EX400-3, EX400-3C Workshop Manual

SECTION 01
GENERAL INFORMATION

CONTENTS

PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

Preparations for Disassembling

- Clean the Machine

  Thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling/assembling, resulting in damage to machine components, as well as decreased efficiency in service work.

- Inspect the Machine

  Be sure to thoroughly understand disassembling procedures beforehand, to help avoid incorrect disassembling of components as well as the purchase of unnecessary service parts.
  Check and record the items listed below to help prevent problems from occurring in the future.

  · The machine model, machine serial number, and hour meter reading,
  · Reason for disassembly (symptoms, failed parts, and causes).
  · Clogging of filters and oil or air leakages, if any,
  · Capacities and dirtiness of lubricants,
  · Loose or damaged parts.

- Prepare and Clean Tools and Disassembly Area

  Prepare tools to be used and areas for disassembling as well as for disassembled parts. Clean the tools and areas.

Precautions for Disassembling and Assembling

- Precautions for Disassembling

  · Be sure to provide appropriate containers for draining fluids.
  · Use matching marks for easier reassembling.
  · Be sure to use specified special tools, when so instructed.
  · If a part or component cannot be removed after removing its securing nuts and bolts, do not attempt to remove it forcibly. Find the cause(s), then take appropriate measures to remove it.
  · Orderly arrange disassembled parts. Put marks and tags on them as necessary.
  · Store common parts, such as and bolts with reference to where they are to be used and in a manner that will prevent loss.
  · Inspect contact or sliding surfaces of disassembled parts for abnormal wear, sticking, or other damage.
  · Measure and record degrees of wear and clearances.

- Precautions for Assembling

  · Be sure to clean all parts and inspect them for any damage. If any damage is found, repair or replace with new ones.
  · Dirt or debris on contact or sliding surfaces may shorten the service life of the machine. Take care not to contaminate any contact or sliding surfaces of the parts to be assembled.
  · Be sure that liquid-gasket-applied surfaces are clean and dry.
  · Clean new parts to remove any anti-corrosive agent, if the agent has been applied on the new parts.
  · Utilize matching marks when assembling.
  · Be sure to use designated tools to assemble bearings, bushings and oil seals.
  · Keep a record of the number of tools used for disassembling/assembling. After assembling is complete, count the number of tools, so as to make sure that no tolls are left in the assembled components.

TIGHTENING TORQUE SPECIFICATIONS

No.	Descriptions			Bolt Dia mm	Q'ty	Wrench Size(mm)	Torque		
							N·m	kgf·m	lbf·ft
1	Engine cushion rubber mounting bolt	Front		22	2	32	740	75	540
		Rear	Engine Cushion rubber	22	2	32	740	75	540
			Cushion Rubber-Machine	16	4	24	265	27	195
2	Engine bracket mounting bolt			14	8	22	175	18	130
3	Radiator mounting bolt			16	4	24	205	21	152
4	Hydraulic oil tank mounting bolt			16	8	24	205	21	152
5	Fuel tank mounting bolt			16	8	24	205	21	152
6	ORS fittings for hydraulic hoses and piping			1−3/16−12UNF 1−7/16−12UNF		36 41	175 205	18 21	130 152
7	Pump transmission mounting bolt			12	12	19	88	9	65
8	Pump device mounting bolt			20	4	30	390	40	290
9	Control valve mounting bolt			16	4	24	205	21	152
10	Swing device mounting bolt Ring gear housing mounting bolt (hexagonal wrench)			22 16	26 24	32 14	740 205	75 21	540 152
11	Swing motor mounting bolt (hexagonal wrench)			18	16	14	295	30	217
12	Battery mounting nut			8	3	13	19.5	2	14.5
13	Cab mounting bolt		STD, LC	16	4	24	205	21	152
			H, LCH	16	6	24	205	21	152
14	Swing bearing mounting bolt to upperstructure Swing bearing mounting bolt to undercarriage			27 27	32 36	41 41	1 370 1 370	140 140	1 010 1 010
15	Travel device mounting bolt Travel motor mounting bolt Sprocket mounting bolt			22 18 22	40 8 48	32 27 32	740 390 740	75 40 75	540 290 540
16	Upper roller mounting		STD, H	18	16	27	390	40	290
			LC, LCH	18	24	27	390	40	290
17	Lower roller mounting bolt		STD, H	22	64	32	740	75	540
			LC, LCH	22	72	32	740	75	540
18	Track shoe bolt		STD, H	24	392	32	1 370	140	1 010
			LC, LCH	24	424	32	1 370	140	1 010
19	Track guard mounting bolt		STD	22	16	32	740	75	540
			LC	22	24	32	740	75	540
			H	22	16	32	740	75	540
			LCH	22	24	32	740	75	540
20	Track mounting bolt		LC, LCH	33	36	50	1 720	175	1 270
21	Coupling and clamp of low pressure piping		Coupling	8		13	10.5 to 12.5	1.05 to 1.26	7.6 to 9.1
			Clamp	1/4-28 UNF		11	5.9	0.6	4.3
22	Counterweight mounting bolt Counterweight retaining bolt			45 24	2 4	63 36	2 350 440	240 45	1 740 330
23	Front Pin-Retaining bolt			20	15	30	390	40	290
	Front Pin-Retaining Nut			20	7	30	390	40	290

NOTE: (1) Apply lubricant (e.g. white zinc B solved into spindle oil) to bolts and nuts to stabilize friction coefficient of them.

(2) Make sure bolt and nut threads are clean before installing.

(3) Apply Loctite to threads before installing and tightening swing bearing mounting bolts.

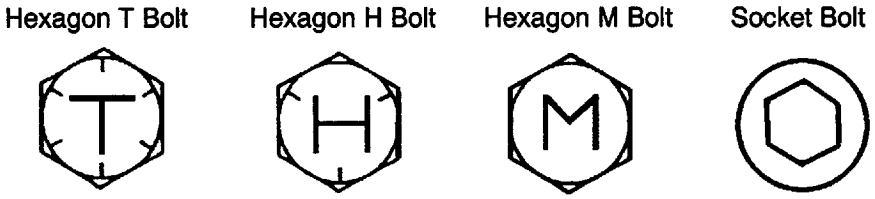
TORQUE CHART

CAUTION: Use tools appropriate for the work to be done. Makeshift tools and procedures can create safety hazards. For loosening and tightening nuts and bolts, use correct size tools. Avoid bodily injury caused by slipping of wrenches.

SA-040

Bolt Types

Tighten nuts or bolts correctly to torque specifications. Four kinds of bolts, hexagon bolts T, H, M and socket bolt, each made of different material, are used. Make sure to employ correct bolts and tighten them correctly when assembling the machine or components.



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Specified Tightening Torque Chart

Bolt Dia,	Wrench Size	Hexagon Wrench Size	T-Bolt			H-Bolt			M-Bolt		
			N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M 8	13	6	29.5	3	22	19.5	2	14.5	9.8	1	7.2
M 10	17	8	64	6.5	47	49	5	36	19.5	2	14.5
M 12	19	10	108	11	80	88	9	11	34	3.5	25.5
M 14	22	12	175	18	130	137	14	18	54	5.5	40
M 16	24	14	265	27	195	205	21	27	79	8	58
M 18	27	14	390	40	290	295	30	40	118	12	87
M 20	30	17	540	55	400	390	40	55	167	17	123
M 22	32	17	740	75	540	540	55	75	215	22	159
M 24	36	19	930	95	690	690	70	95	275	28	205
M 27	41	19	1 370	140	1 010	1 030	105	140	390	40	290
M 30	46	22	1 910	195	1 410	1 420	145	195	540	55	400
M 33	50	24	2 550	260	1 880	1 910	195	260	740	75	540
M 36	55	27	3 140	320	2 310	2 400	245	320	930	95	690

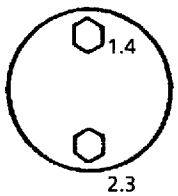
NOTE: (1) Apply lubricant (i.e. white zinc B dissolved into spindle oil) to nuts and bolts to stabilize their friction coefficients.
(2) Torque tolerance is ± 10%.

IMPORTANT:
(1) Apply lubricant (i. e. white zinc B dissolved into spindle oil) to nuts and bolts to stabilize their friction coefficients.
(2) Torque tolerance is ±10 %.
(3) Be sure to use bolts of correct length. Bolts that are too long cannot be tightened, as the bolt tip comes into contact with the bottom of the bolt hole. Bolts that are too short cannot develop sufficient tightening force due to shortness of thread lengths.
(4) The torques given in the chart are genersl use only.
Do not use these torques if a different torque is given for a specific application.
(5) Make sure that nut and bolt threads are clean before installing. Remove dirt or corrosion, if any.

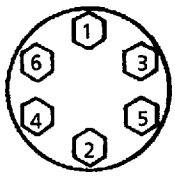
Bolt Tightening Order

When tightening two or more bolts, tighten them alternately, as shown, to ensure even tightening.

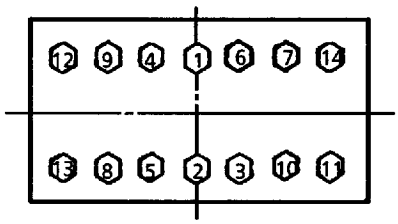
Equally tighten upper and lower alternately



Tighten diagonally



Tighten from center and diagonally



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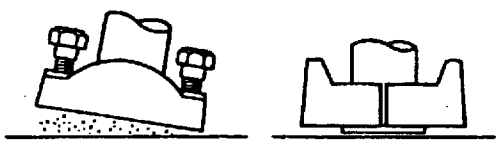
Service Recommendations for Split Flange

IMPORTANT: (1) Clean sealing surfaces. Inspect. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If defects cannot be polished out, replace the component.
(2) Be sure to use specified O-ring. Inspect O-rings for any damage. Take care not to file O-ring surfaces. When installing an O-ring into a groove, use grease to hold it in place.
(3) Loosely assemble split flange halves. Make sure that split is centrally located and perpendicular to the port. Hand tighten bolts to hold parts in place. Do not pinch the O-ring.
(4) Tighten bolts alternately and diagonally, as shown, to ensure even tightening.
(5) Do not use air wrenches. Using an air wrench often causes tightening of one bolt fully before tightening of the others, resulting in damage to O-rings or uneven tightening of bolts.



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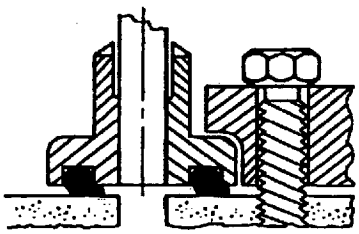
WRONG



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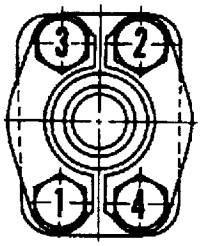

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Nut and Bolt Lockings

- Lock Plate

IMPORTANT: Do not reuse lock plate. Do not try to bend the same point twice.

- Cotter Pin

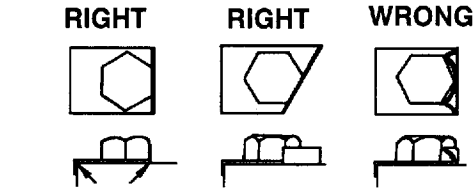
IMPORTANT: Do not reuse split pin. Match the holes in the bolt and nut while tightening, not while loosening.

- Lock Wire

IMPORTANT: Apply wire to bolts in the bolt tightening direction, not in the bolt loosening direction.

RIGHT WRONG

RIGHT RIGHT WRONG



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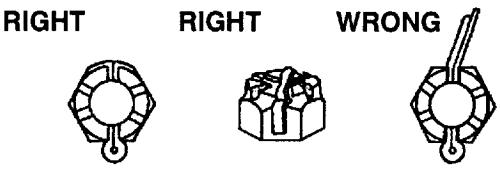
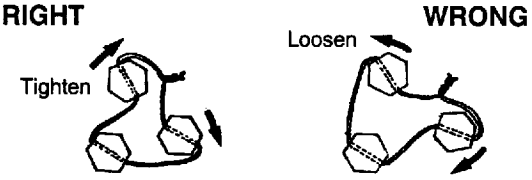
RIGHT RIGHT WRONG



RIGHT WRONG



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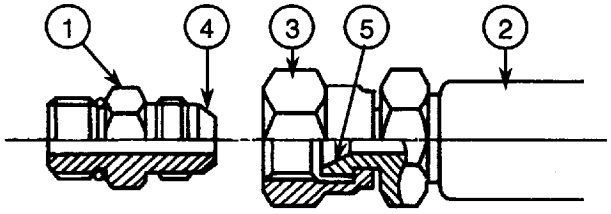
Pipe Thread Connection / Union Joint Tightening Torque Specifications

Union Joint

Metal sealing faces (4) and (5) of adaptor (1) and hose (2) fit together to seal pressure oil. Union joints are used to join small-diameter lines.



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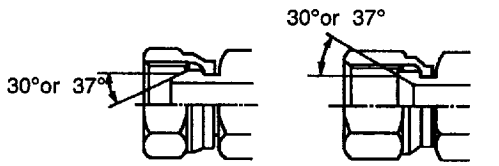
IMPORTANT: (1) Do not over-tighten nut (3). Excessive force will be applied to metal sealing surfaces (4) and (5), possibly cracking adaptor (1). Be sure to tighten nut (3) to specifications.

(2) Scratches or other damage to sealing surfaces (4) or (5) will cause oil leakage at the joint. Take care not to damage them when connecting /disconnecting.



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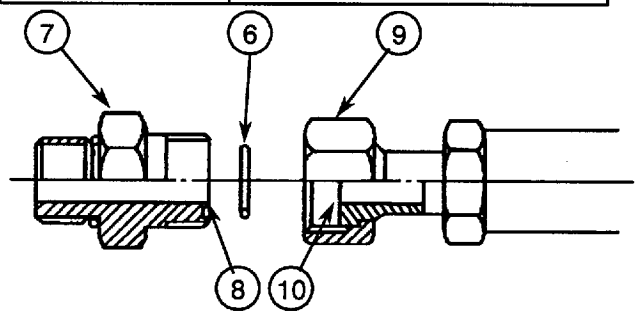
Wrench Size mm	Tightening Torque N·m (kgf·m, lbf·ft)
19	42 (5.0, 36)
22	69 (7.0, 51)
27	93 (9.5, 69)
32	137 (14, 101)
36	175 (18, 130)
41	205 (21, 152)
50	345 (35, 255)
60	540 (55, 400)
70	600 (60, 430)

O-ring Seal Joint

O-ring (6) fits to the end face of adaptor (7) to seal pressure oil.



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IMPORTANT: (1) Be sure to replace O-ring (6) with a new one when reconnecting.

(2) Before tightening nut (9), confirm that O-ring (6) is seated correctly in O-ring groove (8). Tightening nut (9) with O-ring (6) displaced will damage O-ring (6), resulting in oil leakage.

(3) Take care not to damage O-ring groove (8) or sealing face (10). Damage to O-ring (6) will oil leakage.

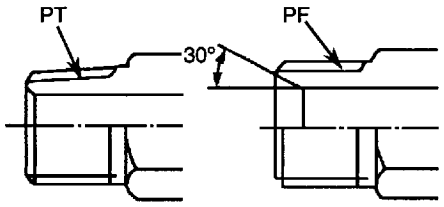
(4) If loose nut (9) is found, causing oil leakage, do not tighten it to stop leakage. Instead, replace O-ring (6) with a new one, then tighten nut (9) after confirming that O-ring (6) is securely seated in place.

Wrench Size mm	Tightening Torque N·m (kgf·m, lbf·ft)
27	93 (9.5, 69)
32	137 (14, 101)
36	175 (18, 130)
41, 46	205 (21, 152)

Screwed-In Connection

IMPORTANT: Many types of screwed-in connections are used for hose connections. Check thread pitch and thread type (taper or straight), to confirm use of the correct one before installing it.

NOTE: Cast Iron: In case of tightening screwed-in connection to cast iron made components.
Steel : In case of tightening screwed-in cannection to steel made components.



Male Taper Thread Male Straight Thread

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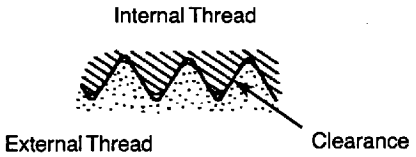
Wrench Size mm	Tightening Touque N·m (kgf·m, lbf·ft)	
	Cast Iron	Steel
19	14.5 (1.5, 10)	34 (3.5, 25)
22	29.5 (3.0, 22)	49 (5.0, 36)
27	49 (5.0, 36)	93 (9.5, 69)
36	69 (7.0, 51)	157 (16, 116)
41	108 (11, 80)	205 (21, 152)
50	157 (16, 116)	320 (33, 240)
60	195 (20, 145)	410 (42, 300)
70	255 (26, 190)	

Seal Tape Application

Seal tape is used to seal clearances between male and female threads, so as to prevent any leakage between threads.
Be sure to apply just enough seal tape to fill up thread clearances. Do not overwrap.



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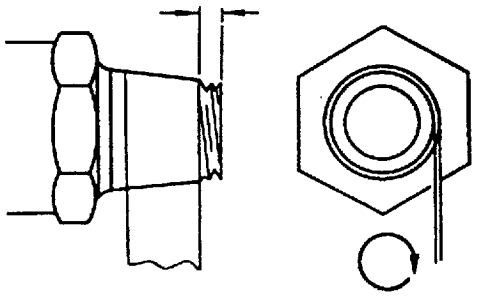
- Application Procedure

  Confirm that the thread surface is clean, free of dirt or damage.
  Apply seal tape around threads as shown. Wrap seal tape in the same direction as the threaeds.

Leave one to two pitch threads uncovered



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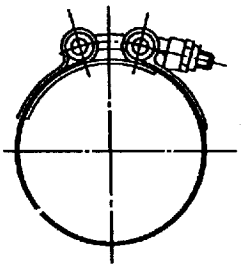
Low-Pressure-Hose Clamp Tightening Torque

Low-pressure-hose clamp tightening torque differs depending on type of clamp.
See below for correct tightening torque of each type of low-pressure-hose clamp.

T-Bolt Type Band Clamp:
4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)
Worm Gears Type Band Clamp:
5.9 to 6.9 N·m (0.6 to 0.7 kgf·m, 4.3 to 5.1 lbf·ft)

T-Bolt Type



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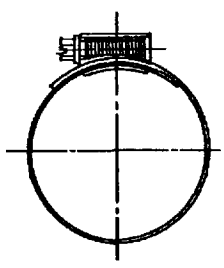
Worm Gears Type



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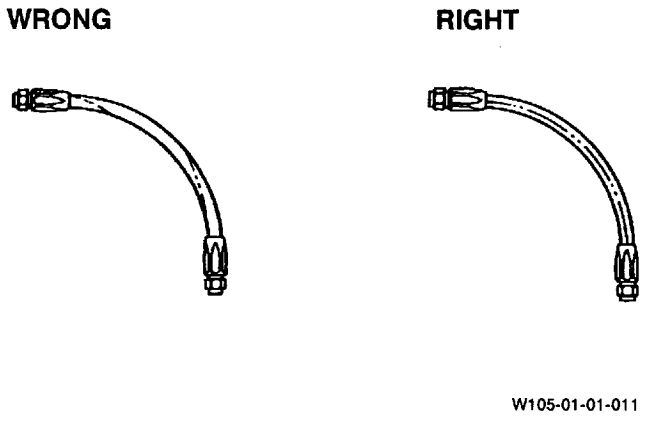
Connecting Hose

CAUTION:

(1) When replacing hoses, be sure to use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leakage, hose rupture or separation of fitting, possibly resulting in a fire on the machine.

(2) Do not install hoses kinked. Application of high oil pressure, vibration, or an impact to a kinked hose may result in oil leakage, hose rupture or separation of fitting. Utilize print marks on hoses when installing hoses to prevent hose from being installed kinked.

(3) If hoses rub against each other, wear to the hoses will result, leading to hose rupture. Take necessary measures to protect hoses from rubbing against each other.
Take care that hoses do not come into contact with moving parts or sharp objects.



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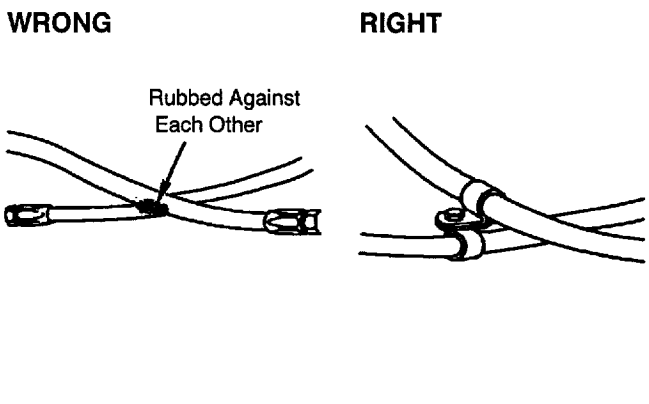

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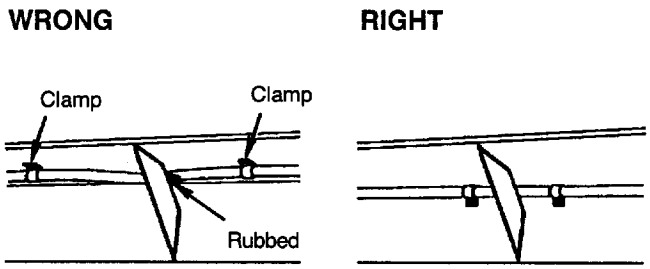

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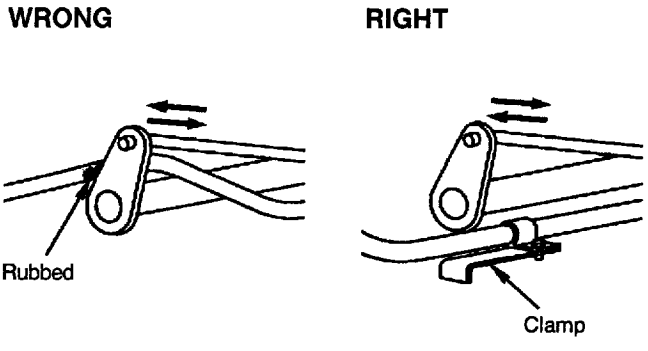

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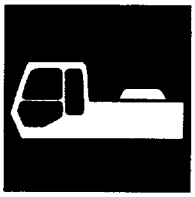
SECTION 02
UPPERSTRUCTURE



CONTENTS

Group 08- Pilot Shut-Off Valve

Group 09- Shockless Valve

Group 10- Accumulator

Group 11- Solenoid Valve

Group 12- Shuttle Valve

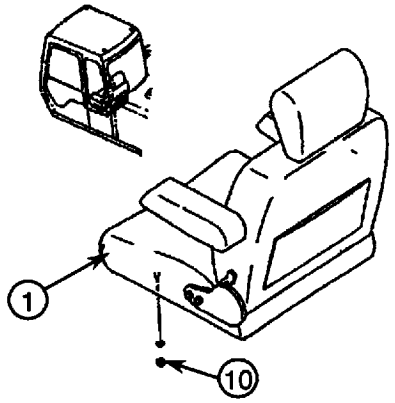
Group 13- Swing Dampener valve

REMOVE AND INSTALL CAB

Remove Cab

1. Remove nuts (10) and seat (1) .

: 13 mm



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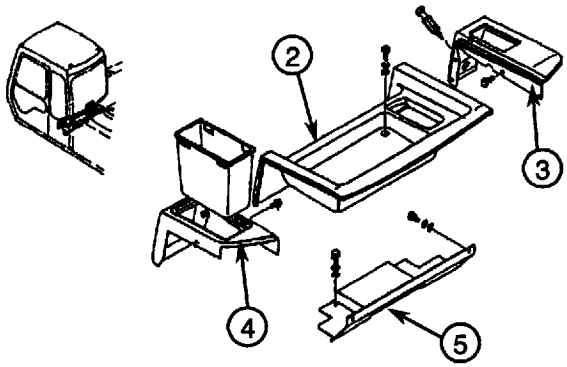
2. Remove covers (2), (3), (4) and (5).

: 13 mm



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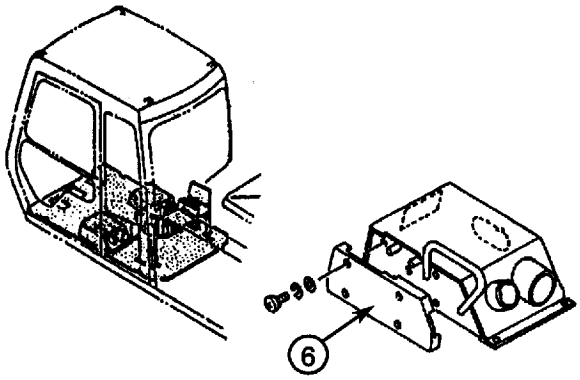
3. Remove cover (6).



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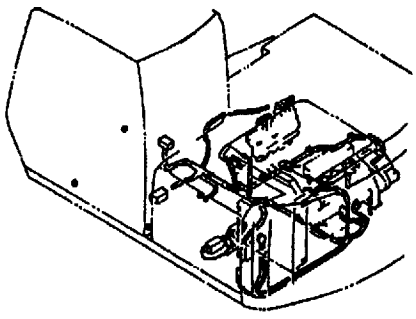
4. Disconnect the wire harness junction box and connectors, and ground. (Wiper motor, radio antenna, cab ground and dome light.)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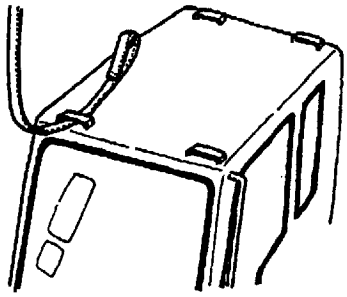
5. After a hoist to the cab using lifting straps.

CAUTION: The approximate weight of the cab is 240 kg (530 lb).

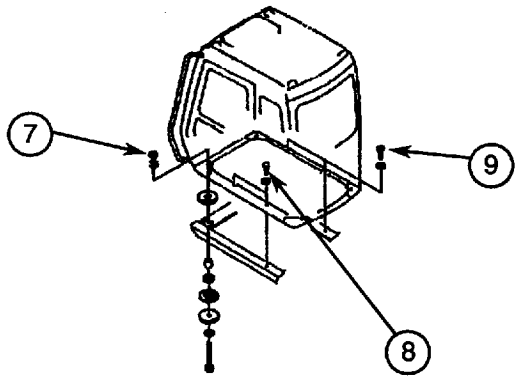


W105-02-01-005

6. Remove nuts (7), bolts (8) and socket bolts (9).

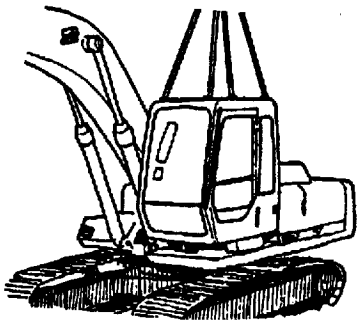
: 17 mm, 24 mm

: 8 mm



W105-02-01-006

7. Carefully remove the cab.

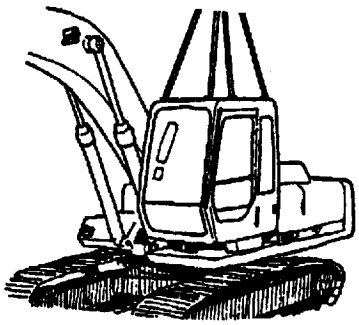


W105-02-01-007

Install Cab

1. After a hoist to the cab using straps.
   Install the cab onto the main frame.

CAUTION: The approximate weight of the cab is 240 kg (530 lb).



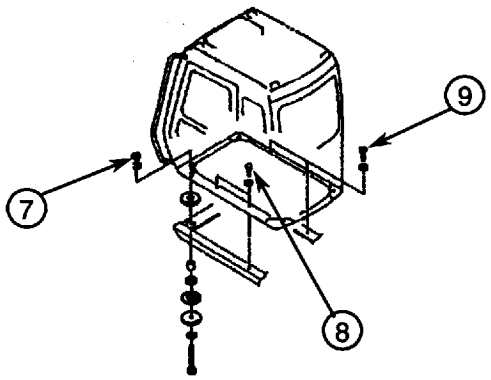
W105-02-01-007

2. Tigeten bolts (8), socket bolts (9), and nuts (7).

(8): 17 mm
: 4.9 N·m (0.5 kgf·m, 36 lbf·ft)

(7): 24 mm
: 205 N·m (21 kgf·m, 152 lbf·ft)

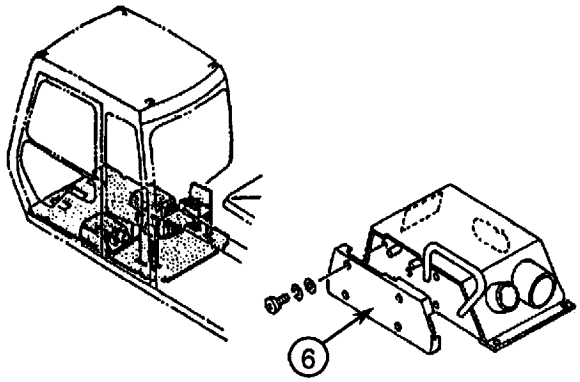
(9): 8 mm
: 64 N·m (6.5 kgf·m, 47 lbf·ft)



W105-02-01-006

3. Install cover (6).

: 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)

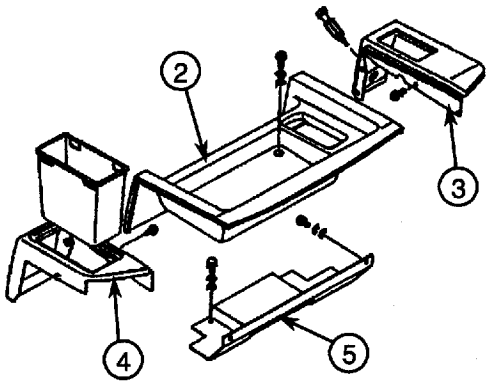


W105-02-01-003

4. Install covers (5), (4), (2) in order.

: 13 mm

: 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

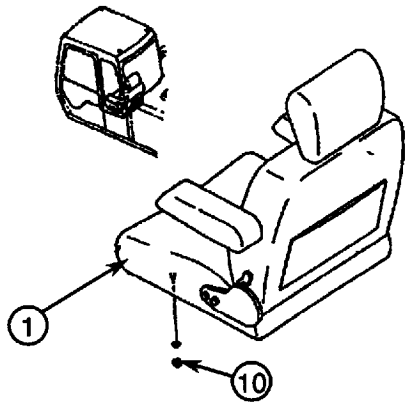


W105-02-01-008

5. Install the seat (1) and tighten nuts (10).

: 13 mm

: 19.5 N·m (2 kgf·m, 14.5 lbf·ft)



W105-02-01-001

6. Connect the wire harness junction box,connectors and ground.