SPECIFICATIONS

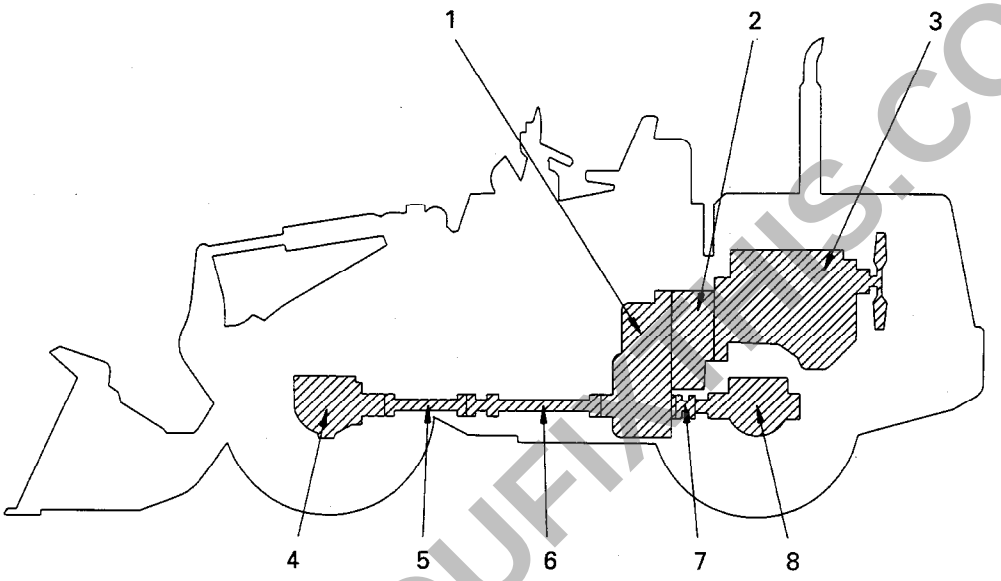
Machine model				WA180-3
Serial No.				50001 and up
Weight	Operating weight		(kg)	8,700
	Distribution (front)		(kg)	3,540
	Distribution (rear)		(kg)	5,160
Performance	Bucket capacity (piled) (with BOC)		(m^3)	1.7
	Rated load		(kg)	2,720
	Travel speed	FORWARD 1st	(km/h)	7.2
		FORWARD 2nd	(km/h)	12.0
		FORWARD 3rd	(km/h)	22.0
		FORWARD 4th	(km/h)	34.5
		REVERSE 1st	(km/h)	7.7
		REVERSE 2nd	(km/h)	12.6
		REVERSE 3rd	(km/h)	22.9
		REVERSE 4th	(km/h)	35.0
	Max. rimpull (Forward)		(N (kg))	81,350(8,300)
	(Reverse)		(N (kg))	76,450(7,800)
	Gradeability		(deg)	25
	Min. turning radius	Center of outside wheel	(mm)	4,650
		Outside portion of chassis	(mm)	5,385
Dimensions	Overall length (with BOC)		(mm)	6,250
	Overall width (chassis)		(mm)	2,320
	Bucket width		(mm)	2,440
	Overall height (top of cab)		(mm)	3,100
	(Bucket raised)		(mm)	4,700
	Wheelbase		(mm)	2,700
	Tread		(mm)	1,820
	Min. ground clearance		(mm)	430
	Height of bucket hinge pin		(mm)	3,545
	Dumping clearance (tip of bucket edge)		(mm)	2,780
	(tip of BOC)		(mm)	2,720
	Dumping reach (tip of bucket edge)		(mm)	945
	(tip of BOC)		(mm)	970

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POWER TRAIN



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1. Transmission
2. Torque converter
3. Engine
4. Front axle
5. Front drive shaft
6. Center drive shaft
7. Rear drive shaft
8. Rear axle

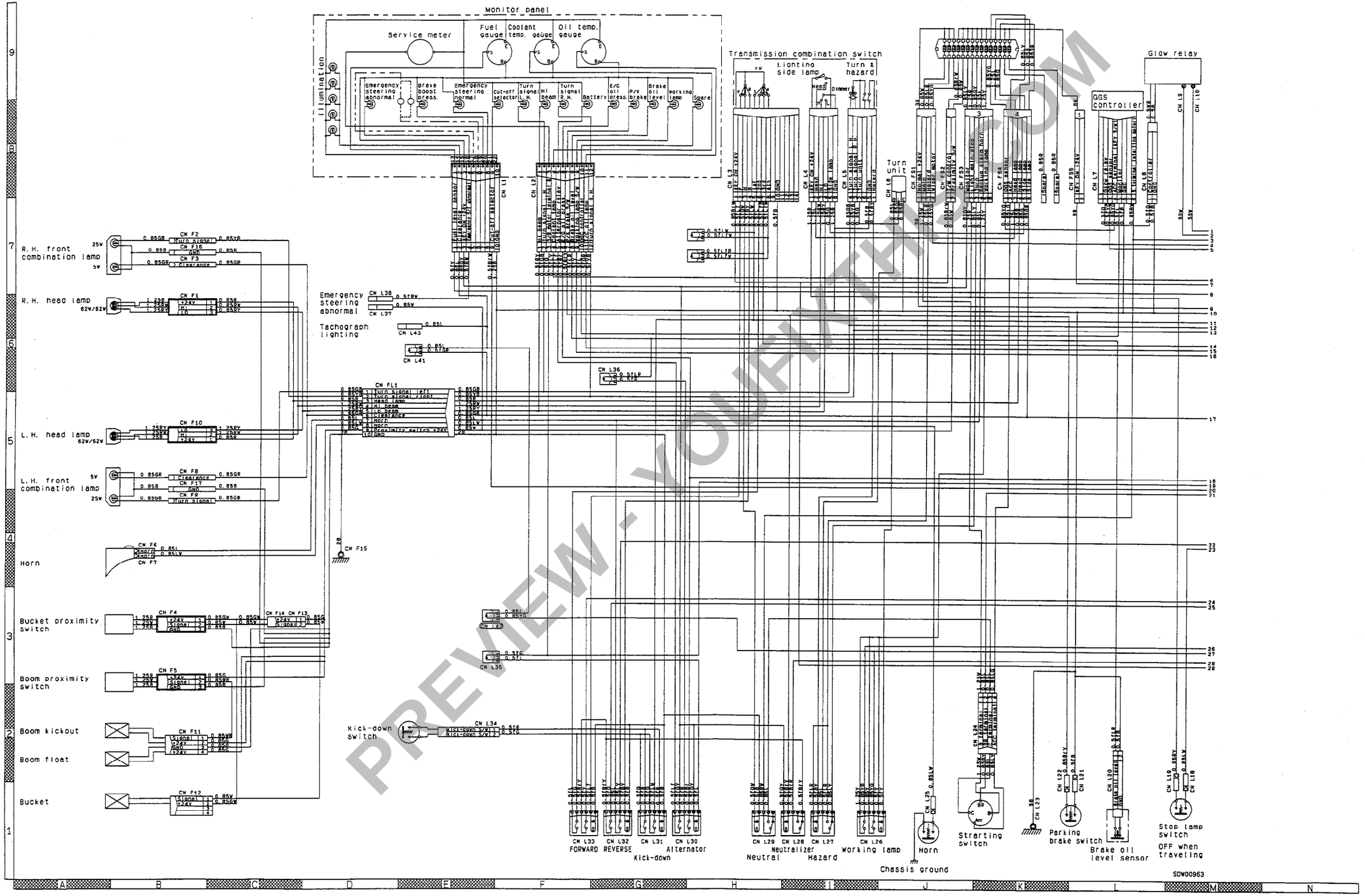
Outline

- The motive force from engine (3) passes through the engine flywheel and is transmitted to torque converter (2), which is connected to the input shaft of transmission (1).
- The transmission has six hydraulically actuated clutches, and these provide four speed ranges for both FORWARD and REVERSE. The transmission speed ranges are selected manually.
- The motive force from the output shaft of the transmission passes through center drive shaft (6), front drive shaft (5) and rear drive shaft (7), and is then transmitted to front axle (4) and rear axle (8) to drive the wheels.

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ELECTRICAL CIRCUIT DIAGRAM (1/2)



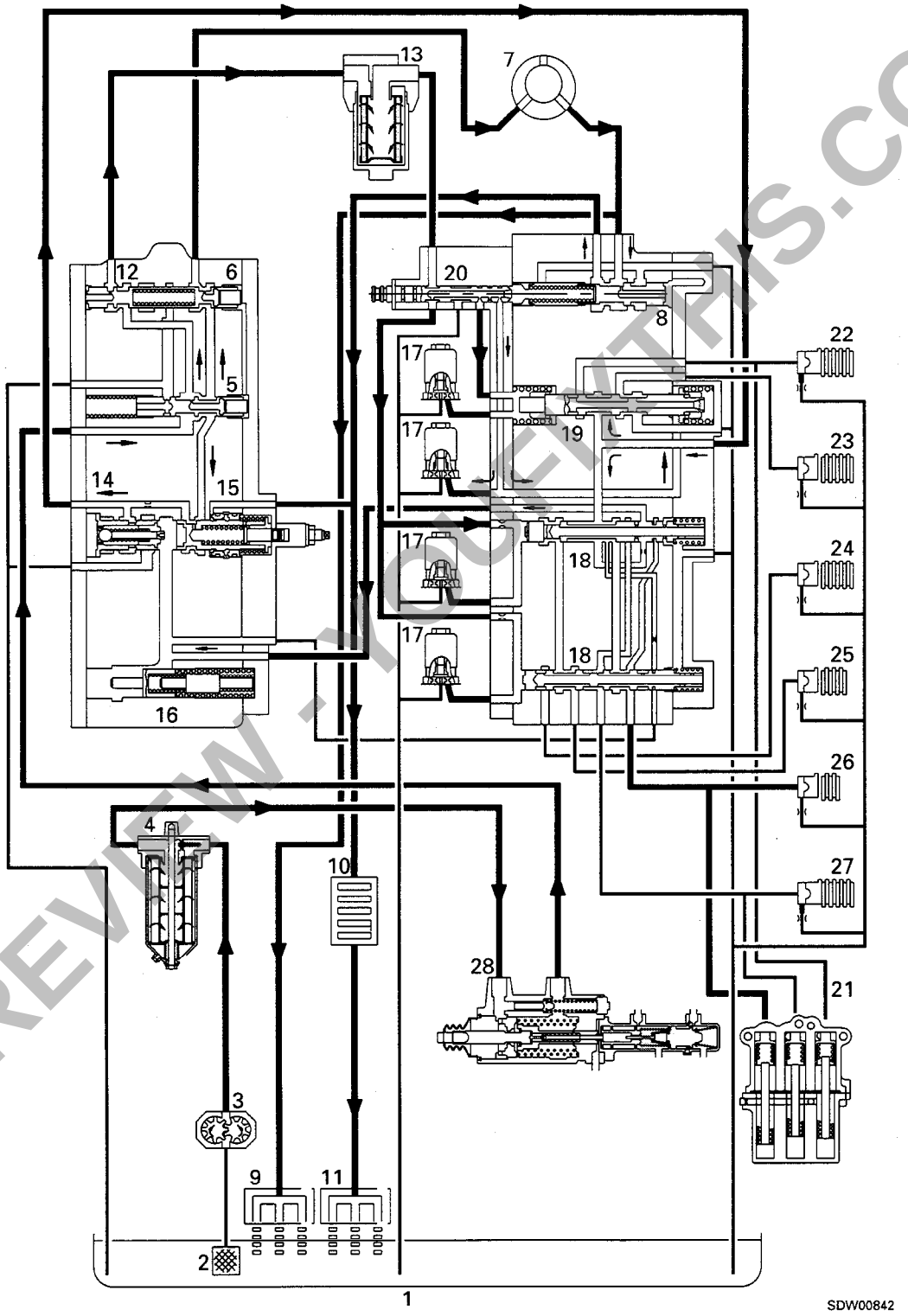
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TRANSMISSION HYDRAULIC SYSTEM DIAGRAM

(Engine low idling, directional lever at Neutral, Speedd lever at 2nd)



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S-1 Starting performance is poor (Starting always takes time)

General causes why starting performance is poor

- Defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air
- Improper selection of fuel
  (At ambient temperature of – 10°C or below, use ASTM D975 No. 1, and – 10°C or above, use ASTM D975 No. 2 diesel fuel.)

★ Battery charging rate.

Ambient temperature \ Charging rate	100%	90%	80%	75%	70%
20°C	1.28	1.26	1.24	1.23	1.22
0°C	1.29	1.27	1.25	1.24	1.23
–10°C	1.30	1.28	1.26	1.25	1.24

- The specific gravity should exceed the value for the charging rate of 70% in the above table.
- In cold weather the specific gravity must exceed the value for the charging rate of 75% in the above table.

Legend
○ : Possible causes (judging from Questions and check items)
◎ : Most probable causes (judging from Questions and Check items)
△ : Possible causes due to length of use (used for a long period)
● : Items to confirm the cause

		Causes: Worn piston ring, cylinder	Defective contact of valve, valve seat	Clogged air cleaner element	Clogged fuel filter, strainer	Clogged feed pump strainer	Defective glow plug	Defective regulator	Defective alternator	Defective or deteriorated battery	Defective injection nozzle	Defective injection timing	Leakage, clogging, air in fuel pump (rack, plunger stuck)	Clogged fuel tank air breather hole	Clogged fuel filter element
Questions	Confirm recent repair history														
	Degree of use: Operated for long period			△	△	△			△						
	Ease of starting: Gradually became worse	◎	◎	○	○	○									
	Ease of starting: Starts when warm						◎		◎						
	Indicator lamp does not light up						◎								
	Engine oil must be added more frequently	◎													
	Replacement of filters has not been carried out according to operation manual			◎	◎	◎				○		○			
	Dust indicator is red			◎											
	Non-specified fuel has been used				○	○				○		○			
Check items	Battery charge lamp is ON						◎	◎							
	Starting motor cranks engine slowly								◎						
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low									◎					
	Engine does not pick up smoothly, and combustion is irregular	○	○							◎					
	Blow-by gas is excessive	◎													
	Match marks on fuel injection pump are out of alignment										◎				
	Mud is stuck to fuel tank cap														○
	When engine is cranked with starting motor 1) Little fuel comes out even when injection pump sleeve nut is loosened											◎			
	When engine is cranked with starting motor 2) Little fuel comes out even when fuel filter air bleed plug is loosened				◎	◎						◎			
	Leakage from fuel piping										○	◎	◎		
	There is hunting from engine (rotation is irregular)				○	○							◎	○	
Troubleshooting	When compression pressure is measured, it is found to be low	●	●												
	When air element is inspected directly, it is found to be clogged			●											
	When fuel filter, strainer are inspected directly, they are found to be clogged				●									●	
	When feed pump strainer is inspected directly, it is found to be clogged					●									
	Glow plug mount does not become warm						●								
	Voltage is 26 – 30V betweem alternator terminal B and terminal E with engine at low idling: Yes							●							
	Voltage is 26 – 30V betweem alternator terminal B and terminal E with engine at low idling: No								●						
	Either specific gravity of electrolyte or voltage of battery is low									●					
	Stop fuel injection to one cylinder at a time. If there is no change in engine speed, that cylinder is not working										●				
	When check is made using delivery method, injection timing is found to be incorrect											●			
	When control rack is pushed, it is found to be heavy or does not return (when blind plug at rear of pump is removed, it can be seen that plunger control sleeve does not move)												●		
	When fuel cap is inspected directly, it is found to be clogged														●
	Remedy	Replace	Repair	Clean	Clean	Clean	Replace	Replace	Replace	Replace	Adjust	Replace	Repair	Clean	

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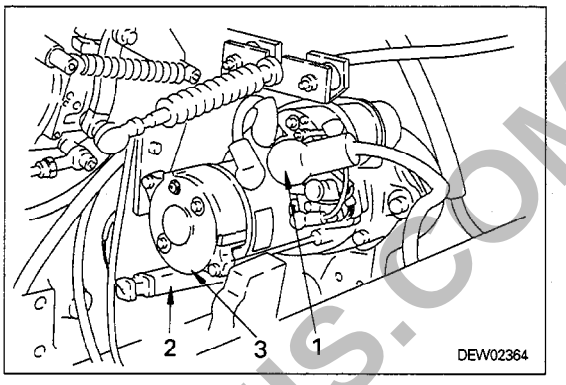
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REMOVAL OF STARTING MOTOR ASSEMBLY

⚠ Disconnect the cable from the negative (–) terminal of the battery.

1. Open engine hood side cover and lock in position.
2. Disconnect wiring (1), then disconnect wiring connector (2).
3. Remove starting motor assembly (3).



INSTALLATION OF STARTING MOTOR ASSEMBLY

- Carry out installation in the reverse order to removal.

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STANDARD TIGHTENING TORQUE

STANDARD TIGHTENING TORQUES OF BOLTS AND NUTS

Use these torques for metric bolts and nuts. (Always use torque wrench).

Thread diameter of bolt	Width across flats	 CDL00372	
mm	mm	Nm	kgm
6	10	13.2±1.4	1.35±0.15
8	13	31±3	3.2±0.3
10	17	66±7	6.7±0.7
12	19	113±10	11.5±1
14	22	177±19	18±2
16	24	279±30	28.5±3
18	27	382±39	39±4
20	30	549±59	56±6
22	32	745±83	76±8.5
24	36	927±103	94.5±10.5
27	41	1320±140	135±15
30	46	1720±190	175±20
33	50	2210±240	225±25
36	55	2750±290	280±30
39	60	3290±340	335±35

Thread diameter of bolt	Width across flats	 CDL00373	
mm	mm	Nm	kgm
6	10	7.85±1.95	0.8±0.2
8	13	18.6±4.9	1.9±0.5
10	14	40.2±5.9	4.1±0.6
12	27	82.35±7.85	8.4±0.8

TIGHTENING TORQUE OF HOSE NUTS

Use these torques for hose nuts.

Nominal No.	Thread diameter	Width across flat	Tightening torque	
	mm	mm	Nm	kgm
02	14	19	24.5±4.9	2.5±0.5
03	18	24	49±19.6	5±2
04	22	27	78.5±19.6	8±2
05	24	32	137.3±29.4	14±3
06	30	36	176.5±29.4	18±3
10	33	41	196.1±49	20±5
12	36	46	245.2±49	25±5
14	42	55	294.2±49	30±5

TIGHTENING TORQUE OF SPLIT FLANGE BOLTS

Use these torques for split flange bolts.

Thread diameter	Width across flat	Tightening torque	
mm	mm	Nm	kgm
10	14	65.7±6.8	6.7±0.7
12	17	112±9.8	11.5±1
16	22	279±29	28.5±3

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10 STRUCTURE AND FUNCTION 10-1

20 TESTING AND ADJUSTING 20-1

30 DISASSEMBLY AND ASSEMBLY 30-1

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SAFETY
SAFETY NOTICE

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for safe machine operation. The service and repair techniques recommended by Komatsu and described in this manual are both effective and safe. Some of these techniques require the use of tools specially designed by Komatsu for the specific purpose.

To prevent injury to workers, the symbol ⚠ is used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the Operation and Maintenance Manual carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
   - Always wear safety glasses when hitting parts with a hammer.
   - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, hand shield, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.

PREPARATIONS FOR WORK

7. Before adding oil or making any repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.
8. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
9. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
10. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

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The affected pages are indicated by the use of the following marks. It is requested that necessary actions must be taken to these pages according to the list below.

Mark	Indication	Action required
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( )	Page to be deleted	Discard

Pages having no marks are not revised at this time.

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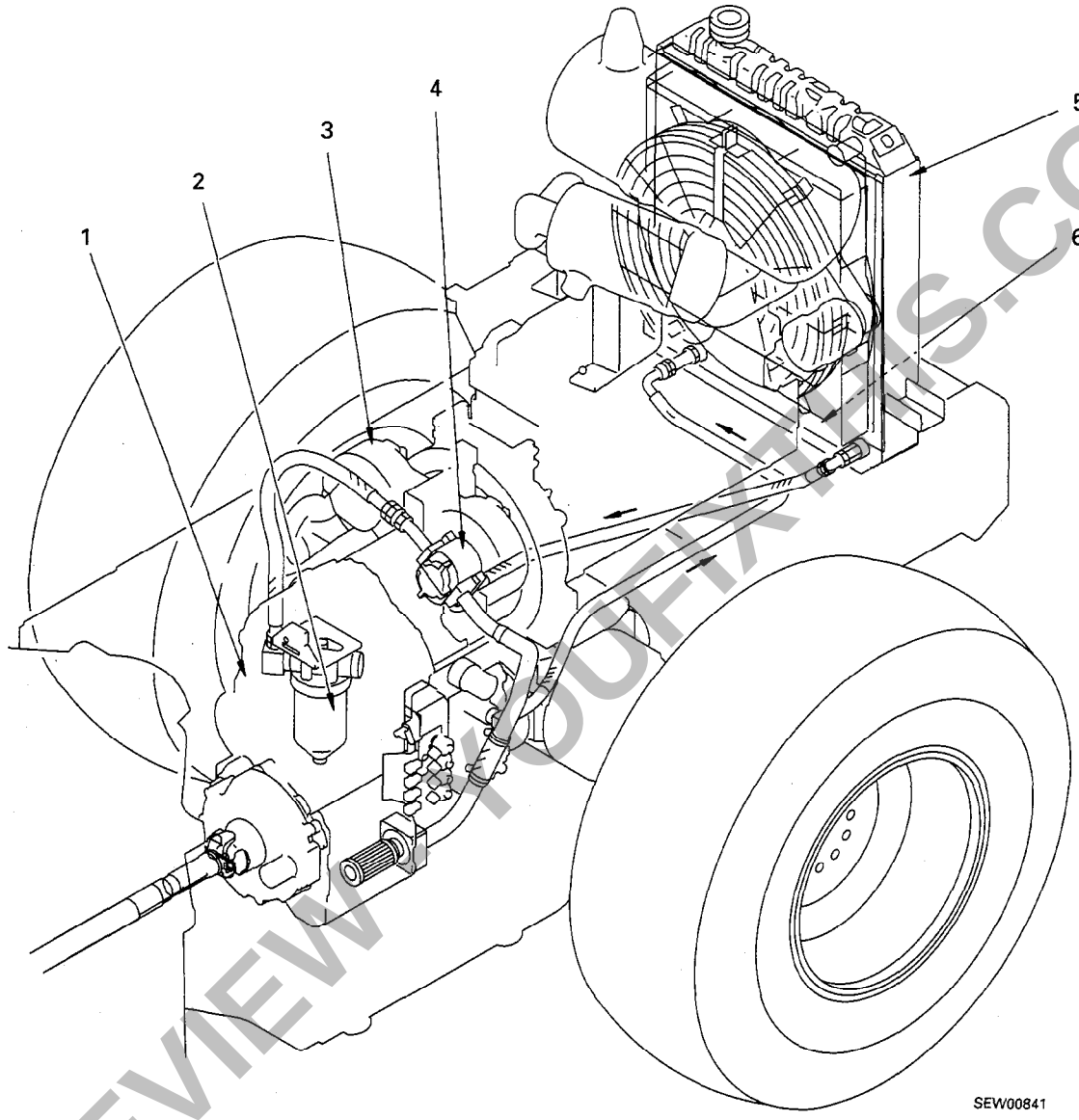
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TORQUE CONVERTER, TRANSMISSION PIPING



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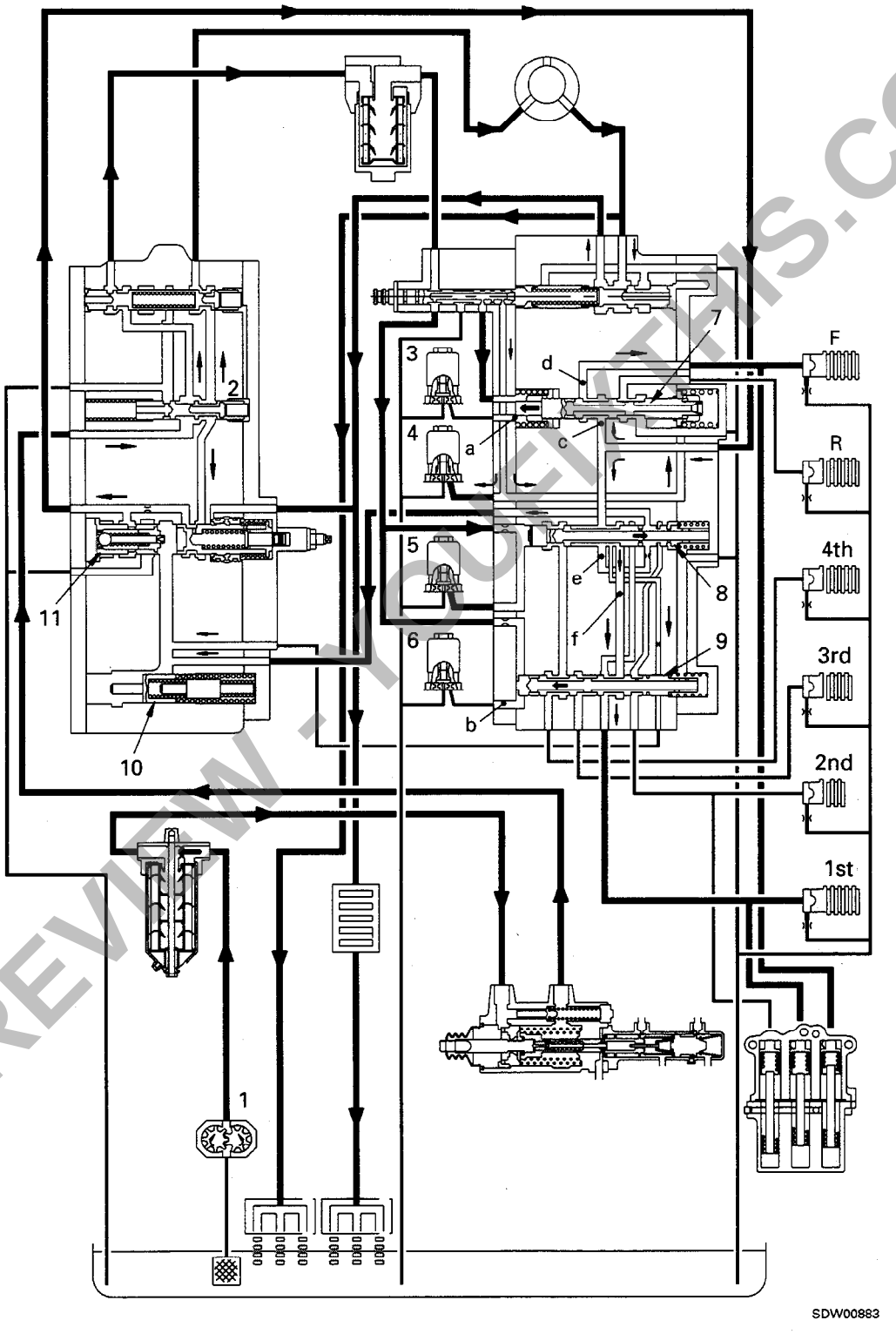
1. Transmission
2. Oil filter
3. Torque converter
4. Torque converter charging pump
5. Radiator
6. Oil cooler

Outline

- The oil from the torque converter charging pump passes through the oil filter and flows to the brake booster. From the brake booster, it flows to the main regulator valve and is divided into three lines: the torque converter circuit, clutch circuit, and solenoid pilot circuit.
- The oil flowing to the torque converter circuit enters the torque converter. The oil pressure is adjusted by the torque converter outlet port valve, the oil is cooled by the oil cooler, lubricates the transmission and returns to the transmission case.

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OPERATION OF FORWARD 1ST

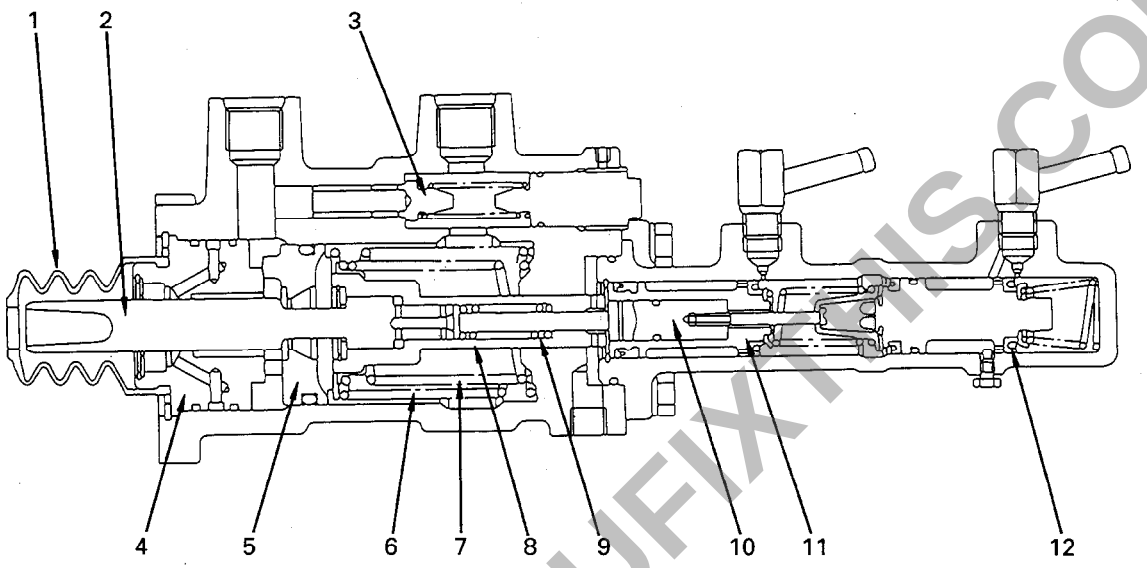


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BRAKE BOOSTER



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1. Dust cover
2. Spool
3. Relief valve
4. Cylinder cover
5. Power piston
6. Return spring (for power piston)
7. Return spring (for connector)
8. Connector
9. Reaction spring
10. Reaction piston
11. Secondary piston
12. Primary piston

Outline

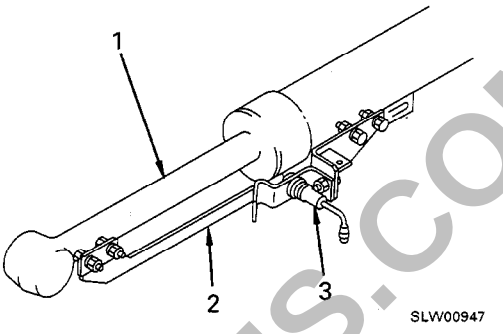
- The brake booster is a boosting system to increase the braking force. It increases the pressure in the master cylinder in proportion to the operating force by using the oil pressure delivered from the oil pump.

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BUCKET POSITIONER

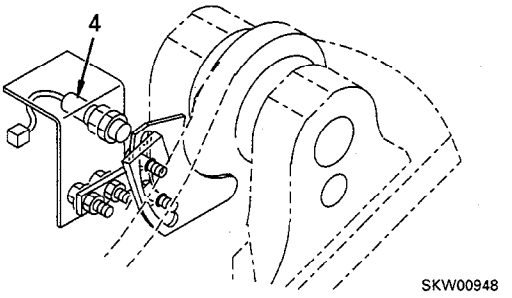
- The bucket positioner is an electrically actuated system which is used to set the bucket to the desired angle when the bucket is moved from the DUMP position to the TILT position. When the bucket reaches the desired position, the bucket lever is returned from the TILT position to the HOLD position, and the bucket is automatically set to the suitable digging angle.
- Lever (2) is secured to bucket cylinder rod (1) by bolts. In addition, proximity switch (3) fixed to the cylinder by bolts.
- When the bucket is moved from the DUMP position to the TILT position, the bucket cylinder rod moves to the left, and at the same time, lever (2) also moves to the left. Proximity switch (3) separates from lever (2) at the desired position, and the bucket lever is returned to neutral.



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BOOM KICK-OUT

- The boom kick-out is an electrically actuated system. It acts to move the boom lever to the HOLD position and stop the boom at the desired position before the boom reaches the maximum height.
- Plate is fixed to the boom. In addition, proximity switch (4) is fixed to the frame.
  When the boom is moved from the LOWER position to the RAISE position, the boom rises, and when it reaches the desired position, the proximity switch and lever come together and the system is actuated to return the boom lever to the HOLD position.

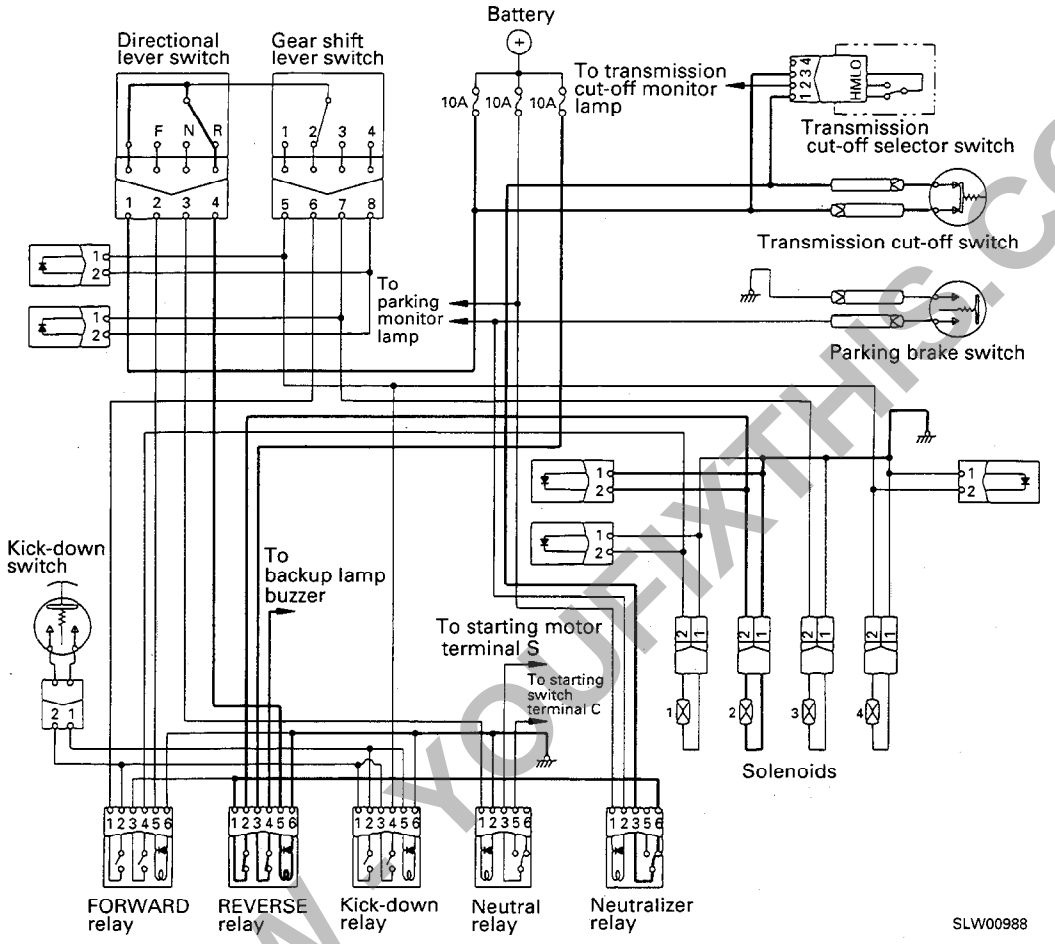


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KICK-DOWN SWITCH ACTUATION CANCELED (1)

(Directional lever at N or R)



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- If the directional lever is moved to the R position, the contacts of terminal F are turned OFF, so the current flowing from FORWARD relay terminals 5 - 6 → ground stops flowing, the FORWARD relay is reset, and FORWARD relay terminals 1 and 2, and terminals 3 and 4 separate.
- When FORWARD relay terminals 1 and 2 separate, the electric current stops flowing from kick-down relay terminals 1 - 2 → terminals 5 - 6 → ground, the kick-down relay is reset, and the self-hold circuit is canceled. (The self-hold circuit is also canceled at the N position.)
- When the kick-down relay is reset, the electric current flowing from kick-down relay terminal 3 - 4 → solenoid (4) → ground stops flowing and the actuation of solenoid (4) is canceled.
- When the directional lever is moved to the R position, electric current flows from battery ⊕ → directional lever switch terminals 1 - 4 → REVERSE relay terminals 5 - 6 → ground, so REVERSE relay terminals 1 and 2, and terminals 3 and 4 are connected, and solenoid (2) is actuated.
- Therefore, there is no electric current flowing to solenoids 1, 3, or 4, so the transmission is set to R2, the position of the gear shift lever.

Solenoid actuation table

	F1	F2	F3	F4	N	R1	R2	R3	R4
1	○	○	○	○					
2						○	●	○	○
3			○	○				○	○
4	○			○		○			○

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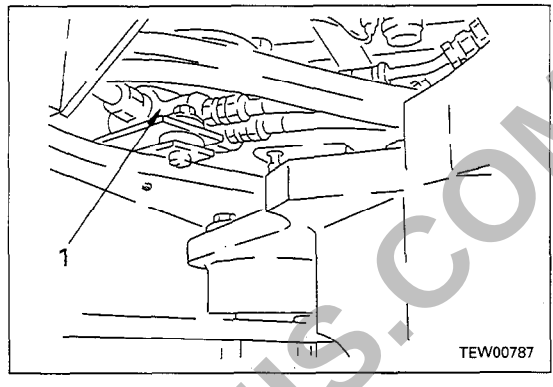
Adjusting

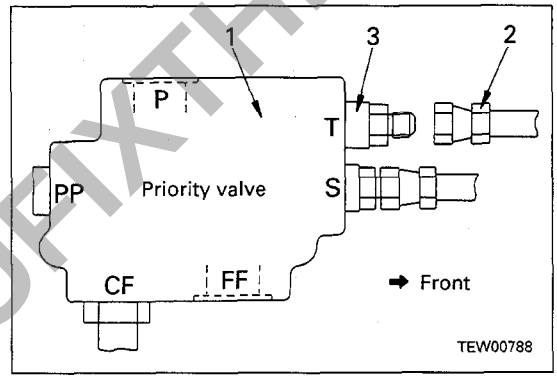
⚠ Always stop the engine before adjusting the oil pressure.

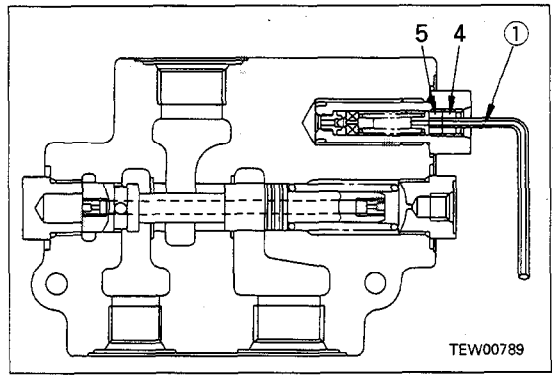
1. Stop the engine.
2. Remove hose (2) and union (3) from port **T** of priority valve (1).
3. Remove double screw (4).
4. Turn adjustment screw (5) to adjust.
   - ★ Pressure adjustment for one turn of adjustment screw: Approx. 6.9 MPa (70 kg/cm^2)
   - ★ Turn the adjustment screw to adjust the set pressure as follows.
     TIGHTEN screw to RAISE pressure
     LOOSEN screw to LOWER pressure
   - ★ Tool ① for turning adjustment screw: Size 7/32 inch, hexagon wrench
   - ★ If the relief pressure cannot be measured accurately, do not try to adjust the pressure.

   kgm Adjustment screw (5): **4.5 ± 2.3 Nm (0.46 ± 0.23 kgm)**

   kgm Double screw (4): **14.7 ± 2.0 Nm (1.5 ± 0.2 kgm)**







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S-4 Engine stops during operations

General causes why engine stops during operations

- Seized parts inside engine
- Insufficient supply of fuel
- Overheating
  - ★ If there is overheating and insufficient output, carry out troubleshooting for overheating.
- Failure in power train
  - ★ If the engine stops because of a failure in the power train, carry out troubleshooting for the chassis.

Legend
○ : Possible causes (judging from Questions and check items)
◎ : Most probable causes (judging from Questions and Check items)
△ : Possible causes due to length of use (used for a long period)
● : Items to confirm the cause.

			Causes: Broken, seized piston connecting rod	Broken, seized crankshaft bearing	Broken valve system (valve, rocker lever, etc.)	Broken, seized gear train	Broken pump auxiliary equipment	Broken fuel pump drive shaft, key	Lack of fuel	Clogged fuel filter, strainer	Clogged feed pump strainer	Broken, seized feed pump piston	Clogged, leaking fuel piping	Clogged fuel tank air breather hole	Defective injection pump (rack, plunger stuck)	Failure in chassis power train
Questions	Confirm recent repair history															
	Degree of use	Operated for long period							△	△						
	Condition when engine stopped	Abnormal noise was heard and engine stopped suddenly	◎	◎	◎	◎	◎	◎			○			○	◎	
		Engine overheated and stopped	◎	○			○									
		Engine stopped slowly						◎	○	○						
		There was hunting and engine stopped						◎	○	○			○			
	Fuel gauge lamp lights up							◎								
	Fuel tank is found to be empty							◎								
	Replacement of filters has not been carried out according to operation manual								◎	◎						
	Non-specified fuel has been used								○	○	○			○		
Check items	When feed pump is operated, there is no response or it is heavy								○	○		◎				
	Mud is stuck to fuel tank cap												◎			
	Engine turns, but stops when transmission control lever is operated															◎
	Try to turn by hand using barring tool	Does not turn at all	◎	◎												
		Turns in opposite direction			◎											
		Moves amount of backlash				◎	◎									
		Shaft does not turn						◎								
	Rust and water are found when fuel is drained								◎	◎						
	Metal particles are found when oil is drained		◎	◎					○	○						
Troubleshooting	Remove oil pan and check directly		●	●												
	Remove head cover and check directly				●											
	When gear train is inspected, it does not turn					●										
	Turns when pump auxiliary equipment is removed						●									
	When fuel filter, strainer are inspected directly, they are found to be clogged								●							
	When feed pump strainer is inspected directly, it is found to be clogged									●						
	Check feed pump directly										●					
	When control rack is pushed, it is fond to be heavy or does not return													●		
		Remedy	Replace	Replace	Replace	Replace	Replace	Replace	Add	Clean	Clean	Replace	Repair	Clean	Replace	–
			Carry out troubleshooting in chassis volume													

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H-13 Bucket shakes during loading operation (Main control valve at HOLD)

Checks before troubleshooting
- Is there play in the work equipment linkage pin, bushing? (Is there any abnormal noise?)

Cause
- Defective bucket cylinder piston seal
- Defective operation of safety valve (with suction valve) at bucket cylinder rod end. If any other problem occurs at the same time, carry out troubleshooting according to the nature of the problem.

H-14 Bucket dumps momentarily when control lever is operated from HOLD to TILT

Checking problem
- When the engine is run at low idling and the bucket control lever is operated slowly from **HOLD** to **TILT**, the bucket dumps momentarily under its own weight. When the lever is operated fully to the **TILT** position, the condition returns to normal.

Cause
- Defective seating of check valve for bucket spool in main control valve

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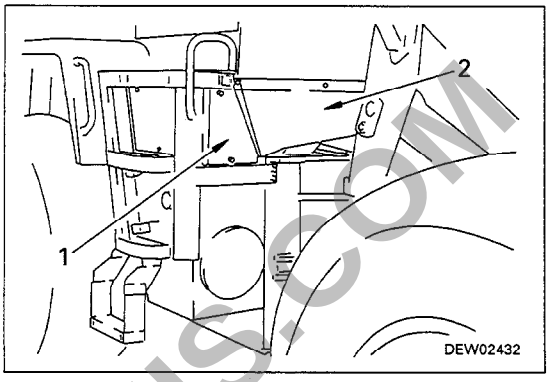
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REMOVAL OF TORQUE CONVERTER, TRANSMISSION ASSEMBLY

⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the bucket to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.

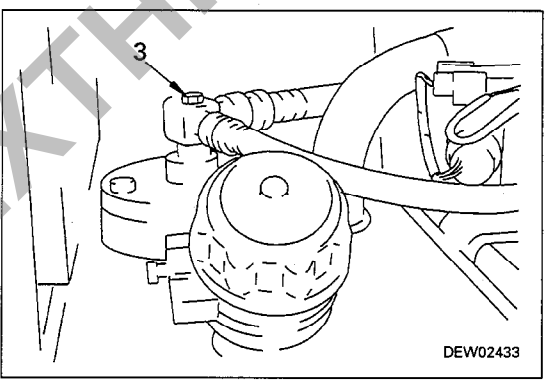
★ Remove cover (1) at the top of the hydraulic tank on the right side, then remove covers (2) on the left and right under the floor.



⚠ Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank. Then operate the control levers several times to release the remaining pressure in the hydraulic piping.

- Loosen plug (3) to prevent the oil inside the hydraulic tank from flowing out.

★ Disconnect the cable from the negative (–) terminal of the battery.



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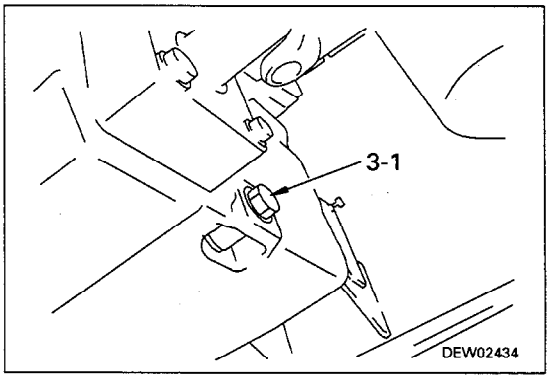
★ **Machines equipped with air conditioner**

- Release the gas at a point far from the compressor. Loosen the hose connection slightly to release the gas.

1. Draining oil

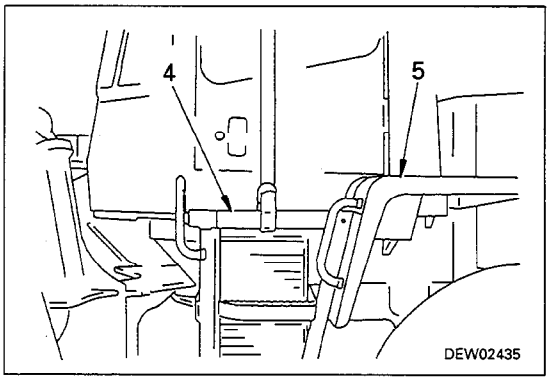
Loosen drain plug (3-1) and drain transmission oil.

Transmission oil: **28.0** ℓ



2. Cover

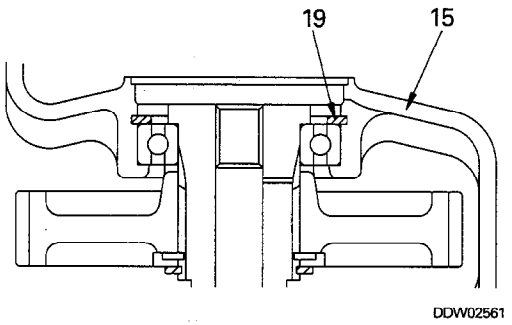
1) Sling left ladder rail (4), then remove mounting bolts, and lift off together with center fender (5).
   - ★ Carry out the operation in the same way on the right side.
   - ★ When lifting off the ladder, be careful of the center of gravity.
   - ★ Be careful not to damage the cab glass.



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4) Turn over rear housing (15), and assemble snap ring (19) at pump mount end.



★ Carry out the operation in the same way at the work equipment pump end.

13. Torque converter

Using eyebolts, raise rear housing (15), set to mount of torque converter, then tighten mounting bolts (64).

★ Install guide pins to the torque converter.
★ Align the mounting bolt hole properly, and be careful of the meshing with the pump gear when installing.
★ When installing, align the match marks made during assembly.

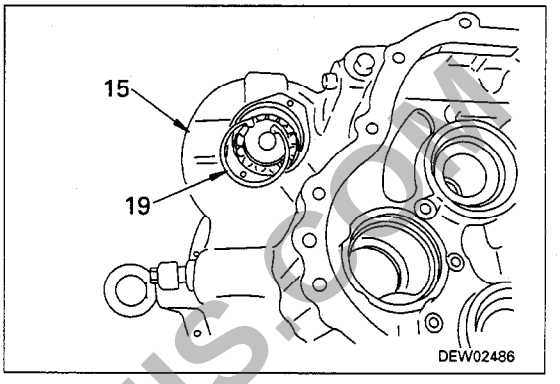
kgm Mounting bolt: **112.8 ± 9.8 Nm (11.5 ± 1.0 kgm)**

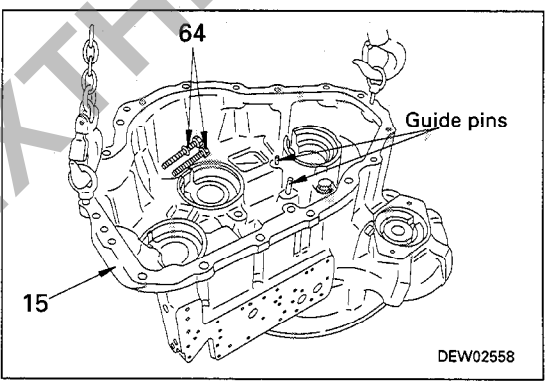
14. Rear housing

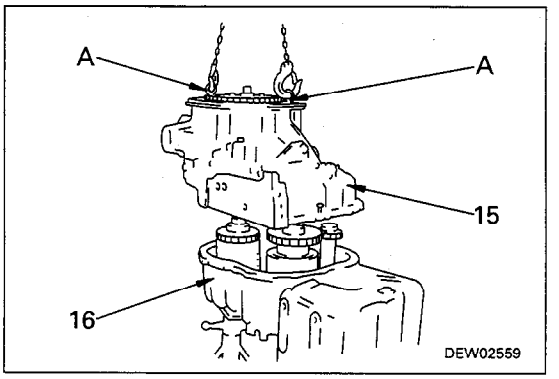
1) Using tool **A**, raise rear housing (15), and assemble to front housing (16).
★ Install guide bolts (**M** = 10, **P** = 1.5, ℓ = 150 mm) to the front housing.

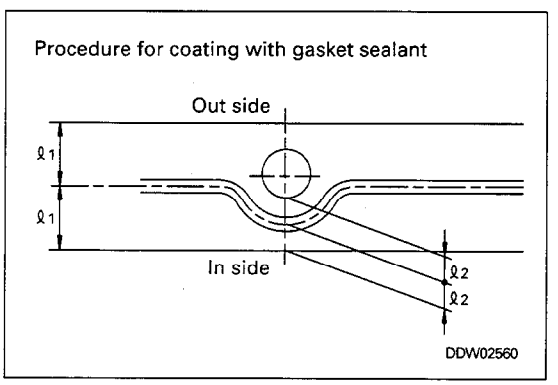
Mating surface of housing: **Gasket sealant (Three Bond 1207B)**

★ Be careful not to coat with too much gasket sealant, and be sure that the gasket sealant is not squeezed out to the inside of the case.









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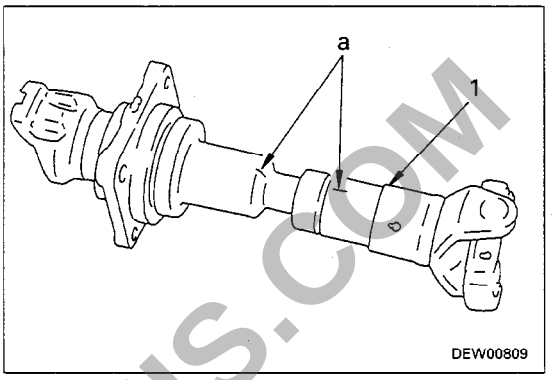
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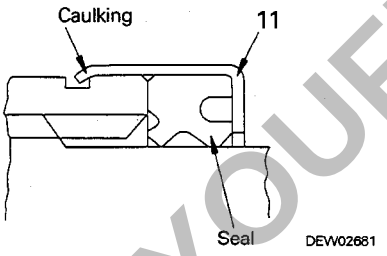
DISASSEMBLY OF DRIVE SHAFT

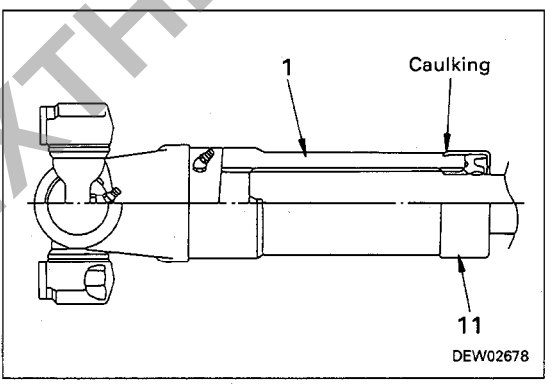
1. Front drive shaft

1) Remove coupling and tube (1).
   ★ Make match marks "**a**" before removing so that the direction of the coupling does not change.

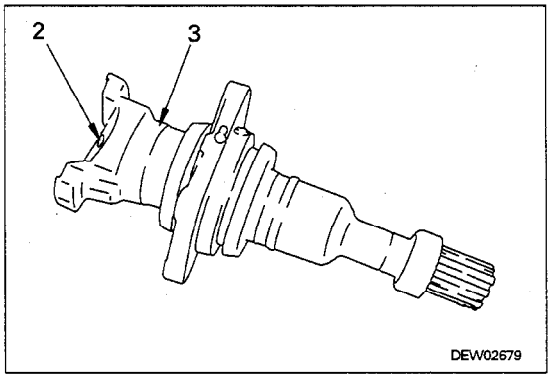


   ★ Cover (11) is caulked at 4 places with a punch, so do not remove it unless necessary.
   ★ When removing cover (11), be careful not to damage cover (11) and tube (1).
   ★ When removing, use a screwdriver to raise the caulking.

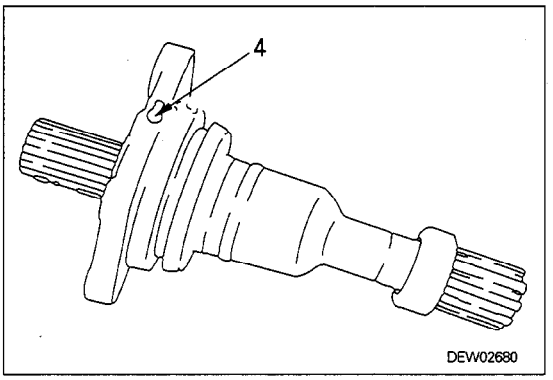




2) Loosen bolt (2), then remove coupling (3) and retainer.
   ★ Make match marks before removing so that the direction of the coupling does not change.



3) Using a press, remove flange bearing (4).



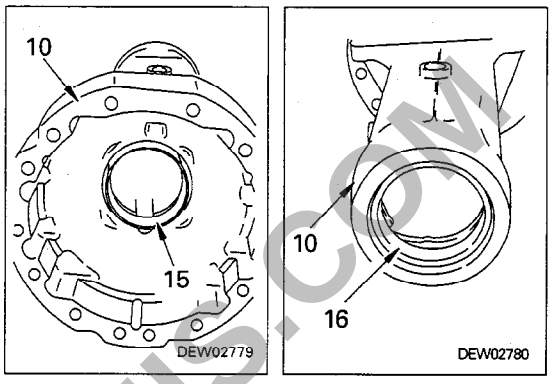
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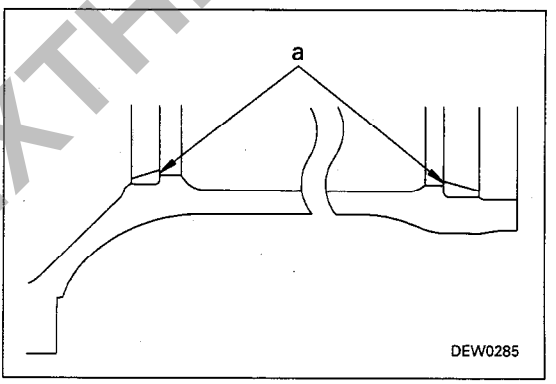
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ASSEMBLY OF AXLE HOUSING

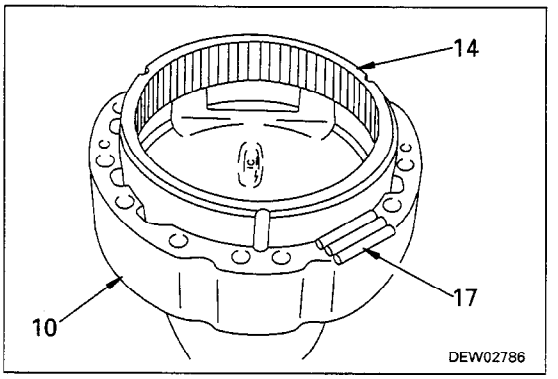
1. **Axle housing**
   Press fit bearing cups (15) and (16) in axle housing (10).
   ★ After press fitting the cups, check that there is no clearance at portion "**a**".





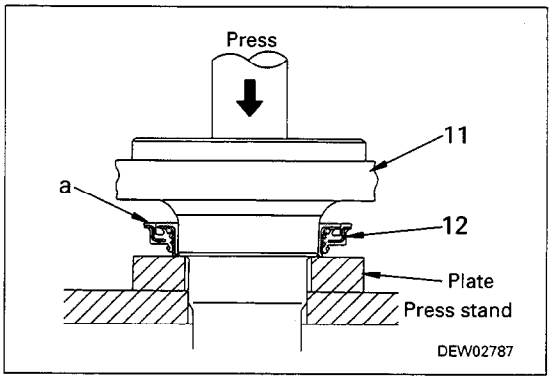
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2. **Ring gear**
   Press fit ring gear (14) in axle housing (10), then insert pins (17).
   ★ Cool ring gear (14) in dry ice to a temperature of about –30°C before press fitting.
   ★ Align the pin holes of the housing and ring gear when assembling.
   ★ Press fit the ring gear horizontally and be careful not to fit it at an angle.



3. **Axle shaft**
   1) Using a press on axle shaft (11), press fit oil seal (12).
      ★ Do not use a hammer as it may cause deformation.
      ★ Coat the press-fitting portion of the sleeve surface "**a**" thinly with oil.

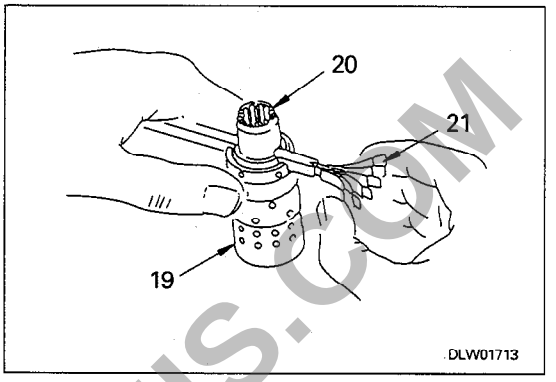
      Press-fitting portion of sleeve: **Axle oil**



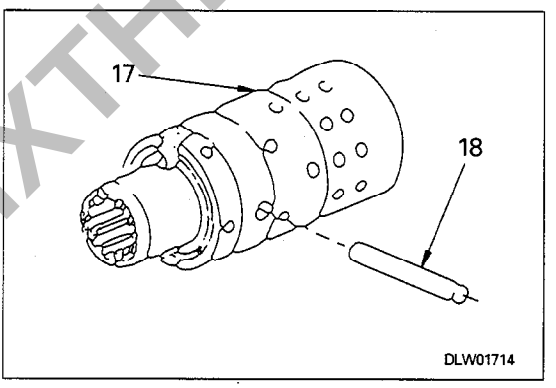
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6. Align spring groove positions of spool (20) and sleeve (19), and set on flat plate, then insert spring (21) in spring groove.
★ Set so that the notches at both ends are at the bottom.

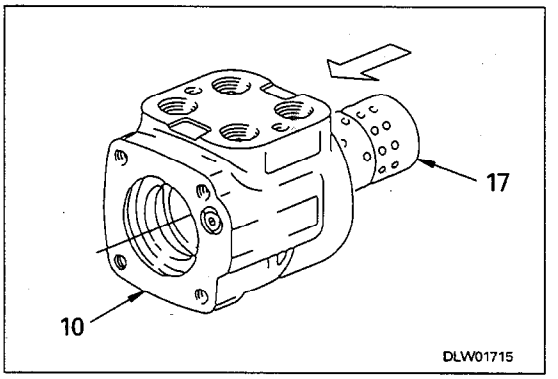


7. Insert pin (18) in spool and sleeve assembly (17).



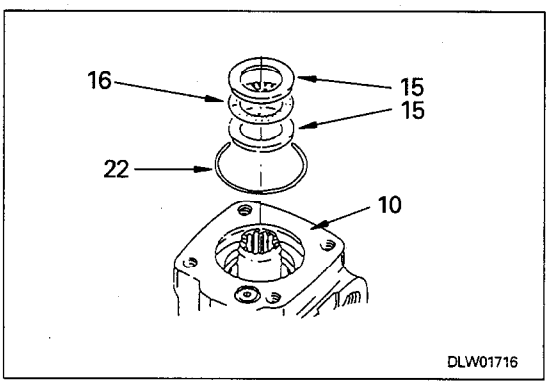
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8. Insert spool and sleeve assembly (17) in housing (10) in the direction of the arrow.
1) Keep pin horizontal and rotate to left and right a little at a time to insert.
★ Be extremely careful not to get it caught.
2) Make the spool and sleeve assembly flush with the rear end face of the housing.
★ If it is inserted beyond the end face, the pin will fall out.
3) Check that spool and sleeve rotate smoothly inside housing.



9. Install O-ring (22) to housing (10).

10. Fit 2 bearing races (15) and thrust needle (16) in case (10).

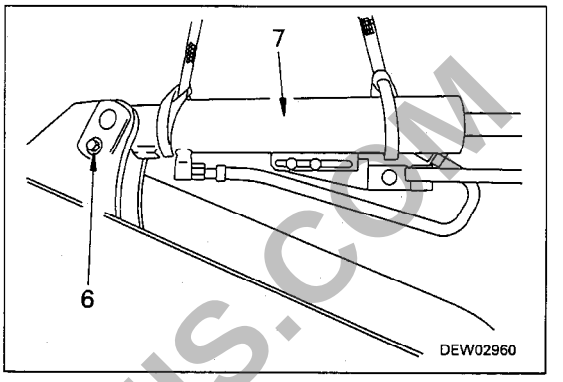


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4. **Bucket cylinder** ※ 3
   1) Remove lock bolt, then remove bottom pin (6).
      ★ If there are shims installed, check the number and thickness of the shims, and keep in a safe place.
   2) Lift off bucket cylinder (7).
      ★ Be careful not to damage the cylinder rod portion.

   kg Bucket cylinder: **56 kg**



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INSTALLATION OF BUCKET CYLINDER

- Carry out installation in the reverse order to removal.

※ 1

⚠ When aligning the position of the pin hole, use a bar. Never insert your fingers in the pin hole.

- **Bucket positioner**

★ For details of adjusting the bucket positioner, see TESTING AND ADJUSTING.

※ 2

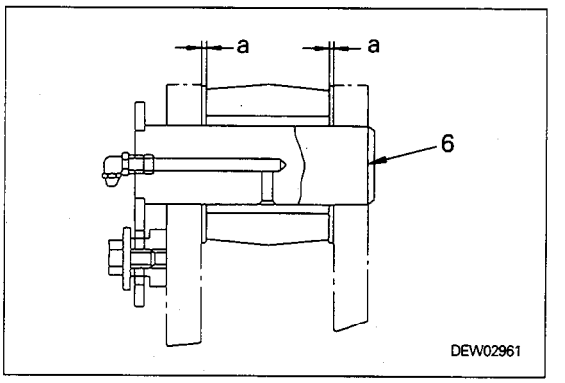
★ Install the hoses without twisting or interference.

※ 3

⚠ When aligning the position of the pin hole, use a bar. Never insert your fingers in the pin hole.

★ Align the pin hole at the cylinder bottom, assemble shims so that the total for clearance **"a"** between the cylinder and frame is within the standard value, then assemble pin (6) and lock with the bolt.

★ Clearance **"a"**: Max. 1.5 mm



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Unit: mm

No.	Check item	Criteria			Remedy
		Standard size	Standard clearance	Clearance limit	
9	Thickness of 4th clutch thrust washer	3.0	±0.1	2.7	Replace
10	Thickness of 3rd clutch thrust washer	3.0	±0.1	2.7	
11	Thickness of 4th clutch spacer	5.0	±0.05	—	
12	Thickness of 3rd clutch spacer	5.0	±0.05	—	
13	End play of 4th gear	0.07 – 0.93			
14	End play of 3rd gear	0.04 – 1.16			

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