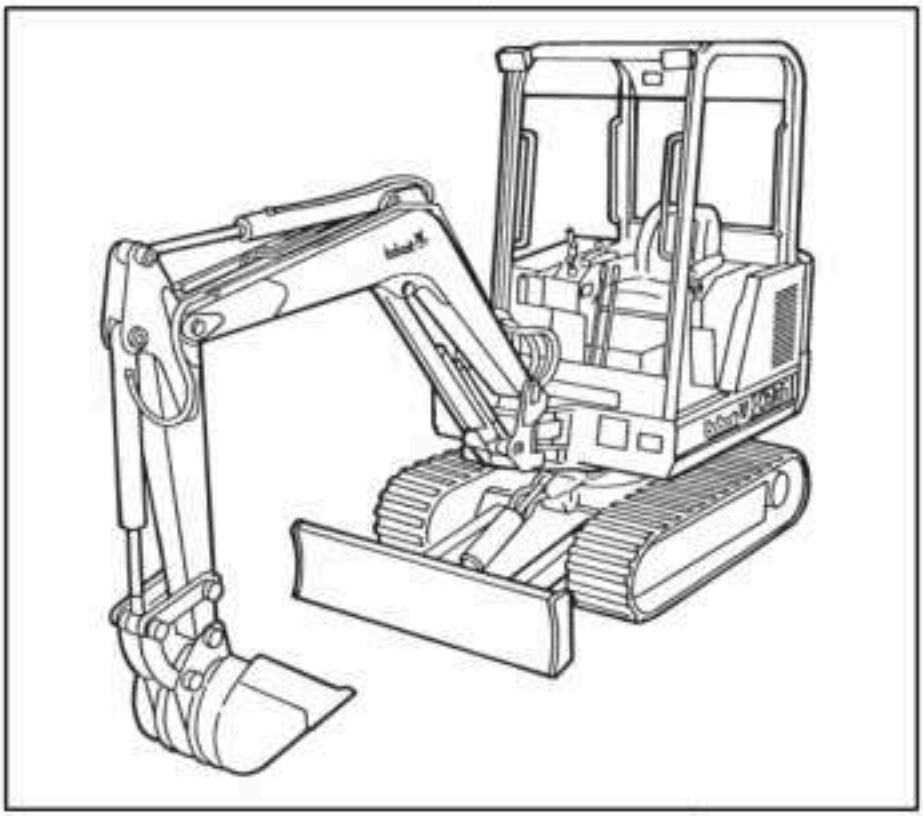
X 331

Excavator

Service Manual

(S/N 511920001 & Above)



MELROE
INGERSOLL-RAND

6722918 (5–94)

Printed in U.S.A.

bobcat

© Melroe Company 1994

MidWestTech | Bobcat X331 Excavator Service Manual | Publication 6722918_5_94 Order the manual at mid-west-tech.com >

CONTENTS

SAFETY INSTRUCTIONS i
SERIAL NUMBER LOCATIONS ii
DELIVERY REPORT ii
HYDRAULIC EXCAVATOR IDENTIFICATION iii
PREVENTIVE MAINTENANCE 1–1
HYDRAULIC SECTION 2–1
DRIVE SECTION 3–1
UPPER WORKS & SWING SECTION 4–1
MAIN FRAME & TRACKS 5–1
ELECTRICAL SYSTEM 6–1
ENGINE SERVICE 7–1
TECHNICAL DATA 8–1

MidWestTech | Bobcat X331 Excavator Service Manual | Publication 6722918_5_94
Order the manual at mid-west-tech.com >

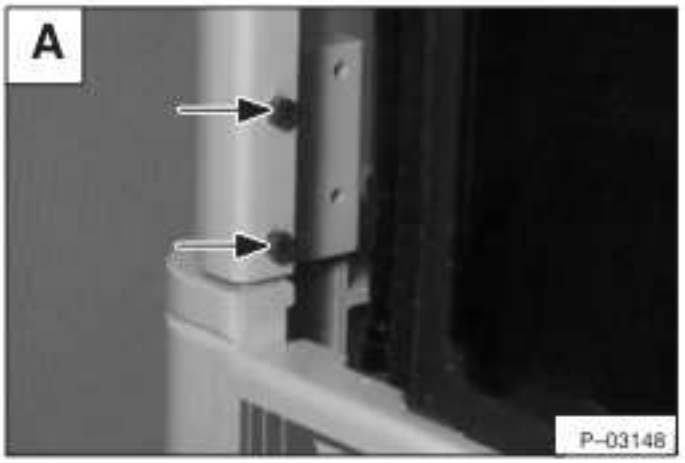
RIGHT HAND CORNER POST

Removal and Installation

Remove the right hand side cover (See Page 4–6).

Remove the two (2) bolts from the inside of the corner post **[A]**.

Installation: Tighten the bolts to 125–140 ft.–lbs. (170–190 Nm) torque.



Remove the two (2) bolts from the outside of the corner post **[B]**.

Installation: Tighten the bolts to 125–140 ft.–lbs. (170–190 Nm) torque.

Remove the corner post.



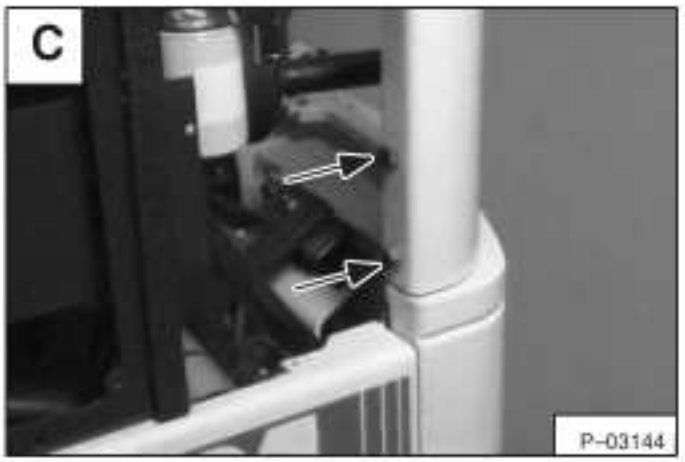
LEFT HAND CORNER POST

Removal and Installation

Remove the left hand side cover (See Page 4–6).

Remove the two (2) bolts from the inside of the corner post **[C]**.

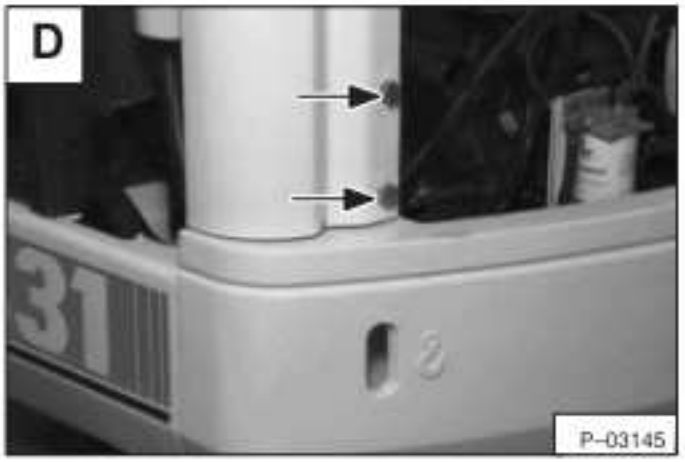
Installation: Tighten the bolts to 125–140 ft.–lbs. (170–190 Nm) torque.



Remove the two (2) bolts from the outside of the corner post **[D]**.

Installation: Tighten the bolts to 125–140 ft.–lbs. (170–190 Nm) torque.

Remove the corner post.



MidWestTech | Bobcat X331 Excavator Service Manual | Publication 6722918_5_94

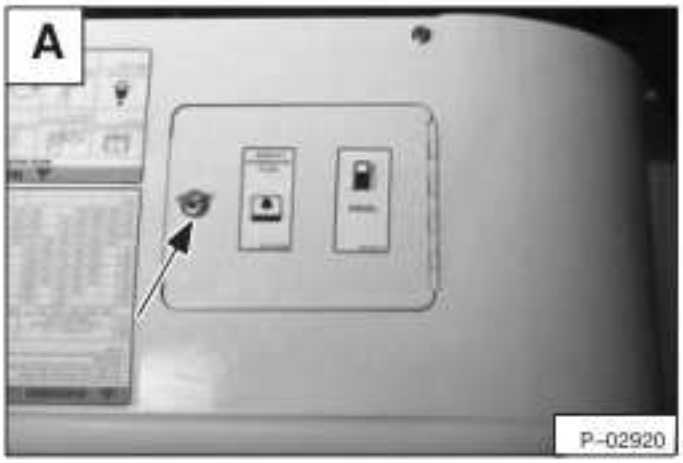
Order the manual at mid-west-tech.com >

FUEL LEVEL SENDER

Removal and Installation

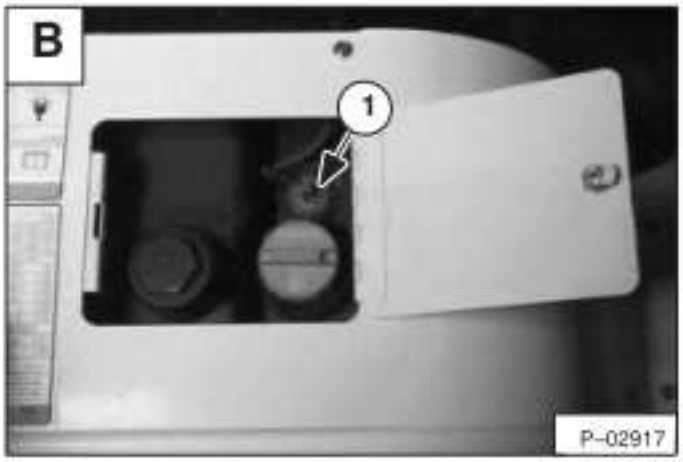
Remove the negative battery cable (See Page 6–4).

Open the locking fuel cover **[A]**.



Disconnect the harness connector (Item 1) from the fuel sender **[B]**.

Remove the fuel sender **[A]**. (The sender threads into the tank, use a wrench and turn out the sender).



Checking

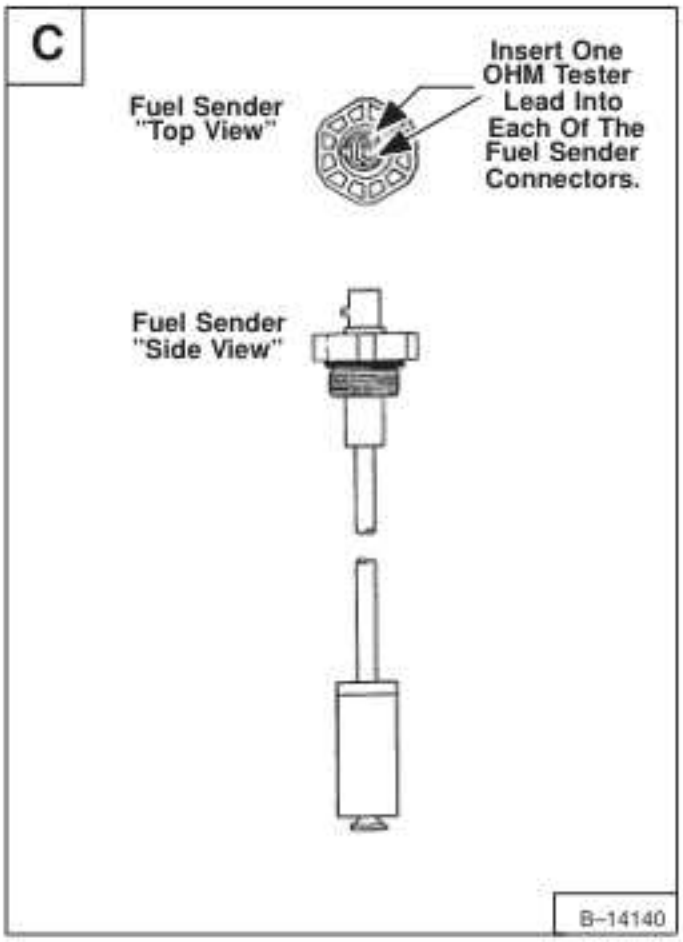
Use an ohmmeter to check the resistance of the fuel sender.

Insert one of the ohm tester leads into each of the fuel senders electrical connectors in the end of the fuel sender **[C]**.

With the fuel sender in the position shown **[C]**, read the ohms in the empty position. Slide the float upwards and the ohm reading will decrease. See resistance chart below.

The resistance should read as follows:

FULL: 15–35 Ohms.
HALF: 82–97 Ohms.
EMPTY: 230–250 Ohms.

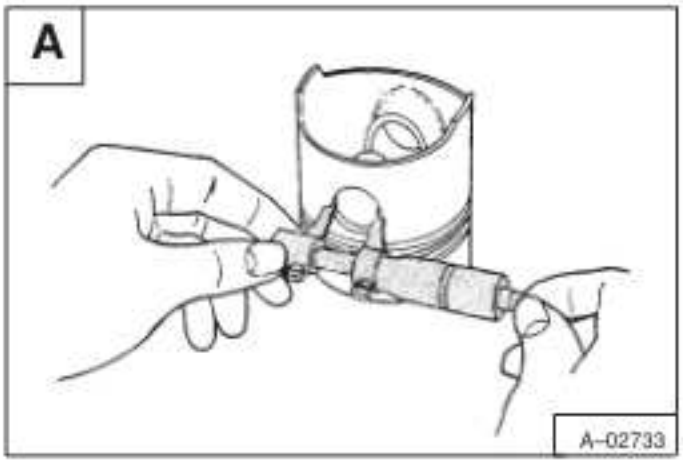


MidWestTech | Bobcat X331 Excavator Service Manual | Publication 6722918_5_94
Order the manual at mid-west-tech.com >

Servicing the Timing Gear and Camshaft (Cont'd)

Measure the piston pin hole **[A]**.

The specifications are .9055–.9060 (23–23,013 mm). The wear limit is .9076 (23,053 mm).



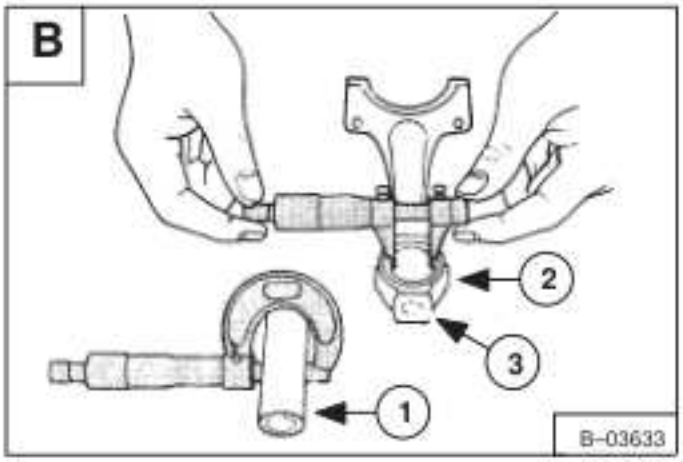
Measure the piston pin (Item 1) **[B]**.

Measure the connecting rod bushing (Item 2) **[B]**.

The specifications are .0006–.0015 (0,152–0,038 mm). The wear limit is .0059 (0,015 mm).

NOTE: Replacement bushing specifications are .0006"–.0026" (0,015–0,066 mm).

When replacing bushings use the connecting rod hole (Item 3) as a guide, drill a hole through the replacement bushing and deburr the hole **[B]**.



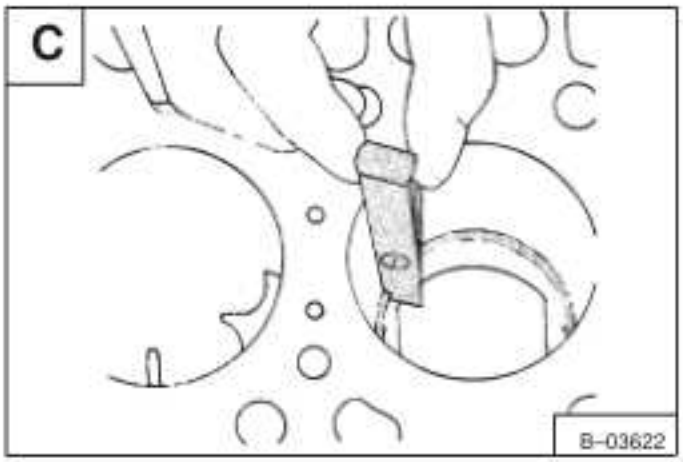
Put the piston ring on the bottom of the cylinder.

Check the clearance of the ring gap **[C]**.

The specification is .0118–.0177 (0,030–0,45 mm) for the 1st and 2nd rings. The wear limit is .0492 (1,25 mm).

The specification for oil ring is .0098"–.0177" (0,249–0,450 mm).

Install the connecting rod on the tool for checking connecting rod alignment.

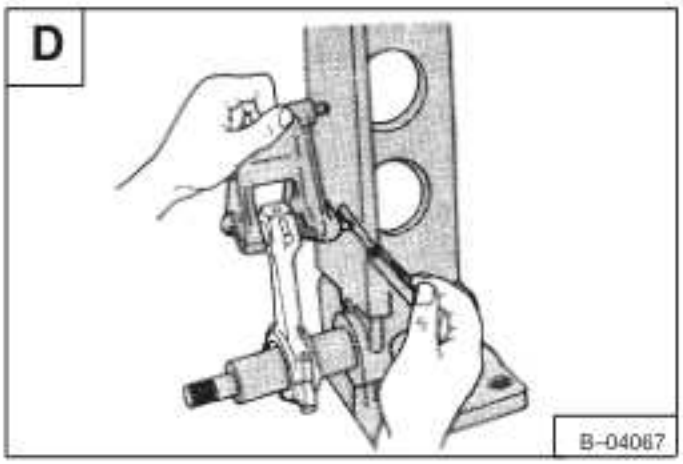


Check the clearance at the piston pin area **[D]**.

The specification is .0008 (0,02 mm).

The wear limit is .0020 (0,05 mm).

NOTE: Be sure the bushing diameter of the connecting rod is within specification.



MidWestTech | Bobcat X331 Excavator Service Manual | Publication 6722918_5_94

Order the manual at mid-west-tech.com >

HYDRAULIC SYSTEM OPERATION

To Be Used With

HYDRAULIC FLOW CHART
(ISO & Standard)

For Model

331 EXCAVATOR (S/N 20001 & Above)

Chart # 6722960 (Printed April 1994)

CHART LEGEND

1. **OIL COOLER**
2. **TRAVEL MOTORS**
3. **CENTER SWIVEL JOINT**
4. **BLADE CYLINDER**
5. **#10 MICRON FILTER** (W/25 PSI By-Pass Valve)
6. **HYDRAULIC PUMPS** 3x9.1 GPM (34.5L/min.) @ 2500 RPM
7. **SUPPLY PORT BLOCK**
8. **HYDRAULIC RESERVOIR PLUG** (Non-Vented)
9. **STRAINER**
10. **HYDRAULIC RESERVOIR** (10.5 Gals. 40 L) (Vented)
11. **TWO SPEED VALVE**
12. **SWING MOTOR**
13. **RETURN PORT BLOCK**
14. **3-SPOOL CONTROL VALVE**
15. **MAIN RELIEF VALVE,** . . . . . 2500 PSI (17235 kPa)
16. **LOAD CHECK VALVE (Blade Cylinder)**
17. **ONE WAY RESTRICTOR** .082" (Blade Cyl.)
18. **LOAD CHECK VALVES** (Boom Swing Cylinder)
19. **BUILD-UP VALVE** . . 200 PSI (1378 kPa)
20. **BOOM SWING CYLINDER**
21. **SHUTTLE VALVE**
22. **PRESSURE REDUCING VALVE** . 363 PSI (2500 kPa)
23. **ACCUMULATOR RELIEF VALVE** 507 PSI (3632 kPa)
24. **CONSOLE LOCK-OUT VALVE**
25. **L.H. JOYSTICK**
26. **R.H. JOYSTICK**
27. **MAIN RELIEF VALVE** - 2 Stage Pressure
    Standard Pressure . . . . . 2500 PSI (17235 kPa)
    High Pressure . . . . . 3000 PSI (20682 kPa)
28. **MAIN RELIEF VALVE** - 2 Stage Pressure
    Standard Pressure . . . . . 2500 PSI (17235 kPa)
    High Pressure . . . . . 3000 PSI (20682 kPa)
29. **6-SPOOL CONTROL VALVE**
30. **PORT RELIEF VALVE** (Boom Cyl.) 2950 PSI (20345 kPa)
31. **PORT RELIEF VALVE** (Boom Cyl.) 3400 PSI (23448 kPa)
32. **PORT RELIEF VALVE** (Bucket Cyl.) 3400 PSI (23448 kPa)
33. **PORT RELIEF VALVE** (Arm Cyl.) 2950 PSI (20345 kPa)
34. **PORT RELIEF VALVE** (Arm Cyl.) 2950 PSI (20345 kPa)
35. **ONE WAY RESTRICTOR** .125" (Arm Cyl.)
36. **ONE WAY RESTRICTOR** .125" (Boom Cyl.)
37. **BUCKET CYLINDER**
38. **ARM CYLINDER (Cushion)**
39. **BOOM CYLINDER (Cushion)**
40. **AUXILIARY QUICK COUPLERS**
41. **AUXILIARY SELECTOR VALVE**
42. **ACCUMULATOR**
43. **RELIEF VALVE** . . . . . swing motor (2) 2088 PSI (14395 kPa)
44. **SHUTTLE VALVE**

FLUID FLOW EXPLANATION

The fluid flows by gravity from the reservoir 10 through a supply port block 7 to the 3 section hydraulic gear pump 6 . The 3 section gear pumps are coupler driven from the engine. Each gear pump section is protected by a relief valve located in the control valve it supplies.

Fluid from the hydraulic pump (Engine flywheel end) is forced to the 6-spool hydraulic control valve 29 P1 port (Inlet). These control valve sections control R.H. travel, Boom and Bucket. Oil under pressure is also diverted to the shuttle valve 21 .

Fluid from the center section hydraulic pump is forced to the P2 port of the 6-spool hydraulic control valve 29 . These control valve sections control L.H. travel, Arm and Auxiliary. The two (2) stage pressure, adjustable relief valves 27 & 28 are located at each end of the 6-spool hydraulic control valve 29 .

When the L.H. Travel section and/or the R.H. Travel section is activated in either the forward or reverse travel direction, oil under pressure is diverted to the two (2) stage pressure relief valves 27 & 28 . The oil pressure shifts the relief valve from standard pressure (2500 PSI - 17235 kPa) to the high pressure (3000 PSI - 20682 kPa). This will allow increased oil pressure to the travel motors 2 for increased drive motor torque. As soon as the travel section spools return to neutral, the two (2) stage pressure relief valves, mechanically (spring activated) return to the standard pressure (2500 PSI - 20682 kPa).

With all spools in the neutral position the open center control valve allows fluid to flow to the oil cooler 1 to the oil filter 5 and to the supply port block 7 . When a spool is activated, the fluid flows to the base or rod end of a cylinder 37 , 38 , 39 . The fluid on the other side of the cylinder flows back to the 6-spool hydraulic control valve 29 . When a cylinder reaches the end of the stroke, the pressure increases to 2500 PSI and opens the two stage pressure relief valve 27 or 28 . The fluid then flows through the 6-spool hydraulic control valve 29 internally and back to the oil cooler 1 , to the oil fitler 5 and to the supply port block 7 .

The 6-spool hydraulic control valve has Port Relief Valves in both ports of the Boom section 30 & 31 , the Rod end of the Bucket section 32 and both ports of the Arm section 33 & 34 . The boom section has a one way restrictor 36 located in the "B" port limiting the "boom down" speed. The arm section has a one way restrictor 35 located in the "B" port limiting the "arm in" speed.

Printed in U.S.A.

MidWestTech | Bobcat X331 Excavator Service Manual | Publication 6722918_5_94

Order the manual at mid-west-tech.com >