charger Serial No 6401TR-09 341450 Crankshaft Mounted lengthwise Rated rpm 2200 Bore and stroke 4.25" x 4.75" Compression ratio 15.7 to 1 404 cu in in Cranking system 12 volt electrical (two 6 volt batteries) Lubrication pressure Air cleaner pre cleaning and two dry type in series with replaceable treated paper elements Oil filter full flow with replaceable paper cartridge Oil Cooler engine coolant heat exchanger for crankcase oil and radiator for transmission and hydraulic system Fuel filter sediment bowl with screen and replaceable paper primary and secondary filter elements Muller was used Cooling medium temperature control thermostat

CHASSIS Type standard Serial No 4433H-003951 Tread width rear 60.0" to 90.1" front 48.0" to 60.0" Wheel base of base 96.7" 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 35.4" Vertical distance above roadway 41.2" Horizontal distance from center of rear tread wheel 0.5" to the left Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial range syncro mesh and power shift Advertised speeds mph first 2.0 second 2.6 third 3.3 fourth 4.3 fifth 4.7 sixth 5.5 seventh 5.9 eighth 7.0 ninth 7.7 tenth 8.5 eleventh 9.1 twelfth 9.8 thirteenth 10.8 fourteenth 11.6 fifteenth 14.0 sixteenth 17.8 seventh 20.0 eighth 22.0 ninth 25.0 Clutch wet multiple disc operated hydraulically 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 140° left 140° (on concrete surface without brake) right 158° left 158° Turning space diameter (on concrete surface with brake applied) right 290° (on concrete surface without brake) right 316° left 316° Power take-off 540 or 1002 rpm at 2200 engine rpm

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASA test code or official Nebraska test procedure. First and second gears were not run as it was necessary to limit the pull in third gear to avoid excessive slippage. Fourth, tenth, eleventh, twelfth, thirteenth, fourteenth, fifteenth and sixteenth gears were not run as test procedure requires only six travel speeds. During maximum drawbar run in 3rd gear the transmission came out of gear wise making it necessary to hold the shift lever in place to complete the run.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1110.

E. F. Larssen
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 operator's 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, 1/4 of the 85% torque; maximum power, 1/4 and 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 hogs, 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.