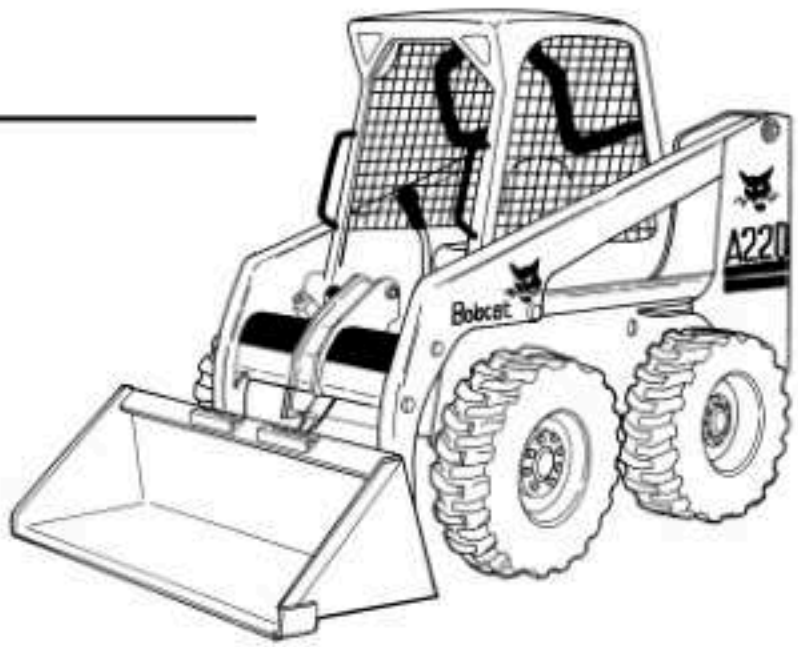
A220 TURBO

A220 TURBO HIGH FLOW

Bobcat®

Service Manual

S/N 519611001 & Above
S/N 519711001 & Above



EQUIPPED WITH BOBCAT INTERLOCK CONTROL SYSTEM (BICS™)

6901245 (7-10)

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A220 HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW AND TWO SPEED VALVE OPTION
S/N 519611124 - 519611311
S/N 519711004 - 519711140

(PRINTED APRIL 2004)
V-0268legend

LEGEND

1. RESERVOIR: Capacity . . . . . 18.8 Qts. (17.8 L)
2. FILTER - CASE DRAIN (90 Micron)
3. FILTER - HYDRAULIC (CANISTER)
4. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
5. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
6. DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (2,5-3,0 Bar)
7. FLOW DIVIDER ADJUSTMENT VALVE
8. CHECK VALVE - BUCKET POSITION VALVE
9. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
10. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
11. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
12. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
13. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
14. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
15. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
16. FILTER - BICS CONTROL VALVE (SCREEN)
17. ONE WAY RESTRICTOR - BOOM DOWN
18. LOAD CHECK VALVE- LIFT AND TILT
19. RELIEF VALVE - MAIN: 2950-3050 PSI (203-210 Bar) at Front Quick Couplers
20. RELIEF VALVE - PORT: 3500 PSI (241 Bar)
21. ANTICAVITATION VALVE
22. RELIEF/ANTICAVITATION VALVE - PORT (TILT BASE END) 3500 PSI (241 Bar)
23. ONE WAY RESTRICTOR VALVE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
25. RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (241 Bar)
26. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
27. CHARGE PRESSURE SWITCH
28. RELIEF VALVE - CHARGE: 120 degrees F. (53 degrees C.)Fluid 350 PSI (24,1 Bar) at High Engine Idle
29. CHARGE PUMP 12.0 GPM (45,4 L/min.) at High Engine Idle
30. HYDRAULIC PUMP . . . . . Gear Type 20.0 GPM (75,8 L/min.) at High Engine Idle
31. DRIVE MOTOR SHUTTLE VALVE
32. SHUTTLE RELIEF VALVE: 200 PSI (13,8 Bar)
33. REAR AUXILIARY BLEED SHUTTLE VALVE
34. LOAD CHECK VALVE - SELECT VALVE (HIGH FLOW)
35. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - HIGH FLOW
36. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - DIVERTER
37. RELIEF VALVE - MAIN (HIGH FLOW) 3000 PSI (207 Bar)
38. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
39. PILOT TO OPEN CHECK VALVE
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BLEED OFF
41. CHECK VALVE - BICS CONTROL VALVE
42. LIFT ARM BY-PASS RESTRICTOR
43. CHECK VALVE - AUXILIARY
44. FILTER - CASE DRAIN (Attachment)
45. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
46. TWO-STAGE RELIEF 1000/2000 PSI (69/138 Bar)
47. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
48. RELIEF VALVE - 1200 PSI (82,7 Bar)
49. RESTRICTOR - 0.015 inch (0,381 mm)
50. PRESSURE COMPENSATED FLOW CONTROL
51. RELIEF VALVE - PORT: 3500 PSI (241 Bar)
52. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
53. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
54. HYDRAULIC BRAKE - SPRING APPLIED - PRESSURE TO RELEASE
55. PUSH BUTTON SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BRAKE
56. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - MAKE-UP
57. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO SPEED
58. BRAKE DIAGNOSTIC PLUG
59. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - TWO SPEED DRIVE MOTOR
60. HYDRAULIC HIGH FLOW PUMP - Gear Type 10.0 GPM (37,9 L/min.) at High Engine Idle
61. SELECT VALVE RESTRICTOR
62. HYDRAULIC STEERING PUMP- Gear Type 13.0 GPM (49,2 L/min.) at High Engine Idle
63. FILTER - STEERING (10 MICRON)
64. SOLENOID ACTIVATED PROPORTIONAL FLOW CONTROL VALVE - STEERING
65. SOLENOID ACTIVATED PRESSURE CONTROL VALVE 0-2000 PSI (0-138 Bar)
66. STEERING CYLINDER
67. CHECK VALVE - 270 PSI (18,6 Bar)
68. PRESSURE CONTROL PILOT VALVE - 2 COILS 0 - 0.085 Ampere
69. DISPLACEMENT CONTROL SPOOL
70. PUMP SERVO
71. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE

NOTE: Unless otherwise specified springs have NO significant pressure value.

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Code 38-48:
AWS FRONT LEFT STEERING SOLENOID ERROR ON

Refer to appropriate Electrical Schematic for circuit description.

Unplug AWS harness connectors C443 and C499. Turn key switch to run.

Code remains 38-48. Possible harness wires shorted to power. Check voltage pin B to ground on C443 or C499.

Below 5.6 Volts. Circuit appears OK. Replace AWS controller *.

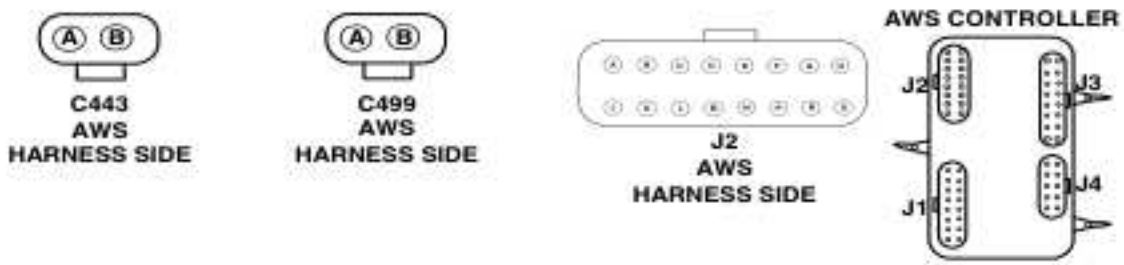
5.6 Volts and above. Harness is shorted to power. Repair or replace harness.

Code 38-48 clears. Power off. Connect one solenoid coil at a time. Power up. Note which connection generates the 38-48 code.

Power off. Reconnect solenoid connectors, unplug the J2 connector on the AWS controller. Power up.

Code 38-47 clears. The system appears OK. Replace AWS controller *.

Code remains 38-48. Repair connector wires that generated the 38-48 code in previous step or replace the AWS harness.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

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TROUBLESHOOTING

Chart

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
Slow cranking speed.	1, 2, 3, 4
Engine will not start.	2, 5, 3, 7, 8, 9, 11, 12,13, 14, 15, 16, 17, 19, 27, 28, 29
Difficult to start.	5, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 25,27, 28, 29
No power to engine.	8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 27, 28, 29,
Engine is mis-firing.	8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 27, 28, 29,
Too much fuel consumption.	10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29
Black exhaust.	10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29
Blue/white exhaust.	4, 10, 15, 16, 17, 21, 23,27, 29, 30, 47, 46
Low oil pressure.	4, 31, 32, 33, 34, 35, 37, 39, 48
Engine knocking.	13, 15, 16, 19, 22, 24, 25, 27, 29, 31, 40, 41, 49
Engine running rough.	7, 8, 9, 10, 11, 12, 13, 17, 18, 22, 24, 25, 26, 29, 40, 49
Vibration.	2, 13, 17, 21, 22, 25, 26, 29, 40, 42, 43
High oil pressure warning.	4, 33, 36
Overheating.	10, 12, 13, 15, 16, 20, 21, 32, 40, 44, 47
Too much crankcase pressure.	22, 27, 29, 46
Poor compression.	10, 16, 21, 24, 25, 27, 28, 29, 30, 41, 49
Start and stop.	9, 10, 11

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A220 HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH TWO SPEED VALVE OPTION
S/N 5196111408 AND ABOVE
S/N 519711198 AND ABOVE

(PRINTED APRIL 2004)
V-0529legend

LEGEND

1. RESERVOIR: Capacity . . . . . 18.8 Qts. (17.8 L)
2. FILTER - CASE DRAIN (90 Micron)
3. FILTER - HYDRAULIC (CANISTER)
4. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
5. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
6. DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (2,5-3,0 Bar)
7. FLOW DIVIDER ADJUSTMENT VALVE
8. CHECK VALVE - BUCKET POSITION VALVE
9. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
10. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
11. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
12. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
13. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
14. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
15. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
16. FILTER - BICS CONTROL VALVE (SCREEN)
17. ONE WAY RESTRICTOR - BOOM DOWN
18. LOAD CHECK VALVE - LIFT AND TILT
19. RELIEF VALVE - MAIN: 2950-3050 PSI (203-210 Bar) at Front Quick Couplers
20. RELIEF VALVE - PORT: 3500 PSI (241 Bar)
21. ANTICAVITATION VALVE
22. RELIEF/ANTICAVITATION VALVE - PORT (TILT BASE END) 3500 PSI (241 Bar)
23. ONE WAY RESTRICTOR VALVE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
25. RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (241 Bar)
26. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
27. CHARGE PRESSURE SWITCH
28. RELIEF VALVE - CHARGE: 120 degrees F. (53 degrees C.)Fluid 350 PSI (24,1 Bara) at High Engine Idle
29. CHARGE PUMP 12.0 GPM (45,4 L/min.) at High Engine Idle
30. HYDRAULIC PUMP . . . . . Gear Type 20.0 GPM (75,8 L/min.) at High Engine Idle
31. DRIVE MOTOR SHUTTLE VALVE
32. SHUTTLE RELIEF VALVE: 200 PSI (13,8 Bar)
33. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BLEED OFF REAR AUXILIARY ("SV2")
34. LOAD SHUTTLE VALVE - BLEED OFF
35. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY CLOSED. ("P2" and "F2")
36. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY OPEN ("D1" and "P1")
37. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY OPEN ("D2" and "P2")
38. FILTER - DIVERTER VALVE (SCREEN) INTEGRATED IN SOLENOID
39. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TO ACTIVATE REAR AUXILIARY ("SV1")
40. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY CLOSED ("P1" and "F1")
41. CHECK VALVE - BICS CONTROL VALVE
42. LIFT ARM BY-PASS RESTRICTOR
43. CHECK VALVE - AUXILIARY
44. FILTER - CASE DRAIN (Attachment)
45. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
46. RELIEF VALVE - 2000 PSI (138 Bar)
47. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
48. RELIEF VALVE - 1200 PSI (82,7 Bar)
49. CHECK VALVE - With 80 PSI (5,5 Bar) Spring
50. CHECK VALVE - With 300 PSI (520,7 Bar) Spring
51. RELIEF VALVE - PORT: 3500 PSI (241 Bar)
52. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
53. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
54. HYDRAULIC BRAKE - SPRING APPLIED - PRESSURE TO RELEASE
55. PUSH BUTTON SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BRAKE
56. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - MAKE-UP
57. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO SPEED
58. DISPLACEMENT CONTROL SPOOL
59. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - TWO SPEED DRIVE MOTOR
60. PUMP SERVO
61. HYDRAULIC STEERING PUMP - Gear Type 13.0 GPM (49,2 L/min.) at High Engine Idle
62. FILTER - STEERING (10 MICRON)
63. SOLENOID ACTIVATED PROPORTIONAL FLOW CONTROL VALVE - STEERING
64. SOLENOID ACTIVATED PRESSURE CONTROL VALVE 0-2000 PSI (0-138 Bar)
65. STEERING CYLINDER
66. CHECK VALVE - 270 PSI (18,7 Bar)
67. PRESSURE CONTROL PILOT VALVE - 2 COILS 0 - 0.085 Ampere
68. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
69. ORIFIVE - 0.120 inch (3,0 mm) Restriction
70. ORIFIVE - 0.025 inch (0,63 mm) Restriction
71. ORIFIVE - 0.030 inch (0,76 mm) Restriction

NOTE: Unless otherwise specified springs have NO significant pressure value.

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