KOBELCO

# SERVICE MANUAL

## HYDRAULIC EXCAVATOR

# SK210LC

# SK250LC

Applicable: SK210LC YQ07U0101~
Applicable: SK2500LC LL08U0101~

S5YQ/LL12E-00 08/00

MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publication S5YQ-LL01E-00

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

Book Code No.
KAI-S5 YQ/LL01 12E

KOBELCO

YQ/LL01

# SHOP MANUAL

# SK210LC
# SK250LC
## Dynamic Acera

## SAFETY

TABLE OF CONTENTS

1.1 General Safety Information ..... 1-2
1.2 Safety Precautions ..... 1-2~1-4
1.3 Pre-Start Safety ..... 1-5~1-7
1.4 Safety During Operation ..... 1-7~1-10
1.5 Inspection 7 Maintenance Safety ..... 1-10~1-12
1.6 Battery Safety ..... 1-13
1.7 Warning Labels & Decals ..... 1-14~1-19
1.8 Prohibited Machine Operation ..... 1-14~1-21
1.9 End of Work Shift Safety ..... 1-21

©2000 KOBELCO AMERICA, INC., Calhoun, Georgia / Stafford, Texas USA. All rights reserved. Any use of editorial or pictorial content is strictly prohibited without express written permission from KOBELCO AMERICA, INC., Calhoun, Georgia / Stafford, Texas USA. Printed in U.S.A.



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >

# Table of Contents

Page

A. GROUND TRANSPORTATION ..... 2
1. Machine Preparation ..... 2
2. Loading the Machine ..... 3
B. LIFTING MACHINE ..... 4
1. Lifting Machine With Attachment Installed ..... 4
2. Lifting Machine Without Attachment ..... 7
C. SHIPPING DIMENSIONS ..... 10
1. SK210(LC)-VI - Figure 5-10A & 5-10B ..... 10
a. Machine With Standard Attachments ..... 10
b. Boom With Arm Cylinder - Figure 5.10C ..... 10
c. Arm With Bucket Cylinder - Figure 5.11A ..... 11
d. Arm With Bucket Cylinder and Bucket - Figure 5.11B ..... 11
e. Bucket - Figure 5.11C ..... 11
2. SK250(LC)-VI - Figure 5-12A & 5-12B ..... 12
a. Machine With Standard Attachments ..... 12
b. Boom With Arm Cylinder - Figure 5.12C ..... 12
c. Arm With Bucket Cylinder - Figure 5.13A ..... 13
d. Arm With Bucket Cylinder and Bucket - Figure 5.13B ..... 13
e. Bucket - Figure 5.13C ..... 13



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >

# Table of contents

Page

6.1 SK210-VI & SK210LC-VI GENERAL SPECIFICATIONS ..... 2
A. MACHINE DIMENSIONS– Figure 6.2A & 6.2B ..... 2
B. WORKING WEIGHTS ..... 2
C. STANDARD AT TACHMENT WORKING RANGES– Figure 6.3 ..... 3
D. DIGGING FORCES ..... 3
E. BUCKET SELECTION CHART ..... 3
F. BOOM– Figure 6.4A ..... 4
G. ARM– Figure 6.4B ..... 4
H. BUCKET– Figure 6.4C ..... 4
I. SHOES– FIGURE 6.4D ..... 4
J. PERFORMANCE SPECIFICATIONS ..... 5
1. Travel Speed, Swing Speed & Gradeability ..... 5
2. Engine ..... 5
3. Hydraulic Components ..... 5
4. Operating Pressures ..... 5
K. MACHINE & COMPONENT WEIGHTS ..... 5
L. LIFTING CAPACITIES FOR EUROPEAN SPEC'S ..... 6
M. LIFTING CAPACITIES KAI SPEC'S ..... 20
6.2 SK210LC-VI LONG REACH SPECIFICATIONS ..... 23
A. MACHINE DIMENSIONS– Figure 6.23A ..... 23
B. WORKING WEIGHTS ..... 23
C. WORKING RANGES— Figure 6.24 ..... 24
D. DIGGING FORCES ..... 24
E. BUCKETS ..... 24
F. LIFTING CAPACITIES KAI SPEC'S ..... 25
6.3 SK250LC-VI & SK250NLC-VI GENERAL SPECIFICATIONS ..... 27
A.MACHINE DIMENSIONS– Figure 6.27A & 6.27B ..... 27
B. WORKING WEIGHT ..... 27
C. STANDARD ATTACHMENT WORKING RANGES– Figure 6.28 ..... 28
D. DIGGING FORCES ..... 28
E. BUCKET SELECTION CHART ..... 28
F. BOOM– Figure 6.29A ..... 29
G. ARM– Figure 6.29B ..... 29
H. BUCKET– Figure 6.29C ..... 29
I. SHOES– FIGURE 6.29D ..... 29
J. PERFORMANCE SPECIFICATIONS ..... 30
1. Travel Speed, Swing Speed & Gradeability ..... 30
2. Engine ..... 30
3. Hydraulic Components ..... 30
4. Operating Pressures ..... 30
K. MACHINE & COMPONENT WEIGHTS ..... 30
L. LIFTING CAPACITIES FOR EUROPEAN SPEC'S ..... 31
M. LIFTING CAPACITIES KAI SPEC'S ..... 45
6.4 SK250LC-VI LONG REACH SPECIFICATIONS ..... 49
A. MACHINE DIMENSIONS– Figure 6.49A ..... 49
B. WORKING WEIGHTS ..... 49
C. WORKING RANGES— Figure 6.50 ..... 50
D. DIGGING FORCES ..... 50
E. BUCKETS ..... 50
F. LIFTING CAPACITIES ..... 51
6.5 TORQUE SPECIFICATIONS ..... 53
A. CAPSCREWS & NUTS ..... 53
B. ORS JOINT (O-RING SEALING TYPE) ..... 53
C. NUTS & SLEEVES ..... 54
D. FLARE TYPE FITTING JOINTS ..... 54
E. N2 (NYLON) TUBE FITTING JOINTS ..... 54
F. TORQUE VALUES FOR MOST COMMON BOLTS ..... 55
6.6 MISCELLANEOUS INFORMATION ..... 56
A. TEMPERATURE TABLE ..... 56
B. SPECIAL PIPE WRENCHES ..... 56
C. WEIGHT OF MATERIALS TABLE ..... 56
D. CAPS AND PLUGS FOR TUBES AND HOSE FITTINGS ..... 56
E. SOME CONVERSION UNITS ..... 58



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >

## J. PERFORMANCE SPECIFICATIONS

The following performance specifications are based on the standard machine with standard attachment.

**1. Travel Speed, Swing Speed & Gradeability**

| DESCRIPTION | SPECIFICATION |
|---|---|
| TRAVEL SPEED | 6.0 km per hr (3.7 mph) in ◆ mode.<br>4.0 km per hr (2.5 mph) in ◆ mode. |
| SWING SPEED | 11 RPM IN M-Mode / "HI" Idle. |
| GRADEABILITY | 70% (35°) (Limited by engine lubrication) |
| DRAWBAR FORCE | 23,250 Kgf (51,257 lbf) |

**2. Engine**

| | |
|---|---|
| Engine Maker | Mitsubishi |
| Model | 6D34-TLEB |
| Type | 4-Cycle, Water Cooled, Direct Injection with Turbocharger, Diesel |
| Number of Cylinders– Bore X Stroke | 6–104 mm X 115 mm (4.09" X 4.53") |
| Displacement | 5.861 liter (358 cu in.) |
| Compression Ratio | 18.2 : 1 |
| Output Rating | 125 kW (168 hp) / 2,100 rpm |
| Maximum Torque | 590 N•m (435 lb-ft)/ 1,600 rpm |
| Ignition Order | 1–5–3–6–2–4 Clockwise Rotation |
| Injection Timing | 17° Before Top Dead Point |
| Intake Valve Clearance Cold | 0.4 mm (0.0157") |
| Exhaust Valve Clearance Cold | 0.4 mm (0.0157") |
| Electrical System | D.C. 24 V |
| Starting Motor | 24 V–5.0 KW |
| Alternator | 24 V–35 A |
| Batteries | 2– 12 V- (136 Ah) |
| Engine Dry Weight* | 480 kg (1,060 lbs) |
| Thermostat | Begin to open at 76.5°C (170°F). Full open at 90°C (194°F). |
| Cooling Fan Drive Method | Ø620 (Ø24.4") Suction Type Belt Drive Pulley Ratio : 0.90 |
| Air Cleaner | Dry Type with Safety Elements |

*Less flywheel and electrics.

**3. Hydraulic Components**

| COMPONENT | TYPE |
|---|---|
| HYDRAULIC PUMPS<br>2X240 L/min (63.4 Gal/min) | Tandem, Variable Displacement, Axial Piston with Pilot Gear Pump. |
| SWING MOTOR | Axial Piston |
| TRAVEL MOTOR | Axial Piston |
| CONTROL VALVES | 6 Spool Multiple Control |
| CYLINDERS (ALL) | Double Acting |
| RETURN FILTER | Safety Valve containing Filter Type |
| OIL COOLER | Air Cooled |

**4. Operating Pressures** Kgf/cm² (psi)

| | |
|---|---|
| PILOT SYSTEM | 50 (710) |
| IMPLEMENT | 350 (4980) |
| SWING | 300 (4270) |
| TRAVEL | 350 (4980) |
| POWER BOOST/HEAVY LIFT | 385 (5470) |

## K. MACHINE & COMPONENT WEIGHTS

The following weight specifications are based on the standard machine with standard attachment.

Unit: Kg (lb)

| COMPONENT | SK250LC-VI | SK250NLC-VI |
|---|---|---|
| COMPLETE MACHINE (STANDARD) | 24,200 (53,350) | 24,100 (53,130) |
| UPPER FRAME ASSEMBLY | 11,400 (25,130) | 11,400 (25,130) |
| COUNTERWEIGHT | 5,510 (12,150) | 5,510 (12,150) |
| CAB | 260 (570) | 260 (570) |
| BOOM CYLINDER* | 220 (490) X 2 | 220 (490) X 2 |
| ENGINE* | 480 (1,060) | 480 (1,060) |
| RADIATOR & OIL COOLER | 97 (210) | 97 (210) |
| PUMP ASSEMBLY | 142 (310) | 142 (310) |
| CONTROL VALVE | 280 (620) | 280 (620) |
| FUEL TANK* | 91 (200) | 91 (200) |
| HYDRAULIC TANK* | 143 (320) | 143 (320) |
| SWING MOTOR & REDUCTION UNIT | 290 (640) | 290 (640) |
| LOWER FRAME ASSEMBLY | 8,900 (19,620) | 8,800 (19,400) |
| SLEWING RING | 364 (800) | 364 (800) |
| TRAVEL MOTOR & REDUCTION UNIT | 300 (660) X2 | 300 (660) X2 |
| IDLER ASSEMBLY | 106 (230) X2 | 106 (230) X2 |
| LOWER ROLLER ASSEMBLY | 35 (77) X14 | 35 (77) X16 |
| UPPER ROLLER ASSEMBLY | 22 (48) X4 | 22 (48) X4 |
| TRACK TENSION ASSEMBLY | 94 (210) X2 | 94 (210) X2 |
| SPROCKET | 54 (120) X2 | 54 (120) X2 |
| SWIVEL JOINT | 30 (66) | 30 (66) |
| TRACK LINK W/ 800mm (31.5") SHOES | 1,890 (4,158)x2 | 1,490 (3,280)x2 |
| TRACK LINK | 580 (1,276)x2 | 580 (1,276)x2 |
| ATTACHMENT (STANDARD) | 3,900 (8,600) | 3,900 (8,600) |
| BUCKET ASSEMBLY [1.04m³ (1.36 cu yd)] | 780 (1,720) | 780 (1,720) |
| ARM ASSEMBLY [2.98 m (9'-9")] | 1,150 (2,540) | 1,150 (2,540) |
| ARM [2.98 m (9'-9")] | 710 (1,570) | 710 (1,570) |
| BUCKET CYLINDER* | 177 (390) | 177 (390) |
| IDLER LINK | 25 (55) X2 | 25 (55) X2 |
| BUCKET LINK | 98 (220) | 98 (220) |
| PIN (2 PCS for mtg bucket cyl & bucket) | 80 (180) | 80 (180) |
| BOOM ASSEMBLY | 2,140 (4,720) | 2,140 (4,720) |
| BOOM | 1,670 (3,680) | 1,670 (3,680) |
| ARM CYLINDER* | 300 (660) | 300 (660) |
| PIN (Mounting the Arm) | 28 (62) | 28 (62) |
| FLUIDS | 550 (1,210) | 550 (1,210) |
| HYD OIL | 225 (500) | 225 (500) |
| ENG OIL | 18 (40) | 18 (40) |
| FUEL | 285 (630) | 285 (630) |
| WATER | 22 (48) | 22 (48) |

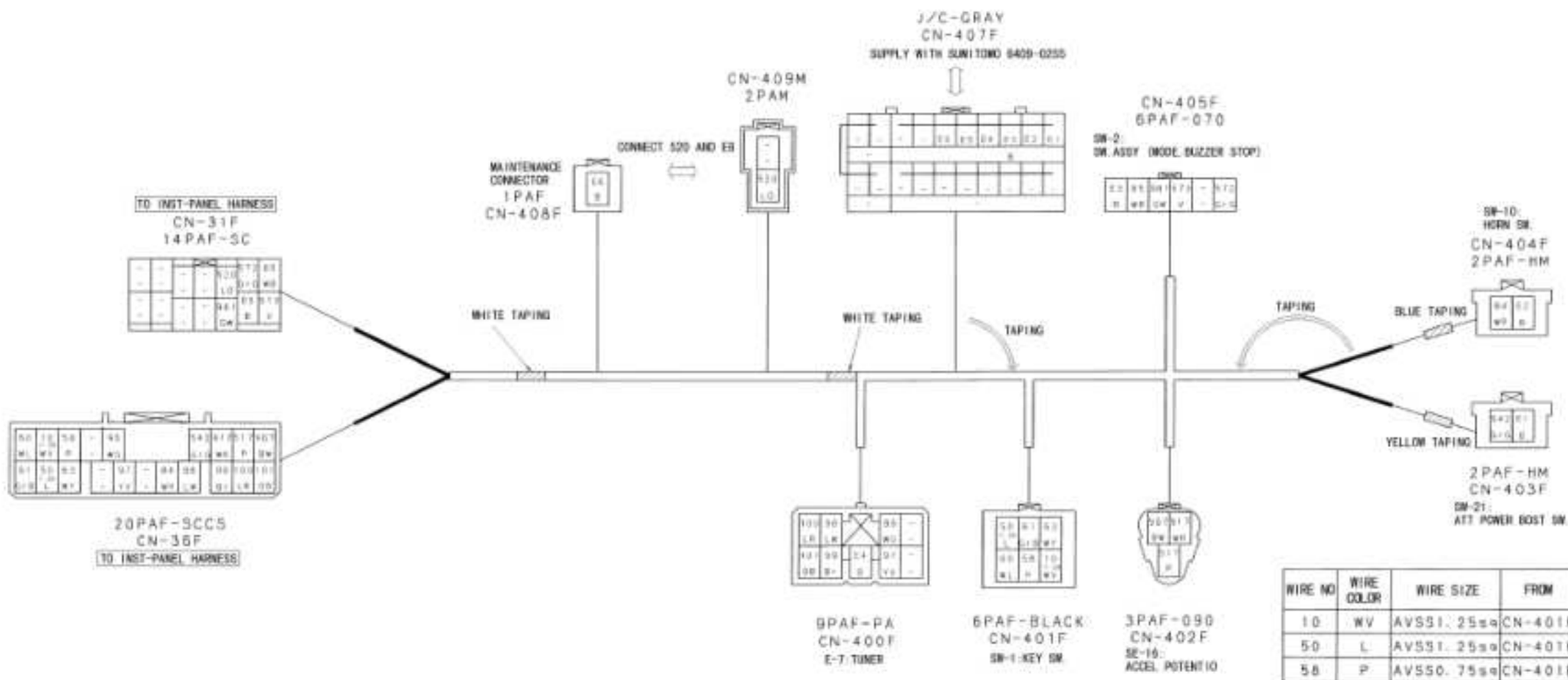
* DRY WEIGHT

**⚠ WARNING ⚠**

USE ONLY LIFTING DEVICES AND EQUIPMENT WITH RATED CAPACITIES SUFFICIENT TO LIFT THE SPECIFIC COMPONENT(S) BEING REMOVED OR INSTALLED.



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >




## CONNECTORS SELECTION TABLE

| CONNECTOR NAME (PIN NUM.) | MANUFUC. | PART. NUMBER | |
|---|---|---|---|
| | | HOUSING | TERMINAL |
| 20PAF-SCCS | AMP | 316010-2 | 175268-1<br>175269-1 |
| 14PAF-SC | AMP | 178689-2 | 175266-2<br>175269-1 |
| 6PAF-070 | AMP | 174923-1 | 173631-2 |
| 3PAF-090 | SUMITOMO | 6180-3241 | 1500-0110 |
| 6PAF-BLACK | YAZAKI | 7123-2262-30 | 7116-2090 |
| 9PAF-PA | YAZAKI | 7119-3090 | 7116-1050 |
| J/C-GRAY | SUMITOMO | 6400-0081<br>6409-0255 | 8240-4422 |
| 2PAF-HM | SUMITOMO | 6090-1001 | 8240-4422 |
| 1PAF | YAZAKI | 7123-2215 | 7116-2090 |
| 2PAM | YAZAKI | 7122-2228 | 7114-2020 |

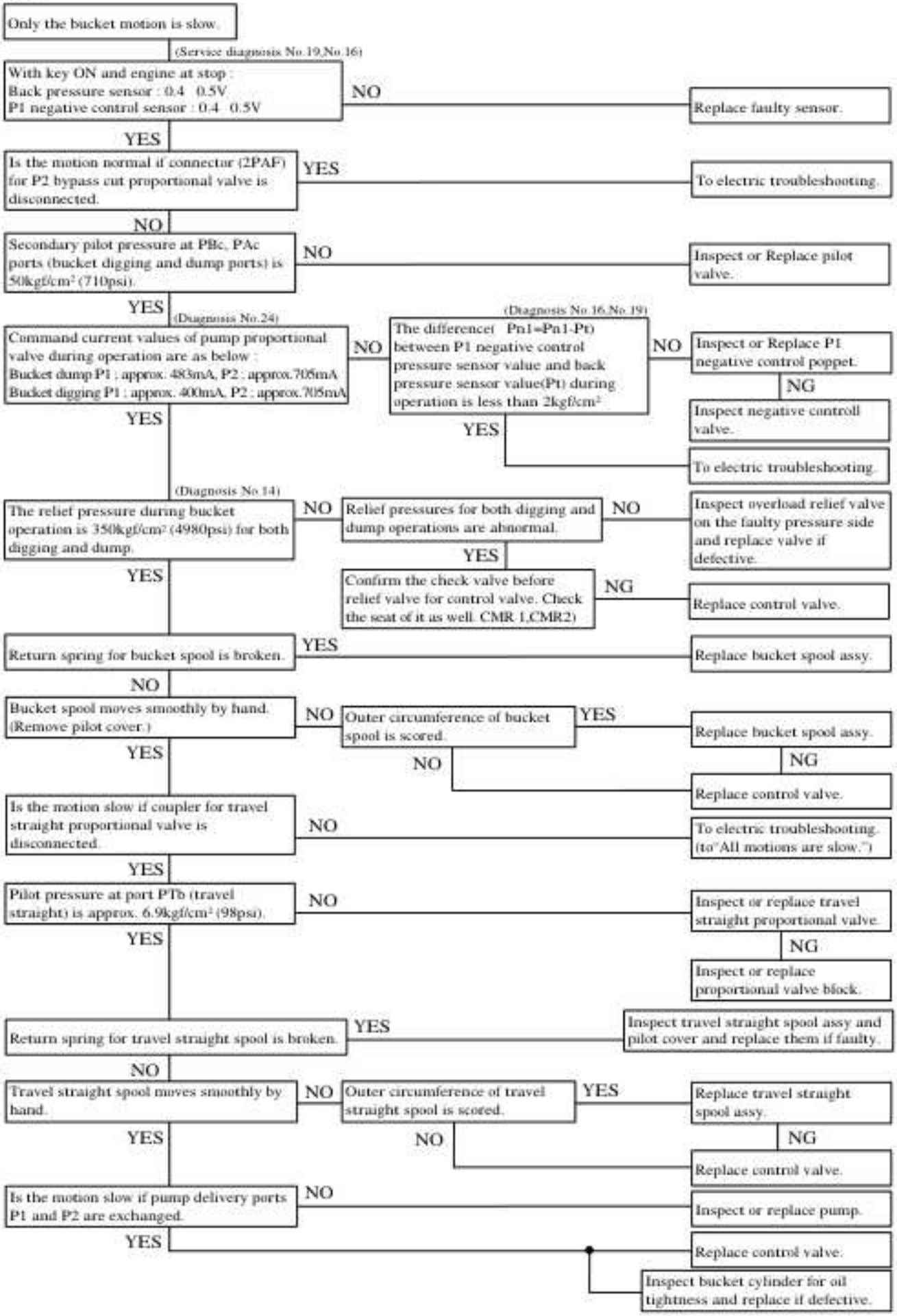
| WIRE NO | WIRE COLOR | WIRE SIZE | FROM | CONNECTION | TO | FUNCTION |
|---|---|---|---|---|---|---|
| 10 | WV | AVSS1.25sq | CN-401F | ——— | CN-36F | KEY SW ← FUSE BOX |
| 50 | L | AVSS1.25sq | CN-401F | ——— | CN-36F | KEY SW → FUSE BOX |
| 58 | P | AVSS0.75sq | CN-401F | ——— | CN-36F | KEY SW → GLOW RELAY |
| 60 | WL | AVSS0.75sq | CN-401F | ——— | CN-36F | KEY SW → BATTERY RELAY |
| 61 | GrB | AVSS0.75sq | CN-401F | ——— | CN-36F | KEY SW → GLOW RELAY |
| 63 | WY | AVSS0.75sq | CN-401F | ——— | CN-36F | KEY SW → STARTER RELAY |
| 84 | WR | AVSS0.75sq | CN-404F | ——— | CN-36F | HORN SW ← HORN RELAY |
| 85 | WB | AVSS0.75sq | CN-405F | ——— | CN-31F | SW ASSY(MODE, BUZZER STOP) ← WORK LIGHT RELAY |
| 96 | WG | AVSS0.75sq | CN-36F | ——— | CN-400F | DC-DC CONVERTER → TUNER |
| 97 | YV | AVSS0.75sq | CN-36F | ——— | CN-400F | DC-DC CONVERTER → TUNER |
| 98 | LW | AVSS0.75sq | CN-400F | ——— | CN-36F | TUNER → SPEAKER LEFT |
| 99 | Br | AVSS0.75sq | CN-400F | ——— | CN-36F | TUNER ← SPEAKER LEFT |
| 100 | LR | AVSS0.75sq | CN-400F | ——— | CN-36F | TUNER → SPEAKER RIGHT |
| 101 | DB | AVSS0.75sq | CN-400F | ——— | CN-36F | TUNER ← SPEAKER RIGHT |
| 517 | P | AVSS0.75sq | CN-402F | ——— | CN-36F | ACCEL POTENTIO → MECHATRO CONTROLLER |
| 520 | LO | AVSS0.75sq | CN-409M | ——— | CN-31F | MAINTENANCE CONNECTOR ← MECHATRO CONTROLLER |
| 542 | GrG | AVSS0.75sq | CN-403F | ——— | CN-36F | POWER BOOST SW ← MECHATRO CONTROLLER |
| 572 | GrG | AVSS0.75sq | CN-31F | ——— | CN-405F | SW BOX ASSY → SW ASSY(MODE, BUZZER STOP) |
| 573 | V | AVSS0.75sq | CN-31F | ——— | CN-405F | SW BOX ASSY → SW ASSY(MODE, BUZZER STOP) |
| 917 | WR | AVSS0.75sq | CN-402F | ——— | CN-36F | ACCEL POTENTIO ← MECHATRO CONTROLLER |
| 987 | BW | AVSS0.75sq | CN-402F | ——— | CN-36F | ACCEL POTENTIO → MECHATRO CONTROLLER |
| 981 | GW | AVSS0.75sq | CN-405F | ——— | CN-31F | SW ASSY(MODE, BUZZER STOP) → MECHATRO CONTROLLER |
| E1 | B | AVSS0.75sq | CN-403F | ———●——— | CN-407F | ATT BOOST SW → J/C-GRAY |
| E2 | B | AVSS0.75sq | CN-404F | ———●——— | CN-407F | HORN SW → J/C-GRAY |
| E3 | B | AVSS0.75sq | CN-405F | ———●——— | CN-407F | SW ASSY(MODE, BUZZER STOP) → J/C-GRAY |
| E4 | B | AVSS0.75sq | CN-400F | ———●——— | CN-407F | TUNER → J/C-GRAY |
| E5 | B | AVSS0.75sq | CN-31F | ———●——— | CN-407F | EARTH ← J/C-GRAY |
| E6 | B | AVSS0.75sq | CN-408F | ———●——— | CN-407F | MAINTENANCE CONNECTOR → J/C-GRAY |

Fig.19E Instrument panel right harness



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publication S5YQ-LL01E-00
Order the manual at mid-west-tech.com >

(2)-2






MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >

## TRAVEL SPEED

### A. Tools & Equipment

1. Stopwatch
2. Device to mark starting point of tracks.

### B. Machine Settings & Site Condition

1. Machine throttle in "High" idle position.
2. Test will be performed with KPSS Mode Switch in "M".
3. Hydraulic oil temperature at 45°C to 55°C (113°F to 131°F).
4. Firm, level testing area.
5. Verify that engine RPM's are at correct specification.

### C. Travel Speed Test

1. Move machine to a firm, level testing area.
2. Allow the hydraulic oil to reach a te perature of 45°C to 55°C (113°F to 131°F).
3. Operate Swing Right Control until mchine is sitting across (perpendicular) tracks.
4. Operate the Boom, Arm and Bucket Controls until bucket is on ground. See Figure 7.4.
5. Operate Boom Control until bottom of right track is approximately 300mm (12") off ground. See Figure 7.4. Make reference mark on track.
6. Place Throttle Control in "HI-IDLE" position and KPSS Switch in "M" Mode. See Figure 7.5.
7. Place Travel Speed Select Switch in 1( ) Speed. See Figure 7.6.
8. Operate the Right Travel Control full forward and measure the time it takes for track to make three complete revolutions. Record the time.
9. Repeat Step 7 ands 8 two more times. Averagethe readings and compare to Travel Speed Specification Chart.
10. Place Travel Speed Select Switch in 2( ) speed and repeat steps 8 and 9.
11. Repeat steps 4 through 13 with Left Track approximately 300mm (12") off ground.

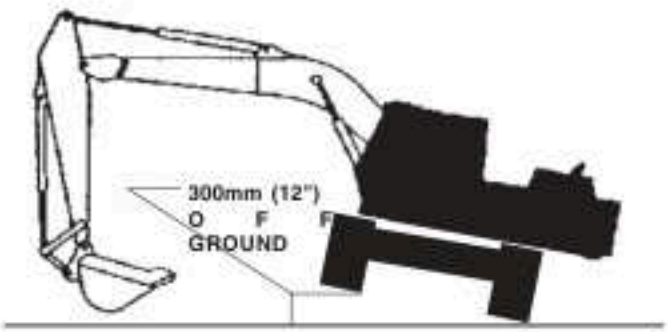



**FIGURE 7.4**
SK210 ~ SK400 ILLUSTRATED

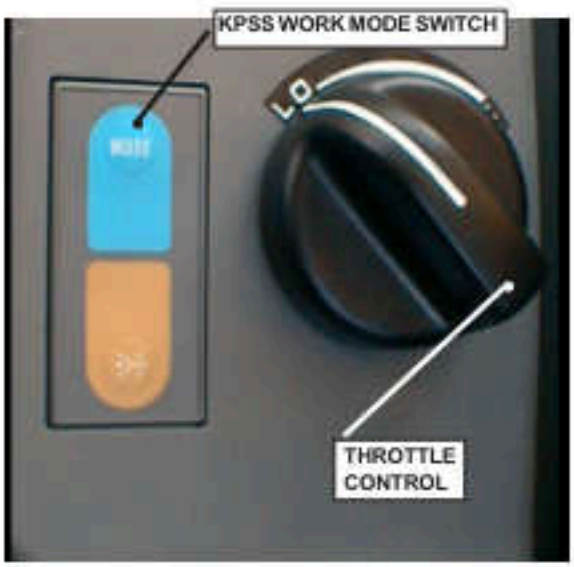



Figure 7.5




Figure 7.6

Unit: Seconds



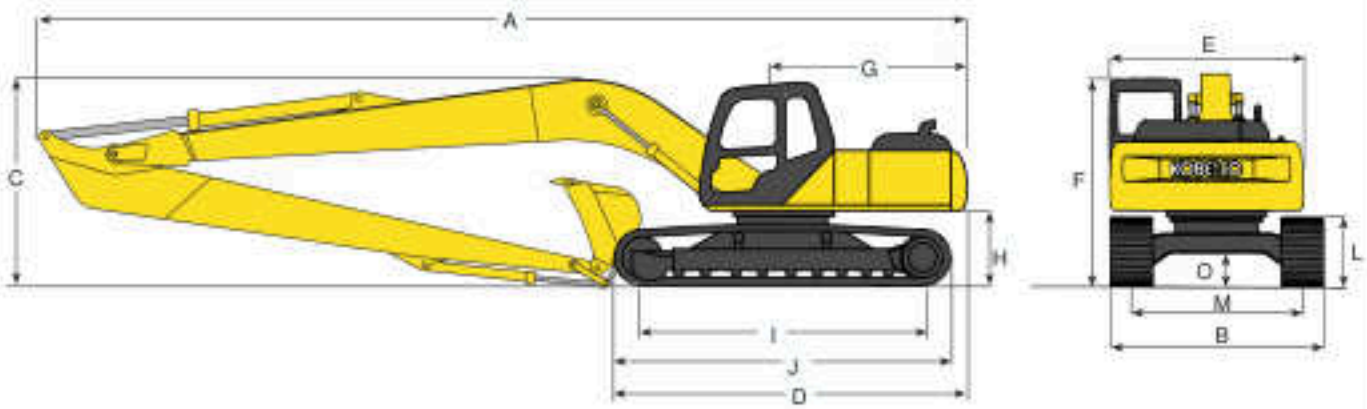
MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >

## 6.4 SK250LC-VI LONG REACH SPECIFICATIONS

The specifications found in this section are given on the SK250 LC -VI Long Reach (60 Feet) Hydraulic Excavator as manufactured by KOBELCO.

### A. MACHINE DIMENSIONS– Figure 6.49A

1. Figure 6.49A shows the machine dimensions with {10.35 m (33' 11")} Boom, {8.25 m (27' 1")} Arm, Bucket {0.40 $m^3$ (0.52 $yrd^3$)}.




| DIMENSIONS | | BOOM: 10.35 M (33' 11") ARM: 8.25 M (27' 1") |
|---|---|---|
| A | Overall length | 14.38 (47' 2") |
| B | Overall width: w/800 mm shoes | 3.39 (11' 1") |
| C | Overall height | 2.94 (9' 7") |
| D | Basic machine length | 5.27 (17' 3") |
| E | Width of revolving upper frame | 2.71 (8' 11") |
| F | Height of cab top | 2.92 (9' 7") |
| G | Radius of rear end | 2.98 (9' 9") |
| H | Ground clearance of rear end | 1.04 (3' 5") |
| I | Center distance of tumblers | 3.85 (12' 8") |
| J | Overall length of crawler | 4.66 (15' 3") |
| L | Crawler height at tumbler center | 980 mm (38.6") |
| M | Track gauge | 2.59 (8' 6") |
| O | Ground clearance undercarriage | 450 mm (17.7") |

**FIGURE 6.49A**

### B. WORKING WEIGHTS

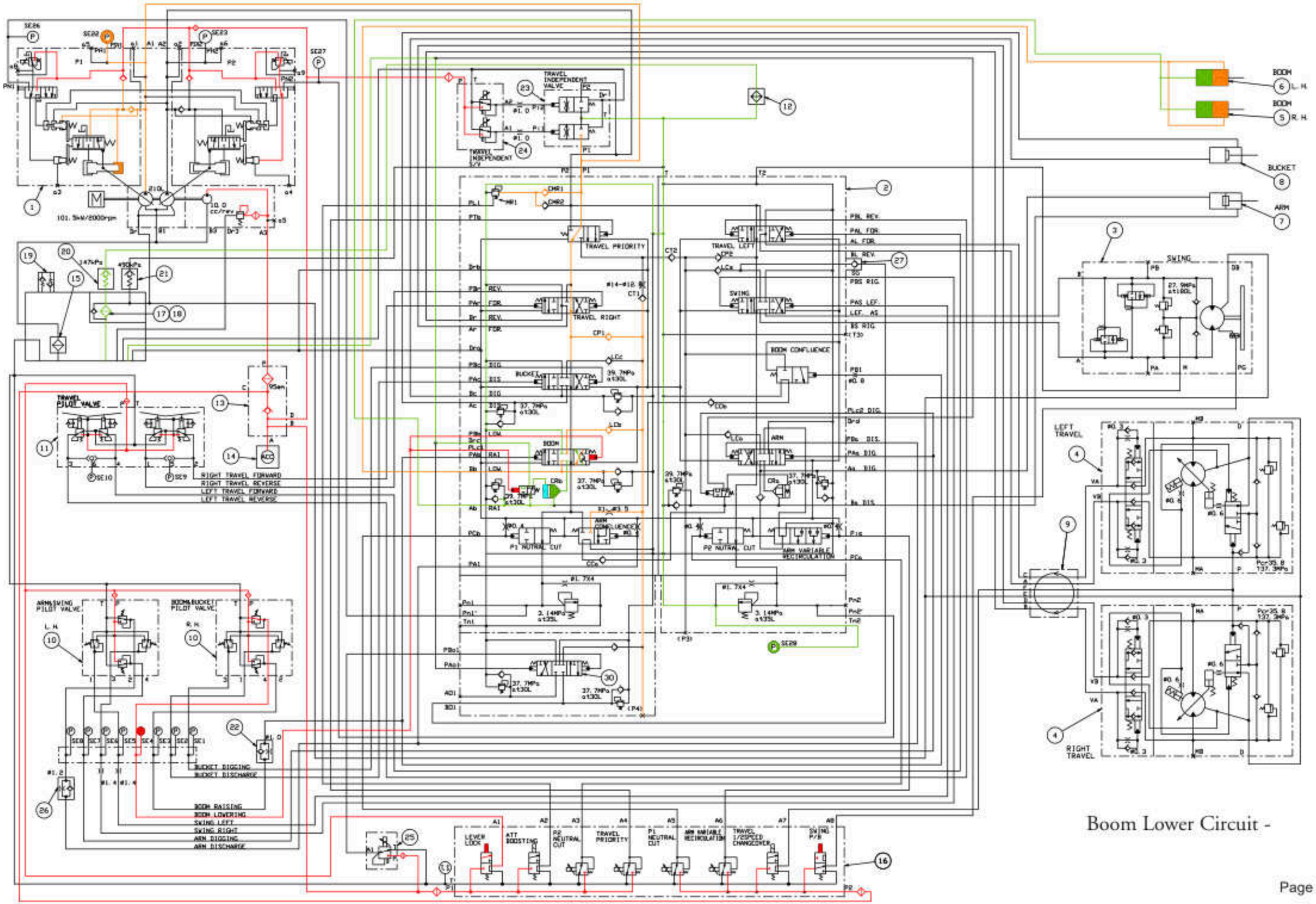
**SK250LC-VI 60Ft. Long Reach**

| | | TRIPLE GROUSER SHOES | |
|---|---|---|---|
| Track shoe width | mm (in) | 800 (31.5) | 900 (31.5) |
| Overall width | m (ft-in) | 3.39 (11 - 1) | 3.49 (11 - 5) |
| Ground pressure | Kg/$cm^2$ (psi) | 0.408 (5.80) | 0.367 (5.22) |
| Working weight | Kg (lbs) | 27,200 (59,966) | 27,500 (60,227) |

Bucket weight: 350 Kg (772 lbs)



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publica... Order the manual at mid-west-tech.com >




Boom Lower Circuit -



MidWestTech | Kobelco SK210LC, SK250LC Hydraulic Excavator Service Manual | Publication S5YQ-LL01E-00

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