Issue	Data of Issue	Applicable Machines	Remarks
First Edition	December, 2008	SK200-8 : YN12-56001~ SK210LC-8 : YQ12-08001~	S5YN0129E01 (SE Asia & Oceania)
↑	September, 2009	SK225SR : YB06-03501~ SK225SRLC : LA06-02501~	↑ (OCE)
↑	November, 2009	SK850LC : LY02-00151~	↑ (SE Asia)
↑	February, 2010	SK140LC-8 : YP09-T0101~ SK130-8 : LP09-T0101~ SK130L-8 : LX07-T0101~	↑ (TKCM)
↑	June, 2010	SK80CS-2 : LF06-04501~	↑ (NA)
↑	↑	E80BMSR : LF06-04501~	↑ (NHK)
↑	↑	E70BSR : YT06-18001~	↑ (NHK-EUR)
↑	↑	SK70SR-2 : YT06-18001~	↑ (NA)
↑	July, 2010	E135BSRLC : YH06-08001~	↑ (NHK-EUR)
↑	↑	SK140SRLC : YH06-08001~	↑ (NA)
↑	August, 2010	SK460-8 : LS11-02501~ SK480LC-8 : YS11-02001~	↑ SE Asia & India (HS Engine)
↑	↑	E235BSR(N)LC : YU06-03001~	↑ (NHK-EUR)
↑	↑	SK235SRLC-2 : YU06-03001~	↑ (NA)
↑	↑	E225BSR : YB06-03501~ E225BSRLC : LA06-02501~	↑ (NHK-EUR)
↑	↑	SK215SRLC : LA06-02501~	↑ (NA)
↑	September, 2010	E385CLC : YC	↑ (NHK)
↑	↑	SK350LC-9 : YC	↑ (NA)
↑	↑	SK330-8 : LC11-T0101~ SK350LC-8 : YC11-T0101~	↑ TKCM (HS Engine)
↑	↑	SK350LC-8 : YC11-T0101~	↑ (TKCM)
↑	October, 2010	SK80MSR-2 : LF06-04547~	↑ (AUS)
↑	↑	SK70SR-2 : YT06-18444~	↑ (AUS)
↑	↑	SK140SRLC : YH06-08001~	↑ (Latin America)

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11.1 TIGHTENING TORQUES FOR CAPSCREWS AND NUTS

Tables Table "Metric coarse thread (Not plated)" and Table "Metric fine thread (Not plated)" indicate tightening torques applicable to cases where no special note is given.
Overtightening of bolts may result in a twist-off and a fracture under load.
Insufficient tightening may lead to a loosening or loss of bolts. Always tighten bolts to proper torques.

Unit : N•m (lbf•ft)

Classification		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6	P=1	4.4±0.5 (3.2±0.4)	3.7±0.4 (2.7±0.3)	9.6±1.0 (7.1±0.7)	8.1±0.8 (6.0±0.6)	17.4±1.8 (12.8±1.3)	14.7±1.5 (10.8±1.1)
M8	P=1.25	10.7±1.1 (7.9±0.8)	9.0±0.9 (6.6±0.7)	23.5±2.0 (17.3±1.5)	19.6±2.0 (14.5±1.5)	42.2±3.9 (31.1±2.9)	35.3±3.9 (26.0±2.9)
M10	P=1.5	21.6±2.0 (15.9±1.4)	17.9±1.8 (13.2±1.3)	46.1±4.9 (34.0±3.6)	39.2±3.9 (28.9±2.9)	83.4±8.8 (61.5±6.5)	70.6±6.9 (52.1±5.1)
M12	P=1.75	36.3±3.9 (26.8±2.9)	31.4±2.9 (23.2±2.1)	79.4±7.8 (58.6±5.8)	66.7±6.9 (49.2±5.1)	143±15 (105±11)	121±12 (89.2±8.9)
M14	P=2	57.9±5.9 (42.7±4.4)	49.0±4.9 (36.1±3.6)	126±13 (92.9±9.6)	106±10 (78.2±7.4)	226±20 (167±15)	191±19 (141±14)
M16	P=2	88.3±8.8 (65.1±6.5)	74.5±6.9 (55.0±5.1)	191±20 (141±15)	161±16 (119±12)	343±39 (253±29)	284±29 (209±21)
M18	P=2.5	122±12 (90.0±8.9)	103±10 (75.8±7.2)	265±29 (195±21)	226±20 (167±15)	481±49 (355±36)	402±39 (297±29)
M20	P=2.5	172±17 (127±13)	144±14 (106±10)	373±39 (275±29)	314±29 (232±21)	667±69 (492±51)	559±59 (412±44)
M22	P=2.5	226±20 (167±15)	192±20 (142±15)	500±49 (369±36)	422±39 (311±29)	902±88 (665±65)	755±78 (557±58)
M24	P=3	294±29 (217±21)	235±29 (173±21)	637±69 (470±51)	520±49 (383±36)	1160±118 (856±87)	941±98 (694±72)
M27	P=3	431±39 (318±29)	353±39 (260±29)	941±98 (694±72)	765±78 (564±58)	1700±167 (1250±123)	1370±137 (1010±101)
M30	P=3.5	588±59 (434±44)	490±49 (361±36)	1285±127 (948±94)	1079±108 (796±80)	2300±235 (1700±173)	1940±196 (1430±145)
M33	P=3.5	794±78 (586±58)	667±69 (492±51)	1726±177 (1270±131)	1451±147 (1070±108)	3110±314 (2290±232)	2610±265 (1930±195)
M36	P=4	1030±98 (760±72)	863±88 (637±65)	2226±226 (1640±167)	1863±186 (1370±137)	4010±402 (2960±297)	3360±333 (2480±246)

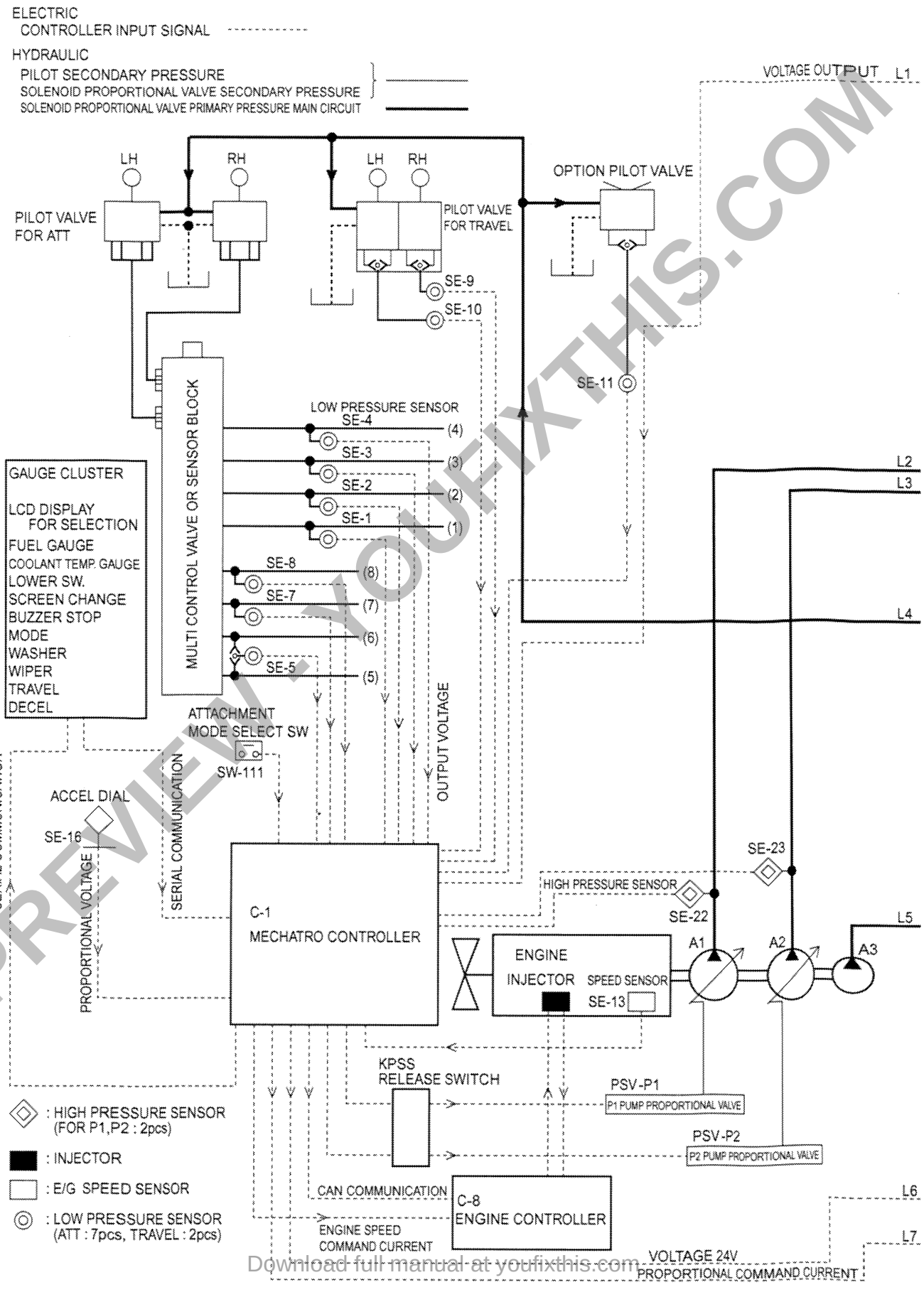
Tightening torque for metric coarse threads (not plated)

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21.1 SUMMARY OF MECHATRO CONTROL SYSTEM

21.1.1 MECHATRO CONTROL SYSTEM IN GENERAL



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Issue	Data of Issue	Applicable Machines	Remarks
First Edition	December, 2008	SK200-8 : YN12-56001~ SK210LC-8 : YQ12-08001~	S5YN3129E01 (SE Asia & Oceania)
↑	September, 2009	SK225SR : YB06-03501~ SK225SRLC : LA06-02501~	↑ (OCE)
↑	November, 2009	SK850LC : LY02-00151~	↑ (SE Asia)
↑	February, 2010	SK140LC-8 : YP09-T0101~ SK130-8 : LP09-T0101~ SK130L-8 : LX07-T0101~	↑ (TKCM)
↑	June, 2010	SK80CS-2 : LF06-04501~	↑ (NA)
↑	↑	E80BMSR : LF06-04501~	↑ (NHK)
↑	↑	E70BSR : YT06-18001~	↑ (NHK-EUR)
↑	↑	SK70SR-2 : YT06-18001~	↑ (NA)
↑	July, 2010	E135BSRLC : YH06-08001~	↑ (NHK-EUR)
↑	↑	SK140SRLC : YH06-08001~	↑ (NA)
↑	August, 2010	SK460-8 : LS11-02501~ SK480LC-8 : YS11-02001~	↑ SE Asia & India (HS Engine)
↑	↑	E235BSR(N)LC : YU06-03001~	↑ (NHK-EUR)
↑	↑	SK235SRLC-2 : YU06-03001~	↑ (NA)
↑	↑	E225BSR : YB06-03501~ E225BSRLC : LA06-02501~	↑ (NHK-EUR)
↑	↑	SK215SRLC : LA06-02501~	↑ (NA)
↑	September, 2010	E385CLC : YC	↑ (NHK)
↑	↑	SK350LC-9 : YC	↑ (NA)
↑	↑	SK330-8 : LC11-T0101~ SK350LC-8 : YC11-T0101~	↑ TKCM (HS Engine)
↑	↑	SK350LC-8 : YC11-T0101~	↑ (TKCM)
↑	October, 2010	SK80MSR-2 : LF06-04547~	↑ (AUS)
↑	↑	SK70SR-2 : YT06-18444~	↑ (AUS)
↑	↑	SK140SRLC : YH06-08001~	↑ (Latin America)

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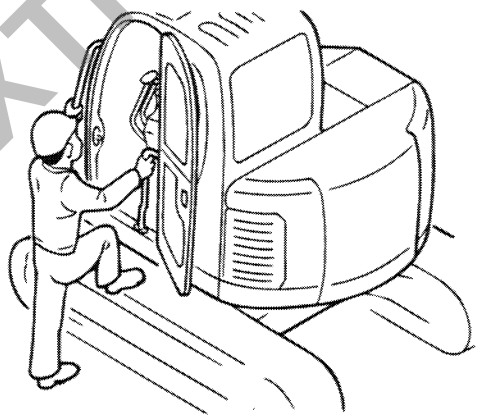
46.1 JUDGMENT OF ACTUAL THING AT SITE

(1) Get to the site as quickly as possible.
Verify model, serial number, situation of trouble and field, and notify person of arrival time.
(2) Verify background of trouble occurred
1. Model name and serial number
2.
Kind of attachment
Check that the combination of attachment is proper or that the operating method is not unreasonable.
3. Operating time by hour-meter
4.
History of trouble occurred and additional works.
5.
Recurrence of past trouble, or problems on the additional works.



Verifying background of trouble occurred.

(3) How to diagnose trouble
1. Verify defective part
2. Make the condition of trouble again
3.
Where defective parts can not be verified, surmise causes systematically.
4. Verify reasons for surmise
5.
Report methods, procedure, and period for repairing to user.



Confirm the symptoms of the trouble.

(4) Explanation of the cause of trouble
1.
Explain the cause of trouble to clients. For example, oil leak through piston is caused by flaws on the piston rod. And the method of using the machines should be explained so that the same kind of trouble does not reoccur.
2.
Treatment of damaged parts
The damaged parts to be claimed and returned are evidence so they should be handled with care. Protect them from entry of water, soils, etc. into port of hydraulic unit, etc. and return them. And also use care not to flaw and damage those surfaces.



Diagnosing fail by means troubleshooting.

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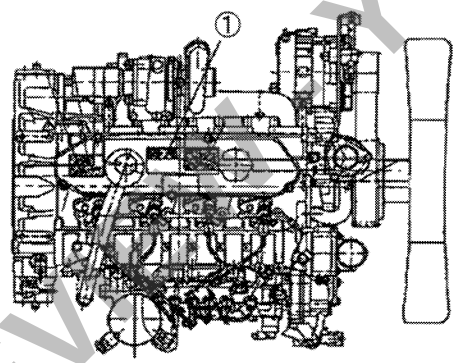
Issue	Date of Issue	Applicable Machines	Remarks
First Edition	June, 2009	SK125SR : YV06-05501~ SK125SRL : LD06-01801~ SK135SR-2 : YY06-15001~ SK135SRLC-2 : YH06-08001~	S5YY5118E01 (SE Asia & Oceania)
↑	July, 2009	SK140LC-8 : YP09-05001~	↑ (SE Asia)
↑	February, 2010	SK140LC-8 : YP09-T0101~ SK130-8 : LP09-T0101~ SK130L-8 : LX07-T0101~	↑ (TKCM)
↑	July, 2010	E135BSRLC : YH06-08001~	↑ (NHK-EUR)
↑	↑	SK140SRLC : YH06-08001~	↑ (NA)
↑	October, 2010	SK140SRLC : YH06-08001~	↑ (Latin America)

- **About the engine ECU**

Eight ranks are set depending on the specification of the engine, that is, "Q-RANK".

Q-RANK of engine ECU corresponds to engine Serial Number, and when engines ECU are replaced, it is necessary to replace it with the same rank ECU.

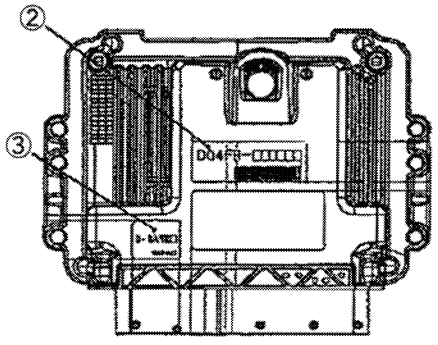
a) Serial No. plate on the top of engine



① Serial No. plate on the top of engine



b) Serial No. plate on the top of engine ECU and Q-Rank plate.



ECU, CONTROLLER

② Serial No. plate on the top of engine ECU



③ Plate for Q-Rank



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Latin America

INDEX

SK140SRLC

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S5YY0220E01 2010-10				SPECIFICATIONS	2
S5YY0320E01 2010-10				ATTACHMENT DIMENSIONS	3
S5YY1120E01 2010-10			MAINTENANCE	TOOLS	11
S5YY1220E01 2010-10				STANDARD MAINTENANCE TIME SCHEDULE	12
S5YY1315E01 2010-10				MAINTENANCE STANDARD AND TEST PROCEDURE	13
S5YY2120E01 2010-10			SYSTEM	MECHATRO CONTROL SYSTEM	21
S5YY2220E01 2010-10				HYDRAULIC SYSTEM	22
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———					
———					
———					
YH06-08001~				APPLICABLE MACHINES	

33 25 1
34 26 2
51 11 3
12
21 13
46 22
47 31 23
48 32 24

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(13)Always use the proper tools that are in good condition and that are suited for the job at hand. Be sure you understand how to use them before performing any service work.

(14)Reinstall all fasteners with the same part number. Do not use a lesser quality fastener if replacements are necessary.

(15)Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength equivalent at least to that of the parent metal. Make sure to disconnect battery before any welding procedures are attempted.

(16)Do not damage wiring during removal operations. Reinstall the wiring so it is not damaged nor will be damaged in operation of the machine by contacting sharp corners, or by rubbing against some object or hot surface. Do not connect wiring to a line containing fluid.

(17)Be sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution and replace the guard or shield after repair is completed.

(18)The maintenance and repair work while holding the bucket raised is dangerous due to the possibility of a falling attachment. Don't fail to lower the attachment and place the bucket to the ground before starting the work.

(19)Loose or damaged fuel, lubricant and hydraulic lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install ones which have been bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Very small (pinhole) leaks can result in a high velocity oil stream that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use card-board or paper to locate pinhole leaks.

(20)Tighten connections to the correct torque. Make sure that all heat shields, clamps and guards are installed correctly to avoid excessive heat, vibration or rubbing against other parts during operation. Shields that protect against oil spray onto hot exhaust components in event of a line, tube or seal failure must be installed correctly.

(21)Do not operate a machine if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.

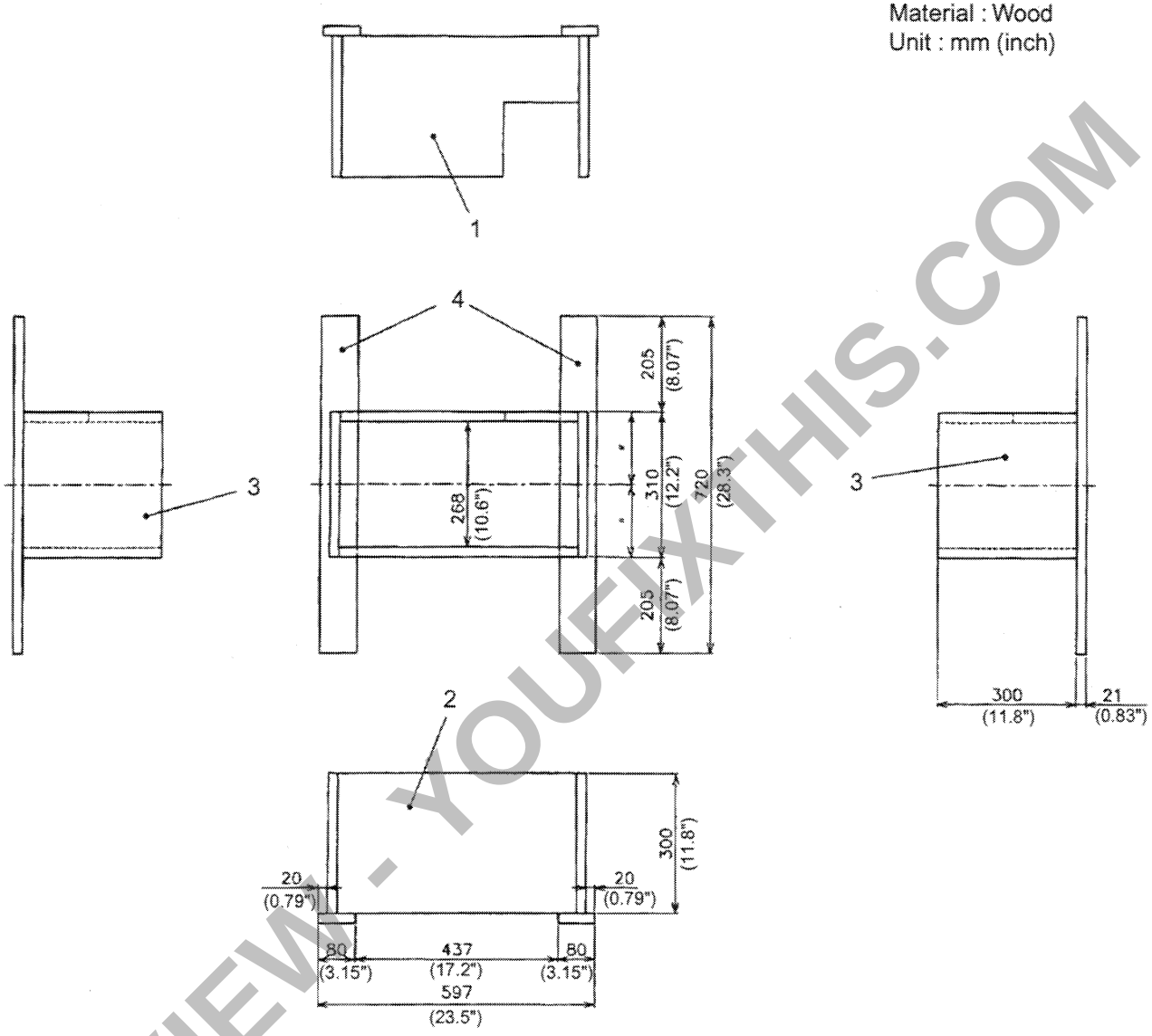
(22)Be careful when servicing or separating the tracks (crawlers). Chips can fly when removing or installing a track (crawlers) pin. Wear safety glasses and long sleeve protective clothing. Tracks (crawlers) can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both tracks (crawlers) are disengaged from the sprockets. Block the machine to prevent it from moving.

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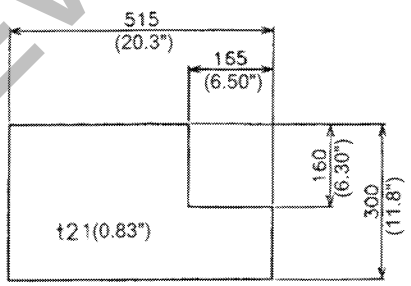
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11.13 ENGINE MOUNTING PEDESTAL

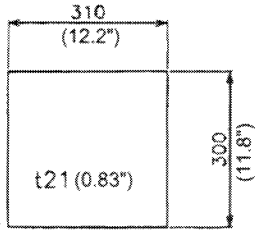
Material : Wood
Unit : mm (inch)



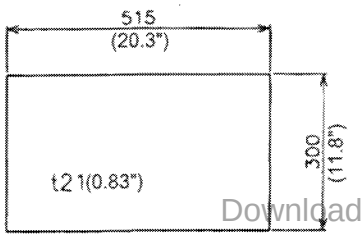
1X1 piece



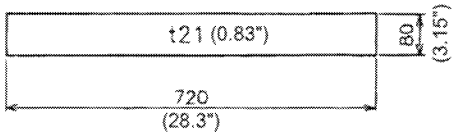
3X2 piece



2X1 piece



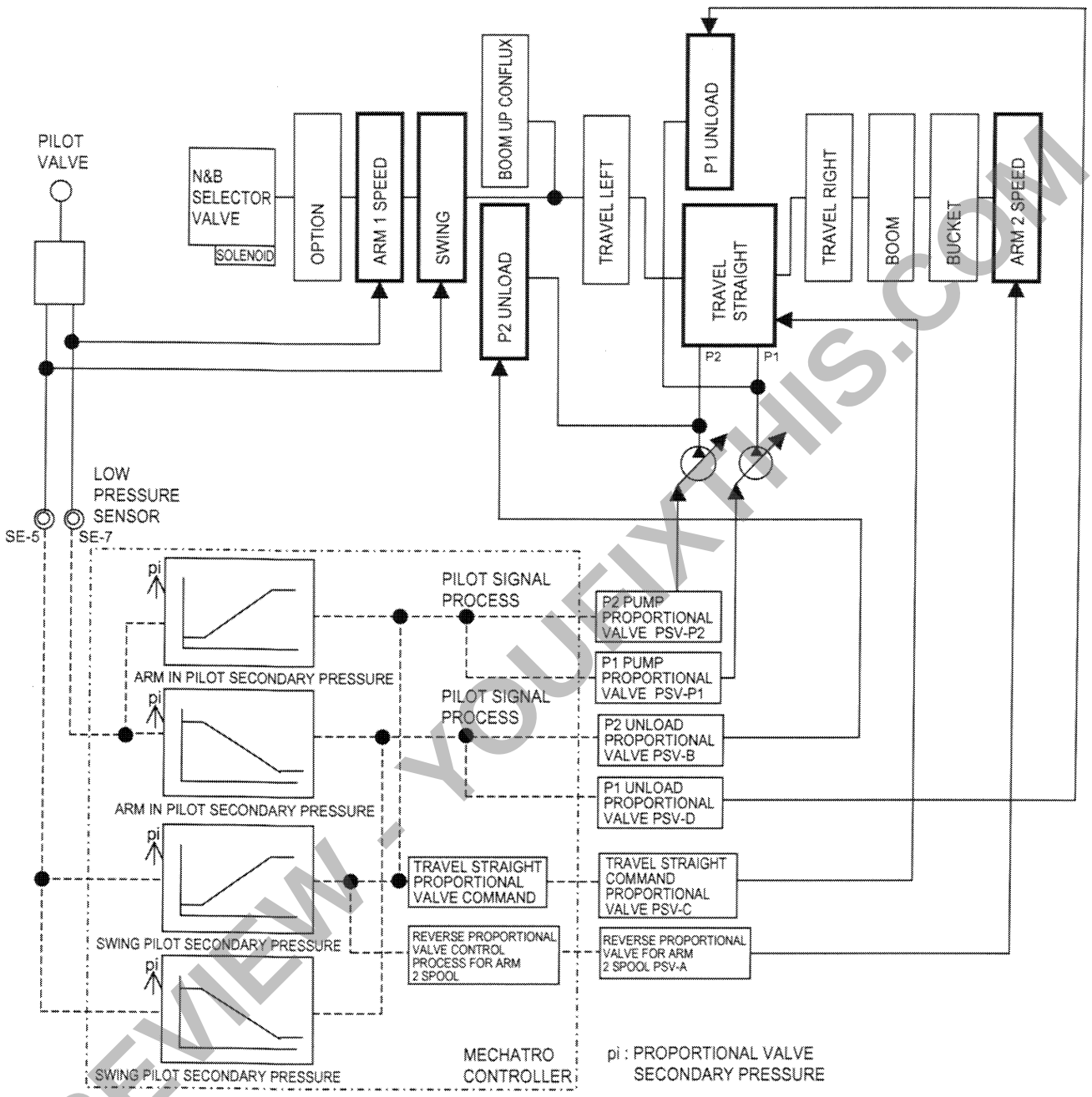
5X2 piece



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21.1.9 SWING PRIORITY CONTROL



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22.6 BUCKET CIRCUIT

This section describes the following.
(1) Bucket digging pilot circuit
(2) Auto accel operation
(3) Flow control in the work mode

22.6.1 PILOT CIRCUIT FOR BUCKET DIGGING

(1) Mechatronics:

1. When the operation for bucket digging is performed, the pilot proportional secondary pressure is delivered through port 1 of the right pilot V (9), flows to PAc port, and acts on the low pressure sensor (SE-1), and at the same time the bucket spool is switched.
2. The voltage output by low pressure sensor inputs in mechatro controller. The mechatro controller performs signal processing and outputs current corresponding to the increase of pump flow rate to pump proportional valve (PSV-P1) on the P1 pump side, and at the same time the command current is output to P1 unloading valve (PSV-D).
   In the following pages, the relation of operation of low pressure sensor to both the increase of pump flow rate and unloading proportional valve is the same. Therefore the explanation is omitted.
3. The secondary pressure output by P1 pump proportional valve (PSV-P1) exerts on pump regulator, actuating the pump onto the delivery flow increase side.
4. The secondary pressure delivered in P1 unloading valve (PSV-D) is led to PBp1 and PCb ports provided in control valve (2).
   The secondary pressure from proportional valve which has exerted on PBp1 port holds the by-pass cut spool on CLOSE side, like the operation in the lever neutral position.
   The secondary pressure from proportional valve which has exerted on PCb port switches the unloading spool in CLOSE side.

22.6.2 AUTO ACCELERATION OPERATION

(1) Principle:
Auto acceleration actuates according to signals from low pressure sensor.
(2) Operation:
<When lever is set to neutral position>
In the event where the sensor does not receive signal for 4 seconds or more even though the acceleration dial is set to MAX position, the engine speed should be raised to 1000rpm.
<When lever is operated>
When the pressure 0.6MPa (87psi) is input to low pressure sensor in STD specification (travel, bucket, swing, arm), proportional voltage from low pressure sensor inputs in mechatro controller, and then the engine speed returns to the dial set position corresponding to the lever operation.

22.6.3 STAND-BY CURRENT CONSTANT CONTROL

(1) Principle:
When the engine speed is intermediate speed or lower, command current value to have the pump delivery rate constant is output.
(2) Operation:
Even if the engine speed specified by acceleration potentiometer is low speed, as the delivery rate corresponds to the intermediate speed, the actuator moves earlier than the movement equivalent to the control lever angle rate in light load operation.

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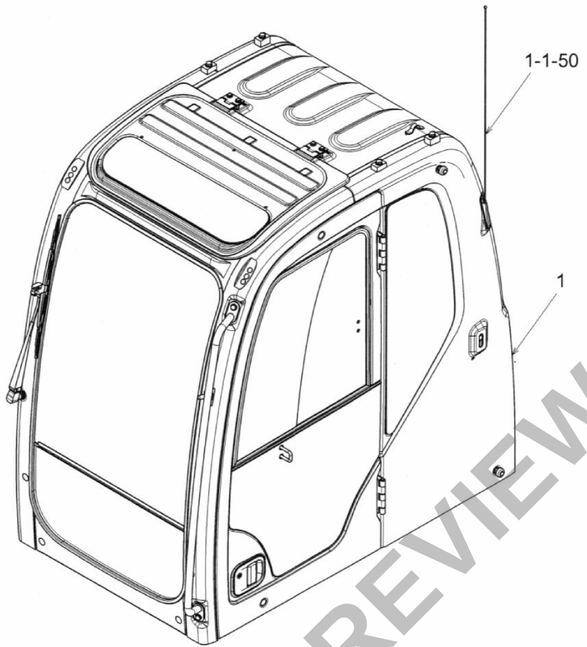
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23.3.9 CAB INSTALL

23.3.9.1-1 CAB ASSY : YY02C00026F1

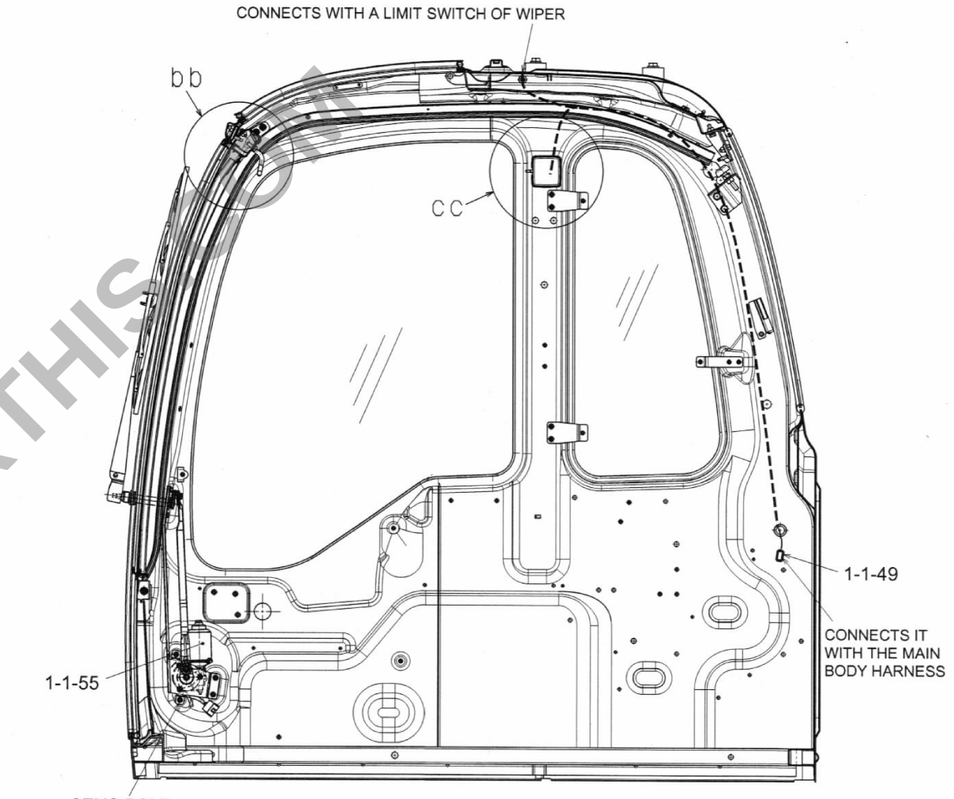
CAB INSTALL

CAB INSTALL		YY02C00024F1	(01)	
ITEM	PART NAME	PART No.	Q'TY	REMARKS
1	CAB ASSY	YY02C00025F1	—	(01)
1-1	CAB ASSY	YY02C00026F1	—	(04)
1-1-26	SWITCH	YT50S00004P1	1	WIPER INTER LOCK
1-1-49	HARNESS	YN02C03098P1	1	ROOM LAMP
1-1-50	ANTENA	YT54S00018F1	1	
1-1-52	ROOM LIGHT	YT80S00001P1	1	
1-1-55	WIPER ASSY	YN53C00012F2	1	R/U MOTOR

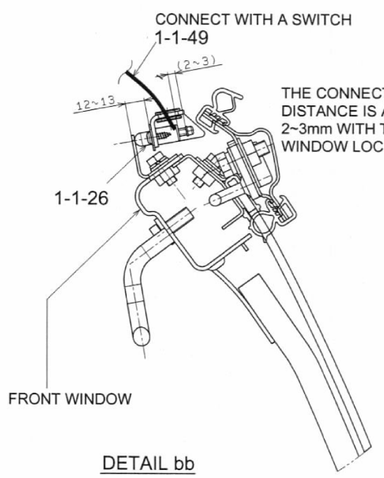


CAB ASSY : YY02C00026F1

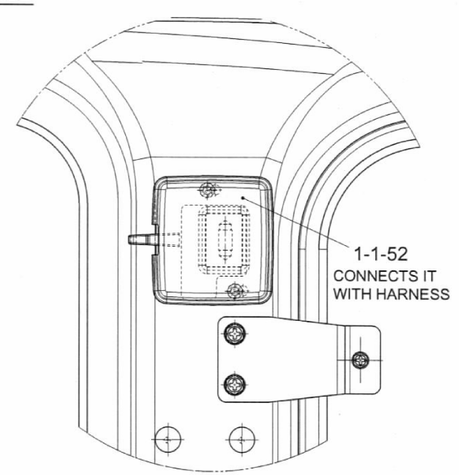
T=TIGHTENING TORQUE



SECTION BB



DETAIL bb



DETAIL cc

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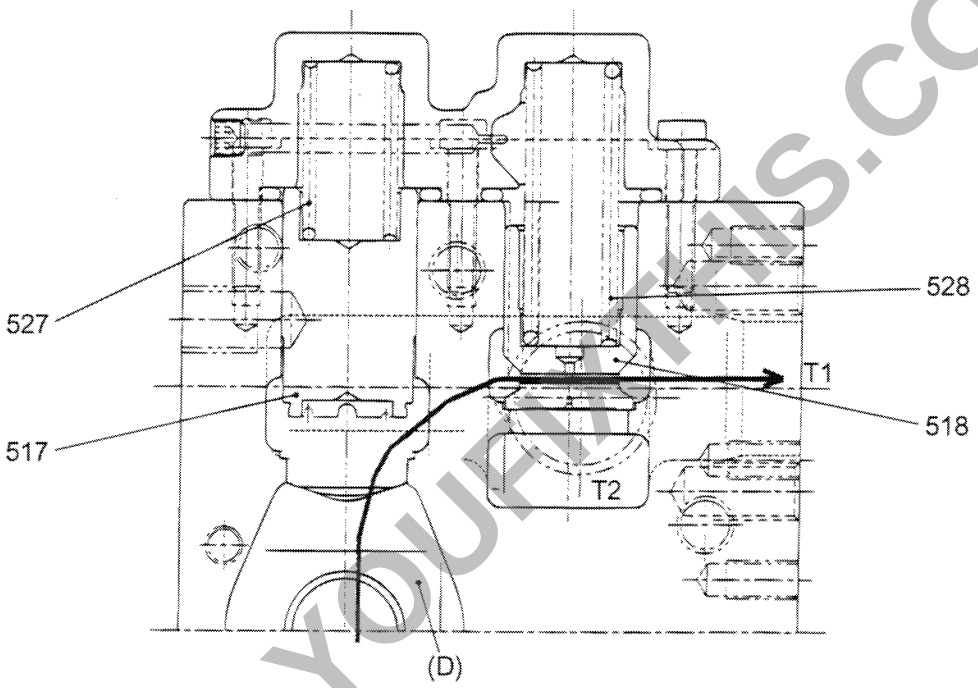
(10)Boost check valve, By-pass check valve

1. Boost check valve

The boost check valve is located between low pressure passage (D) and tank port T1 and generates boost pressure necessary for the low pressure passage.

a. In normal operation

The hydraulic oil from low pressure passage (D) moves the boost check valve (517) upward against the force of spring (527), and returns to the hydraulic tank through tank port T1. At this time, the pressure generated by spring (527) is used as the boost pressure for the low pressure passage.



Boost check valve operation

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Code No. Parts Name Parts No. Use Applicable Machine	Specifications	Description

SW - 11

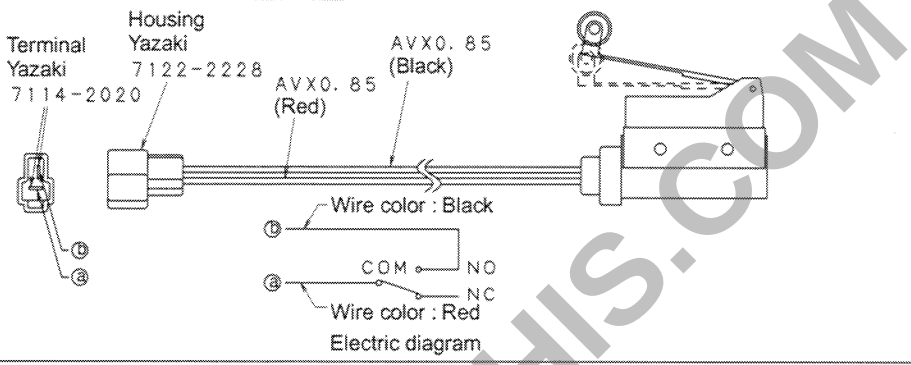
Switch

YN50S00041F1

Lock lever

YV05 - 04501 ~
YY05 - 12001 ~
YH05 - 07001 ~
YV06 - 05501 ~
LD06 - 01801 ~
YY06 - 15001 ~
YH06 - 08001 ~

Model	OMRON D4MC-2000



Electric diagram

SW - 13

Switch

YN50S00040DF

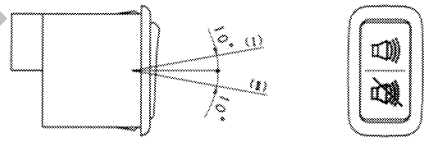
Travel alarm

YV05 - 04501 ~
YY05 - 12001 ~
YH05 - 07001 ~
YV06 - 05501 ~
LD06 - 01801 ~
YY06 - 15001 ~
YH06 - 08001 ~

Rated voltage	DC 24V
Type	Single pole single throw (alternate)
Insulation resistance	More than 1MΩ / DC500V megger

Terminal connector

Position \ Connector	1	2	3
(Ⅰ)	○	○	
(Ⅱ)	○		○



SW - 15

Switch

YN50S00040DD

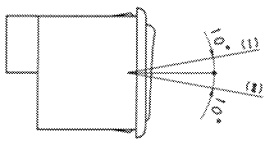
Conflux / single flow switching

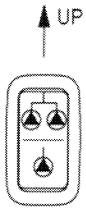
YV05 - 04501 ~
YY05 - 12001 ~
YH05 - 07001 ~
YV06 - 05501 ~
LD06 - 01801 ~
YY06 - 15001 ~
YH06 - 08001 ~

Rated voltage	DC 24V
Type	Single pole single throw (alternate)
Insulation resistance	More than 1MΩ / DC500V megger

Terminal connector

Position \ Connector	1	2	3
(Ⅰ)	○	○	
(Ⅱ)	○		○





SW - 17

Switch

YN50S00040D9

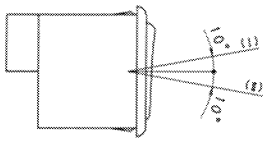
Roof window wiper switch

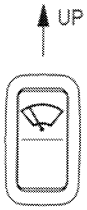
YV05 - 04501 ~
YY05 - 12001 ~
YH05 - 07001 ~
YV06 - 05501 ~
LD06 - 01801 ~
YY06 - 15001 ~
YH06 - 08001 ~

Rated voltage	DC 24V
Type	Single pole single throw (alternate)
Insulation resistance	More than 1MΩ / DC500V megger

Terminal connector

Position \ Connector	1	2	3
(Ⅰ)	○	○	
(Ⅱ)	○		○





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26.1.3 HEIGHT/DEPTH LIMITATION DEVICE

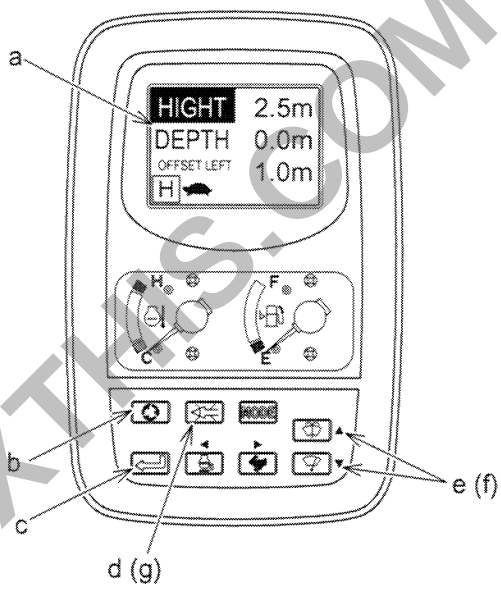
(1) Outline

The LCD multidisplay of the gauge cluster on the right front of the operator's seat indicates the depth, height and left offset distance, and the depth, height and off-set left limit functions and those conditions.
Read the depth, height and offset left limit setting and releasing procedure carefully.

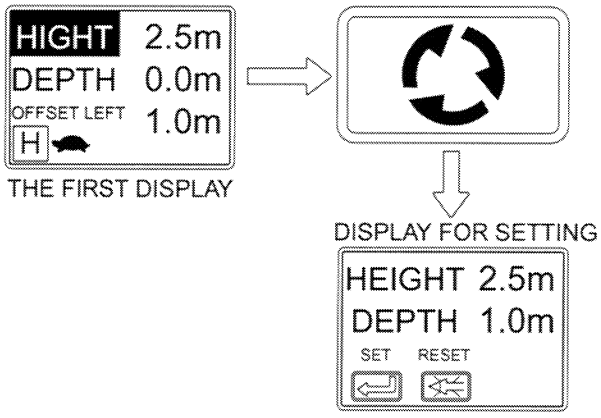
(2) Switches and operations

The following switches are located on the multi-display of the gauge cluster. And the conditions of machine are displayed on this LCD.

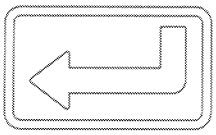
a. Multi display (LCD)
b. Indications switching switch
c. Select switch (Standard setting switch)
d. Buzzer stop switch (Limitation reset switch)
e. Height, depth and offset left limitation adjust switch
f. Depth limitation value variable setting switch (DOWN/UP)
g. Limitation reset switch



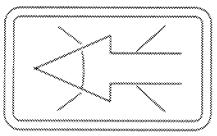
1. Multi-display (LCD)
   Refer to the above (1) Outline.
2. Screen change switch
   When the height, depth, and offset left are set, press this switch (g) to change the display to the setting display.



3. Select switch (Standard setting switch)
   Press this switch to set the height, depth and offset left setting.



4. Buzzer stop switch (Limitation reset switch)
   Press this switch to release the set depth or selected limitation function.



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33. UPPER STRUCTURE

Issue	Date of Issue	Applicable Machines	Remarks
First Edition	October, 2010	SK140SRLC : YH06-08001~	S5YY3320E01 (Latin America)

PREFACE

(1) This Manual describes all the procedures from removing to installing, arranging them by item.

(2) This Manual consists [Removing and installing], and [Disassembling and assembling].

(3) The removing and installing can be performed in the procedure specified in Table of Contents, but in view of actual repairing or time saving some process can be omitted.

(4) The removing and installing procedure does not completely cover all possible situations because of differences of field condition and defective section.

(5) Recognize well that the service man must decide a work procedure before proceeding to repair. When deciding the work procedure, choose an item that is needed, familiarize yourself with the contents of the work and itemize the work procedure, before starting work.

(6) Disconnect the negative terminal of battery first, when the removing and the installing of the electric component and wiring are performed.

(7) The explanatory note and figure of this manual may differ from the actual machine by the difference in specification.

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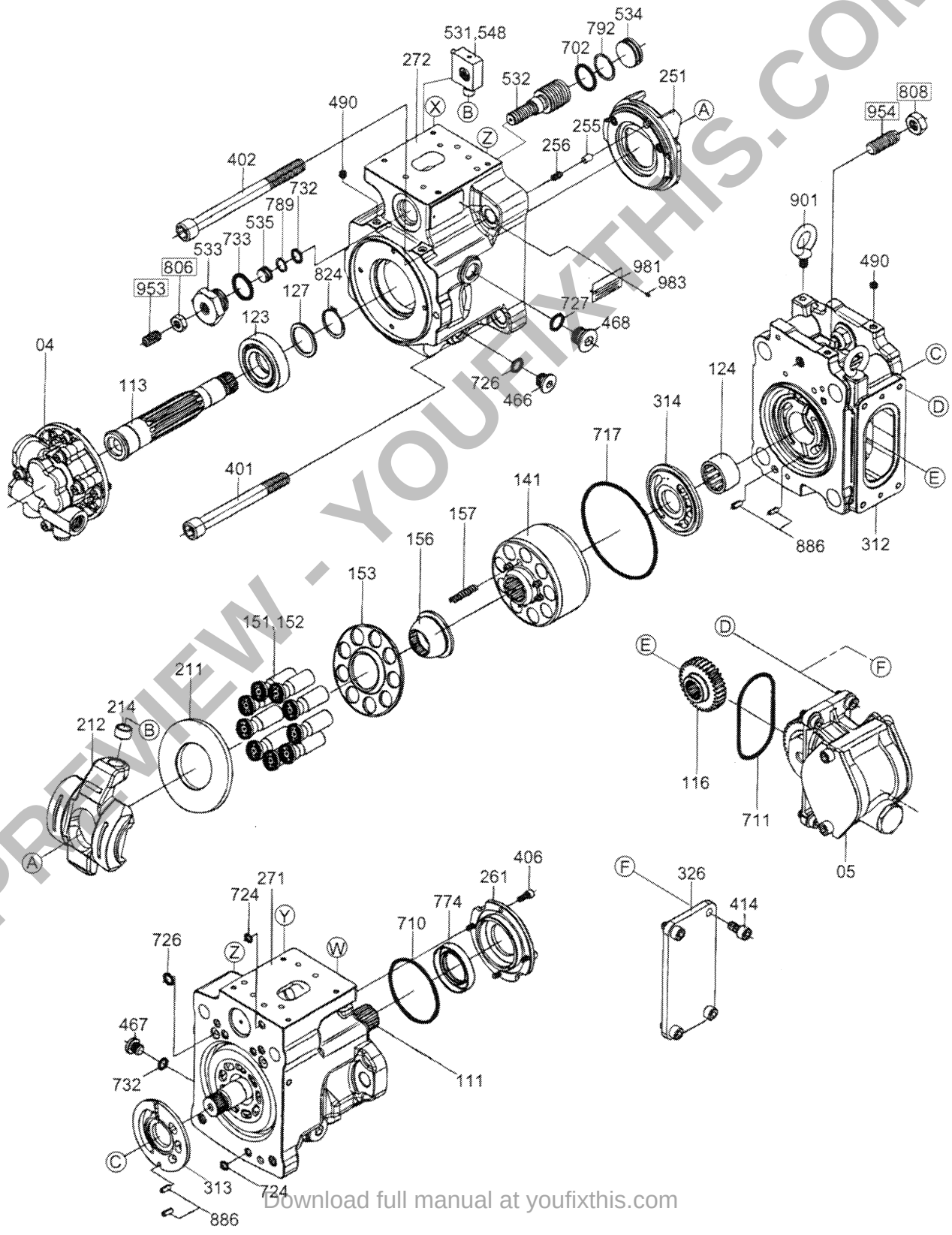
33.2 DISASSEMBLING AND ASSEMBLING

33.2.1 HYDRAULIC PUMP - REGULATOR

33.2.1.1 HYDRAULIC PUMP

33.2.1.1.1 Structural exploded view

(1) Main pump



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33.2.3.6 TROUBLESHOOTING

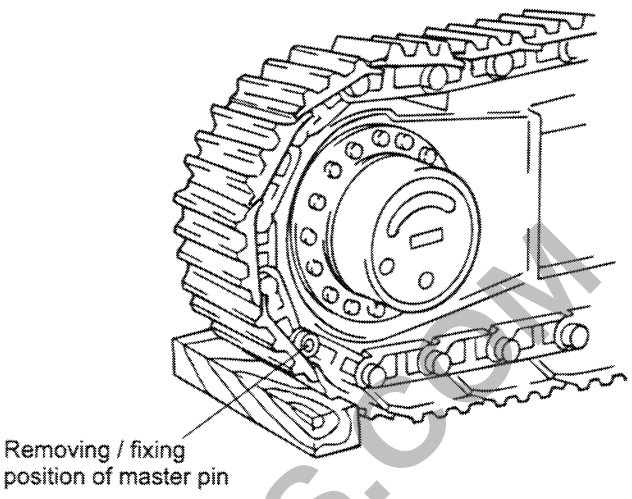
It is very difficult to find defective section. The following table explains the several estimated causes. For repair, refer to the estimated causes and corrective actions.
The following table explains general phenomenon, estimated causes and corrective actions. However, most machine problems are not caused by the failure of only one part, but involve relations with other parts. Therefore corrective action other than those described in this table is often required. The following table does not cover causes and corrective actions for all the troubles. So it may be necessary to perform further investigation of troubles and causes.

Phenomenon	Possible Cause	Corrective action
Secondary pressure does not rise.	1. Primary pressure is insufficient. 2. Secondary pressure springs (241) are broken or fatigued. 3. Clearance between spool (201) and cas-ing (101) is abnormally large. 4. Handle has a looseness.	1. Secure primary pressure. 2. Replace with new ones. 3. Replace spool (201). 4. Disassembly and reassembly or replace handle section.
Secondary pressure is unstable.	1. Sliding parts are caught. 2. Tank line pressure varies. 3. Air has mixed into pipeline.	1. Repair the unsmoothed section. 2. Bring pressure directly to oil tank. 3. Bleed air by operating it several times.
Secondary pressure is high.	1. Tank line pressure is high. 2. Sliding parts are caught.	1. Bring pressure directly to oil tank. 2. Correct.

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3.
Pushing out master pin
Apply jig on master pin and strike it out with a mallet.
(Refer to Fig. "Press fitting of master pin")

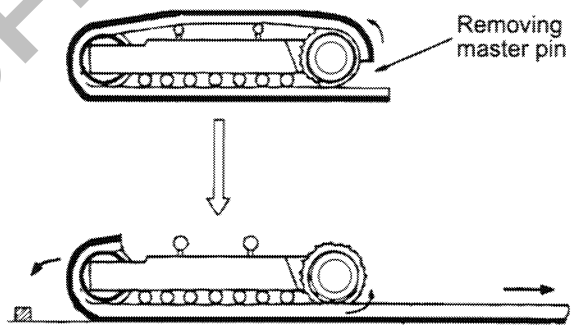


Removing/fixing position of master pin

⚠CAUTION

When using a big hammer, wear protective goggles and a long-sleeved uniform so you do not injure yourself by flying objects.

(3) Removing crawler
Put attachment on ground so that weight is not loaded to the lower frame, and remove track link assy rotating sprocket.



Removing crawler

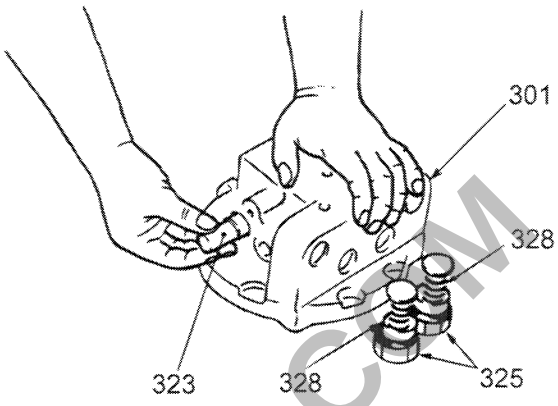
⚠CAUTION

Crawler end section may fall on the ground just before extending it on the ground incurring danger of injury.
Please keep well away from the equipment.

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3. Remove two spring retainer (325) and two springs (328) from rear flange (301).
4. Remove spool (323) from rear flange (301).



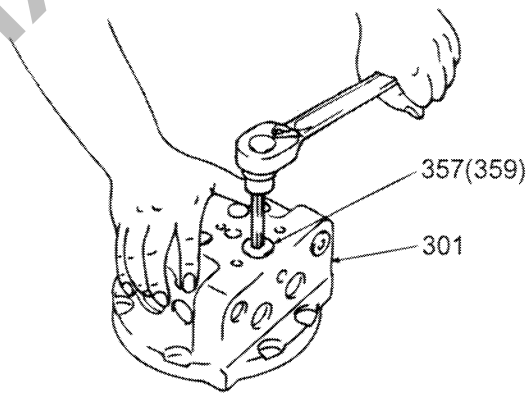
Removing spool (323)

Note

To remove spool (323), place your hand on one part of the plug port of rear flange (301) and tilt it down. Then spool (323) falls down. Hold the tip and remove it.

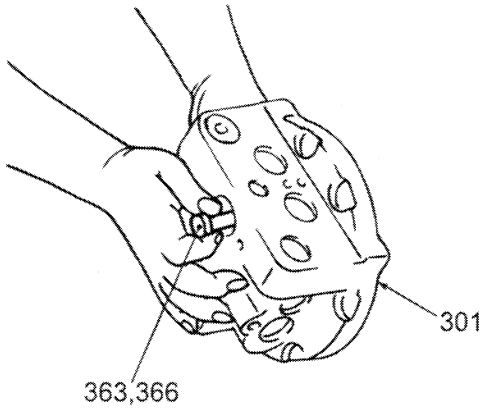
(16) Disassemble the 2-speed selector valve

1. Remove plug (357) from rear flange (301).
   Tools: Allen wrench: 10 mm



Removing plug (357)

2. Remove spool (363) and spring (366) from rear flange (301).
3. Remove O-ring (359) from plug (357).



Removing spool (363) and spring (366)

Note

Do not reuse removed O-ring (359).

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Table 46-31

Error code	B094		
Trouble	Travel right pressure sensor's power source is shortcut.		
Judging condition	The input voltage from Travel right pressure sensor is 4.7V or more.		
Symptom	All operation speed slows down.		
Control in the event of failure	Set proportional valve output rate of P1 and P2 pumps to constant current. (Current value in all operation is neutral.) P1, Set output of P2 unload proportional valve to 0mA. (Valve emergency mode)		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	6	B-9 TRAVEL (R)
	Screen No.		
	Screen No.		

Checking object		Checking contents and remedy
1	-Travel right pressure sensor SE-9	When B094 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between travel right pressure sensor and controller CN-301F CN-102F	When B094 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller	Check that the error is corrected after replacement of controller.

Table 46-32

Error code	B102		
Trouble	Travel left pressure sensor outputs error		
Judging condition	After starter switch ON and engine does not start yet. And the input voltage from the travel left pressure sensor after starter switch ON is in the range of 1.4V or more to less than 4.7V.		
Symptom	The travel left operability becomes poor.		
Control in the event of failure	Normal control		
Returned in normal condition	Not returned automatically under normal condition. Switch the power OFF once and turns on it again.		
Service diagnosis checking screen	Screen No.	6	B-10 TRAVEL (L)
	Screen No.		
	Screen No.		

Checking object		Checking contents and remedy
1	-Travel left pressure sensor SE-10	When B102 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between travel left pressure sensor and controller CN-302F CN-102F	When B102 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller	Check that the error is corrected after replacement of controller.

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(16)Travel deviation

No.	Sections	Contents/normal value		Corrective action, others
1	Travel right and left pressure sensor	Carry out service diagnosis	-See Service Diagnosis Data List Operation No.18 Travel right full lever and idling Operation No.19 Travel left full lever and idling	Check and replace pressure sensor Check remote control valve
2	Remote control valve	Measure directly remote control pressure of travel right and left	Check that pressure is 2.1MPa or more in travel right (left), forward (reverse) full lever and high idling operation	Check remote control valve
3	Actual measuring current value of travel straight proportional valve	Carry out service diagnosis	Check that the value is not change regardless of operation -See Service Diagnosis Data List Operation No. 1 Operation is nil Operation No.18 Travel right full lever & idling Operation No.19 Travel left full lever & idling	-Check voltage of low pressure sensor other than sensor for travel -In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.
4	Secondary pressure of travel straight proportional valve	Measure directly the proportional valve secondary pressure	0.8MPa or less in high idling operation regardless of neutral/ operation	Replace proportional valve
5	Actual measuring current value of P1/ P2 unload proportional valve	Carry out service diagnosis	-No.8 D-1 P1 unload valve (cut valve) D-1 P2 unload valve (cut valve) -See Service Diagnosis Data List Operation No.18 Travel right full lever & idling Operation No.19 Travel left full lever & idling	In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.
6	Secondary pressure of P1, P2 unload proportional valve	Measure the proportional valve secondary pressure directly at the ports A7 and A5 of 7 sections solenoid block	Check that P1/P2 unload secondary pressures are within the range of followings in travel right (left), forward (reverse) full lever and high idling operation Travel right (P1 unload): 0.5 to 1.0MPa Travel left (P2 unload): 0.5 to 1.0MPa	Replace proportional valve
7	Actual measuring current value of P1/ P2 pump proportional valve	Carry out service diagnosis	-No.9 E-1 P1 pump E-2 P2 pump -See Service Diagnosis Data List Operation No.18 Travel right full lever & idling Operation No.19 Travel left full lever & idling	In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.

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2. Tightening torque table

2.1 Major bolts and nuts tightening torque

2.1.1 Basic engine

Table 2-7 Major bolts and nuts tightening torque - Basic engine

Description	Threads Dia × Pitch (mm)	Tightening torque			Remark
		N·m	kgf·m	lbf·ft	
Cylinder head bolt	12 × 1.75	137 ± 5	14 ± 0.5	101 ± 3.6	
Rocker cover bolt	8 × 1.25	20 ± 2	2 ± 0.2	14.5 ± 1.4	
Rocker shaft bracket bolt	8 × 1.25	20 ± 2	2 ± 0.2	14.5 ± 1.4	
Rocker arm adjusting nut	8 × 1.25	20 ± 2	2 ± 0.2	14.5 ± 1.4	
Main bearing cap bolt	14 × 2	137 ± 5	14 ± 0.5	101 ± 3.6	
Connecting rod cap nut	12 × 1.25	103 ± 5	10.5 ± 0.5	76 ± 3.6	
Flywheel bolt	12 × 1.25	83 ± 5	8.5 ± 0.5	62 ± 3.6	
Flywheel housing	10 × 1.5	44 ± 5	4.5 ± 0.5	32 ± 3.6	
Camshaft thrust plate bolt	8 × 1.25	12 ± 2	1.2 ± 0.2	9 ± 1.4	
Front plate bolt	8 × 1.25	19 ± 2	1.9 ± 0.2	13.7 ± 1.4	
	10 × 1.5	35 ± 5	3.6 ± 0.5	25.3 ± 3.6	
Timing gear case bolt	8 × 1.25	19 ± 2	1.9 ± 0.2	13.7 ± 1.5	
	10 × 1.5	35 ± 5	3.6 ± 0.5	25.3 ± 3.6	
Crankshaft pulley nut	30 × 1.5	706 ± 59	72 ± 6	521 ± 43	
Idler thrust plate bolt	10 × 1.25	34 ± 5	3.5 ± 0.5	25 ± 3.6	
Piston cooling nozzle	12 × 1.25	34 ± 5	3.5 ± 0.5	25 ± 3.6	
Oil pan bolt	8 × 1.25	19 ± 2	1.9 ± 0.2	13.7 ± 1.4	
Oil pan drain cock	24 × 1.5	49 ± 5	5 ± 0.5	36 ± 3.6	
Lifting bolt	12 × 1.75	102 ± 10	10.4 ± 1	75.2 ± 7.2	

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REASSEMBLY OF BASIC ENGINE

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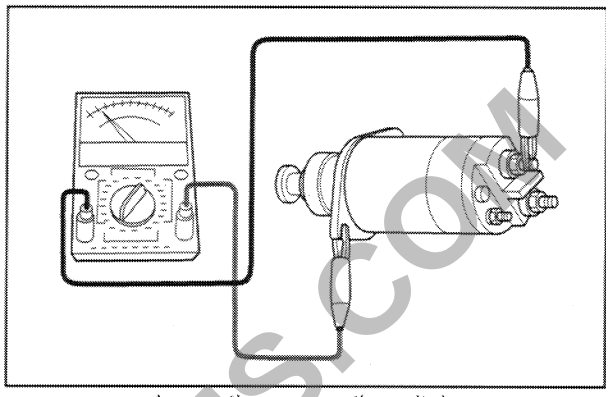
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2.2 Inspecting and repairing starter

2.2.1 Inspecting magnetic switch

Inspect the pressure coil and the holding coil for open circuit using the tester.

Inspect the electrical continuity between the terminal M and the case, if there is no electrical continuity between them, the magnetic switch circuit is an open circuit.



Inspecting magnetic switch

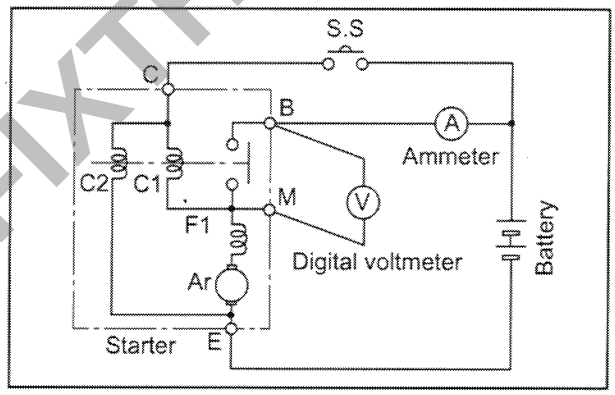
2.2.2 Inspecting magnetic switch contactor

The service limit of the contactor is decided by the condition of the contact surface. Inspect the contactor by following method.

Measure the load current of the starter. If the voltage drop between the terminal B and the terminal M is 0.3 V per 100 A or more, replace the magnetic switch.

Note: (a) When measuring the voltage drop, use a digital volt meter. Measuring by an analog volt meter results breakage.

(b) Be extremely careful when connecting an ammeter to the starter because of the high current flowing into the starter.

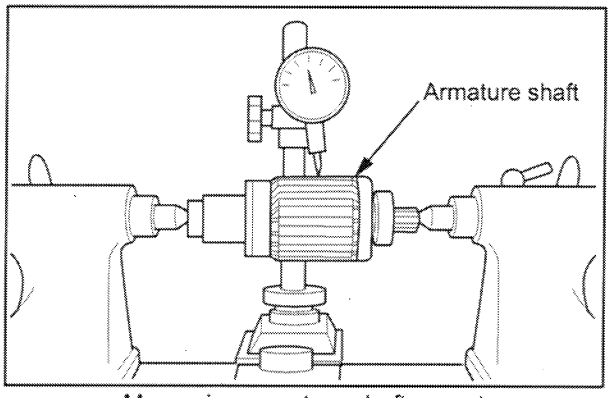


Inspecting magnetic switch contactor

2.2.3 Measuring armature shaft runout

Using a dial gauge, measure the shaft runout. If the runout exceeds the standard, repair or replace the armature.

Item	Standard
Armature shaft runout	0.06 mm [0.0024 in.]



Measuring armature shaft runout

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