JOHN DEERE
7020
TRACTOR

TECHNICAL MANUAL

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TM1031 (01JAN76) English

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LITHO IN THE U.S.A.
ENGLISH

7020 TRACTOR
TECHNICAL MANUAL
TM-1031 (Jan-76)

CONTENTS

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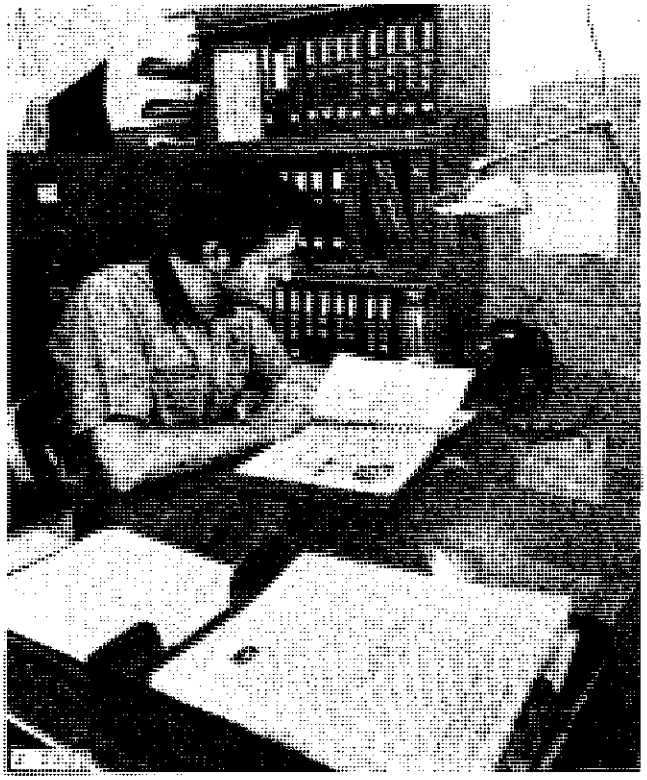
INTRODUCTION



Use FOS Manuals for Reference

Use Technical Manuals for Actual Service

This technical manual is part of a twin concept of service:

- **FOS Manuals—for reference**
- **Technical Manuals—for actual service**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover *basic* theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new men and for reference by experienced men.

Technical Manuals are concise service guides for a *specific* machine. Technical Manuals are on-the-job guides containing only the vital information needed by a journeyman mechanic.

When a serviceman should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

Some features of this technical manual:

- *Table of contents at front of manual*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications grouped for easy reference*

This technical manual was planned and written for you—a journeyman mechanic. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.

⚠ This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

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Section 10
GENERAL

CONTENTS OF THIS SECTION

Group 5
GENERAL TRACTOR SPECIFICATIONS

HORSEPOWER:
Maximum observed at PTO (2200 Engine rpm)* 146.17

ENGINE:
Type . . . . . 6-cylinder, in-line, valve-in-head, diesel, turbocharged, and intercooled
Engine Speeds:
Slow idle . . . . . 800 rpm
Working range . . . . . 1500 to 2200 rpm
Compression ratio
Tractors (-2699) 16.8:1
Tractors (2700-) 15.5:1

* *In official test.*

ENGINE (Continued)
Bore and stroke . . . . . 4-1/4 in. x 4-3/4 in.
Displacement . . . . . 404 cu. in.
Firing order 1-5-3-6-2-4
Valve clearance . . . . . In.-0.018 in. Ex.-0.028 in.
Injection pump timing . . . . . TDC
Lubrication System . . . . . Force-feed pressurized with full-flow oil filter
Fuel System:
Type . . . . . Direct injection
Air cleaner . . . . . Dry type with safety element
Cooling System:
Type . . . . . Pressurized with centrifugal pump
Temperature control . . Heavy-duty thermostats

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Capacities:
- Fuel tank ..... 78 U.S. gals. each tank
- Crankcase (with filter change) ..... 17 U.S. qts.
- Transmission-hydraulic system .... 22 U.S. gals.
- Cooling system ..... 32 U.S. qts.
- Front differential ..... 20 U.S. qts.

Transmission:
- Type ..... Syncro-Range, constant mesh
- Clutch ..... Heavy-duty, 14-3/4 in. plate, foot operated
- Gear selections ..... 8 forward and 2 reverse
- Shifting ... Two lever shifting, synchronized shifting within stations, except reverse gears; Optional "Hi-Lo" speed selector provides two speeds in each gear for 16 forward and 4 reverse.

Ground Speeds (in miles per hour, 2200 engine rpm) *

Gear	"Lo"	"Hi"
1st	1.99	2.29
2nd	3.18	3.66
3rd	4.20	4.83
4th	5.39	6.21
5th	6.71	7.73
6th	8.80	10.13
7th	11.39	13.11
8th	18.59	21.40
1st reverse	4.09	4.70
2nd	6.54	7.53

Electrical System:
- Type ..... 12-volt, negative grounded
- Batteries ..... Two, 6-volt, 75-plate, 172-ampere-hour, 5D type, connected in series
- Alternator ..... 12-volt, 55-amp, with integral transistorized regulator; with air conditioner, 12-volt, 72-amp with integral transistorized regulator

Power Take-Off:
- Type ..... Transmission-driven
- Speed
  - 1900 engine rpm in "Hi" ..... 1000 rpm
  - 2200 engine rpm in "Lo" or with standard 8-speed transmission ..... 1000 rpm
- PTO ahead of drawbar hitch point ..... 16 in.

Hydraulic System:
- Type ..... Closed center, constant pressure. Includes power steering, power brakes, implement control, and transmission and differential lubrication
- Standby pressure ..... 2250 psi

Brakes ..... Hydraulically power-actuated disk-type operating in oil

Tires* * 18.4-34, 6-ply

Wheel Tread: ..... See operator's manual

Dimensions:
- Wheel base ..... 120 in.
- Over-all length ..... 217 in.
- Over-all height (cab) ..... 118-1/2 in.
  -With air conditioner 126 in.
- Height to steering wheel ..... 92-1/4 in.
- Over-all width ..... 95-1/2 in.
  -long-axle-114 in.
- Turning radius ..... 210 in.

Shipping Weight (With equipment for average field service, less fuel and ballast) .... 14,960 lbs.

* *Ground speeds for tractors with standard 8-speed transmission are the same as "Lo."*

* * *Additional tire sizes available*

(Specifications and design subject to change without notice.)

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Group 10
PREDELIVERY, DELIVERY, AND AFTER-SALE SERVICES

PREDELIVERY SERVICE

Because of the shipping factors involved, plus extra finishing touches that are necessary to promote customer satisfaction, proper predelivery service is 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.

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 certify that the tractor has received the proper predelivery service when the portion of the customer's John Deere Delivery Receipt is completed.

NOTE: A Caplug is placed in the muffler outlet to prevent turbocharger rotation during transit. Remove Caplug before unloading tractor. Reinstall Caplug before transporting the tractor to the customer.

TEMPORARY TRACTOR STORAGE

Service	Specifications	Reference
Check radiator for coolant loss and antifreeze protection	2 inches above baffle.	
Reduce shipping pressure of tires		Operator's manual
Cover tractor and tires for protection and cleanliness		

BEFORE DELIVERING TRACTOR

ELECTRICAL SYSTEM		
Install electrolyte and charge batteries		FOS - 20 Manual
Stamp date code on battery		FOS - 20 Manual
Connect alternator. Do not attempt to polarize		Section 40, Group 10
Install light switch knob		
Clean terminals and connect battery cables		Section 40, Group 5
Check alternator belt adjustment		
Tractors Ser. No. (-2699)	1-inch deflection, 25 lb. force (20 lb. force on air conditioned)	Operator's manual
Tractors Ser. No. (2700-)	1-inch deflection, 25 lb. force.	
COOLING SYSTEM		
Inspect radiator for coolant loss	2 inches above baffle.	
Check antifreeze protection		

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BEFORE DELIVERING TRACTOR—Continued

Service	Specifications	Reference
TIRES AND WHEELS		
Adjust pressure of tires		Operator's manual
Check wheel rim clamp nuts, and wheel retainer cap screws for tightness	Retainer cap screws - 300 ft-lbs Rim clamp nuts - 170 ft-lbs	
Set front and rear wheel tread to a minimum of 80 in., and add at least 1000 lb. ballast to each wheel for single wheel operation		Operator's manual
Hillside operation—use double wheels only		Operator's manual
LUBRICATION		
Check crankcase oil level	To upper marks on dipstick.	Operator's manual
Check transmission-hydraulic system oil level	To top of "SAFE" range on dipstick. Type 303 Special-Purpose Oil.	Operator's manual
Check front differential oil level	To level of filler plug opening. Type 303 Special-Purpose Oil.	Operator's manual
Lubricate grease fittings	SAE multipurpose-type grease.	Operator's manual
ENGINE		
Check air cleaner; inspect air intake system connections; check hose clamps for tightness		Operator's manuel
Fill fuel tank and start engine	Capacity - 78 U.S. gallons each tank	Operator's manual
Check operation of starter, alternator, flasher, gauges, and indicator lights		Operator's manual
Check engine timing	TDC	Section 30, Group 15
Check engine speeds	Slow idle - 800 rpm Fast idle - 2400 rpm	Section 30, Group 20

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BEFORE DELIVERING TRACTOR—Continued

Service	Specifications	Reference
OPERATION		
Check transmission clutch free travel	Approximately 1-1/2-inch free travel (at least 3/4 in.)	Operator's manual
Shift transmission through all speeds		Operator's manual
Check throttle linkage for free operation		Section 30, Group 20
Adjust headlights and check operation		Operator's manual
Check power takeoff operation		Operator's manual
Check brakes and accumulator	3 in. maximum travel when brakes have been bled, and accumulator is working properly	Operator's manual
Check air conditioning, heater, and pressurizer operation		Operator's manual
Check hydraulic system operation: Steering, and remote cylinder		Operator's manual
Check seat operation		Operator's manual
GENERAL		
Tighten accessible nuts and cap screws		
Clean tractor and touch up paint		

DELIVERY SERVICE

A thorough discussion of the operation and service of a new tractor at the time of delivery helps to assure complete customer satisfaction. Proper delivery should be an important phase of a dealer's program. A portion of the John Deere Delivery Receipt emphasizes the importance of proper delivery service.

Many complaints have arisen simply because the owner was not shown how to operate and service his new tractor properly. Spend enough time, at the customer's convenience, to introduce the owner to his new tractor and explain to him how to operate and service it properly.

IMPORTANT: Install Caplug in muffler outlet if transporting tractor to customer. This will prevent damage to the turbocharger caused by air passing through the turbocharger and rotating it without lubrication when the engine is stopped.

The following procedure is recommended before the serviceman and owner complete the delivery acknowledgments portion of the delivery receipt.

Using the tractor operator's manual as a guide, be sure that the owner understands these points thoroughly:

1. Controls and Instruments.
2. How to start and stop the engine.
3. The importance of the break-in period.
4. How to use liquid or cast-iron ballast.
5. All functions of the hydraulic system.
6. Using the power takeoff.
7. The importance of safety.
8. The importance of lubrication and periodic services.

After explaining and demonstrating the above features, have the owner sign the delivery receipt and give him the operator's manual.

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AFTER-SALE INSPECTION

The purchaser of a new John Deere tractor is entitled to a free inspection within the warranty period after the equipment has been "run in." The terms of this after-sale inspection are outlined on the back of the John Deere Delivery Receipt.

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.

If the recommended after-sale service inspection is followed, the dealer can eliminate a needless volume of service work by preventing minor irregularities from developing into serious problems later on. This will promote strong dealer-customer relations and present the dealer an opportunity to answer questions that may have arisen during the first few days of operation. During the inspection service, the dealer has the further opportunity of promoting the possible sale of other new equipment.

The following inspection program is recommended within the first 100 hours of tractor operation.

INSPECTION PROCEDURE

Service	Specifications	Reference
COOLING SYSTEM		
Check radiator coolant level	2 inches above baffle.	
Clean external surface of radiator core		
Check hoses and connections for leaks		
FUEL SYSTEM		
Remove water and foreign matter from filter sediment bowl		Operator's manual
Bleed fuel system		Operator's manual
Check air intake system and fuel system for leaks, correcting as required. Tighten all loose connections		
Check air cleaner element, and unloading valve. Clean element if necessary		Operator's manual
ELECTRICAL SYSTEM		
Check specific gravity of battery(s)	Full charge - 1.260 at 80°F.	Operator's manual
Check level of battery electrolyte	To bottom of filler neck in each cell	Operator's manual
Check belt tension		
Tractors Ser. No. (-2699)	1-inch deflection, 25 lb. force (20 lb. force on air conditioned).	
Tractors Ser. No. (2700-)	1-inch deflection, 25 lb. force	Operator's manual

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INSPECTION PROCEDURES—Continued

Service	Specifications	Reference
Start engine and check operation of starter, lights, and indicator lamps		Operator's manual
LUBRICATION		
Check crankcase oil level	To upper marks on dipstick	Operator's manual
Check transmission-hydraulic system oil level	In "SAFE" range on dipstick. Use John Deere Type 303 Special-Purpose Oil.	Operator's manual
Check front differential oil level	To level with filler plug opening Use John Deere Type 303 Special-Purpose Oil.	Operator's manual
ENGINE		
Check valve clearance	Intake - 0.018 inch	
	Exhaust - 0.028 inch	Operator's manual
Check engine speed under load, fuel consumption, and horsepower	Specification	Group 15 of this Section.
CHECK TRACTOR AND POWER TRAIN OPERATION		
Check transmission clutch free travel	Approximately 1-1/2 inch free travel	Operator's manual
Shift transmission through all speeds		Operator's manual
Check power steering	Smooth, easy operation	Section 70, Group 20
Check brakes and accumulator	3 inches maximum brake travel when brakes have been bled and accumulator is working properly	Operator's manual

Inspection Procedures—Continued

Service	Specification	Reference
Hydraulic System		
Check rockshaft and remote cylinder operation		Section 70, Group 30
Reverse signal lock out Ser. No. (-2699)		Section 70, Group 30
Negative signal stop Ser. No. (2700-)		Section 70, Group 30
Check entire tractor for leaks. Inspect drive shafts, hydraulic system pipes and hoses, and check tractor cab controls for proper operation		Operator's manual
NUTS AND CAP SCREWS		
Tighten accessible nuts and cap screws that seem to require adjustment		

TORQUE CHART (ft-lbs)

Bolt Diameter	 Plain Head*	 Three Radial Dashes*	 Six Radial Dashes*
1/4	6	10	14
5/16	13	20	30
3/8	23	35	50
7/16	35	55	80
1/2	55	85	120
9/16	75	130	175
5/8	105	170	240
3/4	185	300	425
7/8	160* *	445	685
1	250* *	670	1030

* *The types of bolts and cap screws are identified by head markings as follows:*

Plain Head: regular machine bolts and cap screws.

3-Dash Head: tempered steel high-strength bolts and cap screws.

6-Dash Head: tempered steel extra high-strength bolts and cap screws.

* * *Machine bolts and cap screws 7/8-inch and larger are sometimes formed hot rather than cold, which accounts for the lower torque.*

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Group 15
TUNE-UP

Before tuning up a tractor, determine whether a tune-up will restore operating efficiency. When there is doubt, the following preliminary tests will help to determine if the engine can be tuned up. If the condition is satisfactory, proceed with the tune-up. Choose from the following procedures only those necessary to restore the unit.

PRELIMINARY ENGINE TESTING

Operation	Specification	Section-Group Reference
Dynamometer Test (at 2200 engine rpm full load)	Compare with previous recorded output; compare with output after tune-up	FOS - 30 Manual, Chapter 12
Compression Test		
Tractors Ser. No. (-2699)	385-410 at 215-245 rpm	FOS - 30 Manual, Chapter 12
Tractors Ser. No. (2700-)	380 at 130 rpm	FOS - 30 Manual, Chapter 12
Engine Coolant Check Test	No air bubbles or oil film in radiator	FOS - 30 Manual, Chapter 12

ENGINE TUNE-UP

Operation	Specification	Section-Group Reference
Air Intake System		
Service air cleaner and check system for leaks		FOS - 30 Manual, Chapter 12
Check system for restrictions using water manometer		FOS - 30 Manual, Chapter 12
Normal reading, inches of water (with clean filter elements)	10-11 in. at 2200 rpm (Full load)	
Maximum permitted reading	25 in. at 2200 rpm (Full load)	
Check restriction indicator light operation	24-26 in. at 2200 rpm	
Check manifold pressure	16-20 psi at full load	30-10

ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Exhaust System		
Check system for leaks		FOS - 30 Manual, Chapter 12
Check muffler and exhaust pipe for restrictions		FOS - 30 Manual, Chapter 12
Crankcase Ventilating System		
Check system for restrictions		FOS - 30 Manual, Chapter 12
Cooling System		
Clean grill screen, radiator core, and oil cooler core		20-30
Clean and flush system; check thermostat	Starts to open-177°F. to 182°F.	20-30
Check pressure cap	6.25 to 7.50 psi release pressure	20-30
Cylinder Head and Valves		
Torque cylinder head cap screws	130 ft-lbs in sequence	20-10
Set valve clearance	Intake - 0.018 in.	
	Exhaust - 0.028 in.	20-10
Diesel Fuel System		
Check fuel tank for water		30-15
Check fuel pump pressure	3-1/2 - 4-1/2 psi (Roosa Master) or	
	20-25 psi (Bosch)	30-15
Change filter		30-15
Injection Pump:		
Service and check timing	TDC	30-15
	5° advance at 1900 rpm (full load) on Roosa Master pump	30-15
Adjust throttle linkage	Slow idle - 800 rpm	
	Fast idle - 2400 rpm	30-20
	Foot throttle - 2650 rpm; Ser. No. (-2699)	30-20
Lubrication system		
Check engine oil pressure	40 - 50 psi (1900 rpm)	20-25
Charging System		
Check battery specific gravity	1.240 - 1.260	40-10 & 12
Check battery water consumption and electrolyte level		40-10 & 12
Clean battery, cables, and box		40-10 & 12
Clean alternator belt tension		
Tractors Ser. No. (-2699)	1-inch deflection, 25 lb. force (20 lb. force on air conditioned)	
Tractors Ser. No. (2700-)	1-inch deflection, 25 lb. force	Operator's Manual

ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Check alternator output		
Motorola	45 amps at 13 to 15 volts (1440 engine rpm). On air conditioned tractors, 65 amps at 13 to 15 volts (1400 engine rpm)	40-10
Delcotron, Ser. No. (-2699)	50 amps at 13 to 15 volts (2400 engine rpm). On air conditioned tractors, 65 amps at 13 to 15 volts (1750 engine rpm)	40-12
Delcotron, Ser. No. (2700-)	50 amps at 13 to 15 volts (1880 engine rpm). On air conditioned tractors, 65 amps at 13-15 volts (1880 engine rpm)	40-12
Check alternator regulated voltage	14.2 - 14.6 volts (operating)	40-10
Starting System		
Check start-safety switch operation		40-15
Check battery voltage when starting	Min. 9 volts (cranking)	40-15
Check starter current draw	Approx. 400 amps	40-15
Check operation of alternator and oil pressure indicator lights		40-25

FINAL ENGINE TEST

Operation	Specification	Section-Group Reference
Dynamometer Test (at 2200 engine rpm full load)	Compare with previous recorded output; record for future use	FOS - 30 Manual - ENGINES, Chapter 12