4000 & 4020 TRACTORS

JOHN DEERE

TECHNICAL MANUAL

4000 & 4020
TRACTORS

TM1006 (01DEC73) English

TM1006 (01DEC73)

LITHO IN THE U.S.A. (REVISED)
ENGLISH

4000 AND 4020 TRACTOR
(Serial No. 201,000-Up)

Technical Manual
TM-1006 (Aug-70)

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 whole manual*
- *Contents at front of each Section*
- *Specifications at end of each Group*
- *Special tools at end of each Group*

⚠ 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.

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.

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Section 10
GENERAL

CONTENTS OF THIS SECTION

Group 5
GENERAL TRACTOR SPECIFICATIONS

PTO HORSEPOWER (Officially observed at 2200 engine rpm with syncro-range transmission)

	4000	4020
Diesel	96.89	94.9 hp.
Gasoline	*96	96.7 hp.
LP-gas		94.6 hp.

ENGINE
Type . . 4-stroke cycle, 6-cylinder in-line, valve-in-head
Bore and Stroke:
Diesel . . . . . 4-1/4 x 4-3/4 in.
Gasoline and LP-gas . 4-1/4 x 4-1/4 in.
Displacement:
Diesel . . . . . 404 cu. in.
Gasoline and LP-gas . . . . . 362 cu. in.
Compression radio:
Diesel . . . . . 16.3 to 1
Gasoline . . . . . 7.5 to 1
LP-gas . . . . . 9.0 to 1
Firing order 1-5-3-6-2-4

*Factory observed.

ENGINE (Continued)
Engine Speeds:
Working range . . . . . 1500 to 2200 rpm
Maximum transport speed . . . 2500 rpm
Slow idle . . . . . 800 rpm

COOLING SYSTEM
Type . Pressurized system with centrifugal pump
Engine temperature control . . . Heavy-duty thermostat

LUBRICATION SYSTEM
Type . Force-feed, pressurized with full-flow oil filter.

FUEL SYSTEM
Diesel . . . Direct injection, inlet metering, distributing-type.
Diaphragm-type fuel pump.

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FUEL SYSTEM (Continued)

Gasoline . . Pressure system, diaphragm-type fuel pump, single barrel, updraft carburetor with electrical shut-off

LP-gas . . . Fuel strainer with electrical shut-off, convertor, and single barrel, updraft carburetor with fuel metering valve

CAPACITIES

Fuel tank
- Diesel and gasoline . . . . . 34 U.S. gals.
- LP-gas (80% full) . . . . . 45 U.S. gals.

Cooling system . . . . . 24 U.S. qts.

Crankcase

Gasoline, LP-gas, and Hi-Crop diesel engines
- Dry measurement . . . . . 9 U.S. qts.
- At 100 hour service interval 7 U.S. qts.
- At 200 hour service interval 8 U.S. qts.

Row-Crop and standard diesel engines
- Dry measurement . . . . . 13 U.S. qts.
- At 100 hour service interval 11 U.S. qts.
- At 200 hour service interval 12 U.S. qts.

Transmission-Hydraulic system*

Syncro-Range
- Dry measurement . . . . . 13 U.S. gals.
- At service intervals . . . 10 U.S. gals.

Power Shift
- Dry measurement . . . . . 17 U.S. gals.
- At service intervals . . . 14 U.S. gals.

Belt pulley . . . . . 2-1/2 U.S. pints

Hi-crop final drive housing. 1-3/4 U.S. qts.

ELECTRICAL SYSTEM

Type . . . . . 12-volt, negative ground

Alternator . . . . . 12-volt,55 amps
- Air Conditioned Cab . . 12-volt, 72 amps
- 4000 tractors . . . . . 12 volt, 35 amps

Battery:

Diesel . . . . Two, 6-volt, 75-plate 172-ampere-hour

Gasoline and LP-gas . . . . One, 12-volt, 78-plate 78-ampere-hour

SYNCRO-RANGE TRANSMISSION

Transmission clutch . . One dry-disk, foot operated

PTO clutch . . One dry-disk, hydraulically actuated, lever operated

**Add approx. 4-1/2 gallons to capacity if equipped with Power Front Wheel Drive.*

SYNCRO-RANGE TRANSMISSION(Continued)

Transmission type. . Constant-mesh, helical gear, syncronized shifting within stations

4000 tractors . . Synchronized shifting in forward gears within stations

Speeds. . . . . 8 forward; 2 reverse

POWER SHIFT TRANSMISSION

Engine disconnect. . . One dry-disk, lever operated clutch

PTO clutch. . . Wet disk, hydraulically actuated, lever operated

Transmission type. Planetary gears, clutches and brakes wet disk, hydraulically actuated, controlled by speed selector

Speeds. . . . . 8 forward; 4 reverse

GROUND SPEED (Row-Crop Tractor with 18.4-34 Rear Tires and 1900 Engine Rpm)

Gear	Syncro-Range	Power Shift
1st	1.6 mph	1.5 mph
2nd	2.6 mph	2.2 mph
3rd	3.4 mph	3.4 mph
4th	4.4 mph	4.4 mph
5th	5.5 mph	5.7 mph
6th	7.2 mph	7.3 mph
7th	9.3 mph	9.7 mph
8th	15.2 mph	16.2 mph
1st reverse	3.3 mph	1.8 mph
2nd reverse	5.3 mph	2.6 mph
3rd reverse	. . . . .	4.0 mph
4th reverse	. . . . .	5.1 mph

POWER FRONT WHEEL DRIVE

Type. . . Hydraulic motor driven with planetary gear reduction in wheel hub, uses pressure oil from hydraulic system

Torque. . . . . Low (series operated) and high (parallel operated)

Controls. . Solenoid operated control valves, synchronized with transmission controls

Planetary disconnect. . Hydraulic wet brake on ring gear releases when drive is disengaged

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POWER TAKE-OFF
- Type. . . Single 1-3/8-inch PTO shaft with mid and rear power take-off. Rear output shafts changed for rear PTO speed conversion.
- PTO Speed (1900 engine rpm):
  - Mid PTO (4020) . . . . . 1000 rpm
  - Rear PTO. . . . . 540 or 1000 rpm
- Rear PTO Ahead of Drawbar Hitch Point:
  - 540 rpm. . . . . 13.8 in.
  - 1000 rpm. . . . . 15.9 in.

BELT PULLEY
- Diameter. . . . . 12 in.
- Width. . . . . 8-1/2 in.
- Pulley speed (1900 engine rpm). . 966 rpm
- Belt speed. . . . . 3034 fpm

HYDRAULIC SYSTEM
- Type. . . Closed center, constant pressure. Actuates power steering, power brakes, Power Front Wheel Drive, and implement control.
- Standby pressure. . . . . 2250 psi

BRAKES
- Type. . . Hydraulically actuated power disk type operating in oil.

STEERING
- Type. . . Hydraulically actuated power, manual operation in case of hydraulic failure.

REAR AXLES
- Types available. . . . . Regular, long, extra long, and special dual

FRONT TIRES
- Row-Crop. 6.00-16, 6-ply
  7.50-15, 6-ply
  7.50-15, 8-ply
  7.50-16, 10-ply
  7.50-18, 6-ply
  10.00-16, 6-ply
  11.00-12, 12-ply
  11.00L-15, 6-ply
  11.00-16, 8-ply
  11.2-24, 6-ply
  12.4-24, 6-ply
  12.4-24, 6-ply C&R
- Standard. 7.50-18, 6-ply
  10.00-16, 6-ply
- Hi-Crop. 7.50-20, 6-ply

*Additional tires sizes available.

REAR TIRES*
- Row-Crop. 13.6-38, 6-ply
  15.5-38, 6-ply
  15.5-38, 8-ply
  16.9-34, 6-ply
  16.9-34, 8-ply
  16.9-38, 8-ply
  18.4-34, 6-ply
  18.4-34, 8-ply
  23.1-30, 8-ply
- Standard. 18.4-34, 6-ply
  18.4-34, 8-ply
  23.1-30, 8-ply
- Hi-Crop. 15.5-38, 8-ply
  18.4-34, 6-ply
  18.4-34, 8-ply

FRONT WHEEL TREAD
- Row-Crop
  - Regular tread. 6.00 tire - 48.5 to 82.3 in.
    7.50 tire - 50.8 to 79.9 in.
    10.00 tire - 54.5 to 78.5 in.
    11.00 tire - 52.8 to 77.9 in.
  - Wide tread . . 6.00 tire - 56.5 to 90.3 in.
    7.50 tire - 58.8 to 87.9 in.
    10.00 tire - 62.5 to 86.5 in.
    11.00 tire - 60.8 to 85.9 in.
  - Power Front Wheel Drive
    - 6-ply R-1 tire. . . . . 64 to 82 in.
    - 6-ply C&R tire. . . . . 66 to 82 in.
  - Standard
    - Fixed tread. . . . . 55.5 and 60.8 in.
    - Adjustable tread. . . . . 50 to 79.3 in.
  - Hi-Crop. . . . . 60 to 89.3 in.

REAR WHEEL TREAD
- Row-Crop
  - Regular axle
    - Regular wheel. . . . . 60 to 91 in.
    - Offset wheel. . . . . 60 to 96 in.
    - 13.6-38 tires. . . . . 60 to 99 in.
    - 23.1-30 tires. . . . . 66 to 94 in.
  - Long axle
    - Regular wheel. . . . . 60 to 97 in.
    - Offset wheel. . . . . 60 to 102 in.
    - 13.6-38 tires. . . . . 60 to 105 in.
    - 23.1-30 tires. . . . . 66 to 100 in.
  - Extra long axle
    - Regular wheel. . . . . 67 to 105 in.
    - Offset wheel. . . . . 60 to 110 in.
    - 13.6-38 tires. . . . . 67 to 113 in.
    - 23.1-30 tires. . . . . 67 to 108 in.
  - Special dual axle
    - Offset wheel. . . . . 60 to 120 in.
    - 18.4-34 tires. . . . . 66 to 115 in.

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REAR WHEEL TREAD (Continued)

Standard	
Regular axle	66 to 94 in.
Long axle	66 to 100 in.
Hi-Crop	73 to 97 in.

DIMENSIONS

Row-Crop:	
Wheel Base:	
Adjustable-tread front axle	100.3 in.
Double front wheel, Roll-O-Matic, and single front wheel	97.5 in.
Over-all height:	
Without cab	90.7 in.
Cab without Air Conditioning:	
Stolper	110.0 in.
Hinson	105.3 in.
Cab with Air Conditioning:	
Stolper	112.0 in.
Hinson	113.0 in.
Height to steering wheel	79.8 in.
Over-all length	152.7 in.
Width:	
Regular axle	89.6 in.
Long axle	95.9 in.
Extra long axle	103.9 in.
Special dual axle	113 in.
Clearance (crop):	
Adjustable axle	24.8 in.
Rear axle housing	27.1 in.
Rear axle	27.9 in.
Clearance (drawbar)	16 in.
Turning Radius:	
Double front wheel, Roll-O-Matic, and single front wheel	9 ft. 2 in.
Adjustable tread front axle	10 ft. 8 in.
**Shipping Weight:	
Diesel	8555 lbs.
Gasoline	8305 lbs.
LP-gas	8490 lbs.
Standard:	
Wheelbase	
Short	89 in.
Long	100.3 in.
Over-all height	90.4 in.
Height to steering wheel	79.4 in.

DIMENSIONS (Continued)

Over-all length	152.7 in.
Width:	
Regular axle	89.6 in.
Long axle	95.9 in.
Extra long axle	113.1 in.
Clearance (crop):	
Adjustable axle	22.5 in.
Rear axle	27.9 in.
Rear axle housing	27.1 in.
Clearance (drawbar)	16 in.
Turning Radius:	
Short wheel base	9 ft. 7 in.
Long wheel base	10 ft. 10 in.
**Shipping Weight:	
Diesel	8185 lbs.
Gasoline	7935 lbs.
LP-gas	8120 lbs.
Hi-Crop:	
Wheel base	100.3 in.
Over-all height	105.6 in.
Height to steering wheel	94.8 in.
Over-all length	150.9 in.
Width	95.4 in.
Clearance (crop):	
Front axle	39.3 in.
Rear axle	28.9 in.
Rear housing	37.6 in.
Turning radius	11 ft. 3 in.
**Shipping Weight:	
Diesel	9235 lbs.
Gasoline	8985 lbs.
LP-gas	9170 lbs.

***Weights are for diesel tractors with Power Shift transmission, 3-point hitch, and regular cast wheel equipment. Deduct approximately 225 pounds for tractors with Syncro-Range transmissions. Add approximately 1000 pounds for tractor with Power Front Wheel Drive. Shipping weight for the 4000 gasoline - 7699 lbs; diesel - 7900 lbs.*

(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 then serve as a basis for certifying that the tractor has received the proper predelivery service when that portion of the customer's John Deere Delivery Receipt is completed.

TEMPORARY TRACTOR STORAGE

Service	Specifications	Reference
Check radiator for coolant loss and antifreeze protection.	1-1/2 inches above baffle.	. . . . .
Drain fuel system (gasoline).	. . . . .	Operator's manual
Reduce shipping pressure of tires. . .	. . . . .	Operator's manual
Cover tractor and tires for protection and cleanliness	. . . . .	. . . . .

BEFORE DELIVERING TRACTOR

Cooling System		
Inspect radiator for coolant loss	1-1/2 inches above baffle.	. . . . .
Check antifreeze protection	. . . . .	. . . . .
Electrical System		
Install electrolyte and charge batteries	. . . . .	FOS-20
Stamp date code on battery	. . . . .	FOS-20
Connect alternator. Remove resistor if present. Do not attempt to polarize	. . . . .	Section 40, Group 10
Connect Power Front Wheel Drive wiring harness at connector near control valves	. . . . .	Section 40, Group 5
Install light switch knob	. . . . .	. . . . .
Clean terminals and connect battery cables	. . . . .	Section 40, Group 5

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BEFORE DELIVERING TRACTOR—Continued

Service	Specifications	Reference
Tires and Wheels		
Adjust pressure of tires.	. . . . .	Operator's manual
Check front wheel hub bolts, rear wheel rim clamp nuts, and rear wheel retainer cap screws for tightness.	Front hub bolts - 85 ft-lbs Rear hub bolts - 300 ft-lbs Rim clamp nuts - 170 ft-lbs	. . . . .
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
Lubricate grease fittings	SAE multipurpose-type grease	Operator's manual
Check distributor lubrication	Distributor cam lubricant	Section 40, Group 20
Engine		
Check air cleaner.	. . . . .	Operator's manual
Fill fuel tank and start engine.	Diesel and gasoline - 34 U.S. gallons; LP-Gas - 45 or 39 U.S. gallons	Operator's manual
Check operation of flasher, gauges, and indicator lamps.	. . . . .	Operator's manual
Check throttle linkage for free operation	. . . . .	Section 20, Group 35
Check engine timing	Diesel - TDC Gasoline - 20° BTDC, 2000 rpm LP-gas - 25° BTDC, 2000 rpm	Section 40, Group 20
Check engine idle speeds.	Diesel - 800 rpm, 2150 rpm, 2400 rpm, and 2650 rpm Gasoline, LP-Gas - 800 rpm, 2170 rpm, 2440 rpm, and 2690 rpm	Section 20, Group 35
Operation		
Check transmission clutch free travel (Syncro-Range transmission)	Approximately 1-1/2-inch free travel (at least 3/4 in).	Operator's manual
Check engine disconnect clutch (Power Shift transmission).	No tendency for tractor to creep when clutch is disengaged.	Section 50, Group 15

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BEFORE DELIVERING TRACTOR—Continued

Service	Specifications	Reference
Shift transmission through all speeds.	. . . . .	Operator's manual
Check Power Front Wheel Drive operation.	. . . . .	Operator's manual
Check power takeoff operation.	. . . . .	Operator's manual
Check differential lock operation. . . .	. . . . .	Operator's manual
Check brakes and brake accumulator	Not to exceed 3 in. immediately after stopping engine.	Section 70, Group 25
Check hydraulic system operation: Rockshaft, steering, and remote cylinder	. . . . .	Operator's manual
Check implement hitch operation . . .	. . . . .	Operator's manual
Check seat operation.	. . . . .	Operator's manual
Check operation of air conditioning system and heater system (if equipped)	. . . . .	Operator's manual
Check air conditioner compressor drive belt	1/4 in. deflection, 15 lb. pull	Operator's manual
Adjust headlights and check 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.

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 the owner to his new tractor and explaining to him how to operate and service it.

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 and belt pulley.
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 customer's 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	1-1/2 inches above baffle.	
Clean external surface of radiator core		
Check hoses and connections for leaks		
Fuel System		
Remove water and foreign matter from fuel pump and filter sediment bowls		Operator's manual
Bleed fuel system		Operator's manual

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INSPECTION PROCEDURES—Continued

Service	Specifications	Reference
Tighten loose connections and check entire system for leaks correct if necessary	. . . . .	. . . . .
Check air cleaner cup, 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.	1-inch deflection with a 25-pound force.	Operator's manual
Start engine and check action 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 distributor lubrication	Distributor cam lubricant	Section 40, Group 20
Engine		
Check valve clearance (static, hot). . .	Diesel - 0.018 in. Gasoline, LP-Gas - Intake - 0.015 in. Exhaust - 0.028 in. (hot) 0.031 in. (cold)	Operator's manual
Check engine speed under load, fuel consumption, and horsepower	. . . . .	Group 15 of this Section.
Hydraulic System		
Check rockshaft and remote cylinder operation.	. . . . .	Operator's manual
Check power steering	Smooth, easy operation.	Section 70, Group 20
Check brakes and brake accumulator.	Not to exceed 3 in. immediately after stopping engine.	Operator's manual Section 70, Group 25

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INSPECTION PROCEDURES—Continued

Service	Specifications	Reference
Clutches and differential lock		
Check transmission clutch free travel (Syncro-Range transmission)	Approximately 1-1/2-inch free travel.	Operator's manual
Check engine disconnect clutch (Power Shift transmission)	No tendency for tractor to creep when clutch is disengaged.	Section 50, Group 15
Shift transmission through all speeds.		Operator's manual
Check Power Front Wheel Drive operation.		Operator's manual
Check PTO clutch and brake operation.		Section 50, Groups 40 & 45
Check differential lock operation.		Operator's manual
Check air conditioning and heater system for proper operation (if equipped)		Operator's manual
Check air conditioner compressor drive belt	1/4 in. deflection, 15 lb. pull	Operator's manual
Nuts and Cap Screws		
Tighten accessible nuts and cap screws that seem to require adjustment		

TORQUE CHART

RECOMMENDED TORQUE IN FT-LBS
COARSE AND FINE THREADS

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 (B-grade).

3-Dash Head: tempered steel high-strength bolts and cap screws (D-grade).

6-Dash Head: tempered steel extra high-strength bolts and cap screws (F-grade).

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Group 15
TUNE-UP

GENERAL INFORMATION

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 2440 engine rpm)	Compare with previous recorded output; compare with output after tune-up	FOS 30 Manual, Chapter 12
Compression Test		
Diesel	400 psi at 275 rpm	FOS 30 Manual, Chapter 12
Gasoline	160 psi at 170 rpm	
LP-gas	180 psi at 170 rpm	
Manifold Depression Test (gasoline and LP-gas)	18-20 inches Mercury	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):		
Diesel - with precleaner and extension	8 in. at 2200 rpm	
without precleaner and extension	4 in. at 2200 rpm	

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ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Air Intake System—Continued		
Gasoline - with precleaner and extension	7 in. at 2200 rpm (full load)	
without precleaner and extension	3 in. at 2200 rpm (full load)	
Maximum permitted reading	20 in. at 2200 rpm (full load)	
	25 in. at 2200 rpm (full load, tractors with safety filter)	
Check restriction indicator light operation	19-21 in. at 2200 rpm (full load)	
	24-26 in. at 2200 rpm (full load, tractor with safety filter)	
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 grille screen, radiator core, and oil cooler core		20-30
Clean and flush system; check thermostat	Range - 160°-182°F; or 180°-202° 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	Diesel - 0.018 in.; gasoline or LP-gas - Intake 0.015, Exhaust 0.028 (hot) 0.031 (cold)	20-10
Ignition System		
Inspect system; install new points, condenser, and plugs (if existing ones are good, clean and regap them)		
Contact point gap 1112624	0.016 in.	40-20
1112466	0.021 in.	40-20
Cam angle 1112624	31 to 34°	40-20
1112466	22 to 26°	40-20
Spark plugs	Gasoline - .025 in.; LP-gas - .015 in.	40-20
Time distributor (2000 engine rpm)	Gasoline - 20° BTDC; LP-gas - 25° BTDC	40-20
Gasoline and LP-gas Fuel System		
Clean sediment bowl or fuel-lock strainer		30-15 & 20
Check system for leaks		30-15 & 20
Check fuel pump pressure	3-1/2 to 4-1/2 psi	30-15
Clean carburetor inlet screen		30-15
Drain carburetor bowl		30-15
Check choke operation		30-15

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ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Gasoline and LP-gas Fuel System—Cont.		
Check carburetor mixture adjustment	Average settings: gasoline 2-1/4 turns M-S or 1-3/4 turns Zenith LP-gas - 5-1/2 turns	30-15 & 20
Adjust throttle linkage (PTO shaft speeds given in parenthesis)	Foot - 2690 (1420) rpm idle, 2500 rpm load; Hand - 2170 (1145) rpm idle, 1900 rpm load; 2440 (1287) rpm idle, 2200 rpm load; 800 (422) rpm idle with 3/64 in. clearance at leaf spring	20-35
Diesel Fuel System		
Check fuel tank for water		30-10
Check fuel pump pressure	3-1/2 - 4-1/2 psi	30-10
Clean sediment bowls and change filter		30-10
Service injection nozzles		30-10
Injection Pump:		
Service and check timing	TDC	30-10
CBC Pump	5° advance at 1900 rpm (full load)	30-10
JDB Pump	4° advance at 1900 rpm (full load)	
Adjust throttle linkage (PTO shaft speeds given in parenthesis)	Foot pedal - 2650 (1399) rpm idle, 2500 rpm load, 1/8 in. breakover; Hand throttle - 2150 (1135) rpm idle, 1900 rpm load; 2400 (1267) rpm idle, 2200 rpm load Slow idle - 780 to 820 rpm; Injection pump arm breaks over 1/8 in.	20-35
Lubrication System		
Check engine oil pressure	25 - 40 psi at 1900 rpm	20-25
Charging System		
Check battery specific gravity	1.240 - 1.260	40-10
Check battery water consumption and electrolyte level		40-10
Clean battery, cables, and box		40-10
Check alternator belt tension	25 lbs. at 1 in. belt deflection	40-10
Check alternator output	40 to 45 amps at 13-15 volts (1443 engine rpm, 3000 alternator rpm) Air conditioned tractors - 65 amps at 13-15 volts (1400 engine rpm); 4000 tractors - 25 amps at 13-15 volts (1440 engine rpm)	40-10
Check alternator regulated voltage	14.2 - 14.6 volts (operating)	40-10

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ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Starting System		
Check start-safety switch operation	. . . . .	40-15
Check battery voltage when starting	Min. 9 volts (cranking)	40-15
Check starter current draw	Diesel - approx. 400 amps Gasoline - approx. 250 amps LP-gas - approx. 340 amps	40-15
Check operation of alternator, oil pressure, and Power Shift transmission filter restriction indicator lights	. . . . .	40-25

FINAL ENGINE TESTING

Operation	Specification	Section-Group Reference
Carburetor mixture	Use exhaust gas analyzer and dynamometer.	30-15 & 20
Dynamometer.	Compare with previous recorded output; record for future use	FOS 30 Manual, Chapter 12

TRACTOR TUNE-UP

Operation	Specification	Section-Group Reference
Adjust Syncro-Range transmission clutch free travel.	1-1/2 in.	50-5
Check Power Shift transmission disconnect lever operation.	6 in. travel	50-10
Transmission		
Check shifting	. . . . .	50-15
Check for proper operation without excessive noise	. . . . .	50-15 & 20
Power Shift transmission pump pressure	140 - 160 psi.	50-20
Power Shift engaged element pressure	Max. of 15 psi less than pump.	. . . . .
Check Power Front Wheel Drive operation.	. . . . .	50-55
Power Take Off		
Check engagement feel.	. . . . .	50-40 & 45
Check for excessive noise	. . . . .	50-40 & 45
Check differential lock operation.	420 - 525 psi.	50-25
Check brake pedal travel and even position	3 in. max. for one emergency application immediately after stopping engine	70-25
Check front wheel bearing adjustment and lubrication.	35 ft-lbs; backoff to nearest hole .	. . . . .

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