NEBRASKA OECD TRACTOR TEST 2220-SUMMARY 1167
JOHN DEERE 7R 310 DIESEL
e23 TRANSMISSION

POWER TAKE-OFF PERFORMANCE

Power HP *(kW)*	Crank shaft speed rpm	Diesel Consumption Gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	D.E.F. Consumption Hp.hr/gal *(kW.h/l)*	Gal/hr *(l/h)*	Mean Atmospheric Conditions
MAXIMUM POWER AND FUEL CONSUMPTION						
Rated Engine Speed—(PTO speed—1077 rpm)						
273.97 *(204.30)*	2100	14.33 *(54.25)*	0.365 *(0.222)*	19.12 *(3.77)*	0.75 *(2.82)*	Fuel used during active exhaust regeneration-1.22 gal *(4.61 l)* (see note 1, p.2)
Standard Power Take-off Speed (1000 rpm)						
299.71 *(223.49)*	1950	15.28 *(57.85)*	0.356 *(0.217)*	19.61 *(3.86)*	0.67 *(2.55)*	
Maximum Power (1 hour)						
307.68 *(229.44)*	1751	15.32 *(57.99)*	0.348 *(0.211)*	20.09 *(3.96)*	0.68 *(2.56)*	
VARYING POWER AND FUEL CONSUMPTION						
273.97 *(204.30)*	2100	14.33 *(54.25)*	0.365 *(0.222)*	19.12 *(3.77)*	0.75 *(2.82)*	Air temperature
238.89 *(178.14)*	2154	12.88 *(48.74)*	0.376 *(0.229)*	18.55 *(3.66)*	0.67 *(2.55)*	72°F *(22°C)*
180.07 *(134.28)*	2166	10.28 *(38.93)*	0.399 *(0.243)*	17.51 *(3.45)*	0.51 *(1.92)*	Relative humidity
120.71 *(90.01)*	2177	7.86 *(29.75)*	0.455 *(0.276)*	15.36 *(3.03)*	0.24 *(0.90)*	52%
60.81 *(45.35)*	2189	5.70 *(21.59)*	0.655 *(0.398)*	10.66 *(2.10)*	0.16 *(0.62)*	Barometer
1.49 *(1.11)*	2198	4.42 *(16.72)*	20.663 *(12.569)*	0.34 *(0.07)*	0.20 *(0.76)*	28.90" Hg *(97.86 kPa)*

Maximum torque - 1007 lb.-ft. *(1366 Nm)* at 1551 rpm
Maximum torque rise - 47.0%
Torque rise at 1681 engine rpm - 40%
Power increase at 1751 engine rpm - 12.3%

DRAWBAR PERFORMANCE
UNBALLASTED - FRONT DRIVE ENGAGED
FUEL CONSUMPTION CHARACTERISTICS

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	D.E.F. Consumption lb/hp.hr *(kg/kW.h)*	Temp.°F*(°C)* cool-ing med	Air dry bulb	Barom. inch Hg *(kPa)*
Power at Rated Engine Speed—11th Gear-Manual mode										
246.09 *(183.51)*	15436 *(68.66)*	5.98 *(9.62)*	2099	3.6	0.406 *(0.247)*	17.18 *(3.38)*	0.024 *(0.015)*	218 *(103)*	64 *(18)*	28.77 *(97.43)*
75% of Pull at Rated Engine Speed—11th Gear-Manual mode										
191.22 *(142.59)*	11561 *(51.43)*	6.20 *(9.98)*	2159	2.8	0.425 *(0.259)*	16.43 *(3.24)*	0.023 *(0.014)*	217 *(103)*	66 *(19)*	28.77 *(97.43)*
50% of Pull at Rated Engine Speed—11th Gear-Manual mode										
129.51 *(96.57)*	7718 *(34.33)*	6.29 *(10.12)*	2172	1.9	0.473 *(0.288)*	14.75 *(2.91)*	0.019 *(0.012)*	216 *(102)*	67 *(19)*	28.77 *(97.43)*
75% of Pull at Reduced Engine Speed— 6.5 mph *(10.4 km/h)*-Auto mode										
191.34 *(142.68)*	11490 *(51.11)*	6.25 *(10.06)*	1429	2.8	0.386 *(0.235)*	18.08 *(3.56)*	0.015 *(0.009)*	216 *(102)*	67 *(19)*	28.78 *(97.44)*
50% of Pull at Reduced Engine Speed— 6.5 mph *(10.4 km/h)*-Auto mode										
129.61 *(96.65)*	7721 *(34.34)*	6.30 *(10.14)*	1237	1.9	0.409 *(0.249)*	17.08 *(3.36)*	0.014 *(0.008)*	215 *(102)*	68 *(20)*	28.77 *(97.43)*

Location of tests: Nebraska Tractor Test Laboratory, University of Nebraska, Lincoln, Nebraska 68583-0832

Dates of tests: September 11- 25, 2020

Manufacturer: John Deere Tractor Works, 3500 East Donald Street, P.O. Box 270, Waterloo Ia, 50704-0270

CONSUMABLE Fluids, OIL and TIME: Fuel No. 2 Diesel **Specific gravity converted to 60°/60°F *(15°/15°C)*** 0.8386 **Fuel weight** 6.982 lbs/gal *(0.837 kg/l)* **Diesel Exhaust Fluid (DEF)** 32% aqueous urea solution **DEF weight** 9.071 lbs/gal *(1.087 kg/l)* **Oil SAE** 10W-30 **API service classification** CK-4 **Transmission and hydraulic lubricant** John Deere Hy-Gard fluid **Front axle lubricant** John Deere Hy-Gard fluid **Total time engine was operated:** 21.0 hours

ENGINE: Make John Deere Diesel **Type** six cylinder vertical with turbocharger, air to air aftercooler and D.E.F. (diesel exhaust fluid) exhaust treatment **Serial No.** *RG6090U086787* **Crankshaft** lengthwise **Rated engine speed** 2100 **Bore and stroke** 4.661" x 5.354" *(118.4 mm x 136.0 mm)* **Compression ratio** 16.0 to 1 **Displacement** 548 cu in *(8984 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper element and prestrainer **Fuel cooler** radiator for pump return fuel **Exhaust** regenerative particulate filter integrated within a vertical muffler **Cooling medium temperature control** thermostat and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel rate: 94.4 - 102.0 lb/h *(42.8 - 46.3 kg/h)* **High idle:** 2190 - 2210 rpm **Turbo boost:** nominal 21.8 - 25.4 psi *(150 - 175 kPa)* as measured 24.2 psi *(167 kPa)*

CHASSIS: Type front wheel assist with duals **Serial No.***1RW7310SELC110403* **Tread width** rear 60.0" *(1524 mm)* to 128.9" *(3272 mm)* front 60.0" *(1524 mm)* to 88.0" *(2235 mm)* **Wheelbase** 115.2" *(2925 mm)* **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with full range operator controlled power shift **Nominal travel speeds mph *(km/h)*** first 1.50 *(2.42)* second 1.74 *(2.80)* third 2.01 *(3.23)* fourth 2.32 *(3.73)* fifth 2.67 *(4.29)* sixth 3.08 *(4.96)* seventh 3.53 *(5.68)* eighth 4.08 *(6.56)* ninth 4.66 *(7.50)* tenth 5.38 *(8.66)* eleventh 6.21 *(10.00)* twelfth 7.15 *(11.51)* thirteenth 8.26 *(13.29)* fourteenth 9.45 *(15.21)* fifteenth 10.92 *(17.57)* sixteenth 12.68 *(20.41)* seventeenth 14.65 *(23.57)* eighteenth 16.91 *(27.22)* nineteenth 19.54 *(31.44)* twentieth 22.48 *(36.17)* twenty-first 25.96 *(41.78)* twenty-second 26.10 *(42.00)* twenty-third 26.10 *(42.00)* electronically limited

DRAWBAR PERFORMANCE
UNBALLASTED - FRONT DRIVE ENGAGED
MANUAL MODE - 2100 ENGINE RPM
DRAWBAR POWER IN SELECTED GEARS

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	D.E.F. Consumption lb/hp.hr *(kg/kW.h)*	Temp.°F*(°C)* cool-ing med	Air dry bulb	Barom. inch Hg *(kPa)*
					7th Gear					
211.82 *(157.95)*	25028 *(111.33)*	3.18 *(5.11)*	2150	12.1	0.450 *(0.274)*	15.53 *(3.06)*	0.031 *(0.019)*	218 *(103)*	59 *(15)*	28.89 *(97.82)*
					8th Gear					
236.70 *(176.51)*	23578 *(104.88)*	3.77 *(6.06)*	2100	7.7	0.422 *(0.257)*	16.55 *(3.26)*	0.027 *(0.016)*	218 *(103)*	62 *(16)*	28.89 *(97.82)*
					9th Gear					
240.76 *(179.53)*	20435 *(90.90)*	4.42 *(7.11)*	2100	5.1	0.415 *(0.252)*	16.83 *(3.32)*	0.025 *(0.015)*	217 *(103)*	65 *(18)*	28.94 *(97.99)*
					10th Gear					
246.53 *(183.84)*	17904 *(79.64)*	5.16 *(8.30)*	2100	4.0	0.406 *(0.247)*	17.20 *(3.39)*	0.026 *(0.016)*	218 *(103)*	61 *(16)*	28.93 *(97.97)*
					11th Gear					
246.09 *(183.51)*	15436 *(68.66)*	5.98 *(9.62)*	2099	3.6	0.406 *(0.247)*	17.18 *(3.38)*	0.024 *(0.015)*	218 *(103)*	64 *(18)*	28.77 *(97.43)*
					12th Gear					
245.97 *(183.42)*	13346 *(59.37)*	6.91 *(11.12)*	2099	3.1	0.405 *(0.247)*	17.22 *(3.39)*	0.024 *(0.015)*	218 *(103)*	64 *(18)*	28.77 *(97.43)*
					13th Gear					
244.52 *(182.34)*	11433 *(50.85)*	8.02 *(12.91)*	2100	2.7	0.410 *(0.249)*	17.04 *(3.36)*	0.025 *(0.015)*	218 *(103)*	61 *(16)*	28.78 *(97.44)*

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive Engaged dB(A)	Disengaged dB(A)
At no load in 9th gear	68.0	67.8
Transport speed - no load - 21st gear		68.7
Bystander in 21st gear		83.6

Horizontal distance of drawbar hitch point behind rear wheel axis - 47.4"*(1203 mm)*

TIRES AND WEIGHT	Tested without ballast
Rear Tires - No., size, ply & psi*(kPa)*	Four 480/80R50;***;11(*75*)
Front Tires - No., size, ply & psi*(kPa)*	Two 420/85R34;***;16 (*110*)
Height of Drawbar	20.5 in (*520 mm*)
Static Weight with operator - Rear	16710 lb *(7580 kg)*
- Front	8690 lb (*3942 kg*)
- Total	25400 lb(*11521 kg*)

reverse 1.41 *(2.27)*, 1.88 *(3.02)*, 2.50 *(4.02)*, 3.30 *(5.31)*, 3.77 *(6.07)*, 5.03 *(8.10)*, 6.69 *(10.76)*, 8.84 *(14.22)*, 11.86 *(19.08)*, 15.81 *(25.45)*, 18.64 *(30.00)* electronically limited **Clutch** wet multiple disc hydraulically actuated by foot pedal **Brakes** wet multiple disc hydraulically operated by two foot pedals that can be locked together **Steering** hydrostatic **Power take-off** 1000 rpm at 1950 engine rpm **Unladen tractor mass** 25225 lb *(11442 kg)*

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

NOTE 1: The manufacturer declares that the average time between active regenerations is 40 hours. A 1% power increase was observed during the active regeneration.

REMARKS: All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. This tractor fell 1.2% short of meeting the manufacturer's remote hydraulic flow claim of 59 GPM *(223.3 l/min)* with the 85 cc pump. The performance figures on this summary were taken from a test conducted under the OECD Code 2 test procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **2220**, Nebraska Summary 1167, February 23, 2021.

Roger M. Hoy
Director

M.F. Kocher
P.J. Jasa
J.D. Luck
Board of Tractor Test Engineers

DRAWBAR PERFORMANCE

UNBALLASTED - FRONT DRIVE ENGAGED - AUTO MODE

(Loads based on 2100 engine rpm manual mode performance runs)

DRAWBAR POWER AT SELECTED TRAVEL SPEEDS

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	D.E.F. Consumption lb/hp.hr *(kg/kW.h)*	Temp.°F*(°C)* cool-ing med	Air dry bulb	Barom. inch Hg *(kPa)*
					3.5 mph *(5.6 km/h)*					
205.24 *(153.04)*	24620 *(109.52)*	3.13 *(5.04)*	1560	9.5	0.410 *(0.249)*	17.04 *(3.36)*	0.022 *(0.014)*	218 *(103)*	61 *(16)*	28.89 *(97.82)*
					4.1 mph *(6.6 km/h)*					
235.64 *(175.71)*	23394 *(104.06)*	3.78 *(6.08)*	1594	7.3	0.396 *(0.241)*	17.62 *(3.47)*	NA *(NA)*	217 *(103)*	65 *(18)*	28.88 *(97.80)*
					4.7 mph *(7.6 km/h)*					
240.76 *(179.53)*	20280 *(90.21)*	4.45 *(7.16)*	1588	5.1	0.390 *(0.237)*	17.90 *(3.53)*	NA *(NA)*	217 *(103)*	66 *(19)*	28.93 *(97.97)*
					5.3 mph *(8.6 km/h)*					
245.45 *(183.03)*	18069 *(80.37)*	5.10 *(8.20)*	1562	4.1	0.384 *(0.233)*	18.20 *(3.58)*	0.024 *(0.014)*	217 *(103)*	63 *(17)*	28.93 *(97.97)*
					6.2 mph *(10.0 km/h)*					
245.27 *(182.90)*	15473 *(68.83)*	5.94 *(9.56)*	1571	3.7	0.379 *(0.231)*	18.40 *(3.62)*	0.020 *(0.012)*	217 *(103)*	65 *(18)*	28.77 *(97.43)*
					7.2 mph *(11.6 km/h)*					
244.91 *(182.63)*	13236 *(58.88)*	6.94 *(11.17)*	1594	3.2	0.379 *(0.230)*	18.43 *(3.63)*	NA *(NA)*	217 *(103)*	66 *(19)*	28.77 *(97.43)*
					8.3 mph *(13.4 km/h)*					
244.65 *(182.44)*	11397 *(50.69)*	8.05 *(12.96)*	1594	2.7	0.380 *(0.231)*	18.37 *(3.62)*	NA *(NA)*	218 *(103)*	63 *(17)*	28.77 *(97.43)*

DRAWBAR PERFORMANCE
UNBALLASTED - FRONT DRIVE ENGAGED - 1750 ENGINE RPM
MAXIMUM POWER IN SELECTED GEARS

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	D.E.F. Consumption lb/hp.hr *(kg/kW.h)*	Temp.°F*(°C)* cool-ing med	Air dry bulb	Barom. inch Hg *(kPa)*
					7th Gear					
211.56 *(157.76)*	25003 *(111.22)*	3.18 *(5.11)*	2151	12.1	0.450 *(0.274)*	15.52 *(3.06)*	0.031 *(0.019)*	218 *(103)*	59 *(15)*	28.88 *(97.80)*
					8th Gear					
237.74 *(177.28)*	24368 *(108.39)*	3.66 *(5.89)*	2074	9.3	0.428 *(0.260)*	16.31 *(3.21)*	0.027 *(0.017)*	218 *(103)*	63 *(17)*	28.88 *(97.80)*
					9th Gear					
255.14 *(190.25)*	23243 *(103.39)*	4.12 *(6.63)*	2003	7.3	0.412 *(0.251)*	16.95 *(3.34)*	0.025 *(0.015)*	217 *(103)*	67 *(19)*	28.88 *(97.80)*
					10th Gear					
263.71 *(196.64)*	21097 *(93.84)*	4.69 *(7.55)*	1946	5.9	0.404 *(0.246)*	17.26 *(3.40)*	0.023 *(0.014)*	218 *(103)*	68 *(20)*	28.88 *(97.80)*
					11th Gear					
269.55 *(201.00)*	19792 *(88.04)*	5.11 *(8.22)*	1823	5.3	0.395 *(0.240)*	17.67 *(3.48)*	0.023 *(0.014)*	218 *(103)*	69 *(20)*	28.88 *(97.80)*
					12th Gear					
273.20 *(203.73)*	18041 *(80.25)*	5.68 *(9.14)*	1750	4.6	0.391 *(0.238)*	17.86 *(3.52)*	0.023 *(0.014)*	218 *(103)*	70 *(21)*	28.88 *(97.80)*
					13th Gear					
276.02 *(205.82)*	15628 *(69.52)*	6.62 *(10.65)*	1750	3.7	0.390 *(0.237)*	17.91 *(3.53)*	0.021 *(0.013)*	218 *(103)*	62 *(17)*	28.77 *(97.43)*
					14th Gear					
276.04 *(205.84)*	13596 *(60.48)*	7.62 *(12.26)*	1748	3.1	0.391 *(0.238)*	17.86 *(3.52)*	0.021 *(0.013)*	218 *(103)*	62 *(17)*	28.77 *(97.43)*
					15th Gear					
274.78 *(204.90)*	11665 *(51.89)*	8.83 *(14.21)*	1751	2.7	0.392 *(0.238)*	17.81 *(3.51)*	0.021 *(0.013)*	218 *(103)*	63 *(17)*	28.77 *(97.43)*

HYDRAULIC PERFORMANCE

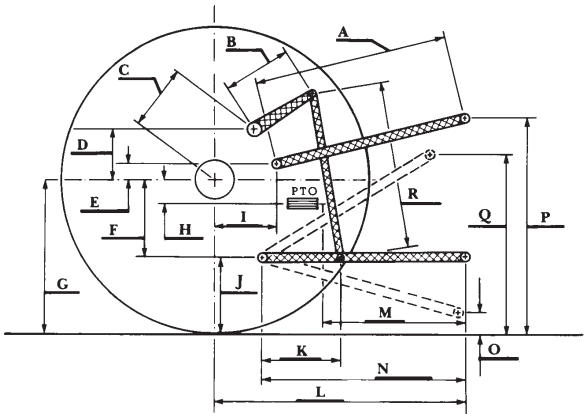
CATEGORY: III
Quick Attach: Yes
OECD Static test

	lift cylinders	
Maximum force exerted through whole range:	15862 lbs *(70.6 kN)* (2x100 mm)	
	18302 lbs *(81.4 kN)* (1x100 mm & 1x 115 mm)	
	63 cc pump	85 cc pump
i) Sustained pressure at compensator cutoff:	2902 psi *(200 bar)*	2931 psi *(202 bar)*
	three outlet sets combined	
ii) Pump delivery rate at minimum pressure and rated engine speed:	44.6 GPM *(169.0 l/min)*	58.3 GPM *(220.7 l/min)*
iii) Pump delivery rate at maximum hydraulic power:	44.0 GPM *(166.6 l/min)*	57.5 GPM *(217.6 l/min)*
Delivery pressure:	2635 psi *(182 bar)*	2571 psi *(177 bar)*
Power:	67.7 HP *(50.5 kW)*	86.2 HP *(64.3 kW)*
	single outlet set	
ii) Pump delivery rate at minimum pressure and rated engine speed:	37.0 GPM *(139.9 l/min)*	36.4 GPM *(137.9 l/min)*
iii) Pump delivery rate at maximum hydraulic power:	35.3 GPM *(133.5 l/min)*	35.4 GPM *(134.0 l/min)*
Delivery pressure:	2341 psi *(161 bar)*	2244 psi *(155 bar)*
Power:	48.2 HP *(35.9 kW)*	46.4 HP *(34.6 kW)*

HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	*mm*
A	28.0	*710*
B	20.5	*520*
C	22.9	*581*
D	18.9	*480*
E	7.3	*185*
F	14.4	*365*
G	38.8	*985*
H	3.5	*90*
I	22.4	*570*
J	24.4	*620*
K	29.3	*745*
L	52.0	*1321*
*L'	56.0	*1423*
M	28.0	*712*
N	43.4	*1102*
O	9.0	*230*
P	51.9	*1319*
Q	39.4	*1001*
R	44.9	*1140*

*L' to Quick Attach ends



RECOMMENDED CITATION FORMAT:

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JOHN DEERE 7R 310 DIESEL

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