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ZTX Series Tractors Service Manual SM 8-12602

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Section 1001

1001

**SAFETY, GENERAL INFORMATION
AND STANDARD TORQUE SPECIFICATIONS**

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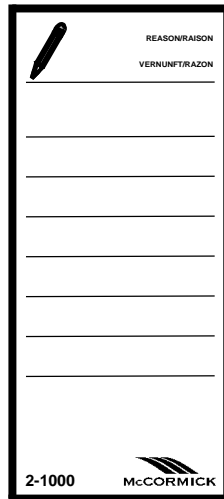
SAFETY



This symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED. The message that follows the symbol contains important information about safety. Carefully read the message. Make sure you fully understand the causes of possible injury or death.

To prevent injury always follow the Warning, Caution and Danger notes in this section and throughout the manual.

Put a warning tag as shown below on the key for the key switch when carrying out servicing or repairs to the tractor. Warning tags (publication number 2-1000) are available from your McCormick dealer.



WARNING: Read the operators manual to familiarize yourself with the correct control functions.



WARNING: Operate the machine and equipment controls from the seat position only. Any other method could result in serious injury.



WARNING: This is one a man machine, no riders allowed.



WARNING: Before starting engine, study Operator's Manual safety messages. Read all safety signs on machine. Clear the area of other persons. Learn and practice safe use of controls before operating.

It is your responsibility to understand and follow manufacturers instructions on machine operation, service, and to observe pertinent laws and regulations. Operator's and Service Manuals may be obtained from you McCormick dealer.



WARNING: If you wear clothing that is too loose or do not use the correct safety equipment for your job, you can be injured. Always wear clothing that will not catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflector clothing.



WARNING: When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.



WARNING: When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. DO NOT change the procedure.



WARNING: When putting the hydraulic cylinders on this machine through the necessary cycles to check operation or to remove air from a circuit, make sure all people are out of the way.



WARNING: Use insulated gloves or mittens when working with hot parts.



CAUTION: Lower all attachments to the ground or use stands to safely support the attachments before you do any maintenance or service.



CAUTION: Pin sized and smaller streams of hydraulic oil under pressure can penetrate the skin and result in serious infection. If hydraulic oil under pressure does penetrate the skin, seek medical treatment immediately. Maintain all hoses and tubes in good condition. Make sure all connections are tight. Make a replacement of any tube or hose that is damaged or thought to be damaged. **DO NOT** use your hand to check for leaks, use a piece of cardboard or wood.



CAUTION: When removing hardened pins such as a pivot pin, or a hardened shaft, use a soft head (brass or bronze) hammer or use a driver made from brass or bronze and a steel head hammer.



CAUTION: When using a hammer to remove and install pivot pins or separate parts using compressed air or using a grinder, wear eye protection that completely encloses the eyes (approved goggles or other approved eye protectors).



CAUTION: Use suitable floor (service) jacks or chain hoist to raise wheels or tracks off the floor. Always block machine in place with suitable safety stands.



CAUTION: When servicing or repairing the machine. Keep the shop floor and operator's compartment and steps free of oil, water, grease, tools, etc. Use oil absorbing material and or shop cloths as required. Use safe practices at all times.



CAUTION: Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this Service Manual.



DANGER: Engine exhaust fumes can cause death. If it is necessary to start the engine in a closed place, remove the exhaust fumes from the area with an exhaust pipe extension. Open the doors and get outside air into the area.



DANGER: When the battery electrolyte is frozen, the battery can explode if (1), you try to charge the battery, or (2), you try to jump start and run the engine. To prevent that battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you or others in the area can be injured.



DANGER: Batteries contain acid and explosive gas. Explosions can result from sparks, flames or wrong cable connections. To connect the jumper cables correctly to the battery of this machine see the Operator's Manual. Failure to follow these instructions can cause serious injury or death.

GENERAL INFORMATION

Cleaning

Clean all metal parts except bearings, in mineral spirits or by steam cleaning. Do not use caustic soda for steam cleaning. After cleaning dry and put oil on all parts. Clean oil passages with compressed air. Clean bearings in kerosene, dry the bearings completely and put oil on the bearings.

Inspection

Check all parts when the parts are disassembled. Replace all parts that have wear or damage. Small scoring or grooves can be removed with a hone or crocus cloth. Complete visual inspection for indications of wear, pitting and the replacement of parts necessary will prevent early failures.

Bearings

Check bearings for easy action. If bearings have a loose fit or rough action replace the bearing. Wash bearings with a good solvent or kerosene and permit to air dry. **DO NOT DRY BEARINGS WITH COMPRESSED AIR.**

Needle Bearings

Before you press needle bearings in a bore always remove any metal protrusions in the bore or edge of the bore. Before you press bearings into position put petroleum jelly on the inside and outside diameter of the bearings.

Gears

Check all gears for wear and damage. Replace gears that have wear or damage.

Oil Seals, O-Rings And Gaskets

Always install new oil seals, o-rings and gaskets. Put petroleum jelly on seals and o-rings.

Shafts

Check all shafts that have wear or damage. Check the bearing and oil seal surfaces of the shafts for damage.

Service Parts

Always install genuine McCormick service parts, when ordering refer to the Parts Catalog for the correct part number of the genuine McCormick replacement items. Failures due to the use of other than genuine McCormick replacement parts are not covered by warranty.

Lubrication

Only use the oils and lubricants specified in the Operators or Service Manual. Failures due to the use of non specified oils and lubricants are not covered by warranty.

STANDARD TORQUE DATA FOR NUTS AND BOLTS

NOTE: A "click type" torque wrench is recommended for the bolt torques listed below.

Chart 1 (Plain Nuts/Bolts)

BOLT SIZE (mm)	TYPE 8.8				TYPE 10.9			
	MIN		MAX		MIN		MAX	
	lb ft	Nm	lb ft	Nm	lb ft	Nm	lb ft	Nm
M4	3.0	4.0	3.4	4.5	4.3	5.8	4.8	6.5
M5	4.8	6.5	5.5	7.5	7.0	9.5	7.8	10.5
M6	8.2	11.0	9.2	12.5	11.8	16.0	13.3	18.0
M8	20.0	27.0	22.5	31.0	28.7	39.0	32.3	44.0
M10	40.0	54.0	45.0	61.0	56.0	77.0	64.0	87.0
M12	69.0	94.0	78.0	106.0	100.0	134.0	110.0	151.0
M14	110.0	150.0	125.0	170.0	160.0	215.0	180.0	240.0
M16	175.0	235.0	190.0	260.0	245.0	335.0	275.0	375.0
M20	345.0	470.0	390.0	530.0	480.0	650.0	540.0	730.0
M22	475.0	640.0	530.0	720.0	655.0	890.0	735.0	1000.0
M24	600.0	810.0	675.0	915.0	830.0	1125.0	930.0	1265.0
M30	1190.0	1615.0	1340.0	1815.0	1645.0	2235.0	1855.0	2515.0
M36	2080.0	2825.0	2340.0	3175.0	2875.0	3900.0	3235.0	4390.0

Chart 2 (Phosphate Coated Nuts/Bolts)

BOLT SIZE (mm)	TYPE 8.8				TYPE 10.9			
	MIN		MAX		MIN		MAX	
	lb ft	Nm	lb ft	Nm	lb ft	Nm	lb ft	Nm
M4	2.3	3.0	2.6	3.4	3.2	4.4	3.6	4.9
M5	3.6	4.9	4.1	5.6	5.2	7.1	5.9	8.0
M6	6.2	8.3	6.9	9.4	8.9	12.0	10.0	13.5
M8	15.0	20.3	16.9	23.3	21.5	29.2	24.2	32.8
M10	30.0	41.0	34.0	46.0	42.0	58.0	48.0	65.0
M12	52.0	71.0	59.0	80.0	75.0	101.0	83.0	113.0
M14	83.0	113.0	94.0	126.0	120.0	161.0	135.0	180.0
M16	131.0	176.0	143.0	195.0	185.0	251.0	205.0	280.0
M20	259.0	353.0	293.0	400.0	360.0	490.0	405.0	550.0
M22	355.0	480.0	400.0	540.0	490.0	665.0	550.0	750.0
M24	450.0	608.0	506.0	686.0	625.0	845.0	700.0	950.0
M30	893.0	1211.0	1005.0	1361.0	1235.0	1675.0	1390.0	1885.0
M36	1560.0	2119.0	1755.0	2381.0	2156.0	2925.0	2425.0	3295.0

Chart 3 (Zinc or Cadmium Plated Nuts/Bolts)

BOLT SIZE (mm)	TYPE 8.8				TYPE 10.9			
	MIN		MAX		MIN		MAX	
	lb ft	Nm	lb ft	Nm	lb ft	Nm	lb ft	Nm
M4	2.6	3.5	2.9	3.9	3.7	5.0	4.1	5.6
M5	4.1	5.6	4.6	6.3	5.9	8.0	6.6	9.0
M6	7.0	9.5	7.8	10.6	10.0	13.6	11.3	15.3
M8	17.0	23.1	19.1	25.9	24.4	33.1	27.4	37.2
M10	34.0	46.0	38.3	52.0	48.0	65.0	54.0	74.0
M12	59.0	80.0	66.0	90.0	85.0	114.0	94.0	128.0
M14	94.0	128.0	106.0	145.0	136.0	183.0	153.0	205.0
M16	149.0	200.0	161.0	220.0	208.0	285.0	235.0	320.0
M20	293.0	400.0	330.0	450.0	408.0	555.0	460.0	620.0
M22	400.0	545.0	450.0	615.0	555.0	755.0	625.0	850.0
M24	510.0	690.0	575.0	780.0	705.0	955.0	790.0	1075.0
M30	1010.0	1375.0	1140.0	1545.0	1400.0	1900.0	1580.0	2140.0
M36	1770.0	2400.0	1990.0	2700.0	2445.0	3315.0	2750.0	3730.0

Section 1002

1002

GENERAL SPECIFICATIONS AND TORQUES

ZTX Series Tractors

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GENERAL SPECIFICATIONS

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GENERAL SPECIFICATIONS

Lubricants and Capacities

ENGINE

Oil Type..... McCormick Engine Oil, SAE 15W - 40
Capacity (With Filter Change)..... 20 Litres (5.3 US gallons)

ENGINE COOLANT

Coolant Mix..... McCormick Universal Anti-freeze
Solution of 33% to 50% Ethylene Glycol
(depending on market requirements)
Capacity..... 40 Litres (10.6 US gallons)

AIR CONDITIONER SYSTEM

Compressor Oil..... Sanden SP - 20 Pag Oil
Capacities..... Refer to Page 5

TRANSMISSION

Oil Type..... McCormick UTTO
Capacity..... 158 Litres (41.7 US gallons)

MFD AXLE

Oil Type..... McCormick Multi-Purpose Gear Oil
SAE 85W - 140 EP Gear Oil to API GL-5
or MIL-L-2105 Specification
Differential Oil 10 Litres (2.6 US gallons)
Axle Planetaries (Each) 1.9 Litres (0.5 US gallons)

FUEL TANK

Fuel Capacity..... 570 Litres (150 US gallons)

Engine

NOTE: For the Engine Specifications, refer to the your Engine Service Manual.

Fuel

NOTE: For the Fuel Specifications, refer to the your Engine Service Manual.

Electrical

System Type 12 Volt Negative Ground
Batteries..... Two 12 Volt, Low Maintenance Hybrid Batteries
Connected in Parallel, DIN Type 60527, Top Stud Terminals

BATTERY TYPE	SAE (COLD CRANKING CAPACITY)	IEC	DIN	AMPERE HOURS	RESERVE CAPACITY
644	660 Amps	440 Amps	400 Amps	95	180 mins
664	770 Amps	515 Amps	465 Amps	105	210 mins
648	810 Amps	545 Amps	490 Amps	120	220 mins

Alternator 12 Volt, 150 Amp
Starter Motor..... 12 Volt, 4.2 kW

Transmission

Pinion Shaft Bearing Preload	0.05 to 0.15 mm
MFD Output Shaft End Play	0 to 0.1 mm

MFD CLUTCH

Number of Clutch Plates	
Friction Plates	8
Separator Plates	7

DIFFERENTIAL AND DIFFERENTIAL LOCK

Ring Gear and Pinion Backlash.....	0.15 to 0.45 mm
Differential Lock Clutch	
Number of Plates	
Friction Plate	8
Separator Plate	7

Hydraulics

HYDRAULIC PUMPS

Charge Pump	
110 l/min	60 cm ³ per revolution
150 l/min	80 cm ³ per revolution
Variable Displacement Pump	
110 l/min	0 to 45 cm ³ per revolution
150 l/min	0 to 60 cm ³ per revolution

Air Conditioning

REFRIGERANT

Type HFC-134A
System Capacity 1.9 kg
Boiling Point at Atmospheric Pressure..... -26°C

COMPRESSOR

Manufacturer..... SANDEN
Model SD 7H15MD4609
Number of Cylinders 7
Displacement Per Revolution 155 cc
Clutch Voltage 12 Volts
Clutch Ampage Draw at 12 Volts 3.6 to 4.2 Amperes
Front Clutch Plate Air Gap 0.4 to 0.8 mm

COMPRESSOR AND SYSTEM LUBRICATION

Lubrication Type..... Sanden SP - 20 PAG Oil

HIGH PRESSURE SWITCH

Operation Closed by Excessive System Pressure

LOW PRESSURE SWITCH

Operation Closed by Low System Pressure

SPECIAL TORQUES

Engine

Engine to Transmission Retaining Bolts		
Adapter Plate to Engine.....	114 to 128 Nm	(84 to 94 lb ft)
Adapter Plate to Transmission	555 to 620 Nm	(409 to 457 lb ft)
Torque Dampener Retaining Bolts.....	74 to 84 Nm	(54 to 62 lb ft)
Front Bolster to Transmission Retaining Bolts	555 to 620 Nm	(409 to 457 lb ft)
Flywheel	108 to 132 Nm	(80 to 97 lb ft)

Transmission

DIFFERENTIAL AND DIFFERENTIAL LOCK

Ring Gear Retaining Bolts	240 to 340 Nm	(177 to 251 lb ft)
Differential Lock Clutch Cage Retaining Bolts	110 to 130 Nm	(81 to 96 lb ft)
Differential Bearing Carrier Retaining Bolts.....	100 to 130 Nm	(74 to 96 lb ft)

REAR AXLES

Rear Axle Mounting Nuts.....	247 to 253 Nm	(182 to 187 lb ft)
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MFD DRIVE SHAFT

MFD Drive Shaft Centre Mounting Bolts.....	570 Nm	(420 lb ft)
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PTO

PTO Housing Retaining Bolts	480 to 640 Nm	(354 to 472 lb ft)
PTO Clutch Pack Retaining Bolt	25 to 34 Nm	(18 to 25 lb ft)
PTO Clutch Assembly Retaining Bolt	50 to 70 Nm	(37 to 52 lb ft)
Bearing Carrier Retaining Bolt.....	72 to 96 Nm	(53 to 71 lb ft)

Cab and Chassis

CAB

Cab Mounting Bracket to Rear Axle Bolts	190 to 244 Nm	(140 to 180 lb ft)
Cab Mounting Bracket to Transmission Bolts Bolts	205 to 260 Nm	(151 to 192 lb ft)
Cab Mounting Bolt to Threaded Plate	47 to 61 Nm	(33 to 45 lb ft)
Cab Mounting Nut.....	190 to 244 Nm	(140 to 180 lb ft)

WHEELS

Front Wheel to MFD Axle Nuts	530 to 570 Nm	(391 to 420 lb ft)
Wheel Hub to Tapered Bushing.....	500 to 600 Nm	(369 to 443 lb ft)
Wheel to Wheel Hub.....	640 to 680 Nm	(472 to 502 lb ft)

Section

2

2

ENGINE

How it Works

ZTX Series Tractors

SECTION 2

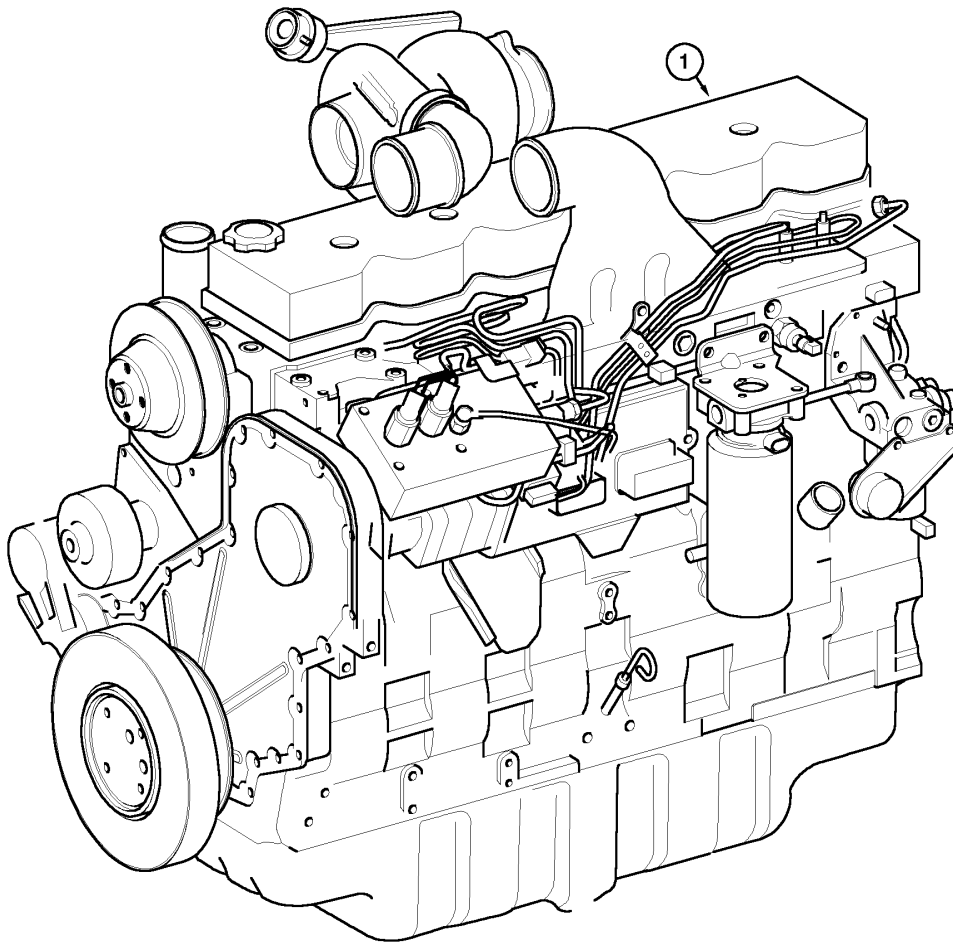
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Engine Description

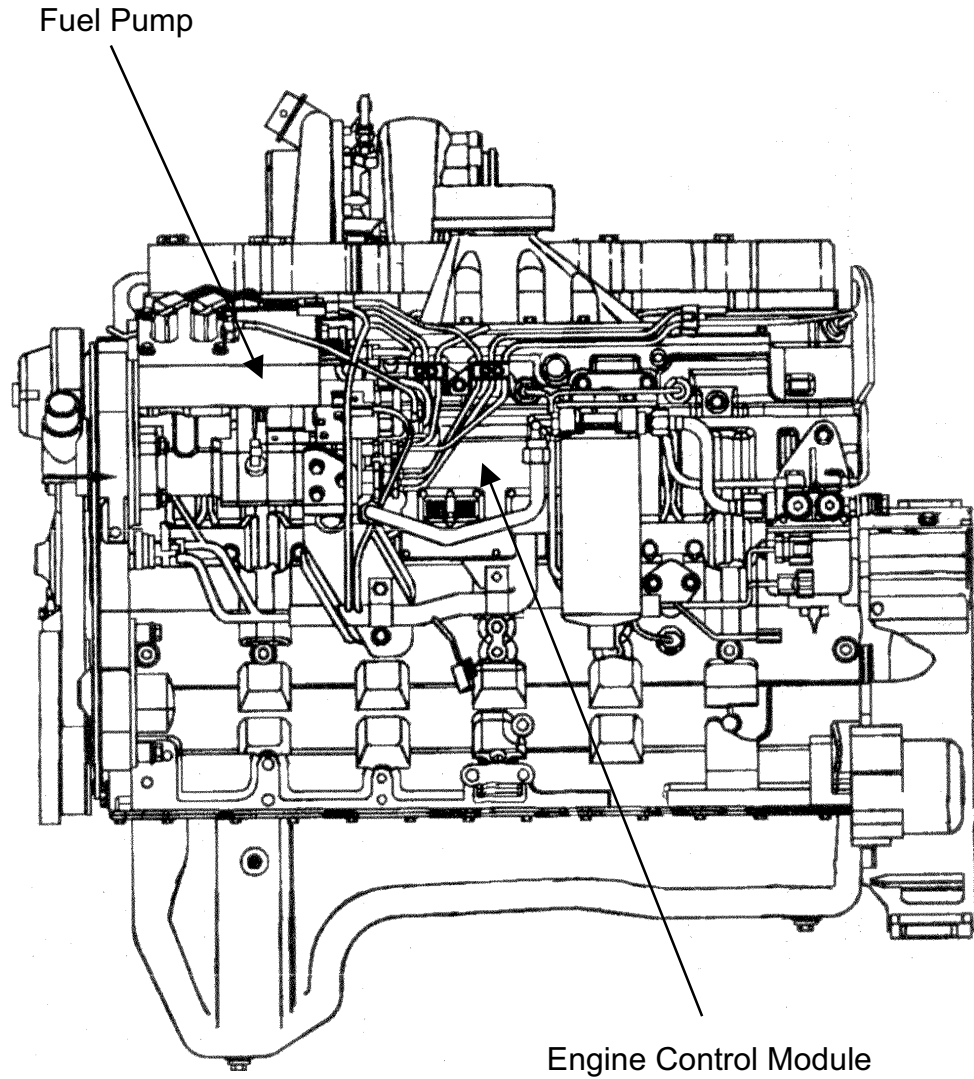
The ZTX, models ZTX230, ZTX 260 and ZTX 280, are fitted with the Cummins QSC 24 valve 8.3 Litre Engine. These engines have full authority electronic control. A vast number of changes have been implemented when compared to the previous C series 8.3-liter Cummins engines.

These engines have 24 valves, 4 valves per cylinder, to ensure optimum airflow, improved fuel economy and fully emissions compliant. The fuel injector is located in the center of the cylinder to provide a more centralized injection and improved fuel burn over conventional layouts.

The fuel system itself is totally electronically controlled and uses an engine mounted ECM (Engine Control Module) to process all relevant information, and make necessary adjustments.



Engine Electronic Control System



(View left-hand side of engine)

Engine Electronic Control System (Cont'd)

The electronic control system for the QSC Engine uses input information from a number of sensors installed on the engine and related equipment. This information is used to monitor the current engine operating conditions, and therefore allow the ECM to determine the quantity and timing of the fuel delivery to the engine.

The engine control module (ECM) is mounted on the left-hand side of the engine, just to the rear of the fuel pump. All the information received, and all corresponding outputs will enter and exit the ECM via two 50-pin connectors located on the body of the controller. All inputs and outputs use the rearmost 50-pin connector, the foot throttle is the only circuit that makes a connection through the front 50-pin connector.

Should there be a requirement to download software into the ECM, or to monitor data for the aid of diagnostics, this can be achieved using the Cummins EST (Electronic Service Tool) by an authorized Cummins agent. Although a connection is provided for at the controller, it is not used by McCormick Tractors as all fault code retrieval; data monitoring functions can be carried out through the diagnostics connector found in the operators cab.

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