

# John Deere 820 Tractor



## TECHNICAL MANUAL John Deere 820 Tractor

TM4212 (01Jun72) English

John Deere Werke Mannheim  
TM4212 (01Jun72)

LITHO IN U.S.A.  
ENGLISH





# Model 820 Tractor

(from tractor serial no. 37000)

Technical Manual

TM-4212 (June-72)

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## INTRODUCTION

This technical manual for the 820 tractor is a concisely written publication for the service personnel. It contains procedures and specifications which an individual cannot be expected to remember.

The table of contents on the first page of this manual lists the individual sections and their groups. A table of contents on the first page of each section lists the groups in the section and the page number of the major subjects found in each group. Coloured tabs make it easy to locate the individual sections.

Coverage for each components includes:

General information, diagnosing malfunctions checks, removal, disassembly, repair, assembly, installation, adjustments, specifications and special tools. Specifications and special tools are always listed at the end of each group.

The section "GENERAL INFORMATION" includes instructions for "Pre-delivery, delivery and after-sales inspections" as well as "Engine and tractor tune-up" to restore full performance.

Tractor service and lubrication as well as lubricants required are described in the Operator's Manual.

Little explanation is given about theory of operation in this manual unless the theory is peculiar only to the component in this machine. Basic theory of operation and general information about the systems or components of the tractor will be found in the "JOHN DEERE Fundamentals of Service" manuals.

Keep this "Technical Manual" in the shop where it is readily accessible and refer to it whenever in doubt about correct procedures of servicing the 820 tractor. Using it as a guide for any and all service problems will reduce error and costly delay.

## Section 10

# GENERAL INFORMATION

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## Group 5

# SPECIFICATIONS

### SERIAL NUMBERS

The engine serial number is stamped into the name plate at the lower right of the front cylinder block.

*NOTE: If ordering engine parts, indicate all digits of the serial number on the name plate.*

The name plate showing the tractor serial number is located on the right-hand side of the front support.

*NOTE: If ordering tractor parts, (excluding engine parts), indicate all digits of the serial number on the name plate.*

### MODEL NUMBERS

The injection pump, injection nozzles, the generator, starter and the main hydraulic pump have model numbers to facilitate identification of different makes of a given unit.

### SPECIFICATIONS

#### ENGINE

Number of cylinders	3
Cylinder liner bore	3.86 in (98 mm)
Stroke	4.33 in. (110 mm)
Displacement	152 cu.in. (2490 cm <sup>3</sup> )
Compression ratio	16.7 : 1
Maximum torque at 1400 rpm	92 ft.lbs. (12.7 mkg)
Firing order	1 - 2 - 3
Valve clearance (engine hot or cold)	
Intake valve	0.014 in. (0.35 mm)
Outlet valve	0.018 in. (0.45 mm)
Fast idle	2545 rpm
Slow idle	650 rpm
Working speed range	1400 to 2100 rpm

*Engine horsepower on tractors equipped with BOSCH or ROTO DIESEL injection pump.*

Flywheel horsepower <sup>1)</sup> at 2100 rpm	
incl. accessories <sup>2)</sup>	32 HP (32 PS)
without accessories <sup>2)</sup>	34 HP (34 PS)

PTO horsepower <sup>3)</sup>	29 HP (29 PS)
(at 2100 rpm engine speed and 547 or 1016 rpm powershaft speed)	

*Engine horsepower on tractors equipped with ROOSA MASTER injection pump*

Flywheel horsepower <sup>1)</sup> at 2100 rpm	
incl. accessories <sup>2)</sup>	34 HP (34 PS)
without accessories <sup>2)</sup>	36 HP (36 PS)

PTO horsepower <sup>3)</sup>	31 HP (31 PS)
(at 2100 rpm engine speed and 547 or 1016 rpm powershaft speed)	

#### ENGINE DUAL-STAGE CLUTCH

Dual dry disk clutch, foot-operated.

#### ELECTRICAL SYSTEM

Batteries	2x12 Volts, 60 Ah
Starter	12 Volts, 4 HP (4 PS)
Generator	12 Volts, 11 A
Battery terminal grounded	negative

1) 1 PS = 1 ch = 0.736 KW; 1 KW = 1.36 PS = 1.36 ch; 1 PS = 0.986 HP; 1 HP = 1.01 PS

2) Water pump, fan, generator, air cleaner and muffler.

3) With the engine run in (above 100 hours of operation) and having reached operating temperature (engine and transmission); measured by means of a dynamometer. Permissible variation ± 5%.

**COLLAR-SHIFT TRANSMISSION**

8-speed transmission with helical-cut gears. This transmission is available in three variations:

8-speed transmission with parking lock, without independent hand brake, 8-speed transmission without parking lock and with independent hand brake; 8-speed transmission without parking lock, with blocked 8th gear and independent hand brake.

With this transmission 8 or 7 forward and 4 reverse speeds are available.

**DIFFERENTIAL AND FINAL DRIVES**

Planetary reduction gear and differential with spiral bevel gears.

**DIFFERENTIAL LOCK**

Hand or foot operated; spring-loaded out of engagement.

**POWERSHAFTS**

Single, 540 rpm rear powershaft or dual 540 and 1000 rpm rear powershaft. Conversion from 540 rpm to 1000 rpm and vice versa is made by interchanging the stub shaft. In addition, a front 1000 rpm powershaft may be installed.

The powershafts are independent of the transmission as the tractor is equipped with a dual-stage engine clutch.

*Powershaft Speeds*

engine speed in rpm	540 rpm shaft	1000 rpm shaft
650	169	315
2067	538	1000
2075	540	1004
2100	547	1016
2225	578	1075
2545	662	1232

**HYDRAULIC SYSTEM**

Open center, constant oil flow system; also includes rockshaft and selective control valves.

*Pump* . . . . . gear pump driven by the engine

System pressure . . . . . 2000 psi (140 kg/cm<sup>2</sup>)

**STEERING**

The steering is a recirculating ball bearing, worm and nut type. A number of steel balls between ball nut and steering wheel shaft provide for positive engagement of steering wheel and steering linkage.

**HYDRAULIC BRAKES**

The disk brakes run in an oil bath and are hydraulically controlled.

**HANDBRAKE**

Band-type locking brake acting on differential.

**CAPACITIES**

	Imp. Gals.	US Gals.	Lit.
Fuel tank . . . . .	13.75	16.5	62.5
Cooling system.. . . .	2.3	2.75	10.5
Engine crankcase incl. filter . . . . .	1.25	1.5	5.7
Transmission-hydraulic system			
Dry system. . . . .	6.6	7.9	30.0
At service intervals . .	6.15	7.4	38.0
Oil-bath air cleaner . . .	0.22	0.26	1.0
Belt pulley . . . . .	0.25	0.30	1.1

**TRAVEL SPEEDS**

See Operator's Manual

**FRONT AND REAR WHEELS**

For tire sizes, treads, inflation pressure and weights see Operator's Manual.

**DIMENSIONS AND WEIGHTS**

See Operator's Manual.





**Group 10**

# PREDELIVERY, DELIVERY AND AFTER-SALES INSPECTIONS

## PREDELIVERY INSPECTION

Every new JOHN DEERE tractor leaves the factory in such a condition that it can be delivered to the customer after a minimum of service.

To promote complete customer satisfaction, proper predelivery service including mending of possible shipping damage and giving the finishing touches to the tractor, are of prime importance to the dealer.

A tag pointing out the factory-recommended procedure for predelivery service is attached to each new tractor before it leaves the factory. The reverse side of this tag is filled in by the factory after the tractor has undergone a thorough inspection prior to shipping.

After completing the factory-recommended dealer checks and services listed on the predelivery tag, remove the tag from the tractor and file it with the shop order for the job. The tag will then serve as a basis for certifying that the unit has received the proper predelivery service.

## TEMPORARY TRACTOR STORAGE

Service	Specifications	Reference
Check radiator for coolant loss and antifreeze protection (gravity of anti-freeze and rust inhibitor mixture)  <b>CAUTION: On tractors shipped with dry-charged batteries or without batteries which are to be started by means of a slave battery, do not remove insulating tape on terminal of cable to starter under any circumstances. Also, do not remove — contrary to earlier statements — wire between terminals D+ of regulator and D+ of generator. If this advice is disregarded, damage to generator and regulator may result.</b>	Coolant level should be midway between radiator core and bottom edge of filler neck  .....	Operator's manual  .....
Remove batteries, drain and store electrolyte.  Reduce shipping pressure of tires  Cover tractor and tires for protection and cleanliness	Store at room temperature  ..... .....	.....  Operator's manual  .....

**BEFORE DELIVERING TRACTOR**

Service	Specifications	Reference
<b>COOLING SYSTEM</b>		
Check radiator for coolant loss	Coolant level should be midway between radiator core and bottom edge of filler neck.	Operator's manual
Check gravity of antifreeze and rust inhibitor mixture	.....	Operator's manual
<b>ELECTRICAL SYSTEM</b>		
<b>CAUTION:</b> If the tractor is to be started by means of a slave battery, do not remove insulating type on terminal of battery cable to starter under any circumstances. Also, do not remove — contrary to earlier statements — wire between terminals D+ of regulator and D+ of generator. If this advice is disregarded, damage to generator and regulator may result.	.....	Section 40, group 10
If the batteries are to be installed in the tractor, remove insulating tape on terminal of battery cable if tractor was shipped with dry-charged batteries or without batteries.	.....	.....
Fill batteries with electrolyte, charge batteries and install in tractor.	.....	"Fundamentals of Service, Electrical Systems" manual under "Batteries"
<b>TIRES AND WHEELS</b>		
Check tire inflation pressure	.....	Operator's manual
Retighten wheel bolts	.....	Operator's manual
<b>LUBRICATION</b>		
Check crankcase oil level	Top mark on dip stick	Operator's manual
Check transmission-hydraulic system oil level	.....	Operator's manual
Lubricate all lubrication points on the tractor	.....	Operator's manual

**BEFORE DELIVERING TRACTOR - Continued**

Service	Specifications	Reference
<b>ENGINE</b>		
Check oil bath air cleaner	Fill with oil to "Full" mark	.....
Check dry type air cleaner	.....	Operator's manual
Fill fuel tank and start engine	Capacity: 13.75 Imp. (16.5 US) Gals = 62.5 lit.	Operator's manual
Check lighting system, indicator lamps and instruments for proper operation	.....	Operator's manual
Check if speed control linkage moves easily	.....	Section 20, group 40
Check engine idle speeds	.....	Section 20, group 40
Check injection timing	.....	Section 30, group 15 und 25
<b>TESTING OPERATION</b>		
Check dual-stage clutch operation	Approx. 1 in. (25 mm) clutch pedal free travel	Section 50, group 5
Shift transmission through all speeds	.....	Operator's manual
Check differential lock operation	.....	Operator's manual
Check powershaft operation	.....	Operator's manual
Check 3-point hitch operation	.....	Operator's manual
Check hydraulic system operation	.....	Section 70, group 5
Check brake system	.....	Section 60, group 15
Check steering	.....	Section 60, group 10
Check seat adjustment	.....	Operator's manual
<b>GENERAL</b>		
Tighten accessible nuts and attaching screws	.....	Section 10, group 20
Clean tractor and touch up paint	.....	.....

### DELIVERY INSPECTION

A thorough discussion of the operation and service of the tractor at the time of its delivery helps to assure complete customer satisfaction.

Proper delivery should be an important phase of the dealer's program.

It is a well-known fact that many complaints have arisen simply because the owner was not shown how to operate and service his new tractor properly.

Enough time should be devoted, at the customer's convenience, to introducing him to his new tractor and explaining to him how to operate and service it.

Using the tractor operator's manual as a guide, be sure that the owner understands the following points properly.

1. Adjusting the seat
2. Operation of control levers and instruments
3. Starting and shutting off the engine
4. The importance of the tractor break-in period
5. Use of counterweights and proper inflation pressure as well as filling of tires with water and magnesium chloride, if required.
6. Operating the complete hydraulic system
7. Operating the powershaft
8. The importance of the safety rules
9. The importance of lubrication and periodic service

### AFTER-SALES INSPECTION

In the interest of the purchaser and the dealer an after-sales inspection should be carried out by the dealer after the first 100 hours of using a new John Deere tractor.

The purpose of this inspection is to make sure that the customer is receiving satisfactory performance from his tractor. At the same time, the inspection should reveal whether or not the tractor is being operated, lubricated and serviced properly.

Through this inspection a needless volume of service work can be eliminated by preventing minor difficulties from developing into serious problems later on. It also will promote stronger dealer-customer relations and give the customer an opportunity to ask questions that may have arisen during the first few days of use.

Thereby the dealer has the further opportunity of promoting the possible sale of other new equipment.

The following inspection program is recommended:

**AFTER-SALES INSPECTION**

Service	Specifications	Reference
<b>COOLING SYSTEM</b>		
Check coolant level	Coolant level should be midway between radiator core and bottom edge of filler neck	Operator's manual
Clean exterior of radiator	.....	.....
Check hose connections	.....	.....
<b>FUEL SYSTEM</b>		
Check sediment bowls and elements of fuel filter as well as bowl of fuel transfer pump for water or sediments	.....	Operator's manual
Check line connections	.....	.....
<b>ELECTRICAL SYSTEM</b>		
Check gravity of battery electrolyte	Gravity should be 1.260 at an electrolyte temperature of 80°F (27°C)	
Check electrolyte level of batteries	To bottom of filler neck in each cell	Operator's manual
Check tension of fan belt	3/4 in. (19 mm) deflection with a 20 lbs (9 kg) force	Operator's manual and section 20, group 35
Start engine and check operation of lights, indicator lamps and instruments	.....	Operator's manual
<b>LUBRICATION</b>		
Check crankcase oil level	Top mark on dip stick	Operator's manual
Check transmission oil level	.....	Operator's manual
Check oil level of steering gear housing	Add oil to filler hole	Operator's manual
Check oil level of belt pulley housing	Add oil to filler hole	Operator's manual
Lubricate dual-stage clutch throw-out bearing	.....	Operator's manual
Lubricate 3-point hitch	.....	Operator's manual

**AFTER-SALES INSPECTION**

Service	Specifications	Reference
<b>ENGINE</b>		
Check oil level in oil-bath air cleaner	Fill with oil to level mark	Operator's manual
Check dry-type air cleaner	.....	Operator's manual
Check valve clearance	Intake valve: 0.014 in (0.35 mm) Exhaust valve: 0.018 in. (0.45 mm)	Section 20, group 10
Check engine speed under load as well as fast and slow idle speed	.....	Section 20, group 40
Check engine performance	.....	Section 10, group 20
<b>GENERAL</b>		
Check clutch pedal adjustment	Approx. 1 in (25 mm) free travel	Section 50, group 5
Shift transmission through all speeds	.....	Operator's manual
Check operation of powershaft	.....	Operator's manual
Check differential lock	.....	Operator's manual
Check operation of hydraulic system	.....	Section 70, group 5
Check steering system	.....	Section 60, group 10
Check brakes	.....	Section 60, group 15
Tighten accessible nuts and cap screws	.....	Section 10, group 20
Tighten accessible hydraulic lines	.....	.....
Visual inspection of tractor	Damaged paint, loose connections, proper positioning of hoses and lines, leaks, operation of all mechanical parts	.....

## **Group 15**

# **LUBRICATION AND ADJUSTMENT**

For brands of oil and lubricants to be used as well as for lubricating and servicing the model 820 tractor, see operator's manual.





## Group 20

# ENGINE AND TRACTOR TUNE-UP

### GENERAL INFORMATION

Before tuning up the engine, determine whether a tune-up will restore operating efficiency. If there is doubt, the following preliminary tests will help to determine if the engine can be tuned up.

### PRELIMINARY ENGINE TESTING

Service	Specifications	Reference
Checking air intake system by means of vacuum gauge	14 to 25 in. (355-635 mm) water head; engine running at fast idle speed	"Fundamentals of Service, Engine" manual under "Diagnosis and Testing"
Check radiator for air bubbles or oil film	.....	.....
Check compression pressure which should be at least (using special tool No. 19.58-90.578)	300 psi (21 kg/cm <sup>2</sup> )	"Fundamentals of Service, Engine" manual under "Diagnosis and Testing"
Measure engine horsepower at powershaft	Record measured performance and compare with performance measured after carrying out "Engine Tune-up"	.....

### ENGINE TUNE-UP

<b>AIR INTAKE SYSTEM</b>		
Dry-type air cleaner - clean filter element and dust unloading valve	.....	Operator's manual and "Fundamentals of Service, Engine" manual.
Oil-bath air cleaner - clean oil cup and fill with fresh engine oil to "Full" mark	.....	Operator's manual and "Fundamentals of Service, Engine" manual
Check crankcase vent tube for foreign particles (restriction)	.....	.....
Tighten cylinder head cap screws	110 ft.lbs (15 mkg)	Section 20, group 10

**ENGINE AND TRACTOR TUNE-UP-Continued**

Service	Specifications	Reference
Check and adjust valve clearance	Intake valve 0.014 in. (0.35 mm) Outlet valve 0.018 in. (0.45 mm)	Section 20, group 10
<b>BATTERIES</b>		
Thoroughly clean wires, connections and batteries	.....	.....
Tighten cable clamp screws	.....	.....
Liberally coat battery terminals and cable connectors with petroleum jelly	.....	.....
Check electrolyte level of battery	.....	Operator's manual
Check specific gravity of electrolyte	.....	Operator's manual
<b>GENERATOR</b>		
Check fan belt tension	3/4 in. (19 mm) deflection with 20 lbs (9 kg) force	Section 20, group 35
<b>FUEL SYSTEM</b>		
Check fuel tank and lines for leaks or restriction	.....	.....
Remove bowl and strainer of fuel transfer pump and clean	.....	.....
Check first stage filter element and replace, if necessary	.....	Section 30, group 10
Check injection timing and adjust, if necessary	.....	Section 30, group 15, 20 and 25
Bleed fuel system	.....	Section 30, Group 15, 20 and 25
Check engine speeds and adjust speed control linkage, if necessary	.....	Section 20, group 40
<b>ENGINE LUBRICATION SYSTEM</b>		
Check engine oil pressure	50 to 60 psi (3.5 to 4.2 kg/cm <sup>2</sup> ) at 2100 rpm	Section 20, group 30