

SERIES/SECTION	SECTION NO.	FORM NO.
1 GENERAL		
Safety Rules, Service Manual Introduction, and Torque		
Specifications	1001	8-44360
Maintenance and Lubrication	1002	8-44630
General Engine Specifications	1010	8-26390
Detailed Engine Specifications	1024	8-26061
2 ENGINES		
Engine and Radiator Removal and Installation	2000	8-44630
Engine Accessories (Air cleaner, Cold Start System, Muffler)	2001	8-44630
Cylinder Head and Valve Train	2415	8-26071
Cylinder Block, Pistons, Rods, Camshaft Main Bearings, Oil Seals, and Flywheel	2425	8-26081
Lubrication System	2445	8-26091
Cooling System	2455	8-26101
Turbocharger	2465	8-26110
Turbocharger Failure Analysis	2565	9-78235
3 FUEL SYSTEM		
Fuel Lines, Fuel Tank, and Engine Controls	3001	8-44630
Fuel System and Filters	3410	8-26131
Bosch Fuel Injection Pump, Drive Gear, and Timing	3412	8-26141
Fuel Injectors	3413	8-26150
4 ELECTRICAL		
Removal and Installation of Starter and Alternator	4001	8-44630
Electrical System Specifications and Troubleshooting	4002	8-44630
Wiring Diagrams	In Pocket at Rear of Manual	
Batteries	4005	8-44630
Starter	4006	8-42240
Alternator	4007	8-42240
Collector Ring	4016	8-38470
5 STEERING		
Steering System Troubleshooting	5002	8-44630
Steering Control Valves	5007	8-44630
Steering Relief Valve and Steering Reversal Valve	5011	8-44630
Steering Axle and Tie Rod	5021	8-38470
Auxiliary Steering	5022	8-38480
6 POWER TRAIN		
Troubleshooting and Pressure Checks	6102	8-44630
Torque Converter	6110	8-44630
Transmission	6116	8-38220
Transmission Controls	6118	8-44630
Drive Shafts	6122	8-44630
Axle Differential	6126	8-38220
Axle Planetaries	6127	8-38220
Axle Removal and and Installation	6128	8-44630
Wheels and Tires	6129	8-44630

SERIES/SECTION	SECTION NO.	FORM NO.
7 BRAKES		
Troubleshooting and Air System Schematic	7102	8-44630
Air Compressor and Governor	7103	8-44630
Air Reservoir and Relief Valve	7104	8-44630
Brake Valve, Relay Valve, and Pressure Reducing Valve	7105	8-44630
Brake Actuator, Digging Brake Control Valve, and Double Check Valve	7106	8-44630
Parking Brake Actuator, Parking Brake Valve, and Quick Release Valve	7107	8-44630
Solenoid Valves and Air Cylinders for Transmission Range, Outriggers, and Fast Crowd	7108	8-44630
Air Swivel	7110	8-44630
Alcohol Evaporator	7111	8-44630
Brake Shoes and Wheel Cylinders	7121	8-38470
Swing Brake	See Section 9210	
8 HYDRAULICS		
Removal and Installation of Hydraulic Components	8201	8-44630
Hydraulic System Specifications and Troubleshooting	8202	8-44630
Hydraulic Pump for Steering and Outside Control Valve	8205	8-44630
Hydraulic Pump for Outrigger and Inside Control Valve	8206	8-44630
Inside and Outside Control Valves	8207	8-44630
Outrigger Control Valve	8209	8-44630
Swing Motor	8210	8-44630
Boom Hydraulic Circuit	8211	8-44630
Arm Hydraulic Circuit	8212	8-44630
Tool Hydraulic Circuit	8213	8-44630
Hydraulic Swivel	8218	8-38470
Power Sensing Valve	8221	8-38240
Cylinders	8290	8-44630
9 MOUNTED EQUIPMENT		
Controls and Linkages	9206	8-44630
Outriggers	9209	8-38220
Swing Geabox and Swing Brake	9210	8-44630
"E" Boom	9211	8-38220
"Y" Boom	9212	8-38220
Attachments	9213	8-44630
Turntable, Bearing, and Related Parts	9216	8-44630
REAR POCKET		
Electrical Schematic		850804
Hydraulic Schematic		850926

1001

SAFETY RULES, SERVICE MANUAL INTRODUCTION, AND TORQUE SPECIFICATIONS

TABLE OF CONTENTS

Safety Rules	1001-2
Service Manual Introduction	1001-4
Torque Specifications - U.S. Hardware	1001-5
Torque Specifications - Metric Hardware	1001-6
Torque Specifications - Steel Hydraulic Fittings	1001-7

Written In *Clear
And
Simple
English*

SAFETY RULES

 **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. 1-1-C

NOTE: To prevent injury on job, follow the Warning, Caution, and Danger notes in this section and other sections throughout this manual. Follow the instructions carefully.

The procedures recommended and shown in this manual are good, effective service methods. However, all possible procedures and service hazards may not be covered. Therefore, if you use a tool or procedure not recommended, you must make sure that the method you select is a safe method.

Put the warning tag shown below on the key for the key switch when you are servicing or repairing this machine. One warning tag is on every new machine. You can buy additional warning tags, part number 331-4614, from Service Parts Supply.

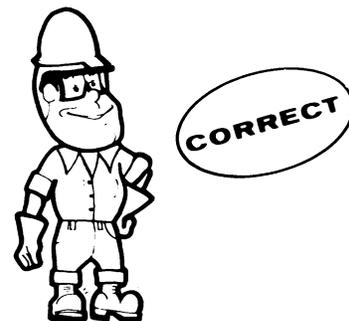


 **WARNING:** This is a one man machine, no riders allowed. 35-8

 **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 manufacturer's instructions on machine operation, service, and to observe pertinent laws and regulations. Operator's and service manuals may be obtained from your J I Case dealer. 45-2

 **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. 45-3-A



 **WARNING:** Read operator's manual to familiarize yourself with control lever functions. 46-27

 **WARNING:** Operate tractor and equipment controls from the seat position only. Any other method could result in serious injury. 48-55

 **WARNING:** When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution. 35-4



WARNING: When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. **DO NOT** change the procedure. 47-44



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. 47-45



WARNING: Use insulated gloves or mittens when working with hot parts. 47-41A



CAUTION: Lower all attachments to the ground or use stands to safely support the attachments before you do any maintenance or service. 49-11



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. 40-6-A



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. 46-17



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). 46-13



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 an oil absorbing material and/or shop cloths as required. Use safe practices at all times. 40-8



CAUTION: Use suitable floor (service) jacks or chain hoists to raise wheels or track off the floor. Always block machine in place with suitable safety stands. 40-7-A



CAUTION: Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this service manual. 40-10



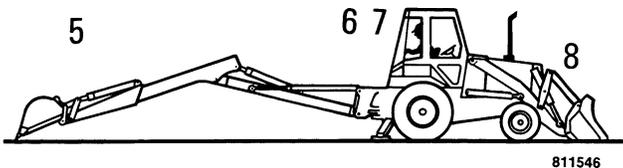
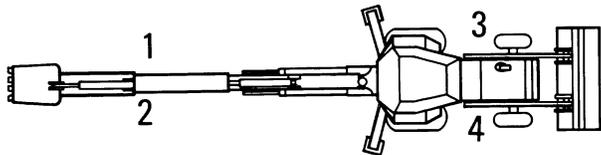
DANGER: Engine exhaust fumes can cause death. If it is necessary to start the engine in a closed place, remove the exhaust fumes from the area with an exhaust pipe extension. If you do not have an exhaust pipe extension, open the doors and get outside air into the area. 48-56

SERVICE MANUAL INTRODUCTION

This service manual has been prepared with the latest service information available. Troubleshooting, removal, disassembly, inspection and installation procedures, and complete specifications and tightening references can be found in most sections. Some sections have drawings but no written procedure because the job is so easily done. This service manual is one of the most important tools available to the service technician.

Right, Left, Front, and Rear

The terms right-hand and left-hand and front and rear as used in this manual indicate the right and left sides, and front and rear of the machine as seen from the operator's seat for correct operation of the machine or attachment.



- | | |
|-----------------------|------------------|
| 1. Right Side-Backhoe | 5. Front-Backhoe |
| 2. Left Side-Backhoe | 6. Rear-Backhoe |
| 3. Left Side-Machine | 7. Rear-Machine |
| 4. Right Side-Machine | 8. Front-Machine |

Table of Contents

A Table of Contents is in the front of this manual. The Table of Contents shows the main divisions and the sections that are in each division. The individual sections also have a Table of Contents.

Page Numbers

All page numbers are made of two numbers separated by a dash, such as 4002-9. The number before the dash is the section number. The number following the dash is the page number in that section. Page numbers will be found at the upper right or left of each page.

Illustrations

Illustrations are put as near as possible to the text and are to be used as part of the text.

Clear and Simple English

This manual is written in C.A.S.E. (Clear and Simple English). C.A.S.E. is easier to read than "regular" English because C.A.S.E. uses a small number of common words and has special rules for writing.

All sections written in C.A.S.E. are indicated by the symbol below.

Written In *Clear
And
Simple
English*

Special Tools

Special tools are needed to remove and install, disassemble and assemble, check and adjust some component parts of this machine. Some special tools can be easily made locally and the necessary information to make the tool is in this service manual. Other special tools are more difficult to make locally and are available from Service Tools in the U.S. and from Jobborn Manufacturing in Canada. Use these tools according to the instructions in this service manual for your personal safety and to do the job correctly.

Order special tools from either of the following companies.

Service Tools
P.O. Box 314
Owatonna, Minnesota 55060

Jobborn Manufacturing Co.
97 Frid Street
Hamilton, Ontario L8P 4M3
Canada

TORQUE SPECIFICATIONS - U.S. HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers, dry, or when lubricated with engine oil. Not applicable if special graphites, moly-disulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs			
			
Size	Pound-Feet	Newton metres	Kilogram metres
1/4 in 6.4 mm	9-11	12-15	1.2-1.5
5/16 in 7.9 mm	17-21	23-28	2.4-2.9
3/8 in 9.5 mm	35-42	48-57	4.8-5.8
7/16 in 11.1 mm	54-64	73-87	7.5-8.8
1/2 in 12.7 mm	80-96	109-130	11.1-13.3
9/16 in 14.3 mm	110-132	149-179	15.2-18.2
5/8 in 15.9 mm	150-180	203-244	20.8-24.9
3/4 in 19.0 mm	270-324	366-439	37.3-44.8
7/8 in 22.2 mm	400-480	542-651	55.3-66.4
1.0 in 25.4 mm	580-696	787-944	80.2-96.2
1-1/8 in 28.6 mm	800-880	1085-1193	111-122
1-1/4 in 31.8 mm	1120-1240	1519-1681	155-171
1-3/8 in 34.9 mm	1460-1680	1980-2278	202-232
1-1/2 in 38.1 mm	1940-2200	2631-2983	268-304

Grade 8 Bolts, Nuts, and Studs			
			
Size	Pound-Feet	Newton metres	Kilogram metres
1/4 in 6.4 mm	12-15	16-20	1.7-2.1
5/16 in 7.9 mm	24-29	33-39	3.3-4.0
3/8 in 9.5 mm	45-54	61-73	6.2-7.5
7/16 in 11.1 mm	70-84	95-114	9.7-11.6
1/2 in 12.7 mm	110-132	149-179	15.2-18.2
9/16 in 14.3 mm	160-192	217-260	22.1-26.5
5/8 in 15.9 mm	220-264	298-358	30.4-36.5
3/4 in 19.0 mm	380-456	515-618	52.5-63.0
7/8 in 22.2 mm	600-720	814-976	83.0-99.5
1.0 in 25.4 mm	900-1080	1220-1465	124-149
1-1/8 in 28.6 mm	1280-1440	1736-1953	177-199
1-1/4 in 31.8 mm	1820-2000	2468-2712	252-277
1-3/8 in 34.9 mm	2380-2720	3227-3688	329-376
1-1/2 in 38.1 mm	3160-3560	4285-4827	437-492

TORQUE SPECIFICATIONS - METRIC HARDWARE

Use the following torques when special torques are not given.

These values apply to fasteners with coarse threads as received from supplier, plated or unplated, or when lubricated with engine oil. These values do not apply if graphite or moly-disulfide grease or oil is used.

Grade 8.8 Bolts, Nuts, and Studs			
			
Size	Pound-Feet	Newton metres	Kilogram metres
M4 0.15 in	2-3	3-4	0.3-0.4
M5 0.19 in	5-6	6.5-8	0.7-0.8
M6 0.23 in	8-9	10.5-12	1.1-1.2
M8 0.31 in	19-23	26-31	2.6-3.2
M10 0.39 in	38-45	52-61	5.3-6.2
M12 0.46 in	66-79	90-107	9.1-10.9
M14 0.55 in	106-127	144-172	14.7-17.6
M16 0.62 in	160-200	217-271	22.1-27.7
M20 0.78 in	320-380	434-515	44.2-52.5
M24 0.94 in	500-600	675-815	69.1-83.0
M30 1.17 in	920-1100	1250-1500	127-152
M36 1.40 in	1600-1950	2175-2600	221-270

Grade 10.9 Bolts, Nuts, and Studs			
			
Size	Pound-Feet	Newton metres	Kilogram metres
M4 0.15 in	3-4	4-5	0.4-0.5
M5 0.19 in	7-8	9.5-11	1.0-1.1
M6 0.23 in	11-13	15-17.5	1.5-1.8
M8 0.31 in	27-32	37-43	3.7-4.4
M10 0.39 in	54-64	73-87	7.5-8.8
M12 0.46 in	93-112	125-150	12.9-15.5
M14 0.55 in	149-179	200-245	20.6-24.7
M16 0.62 in	230-280	310-380	31.8-38.7
M20 0.78 in	450-540	610-730	62.2-74.7
M24 0.94 in	780-940	1050-1275	108-130
M30 1.17 in	1470-1770	2000-2400	203-245
M36 1.40 in	2580-3090	3500-4200	357-427

Grade 12.9 Bolts, Nuts, and Studs



Usually the torque values specified for grade 10.9 fasteners can be used satisfactorily on grade 12.9 fasteners.

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres	Kilogram metres
37 Degree Flare Fittings				
1/4 in 6.4 mm	7/16-20	6-12	8-16	0.8-1.7
5/16 in 7.9 mm	1/2-20	8-16	11-21	1.1-2.2
3/8 in 9.5 mm	9/16-18	10-25	14-33	1.4-3.5
1/2 in 12.7 mm	3/4-16	15-42	20-56	2.1-5.8
5/8 in 15.9 mm	7/8-14	25-58	34-78	3.5-8.0
3/4 in 19.0 mm	1-1/16-12	40-80	54-108	5.5-11.1
7/8 in 22.2 mm	1-3/16-12	60-100	81-135	8.3-13.9
1.0 in 25.4 mm	1-5/16-12	75-117	102-158	10.4-16.2
1-1/4 in 31.8 mm	1-5/8-12	125-165	169-223	17.3-22.8
1-1/2 in 38.1 mm	1-7/8-12	210-250	285-338	29.0-34.6

Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres	Kilogram metres
Straight Threads with O-ring				
1/4 in 6.4 mm	7/16-20	12-19	16-25	1.7-2.6
5/16 in 7.9 mm	1/2-20	16-25	22-33	2.2-3.5
3/8 in 9.5 mm	9/16-18	25-40	34-54	3.5-5.5
1/2 in 12.7 mm	3/4-16	42-67	57-90	5.8-9.3
5/8 in 15.9 mm	7/8-14	58-92	79-124	8.0-12.7
3/4 in 19.0 mm	1-1/16-12	80-128	108-174	11.1-17.8
7/8 in 22.2 mm	1-3/16-12	100-160	136-216	13.8-22.1
1.0 in 25.4 mm	1-5/16-12	117-187	159-253	16.2-25.9
1-1/4 in 31.8 mm	1-5/8-12	165-264	224-357	22.8-36.5
1-1/2 in 38.1 mm	1-7/8-12	250-400	339-542	34.6-55.3

Split Flange Mounting Bolts			
Size	Pound- Feet	Newton metres	Kilogram metres
5/16-18	15-20	20-27	2.1-2.8
3/8-16	20-25	26-33	2.8-3.5
7/16-14	35-45	47-61	4.7-6.2
1/2-13	55-65	74-88	7.6-9.0
5/8-11	140-150	190-203	19.4-20.7

1002

MAINTENANCE AND LUBRICATION

TABLE OF CONTENTS

Fluids and Lubricants	1002-2	Run-In Period	1002-5
Systemgard Lubricant Analysis Service	1002-4	Run-In Maintenance Schedule	1002-5
Systemgard Testing Schedule	1002-4	Maintenance Schedule	1002-6

Written In *Clear
And
Simple
English*

FLUIDS AND LUBRICANTS

FUEL TANK

Capacity 50 gallons (190 litres)

Specifications See Operators Manual

ENGINE COOLING SYSTEM

Capacity - System 8.5 gallons (32 litres)

Coolant reservoir 2 quarts (1.9 litres)

Specifications See Operators Manual

HYDRAULIC SYSTEM

Capacity - System 59 gallons (223 litres)

Reservoir 18.7 gallons (70.8 litres)

Specifications Case TCH Fluid

Alternate Type C3 Fluid (10W)

TRANSMISSION/TORQUE CONVERTER

Capacity 21 quarts (19.8 litres)

Specifications Case TCH Fluid

Alternate Type C3 Fluid (10W)

SWING GEARBOX

Capacity - Gearbox 14 pints (6.6 litres)

Reservoir 3 pints (1.4 litres)

Specifications Case FDL

Alternate Gear Lubricant, SAE 85/140, API-GL-5

AXLE (Differential)

Capacity - Front 4 gallons (15.1 litres)

Rear 4 gallons (15.1 litres)

Specifications Case FDL

Alternate Gear Lubricant, SAE 85/140, API-GL-5

AXLE (Planetary Hubs)

Capacity (Each) 6.5 pints (3.1 litres)

Specifications Case FDL

Alternate Gear Lubricant, SAE 85/140, API-GL-5

BRAKE FLUID RESERVOIRS

Capacity - System 2 quarts (1.9 litres)

Specifications DOT-3 Brake Fluid (SAE J1703)

ACCELERATOR MASTER CYLINDER

Capacity 1 pint (0.5 litre)

Specifications DOT-3 Brake Fluid (SAE J1703)

ALCOHOL EVAPORATOR

Capacity 1.25 quart (1.2 litre)

Specifications Methyl Alcohol

TURNTABLE RING GEAR

Quantity As required

Specifications Symquip Spray Lub (OGLD-20) Case part No. 31-437

TRANSMISSION SHIFTING GUIDES

Quantity As required

Specifications Dry-Slide or Dry-Graphite (molybdenum sulfide)

BATTERIES

Quantity As required

Specifications Drinking or distilled water

GREASE FITTINGS

Quantity As required

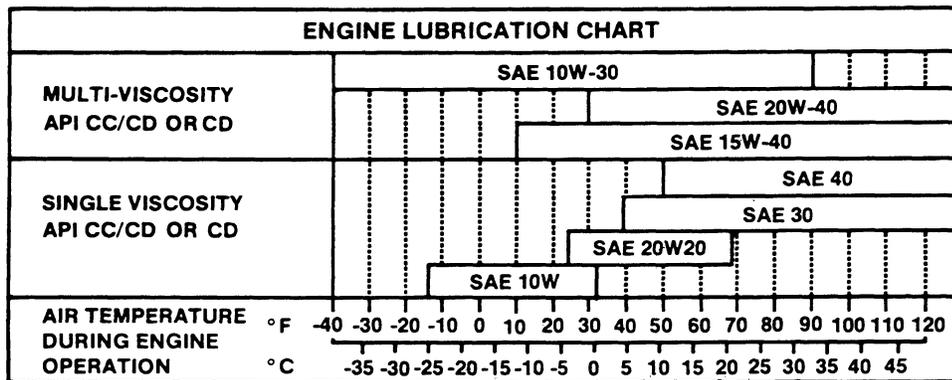
Specifications Molydisulfide multi-purpose grease

ENGINE CRANKCASE

Capacity - Without filter change 15 quarts (14.2 litres)

With filter change 17 quarts (16.1 litres)

Specifications Case HDM Engine Oils



SYSTEMGARD LUBRICANT ANALYSIS SERVICE



830752

Through this service your machine lubricants are tested in a laboratory. The results of these tests shows lubricant contamination and component wear rates. You will get service recommendations to increase the life of your machine. See your Case dealer for more information.

Systemgard Testing Schedule

Get samples of lubricants for Systemgard analysis at the intervals shown below. Follow the instructions with the Systemgard kits.

NOTE: *Get your sample before you drain the lubricant.*

- Engine oil Every 250 hours of operation or every oil change
- Hydraulic fluid Every 500 hours of operation or 3 times each year
- Transmission fluid Every 500 hours of operation or 3 times each year
- Swing gearbox oil Every 500 hours of operation or 3 times each year
- Differential/Planetary oil Every 500 hours of operation or 3 times each year

RUN-IN PERIOD

During the first 20 hours of operation for a new machine, or a machine with a rebuilt engine, make sure you do the following:

1. Operate the machine with normal loads for the first 8 hours.

2. Keep the engine at normal operating temperatures.

3. Do not run the engine at idle speeds for long periods of time.

4. See the Run-In Maintenance Schedule on this page for additional information.

RUN-IN MAINTENANCE SCHEDULE

The following items are to be done during the Run-In Period and are in addition to the items in the Maintenance Schedule on the following page.

————— **After 4, 8, 12, 16, and 20 Hours of Operation** —————

Check the torque for the wheel nuts See Section 6129

Lubricate the boom, arm (dipper), and attachments (bucket, etc.) See Operators Manual

————— **After First 20 Hours of Operation** —————

Do the After Delivery Check See Operators Manual

MAINTENANCE SCHEDULE

The items in this maintenance schedule are at maximum intervals. If you are operating the machine under severe conditions (high temperatures, mud, dust, water, etc.), shorten the intervals. -

As Required

- Service air cleaner if red band in restriction indicator is in full view See Operators Manual
- Replace the hydraulic filter elements if hydraulic filter
warning lamp illuminates See Operators Manual
- Check torque of wheel nuts if a wheel has been removed and installed See Section 6129

Every 10 Hours of Operation or Each Day, Whichever Occurs First

- Check air cleaner restriction indicator See Operators Manual
- Check engine oil level See Operators Manual
- Check condition of drive belt See Operators Manual
- Check hydraulic reservoir fluid level See Operators Manual
- Check transmission/torque converter fluid level See Operators Manual
- Check oil level for swing gearbox reservoir See Operators Manual
- Check spray lubricant can See Operators Manual
- Check tires for damage and correct air pressure See Section 6129
- Check and clean safety and instructional decals See Operators Manual
- Check alcohol level for alcohol evaporator (if equipped) See Operators Manual
- Drain water from air reservoir See Operators Manual
- Lubricate
 - Boom, arm (dipper), and attachments (bucket, etc.) See Operators Manual
 - Turntable ring gear See Operators Manual

Every 50 Hours of Operation

Check coolant reservoir fluid level	See Operators Manual
Check fluid level for each battery	See Operators Manual
Drain any water and sediment from primary fuel filter	See Operators Manual
Front and rear axles	
Check oil level for differentials and planetaries	See Operators Manual
Master cylinders	
Check accelerator master cylinder fluid level	See Section 3001
Check fluid level for chassis brake master cylinders	See Operators Manual
Clean air cleaner dust valve	See Operators Manual
Clean swing gearbox breather	See Operators Manual
Lubricate	
Turntable bearing raceway	See Operators Manual
Steering cylinder	See Operators Manual
Wheel pivot pins	See Operators Manual
Front axle pivot	See Operators Manual
Transmission bellcrank linkage	See Operators Manual
Steering universal joint	See Operators Manual
Tie rod ends	See Operators Manual
Outriggers	See Operators Manual
Foot pedal bellcranks	See Operators Manual
Drive shaft universal joints	See Operators Manual
Upper and lower shifting guide rods	See Operators Manual
Axle oscillation lock pivots	See Operators Manual

Every 250 Hours of Operation

- Systemgard testing schedule See page 1002-4
- Change engine oil and oil filter See Operators Manual
- Check radiator coolant level See Operators Manual
- Check swing brake for correct operation See Operators Manual
- Check torque for turntable bearing cap screws See Section 9216
- Lubricate both control lever pivots See Operators Manual
- Lubricate top of hydraulic and air swivel See Operators Manual
- Check and clean collector ring See Section 4016
- Check torque for swing gearbox mounting bolts See Section 9210

Every 500 Hours of Operation

- Systemgard testing schedule See page 1002-4
- Replace fuel filters See Operators Manual
- Hydraulic system
 - Clean reservoir breather See Operators Manual
 - Replace filter elements See Operators Manual
- Replace transmission filter element See Operators Manual

Every 1000 Hours of Operation

- Transmission/Torque converter
 - Clean breather See Operators Manual
 - Clean suction screen See Operators Manual
 - Change fluid See Operators Manual

Every 1500 Hours of Operation

Change swing gearbox oil	See Operators Manual
Hydraulic system	
Change fluid	See Operators Manual
Clean reservoir screen	See Operators Manual
Clean inline screens	See Operators Manual
Front and rear axles	
Clean breathers for differentials	See Operators Manual
Change oil for differentials and planetaries	See Operators Manual
Check propane heater (if equipped)	See Section 4018

**Every 3000 Hours of Operation of Each Year,
Whichever Occurs First**

Clean cooling system	See Operators Manual
Clean alcohol evaporator	See Section 7111
Overhaul brake relay valve	See Section 7105

Section 1010

GENERAL ENGINE SPECIFICATIONS

Written In *Clear
And
Simple
English*

IMPORTANT: *This engine was made using the metric measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

Section 1024

SPECIFICATION DETAILS

Written In **Clear
And
Simple
English**

IMPORTANT: *This engine was made using the metric measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

TABLE OF CONTENTS

RUN-IN INSTRUCTIONS	3
ENGINE SPECIFICATION DETAILS	
Cylinder Block	4
Service Cylinder Sleeve	4
Piston	4
Piston Pin	4
Piston Rings	5
Cylinder Head	5
Tappets	5
Connecting Rod	5
Crankshaft	6
Camshaft	7
Valve Push Rod Lifters	7
Gear Train	7
Rocker Arm Assembly	7
Turbocharger	7
Intake Valve	8
Exhaust Valve	8
Valve Springs	8
SPECIAL TORQUES	9-11

RUN-IN INSTRUCTIONS

Engine Lubrication

Fill the 6-590 engine crankcase with CC or CD service classification oil that has the correct viscosity rating for the ambient air temperature. Install new oil filters, after the engine has been rebuilt.

Fill the 6T-590 and the 6TA-590 engine crankcase with CD service classification oil that has the correct viscosity rating for the ambient air temperature. Install new oil filters, after the engine has been rebuilt.

Run-In Procedure For Rebuilt Engine

- Step 1 Disconnect the wire to the electric shut-off on the injection pump so that the engine will not start. Crank the engine for 30 seconds until there is oil pressure, then reconnect the wire.
- Step 2 Remove the air from the cooling system at the temperature sending unit for the 6-590 and 6T-590 engine. Loosen the upper plug on the aftercooler to remove the air from the cooling system for the 6TA-590 engine.
- Step 3 Run the engine at 1000 RPM minimum load for 5 minutes and check for oil leaks.
- Step 4 During the Run-In, continue to check the oil pressure, coolant level, and coolant temperature.

Run-In Procedure For Rebuilt Engines (With A Dynamometer)

The following procedure must be followed when using a PTO dynamometer to Run-In the engine. The dynamometer will control the engine load at each speed and will remove stress on new parts during Run-In.

During the Run-In, continue to check the oil pressure, coolant level and coolant temperature.

STEP	TIME	ENGINE SPEED	DYNAMOMETER SCALE LOAD
1	5 Minutes	1000 RPM	50
2	5 Minutes	1100 RPM	1/2
3	5 Minutes	2200 RPM	Full

Run-In Procedure for Rebuilt Engines (Without A Dynamometer)

STEP	TIME	ENGINE SPEED	LOAD
1	5 Minutes	1000 RPM	No Load
2	5 Minutes	1100 RPM	Light Load
3	5 Minutes	2200 RPM	Full

Run-In Procedure (Agriculture Tractors)

For the first 8 hours of field operation stay one gear lower than normal. For the next 12 hours DO NOT "lug" the engine. Prevent "lugging" by moving the lever to a lower gear. The engine must not be "lugged" below the rated engine RPM during early hours of life.

Run-In Procedure (Construction Equipment)

For the first 8 hours, operate the engine at full throttle maintaining a normal load. DO NOT "baby" the engine, but avoid converter or hydraulic stall. The engine must not be "lugged" below the Rated Engine RPM (Do not stall the engine more than 10 seconds).

ENGINE SPECIFICATION DETAILS

Cylinder Block

	Metric Value
Type	Non-Sleeved
Material	Cast Iron
ID of Cylinder	102.00 to 102.04 mm
Maximum Service Limit	102.116 mm
Cylinder Out of Round (Maximum)	0.038 mm
Cylinder Taper (Maximum)	0.076 mm
0.5 mm Oversize Piston	
Machine Cylinder Bore to	102.40 to 102.44 mm
Hone Cylinder Bore to	102.50 to 102.54 mm
1.00 mm Oversize Piston	
Machine Cylinder Bore to	102.900 to 102.960 mm
Hone Cylinder Bore to	103.00 to 103.04 mm

Service Cylinder Sleeve

Type	Dry, Can Be Replaced
Material	Cast Iron
Machine Cylinder Block Bore to	104.485 to 104.515 mm
Installation	Press Fit
Hone Cylinder Bore to	102.00 to 102.10 mm

Piston

Type	Cam Ground
Material	Aluminum alloy
OD at 12 mm From the Bottom, 90 Degrees From Piston Pin	
Standard Size Piston	101.873 to 101.887 mm
Minimum Service Limit	101.823 mm
0.5 mm Oversize Piston	102.373 to 102.387 mm
Minimum Service Limit	102.323 mm
1.0 mm Oversize Piston	102.873 to 102.887 mm
Minimum Service Limit	102.823 mm
ID of Piston Pin Bore	40.006 to 40.012 mm
Maximum Service Limit	40.025 mm
Width of 1st Ring Groove (Top)	2.465 to 2.485 mm
Width of 2nd Ring Groove (Intermediate)	2.425 to 2.445 mm
Width of 3rd Ring Groove (Oil Ring)	4.040 to 4.060 mm
Protrusion Above Cylinder Block (Maximum)	0.660 mm

Piston Pin

Type	Full Float
OD of Pin	39.997 to 40.003 mm
Minimum Service Limit	39.990 mm

Piston Rings

No. 1 Compression (6T-590 and 6TA-590 Engine)	Key Stone Type (Barrel Face)
End Gap in 102.02 ID	0.40 to 0.70 mm
No. 1 Compression 6-590 Engine	Rectangular Type (Barrel Face)
End Gap in 102.02 ID	0.25 to 0.55 mm
Maximum Service Limit	0.806 mm
Side Clearance	0.075 to 0.120 mm
Maximum Service Limit	0.15 mm
No. 2 Compression	Rectangular Type (Taper Face)
End Gap in 102.02 ID	0.25 to 0.55 mm
Maximum Service Limit	0.806 mm
Side Clearance	0.075 to 0.120 mm
Maximum Service Limit	0.15 mm
No. 3 Oil Control Rings	Two Piece
End Gap in 102.02 ID	0.25 to 0.55 mm
Maximum Service Limit	0.806 mm
Side Clearance	0.130 mm

Cylinder Head

Warpage (Maximum)	0.20 mm
-------------------	---------

Lifters

Material	Hardened Iron
OD of Lifter	15.961 to 15.977 mm
Minimum Service Limit	15.960 mm
Bore Diameter in Block	16.000 to 16.030 mm
Maximum Service Limit	16.055 mm

Connecting Rod

Bushing	Steel Backed Leaded Bronze
Bushing ID Installed (Ream to Size)	40.053 to 40.067 mm
Maximum Service Limit	40.092 mm
Bearing Liners	Replaceable
Journal ID Without Bearing Liners	72.987 to 73.013 mm
Bearing Oil Clearance	0.038 to 0.116 mm
Maximum Service Limit	0.129 mm
Side Clearance	0.100 to 0.300 mm
Maximum Service Limit	0.330 mm
Connecting Rod Bend (Maximum)	
Without Bushing	0.200 mm
With Bushing	0.150 mm
Connecting Rod Twist (Maximum)	
Without Bushing	0.500 mm
With Bushing	0.300 mm

Crankshaft

Type	Hardened Steel, Balanced
Main Bearing Liners	Replaceable
Crankshaft End Clearance	0.137 to 0.264 mm
Center Main Bearing Thrust Surface Thickness	2.50 mm
Connecting Rod Journal	
OD, Standard	68.987 to 69.013 mm
Maximum Service Limit	68.962 mm
0.25 mm OD Undersize, Grind to	68.737 to 68.763 mm
Maximum Service Limit	68.712 mm
0.50 mm OD Undersize, Grind to	68.487 to 68.513 mm
Maximum Service Limit	68.462 mm
0.75 mm OD Undersize, Grind to	68.237 to 68.263 mm
Maximum Service Limit	68.212 mm
1.00 mm OD Undersize, Grind to	67.987 to 68.013 mm
Maximum Service Limit	67.962 mm
Connecting Rod Journal Maximum Taper	0.013 mm
Journals Out of Round Maximum	0.050 mm
Undersize Main Bearing Liners For Service	0.25, 0.50, 0.75 and 1.00 mm
Main Bearing Oil Clearance	0.041 to 0.119 mm
Maximum Service Limit	0.140 mm
Main Bearing Journal	
OD, Standard	82.987 to 83.013 mm
Maximum Service Limit	82.962 mm
0.25 mm OD Undersize, Grind to	82.737 to 82.763 mm
Maximum Service Limit	82.712 mm
0.50 mm OD Undersize, Grind to	82.487 to 82.513 mm
Maximum Service Limit	82.462 mm
0.75 mm OD Undersize, Grind to	82.237 to 82.263 mm
Maximum Service Limit	82.212 mm
1.00 mm OD Undersize, Grind to	81.987 to 82.013 mm
Maximum Service Limit	81.962 mm
Main Bearing Journal Bore ID No Liners	87.982 to 88.018 mm
Maximum Service Limit	88.031 mm
Main Journal Width:	
1st, 2nd, 3rd, 5th and 6th	37.424 to 37.576 mm
4th	37.475 to 37.525 mm
Connecting Rod Journals Width	38.950 to 39.050 mm

Camshaft

Type	Hardened Iron
Bushing (Front Only)	1, Replaceable
Bushing Lubrication:	
Front Bushing	Pressure Lubricated
Intermediate	Pressure Lubricated
Rear	Pressure Lubricated
Oil Clearance	0.076 to 0.152 mm
ID of No. 1 Bushing (Installed)	54.107 to 54.133 mm
Maximum Service Limit	54.146 mm
ID of No. 1 Oversize (57.36 to 57.40 mm OD) Service Bushing	54.107 to 54.133 mm
Maximum Service Limit	54.146 mm
ID of No. 2, 3, 4, 5 and 6 Service Bushing	54.107 to 54.133 mm
Maximum Service Limit	54.146 mm
Width of No. 1 Bushing	25.15 to 25.65 mm
Width of No. 2, 3, 4, 5 and 6 Service Bushing	17.75 to 18.25 mm
Camshaft Bushing Journal OD	53.987 to 54.013 mm
Minimum Serviceable Limit	53.962 mm
Camshaft Bore Diameter in Block	
No. 1 Bushing	57.222 to 57.258 mm
No. 1 Oversize Bushing, Machine to	57.722 to 57.758 mm
No. 2, 3, 4, 5 and 6 Less Bushings	54.107 to 54.133 mm
No. 2, 3, 4, 5 and 6 Oversize for Bushings, Machine to	57.222 to 57.258 mm
Camshaft Thrust Thickness	9.42 to 9.58 mm
Minimum Service Limit	9.34 mm
Camshaft Thrust Clearance	0.130 to 0.340 mm
Maximum Service Limit	0.470 mm

Turbocharger

Horizontal Travel of Turbine Shaft	0.10 to 0.16 mm
--	-----------------

Gear Train

Backlash:	
Crankshaft Gear to Camshaft Gear	0.08 to 0.33 mm
Crankshaft Gear to Idler Gear	0.08 to 0.33 mm
Camshaft to Fuel Pump Gear	0.08 to 0.33 mm
Idler Gear to Oil Pump	0.08 to 0.33 mm
Camshaft to Auxiliary	0.08 to 0.33 mm
Maximum Service Limit (All Gears)	0.45 mm

Rocker Arm Assembly

OD of Shaft	18.963 to 18.975 mm
Minimum Service Limit	18.938 mm
ID of Arm Bore	19.000 to 19.026 mm
Maximum Service Limit	19.051 mm
Lubrication	Pressure From Oil Gallery

Intake Valve

Tappet Clearance (Cold)	0.254 mm
Face Angle	29 Degrees
Face Run-Out	0.038 mm
Valve Head Edge Thickness, Minimum	1.50 mm
Length	128.84 to 129.46 mm
OD of Stem	7.960 to 7.980 mm
Minimum Service Limit	7.940 mm
OD of Head	44.870 to 45.130 mm
Seat Angle	30 Degrees
Seat Contact Width	1.32 to 1.92 mm
Seat Run-Out	0.10 mm
Insert Height	6.84 to 6.96 mm
OD of Insert	47.063 to 47.089 mm
ID of Insert	Tapered
Valve Recession Below Head Surface	0.99 to 1.52 mm
Maximum Service Limit	1.52 mm
ID of Valve Guide Bore	8.019 to 8.039 mm
Maximum Service Limit	8.089 mm

Exhaust Valve

Tappet Clearance (Cold)	0.508 mm
Face Angle	44 Degrees
Face Run-Out	0.038 mm
Valve Head Edge Thickness, Minimum	1.50 mm
OD of Head	41.870 to 42.130 mm
OD of Stem	7.960 to 7.980 mm
Minimum Service Limit	7.940 mm
Length	128.74 to 129.36 mm
Insert Seat Angle	45 Degrees
Seat Contact Width	1.47 to 2.07 mm
Seat Run-Out	0.10 mm
Insert Height	6.65 to 6.77 mm
OD of Insert	43.713 to 43.739 mm
ID of Insert	Tapered
Valve Recession Below Head Surface	0.99 to 1.52 mm
Maximum Service Limit	1.52 mm
ID of Valve Guide Bore	8.019 to 8.039 mm
Maximum Service Limit	8.089 mm

Valve Springs

Free Length	55.63 mm
Total Coils	7.25
Wire Diameter	4.830 to 4.930 mm
Compressed to 38.53 mm	(Valve Open) 785 to 839 N
Maximum Service Limit	765 N
Compressed to 49.25 mm	(Valve Closed) 285 to 321 N
Minimum Service Limit	270 N

Sample of manual. Download All 919 pages at:

<https://www.arepairmanual.com/downloads/case-1085b-1086b-cruz-air-service-repair-manual-8-44630/>