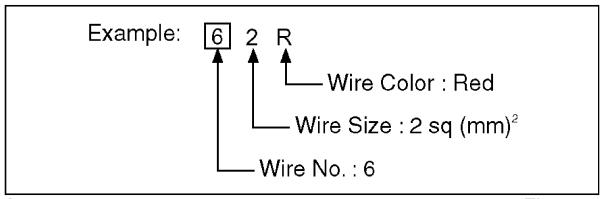
23.1 HOW TO READ CIRCUIT DIAGRAM AND HARNESS CONNECTION

23.1.1 ELECTRIC CIRCUIT DIAGRAM

NOTE: *For the electric circuit diagram, refer to Fold Out Schematic.*

In the diagram, the number, size and color of wires are shown on the wiring line.

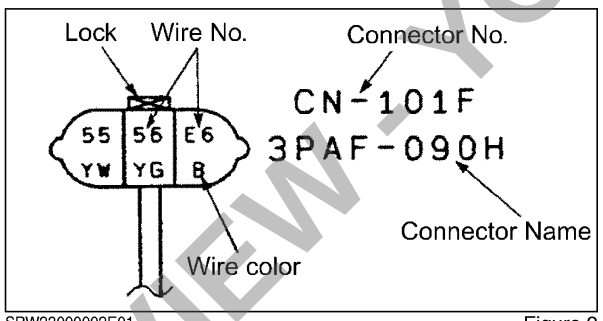
The size of the wire is to be 0.75 sq. (square mm = mm^2) unless otherwise specified.



SPW23000001E01 Figure 1

SYMBOL	COLOR	SYMBOL	COLOR
B	Black	P	Pink
Br	Brown	R	Red
G	Green	Sb	Sky Blue
Gr	Gray	V	Violet
L	Blue	W	White
Lg	Light Green	Y	Yellow
O	Orange		

23.1.2 HARNESS CONNECTION

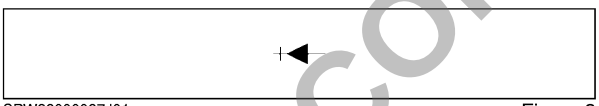


SPW23000002E01 Figure 2

1. Indication for Connector
   1. The figure for the connector pin arrangement is shown by putting the lock (nail) to upper portion, and looking from the fitting face.
   2. The numbers in the connector show the wire No., and alphabetical letters show the wire color.
   3. On the side face of connector, the connector name and serial number of the connector No. are indicated.
   4. At the place indicated as DOUBLE SPLICE, Two wires are connected to one place.
2. The connector is to be connected by engaging the male (M) and female (F) connectors of the same number.

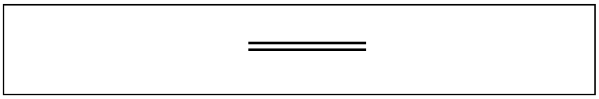
   Example: CN-101M and CN-101F

   Where: M for Male, and F for Female.



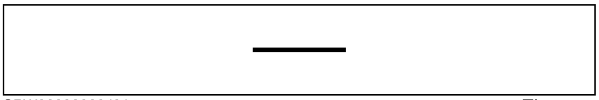
SPW23000037J01 Figure 3

3. This mark means a connector with a diode. The direction for diode is shown by the arrow.
4. The AVSS wires are to be used for the size between 0.75 sq. and 2 sq. AVS wires between 3 sq. and 5 sq. and others are AV wires, unless otherwise specified.
5. The wire size is 0.75 sq., unless otherwise specified.
6. The treatment for the harness end is to be as follows:



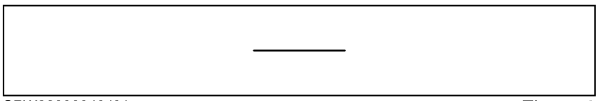
SPW23000038J01 Figure 4

   1. After roughly applying harness taping, wires are installed in a corrugated tube.



SPW23000039J01 Figure 5

   2. Harness taping by two plies.



SPW23000040J01 Figure 6

   3. No harness treatment for connection.
7. The length for the above (6)-3) is to be 30 ± 10 mm. (1.2 ± 0.4 in), and the length includes in the total length of wire shown in the diagram.

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CHAPTER 12
STANDARD MAINTENANCE TIME TABLE

TABLE OF CONTENTS

12.1 WORKING STANDARDS FOR TIME TABLES
12.1.1 Working Conditions 12-3
12.1.2 Applicable Range of Standard Maintenance Time 12-3
12.1.3 Excluded Time 12-3
12.1.4 Applicable Machine for Estimation of Standard Maintenance Time 12-3
12.1.5 Standard Maintenance Time Table 12-3
12.1.6 Classification of Work Code 12-3

12.2 TIME TABLES
12.2.1 Attachment - Group 01 12-4
12.2.2 Canopy and Guard - Group 02 12-6
12.2.3 Upper Structure - Group 03 12-7
12.2.4 Under Carriage - Group 04 12-10

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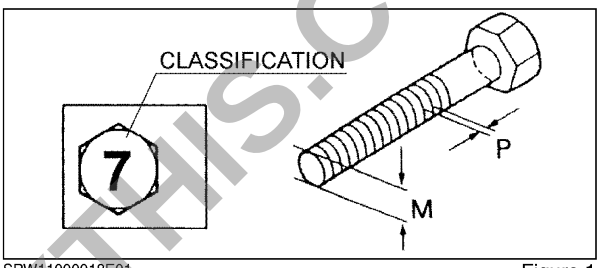
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11.1 TORQUE SPECIFICATIONS FOR CAPSCREWS AND NUTS

The following Torque Specifications are provided for use when actual torque value of a fastener is not known. Check the capscrews and nuts for their tightness and the loss of before starting work and at periodic maintenance. Retighten and replace as needed. For a new machine, check and retorque after the first 50 hours operation. Replace with genuine parts.

Refer to the table below for the tightening and retightening of capscrews.

1. The table below is not applicable for the capscrews that secure plastic covers. For the tightening torque for such capscrews, contact your dealer. Over-tightening may cause damage to the plastic parts.
2. In case that the tightening torque is specified in the manual, use those torque values regardless to the table below.
3. Numerical indication on the capscrew head shows the classification for strength (e.g., 7=7 T). No indication is provided for smaller size of capscrews, M5 or less.



SPW11000018E01 Figure 1

11.1.1 METRIC COARSE THREAD STANDARD TIGHTENING TORQUE VALUES

Make sure to tighten all Capscrews and Nuts to proper torque values.

METRIC COARSE THREAD STANDARD TIGHTENING TORQUE VALUES							
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)

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CHAPTER 42
TROUBLESHOOTING (HYDRAULIC SYSTEM)

TABLE OF CONTENTS

42.1 GENERAL PRECAUTIONS
42.1.1 Confirm Actual Troubled Conditions At Site 42-3

42.2 TROUBLE DIAGNOSIS: HYDRAULIC

42.3 TROUBLESHOOTING
42.3.1 Attachment 42-5
42.3.1.1 Attachment operational failure (Excluding swing operations) 42-5
42.3.1.2 Attachment speed is slow 42-5
42.3.1.3 Attachment operating power is low 42-6
42.3.1.4 Malfunction of attachment 42-7
42.3.2 Travel operation 42-8
42.3.2.1 Travel operational failure 42-8
42.3.2.2 Travel speed is slow 42-8
42.3.2.3 Travel power is low 42-9
42.3.2.4 It deviates in travel independent operation 42-9
42.3.3 Slewing operation 42-10
42.3.3.1 Slewing operational failure 42-10
42.3.3.2 Slewing speed is slow 42-10
42.3.3.3 Slewing power is low 42-11
42.3.3.4 Malfunction of slewing operation 42-11
42.3.4 Pump 42-11
42.3.4.1 Engine speed is reduced due to pump load 42-11
42.3.4.2 Malfunction of pump 42-12

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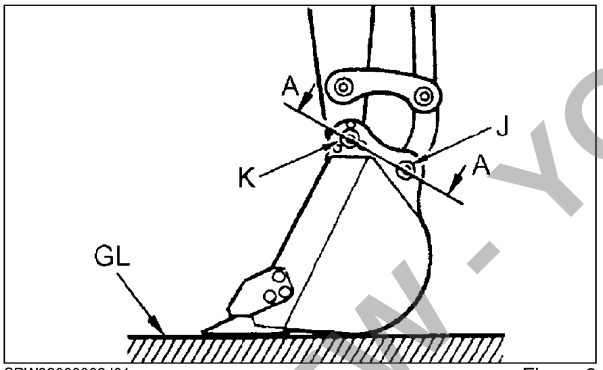
32.1.2 BUCKET

32.1.2.1 REMOVAL OF BUCKET

1. Place the bucket on the ground so that the bucket and arm connecting pins do not have pressure on them.
2. Move the O-rings (3) toward the bucket bosses.
3. In order to remove pin (K) which links the arm and bucket, remove the ring (2) and the pin (1) with a punch and drive out pin (K).
   - If the pin does not come off easily, the pin has pressure on it.
   - Do not damage the dust seal between the arm and the bucket bosses.
4. Adjust the bucket so that pin (J) between the bucket link and the bucket does not have pressure on it.
5. Remove the ring (2) and pin (1) then drive out pin (J).
6. Remove bucket assembly

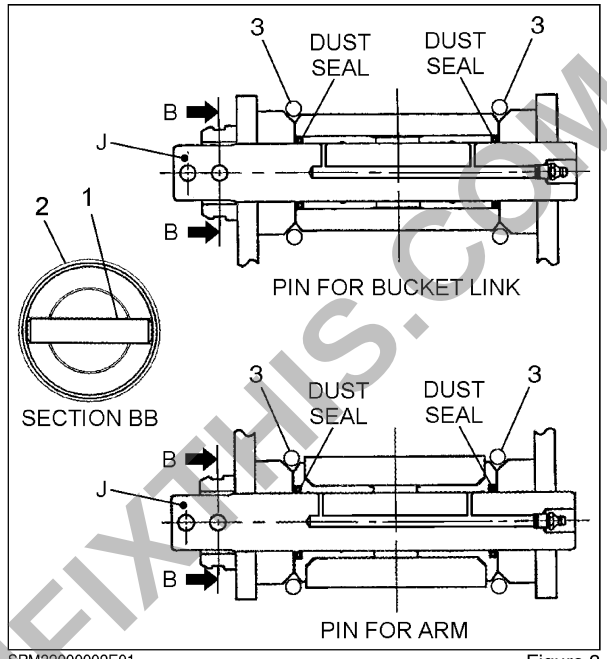
   Weight:

   64 kg (141 lbs)



SPW32000002J01 Figure 2

FIG. 32-2 TO PLACE BUCKET ON GROUND



SPM32000009E01 Figure 3

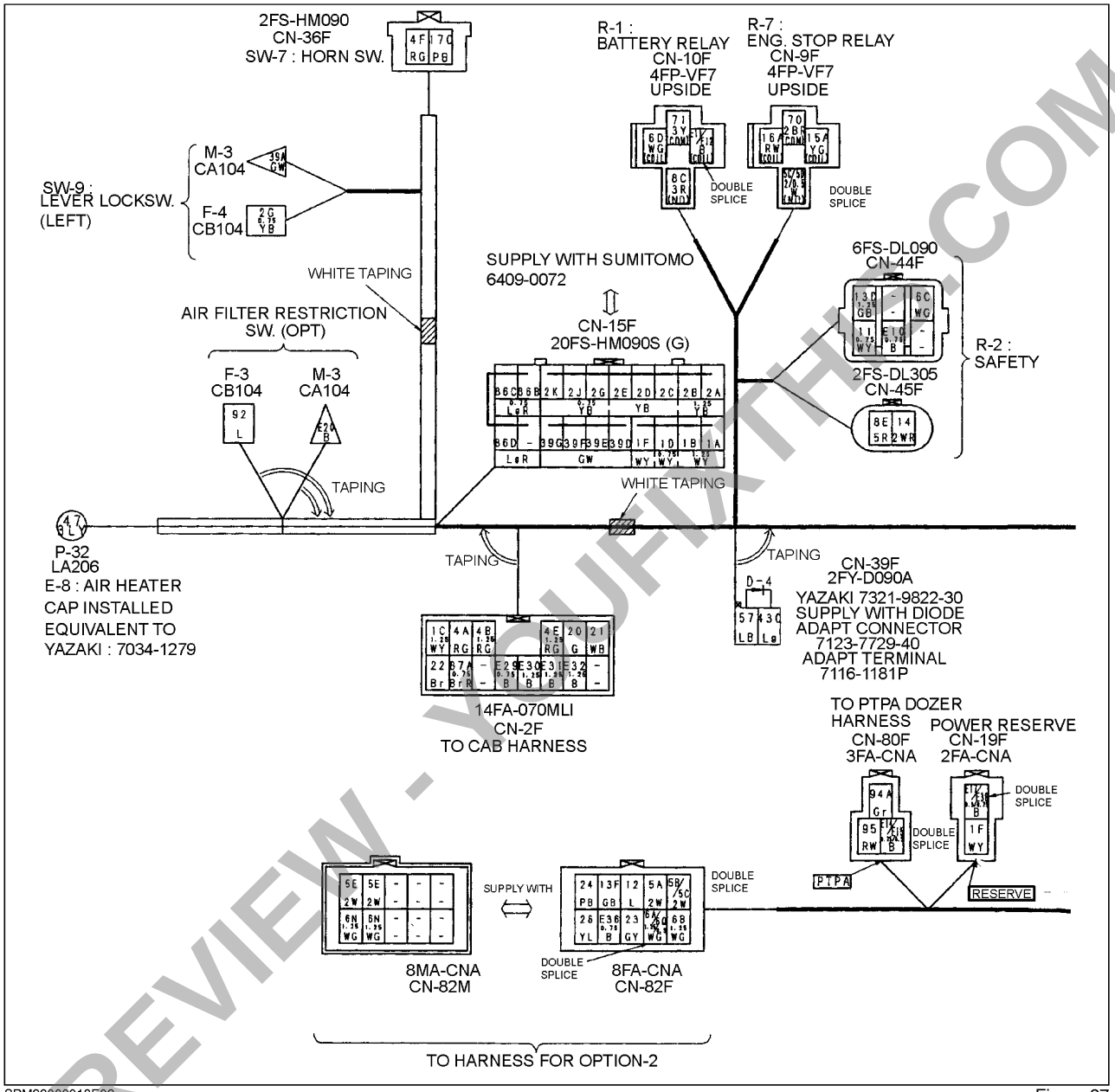
FIG. 32-3 ASSEMBLY OF PIN (SECTION A-A)

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23.2.4 DETAIL OF HARNESS & CABLE

23.2.4.1 INST • MAIN HARNESS (NO. H-1)



SPM23000018E02

Figure 27

FIG. 23-19 INST • MAIN HARNESS (NO. H-1) — (1/8)

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NOTES

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Torque value Unit: N•m (lb•ft)

11.1.2 METRIC FINE THREAD STANDARD TIGHTENING TORQUE VALUES

Make sure to tighten all Capscrews and Nuts to proper torque values.

METRIC FINE THREAD STANDARD TIGHTENING TORQUE VALUES							
Classification		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M8	P=1.0	11.3±1.1 (8.3±0.8)	9.5±1.0 (7.0±0.7)	24.5±2.0 (18.1±1.5)	20.6±2.0 (15.2±1.5)	44.1±3.9 (32.5±2.9)	37.3±3.9 (27.5±2.9)
M10	P=1.25	22.6±2.0 (16.7±1.5)	18.7±1.9 (13.8±1.4)	48.1±4.9 (35.5±3.6)	41.2±3.9 (30.3±2.9)	87.3±8.8 (64.4±6.5)	73.5±6.9 (54.2±5.1)
M12	P=1.25	39.2±3.9 (28.9±2.9)	33.3±2.9 (24.6±2.1)	85.3±8.8 (62.9±6.5)	71.6±6.9 (52.8±5.1)	154±16 (114±12)	129±13 (95.2±9.6)
M16	P=1.5	92.2±8.8 (68.0±6.5)	77.5±7.8 (57.2±5.8)	196±20 (145±15)	169±17 (125±13)	363±39 (268±29)	304±29 (224±21)
M20	P=1.5	186±19 (137±14)	155±16 (114±12)	402±39 (297±29)	333±29 (246±21)	726±69 (535±51)	608±59 (448±44)
M24	P=2	314±29 (232±21)	265±29 (195±21)	686±69 (506±51)	569±59 (420±44)	1240±118 (915±87)	1030±98 (760±72)
M30	P=2	637±59 (470±44)	530±49 (391±36)	1390±137 (1030±101)	1157±118 (853±87)	2500±255 (1840±188)	2080±206 (1530±152)
M33	P=2	853±88 (629±65)	706±70 (521±52)	1860±186 (1370±137)	1550±155 (1140±114)	3350±334 (2470±246)	2790±275 (2060±203)
M36	P=3	1070±108 (789±80)	892±88 (658±65)	2330±226 (1720±167)	1940±196 (1430±145)	4200±422 (3100±311)	3500±353 (2580±260)
Torque value Unit: N•m (lb•ft)							

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42.2 TROUBLE DIAGNOSIS: HYDRAULIC

Classification	Reference No.		Causes / Phenomenon	Pump			Valve									Actuator		
				Main pump	Trochoid pump	Gear pump	Travel & ATT main R/V	Main gear pump R/V	Each overload R/V	Travel straight valve	Travel spool	Attachment spool	Check valve	Shuttle valve	Slewing motor unit	Travel motor unit	Hydraulic cylinder
Attachment	1	(1)	Attachment operational failure	X							X	X					
		(2)	Travel speed is slow.	X								X					X
		(3)	Attachment operating power is low.				X		X								X
		(4)	Malfunction of attachment							X		X					X
Travel operation	2	(1)	Travel operational failure	X							X					X	
		(2)	Travel speed is slow.	X							X					X	
		(3)	Travel operating power is low.				X									X	
		(4)	It deviates in travel independent operation.	X						X	X					X	
Slewing operation	3	(1)	Slewing operational failure									X			X		
		(2)	Slewing speed is slow.			X											
		(3)	Slewing operating power is low.					X	X						X		
		(4)	Malfunction of slewing operation									X		X	X		
Pump	4	(1)	Engine speed is reduced due to pump load.	X													
		(2)	Malfunction of pump	X	X	X											

Abbreviation

E/G : Engine
SOL : Solenoid
SW : Switch
ATT : Attachment
C/V : Control valve
R/V : Relief valve
V : Valve

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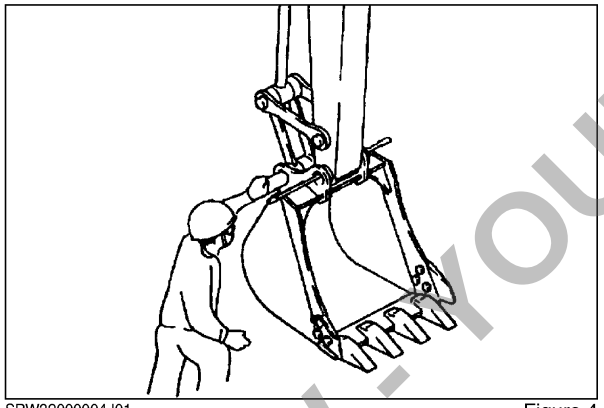
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32.1.2.2 INSTALLATION OF BUCKET

Installation is performed in the reverse order of removal, including the following:

> **CAUTION:** *When aligning the pin position, do not put your finger in the pin holes in any circumstances, align them visually.*

1. Clean the welded part of the structures and check that there is no cracks on the parts.
2. Check that the dust seal is not damaged, replace as needed.
3. Inspect pins and bushings according to the Section “ATTACHMENT DIMENSIONS” and “SPECIFICATIONS”.
4. When inserting the pin, coat the shaft with grease.
   - The bucket can be mounted easily if the bucket link is installed in the first.



SPW32000004J01 Figure 4

FIG. 32-4 INSTALLATION OF BUCKET

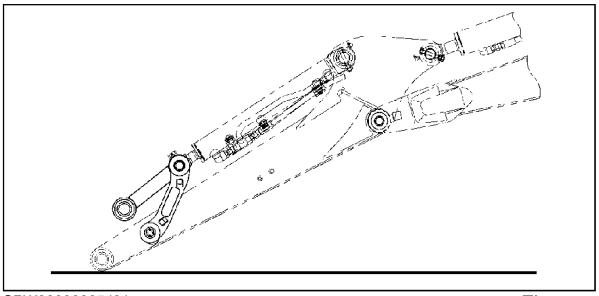
32.1.3 ARM

32.1.3.1 REMOVAL OF ARM

1. Retract the bucket and arm cylinders, lower the boom to the ground.
2. Shut off the engine and operate the control levers several times to release the pressure in circuits.
3. Then put the safety lock lever in the “Locked” position, depress the air breather on the hydraulic oil tank to release the pressure in the tank.
4. Disconnect the hoses connected to the bucket cylinder. Then plug to the openings.

   : 22mm
5. Lift up the arm cylinder with a sling in order to release any load to the pin (E).
6. Remove the capscrew and nuts securing pin (E). Remove the pin (E) and shims.

   : 17mm
7. Placing a wooden block under the arm cylinder, let the cylinder down.
8. Install the pin (E) and capscrew and nuts that secure pin (E). Attach lifting equipment to pin (E) and the arm tip, slightly lift up in order to relieve any load to the pin (F).

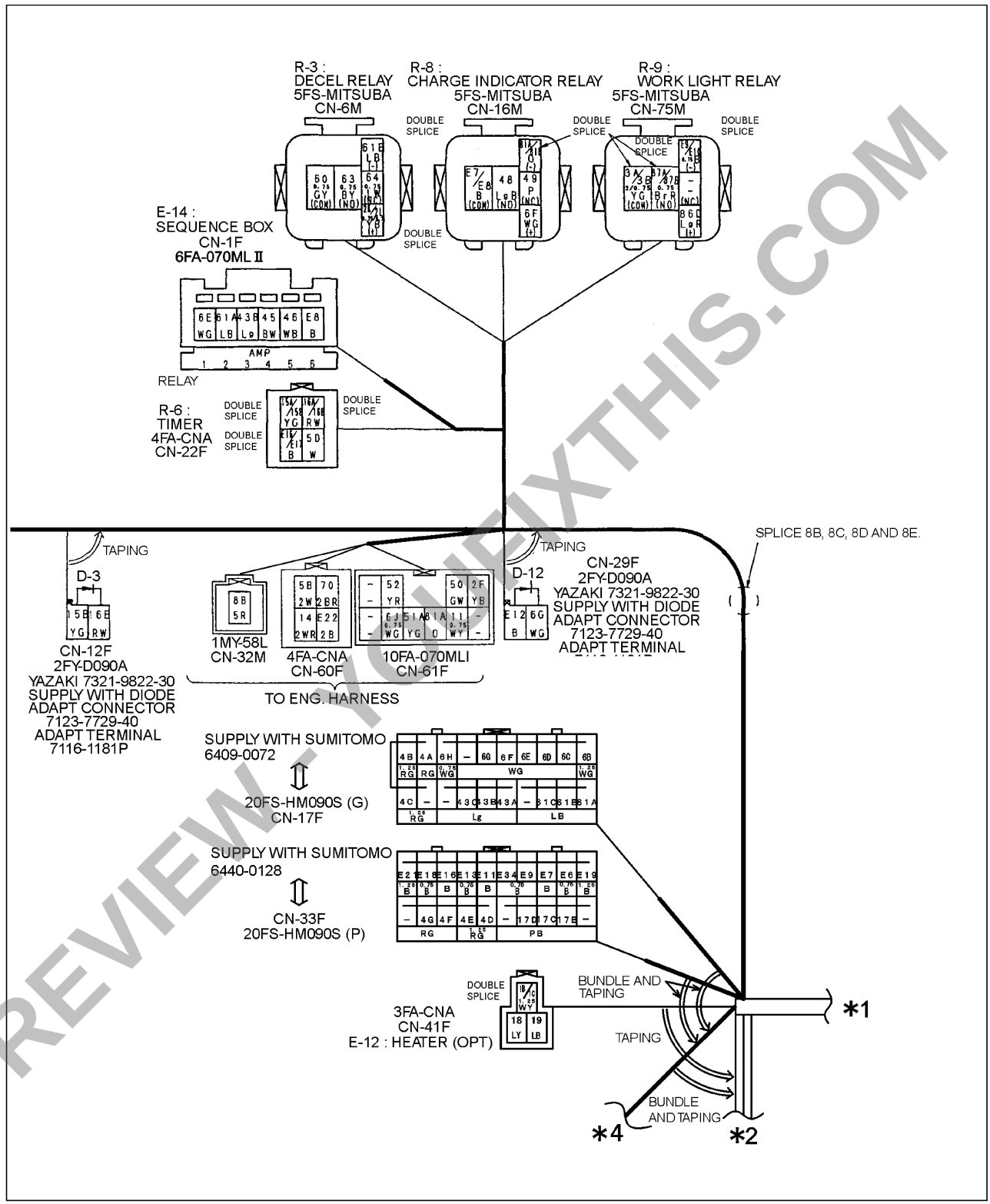


SPW32000005J01 Figure 5

FIG. 32-5 ARM REMOVING POSTURE

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SPM23000019E01

Figure 28

FIG. 23-20 INST • MAIN HARNESS (NO. H-1) — (2/8)

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12.1 WORKING STANDARDS FOR TIME TABLES

12.1.1 WORKING CONDITIONS

1. Technicians:
   One or more technicians who are qualified by Manufacturer are needed. The technicians need five years or more experience, they have to complete the training in the operation of this machine.
2. Facilities:
   General jigs, tools, apparatus, testers to be provided. The maintenance workshop should be equipped with a crane and inspection instruments necessary for specific self inspection activities.
3. Place:
   The workshop should be located on a flat land with a service truck and a crane are available.

12.1.2 APPLICABLE RANGE OF STANDARD MAINTENANCE TIME

1. Standard maintenance time:
   Direct maintenance time plus spare time.
2. Direct maintenance time:
   Net time actually spent for maintenance.
3. Additional time:
   Time for transportation of the machine for maintenance, preparation for a safe work site.

12.1.3 EXCLUDED TIME

NOTE: *Not included in standard maintenance time.*

1. Repairing time:
   Time for machining, sheet metal processing, welding, gas cutting, removing broken screw, taking care of parts and painting.
2. Items excluded from maintenance time because of uncertainty in time:
   Receiving the vehicle into shop, transportation, delivery, final inspection and investigation of causes for trouble, diagnosis and inspection.
3. Indirect time:
   Time for field work, preparation of required parts, etc., before starting work, going to and from the site, waiting due to user's convenience at the site and paper work for reports, bills, etc.
4. Over time:
   Over time should be calculated separately.
5. Separate calculation:
   The cost for service cars, trucks with crane and truck cranes should be calculated separately.

12.1.4 APPLICABLE MACHINE FOR ESTIMATION OF STANDARD MAINTENANCE TIME

1. Standard machine.
2. A well maintained machine combined with standard attachments which has operated in a normal circumstances.

12.1.5 STANDARD MAINTENANCE TIME TABLE

1. Units of working time:
   6 minutes = 0.1 hour
2. Calculating method of standard maintenance time:
   Maintenance time = Working time × Number of workers
   Working time = Maintenance time / Number of workers)
3. When more than one job is done,
   A. Add each standard maintenance time
   B. A time is given except for covers that are easily removed by hand.
   C. Assembly (Assy) works include the following works marked with black dot •
4. O / H:
   The removing and installing time are not included.
5. Abbreviations used in the Standard Working Time Table.

Abbreviations					
Assembly	ASSY	Engine	E/G	Solenoid	SOL
Attachment	ATT	Flexible hose	F hose	Switch	SW
Bearing	BRG	Installation	Inst.	Valve	V
Control valve	C/V	Overhaul	O/H		
Cylinder	Cyl	Removal	Rem.		

12.1.6 CLASSIFICATION OF WORK CODE

GROUP		REMARKS
No.	Description	
01	Attachment	To indicate removing, installing, replacement and overhaul.
02	Canopy and Guard	
03	Upper Structure	
04	Under carriage	

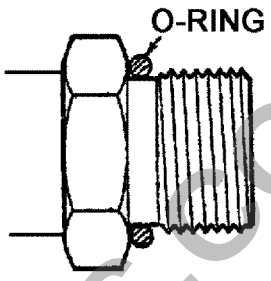
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11.3 TORQUE SPECIFICATIONS FOR JOINTS AND HOSES

11.3.1 JOINTS FOR PIPING (O-RING SEALING TYPE)

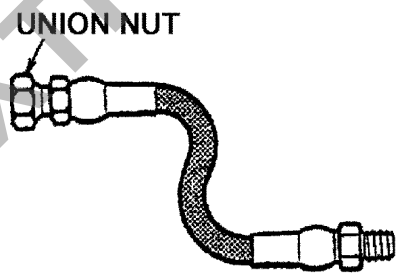
Nominal screw size (PF)	Spanner size (MM.)	Tightening torque N•m (lb•ft)
1 / 8	14	17±2 (12±1)
1 / 4	19	36±2 (27±1)
3 / 8	22	74±5 (54±4)
1 / 2	27	108±9.8 (80±7)
3 / 4	36	162±9.8 (119±7)
1	41	255±9.8 (188±7)



SPW11000003E01 Figure 4

11.3.2 HYDRAULIC HOSE (30 DEGREE FLARE TYPE)

Nominal screw size (PF)	Spanner size (MM.)	Tightening torque N•m (lb•ft)
1 / 8	17	15±2.0 (11±1)
1 / 4	19	29±4.9 (22±4)
3 / 8	22	49±4.9 (36±4)
1 / 2	27	78±4.9 (58±4)
3 / 4	36	118±9.8 (87±7)
1	41	137±15 (101±11)



SPW11000019E01 Figure 5

The application of the tightening torque is subject to a dry condition.

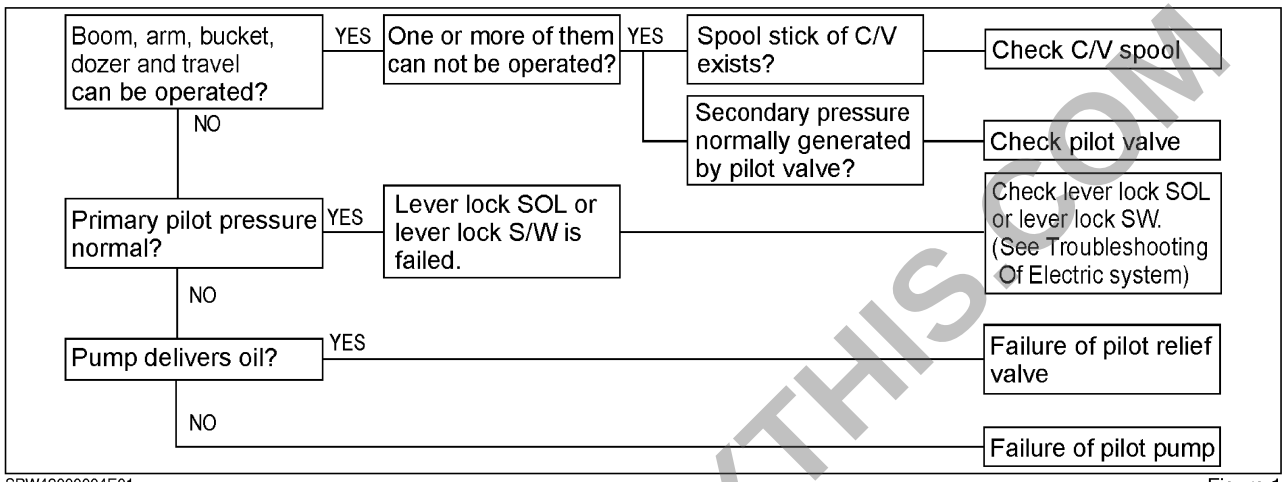
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42.3 TROUBLESHOOTING

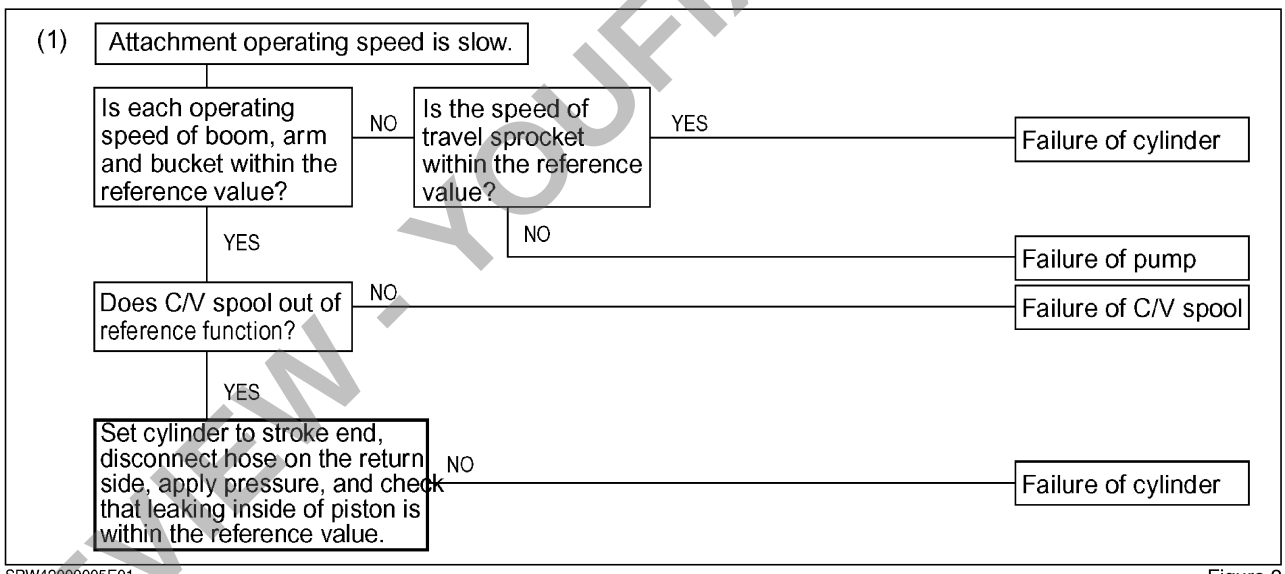
42.3.1 ATTACHMENT

42.3.1.1 ATTACHMENT OPERATIONAL FAILURE (EXCLUDING SWING OPERATIONS)



SPW42000004E01 Figure 1

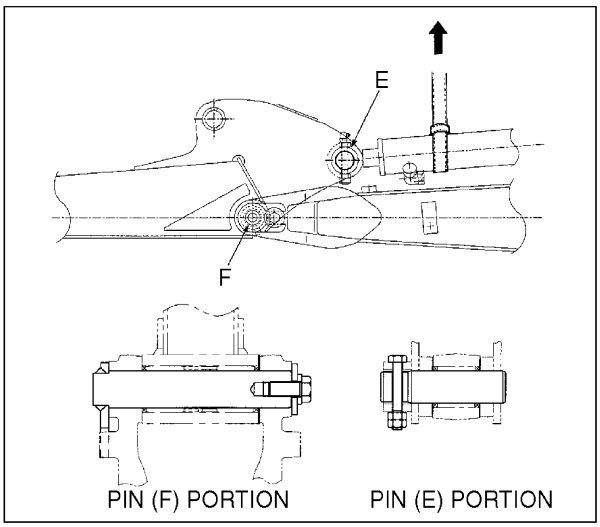
42.3.1.2 ATTACHMENT SPEED IS SLOW



SPW42000005E01 Figure 2

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SPW32000006E01 Figure 6

FIG. 32-6 SECTIONAL VIEW OF INSTALLING PIN

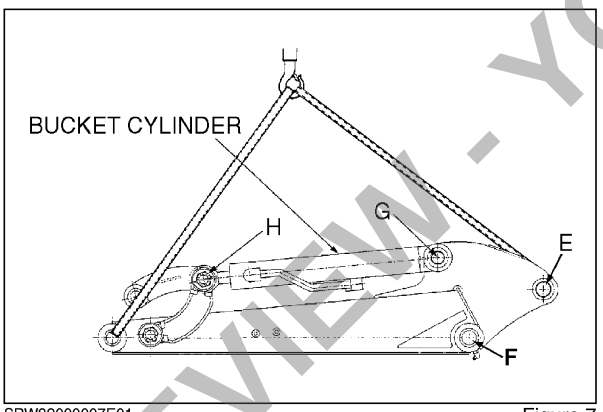
9. Remove the capscrew from pin (F), remove pin (F).

: 24mm

10. Remove the arm assembly.

    Weight of arm assembly: approx.

    95 kg (209 lbs)



SPW32000007E01 Figure 7

FIG. 32-7 REMOVAL OF ARM ASSEMBLY

11. Removal of Bucket Cylinder

    1. Remove the capscrew from pin (H), remove pin (H).

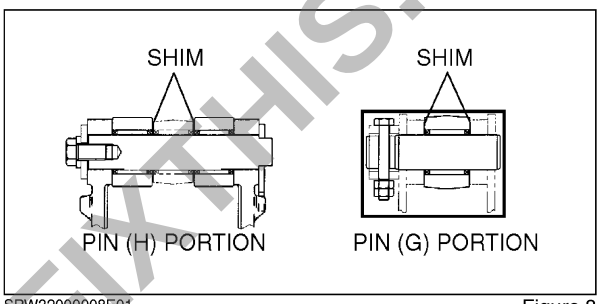
    : 24mm

    2. Remove the capscrew and nuts from pin (G), remove pin (G).

    : 17mm

    3. Attach suitable lifting equipment to the bucket cylinder, and remove the cylinder.

       Weight; approx. 17 kg (37 lbs)



SPW32000008E01 Figure 8

FIG. 32-8 SECTIONAL VIEW OF INSTALLING PIN

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EH27.B
HYDRAULIC EXCAVATOR
TABLE OF CONTENTS

SECTION 1
STANDARD SPECIFICATIONS AND MAINTENANCE

Table of Contents I
(Book/Form Number: 6-78100 NA)

CHAPTER 1
GENERAL INFORMATION AND SAFETY
Table of Contents 1-1
(Book/Form Number: 6-78110 NA)

CHAPTER 2
SPECIFICATIONS
Table of Contents 2-1
(Book/Form Number: 6-78120 NA)

CHAPTER 3
ATTACHMENT DIMENSIONS
Table of Contents 3-1
(Book/Form Number: 6-78130 NA)

CHAPTER 11
TOOLS
Table of Contents 11-1
(Book/Form Number: 6-78140 NA)

CHAPTER 12
STANDARD MAINTENANCE TIME TABLE
Table of Contents 12-1
(Book/Form Number: 6-78150 NA)

CHAPTER 13
MAINTENANCE STANDARDS AND TEST PROCEDURES
Table of Contents 13-1
(Book/Form Number: 6-78160 NA)

SECTION 2
HYDRAULIC, ELECTRICAL, AND COMPONENT SYSTEMS

Table of Contents I
(Book/Form Number: 6-78170 NA)

CHAPTER 22
HYDRAULIC SYSTEM
Table of Contents 22-1
(Book/Form Number: 6-78180 NA)

CHAPTER 23
ELECTRICAL SYSTEM
Table of Contents 23-1
(Book/Form Number: 6-78190 NA)

CHAPTER 24
COMPONENTS SYSTEM
Table of Contents 24-1
(Book/Form Number: 6-78200 NA)

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1.1 GENERAL SAFETY INFORMATION

WARNING: *Do not operate or perform any maintenance on this machine until all instructions in the OPERATOR'S MANUAL and this MANUAL have been thoroughly read and understood.*

WARNING: *Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death.*

WARNING: *Always keep the manual in storage.*
If it is missing or damaged, place an order with an authorized Distributor for a replacement.
If you have any questions, please consult your dealer.

1. Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents. Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in the manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.
2. Operation, inspection, and maintenance should be carefully carried out, safety must be given the first priority. The safety information contained in the manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.
3. Messages of safety appear in the manual and on the machine:

   All messages of safety are identified by either word of DANGER, WARNING, and CAUTION.

DANGER: *Shows an imminently hazardous situation which, if not avoided, will result in death or serious injury.*

WARNING: *Shows a potentially hazardous situation which, if not avoided, could result in death or serious injury.*

CAUTION: *Shows a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components.*

4. It is very difficult to foresee every danger that may occur during operation. However, safety can be ensured by fully understanding proper operating procedures for this machine according to methods recommended.
5. While operating the machine, be sure to perform work with great care, so no damage to the machine or accidents will occur.
6. Continue studying the manual until all Safety, Operation and Maintenance procedures are completely understood by all persons working with the machine.

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All data given in this publication is subject to production variations. Dimensions and weights are only approximate. Illustrations do not necessarily show products in standard condition. For exact information about any particular product, please consult your Dealer

Revision History				
Issue	Issue Date	Applicable Machines	Remarks	
First Edition	August, 2004	EH27.B: PV10–27001~	S5PV0007E01 (Section 1 title page)	

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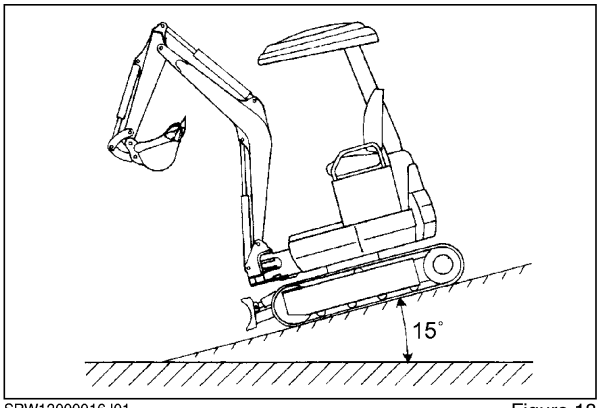
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13.5.4 MOVEMENT DRIFT DUE TO GRAVITY

Measure the movement distance of machine on a slope due to machine's own weight, holding the machine for 5 minutes on the slope.

Measuring Conditions:

- Engine: Stopped
- Hydraulic Oil Temperature: 50-60°C (122-140°F)
- 15 degree grade (Approximately 1/3.73)
- Machine posture: Fully extending the boom, arm and bucket cylinders, and fully contracting the dozer cylinder.

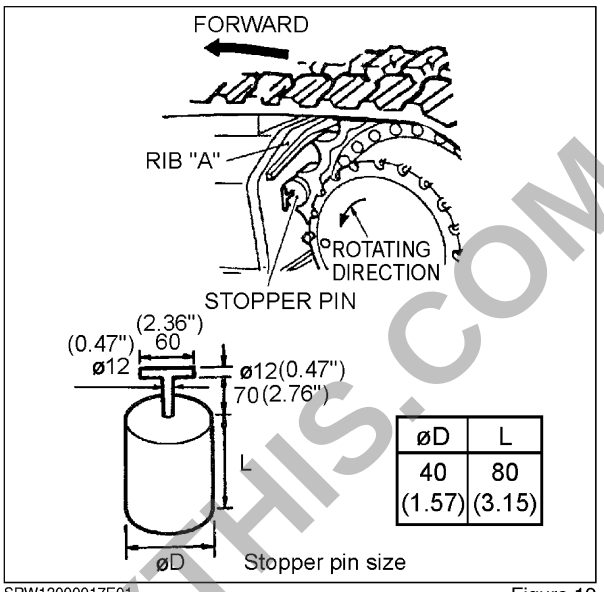


SPW13000016J01 Figure 18

13.5.5 DRAIN RATE ON TRAVEL MOTOR

1. Preparation
   A. Apply stopper pins for both travel sprockets of left and right.
   B. Stop the engine, and release air in the hydraulic reservoir.
   C. Connect a hose to the drain port of travel motor and place in a container.
   D. Install a plug to the drain line at the tank side.

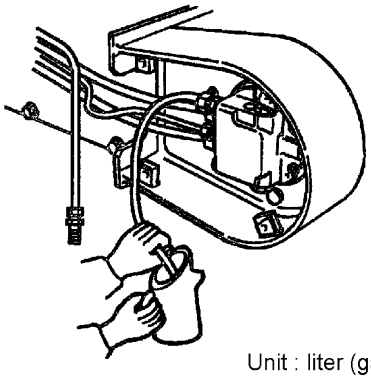
WARNING: *Make sure of the rotating direction of travel motor. Otherwise, rib "A" may be broken by the stopper pin.*



øD	L
40 (1.57)	80 (3.15)

SPW13000017E01 Figure 19

2. Measurement:
   - Engine: At rated speed
   - Hydraulic oil temperature: 50-60°C (122-140°F)
   - Machine posture: Locked travel and over running the relief on the travel motor
   - Measure the drain volume of oil for 30 seconds.



Unit : liter (gal.) /30sec

SPEED SHIFT	DRAIN RATE OF TRAVEL MOTOR		
	Standard value	Standard value for repair	Serviceability limit
1 st	1.5 (0.40) or less	—	3 (0.79) or more

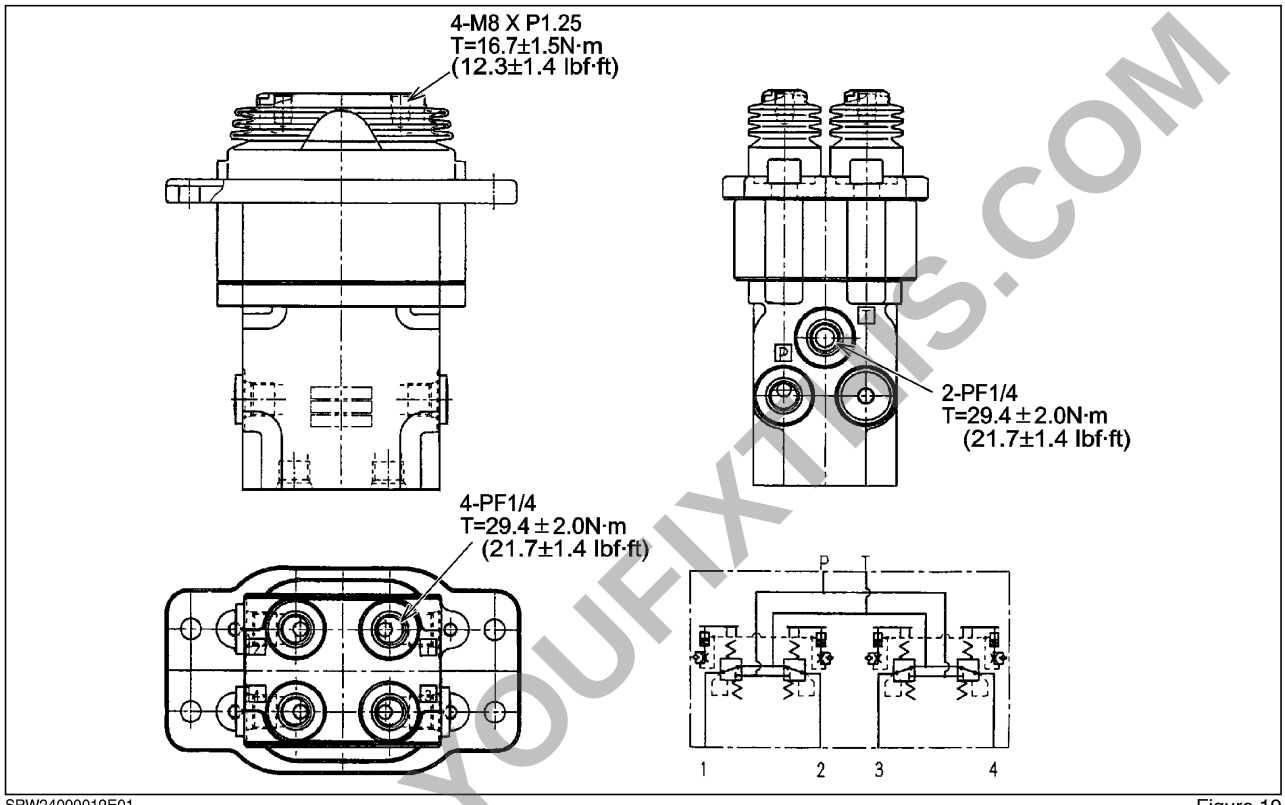
SPW13000018E01 Figure 20

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24.1.3 PILOT VALVE (TRAVEL)

24.1.3.1 SUMMARY

24.1.3.1.1 GENERAL VIEW



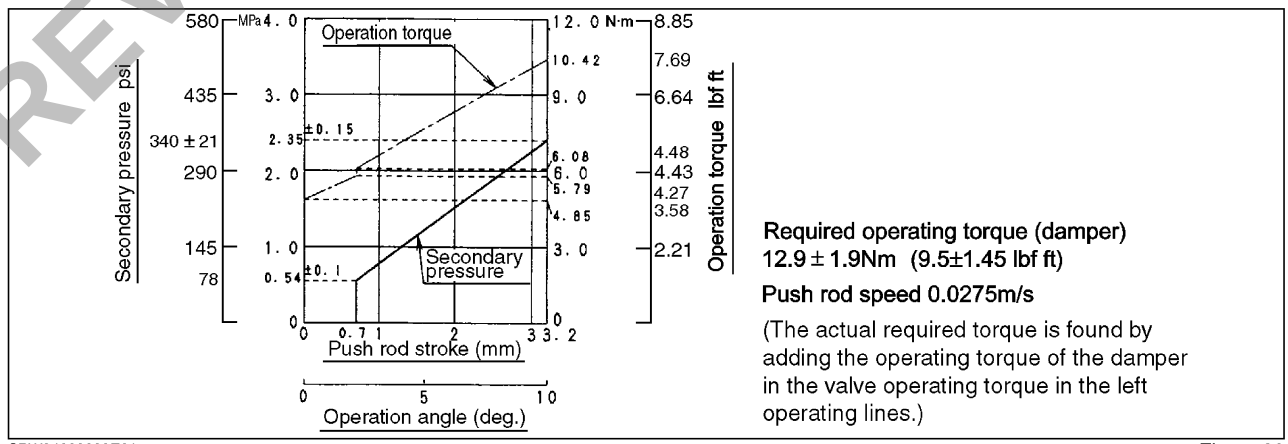
SPW24000019E01

Figure 19

24.1.3.1.2 SPECIFICATIONS

ITEM	SPECIFICATIONS
Model (Type)	PVD6P4001
Max. primary pressure	6.9MPa (1000 psi)
Rated flow	10 L/min (2.6 gal/min)
Weight	3.9 kg (8.6 lb)

24.1.3.1.3 PERFORMANCE CHARACTERISTICS



SPW24000020E01

Figure 20

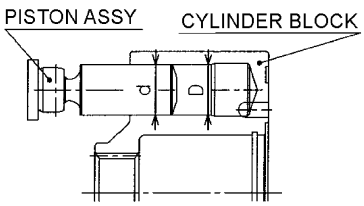
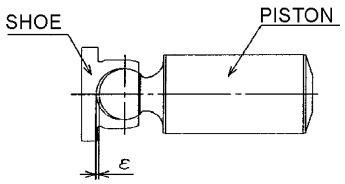
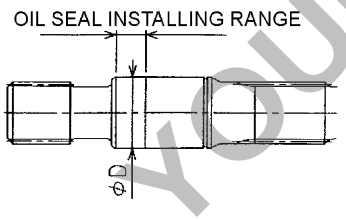
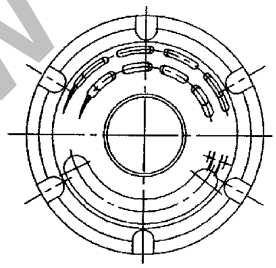
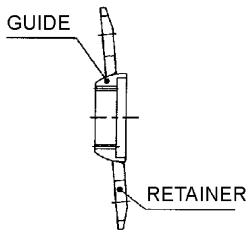
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NOTES

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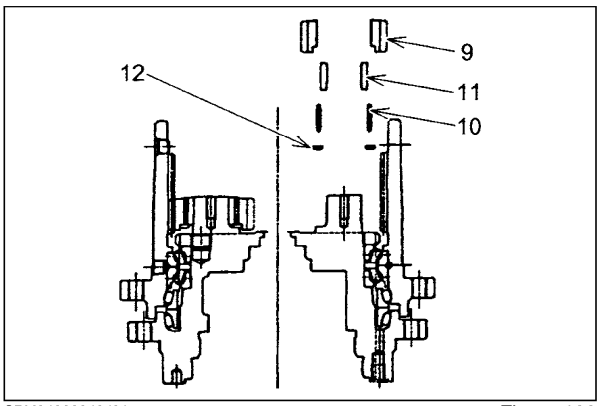
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33.2.1.3 MAINTENANCE STANDARD

Item		Replacement criterion	Remedy
Piston assembly and cylinder block	 SPW33000190E01 Figure 189	Visual inspection To be free from flaw, galling and wear. (Especially the sliding section) Check clearance between the piston outer diameter and inner diameter of the cylinder block. D-d≦0.06 mm (0.0024 in)	Replace.
Piston shoe and piston	 SPW33000191E01 Figure 190	Piston shoe and piston Check the play in the axial direction of the piston and shoe shaft. ε≦0.2 mm (0.0079 in)	Replace.
Shaft	 SPW33000192E01 Figure 191	Shaft Check the wear of the oil seal. Wear amount ≦0.025 mm (0.0010 in)	Replace.
Control plate	 SPW33000193J01 Figure 192	Check the sliding surface for flaw.	Replace it when the flaw is severe.
Guide and retainer	 SPW33000194E01 Figure 193	Check if it is free form galling and step wear.	Replace it in a set if it is impossible to repair.
		Check if it is free from slight galling and flaw.	After repairing with lapping, clean it to remove the lapping compound.

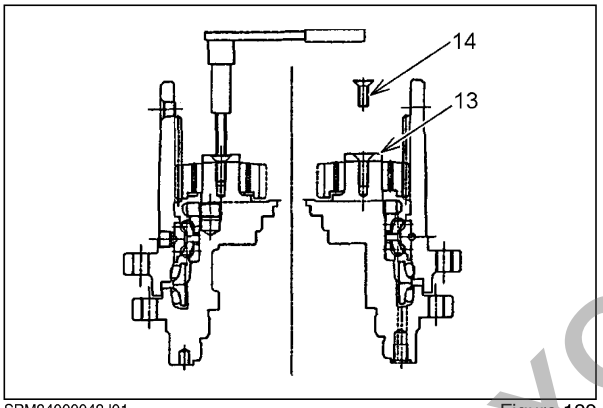
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SPM34000042J01 Figure 128

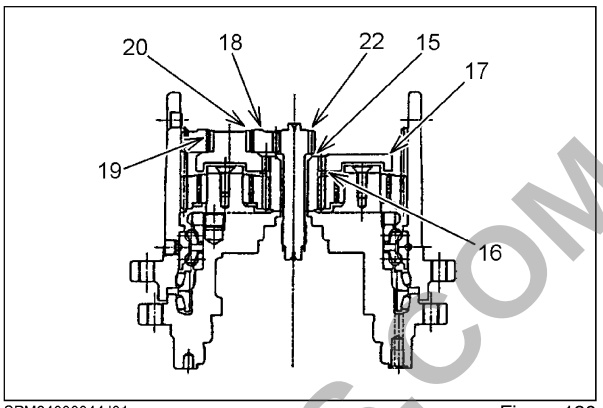
F. Install planetary gear B (9), needle bearing (10), inner race (11) and thrust washer (12).



SPM34000043J01 Figure 129

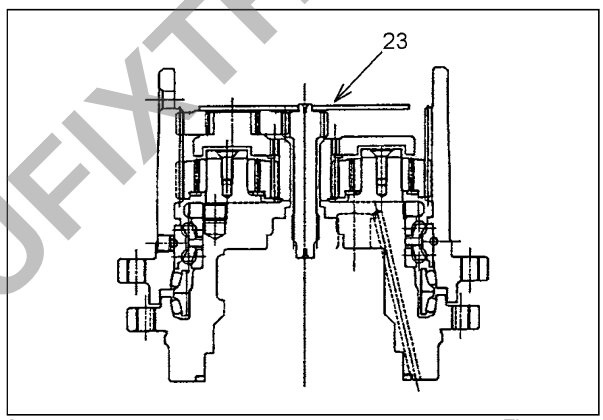
G. Put thrust plate (13) on the trunnion section of flange holder (1), apply Loctite #262 to screw (14) and tighten it.
Before applying the Loctite, degrease the parts completely and use hardening accelerator.

: 4 mm
Torque = 6.1 Nm (4.5 lb ft)



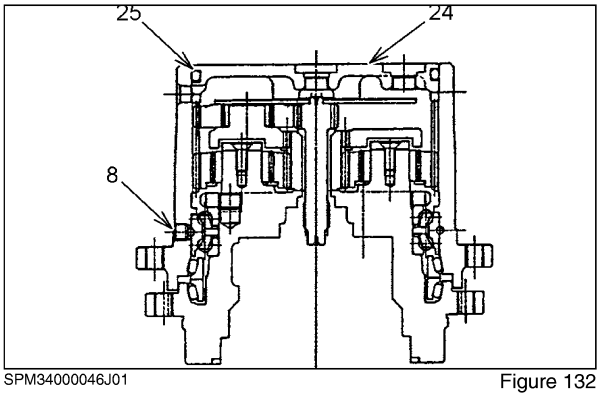
SPM34000044J01 Figure 130

H. Install sun gear (15) with snap ring (16), holder (17) with inner race, planetary gear A (18), needle bearing (19) and drive gear (22).



SPM34000045J01 Figure 131

I. Install thrust plate (23).



SPM34000046J01 Figure 132

J. Apply grease to O-ring (25), place the O-ring on cover (24), and install cover (24) onto housing (6) matching the threaded hole of socket plug (8) of housing (6) with the U-groove (for wire ring).

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(12) 4TNV106T

Engine name		Unit	4TNV106T			
Engine specification class		-	CL		VM	
Type		-	Vertical, in-line, 4-cycle, water-cooled diesel engine			
Combustion chamber		-	Direct injection			
Number of cylinders		-	4			
Cylinder bore×stroke		mm×mm	106×125			
Displacement		L	4.412			
Continuous rating	Revolving speed	Min^{-1}	1500	1800	-	
	Output	kW (hp)	51.5 (70.0)	61.8 (84.0)	-	
Rated output	Revolving speed	Min^{-1}	1500	1800	2000	2200
	Output	kW (hp)	56.8 (77.2	68.0 (92.5)	69.9 (95.0)	72.0 (97.9)
Max. no-load speed (±25)		min^{-1}	1600	1895	2180	2400
Ignition order		-	1-3-4-2-1(No.1 cylinder on flywheel side)			
Power take off		-	Flywheel			
Direction of rotation		-	Counterclockwise (viewed from flywheel)			
Cooling system		-	Radiator			
Lubrication system		-	Forced lubrication with trochoid pump			
Starting system		-	Electric			
Applicable fuel		-	Diesel oil-ISO 8217 DMA, BS 2869 A1 or A2 (Cetane No.45 min.)			
Applicable lubricant		-	API grade class CD or CF			
Lubricant capacity (oil pan) *	Total	L	14.0			
	Effective	L	9.0		7.5	
Coolant water capacity (engine only)		L	6.0			
Engine dimensions ** (with flywheel housing)	Overall length	mm	808		776	
	Overall width	mm	629		628.6	
	Overall height	mm	866		866	
Engine mass (dry) ** (with flywheel housing)		kg	355 (equivalent to SAE#3)		340 (equivalent to SAE#3)	
Cooling fan (std.)		mm	500 mm O/D, 7 blades pusher type		500 mm O/D, 7 blades suction type	
Crankshaft V pulley diameter & Fun V pulley diameter (std.)		mm	150×150			

* Engine oil capacity may differ from the above depending on an engine installed on a machine unit.
** Engine mass and dimensions without radiator

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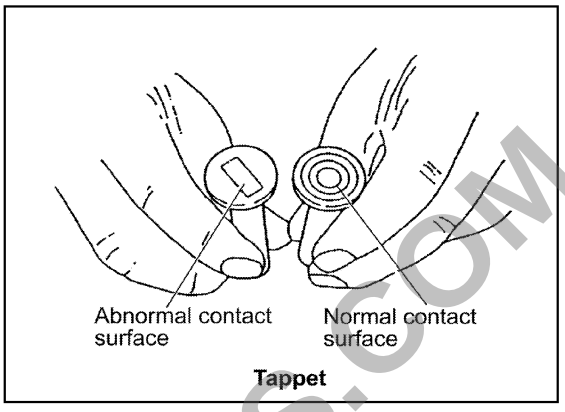
(6) Tappet

Mainly check the tappet contact surface with the cam and push rod. Slight surface defects shall be corrected with an oilstone.

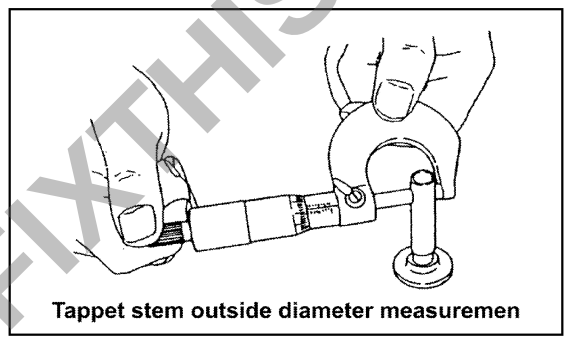
(a) Tappet stem outside diameter measurement

mm

Model	Item	Standard	Limit
TNV82A~88	Tappet hole I.D.	12.000~12.025	12.045
	Stem O.D.	11.975~11.990	11.955
	Clearance	0.010~0.050	0.090
4TNV94L·98	Tappet hole I.D.	12.000~12.018	12.038
	Stem O.D.	11.975~11.990	11.955
	Clearance	0.010~0.043	0.083
4TNV106(T)	Tappet hole I.D.	14.000~14.018	14.038
	Stem O.D.	13.966~13.984	13.946
	Clearance	0.015~0.052	0.092



Tappet

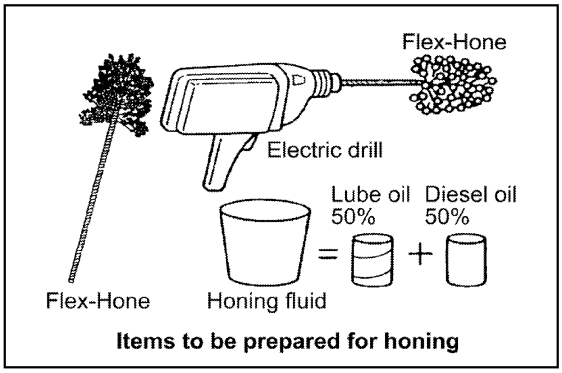

Tappet stem outside diameter measuremen

4.4.6 Cylinder bore correction

1) Slight uneven worn, flawed, etc. shall be corrected by honing only. If the cylinder is unevenly worn partially, flawed or otherwise damaged and cannot be repaired simply by honing, rebore the cylinder first and then hone. See 4.4.5.(1)(c) for the boring dimension.

2) Items to be prepared for honing

- Flex-Hone (see No.8 of 4.1.2 in Chapter 4)
- Electric drill
- Honing fluid (50:50 mixture of lube oil and diesel oil)



Items to be prepared for honing

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