TOYOTA

REPAIR MANUAL

4SDK3,4,5,6,8,10

Pub. No. CE632-1

FOREWORD

This manual covers the service procedures of the TOYOTA SKID STEER LOADER 4SDK3 ~ 10. Please use this manual for providing quick, correct servicing of the corresponding forklift models.

Since 4SDK5 ~ 8 are subject to model changes with much improvement, this manual mainly covers service instructions concerning 4SDK5 ~ 8. For 4SDK3, 4 and 10, supplements explaining only the improved points are edited and added to the end of this manual.

This manual deals with the above models as of January 1997. Please understand that disagreement can take place between the descriptions in the manual and actual vehicles due to change in design and specifications. Any change or modifications thereafter will be informed by TOYOTA Industrial Equipment Parts & Service News.

For the service procedures of the mounted engine, read the repair manuals listed below as reference together with this manual.

(Reference)

Repair manuals related to this manual are as follows:

TOYOTA INDUSTRIAL EQUIPMENT 3TN66, 3TNE68 ENGINE
REPAIR MANUAL (No.CE612-1)

TOYOTA INDUSTRIAL EQUIPMENT 3TNE84 ENGINE
REPAIR MANUAL (No.CE633)

TOYOTA INDUSTRIAL EQUIPMENT 1DZ ENGINE
REPAIR MANUAL (No.CE618)

TOYOTA INDUSTRIAL EQUIPMENT 2Z ENGINE
REPAIR MANUAL (No.CE625-1)

TOYOTA INDUSTRIAL EQUIPMENT 3SDK3·4·5
REPAIR MANUAL (No.CE611)

TOYOTA INDUSTRIAL EQUIPMENT SDK10
REPAIR MANUAL (No.CE616)

TOYOTA Material Handling Company
A Division of TOYOTA INDUSTRIES CORPORATION

SECTION INDEX

4SDK5·6·8

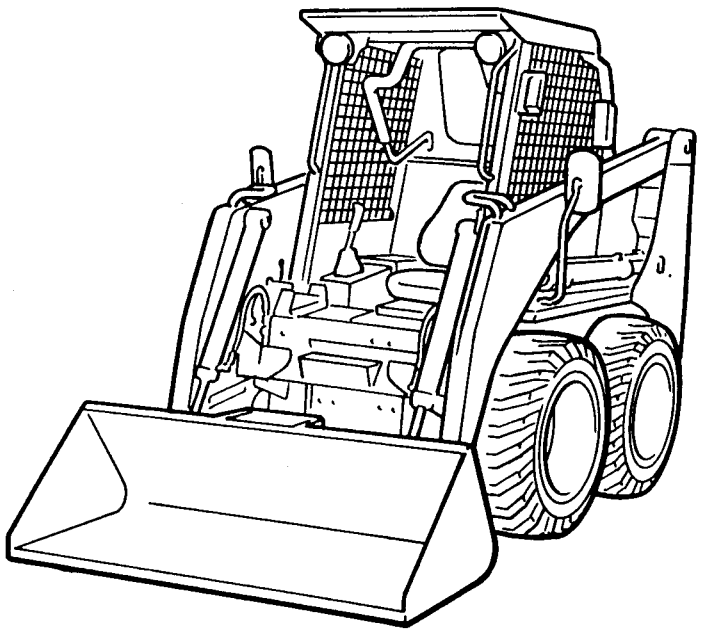
4SDK3·4

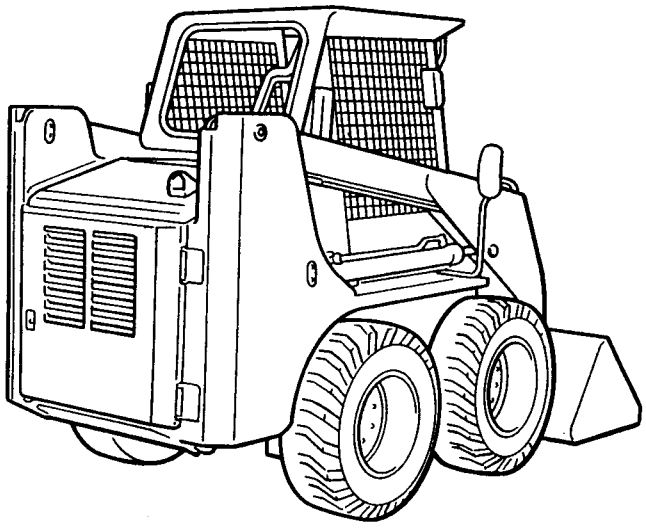
4SDK10

WIRING DIAGRAM

GENERAL

EXTERIOR VIEWS



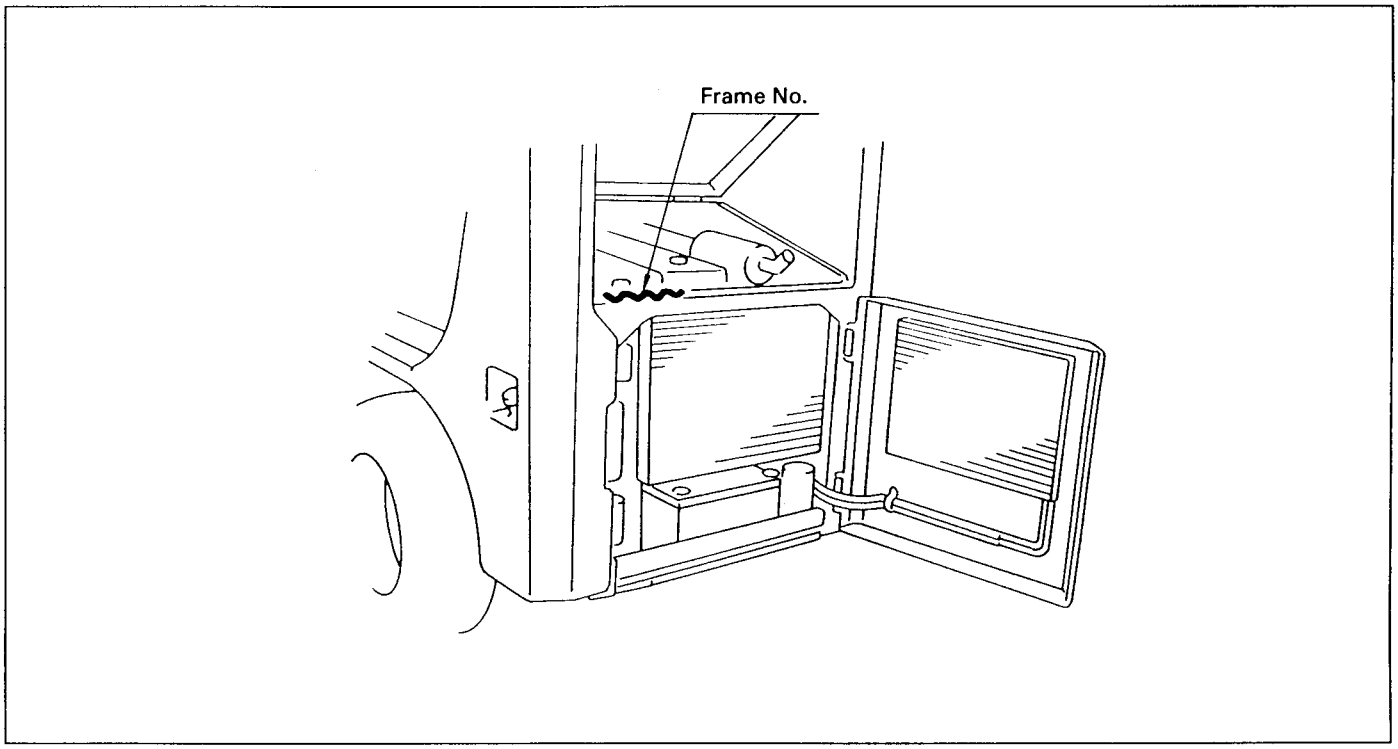


VEHICLE MODEL

Model	Engine	Operating Load	Bucket Capacity	Machine Weight
4SDK5	YANMAR 3TNE84 Diesel Engine	430 kg (948 lb)	0.22 m^3	1650 kg (3638 lb)
4SDK6	YANMAR 3TNE84 Diesel Engine	500 kg (1103 lb)	0.28 m^3	2240 kg (4939 lb)
4SDK8	TOYOTA 1DZ Diesel Engine	600 kg (1320 lb)	0.31 m^3	2310 kg (5094 lb)

FRAME NUMBER

Frame No. Punching Position



Frame No. Punching Format

Model	Engine	Punching format
4SDK5	YANMAR 3TNE84	4SDK5-10011
4SDK6	↑	4SDK6-10011
4SDK8	TOYOTA 1DZ	4SDK8-10011

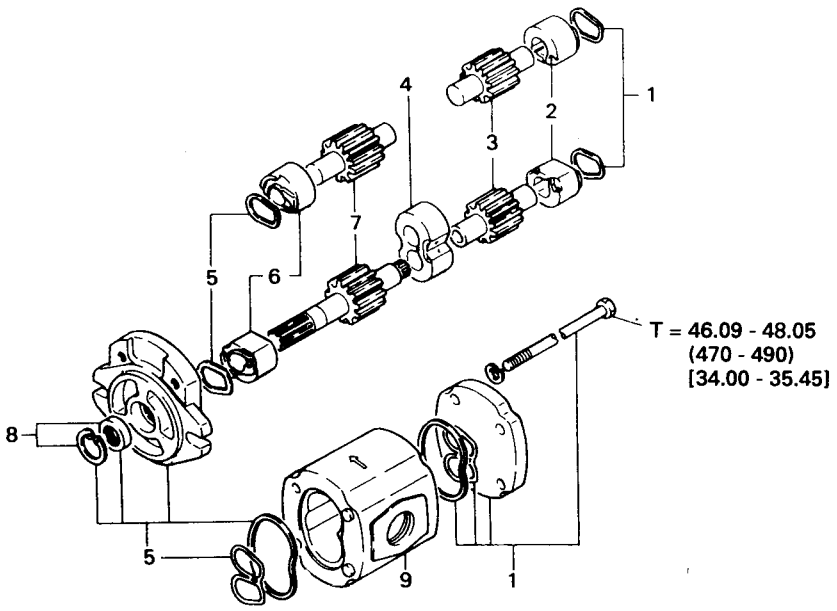
HOW TO READ THIS MANUAL

EXPLANATION METHOD

1. Operation procedure
   (1) The operation procedure is described in either pattern A or pattern B below.
   Pattern A: Explanation of each operation step with an illustration.
   Pattern B: Explanation of operation procedure by indicating step numbers in one illustration, followed by explanation of cautions and notes summarized as point operations.

Example of description in pattern B

DISASSEMBLY·INSPECTION·REASSEMBLY Tightening torque unit T = N·m (kgf-cm) [ft-lbf]



Disassembly Procedure

1 Remove the cover. **[Point 1]**

2 Remove the bush. **[Point 2]** ← Operation explained later

3 Remove the gear.

Point operations Explanation of key point for operation with an illustration

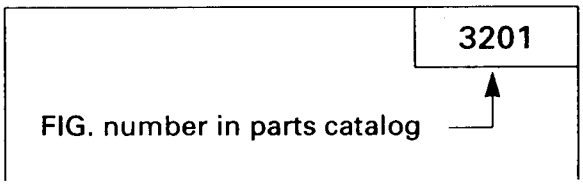
[Point 1]
Disassembly: Put a match mark when removing the pump cover.

[Point 2]
Inspection: Measure the bush inside diameter.
Bush inside diameter limit: 19.12 mm (0.7528 in)

2. How to read components figures

(1) The components figure uses the illustration in the parts catalog for the vehicle model. Please refer to the catalog for checking the part name.
The number at the right shoulder of each components figure indicates the Fig. number in the parts catalog.

(Example)



3. Matters omitted in this manual

(1) This manual omits description of the following jobs, but perform them in actual operation:
① Cleaning and washing of removed parts as required
② Visual inspection (partially described)

TERMINOLOGY

Caution:
Important matters of which negligence may cause accidents. Be sure to observe them.

Note:
Important items of which negligence may cause accidents, or matters in operation procedure requiring special attention.

Standard: Values showing allowable range in inspection and adjustment.
Limit: Maximum or minimum allowable value in inspection or adjustment.

ABBREVIATIONS

Abbreviation (code)	Meaning	Abbreviation (code)	Meaning
ABDC	After bottom dead center	OR	Off-road
ASSY	Assembly	PR	Ply reading
ATDC	After top dead center	RH	Right hand
BBDC	Before bottom dead center	SAE	Society of Automotive Engineers (USA)
BTDC	Before top dead center		
HST	Hydrostatic transmission	SST	Special service tool
LH	Left hand	STD	Standard
LLC	Long life coolant	SUB-ASSY	Sub-assembly
L /	Less	T=	Tightening torque
OHV	Overhead valve	○○T	Number of teeth (○○)
OPT	Option	W /	with

OPERATIONAL TIPS

1. Safe operation
   (1) After jacking up, always support with rigid stands.

   (2) When hoisting the vehicle or its heavy component, use wire rope(s) with a sufficient reserve in load capacity.

   (3) Always disconnect the battery plugs before the inspection or servicing of electrical parts.

   (4) Bring the material handling equipment such as the lift arm and bucket down to the floor surface before starting inspection or maintenance.
   For inspection or maintenance with the material handling equipment in raised state, support it with a safety block or stand.

2. Tactful operation
   (1) Prepare the mechanic tools, necessary measuring instruments (circuit tester, megger, oil pressure gage, etc.) and SSTs before starting operation.

   (2) Before disconnecting wiring, always check the cable color and wiring state.

   (3) When overhauling functional parts, complicated portions or related mechanisms, arrange the parts neatly to prevent confusion.

   (4) When disassembling and inspecting such a precision part as the control valve, use clean tools and operate in a clean location.

   (5) Follow the described procedures for disassembly, inspection and reassembly.

   (6) Replace gaskets, packings and O-rings with new ones each time of disassembly.

   (7) Use genuine Toyota parts for replacement.

   (8) Use specified bolts and nuts. Observe the specified tightening torque at the time of reassembly.
   If no tightening torque is specified, tighten the bolt or nut according to the standard tightening torque table.

3. Grasping the trouble state
   When a trouble occurs, do not attempt immediate disassembly or replacement but first check if the trouble requires disassembly or replacement for correction.

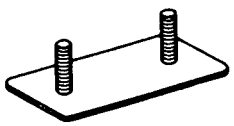
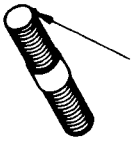
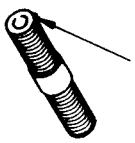
STANDARD BOLT & NUT TIGHTENING TORQUE

Standard bolt and tightening torques are not indicated.
Judge the standard tightening torque as shown below.

1. Find out the type of the bolt from the list below and then find the bolt tightening torque from the table.
2. The nut tightening torque can be judged from the mating bolt type.

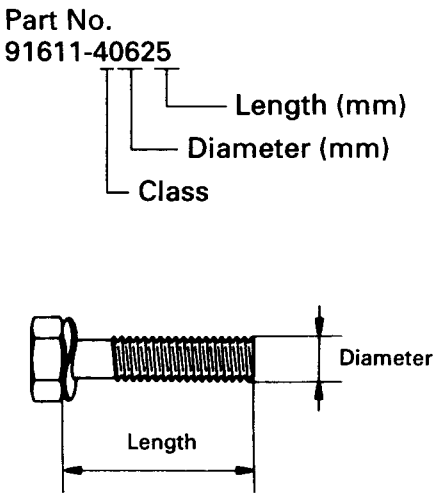
BOLT STRENGTH TYPE IDENTIFICATION METHOD

1. Identification by bolt shape

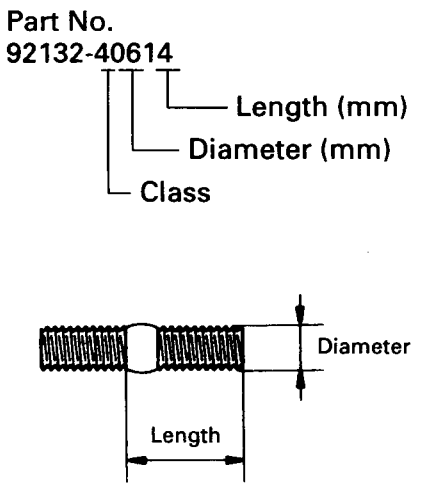
	Shape and class	Class
Hexagon head bolt	 Bolt head No.	4 = 4T 5 = 5T 6 = 6T 7 = 7T 8 = 8T
	 No mark	4T
Hexagon flange bolt	 No mark	4T
Hexagon head bolt	 Two protruding lines	5T
Hexagon flange bolt	 Two protruding lines	6T
Hexagon head bolt	 Three protruding lines	7T
Hexagon head bolt	 Four protruding lines	8T
Welded bolt		4T
Stud bolt	 No mark	4T
	 Grooved	6T

2. Identification by part No.

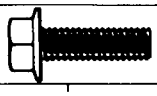
Hexagon head bolt

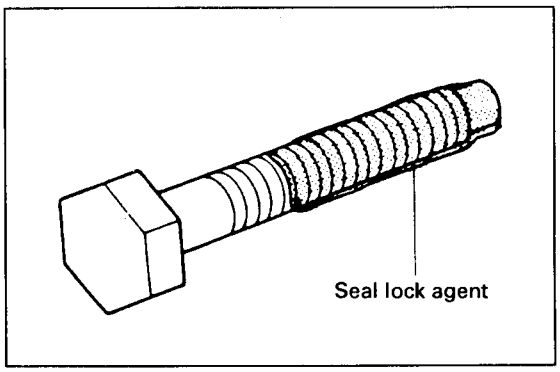


Stud bolt



TIGHTENING TORQUE TABLE

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt 			Hexagon flange bolt 		
			N·m	kgf-cm	ft-lbf	N·m	kgf-cm	ft-lbf
4T	6	1.0	5.4	55	48 in-lbf	5.9	60	52 in-lbf
	8	1.25	13	130	9	14	145	10
	10	1.25	25	260	19	28	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	75	760	55	83	850	61
	16	1.5	113	1150	83	–	–	–
5T	6	1.0	6.4	65	56 in-lbf	7.5	75	65 in-lbf
	8	1.25	16	160	12	18	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1050	76
	16	1.5	137	1400	101	157	1600	116
6T	6	1.0	7.8	80	69 in-lbf	8.8	90	78 in-lbf
	8	1.25	19	195	14	21	215	16
	10	1.25	38	400	29	43	440	32
	12	1.25	72	730	53	79	810	59
	14	1.5	110	1100	80	123	1250	90
	16	1.5	170	1750	127	191	1950	141
7T	6	1.0	11	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	103	1050	76
	14	1.5	147	1500	108	167	1700	123
	16	1.5	226	2300	166	–	–	–
8T	6	1.0	12	125	9	14	145	9
	8	1.25	29	300	22	32	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	108	1100	80	123	1250	90
	14	1.5	172	1750	127	196	2000	145
	16	1.5	265	2700	195	299	3050	221



PRECOAT BOLTS

(Bolts with seal lock agent coating on threads)

1. Do not use the precoat bolt as it is in either of the following cases.
   (a) After it is removed.
   (b) When the precoat bolt is moved (loosened or tightened) by tightness check, etc.

Note:
For torque check, use the lower limit of the allowable tightening torque range. If the bolt moves, retighten it according to the steps below.

2. Method for reuse of precoat bolts
   (1) Wash the bolt and threaded hole. (The threaded hole must be washed even for replacement of the bolt.)
   (2) Perfectly dry the washed parts by air blowing.
   (3) Coat the specified seal lock agent to the threaded portion of the bolt.

HIGH PRESSURE HOSE FITTING TIGHTENING TORQUE

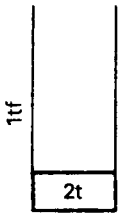
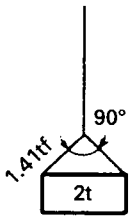
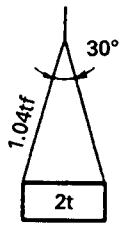
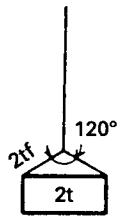
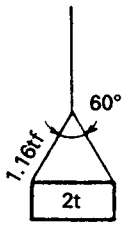
1. When connecting a high pressure hose, wipe the hose fitting and mating nipple contact surfaces with clean cloth to remove foreign matters and dirt. Also check no dent or other damage on the contact surfaces before installation.

2. When connecting a high pressure hose, hold the hose to align the fitting with the nipple and tighten the fitting.

3. The maximum tightening torque must not exceed twice the standard tightening torque.

Nominal diameter of screw	Standard tightening torque N·m (kgf-cm) [ft-lbf]		Hose inside diameter mm (in)
	Standard	Tightening range	
7/16 - 20UNF	25 (250) [18.1]	24~26 (240~270) [17.4~19.5]	6 (0.24)
9/16 - 18UNF	49 (500) [36.2]	47~52 (480~530) [34.7~38.3]	9 (0.35)
3/4 - 16UNF	59 (600) [43.4]	56~62 (570~630) [41.2~45.6]	12 (0.47)
7/8 - 14UNF	59 (600) [43.4]	56~62 (570~630) [41.2~45.6]	12 (0.47)
7/8 - 14UNF	78 (800) [57.9]	74~82 (760~840) [55.0~60.8]	15 (0.59)
1.1/16 - 12UNF	118 (1200) [86.8]	112~123 (1140~1250) [82.5~90.4]	19 (0.75)
1.5/16 - 12UNF	137 (1400) [101.3]	130~144 (1330~1470) [96.2~106.4]	25 (0.98)
PF1/4	25 (250) [18.1]	24~26 (240~270) [17.4~19.5]	6 (0.24)
PF3/8	49 (500) [36.2]	47~52 (480~530) [34.7~38.3]	9 (0.35)
PF1/2	59 (600) [43.4]	56~62 (570~630) [41.2~45.6]	12 (0.47)
PF3/4	118 (1200) [86.8]	112~123 (1140~1250) [82.5~90.4]	19 (0.75)
PF1	137 (1400) [101.3]	130~144 (1330~1470) [96.2~106.4]	25 (0.98)

WIRE ROPE SUSPENSION ANGLE LIST

Suspension angle	Tension	Compression	Suspension method	Suspension angle	Tension	Compression	Suspension method
0°	1.00 time	0 time		90°	1.41 time	1.00 time	
30°	1.04 time	0.27 time		120°	2.00 time	1.73 time	
60°	1.16 time	0.58 time					

SAFE LOAD FOR EACH WIRE ROPE SUSPENSION ANGLE

Unit: N (ton) [lb]

Rope diameter	Cutting load	Single-rope suspension	Two-rope suspension				Four-rope suspension			
		0°	0°	30°	60°	90°	0°	30°	60°	90°
6 mm (0.24 in)	21380 (2.18) [4807]	3040 (0.31) [683.6]	6080 (0.62) [1367]	5880 (0.6) [1323]	5200 (0.53) [1169]	4310 (0.44) [970]	12160 (1.24) [2734]	11770 (1.2) [2646]	10400 (1.06) [2337]	8630 (0.88) [1940]
8 mm (0.32 in)	31480 (3.21) [7078]	4410 (0.45) [992.3]	8830 (0.9) [1985]	8530 (0.87) [1918]	7650 (0.78) [1720]	6280 (0.64) [1411]	17650 (1.8) [3969]	17060 (1.74) [3937]	15300 (1.56) [3440]	12550 (1.28) [2322]
10 mm (0.4 in)	49230 (5.02) [11069]	6960 (0.71) [1565.6]	14020 (1.43) [3153]	13440 (1.37) [3021]	11770 (1.2) [2646]	9810 (1.0) [2205]	27460 (2.8) [6174]	26480 (2.7) [5954]	23540 (2.4) [5292]	19610 (2.0) [4410]
12.5 mm (0.5 in)	76880 (7.84) [17387]	10980 (1.12) [2469.5]	21570 (2.2) [4851]	21280 (2.1) [4631]	18630 (1.9) [4190]	14710 (1.5) [3308]	43150 (4.4) [9702]	41190 (4.2) [9261]	37270 (3.8) [8379]	29420 (3.0) [6615]
14 mm (0.56 in)	96400 (9.83) [21675]	13730 (1.4) [3087]	27460 (2.8) [6174]	26480 (2.7) [5954]	23540 (2.4) [5292]	18630 (1.9) [4190]	54920 (5.6) [12348]	52960 (5.4) [11907]	47070 (4.8) [10584]	37270 (3.8) [8379]

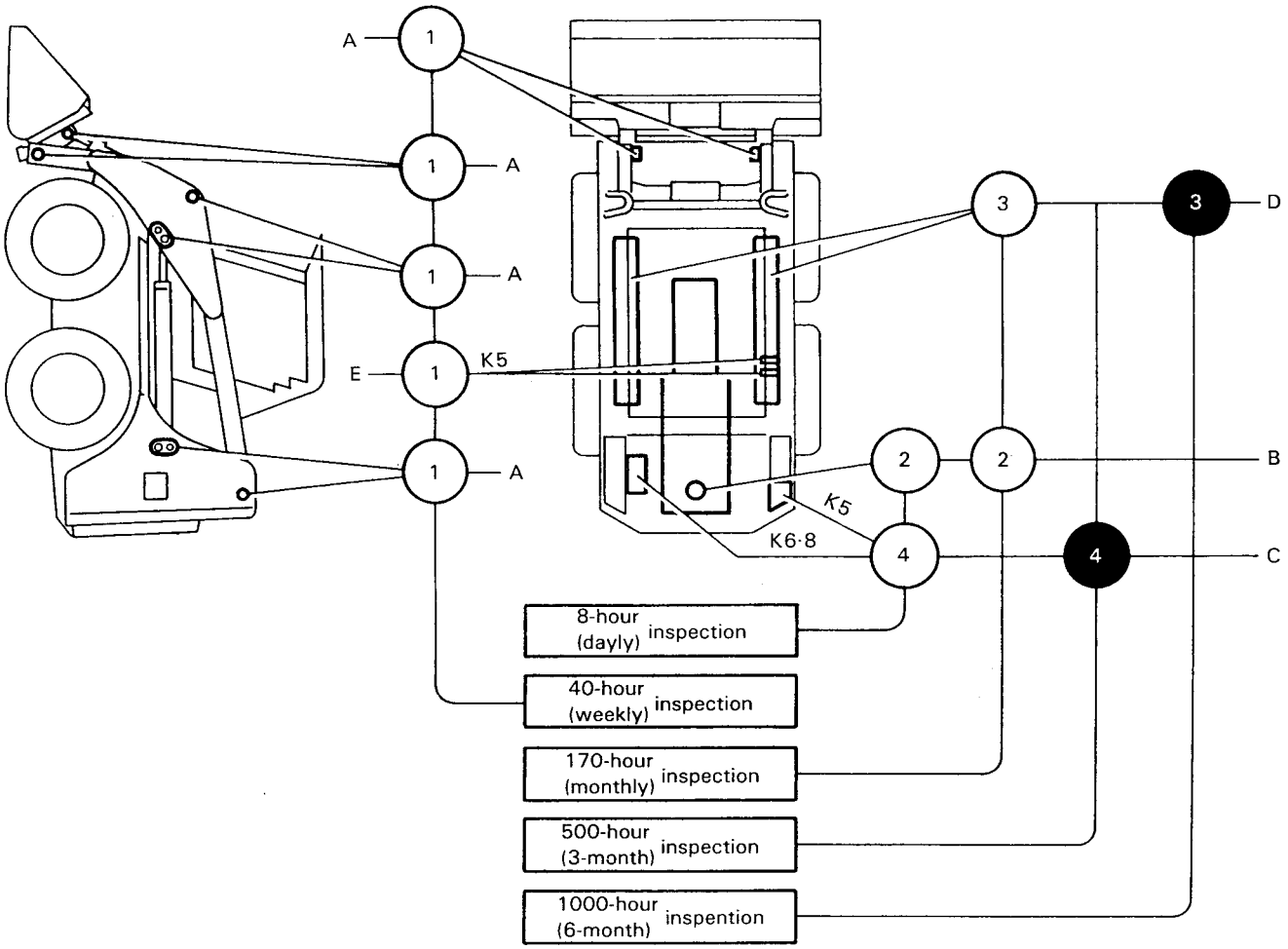
COMPONENTS WEIGHT

Item		Weight kg
Engine	3TNE84	Approx. 138
	1DZ	176
HST pump		Approx. 50
HST motor	4SDK5	Approx. 20
	4SDK6·8	Approx. 20
Drive unit	4SDK6·8	Approx. 20
Operator guard		110
Bucket	4SDK5	80
	4SDK6	110
	4SDK8	120
Lift Arm w/ bucket bracket	4SDK5	220
	4SDK6·8	260

RECOMMENDED LUBRICANT QUANTITY & TYPES

Item	Capacity ℓ (US-gal)		Type
	4SDK5·6	4SDK8	
Engine oil	5.0 (1.32)	7.25 (1.92)	STD: Diesel engine oil SAE 10W-30 (API: CC) Cold area: Diesel engine oil SAE 5W-30 (API: CC)
Hydraulic oil (total amount)	19.0 (5.02)	24.0 (6.34)	Auto Fluid Special (ATF type F)
	1.5 (0.40)		HST oil additive: 38999-42800-71
Chain case (one side)	16.0 (4.22)	23.0 (6.07)	Diesel engine oil SAE 10W-30 (API: CC)
Fuel tank	35 (9.24)	52 (13.73)	Gas oil
Lubricating grease	Appropriate amount		MP Grease No.2
Cooling water [excluding 1.1 (0.29) in reservoir tank]	5.0 (1.32)	7.8 (2.06)	Long life coolant STD: 30% Cold area: 50%

LUBRICATION CHART



○: Inspection
●: Replacement

1. MP grease No. 2
2. Diesel engine oil
3. Diesel engine oil
4. Auto Fluid Special

A: Material handling system pins
B: Engine oil
C: Hydraulic oil tank
D: Chain case
E: Pedal lock shaft

PERIODIC MAINTENANCE

INSPECTION METHOD

I : Inspection. Repair or replacement if required.
M : Measurement. Repair or adjustment if required.
T : Retightening C : Cleaning L : Lubrication
* : For new vehicle *1 : Flaw detector

Item \ Inspection Period		Every 1 month	Every 3 months	Every 6 months	Every 12 months
		Every 170 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
ENGINE					
Main body	Proper starting and abnormal noise	I	←	←	←
	Rotating condition at idling	M	←	←	←
	Rotating condition during acceleration	M	←	←	←
	Exhaust gas condition	I	←	←	←
	Air cleaner element	C	←	←	←
	Valve clearance	M*			M
	Compression				M
	Cylinder head bolt loosening				T
	Muffler rubber mount				I
PCV system	Clogging and damage in PCV valve and piping	I	←	←	←
Governor	No-load maximum speed	M	←	←	←
Lubrication system	Oil leakage	I	←	←	←
	Oil level	I	←	←	←
	Clogging and dirt of oil filter	I	←	←	←
Fuel system	Fuel leakage	I	←	←	←
	Dirt and clogging of fuel filter and element	I	←	←	←
	Injection timing			M	←
	Injection nozzle injection pressure and spray status				M
	Draining of sedimenter			I	←
Cooling system	Coolant level in radiator and leakage	I	←	←	←
	Rubber hose degradation	I	←	←	←
	Radiator cap condition	I	←	←	←
	Fan belt tension, looseness and damage	I	←	←	←
	Radiator rubber mount				I

Item \ Inspection Period		Every 1 month	Every 3 months	Every 6 months	Every 12 months
		Every 170 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
POWER TRANSMISSION SYSTEM					
HST	Oil leak	I	←	←	←
	HST pump and motor operation and abnormal noise	I	←	←	←
	Charge pressure measurement		M	←	←
	Relief pressure measurement		M	←	←
Reduction gear unit	Oil leak	I	←	←	←
	Oil level	I	←	←	←
	Drive unit operation and abnormal noise	I	←	←	←
	Deformation of chain bush engaged part		I	←	←
	Deformation and damage of sprocket		I	←	←
DRIVE SYSTEM					
Wheels	Tire inflation pressure	M	←	←	←
	Tire cuts, damage and uneven wearing	I	←	←	←
	Loose rim and hub nuts	T	←	←	←
	Tire groove depth	M	←	←	←
	Metal chips, pebbles and other foreign matter trapped in tire grooves	I	←	←	←
	Rim, side ring and disc wheel damage	I	←	←	←
	Abnormal noise and looseness of front wheel bearing	I	←	←	←
	Abnormal noise and looseness of rear wheel bearing	I	←	←	←
Front axle	Cracks, damage and deformation of housing				I
Rear axle	Cracks, damage and deformation of beem				I
STEERING SYSTEM					
Steering control lever	Play and looseness	I	←	←	←
	Function	I	←	←	←
	Neutral state	I	←	←	←
Link and rod	Bend and damage of link and rod	I	←	←	←
	Loosening of mounting	I	←	←	←

Item \ Inspection Period		Every 1 month Every 170 hours	Every 3 months Every 500 hours	Every 6 months Every 1000 hours	Every 12 months Every 2000 hours
BRAKING SYSTEM					
Parking brake	Operating force	I	←	←	←
	Braking effect	I	←	←	←
	Link and rod looseness and damage	I	←	←	←
MATERIAL HANDLING SYSTEM					
Bucket	Wear and damage of bucket edge	I	←	←	←
	Deformation, damage and crack of bucket	I	←	←	←
	Crack at welded part				I
Lift arm and link	Deformation, damage and crack of lift arm and link	I	←	←	←
	Crack at welded part				I
Bucket bracket	Damage of stop lever, link and pin	I	←	←	←
	Deformation, damage and crack of bucket bracket	I	←	←	←
	Crack at welded part				I
Various attachments	Abnormality and mounting condition of each part	I	←	←	←
HYDRAULIC SYSTEM					
Cylinder	Loosening and damage of cylinder mounting	I	←	←	←
	Deformation and damage of rod and rod end	I	←	←	←
	Cylinder operation	I	←	←	←
	Natural drop and natural forward tilt (hydraulic drift)	M	←	←	←
	Oil leakage and damage	I	←	←	←
	Wear and damage of pin and cylinder bearing	I	←	←	←
	Lifting speed and dumping speed	M	←	←	←
	Uneven movement	I	←	←	←
Oil pump	Oil leak and abnormal sound	I	←	←	←
Hydraulic oil tank	Oil level and contamination	I	←	←	←
	Cleaning of oil tank and strainer		C	←	←
	Oil leakage	I	←	←	←
Operating pedal	Loose linkage	I	←	←	←
	Operation	I	←	←	←
	Pedal lock function	I	←	←	←

Item \ Inspection Period		Every 1 month	Every 3 months	Every 6 months	Every 12 months
		Every 170 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
Oil control valve	Oil leakage	I	←	←	←
	Relief pressure measurement				M
	Relief valve and tilt lock valve functions	I	←	←	←
Hydraulic piping	Oil leakage	I	←	←	←
	Deformation and damage	I	←	←	←
	Loose joint	T	←	←	←
ELECTRICAL SYSTEM					
Starting motor	Pinion gear meshing status	I	←	←	←
Alternator	Charging function	I	←	←	←
Battery	Battery fluid level	I	←	←	←
	Battery fluid specific gravity			M	←
Electrical wiring	Damage of wiring harness	I	←	←	←
	Fuses	I	←	←	←
Preheater	Open-circuit in glow plug (1DZ)			I	←
	Open-circuit in intake heater (3TNE84)			I	←
Engine stopping system	Diesel engine key stop device function	I	←	←	←
SAFETY DEVICE, ETC.					
Operator guard	Loosening of mounting	T	←	←	←
	Deformation, crack and damage	I	←	←	←
Lighting system	Function and mounting condition	I	←	←	←
Horn	Function and mounting condition	I	←	←	←
Instruments	Functions	I	←	←	←
Backup buzzer	Function and mounting condition	I	←	←	←
Rear-view mirror	Dirt, damage	I	←	←	←
	Rear reflection status	I	←	←	←
Seat	Loosening and damage of mounting	I	←	←	←
Seat belt	Belt state	I	←	←	←
	Loosening and damage of mounting	I	←	←	←
Body	Damage and cracks of frame, cross members, etc.				I
	Bolt looseness				T
Others	Grease up	L	←	←	←

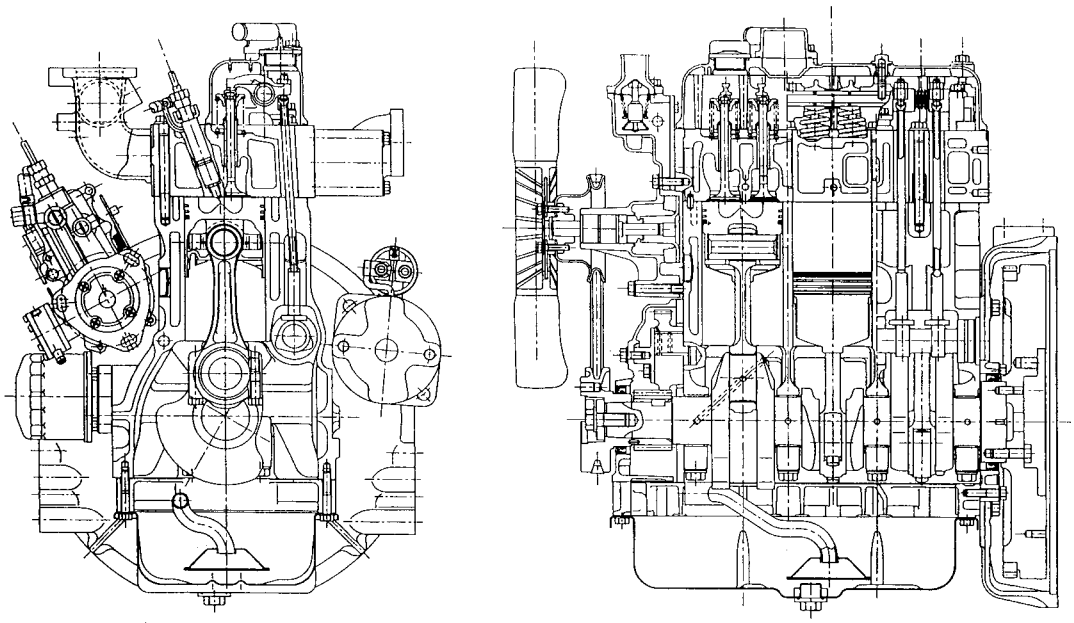
PERIODIC REPLACEMENT OF PARTS AND LUBRICANTS

Replacement Period / Replacement Item	Weekly services	Monthly services	3-month services	6-month services	Annual services	Remarks
	Every 40 hours	Every 170 hours	Every 500 hours	Every 1000 hours	Every 2000 hours	
Engine Oil		●	←	←	←	
Engine Oil Filter		● (New vehicle)	●	←	←	
Coolant (Excluding LLC)			●	←	←	Replace LLC every 2 years
Air Cleaner Element					●	Replace every 6-times cleaning
Fuel Filter				●	←	
Hydraulic Oil			●	←	←	
Chain Case Oil				●	←	
HST Oil Filter	● (New vehicle)	NOTE: After 2nd time, replace every 500 hours (or 1 year)				Replace by warning lamp and buzzer indication
Fuel Hose						Replace every 2 years
Hydraulic hose						Replace every 2 years
HST hose						Replace every 2 years

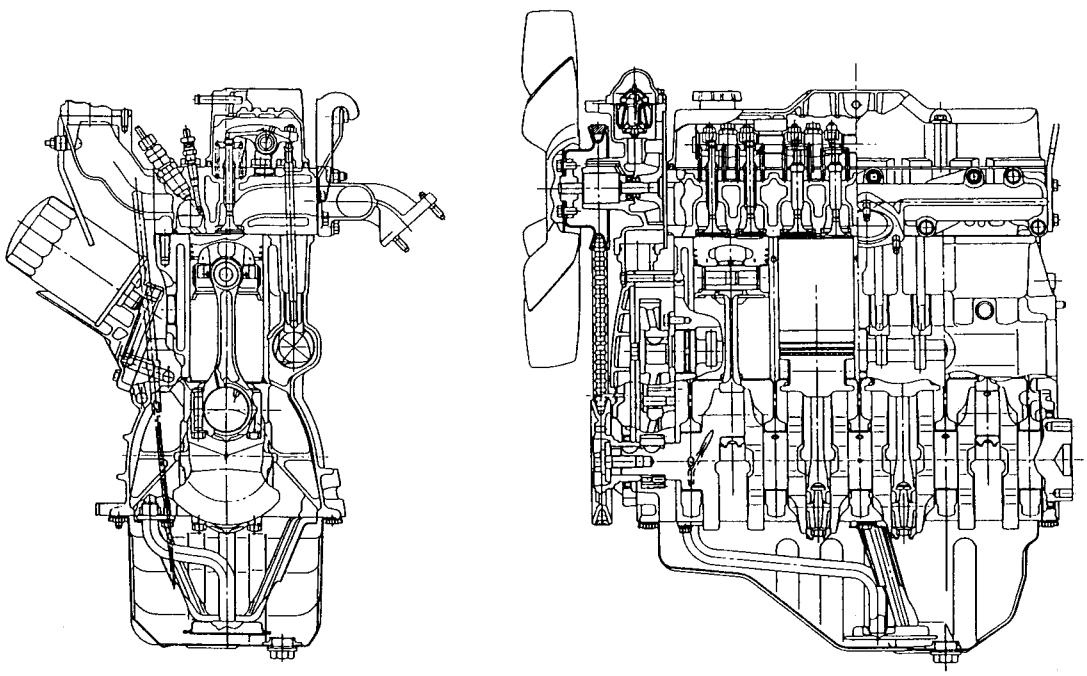
ENGINE

ENGINE SECTIONAL VIEWS

3TNE84



1DZ



MAJOR SPECIFICATIONS

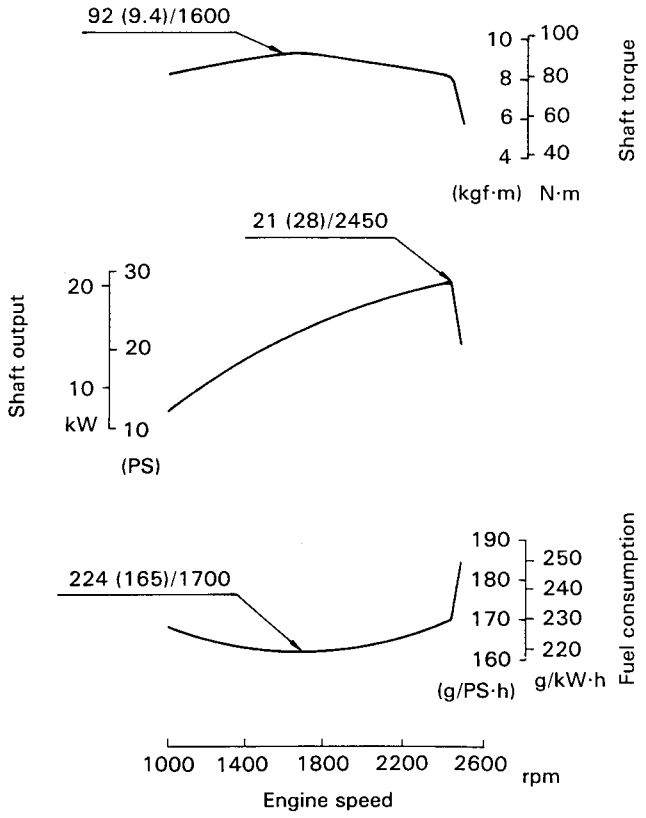
Item \ Vehicle model			4SDK5·6	4SDK8
Engine model			YANMAR 3TNE84	TOYOTA 1DZ
Number of cylinders and arrangement			Inline 3 cylinders	Inline 4 cylinders
Combustion chamber type			Direct injection type	Swirl chamber type
Valve mechanism			OHV, gear-driven	←
Bore × stroke mm (in)			84.0 × 90.0 (3.31 × 3.54)	86.0 × 107.0 (3.39 × 4.21)
Total displacement cc (in^3)			1496 (91.29)	2486 (151.71)
Compression ratio			18.0	21.5
Compression pressure kPa (kgf/cm^2)-rpm			3240 (33)-250	2840 (29)-250
Maximum output kW (PS)/rpm			21 (28)/2450	41 (55)/2400
Maximum torque N·m (kgf-m)/rpm			92.2 (9.4)/1600	166 (17.0)/1600
Minimum specific fuel consumption ratio g/kW·H (g/PS·h)/rpm			224 (165)/1700	252 (185)/1400
Service weight kg (lb)			138 (304.3)	176 (388.1)
Valve timing	Intake	Open	15°BTDC	14°BTDC
		Close	45°ABDC	44°BTDC
	Exhaust	Open	56°BBDC	52°BBDC
		Close	18°ATDC	14°ATDC
Valve clearance (in hot state) mm (in)	Intake		0.20 (0.0079)	0.20 (0.0079)
	Exhaust		0.20 (0.0079)	0.36 (0.0142)
Injection timing BTDC/stationary			BTDC 14°	BTDC 0°
Injection order			1—3—2*	1—3—4—2
No-load maximum speed rpm			2600 ± 50	2600 ± 50
Idling speed rpm			1200 ± 50	750 ± 25

* In the order of 1, 2 and 3 from the flywheel side.

ENGINE PERFORMANCE CURVES

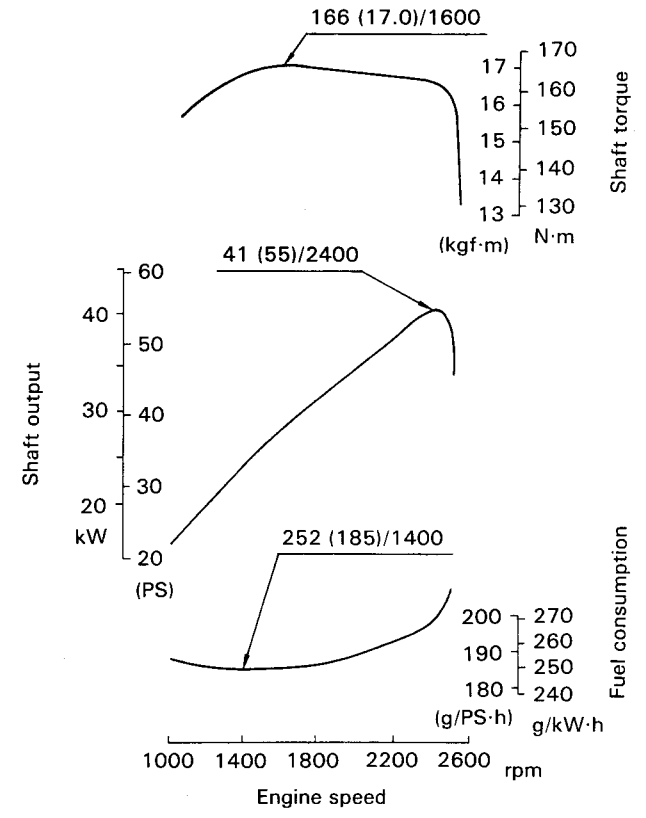
3TNE84

4SDK5·6



1DZ

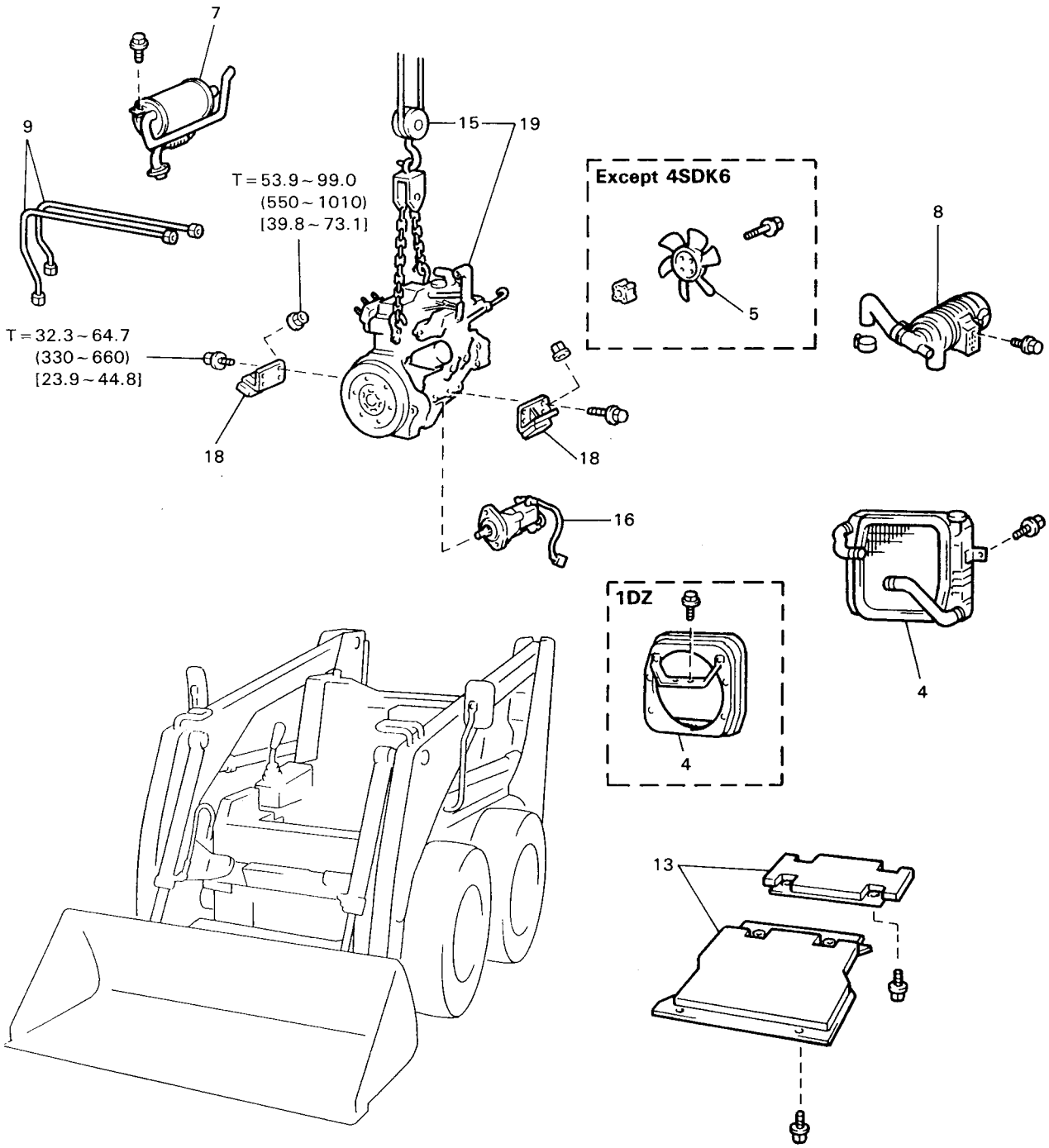
4SDK8



ENGINE ASSY

REMOVAL·INSTALLATION

T = N·m (kgf-cm) [ft-lbf]



Removal Procedure

1 Remove the operator guard. (See 7-7.)

2 Remove the engine hood.

3 Drain cooling water.

4 Remove the radiator (with fan shroud on the vehicle with the 1DZ engine).

5 Remove the cooling fan (excluding 4SDK6).

6 Remove the battery and bracket (4SDK5 only).

7 Remove the muffler.

8 Disconnect the air cleaner hose (on the 1DZ engine vehicle), or remove the air cleaner W/hose (on the 3TN84 engine vehicle).

9 Disconnect the pipes.

10 Remove the engine oil drain plug.

11 Disconnect electrical wiring.

12 Disconnect the accelerator wire (with bracket on the 3TNE84 engine vehicle).

13 Remove the front and rear under covers.

14 Remove the lower set bolts (HST pump support — engine).

15 Slightly hoist the engine. **[Point 1]**

16 Remove the starting motor W/battery cable.

17 Remove the upper set bolts (HST pump support — engine).

18 Remove the engine mount brackets RH and LH.

19 Remove the engine. **[Point 2]**

20 Remove the damper.

21 Remove the flywheel.

22 Remove the end plate.

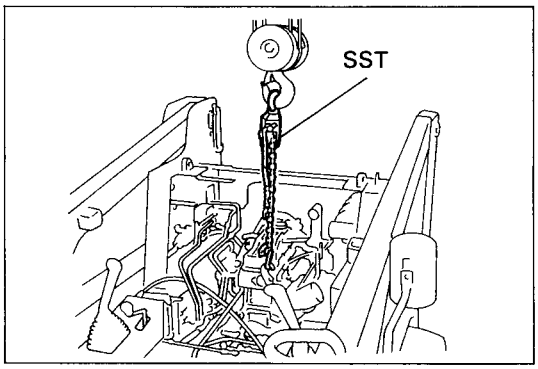
Installation Procedure

The installation procedure is the reverse of the removal procedure.

Notes:
- **Coat and fill grease (Molywhite TA or equivalent) on the spline portion between the HST pump and damper and in the grease cap.**
- **Bleed air from the fuel system. (See 1-10.)**
- **Bleed air from the hydraulic circuit. (See 12-5.)**
- **Apply lock agent 08833-76001-71 (08833-00070) on the threaded portion of the flywheel set bolt on the vehicle with the 1DZ engine.**

Tightening torque

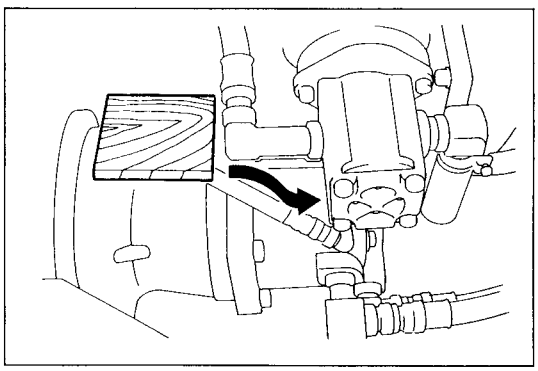
HST support × engine:	**76.4 ~ 93.1 N·m (780 ~ 950 kgf-cm) [56.4 ~ 68.7 ft-lbf]**
HST support × end plate:	**31.4 ~ 47.0 N·m (320 ~ 480 kgf-cm) [23.2 ~ 34.7 ft-lbf]**
HST support × HST pump:	**56.8 ~ 86.2 N·m (580 ~ 880 kgf-cm) [42.0 ~ 63.7 ft-lbf]**
Damper × flywheel:	**31.4 ~ 47.0 N·m (320 ~ 480 kgf-cm) [23.2 ~ 34.7 ft-lbf]**
Flywheel × crankshaft:	**76.4 ~ 93.1 N·m (780 ~ 950 kgf-cm) [56.4 ~ 68.7 ft-lbf]**



Point Operations

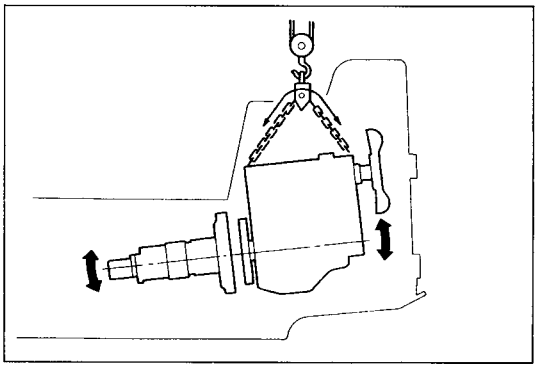
[Point 1]

Removal·Installation: SST 09090-76001-71 (SST 09090-04010)

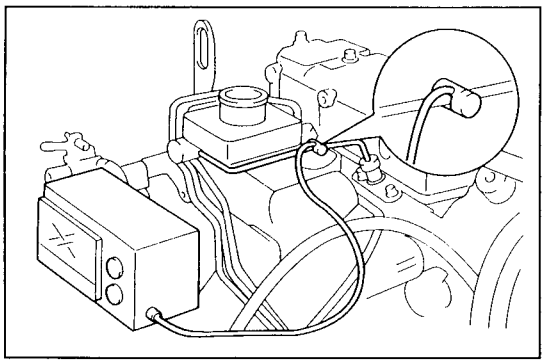


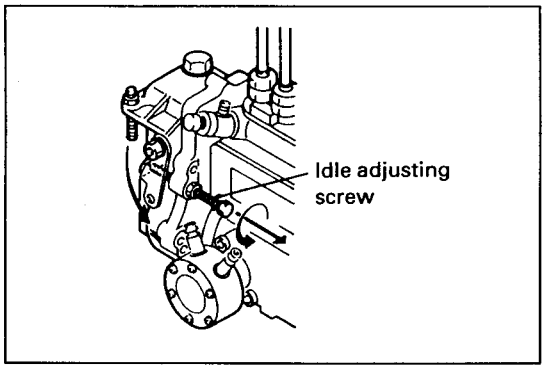
[Point 2]

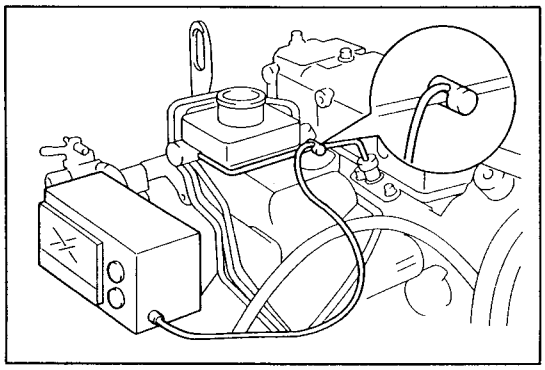
Removal·Installation: Insert a protecting plate so that the material handling oil pump will not collide with the HST motor when removing or installing the engine.

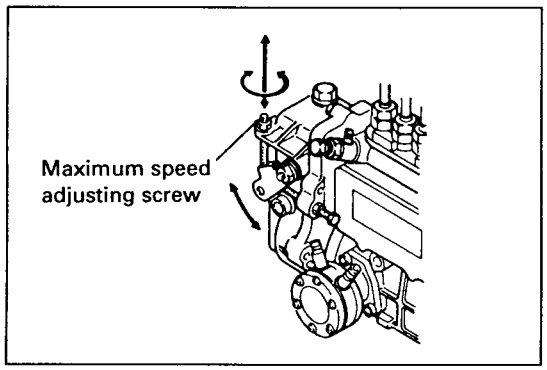


Installation: Couple the HST pump support and the engine after centering the HST pump shaft spline and damper spline by operating a hoist and the SST.









ENGINE SPEED ADJUSTMENT

YANMAR 3TNE84 Engine

Idling speed inspection and adjustment

1. Warm up the engine.

   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

2. Install the engine tachometer.

3. Inspect the idling speed.

   Standard: 1200 ± 50 rpm

4. Adjust the idling speed.
   (1) Loosen the lock nut, and make adjustment by means of the idle adjusting screw.

No-load maximum speed inspection and adjustment

1. Warm up the engine.

   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

2. Install the engine tachometer.

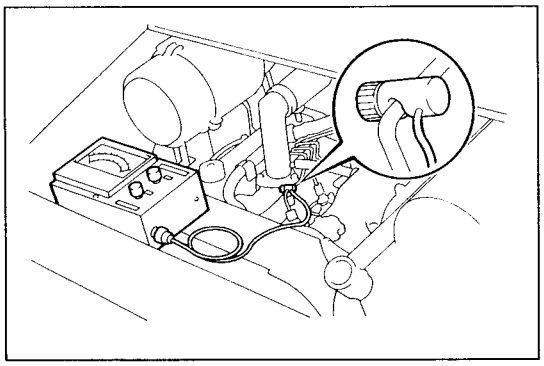
3. Inspect the no-load maximum speed.
   (1) Fully depress the accelerator pedal and inspect the no-load maximum speed.

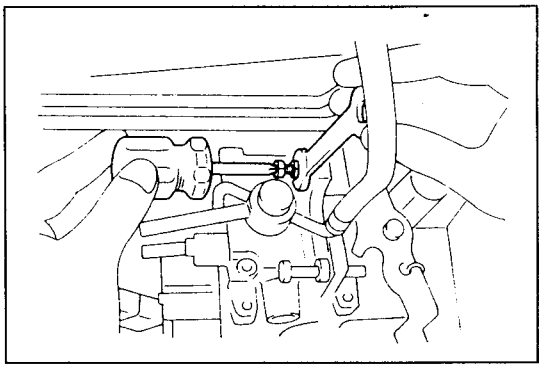
   Standard: 2600 ± 50 rpm

4. Adjust the no-load maximum speed.
   (1) Remove the seal.
   (2) Make adjustment by means of the maximum speed adjusting screw.

   Standard: 2600 rpm

5. Seal after adjustment.





TOYOTA 1DZ Engine

Idling speed inspection and adjustment

1. Warm up the engine.

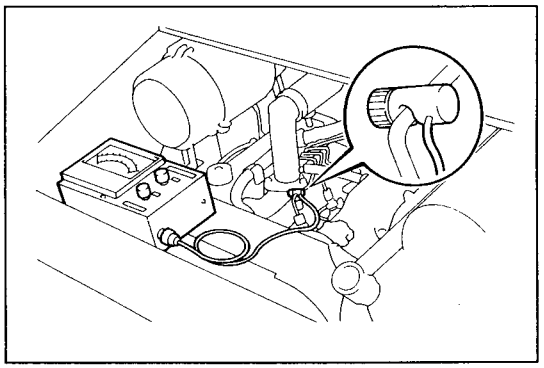
   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

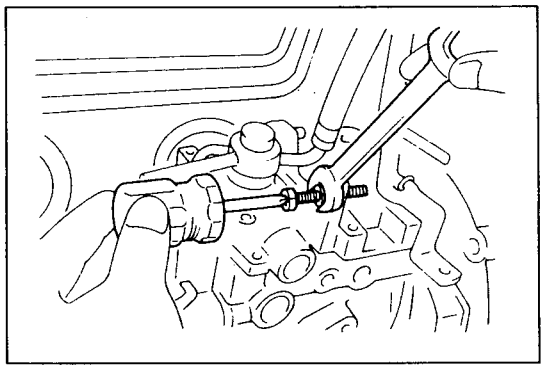
2. Install the engine tachometer.

3. Inspect the idling speed.

   Standard: 970 ± 50 rpm

4. Adjust the idling speed.
   (1) Loosen the lock nut, and make adjustment by means of the idle adjusting screw.





No-load maximum speed inspection and adjustment

1. Warm up the engine.

   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

2. Install the engine tachometer.

3. Inspect the no-load maximum speed.
   (1) Fully depress the accelerator pedal and inspect the no-load maximum speed.

   Standard: 2600 ± 50 rpm

4. Adjust the no-load maximum speed.
   (1) Remove the seal.
   (2) Make adjustment by means of the maximum speed adjusting screw.

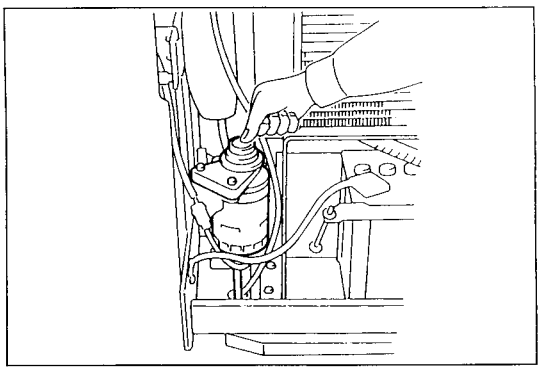
   Standard: 2650 rpm

5. Seal after adjustment.

BLEEDING AIR FROM FUEL SYSTEM

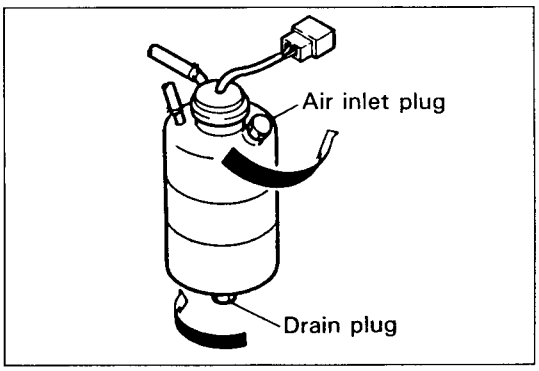
3TNE84

1. Crank the engine by turning the key switch for within 30 seconds. If the engine does not start within 30 seconds, operate the feed pump lever (beside the injection pump) up and down, and crank again by turning the key switch.



1DZ

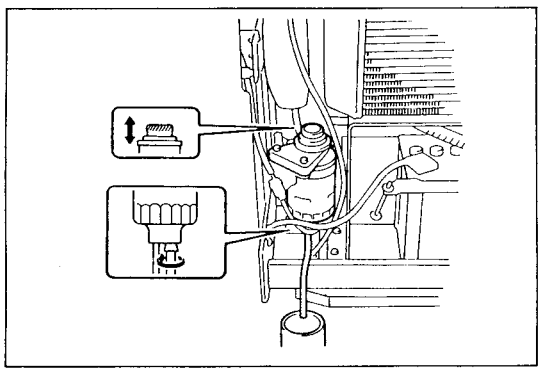
1. Operate the fuel filter hand pump until it becomes heavy.



DRAINING WATER FROM SEDIMENTER

3TNE84 (OPT)

1. Loosen the air inlet plug.
2. Prepare a receiving pan, and loosen the drain plug to drain water. Tighten the drain plug when fuel starts to flow out.
3. Tighten the air inlet plug.
4. Bleed air from the fuel system.

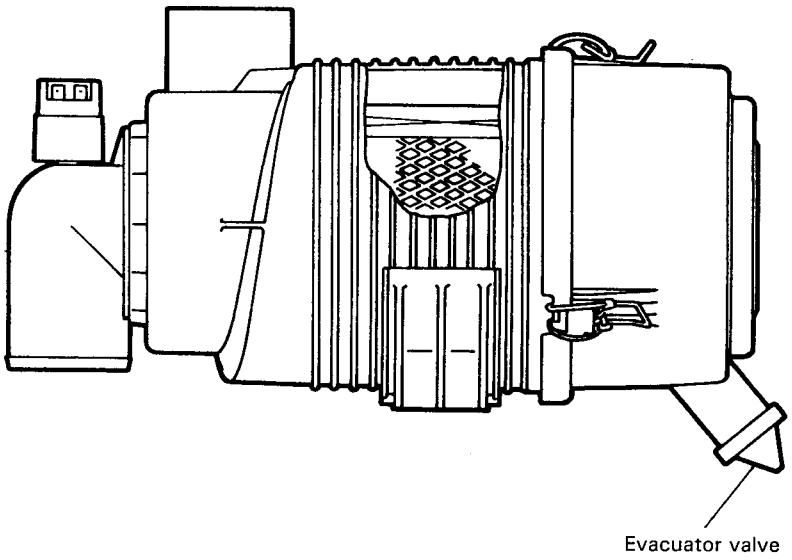


1DZ

1. Prepare a receiving pan. Loosen the drain cock by 1-1/2 or 2 turns, and push the pump lightly to drain water. Tighten the drain cock when fuel starts to flow out.

AIR CLEANER

GENERAL

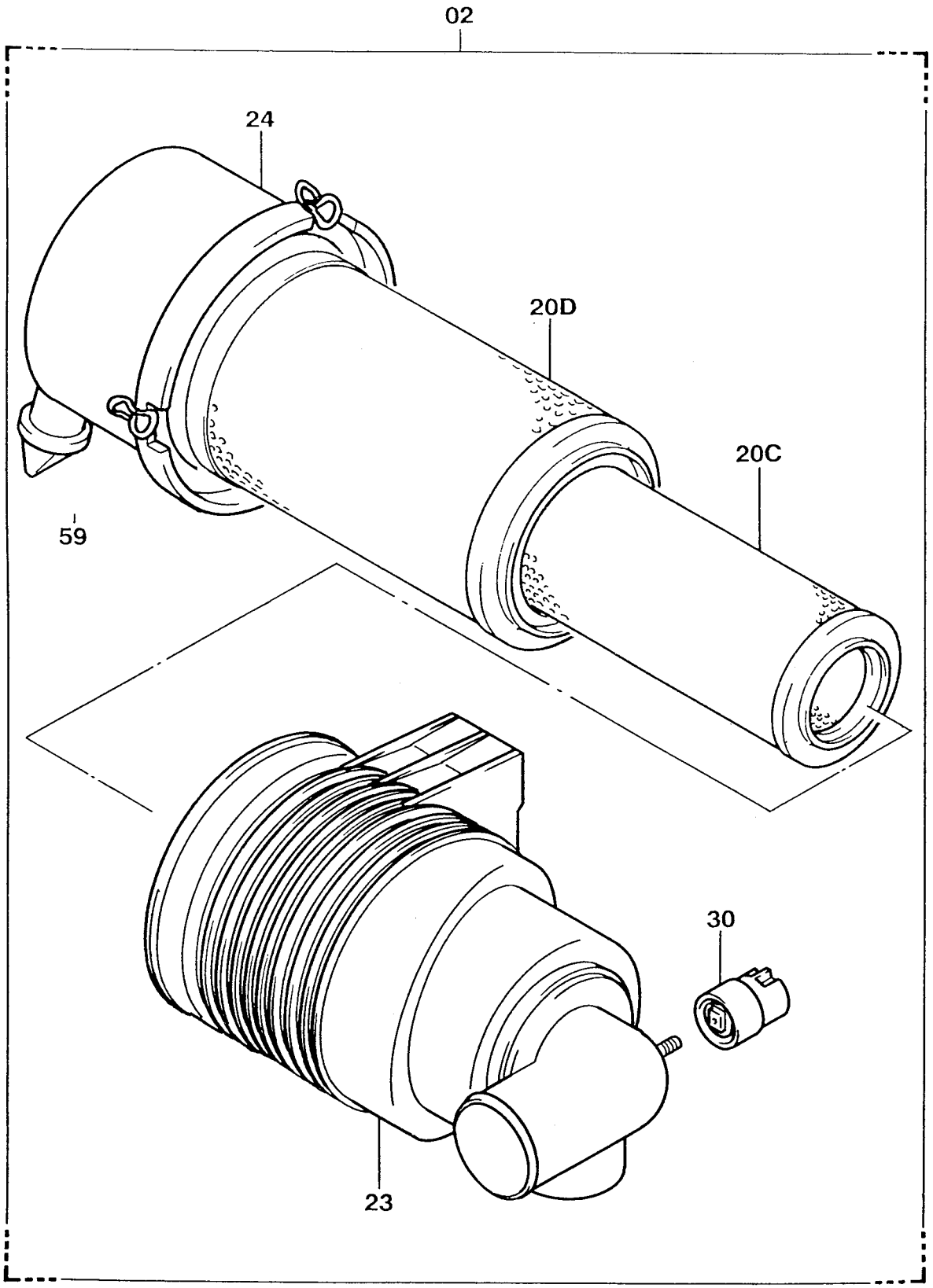


SPECIFICATIONS

	4SDK5·6	4SDK8
Type	Cyclone type	←
Size	5-inch	6-inch
Intake type	Fresh air introduction type	←
Filtering area cm^2 (in^2)	Outer: 9000 (1395)	Outer 14000 (2170)
	Inner: 3500 (542.5)	Inner: 5700 (883.5)
Others	With evacuator valve	←

COMPONENTS

1703



1703-387

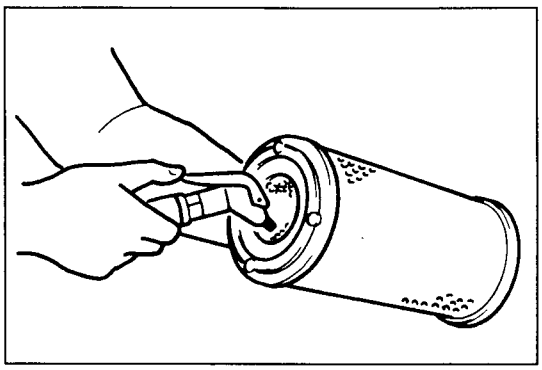
INSPECTION·CLEANING

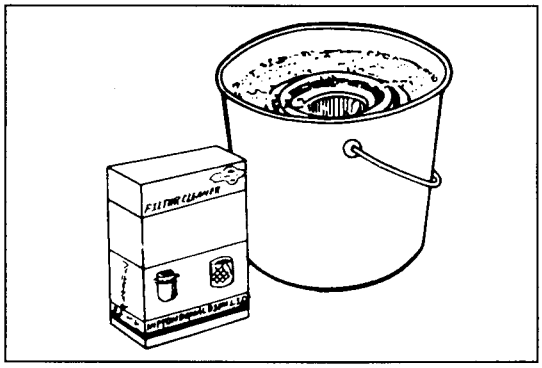
1. Open the engine hood.

2. Remove the element.

Note:
In case of the double element type, do not remove the inner element for other than replacement.

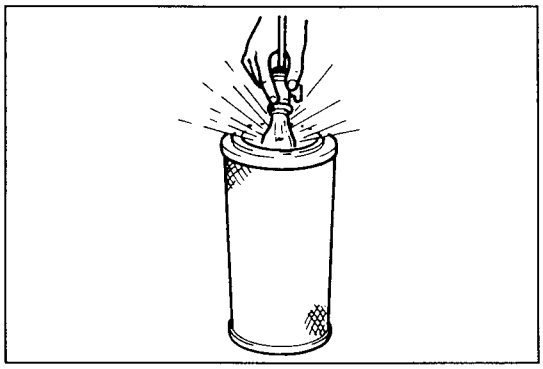
3. Clean the element.
   (1) For ordinary cleaning, blow with compressed air [690 kPa (7 kg/cm²) [100 psi] or less] vertically along the pleats from the inside of the element.
   If heavily contaminated, washing is possible.
   (2) Element washing method
   Dissolve neutral detergent in tepid water (approx. 40°C (104°F)) and immerse the element in it for about 30 minutes. Then, rinse the element well with clear water. [Water pressure: 275 kPa (2.8 kg/cm²) [40 psi] or less]
   After washing, naturally dry the element or dry the element with a dryer (cold air).





Notes:
- **Do not damage the element during washing.**
- **Never use compressed air or hot air for drying.**

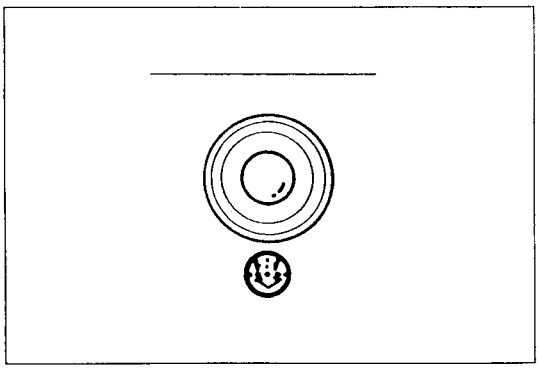
4. Clean the evacuator valve (dust discharge valve).
   (1) Hold the tip end of the evacuator valve and discharge dust and dirt from the inside of the valve.



5. Inspect the element.
   (1) After cleaning, place an electric bulb in the element to inspect any damage in the element. If any pinhole, tear or damage is found, replace it with a new element.

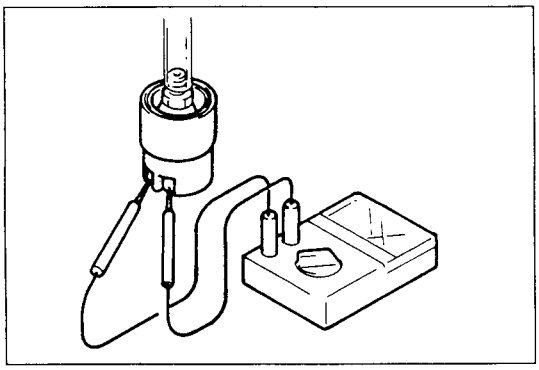
6. Element replacement

   Replace the element after it is washed six times or generally at intervals of 12 months.



CLOGGING WARNING SYSTEM INSPECTION

1. Warning lamp inspection
   (1) See that the air cleaner warning lamp comes on when the ignition switch is turned ON and goes out when the engine starts.



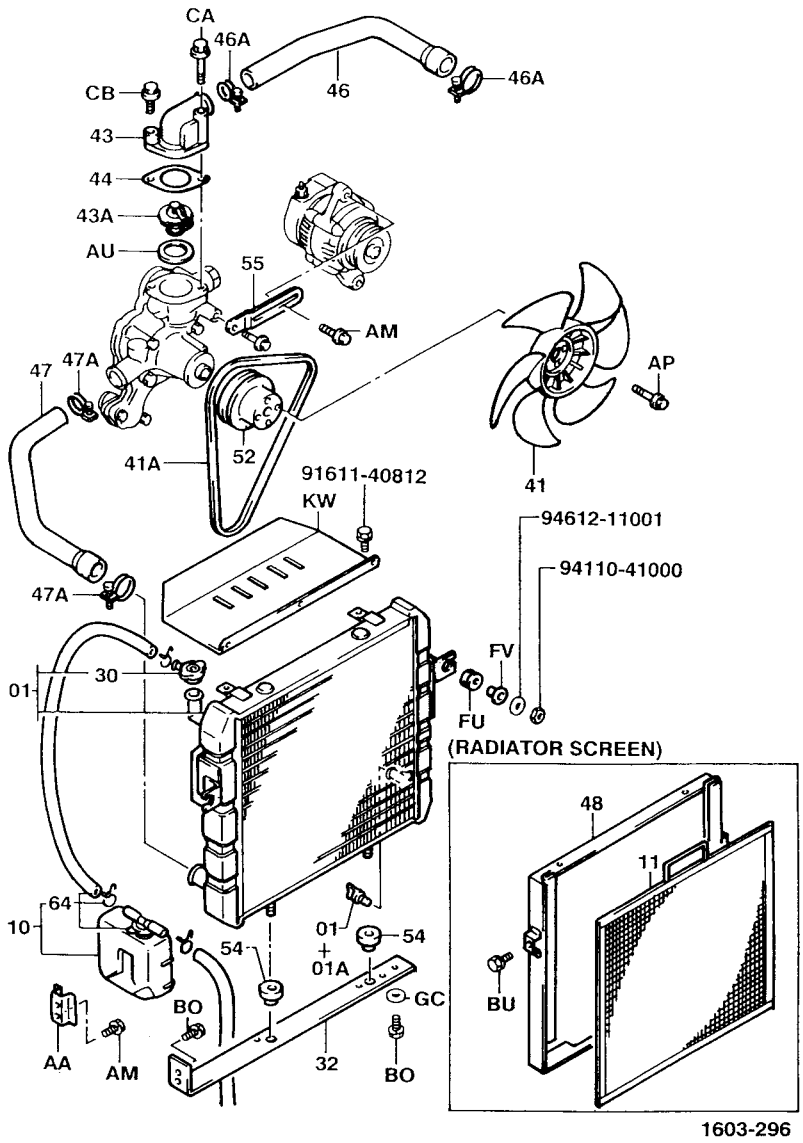
2. Individual inspection
   (1) Use a mity vac to apply a negative pressure to the vacuum switch, and inspect conduction.

   Standard:
   7473 ± 569 Pa (762 ± 58 mmH_2O)
   [56.0 ± 4.3 mmHg]: Continuity shall exist.

RADIATOR

COMPONENTS

1603



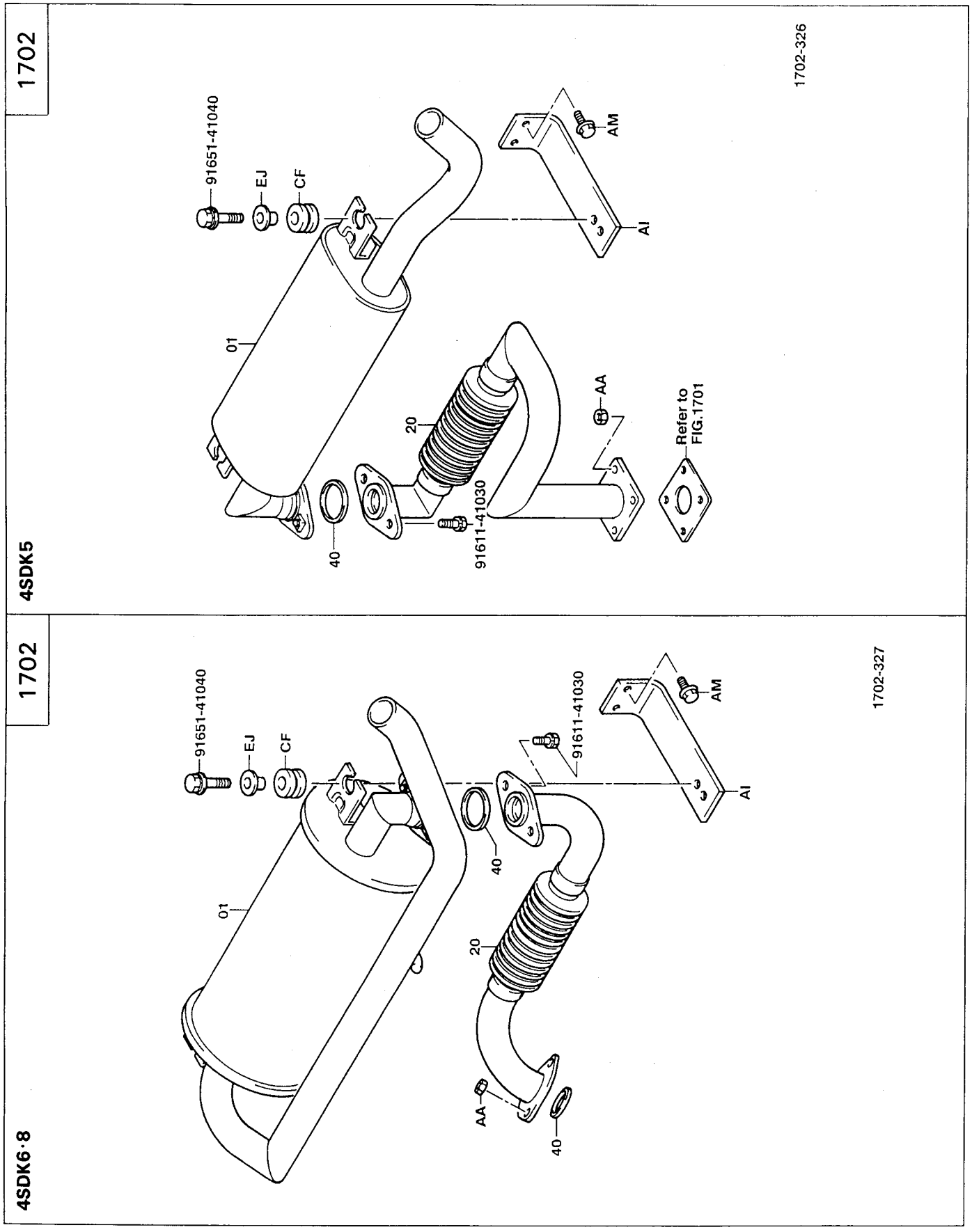
SPECIFICATIONS

Radiator

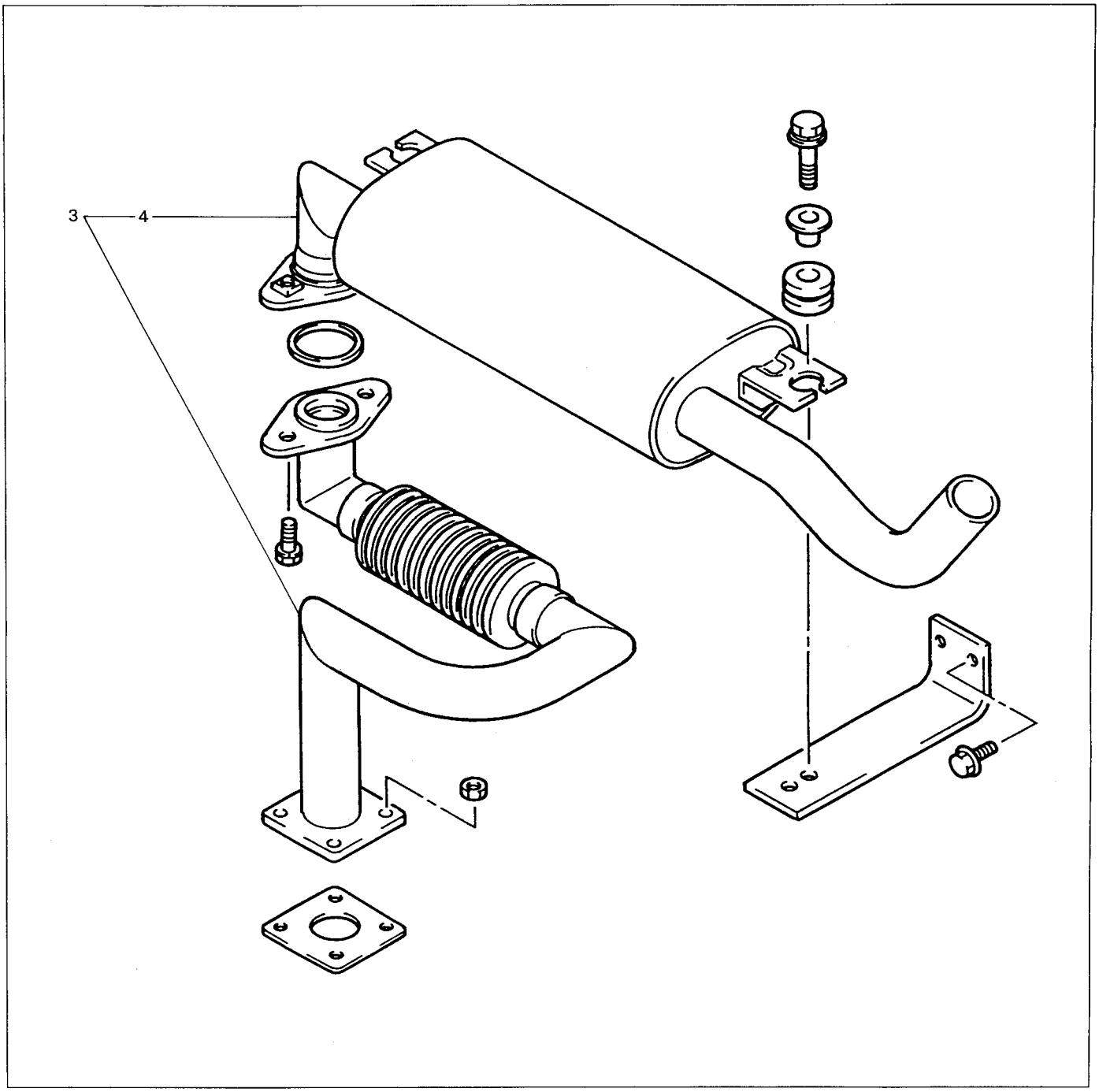
Item \ Model		4SDK5 · 6	4SDK8
Core type		Corrugated fin	←
Core dimensions	mm (in)		
Height		454 (17.87)	430 (16.93)
Width		510 (20.08)	500 (19.69)
Thickness		32 (1.26)	48.5 (1.91)
Fin pitch	mm (in)	6.0 (0.24)/2	←
Fin thickness	mm (in)	0.05 (0.002)	←
Cap valve opening pressure	kPa (kgf/cm²) [psi]	88 (09) [12.80]	←
Reservoir tank capacity		1.1 ℓ (0.29 US-gal)	←

MUFFLER & EXHAUST PIPE

COMPONENTS



REMOVAL·INSTALLATION



Removal Procedure

1 Open the operator guard. (See page 7-7.)

2 Open the engine hood.

3 Remove the muffler and exhaust pipe.

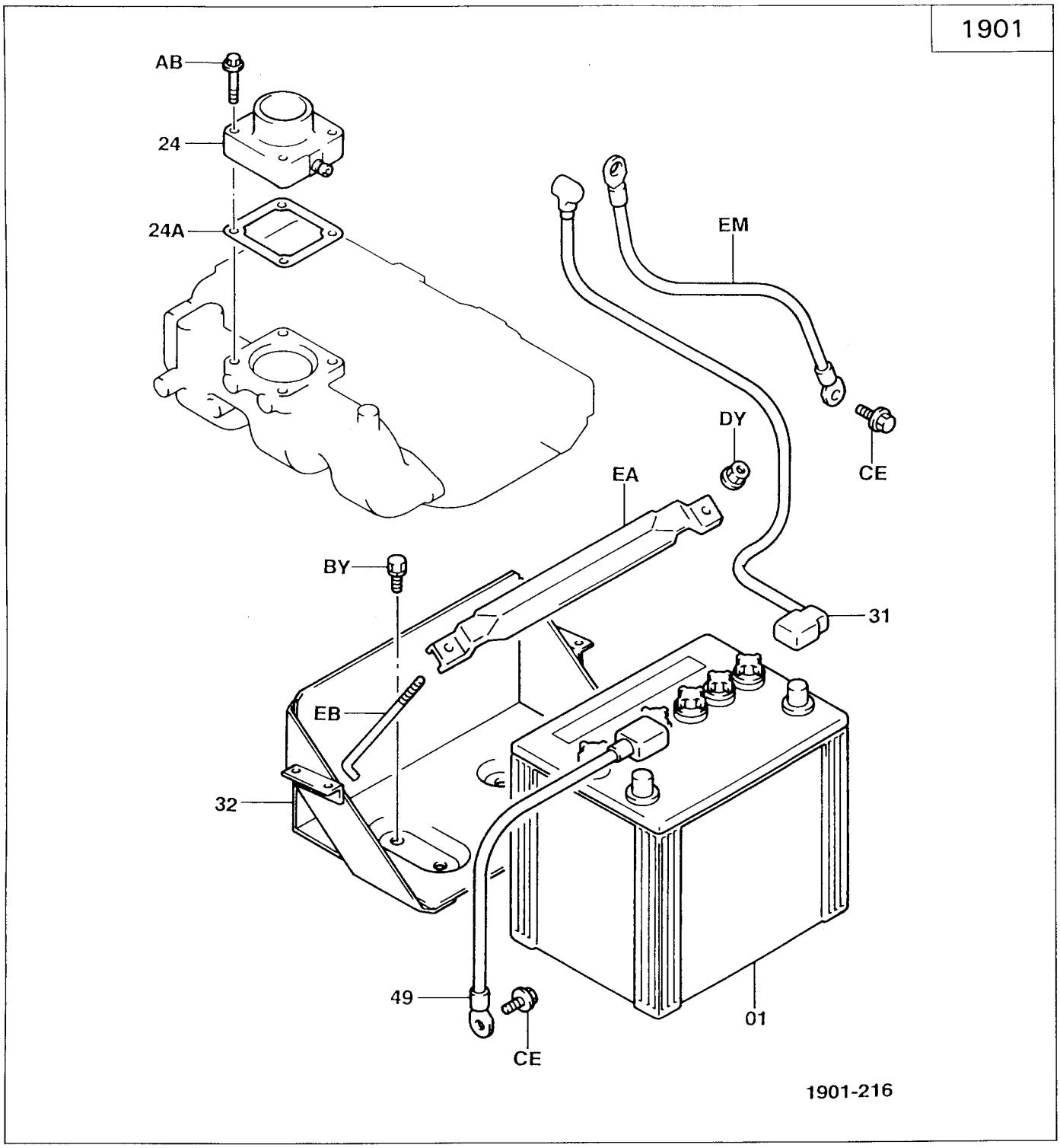
4 Remove the muffler.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

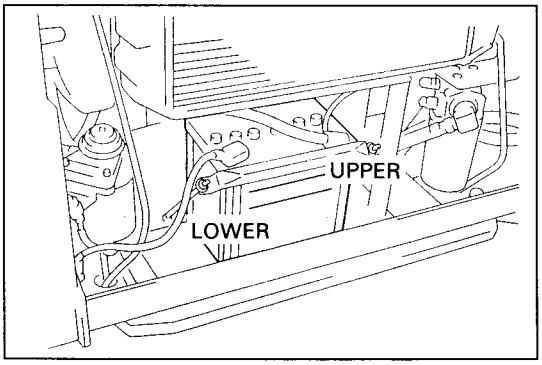
BATTERY

COMPONENTS



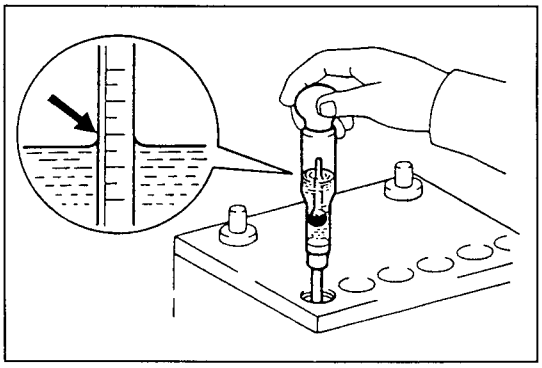
SPECIFICATIONS

		STD	High capacity (OPT)
Type	:	55D23L	130E41L
Voltage/Capacity	:	12 V/60 Ah	12 V/110 Ah
Specific gravity of battery fluid	:	1.280 (20°C) [68°F]	←



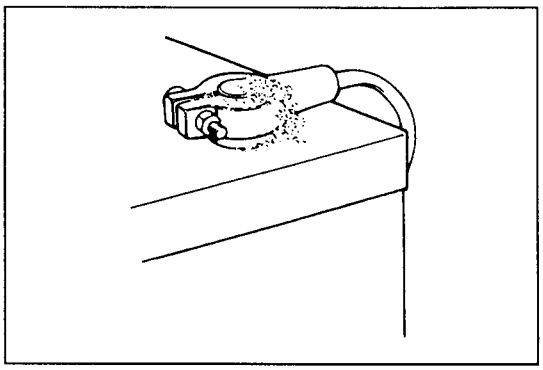
INSPECTION

1. Inspect the battery fluid level.
   (1) Inspect if the battery fluid level is in the range of UPPER ↔ LOWER. If insufficient, add distilled water to the UPPER level.



2. Inspect the specific gravity of the battery fluid.
   (1) Use a hydrometer and measure the specific gravity of the battery fluid.

   Standard: 1.280 (at 20°C (68°F))
   Calculating equation
   S20 = St + 0.0007 (t-20)
   S20: Specific gravity converted to 20°C (68°F)
   St: Measured specific gravity at t°C
   t: Fluid temperature at the time of measurement



3. Inspect the battery terminals.
   (1) If battery terminals are contaminated to white, clean them and apply a thin coat of MP grease on terminals.

4. Install the battery terminals and the harness connecting portion for loosening.
   (1) Retighten the battery terminals and the harness connecting portion.

Battery Removal

1. Disconnect battery terminals.

Note:
Disconnect the negative terminal first.

2. Remove the battery stopper.

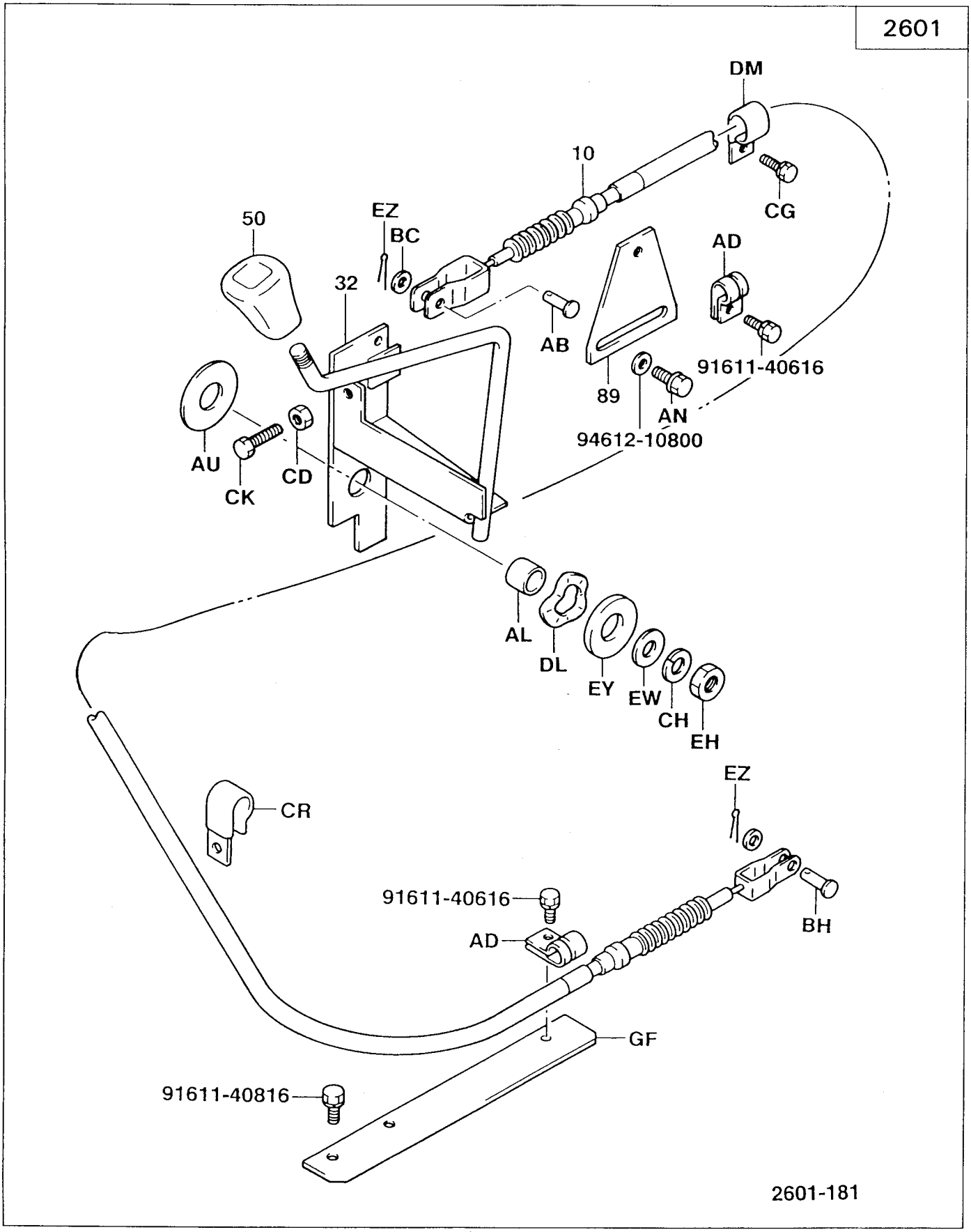
3. Remove the battery.

Battery Installation

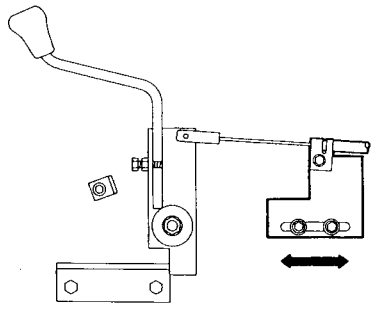
Reverse the removal procedure.

ACCELERATOR LEVER

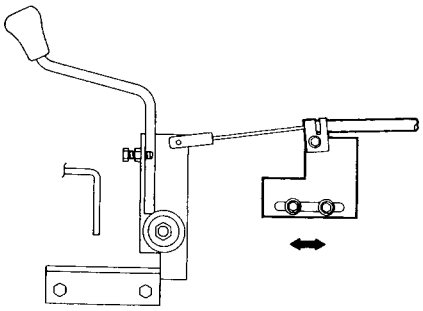
COMPONENTS



4SDK5



4SDK6·8

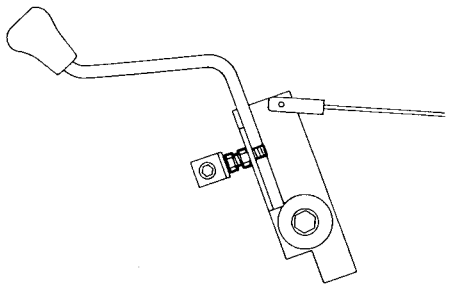


ADJUSTMENT

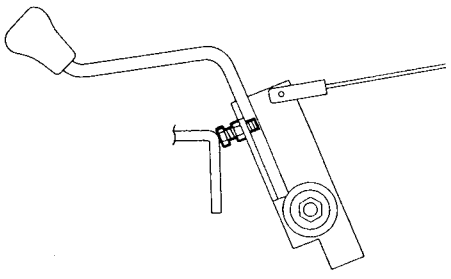
Note:
See that the engine speed is adjusted to the standard. (See page 1-8·9.)

1. Adjust the wire bracket so that the wire slackness is 1 to 3 mm when the accelerator lever is set to the idling side.

4SDK5



4SDK6·8



2. Loosen the lever stopper bolt lock nut, and tighten the stopper bolt.

3. Set the accelerator lever in the full throttle position.

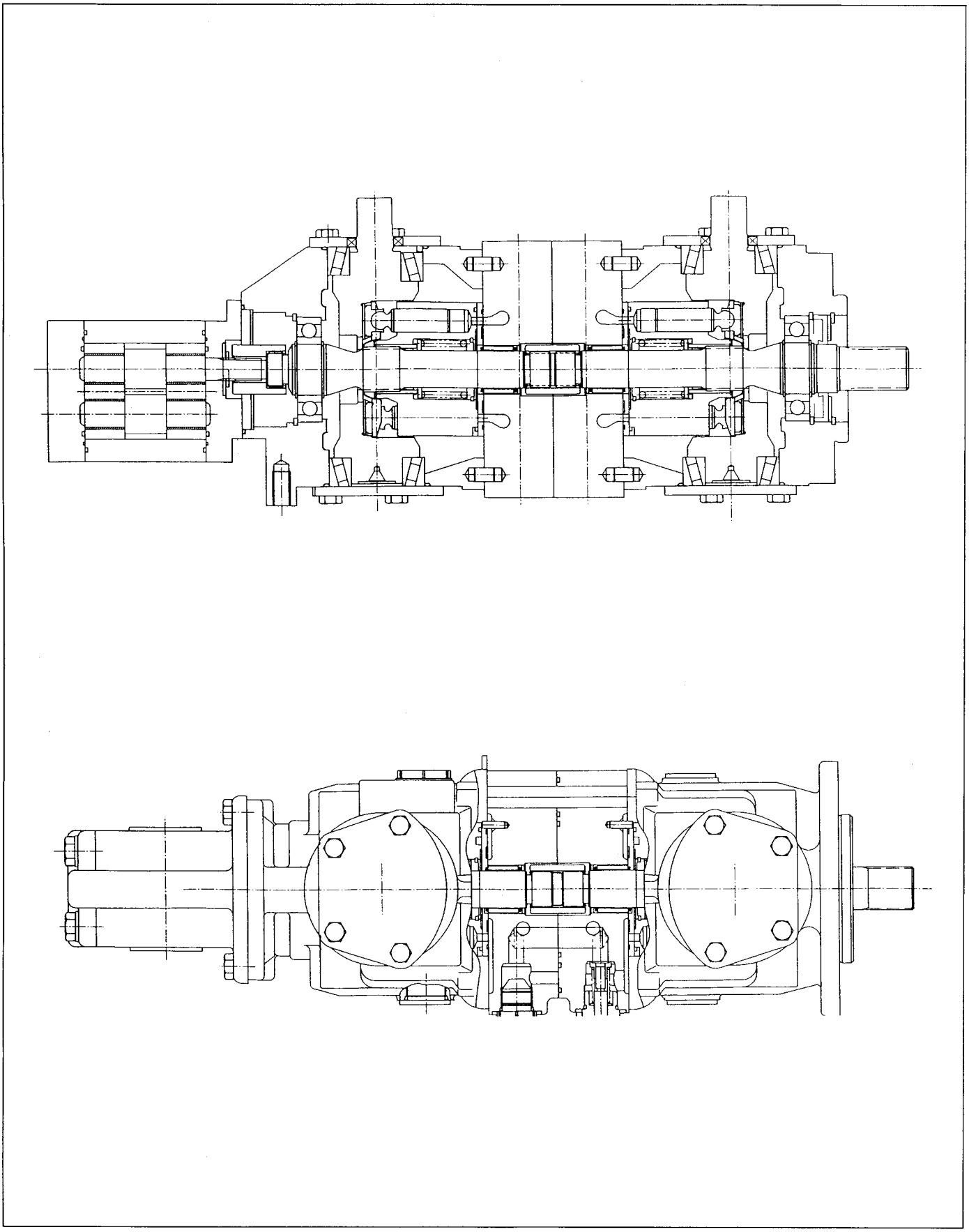
Note:
Do not apply excessive force since the stopper bolt is inactive.

4. Loosen the stopper bolt by one turn further from the position where it comes into contact with the frame, and lock it in the position by tightening the lock nut.

HST

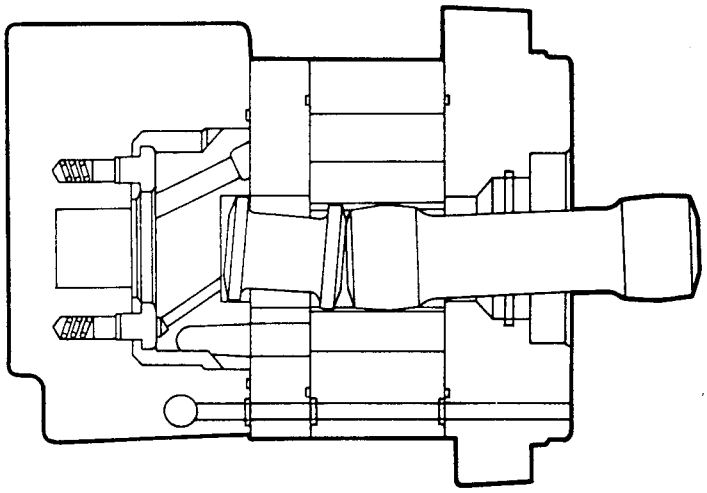
GENERAL

HST PUMP

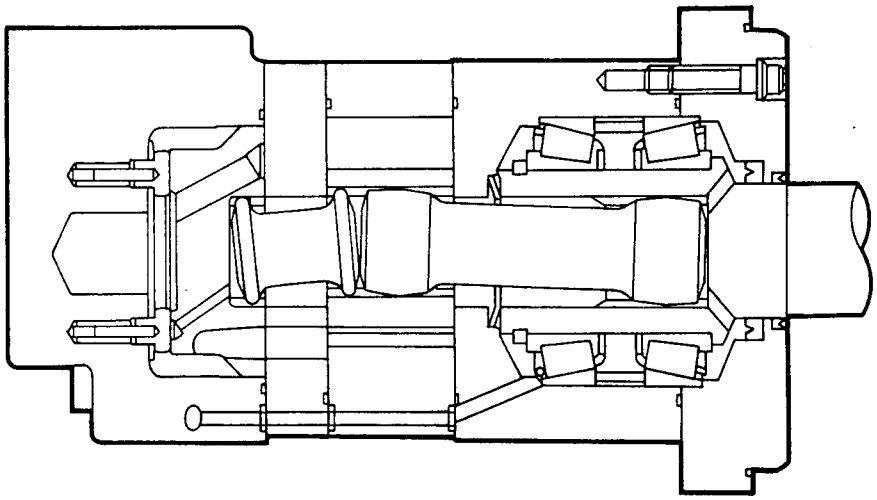


HST Motor

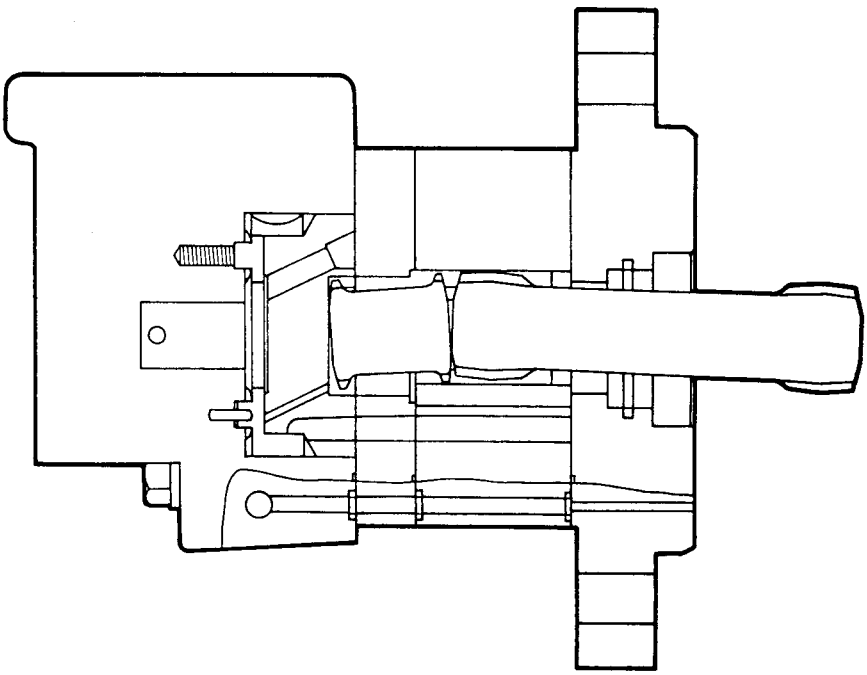
4SDK5



4SDK6



4SDK8



SPECIFICATIONS

HST Pump

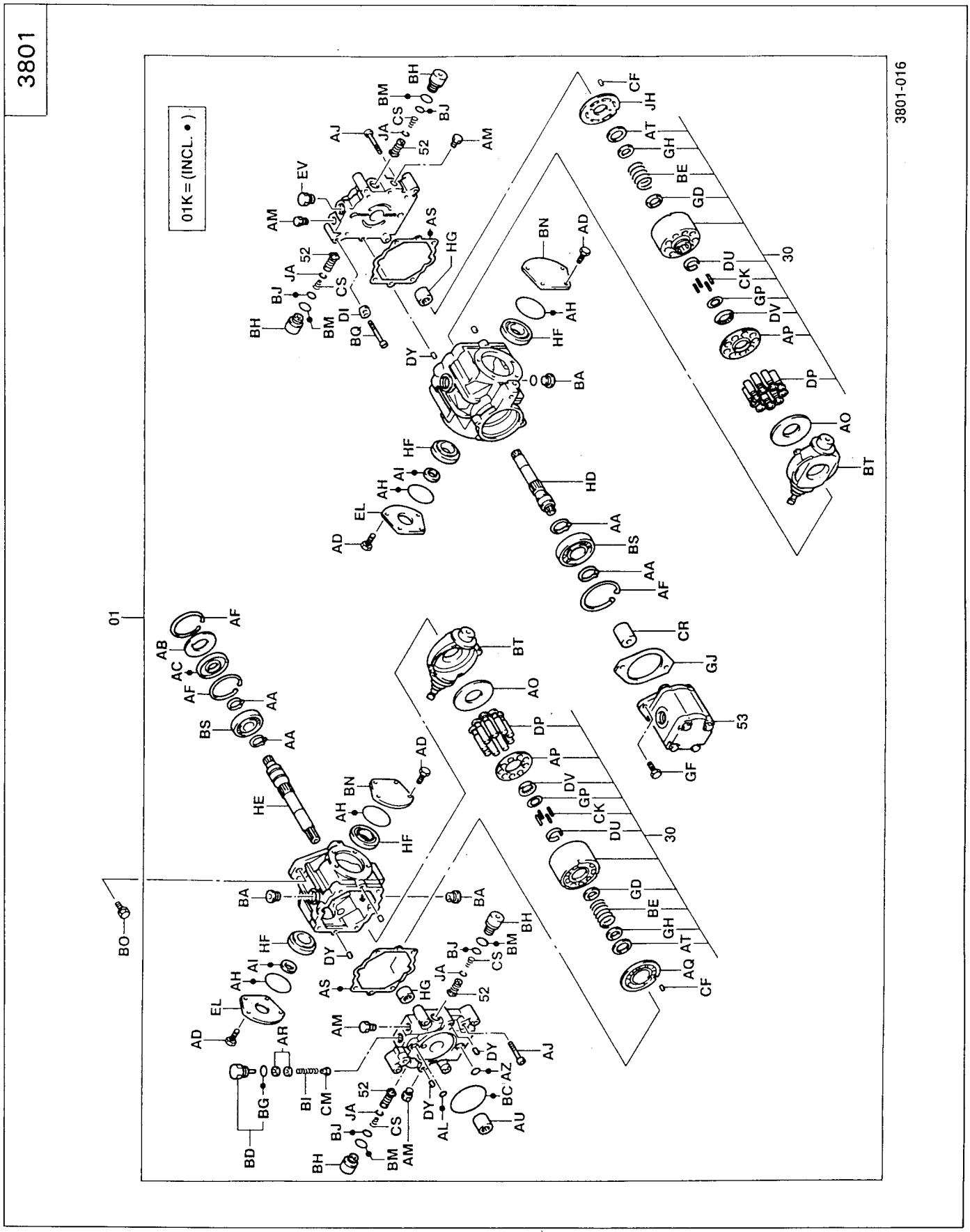
Item \ Vehicle model	4SDK5	4SDK6	4SDK8
Type	PV3535-512	PV3535-513	PV3535-514
Name	Variable capacity piston pump (tandem type)		
Displacement cc/rev	0 to 35.0 × 2 pcs.		
Slipping plate angle	± 16°		
Rotating direction	Clockwise as seen from the shaft end		
High pressure relief valve set pressure MPa (kgf/cm²)	21.0 (214)	26.0 (265)	30.0 (306)
Charge pressure kPa (kg/cm²) [psi]	At idling: 343 (3.5) [49.8] At maximum speed: 461 (4.7) [66.8]		
Weight kg	Approx. 50		

HST Motor

Item \ Vehicle model	4SDK5	4SDK6	4SDK8
Type	4-250	4-310	6-310
Name	Low-speed high-torque motor with shuttle valve (internal gear motor)		
Displacement cc/rev	246	311	311
Maximum pressure MPa (kgf/cm²)	21.0 (214)	26.0 (265)	30 (306)
Rotating direction	Both (clockwise and counterclockwise)		
Weight kg	Approx. 20		

COMPONENTS

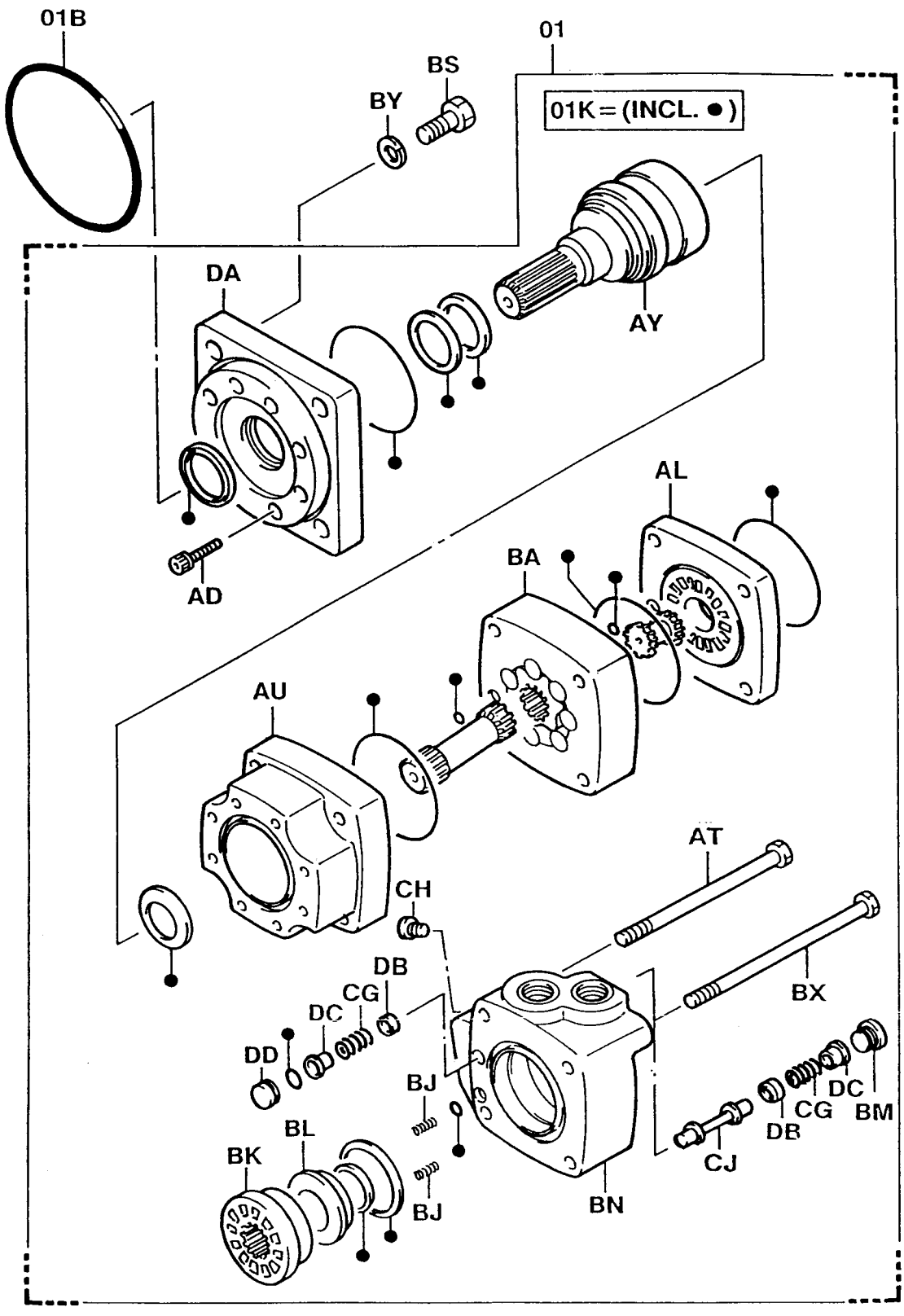
HST Pump



HST Motor

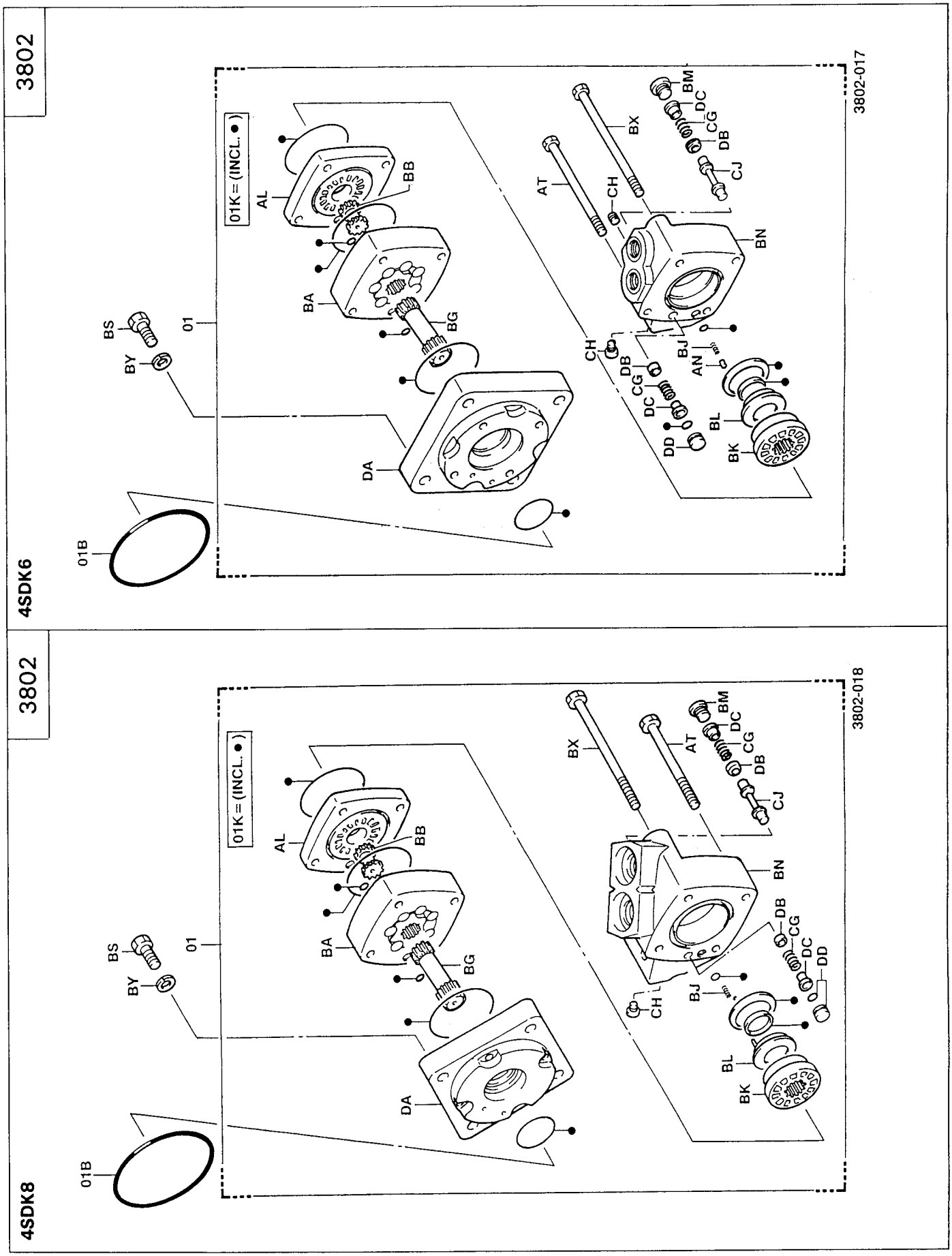
4SDK5

3802

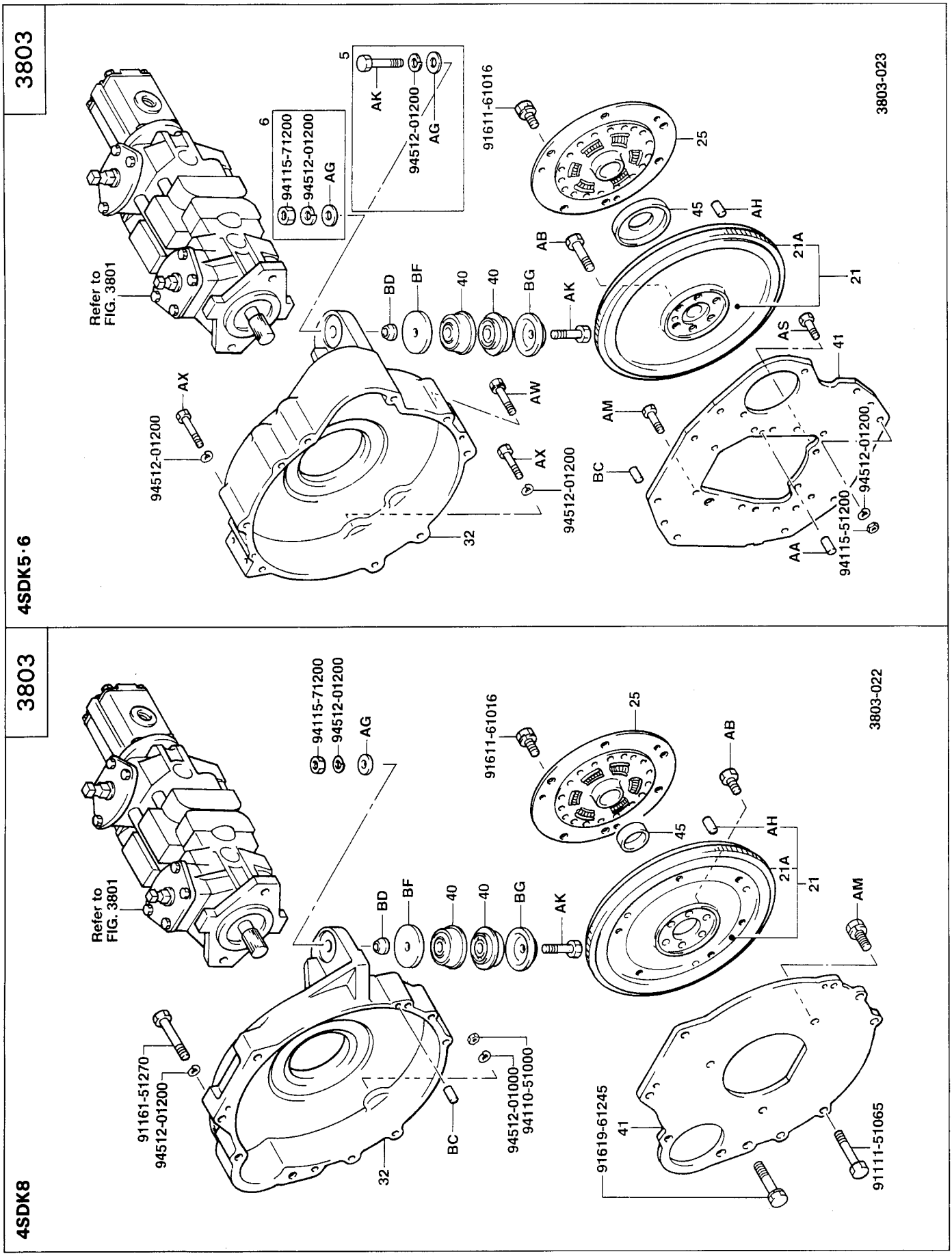


3802-016

HST Motor



HST Pump Mounting



TROUBLESHOOTING

Defect phenomenon	Defective portion	Judgment and corrective action
1. The vehicle does not move at all or is powerless.	(1) Is the pump shaft rotating?	○ If the pump shaft is not rotating, the pump shaft spline (on the engine side) or the damper is defective. → Replace.
	(2) Oil tank level inspection.	○ Add if below the specified lower limit.
	(3) Isn't the oil whitened?	○ If whitened, bleed air from the hydraulic circuit. See the "Hydraulic Piping — Hydraulic Circuit Air Bleeding" section for the procedure.
		○ Retighten the oil pump suction line.
	(4) Does the pump control shaft move normally?	○ Inspect the steering control lever to pump control shaft link.
		○ Damage of steering rod or rod end → Replace.
	(5) Inspect the HST filter warning lamp on or off state. [Engine switch ON: Lamp on Engine started: Lamp off]	○ Normal if the lamp comes on while idling and goes out upon acceleration.
		○ Lengthen the warming up time in winter or cold area.
		○ Check if the cylinder operation is normal.
		○ Replace the HST oil filter. Check if the filter paper is damaged or is metal particles exist in the oil in the filter. Overhaul the pump and motor if the filter paper is damaged or metal particles exist.
		○ Inspect the charge valve for accurate seating and smooth motion. If defective, replace the valve.
	(6) Measure the charge pressure. Remove the HST pump charge pressure check port plug, and install an oil gauge for 0 to 15 kgf/cm^2.	○ Normal if the charge pressure is 2 kgf/cm^2 or above at idling and 3.2 kgf/cm^2 at the maximum engine speed.
		○ Overhaul the pump and motor if the pressure is below the level above when the steering control lever is operated.
	(7) Check and high pressure relief valve inspection.	○ Check for accurate seating and smooth motion. Replace if defective.
	(8) Check the pump bypass valve for loosening.	○ Retighten if not tightened.

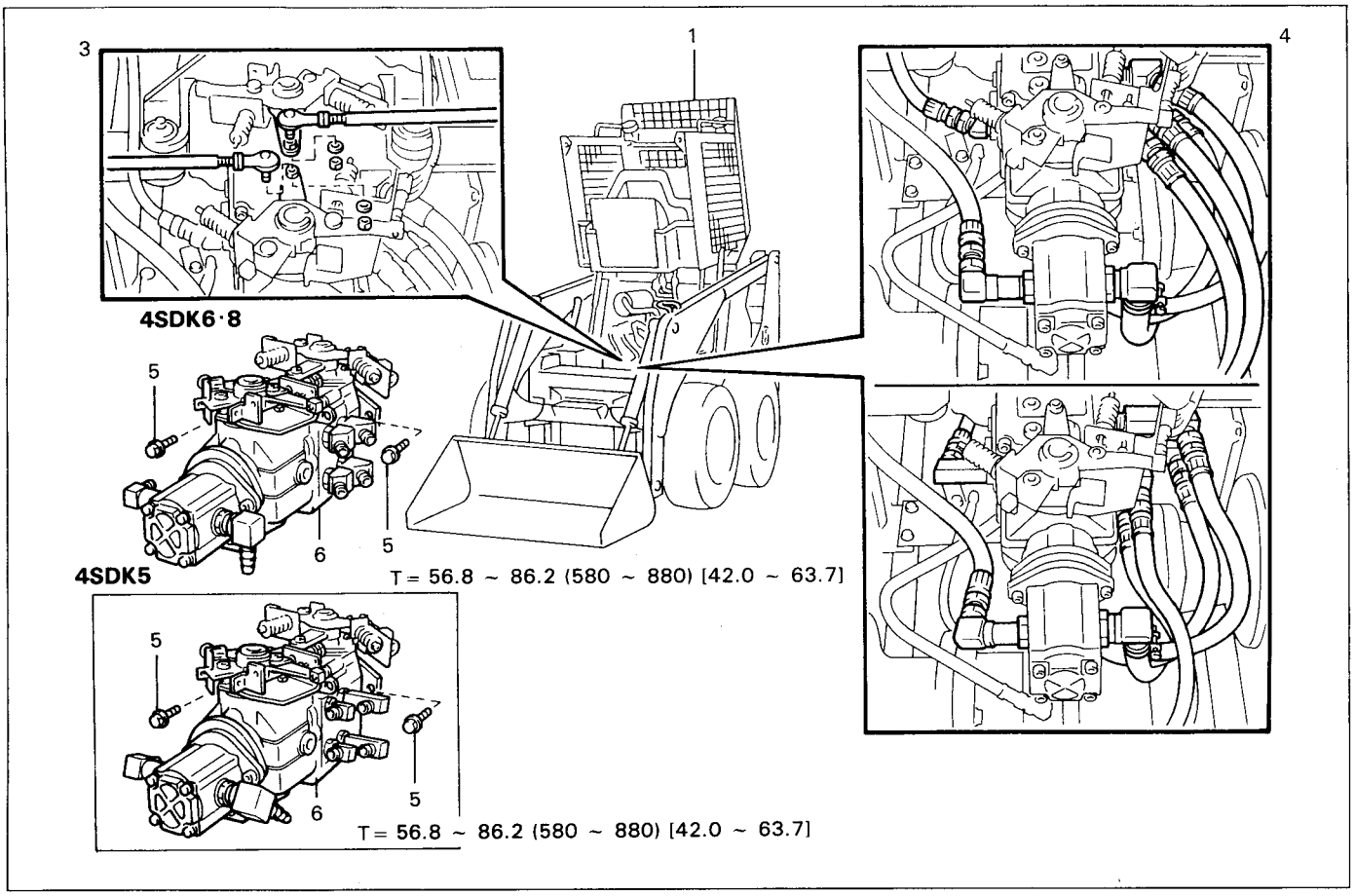
Defect phenomenon	Defective portion	Judgment and corrective action
2. Moves only on one side (left or right side).	(1) Does the pump control shaft move normally?	○ See 1. (4) on the previous page.
	(2) Isn't the check and high pressure relief valve open?	○ If stuck, eliminate the sticking cause and replace the relief valve. ○ Exchange the relief valves LH and RH. Replace the relief valve since it is defective if motion on the non-moving side occurs.
	(3) Check the HST filter warning lamp for on or off.	○ See 1. (5) on the previous page.
	(4) Isn't the pump bypass valve loosened?	○ Retighten if loosened.
3. The neutral position is incorrect.	(1) Steering control link inspection.	○ Adjust the neutral position of the steering link control lever by referring to the "Steering — Steering Neutral Adjustment" section.
4. Abnormal oil temperature rise	(1) Oil tank level check.	○ If below the lower limit, add oil.
	(2) Isn't the oil whitened?	○ See 1. (3) on the previous page.
	(3) Oil cooler clogging check.	○ Clean or replace the oil cooler.
	(4) HST oil filter clogging check.	○ Replace the oil filter.
	(5) Isn't the check and high pressure relief valve open?	○ See 2. (2) above.
	(6) Isn't the bypass valve loosened?	○ Retighten if loosened.
	(7) Isn't the engine speed above the specified level?	○ Adjust the engine speed by referring to the "Engine Tune-up" section. Check the pump and motor for functional degradation. Check the vehicle speed to see if the motor speed is dropped. If dropped, overhaul the pump and motor. Measure the charge pressure. Overhaul the pump and motor if it is below the standard.
5. Abnormal noise generation	(1) Oil tank level check.	○ Add oil if below the lower limit. ○ See 1. (3) on the previous page.
	(2) Isn't any hose or pipe loosened?	○ Inspect and correct installation. ○ Correct any portion that comes into contact by pipe vibration.
	(3) Isn't the pump or motor installation loosened?	○ Check the installation and retighten if loosened.

Defect phenomenon	Check portion	Judgment and corrective action
	(4) Inspect the pump shaft spline and damper.	○ Worn pump shaft spline → Replace. ○ Wear or damage of damper → Replace. ○ Loosened damper set bolt → Retighten.
	(5) Defective meshing between reduction sprocket and chain.	○ Replace the sprocket and chain, and correct centering in meshing.
6. Poor acceleration or deceleration	(1) Oil tank level check.	○ Add if below the lower limit. ○ See 1. (3) on page 2-9.
	(2) Pump or motor performance degradation.	○ See 4. (7) on the previous page.
	(3) Isn't engine power fallen?	○ Engine speed adjustment. ○ Engine tune-up.

HST PUMP

REMOVAL·INSTALLATION

Note:
Cover the hose and elbow with nylon caps to prevent dust entrance. T = N·m (kgf·cm) [ft·lb]



Removal Procedure

1 Open the operator guard. (See page 7-7.)
2 Drain hydraulic oil from the oil tank.
3 Disconnect the steering link.
4 Disconnect the piping.
5 Remove the HST set bolts.
6 Remove the HST pump ASSY.

Installation Procedure

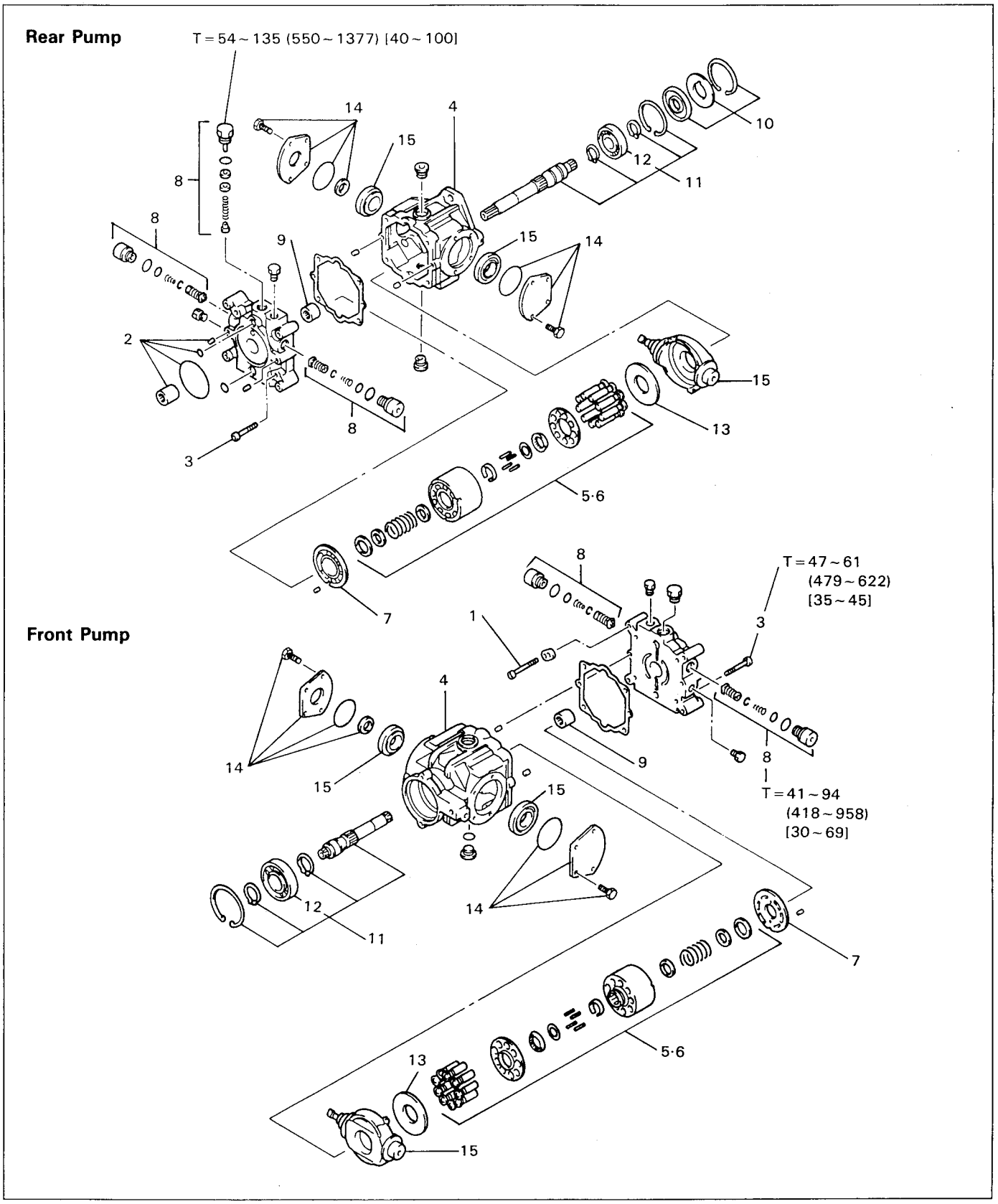
The installation procedure is the reverse of the removal procedure.

Notes:
- **When installing the HST pump on the engine, coat and fill Molywhite TA or equivalent on the HST pump and damper spline portions and in the grease seal cap.**
- **After pouring hydraulic oil (Auto Fluid Special) from the HST pump tank port, connect the piping.**
- **Check the hydraulic oil level.**
- **Bleed air from the hydraulic circuit. See the "Hydraulic Piping — Hydraulic Circuit Air Bleeding" section for the procedure.**

DISASSEMBLY·INSPECTION·REASSEMBLY

Notes:
- **As each part is finished with high precision, carefully disassemble them to prevent any damage.**
- **Operate in a clean place.**

T = N·m (kgf-cm) [ft-lbf]



Disassembly Procedure

Notes:
- **Since the check and high pressure relief valve pressure setting is individually adjusted, carefully prevent any change in the mounting position.**
- **Since the charge relief valve is adjusted by shim insertion, carefully disassemble so as not to lose any shim.**

1 Remove the pump joint bolt.

2 Remove the straight pin and O-ring.

3 Remove the end plate set bolts. **[Point 1]**

4 Remove the oil pump housing ASSY. **[Point 2]**

5 Remove the cylinder block kit.

6 Disassemble the cylinder block kit. **[Point 3]**

7 Remove the valve plate. **[Point 4]**

8 Remove the check and high pressure relief valve and the charge relief valve.

9 Remove the needle bearing. **[Point 5]**

10 Remove the snap ring, and remove the oil seal. (Rear pump only) **[Point 6]**

11 Remove the snap ring and remove the drive shaft W/bearing.

12 Remove the drive shaft bearing. **[Point 7]**

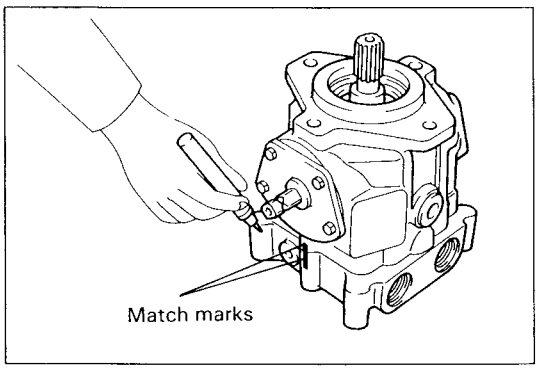
13 Remove the thrust plate. **[Point 8]**

14 Remove the swash plate seal carrier and cover.

15 Remove the swash plate bearing and remove the swash plate.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

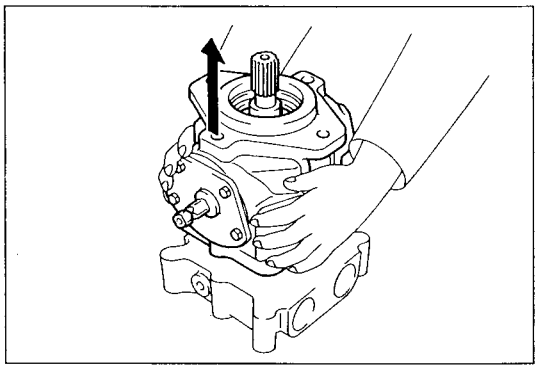


Point Operations

[Point 1]

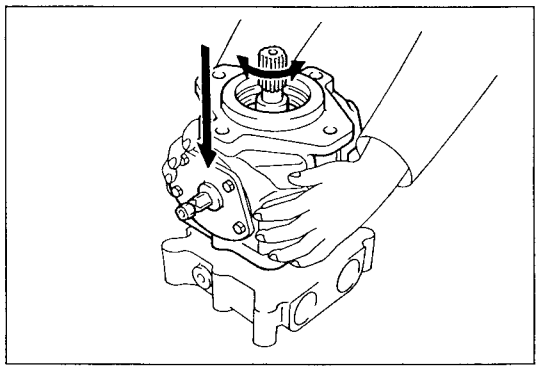
Disassembly: Put a match mark on the end plate and oil pump housing.

Reassembly: Align the match marks.

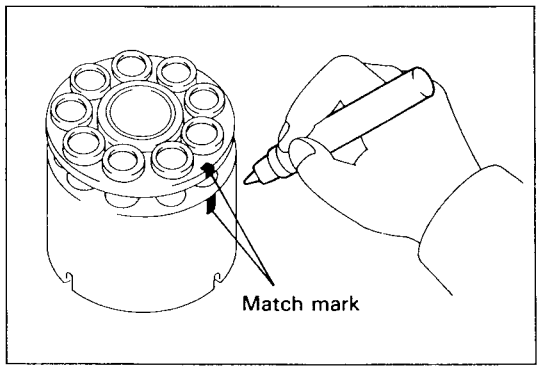


[Point 2]

Disassembly: Remove the pump housing straight to leave the cylinder kit in the end plate.



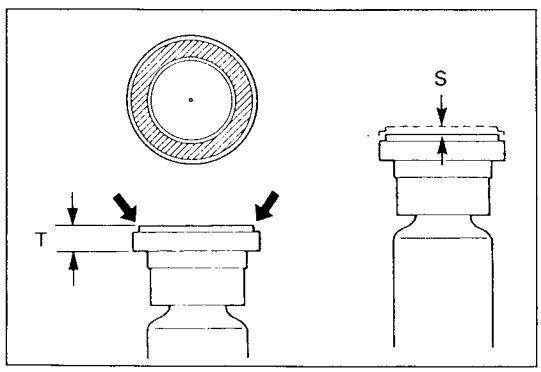
Reassembly: Install the pump housing straight so as not to displace the cylinder block kit pin and guide retainer positions. If insertion fails halfway due to spline mismatching, turn the drive shaft a little to match the spline.



[Point 3]

Disassembly: Put a match mark on the cylinder block and slipper guide.

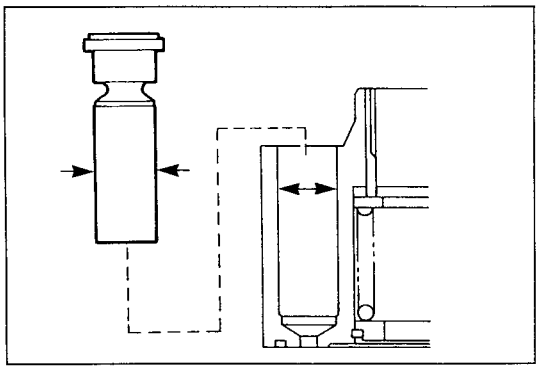
Reassembly: Align the match marks.



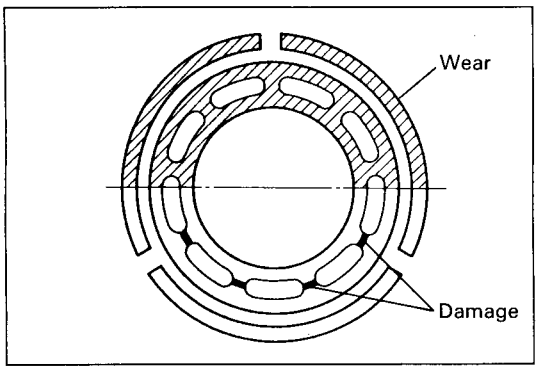
Inspection: Inspect the piston slipper sliding contact surface (hatched portions) for wear and flaw.

Limit (T): 3.5 mm (0.138 in)
Limit (S): 0.3 mm (0.012 in)

Note:
Replace the piston slipper if the flaw catches a nail or if the circumference of the sliding portion is rounded as a result of wear.

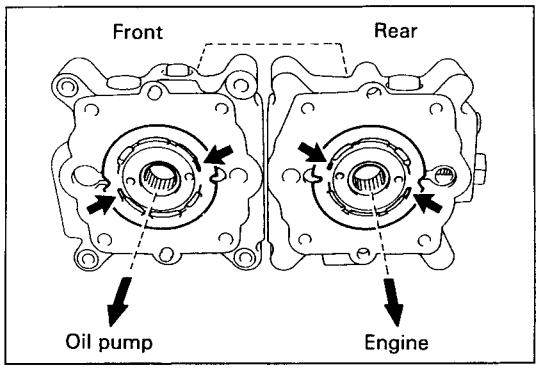


Inspection: Inspect the piston clearance.



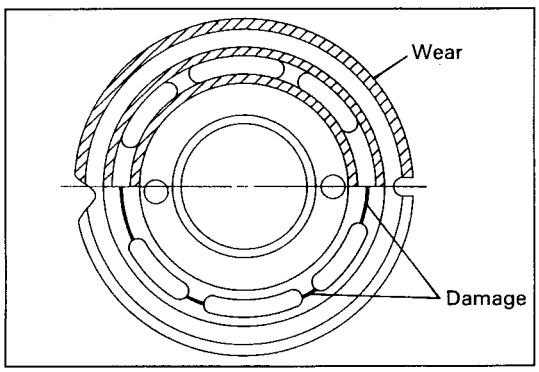
Inspection: Inspect the cylinder block sliding contact surface (hatched portions) for wear or flaw.

Note:
Replace the valve plate if the flaw catches a nail.



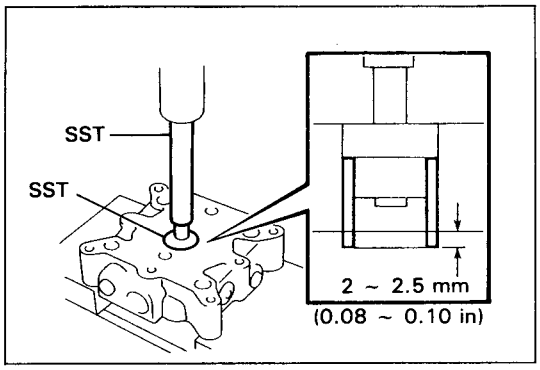
[Point 4]

Disassembly·Reassembly: Since the groove shape and position are different between the front pump side and rear pump side, check the shape.



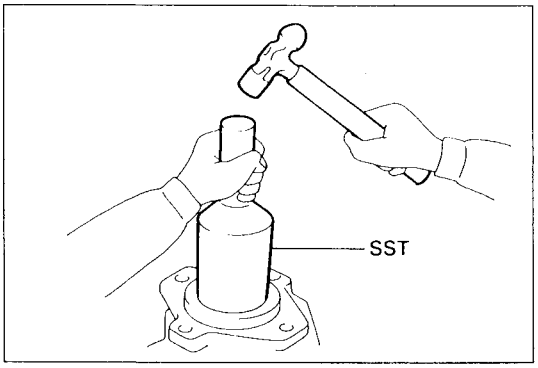
Inspection: Inspect the valve plate sliding contact surface (hatched portions) for wear and flaw.

Note:
Replace the valve plate if the flaw catches a nail.



[Point 5]

Disassembly·Reassembly: SST 09950-76018-71
(SST 09950-60010)
SST 09950-76020-71
(SST 09950-70010)

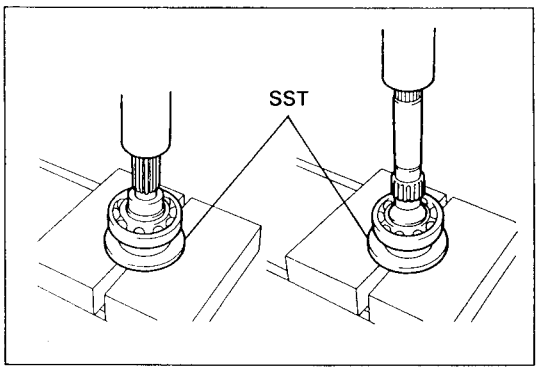


[Point 6]

Reassembly: Oil seal installation.

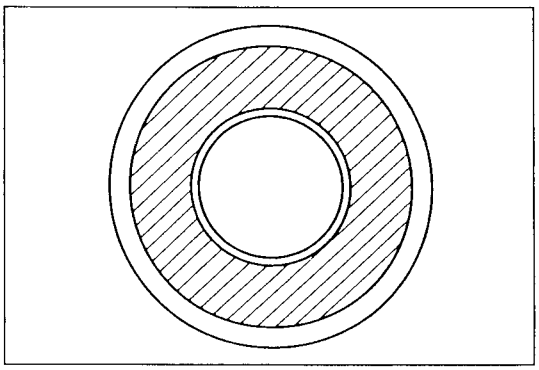
1. Apply grease on the oil seal lip portion.
2. Use the SST and install the oil seal.

   SST 09214-76004-71
   (SST 09214-76011)



[Point 7]

Disassembly·Reassembly: SST 09316-76008-71
(SST 09316-60011)



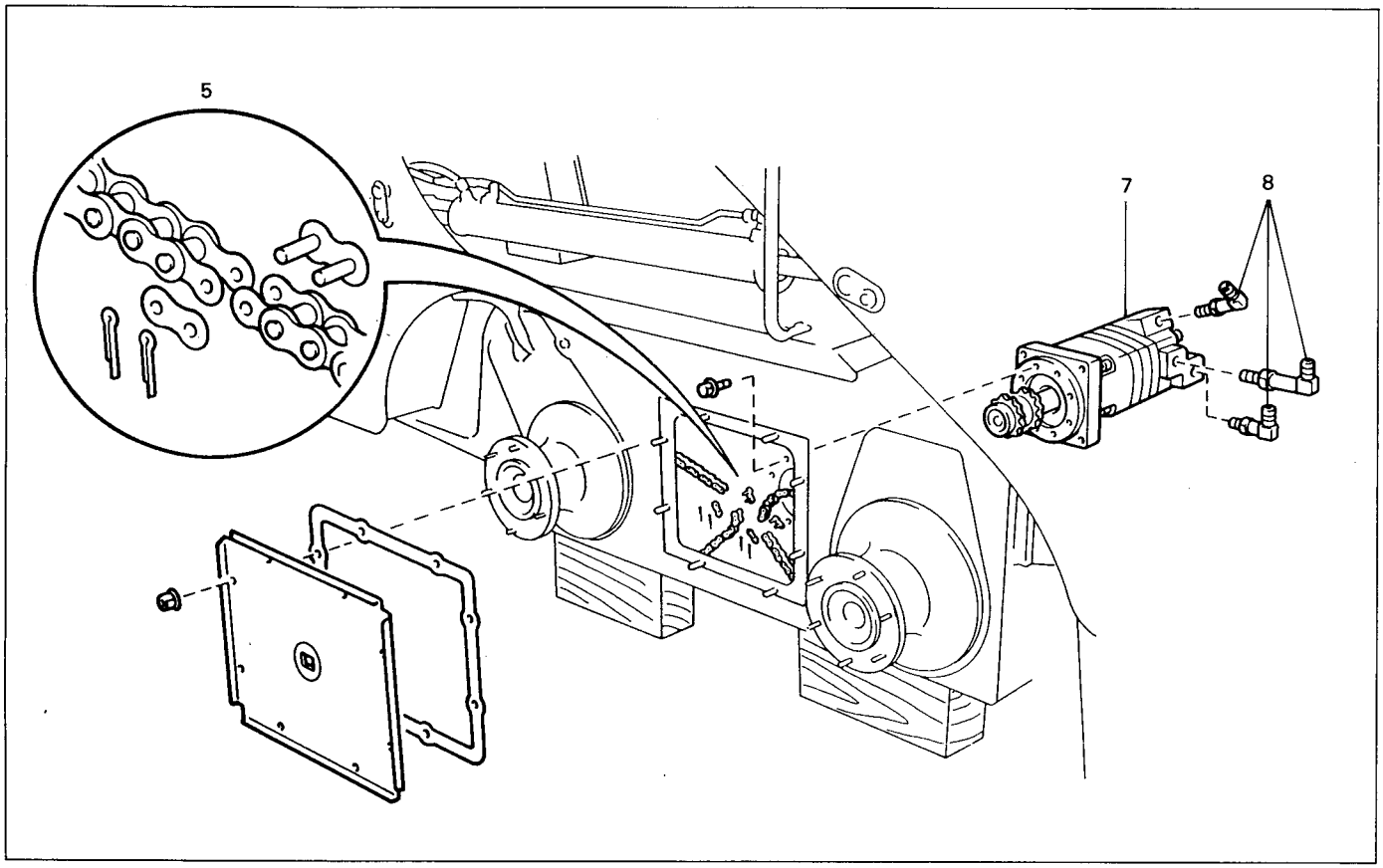
[Point 8]

Inspection: Inspect the thrust plate sliding contact surface (hatched portions) for wear and flaw.

Note:
Replace the thrust plate if the flaw catches a nail.

HST MOTOR ASSY (4SDK5)

REMOVAL·INSTALLATION



Removal Procedure

1 Drain hydraulic oil from the oil tank.

2 Remove the front under cover.

3 Remove the rear under cover.

4 Remove the service hole cover.

5 Disconnect the drive chain and remove it from the sprocket.

6 Disconnect the piping.

7 Remove the HST motor ASSY.

8 Remove the fitting from the HST motor ASSY.

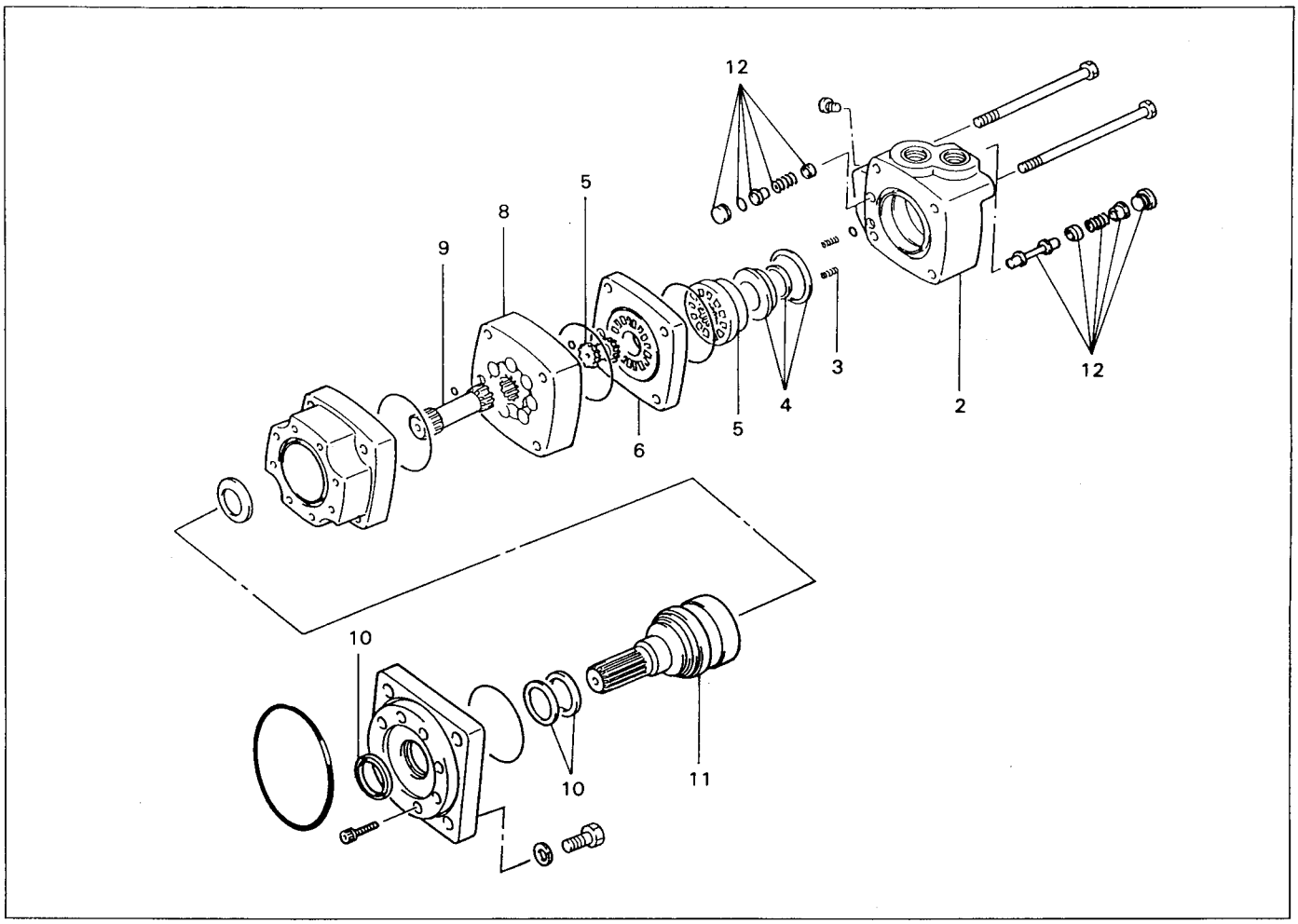
Installation Procedure

The installation procedure is the reverse of the removal procedure.

Notes:
- **Connect the piping after filling hydraulic oil in the HST motor.**
- **Bleed air from the hydraulic circuit by referring to the procedure in the "Hydraulic Piping — Hydraulic Circuit Air Bleeding" section (page 12-5).**
- **Check the hydraulic oil level.**

DISASSEMBLY·INSPECTION·REASSEMBLY

T = N·m (kgf-cm) [ft-lbf]



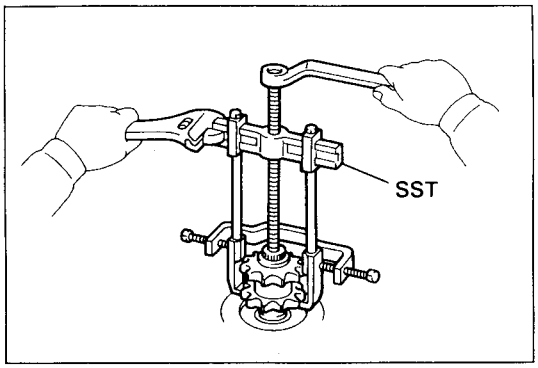
Disassembly Procedure

1 Remove the sprocket. **[Point 1]**
2 Remove the valve housing. **[Point 2]**
3 Remove two springs from the balance plate.
4 Remove the balance plate W/seal. **[Point 3]**
5 Remove the valve. **[Point 4]**
6 Remove the valve plate.
7 Remove the valve drive. **[Point 5]**
8 Remove the gyroller set. **[Point 6]**
9 Remove the drive. **[Point 7]**
10 Remove the front retainer. **[Point 8]**
11 Remove the shaft and bearing ASSY. **[Point 9]**
12 Remove the shuttle valve from the bearing housing.

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

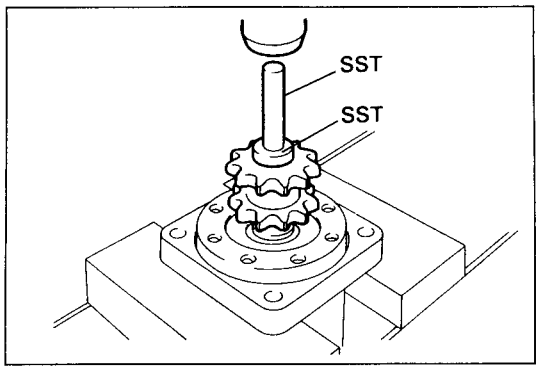
Notes:
- **Clean the top of the work bench before starting disassembly.**
- **Wash dirt off from the outside of the body and HST motor ASSY before starting disassembly.**
- **Carefully handle disassembled parts to prevent any damage.**
- **Drain hydraulic oil from the motor before starting disassembly.**
- **Coat lock agent (08833-76001-71 (08833-00070) or equivalent) on the threaded portions of set bolts.**
- **Align the drain holes in the bearing housing, gyroller valve plate and valve housing.**



Point Operations

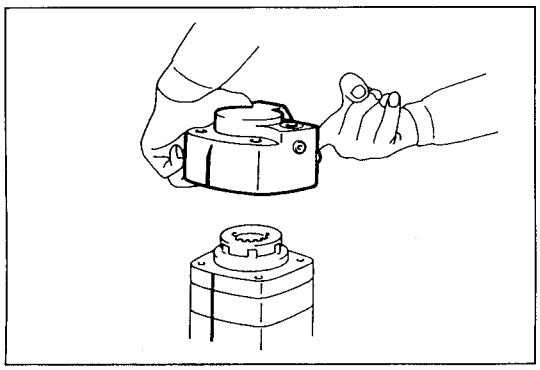
[Point 1]

Disassembly: SST 09950-76013-71
(SST 09950-40010)



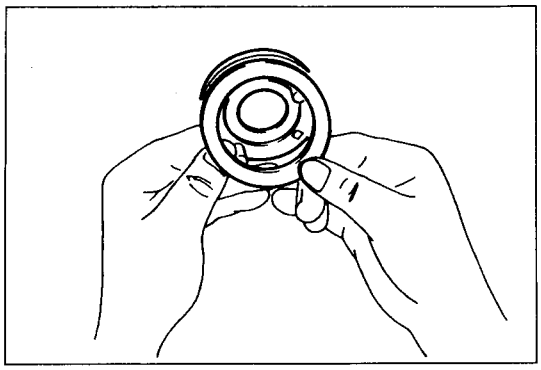
Reassembly: Use a press for installing the sprocket.

SST 09950-76018-71
(SST 09950-60010)
SST 09950-76020-71
(SST 09950-70010)



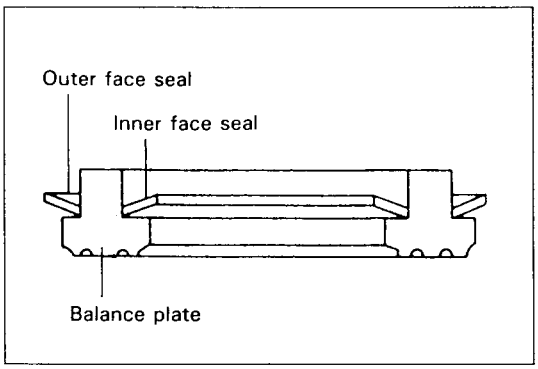
[Point 2]

Reassembly: Insert a brass or bamboo bar from the port hole and hold the balance plate to prevent the balance plate from falling. Place the valve housing on top of the valve, align the bolt holes and tighten the bolt.

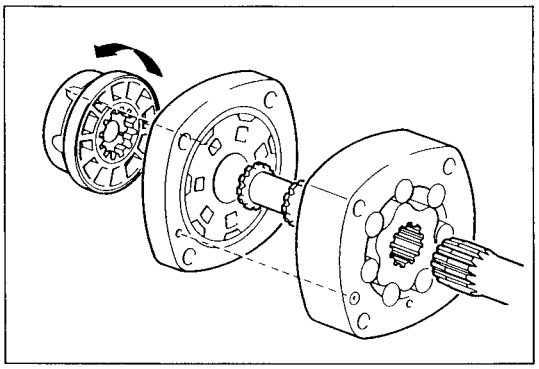


[Point 3]

Disassembly: Remove the inner face seal and outer face seal from the balance plate.

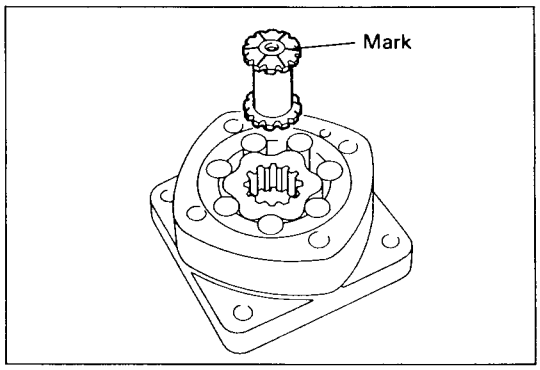


Reassembly: Install the inner face seal and outer face seal in the illustrated directions and install them carefully on the balance plate so as not to cause any damage.



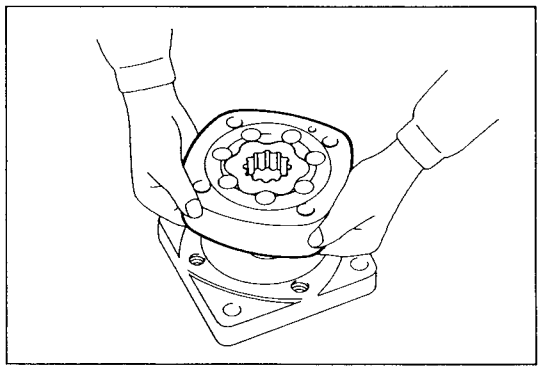
[Point 4]

Reassembly: Mesh the spline after aligning one of the oil hole on the outer side of the valve with the largest pocket in the gyroller and rotating it by 1/2 turn clockwise as seen from the valve housing from the groove hole position of the valve plate.



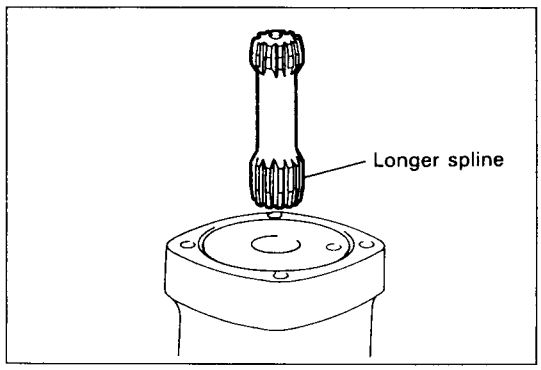
[Point 5]

Reassembly: Install so that the marked spline tooth of the valve drive faces the valve.



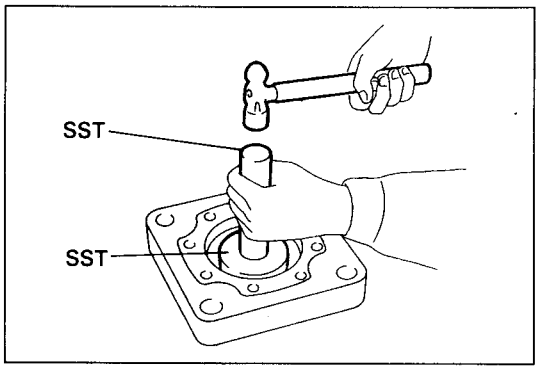
[Point 6]

Disassembly·Reassembly: Disassemble and reassemble while holding with hands to prevent the gyroller set roller from coming off.



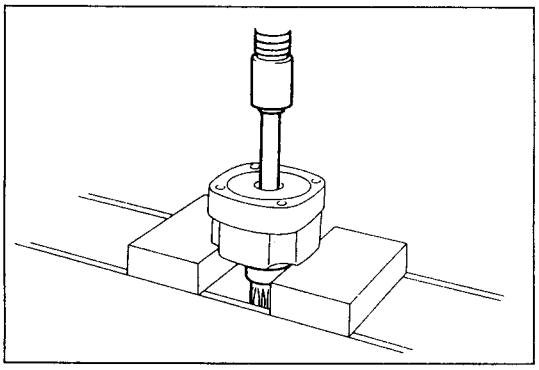
[Point 7]

Reassembly: Assemble with the longer spline of the drive facing the bearing housing.



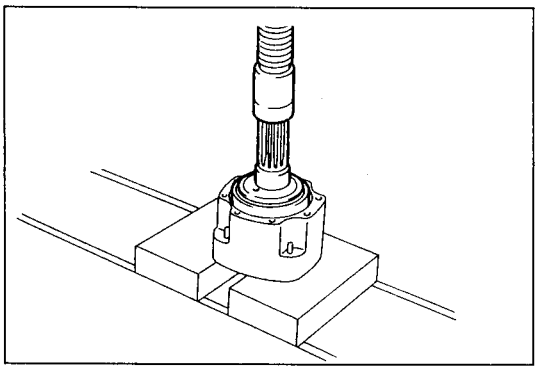
[Point 8]

Reassembly: SST 09950-76018-71
(SST 09950-60010)
SST 09950-76020-71
(SST 09950-70010)



[Point 9]

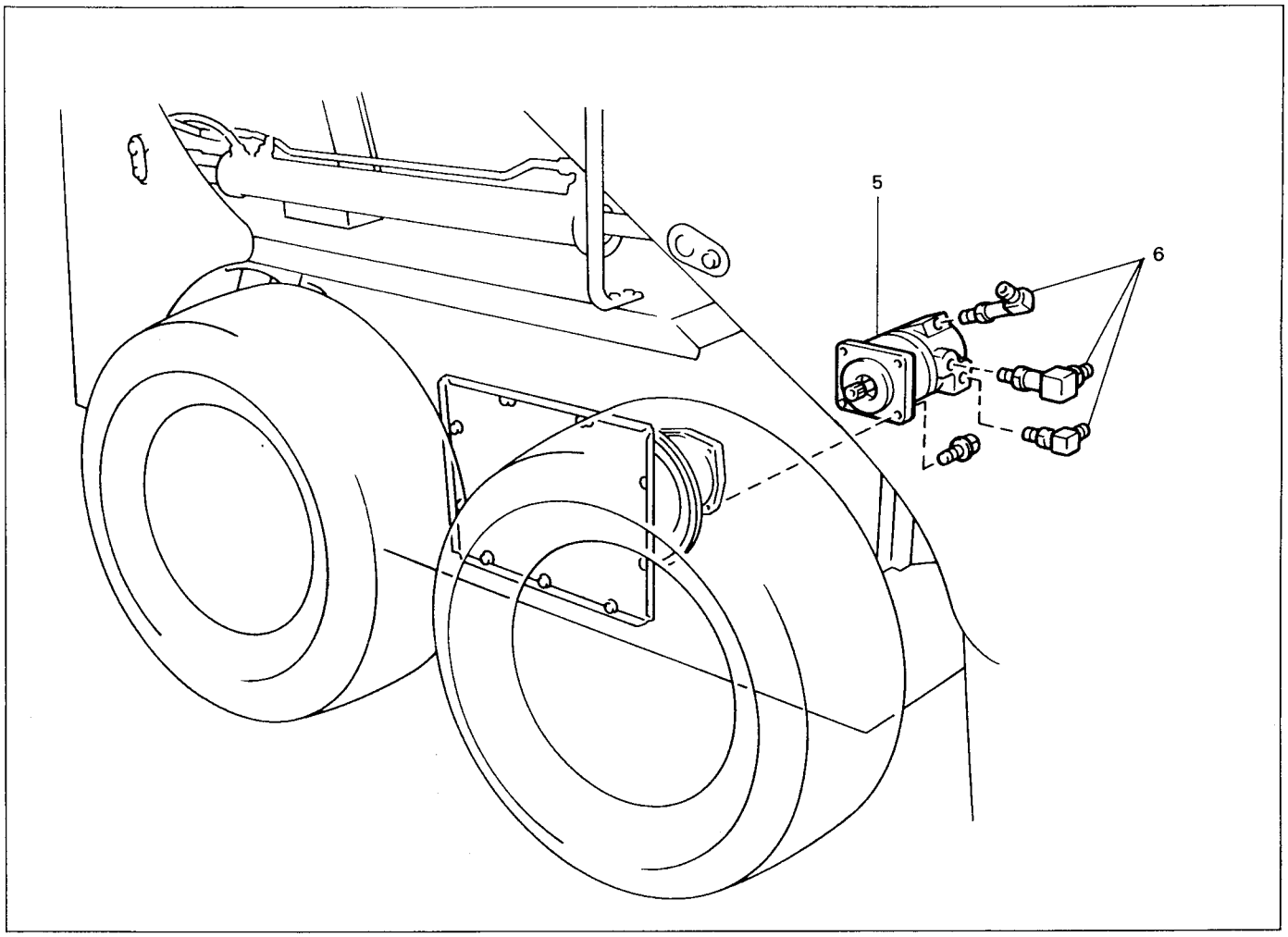
Disassembly: Use a press for removing the shaft and bearing ASSY.



Reassembly: Use a press to install the shaft and bearing ASSY.

HST MOTOR ASSY (4SDK6·8)

REMOVAL·INSTALLATION



Removal Procedure

1 Drain hydraulic oil from the oil tank.

2 Remove the front under cover.

3 Remove the rear under cover.

4 Disconnect the piping.

5 Remove the HST motor ASSY.

6 Remove the fitting from the HST motor ASSY.

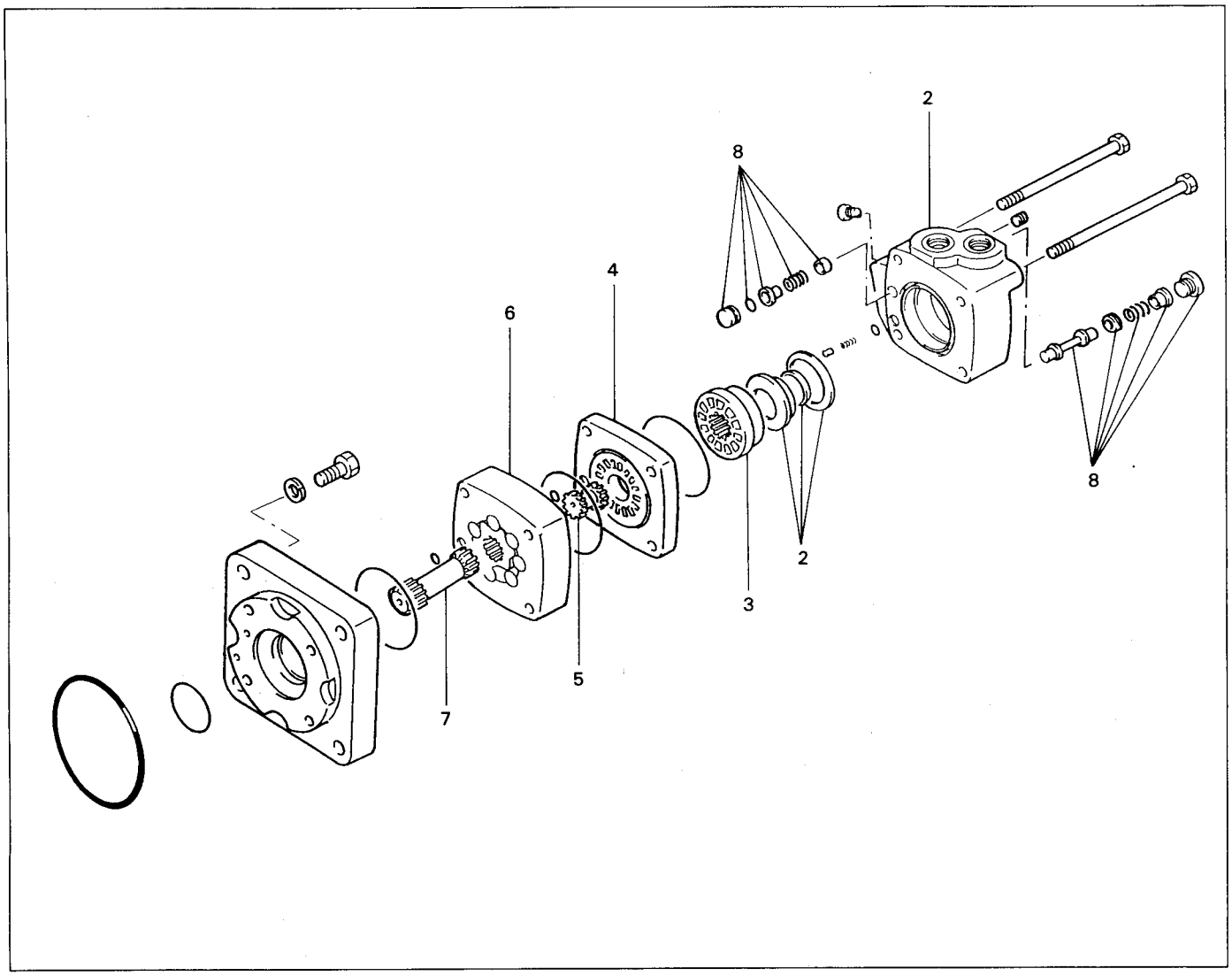
Installation Procedure

The installation procedure is the reverse of the removal procedure.

Notes:
- **Connect the piping after filling hydraulic oil in the HST motor.**
- **Bleed air from the hydraulic circuit by referring to the procedure in the ''Hydraulic Piping — Hydraulic Circuit Air Bleeding'' section (page 12-5).**
- **Check the hydraulic oil level.**

DISASSEMBLY·INSPECTION·REASSEMBLY

T = N·m (kgf-cm) [ft-lbf]



Disassembly Procedure

1 Remove the valve housing. **[Point 1]**

2 Remove the balance plate W/seal and three springs. **[Point 2]**

3 Remove the valve. **[Point 3]**

4 Remove the valve plate.

5 Remove the valve drive. **[Point 4]**

6 Remove the gyroller set. **[Point 5]**

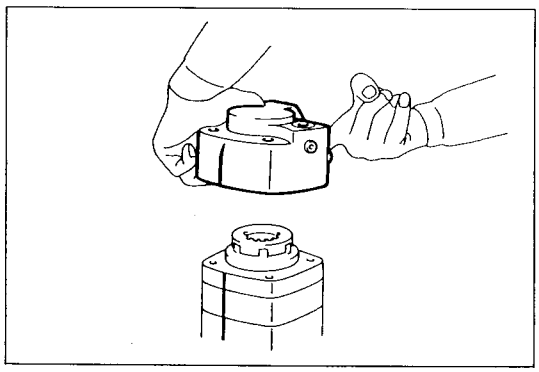
7 Remove the drive. **[Point 6]**

8 Remove the shuttle valve from the bearing housing.

Reassembly Procedure

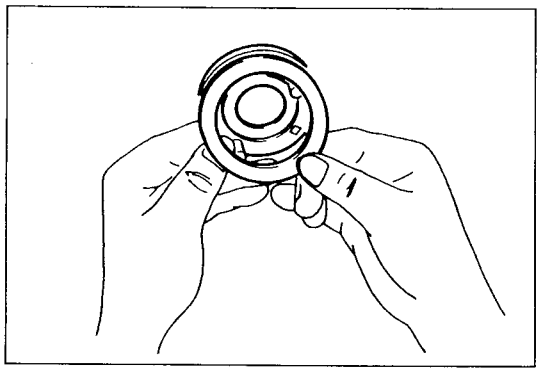
The reassembly procedure is the reverse of the disassembly procedure.

Notes:
- **Clean the top of the work bench before starting disassembly.**
- **Wash dirt off from the outside of the body and HST motor ASSY before starting disassembly.**
- **Carefully handle disassembled parts to prevent any damage.**
- **Drain hydraulic oil from the motor before starting disassembly.**
- **Coat lock agent (08833-76001-71 (08833-00070) or equivalent) on the threaded portions of set bolts.**
- **Align the drain holes in the bearing housing, gyroller valve plate and valve housing.**



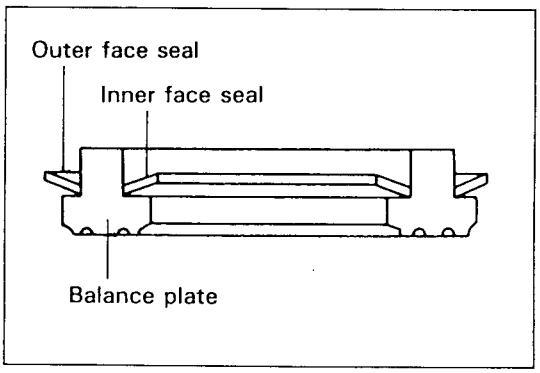
[Point 1]

Reassembly: Insert a brass or bamboo bar from the port hole and hold the balance plate to prevent the balance plate from falling. Place the valve housing on top of the valve, align the bolt holes and tighten the bolt.

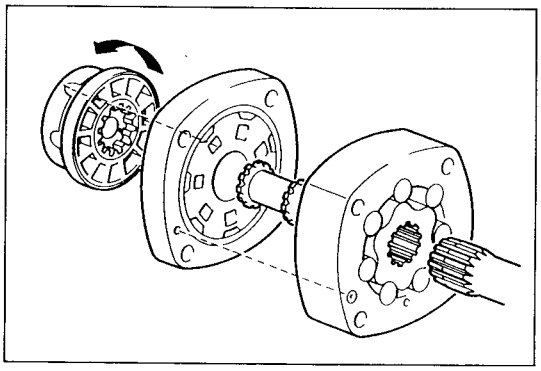


[Point 2]

Disassembly: Remove the inner face seal and outer face seal from the balance plate.

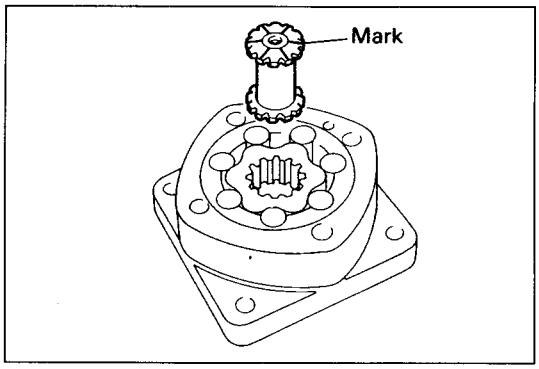


Reassembly: Install the inner face seal and outer face seal in the illustrated directions and install them carefully on the balance plate so as not to cause any damage.



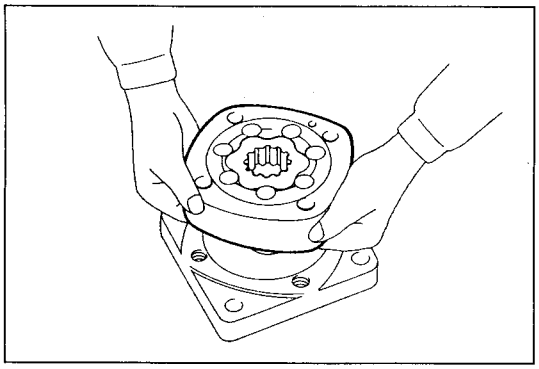
[Point 3]

Reassembly: Make splines mesh at the position turned by 1/2 tooth clockwise (as seen from the valve housing) after aligning one of the oil holes on the outer side of the valve with any of the oil holes in the valve plate.



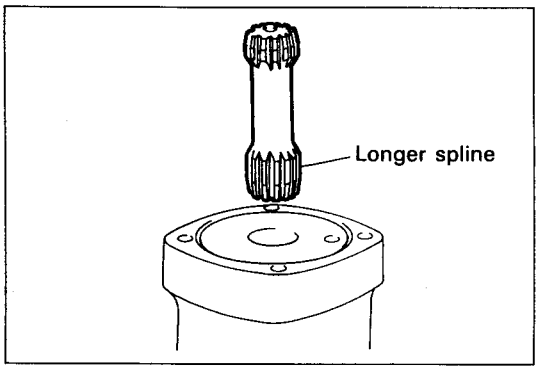
[Point 4]

Reassembly: Install so that the marked spline tooth of the valve drive faces the valve.



[Point 5]

Disassembly·Reassembly: Disassemble and reassemble while holding with hands to prevent the gyroller set roller from coming off.



[Point 6]

Reassembly: Assemble with the longer spline of the drive facing the bearing housing.

OIL PRESSURE MEASUREMENT

CHARGE PRESSURE MEASUREMENT

Measurement Procedure

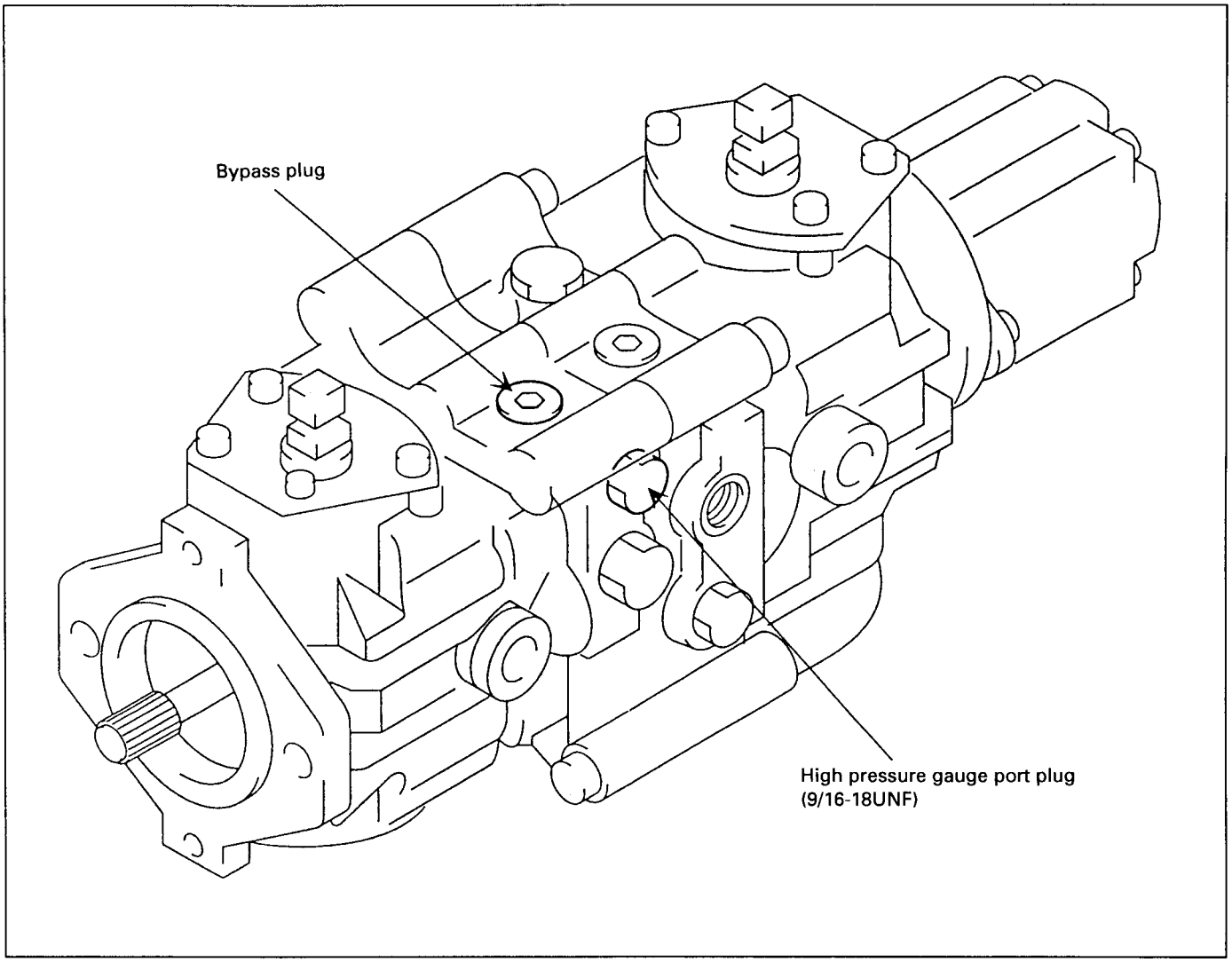
1 Open the operator guard.

2 Loosen the bypass plug on top of the HST pump by 4 turns.

3 Remove the high pressure gauge port plug (9/16-18UNF) on the right side surface of the HST pump, and set a pressure gauge.

4 Measure the charge pressure.
Applicable pressure gauge: 0 to 1471 kPa (0 ~ 15 kg/cm^2) [213.3 psi]

Caution:
Carefully install the pressure gauge so as not to let any dirt or dust enter the hydraulic circuit.

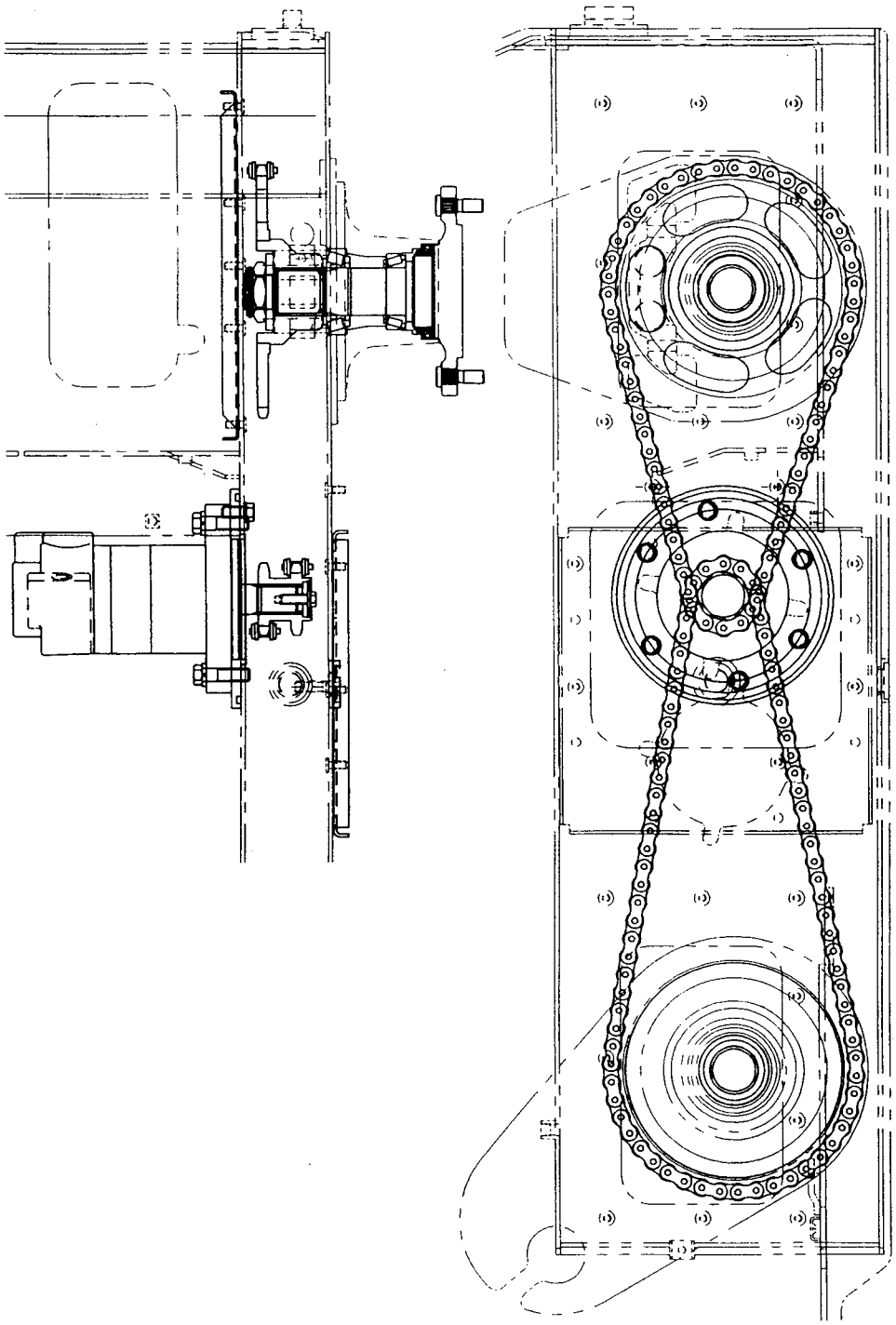


Charge pressure standards:
At idling : 343 kPa (3.5 kg/cm^2) [49.8 psi] or above
At maximum speed: 461 kPa (4.7 kg/cm^2) [66.8 psi] or above

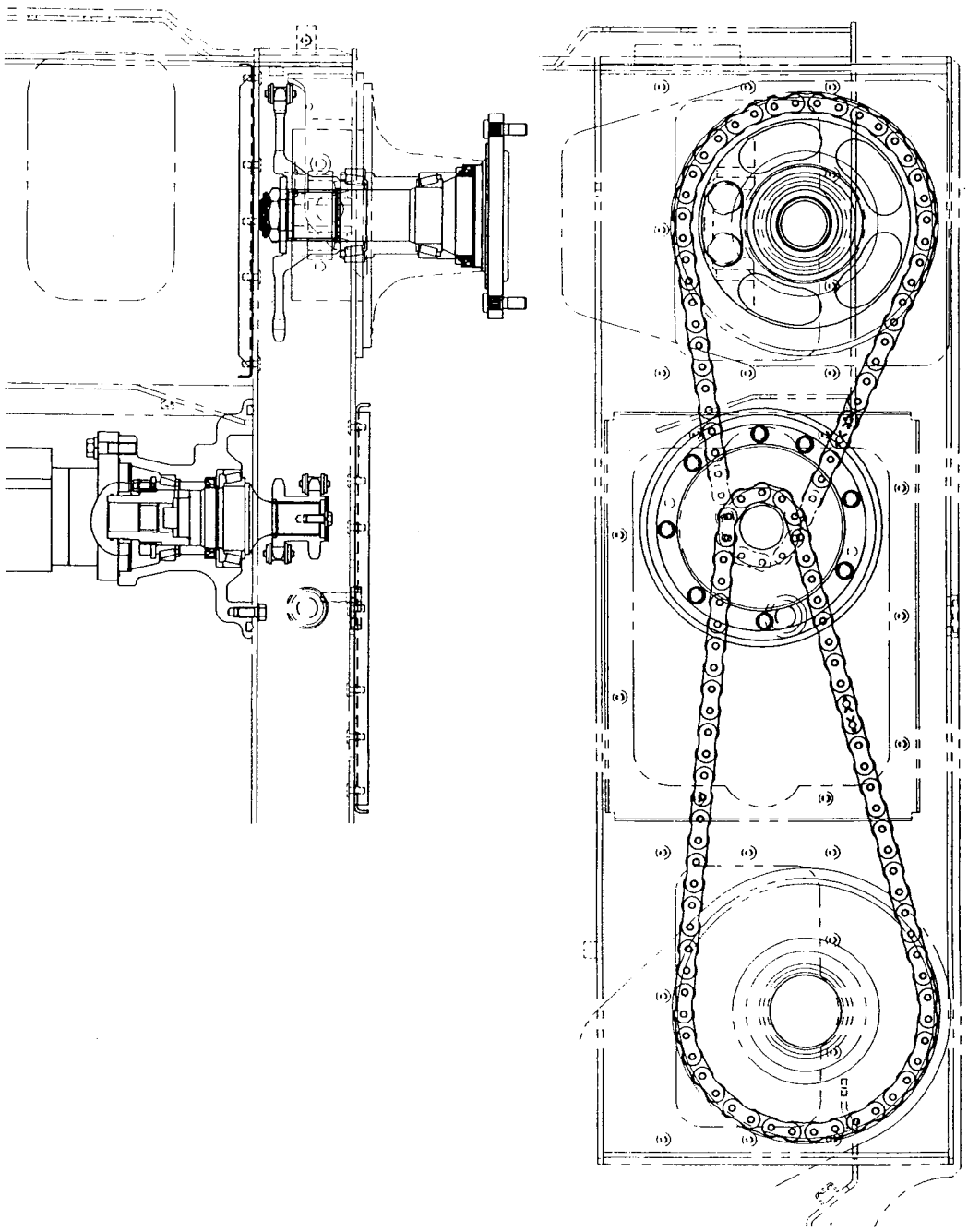
REDUCTION GEAR

GENERAL

4SDK5



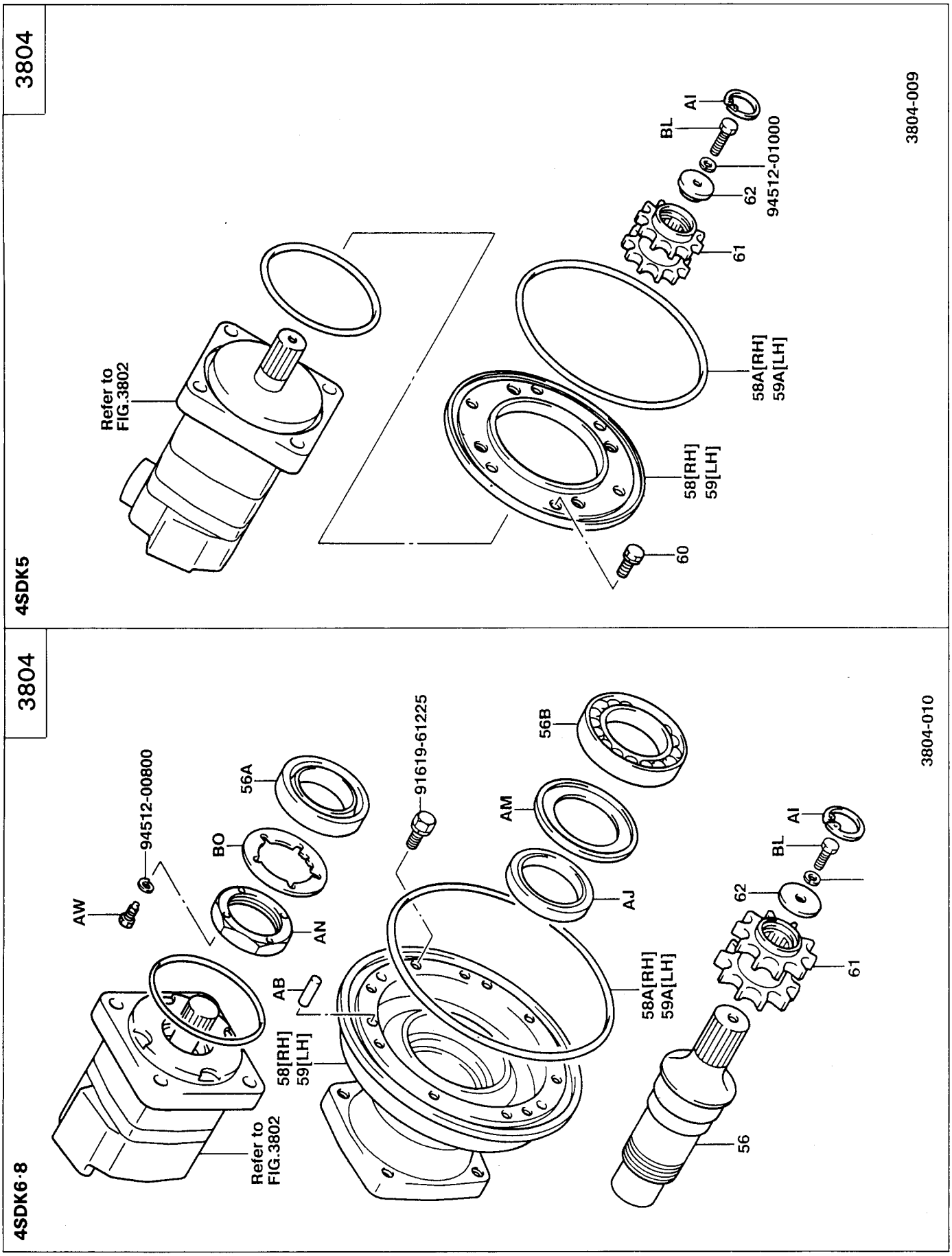
4SDK6·8



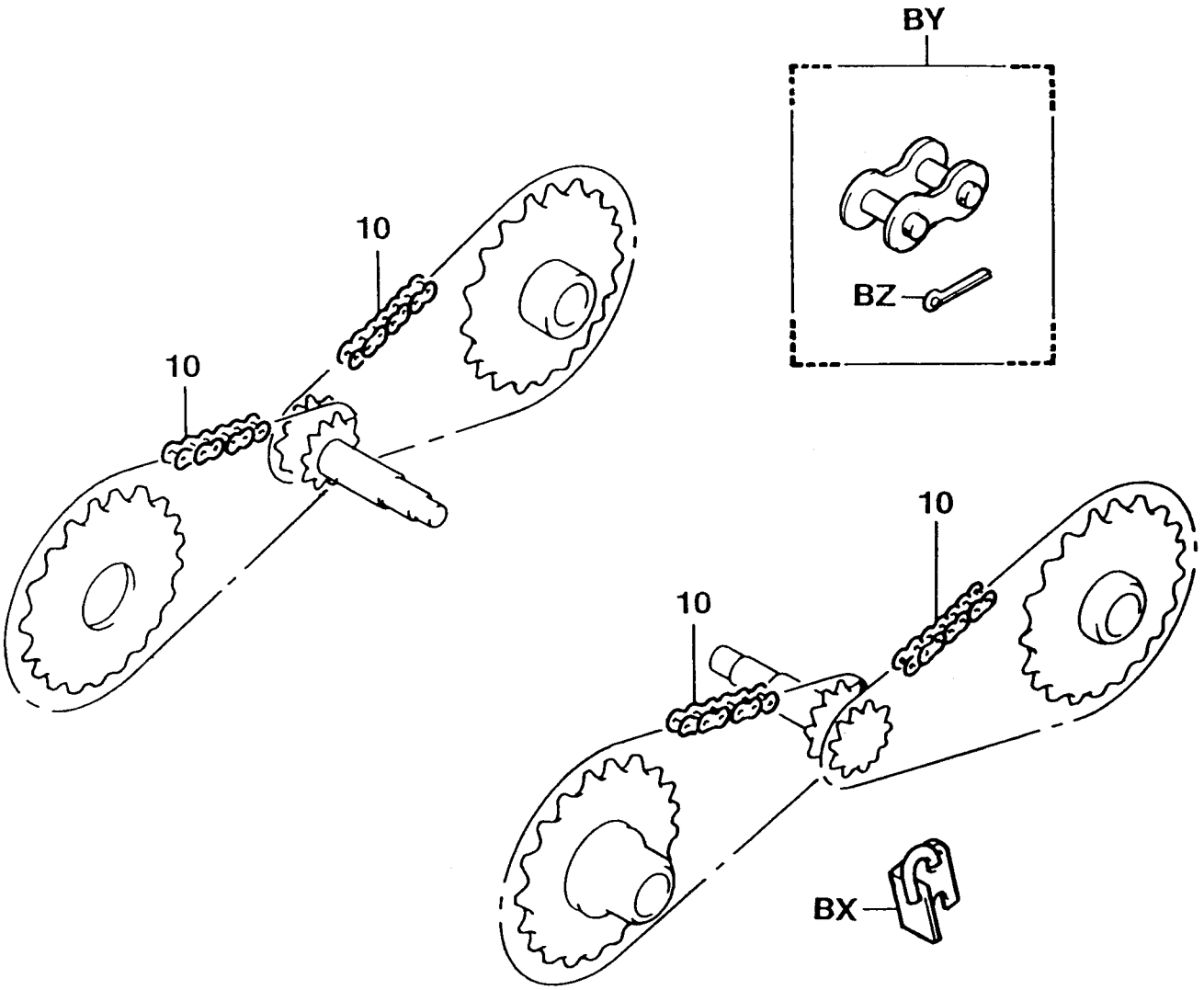
SPECIFICATIONS

	4SDK5	4SDK6	4SDK8
Reduction ratio :	3.818	3.500	←
Chain type :	RS60HT	RS80	RS80HT

COMPONENTS



4105



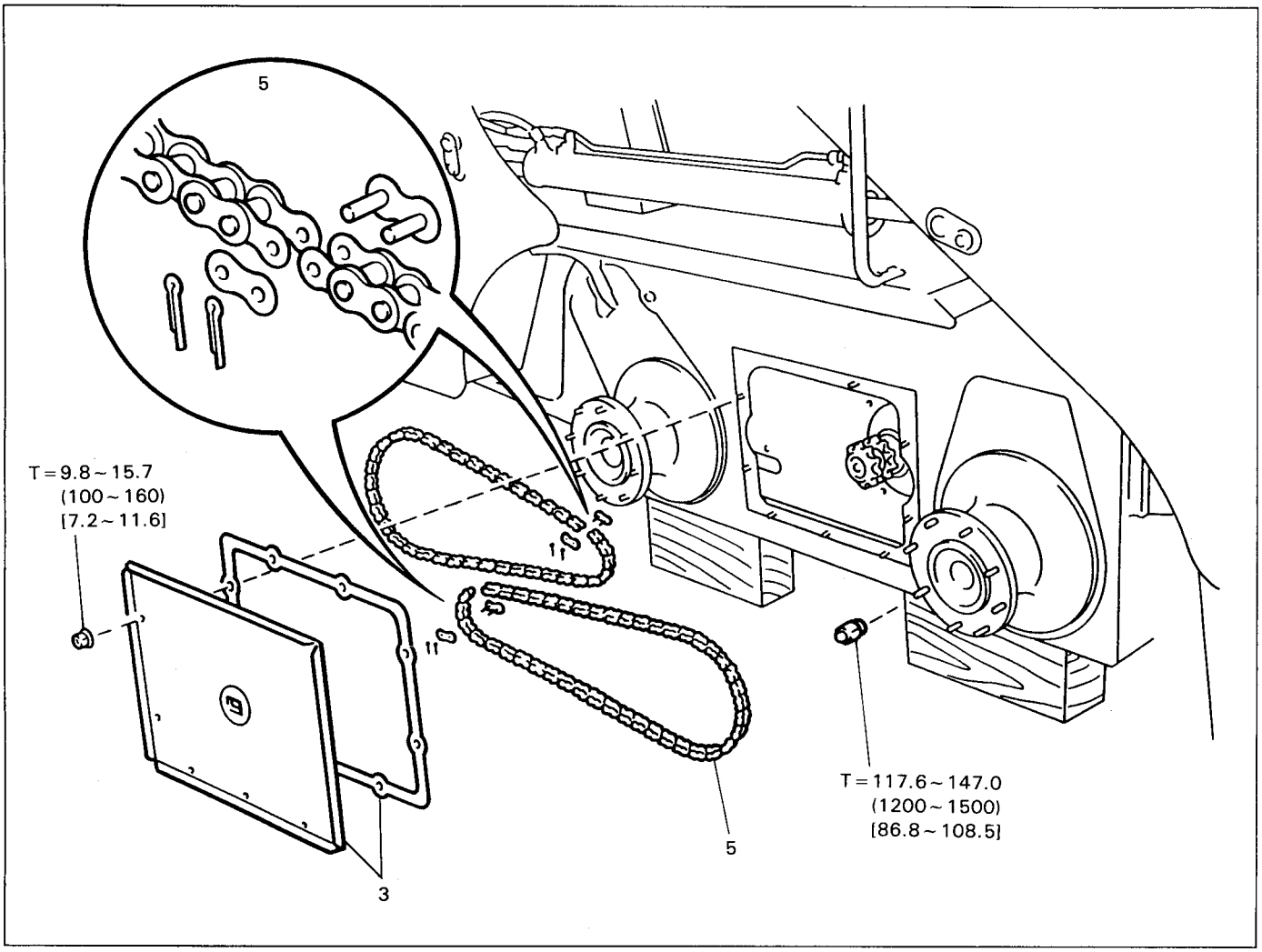
4105-013

3

DRIVE CHAIN

REMOVAL·INSTALLATION

T = N·m (kgf-cm) [ft-lbf]



Removal Procedure

1 Remove the front and rear wheels.

2 Drain gear case oil.

3 Remove the service hole cover.

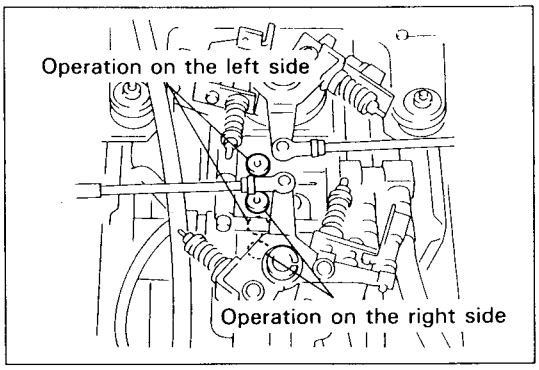
4 Move the joint link to the service hole portion. **[Point 1]**

5 Remove the drive chain. **[Point 2]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
Tighten the HST bypass valve to the specified torque.
T = 41 ~ 94 N·m (418 ~ 958 kgf-cm) [30.2 ~ 69.3 ft-lbf]

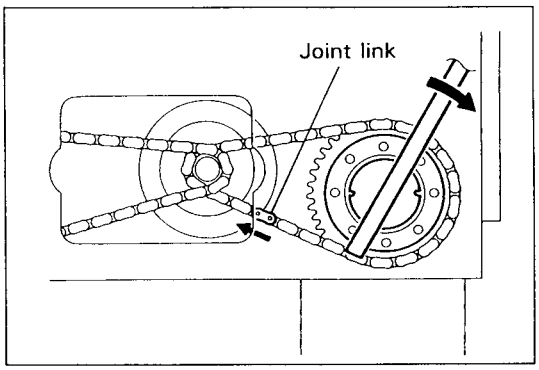


Point Operations

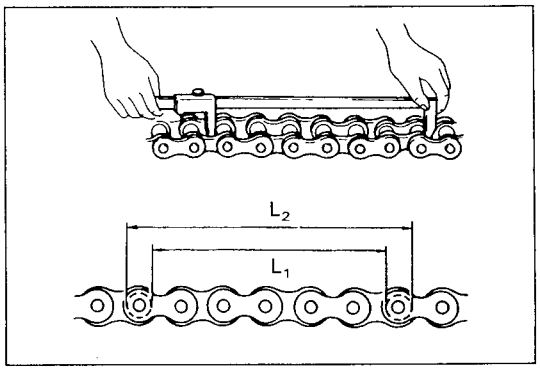
[Point 1]

Removal: Move the joint link to the service hole portion

1. Loosen the HST bypass valve by four turns.



2. Rotate the axle shaft to the position allowing easy operation.



[Point 2]

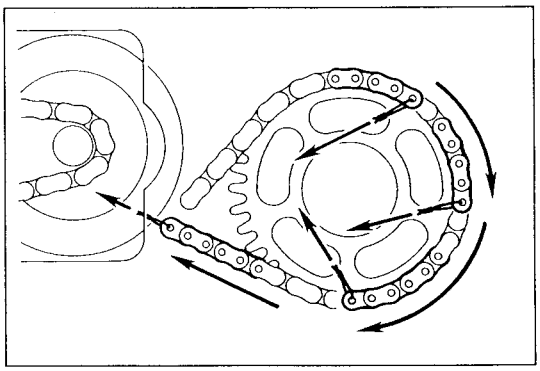
Inspection: Chain inspection for wear and elongation

1. Use washing fluid to clean the chain.

2. Stretch the chain and measure the inside length (L_1) and outside length (L_2) between six rollers, and calculate the actual length (L) as follows:

$$L = \frac{L_1 + L_2}{2}$$

Wear limit
4SDK5 : 116.0 mm (4.567 in)
4SDK6·8: 154.7 mm (6.090 in)

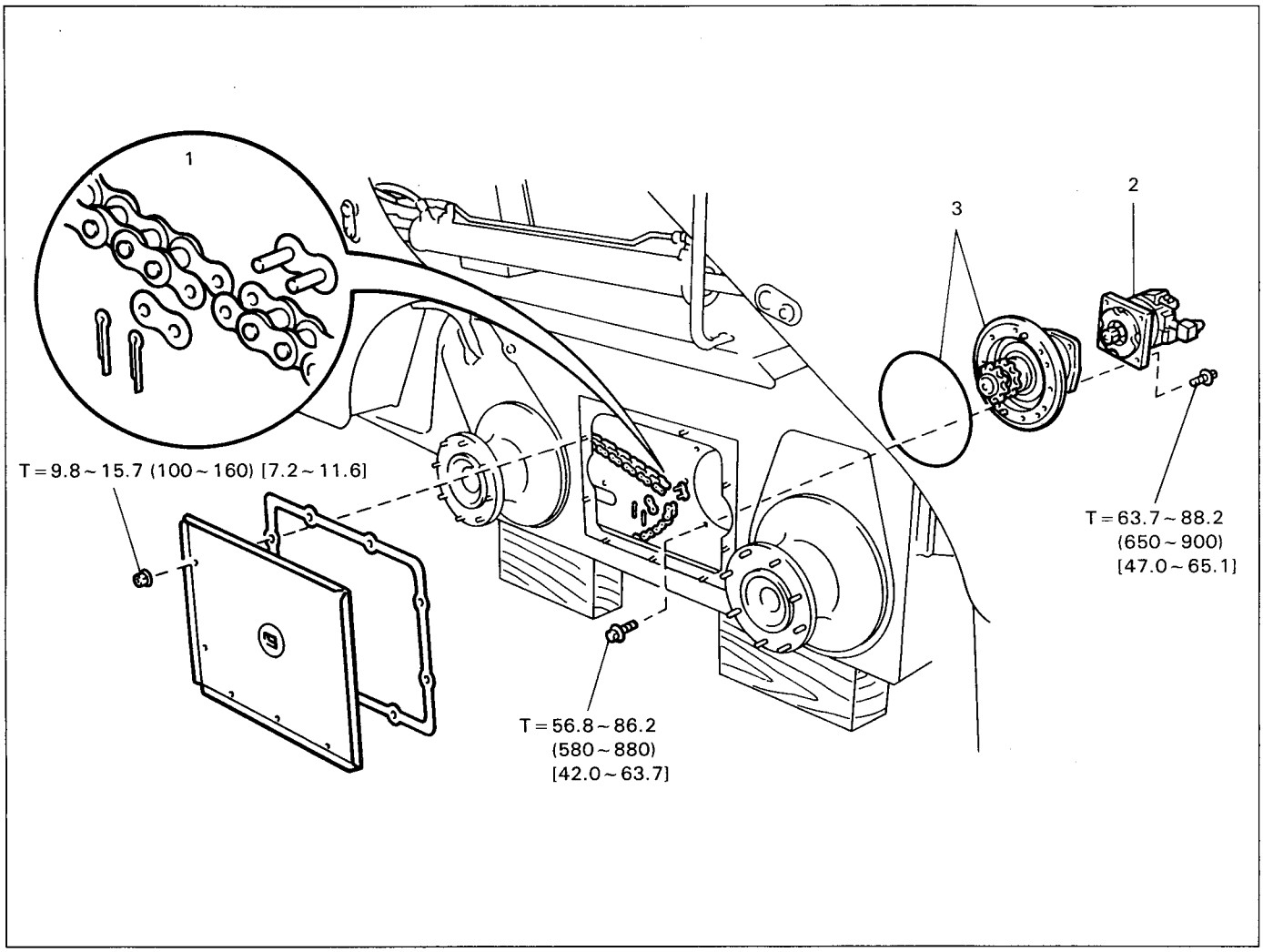


Installation: Install the chain with a wire connected to the leading end from above the sprocket on the axle side while rotating the axle shaft. Pull the wire to the inner side of the sprocket during this operation to prevent the chain from being freed.

DRIVE UNIT (4SDK6·8)

REMOVAL·INSTALLATION

T = N·m (kgf-cm) [ft-lbf]



Removal Procedure

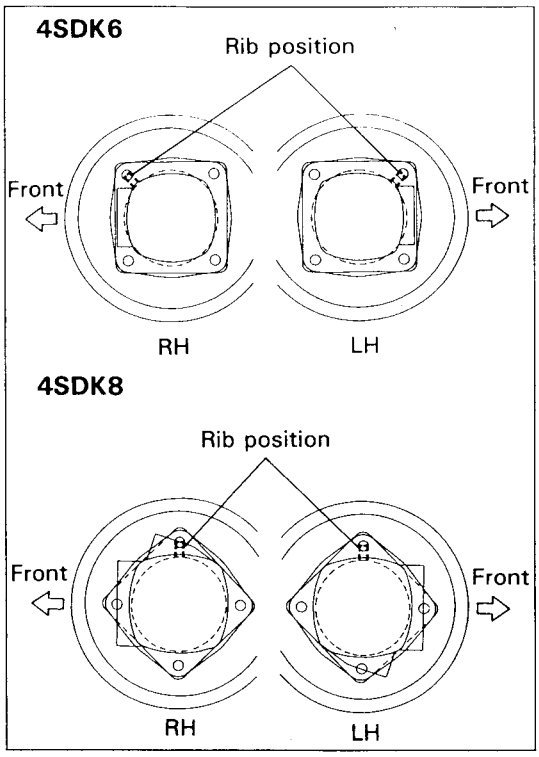
1 Remove the drive chain. (See page 3-6.)

2 Remove the HST motor. (See page 2-23.)

3 Remove the drive unit. **[Point 1]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

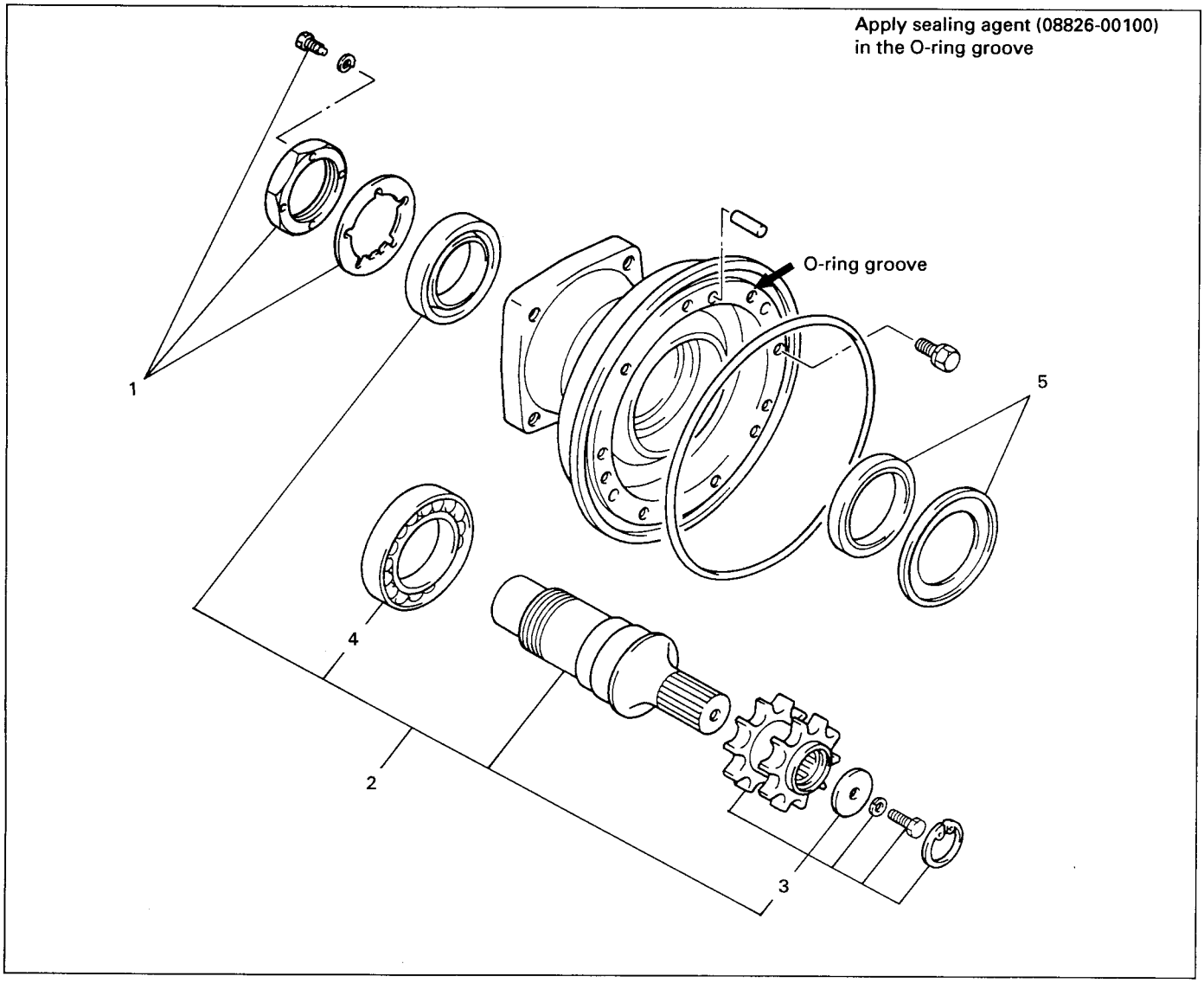


Point Operation

[Point 1]

Installation: Check the rib position at the time of installation.

DISASSEMBLY·INSPECTION·REASSEMBLY



Disassembly Procedure

1 Remove the lock bolt, lock nut and plate washer. **[Point 1]**

2 Remove the drive shaft W/bearing.

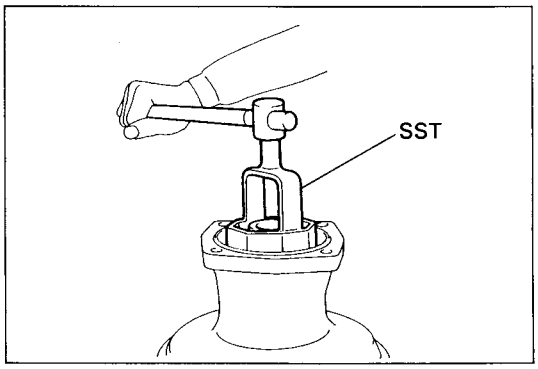
3 Remove the drive sprocket. **[Point 2]**

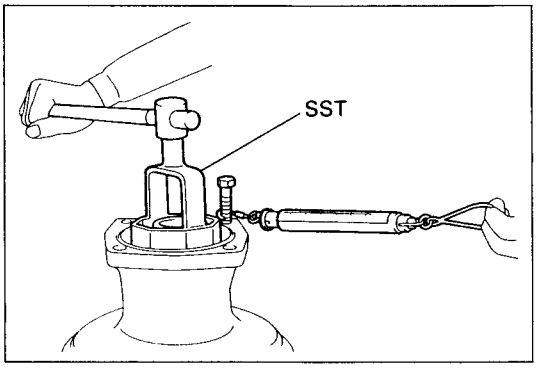
4 Remove the drive shaft bearing. **[Point 3]**

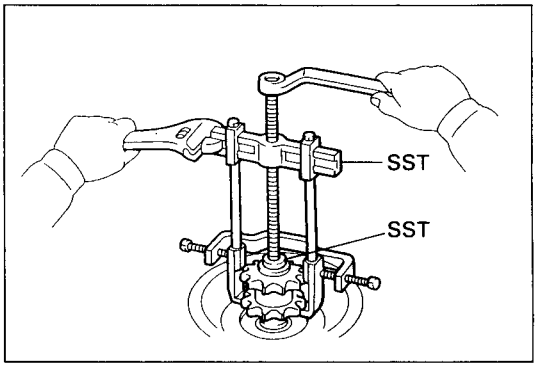
5 Remove the oil seal. **[Point 4]**

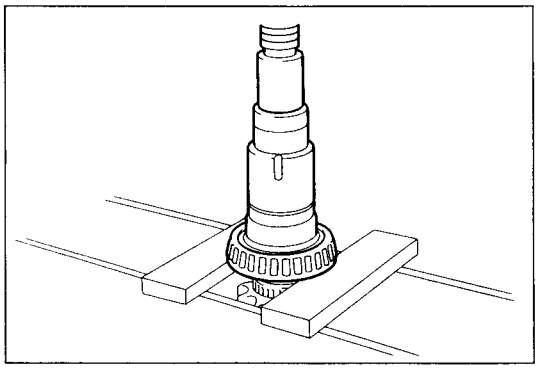
Reassembly Procedure

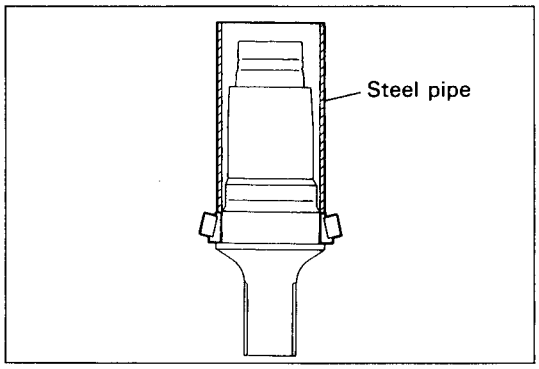
The reassembly procedure is the reverse of the disassembly procedure.











Point Operations

[Point 1]

Disassembly·Reassembly: SST 09509-76003-71
(SST 09509-55030)

Reassembly: Measure motor shaft starting force.

1. Tighten the lock nut fully (to the position where the housing cannot be rotated any more) while checking smooth roation of the motor shaft housing.
2. Retighter the lock nut after loosening sufficiently and check the no-load starting force.

   Standard: 13.8 ~ 36.3 N (1.5 ~ 3.7 kgf) [3.31 ~ 8.16 lbf]
   (At HST moter set bolt installed hole)

   If the standard is not satisfied, carry out reassembly and check satisfaction of the standard again.
3. Tighten the lock nut furher and check the final starting force.

   Standard: 11.9 ~ 24.2 N (1.2 ~ 2.5 kgf) [2.65 ~ 5.51 lbf]

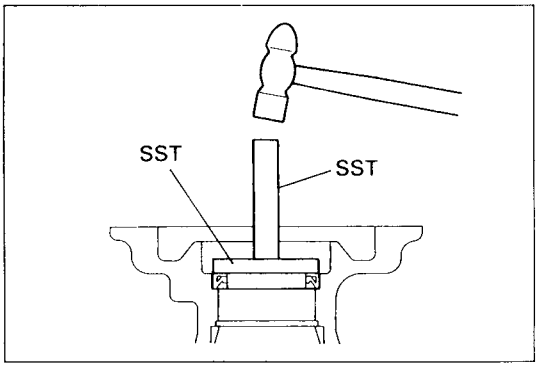
[Point 2]

Disassembly: SST 09950-76013-71
(SST 09950-40010)

[Point 3]

Disassembly: Use a press and remove the bearing.

Reassembly: Use a steel pipe whose inside diameter is 75 mm (2.95 in) and press the bearing in.



[Point 4]

Reassembly: Oil seal installation

1. Use the SST and install the oil seal.

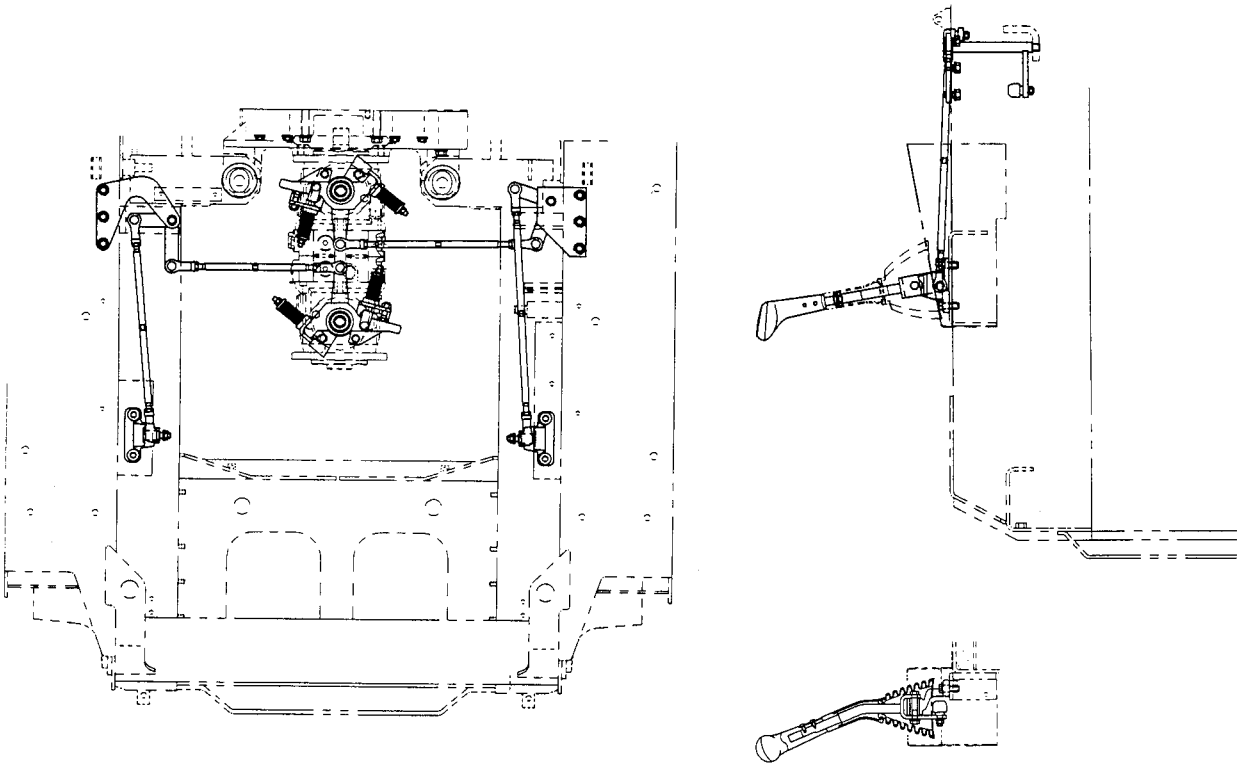
   SST 09950-76019-71
   (SST 09950-60020)
   SST 09950-76020-71
   (SST 09950-70010)

2. Apply grease on the lip portion of the oil seal.

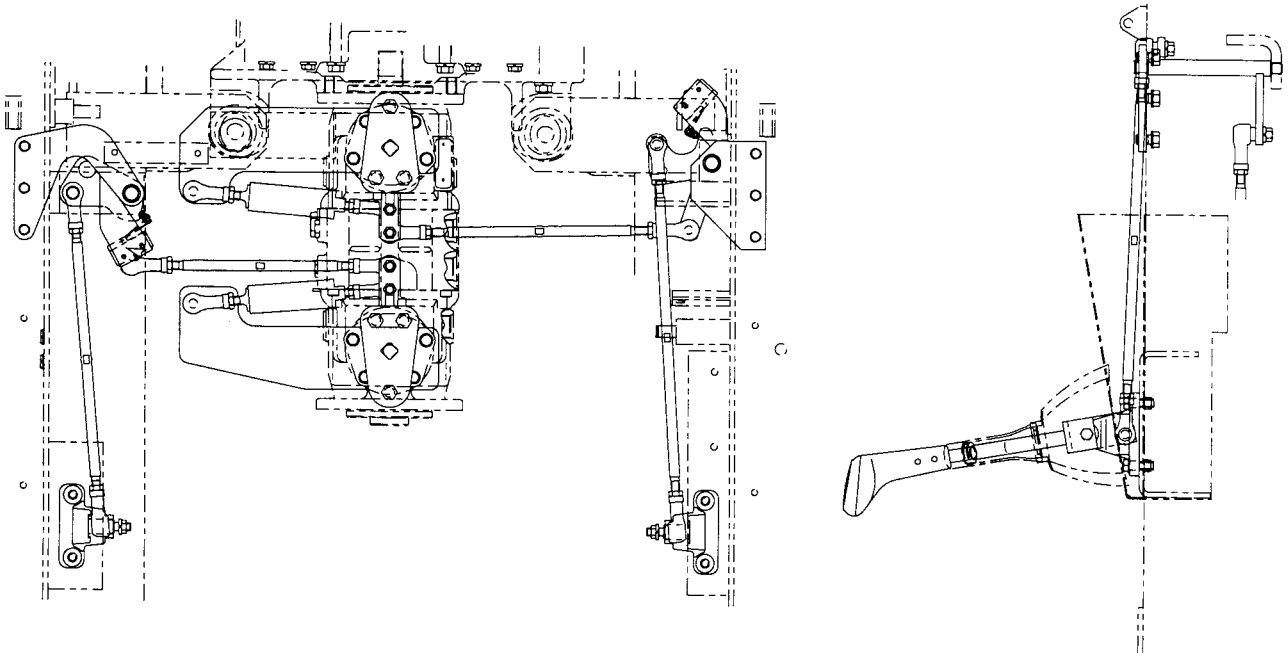
STEERING

GENERAL

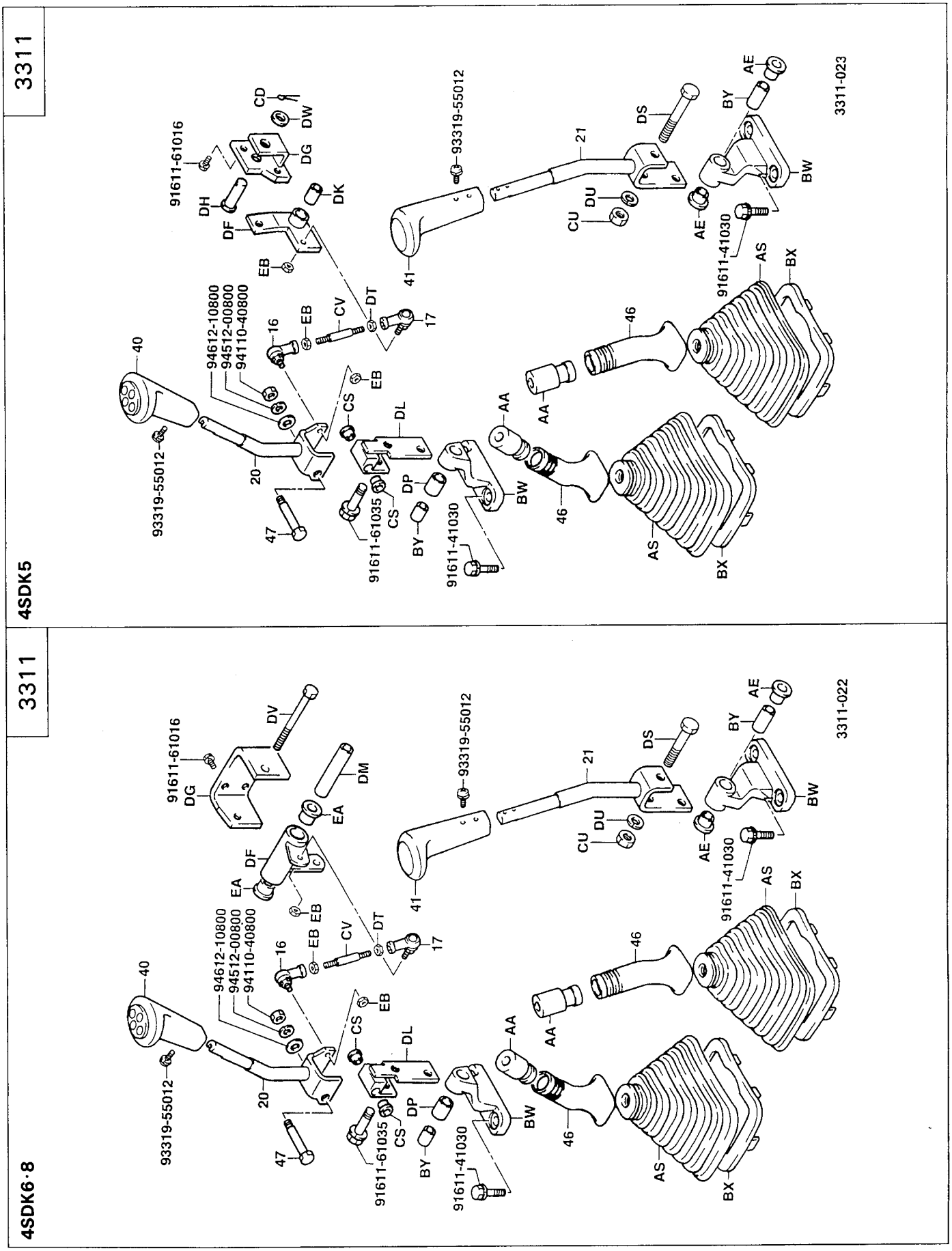
(1997.1 ~ 1999.3)



(1999.4 ~)

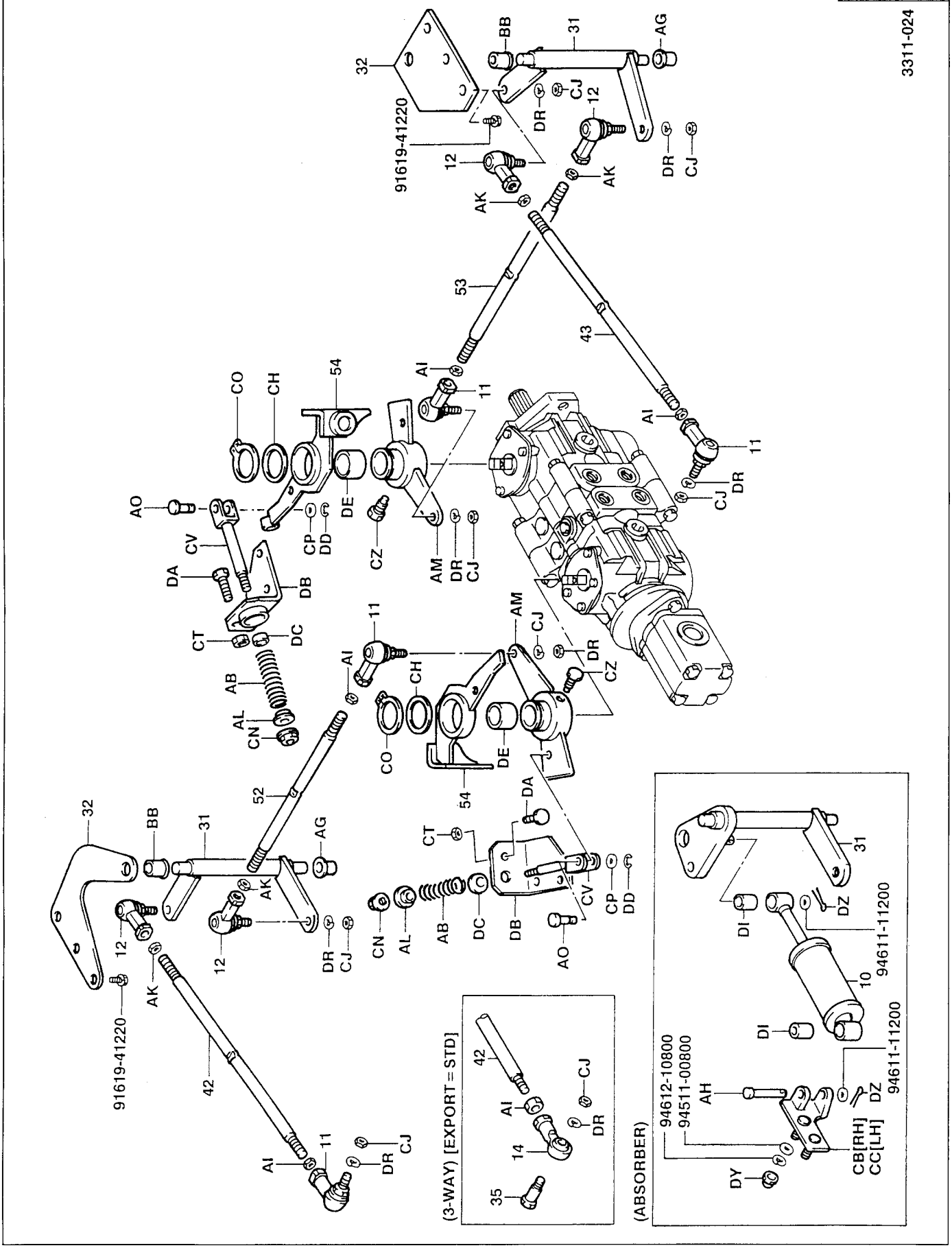


COMPONENTS

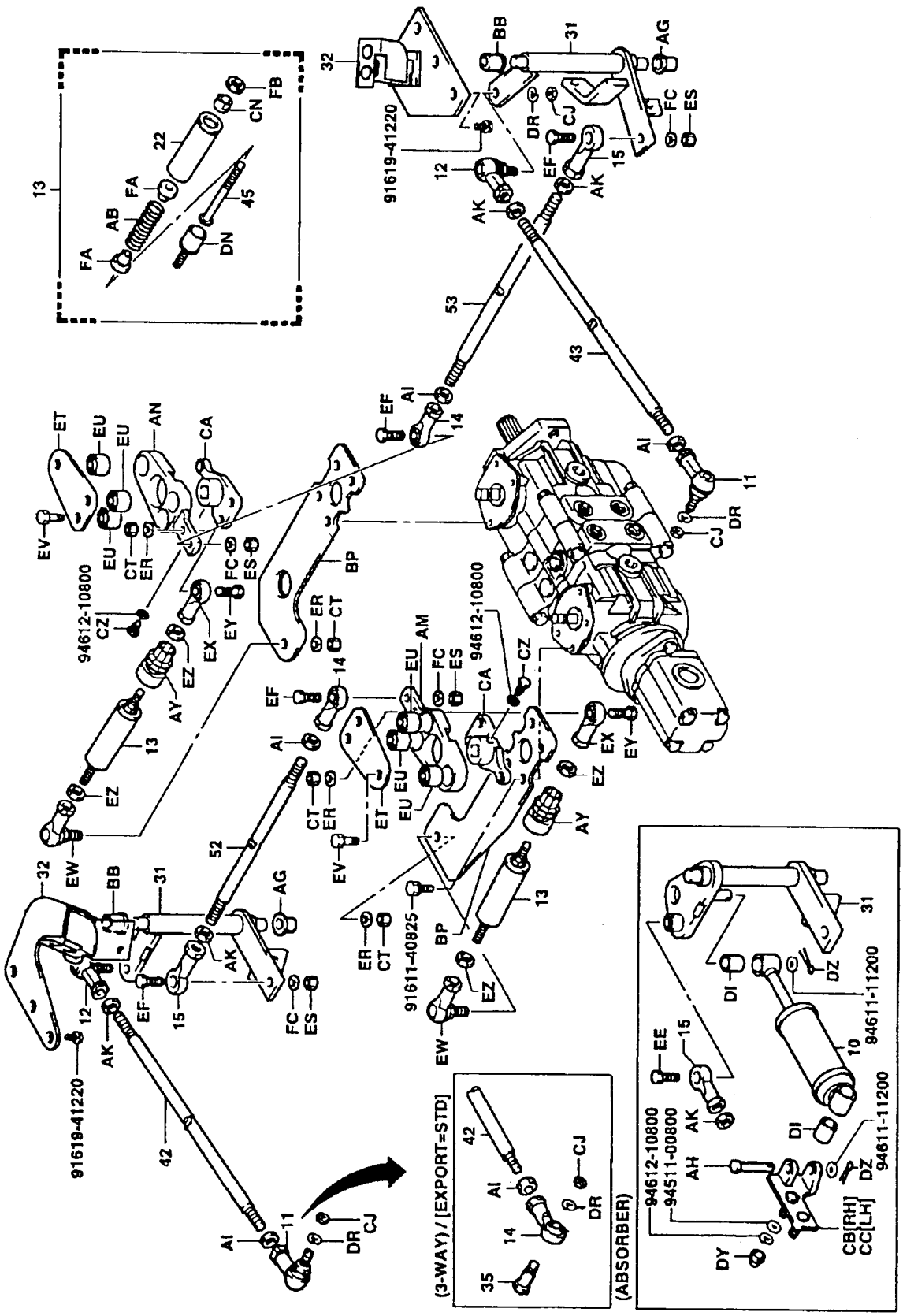


(1997.1 ~ 1999.3)

3311

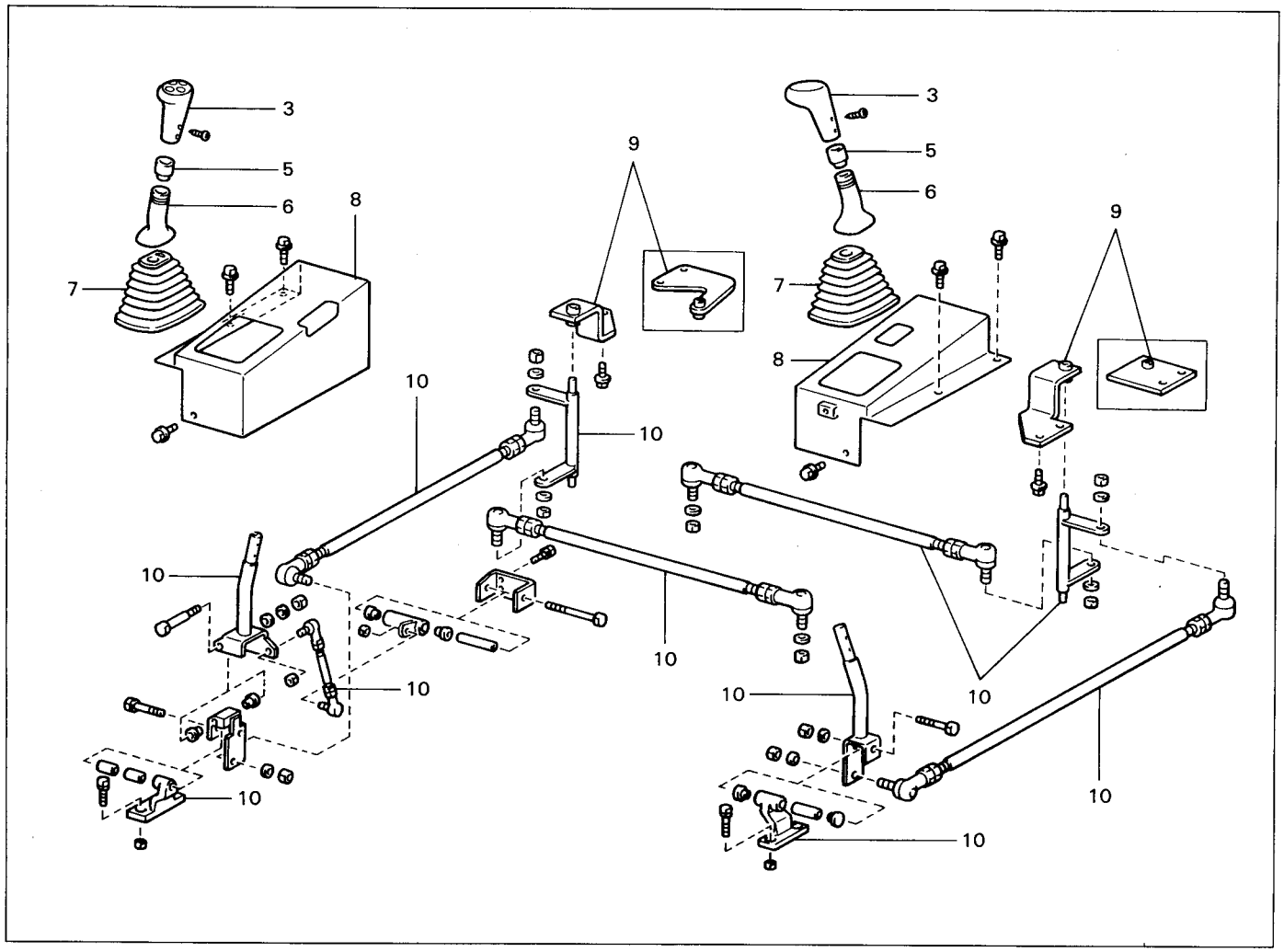


(1999.4 ~)



STEERING

REMOVAL·INSTALLATION (1997.1 ~ 1999.3)

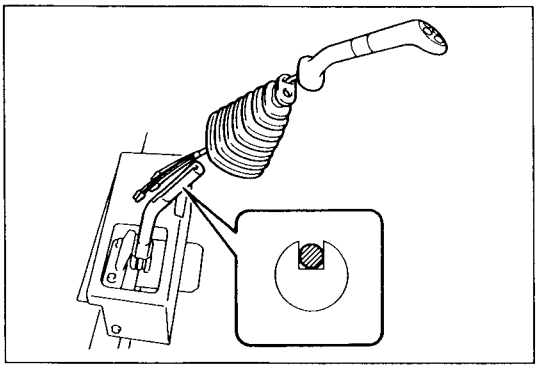


Removal Procedure

1 Open the operator guard. (See page 7-7.)
2 Remove the floor panel.
3 Remove the steering shift lever knob.
4 Remove the accelerator knob or parking brake lever knob.
5 Remove the bush.
6 Remove the upper boot.
7 Remove the lower boot. **[Point 1]**
8 Remove the shift lever case.
9 Remove the bracket.
10 Remove the steering shift lever W/link. **[Point2]**
11 Remove the HST pump lever. **[Point 3]**

Installation Procedure

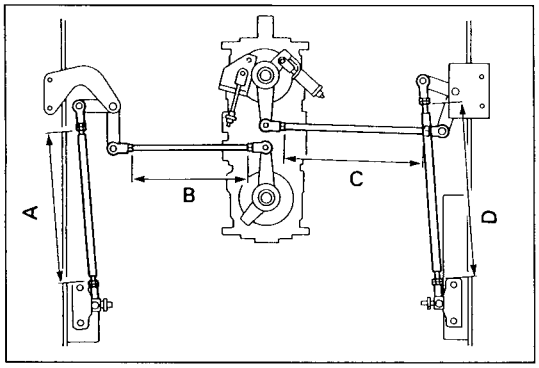
The installation procedure is the reverse of the removal procedure.



Point Operations

[Point 1]

Installation: At the time of installation, pass the harness from the shift lever knob along the shift lever groove and past the lower boot.



[Point 2]

Note:
The neutral position of the HST pump lever must have been adjusted correctly.

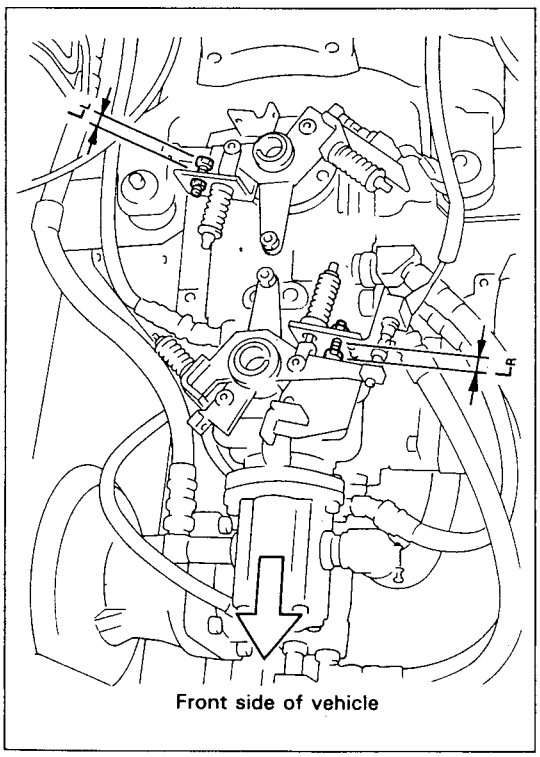
Reassembly: Install the steering shift lever W/link.

1. Set links A and D to the lengths below before installation on the vehicle.

   Standard:
   A 4SDK5 : 317 mm (12.5 in)
   4SDK6·8: 305 mm (12.0 in)
   D 4SDK5 : 300 mm (11.8 in)
   4SDK6·8: 370 mm (14.6 in)

2. Assemble after adjusting links B and C to match the vehicle.

   Reference:
   B 4SDK5 : 170 mm (6.7 in)
   4SDK6·8: 212 mm (8.3 in)
   C 4SDK5 : 155 mm (6.1 in)
   4SDK6·8: 259 mm (10.2 in)



[Point 3]

Note:
Jack up the vehicle and support the frame with stands to make all four wheel float above the ground.

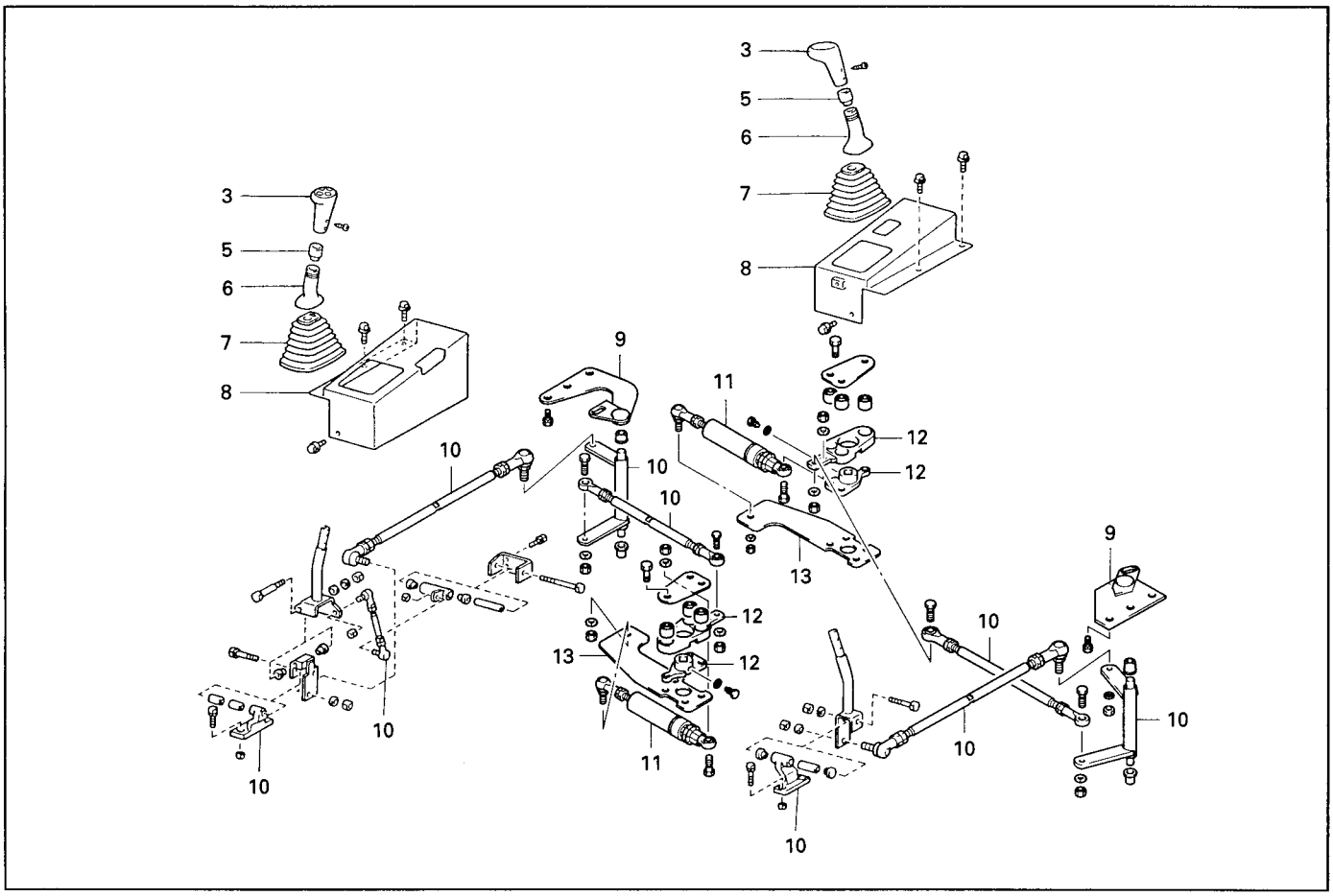
1. Start the engine at a low speed for warming up.

2. Gradually raise the engine speed and see if the wheels are rotated. If rotated, make the following adjustment:

   Right forward travel: Lengthen L_R.
   Right reverse travel: Shorted L_R.
   Left forward travel: Shorten L_L.
   Left reverse travel: Lengthen L_L.

3. Securely lock the stopper bolt.

REMOVAL·INSTALLATION (1999. 4 ~)



Removal Procedure

1 Open the operator guard. (See page 7-7.)

2 Remove the floor panel.

3 Remove the steering shift lever knob.

4 Remove the accelerator knob or parking brake lever knob.

5 Remove the bush.

6 Remove the upper boot.

7 Remove the lower boot. **[Point 1]**

8 Remove the shift lever case.

9 Remove the link plate.

10 Remove the steering shift lever, steering rod. **[Point 2]**

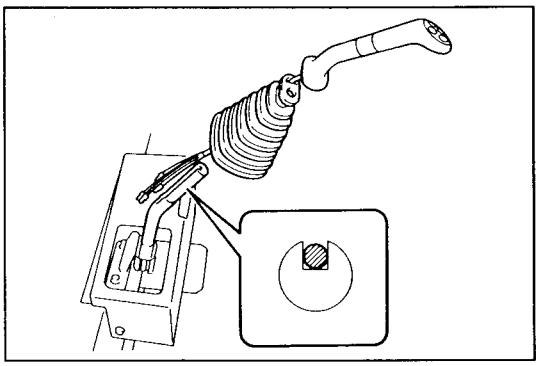
11 Remove the spring holder ASSY. **[Point 3]**

12 Remove the HST pump lever. **[Point 4]**

13 Remove the spring bracket.

Installation Procedure

The installation procedure is the reverse of the removal procedure.



Point Operations

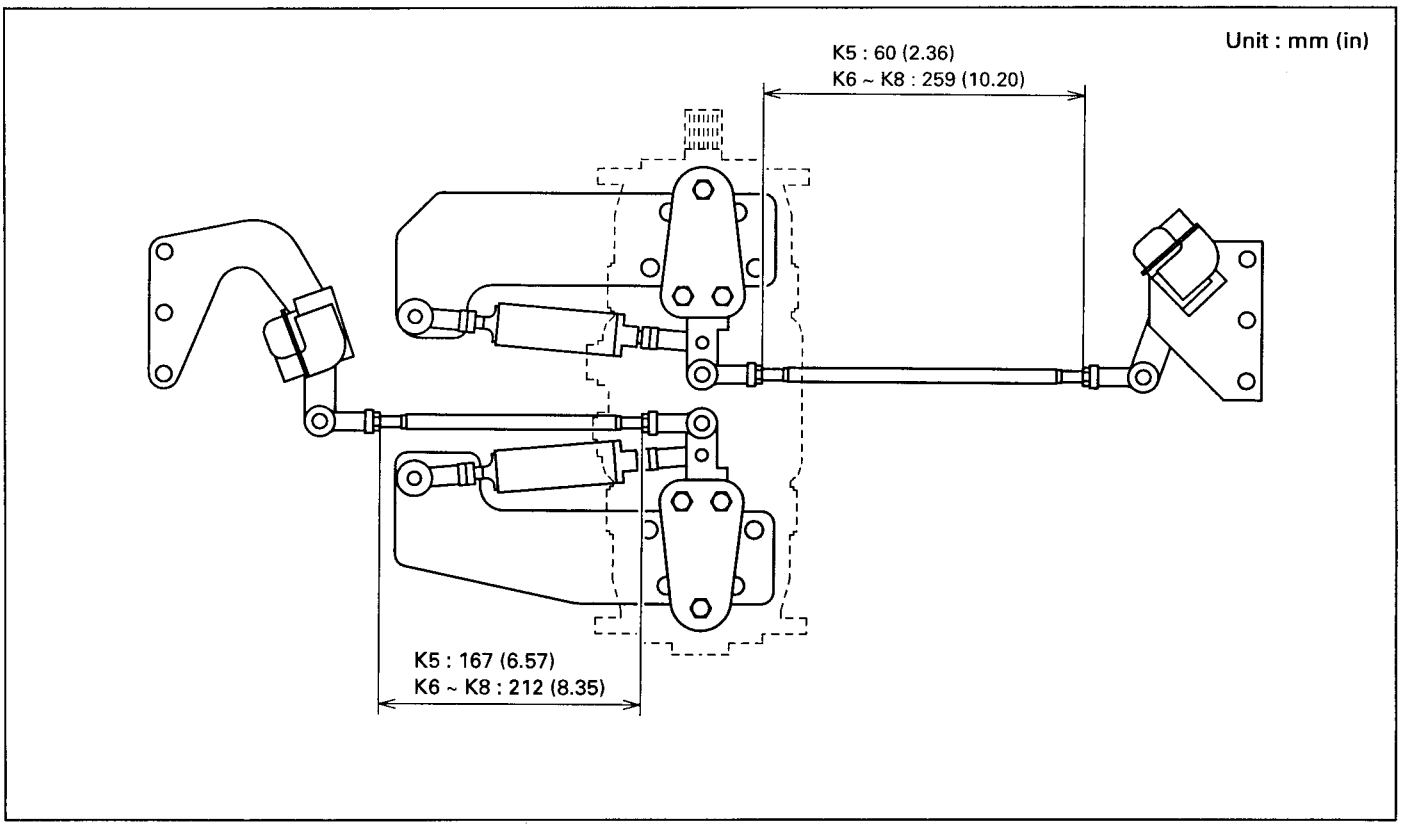
[Point 1]

Installation: At the time of installation, pass the harness from the shift lever knob along the shift lever groove and past the lower boot.

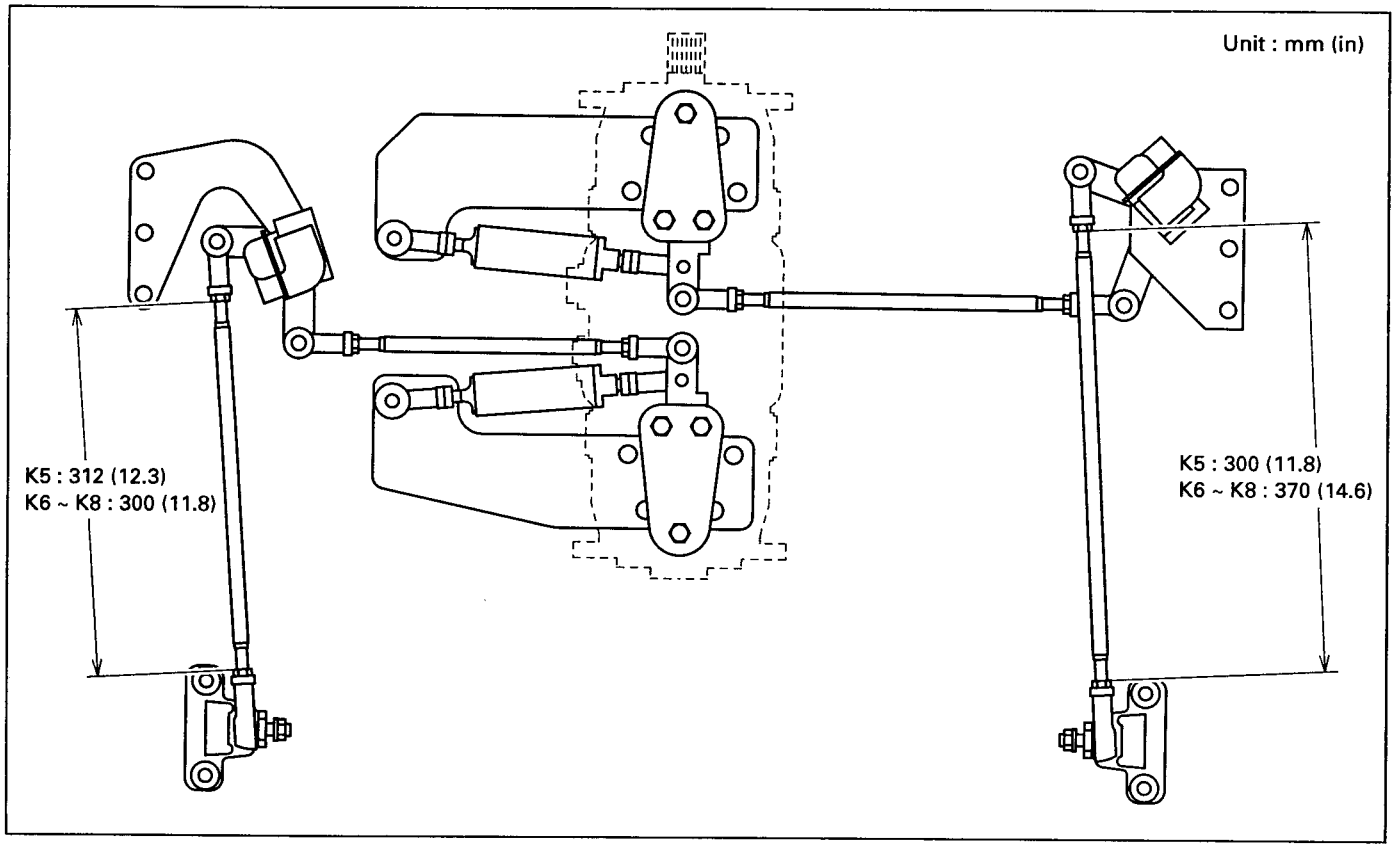
[Point 2]

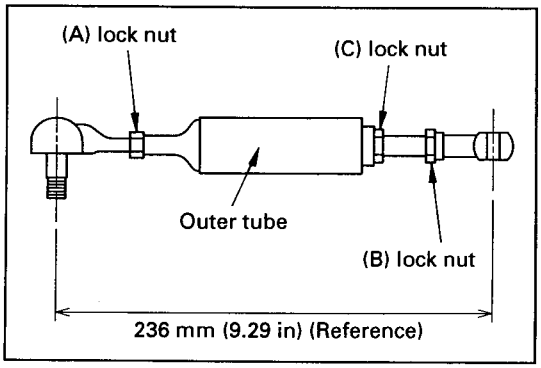
Installation:

1. Adjust the steering rod length to the dimension shown below.



2. Install the connecting rod uniting the steering link lever and the steering lever. Then adjust to the length as shown in the illustration.





[Point 3]

Installation:

1. Determine the spring holder dimension temporarily.

Note:
- **The tightening depth to the rod end should be equal between RH and LH side.**
- **The temporary length is as shown in the illustration.**

2. Secure the lock nut (B).

Note:
Lock nut (C) remains original lock state. Don't tamper for adjustment.

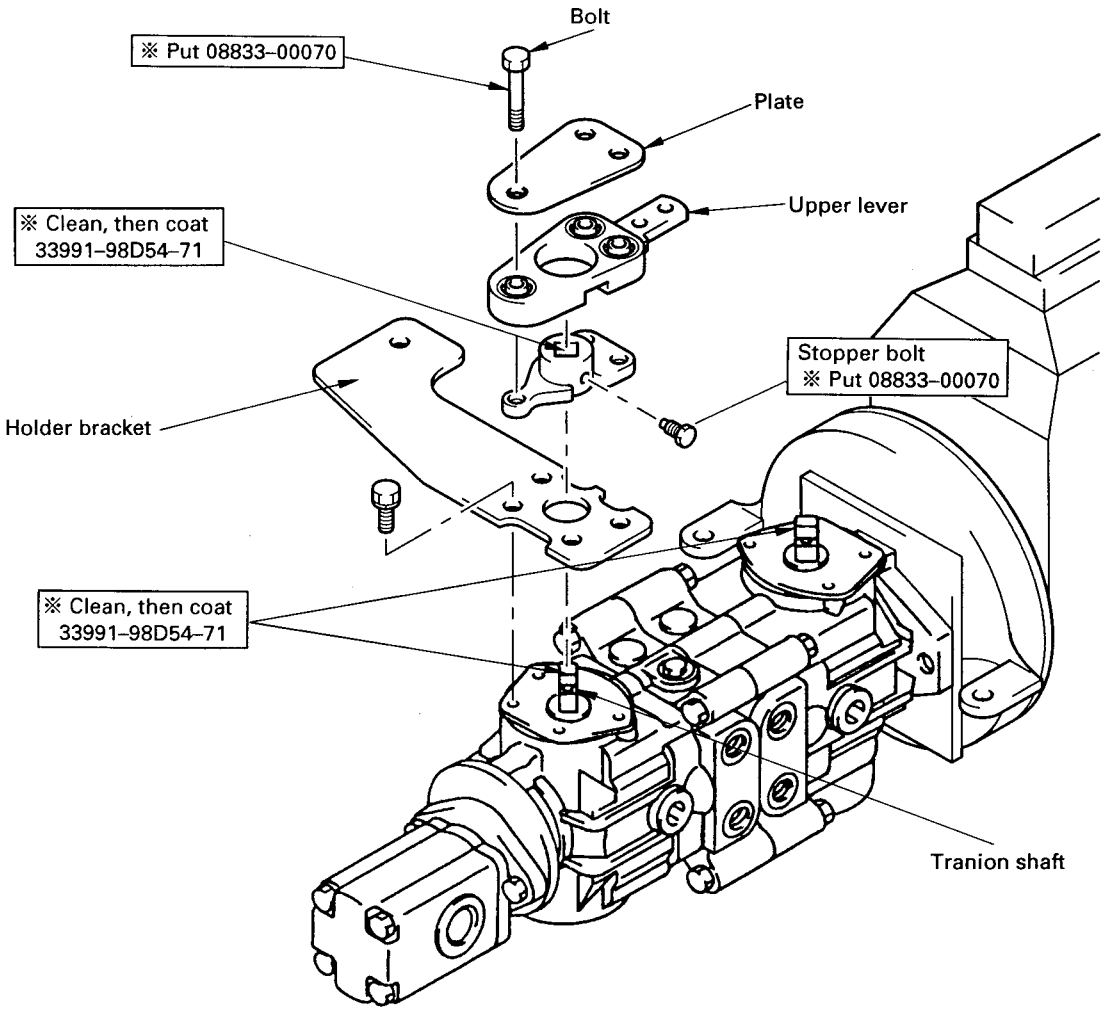
[Point 4]

Installation:

1. Following articles should be ready in advance.

   - Adhesive Cement–33991–98D54–71 or corresponding article.
   - Hardening–sped compound–33992–98D54–71 primer or corresponding article.
   - Locking agent part No.08833-76001-71 (08833-00070).
   - Detergent
   - Wire brush
   - Tools for general purpose
   - Torque wrench

2. RH and LH steering lower lever should be installed to HST tranion shaft in the following sequence.



(1) Eliminate whole the dirts, smudges, stained grease from the fitting portion of HST shaft.

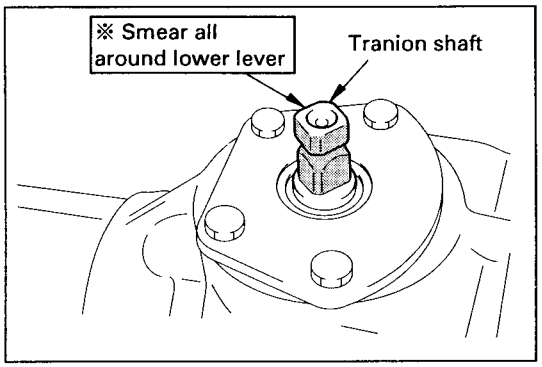
Note:
It largely depends on cleansing to ensure the bond giving quality effect. Clean thoroughly.

(2) Install the spring holder bracket to HST pump cover.

Note:
- **Bolt must be renewed.**
- **Tightening torque 19 N·m (200 kgf-cm) [14.5 ft-lbf]**

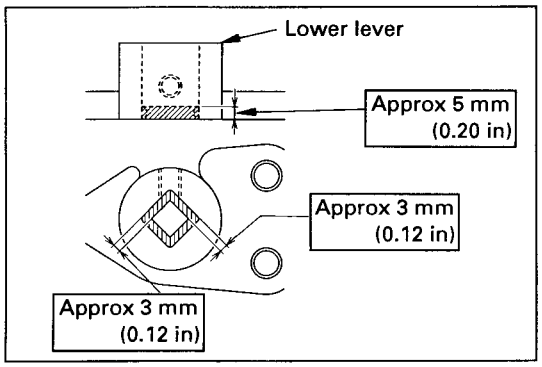
(3) Smear ThreeBond 1390E (Primer) on the whole surface of the fitting evenly uniting the pump shaft and the lower lever.

Note:
- **Permeate absorbent cotton with the primer so as to ensure uniform, even coating.**
- **It is unnecessary to use primer if none. On the occasion, however, it will need to wait over 5 hours by the time that the bond become hardened.**



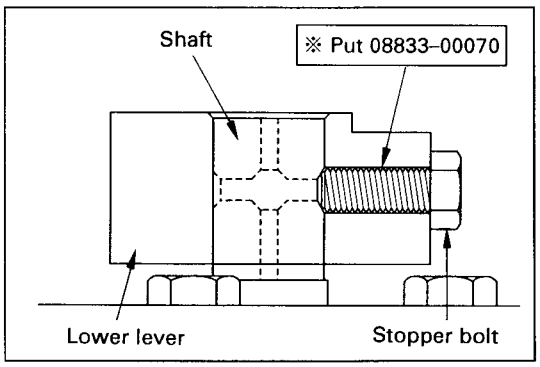
(4) Dry the primer.

(5) Smear 33991–98D54–71 evenly on the square surfaces of the HST pump tranion shaft.



(6) Smear a streak of the bond 33991–98D54–71 on the lower lever at inner fitting surface wholely.

Note:
- **Refer to the illustration for Bond coating.**
- **Hatched area shows coating area.**



(7) Put 08833-76001-71 (08833-00070) on the stopper bolt, and tighten the lower lever.

Tightening torque
19 N·m (200 kgf-cm) [14.5 ft-lbf]

Note:
Wait for hardening polymer.
- **Case of polymer coating : 30 minutes.**
- **Case of non use : Over 5 hours.**
- **While hardening, don't move, or turn the tranion shaft.**

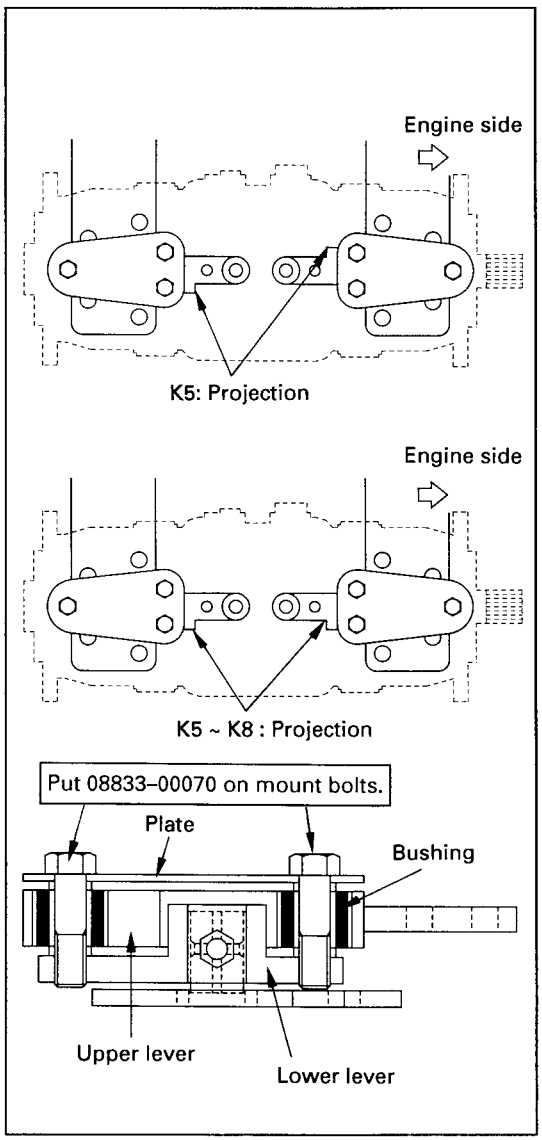
3. Install the link plate, the link lever to the RH and LH frame.

4. Install the brake switch sub-harness to the link plate.

5. Install the following parts to the pump lower lever.

(1) Pump upper lever.

Note:
Take care for the direction of the projection shown in the illustration.



(2) Rubber bushing.

(3) Plate

- Put 08833-76001-71 (08833-00070) on mount bolts.
- Tightening torque
  59 N·m (600 kgf-cm) [43.4 ft-lbf]

6. RH and LH steer-link, link lever and pump.

Connect the upper link with either side of the steering link rod.

Note:
Tightening length should be equal between the right and left.

Steering neutral adjustment

(1) Jack up the body frame to lift up four tyre wheels from the floor.

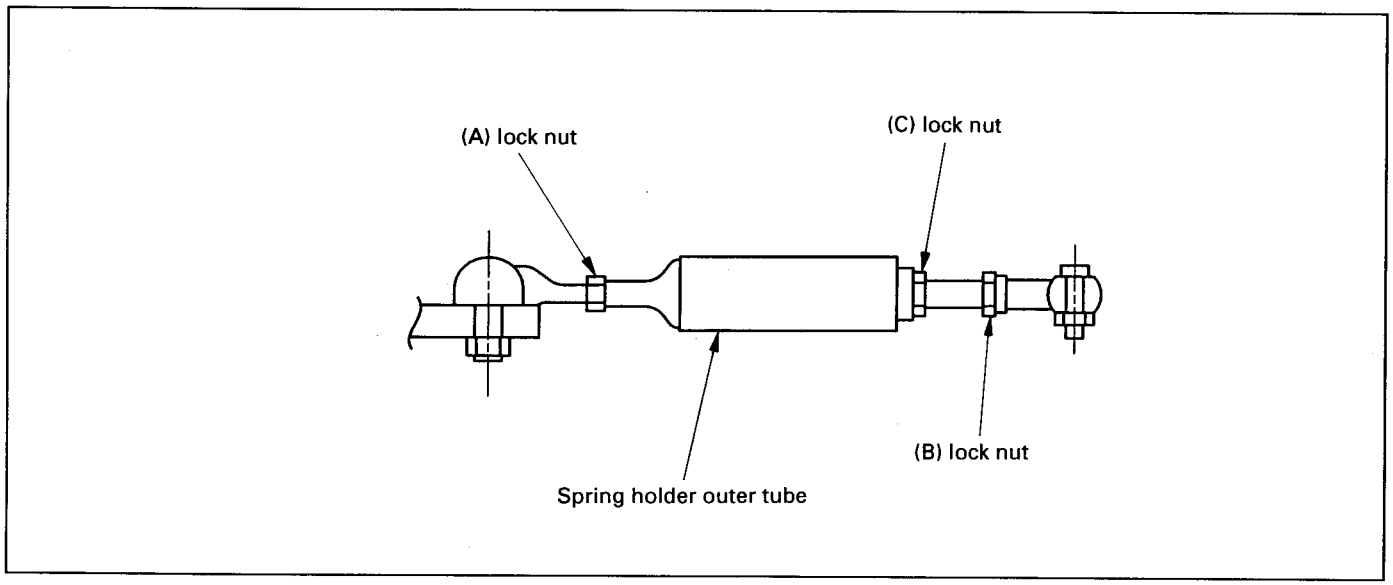
(2) Disengage the parking brake, and raise the operator guard.

(3) Warm up the engine. Check the idling speed. If improper, adjust.
Idling rpm : 970 ± 50 rpm.

(4) While running the engine in the idling speed 970 ± 50 rpm, check to see whether the tyre wheels are rotating.

① In case that the tyre wheels are rotating adjust in the following method:
a. Loosen the lock nut (A) at the spring holder rod end.
b. Turn the outer tube of the spring holder to either side until the tyre wheels stop rotating.

Note:
- **Where the tyre wheels rotation coming to a halt corresponds to the neutral position.**
- **Never loosen the lock nut (B) and (C).**



② Raise the engine rpm, check to confirm that the tyre wheels are not rotating.
If rotating, repeat the sequences in step ①.

③ When ensuring the tyre wheels stop rotating in ②, return the engine to idling, and check to see the tyre wheels.

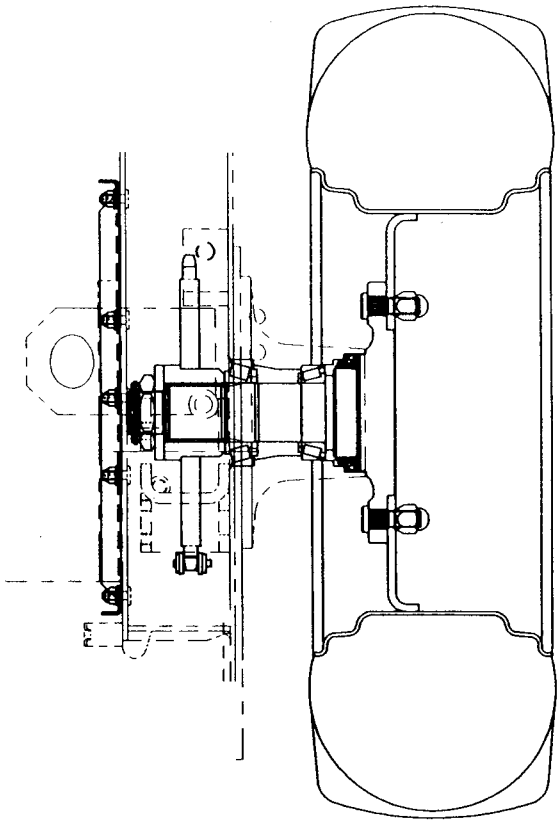
Note:
Repeat ① and ② , by the time the tyre wheels stop rotating.

④ Again check the locks to each link rod, and rod end lock nuts at the spring holder.

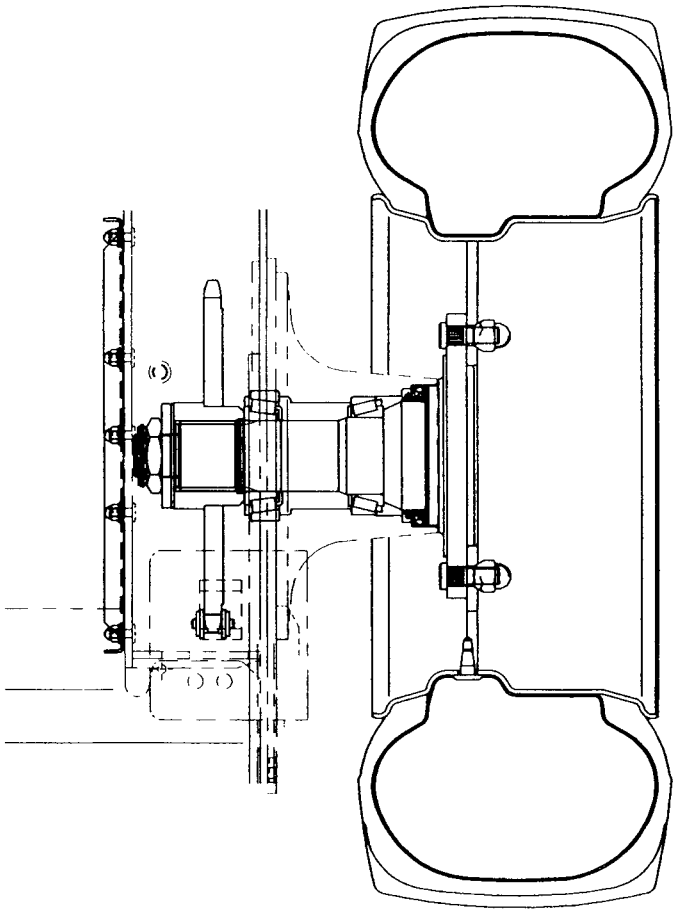
AXLE

GENERAL

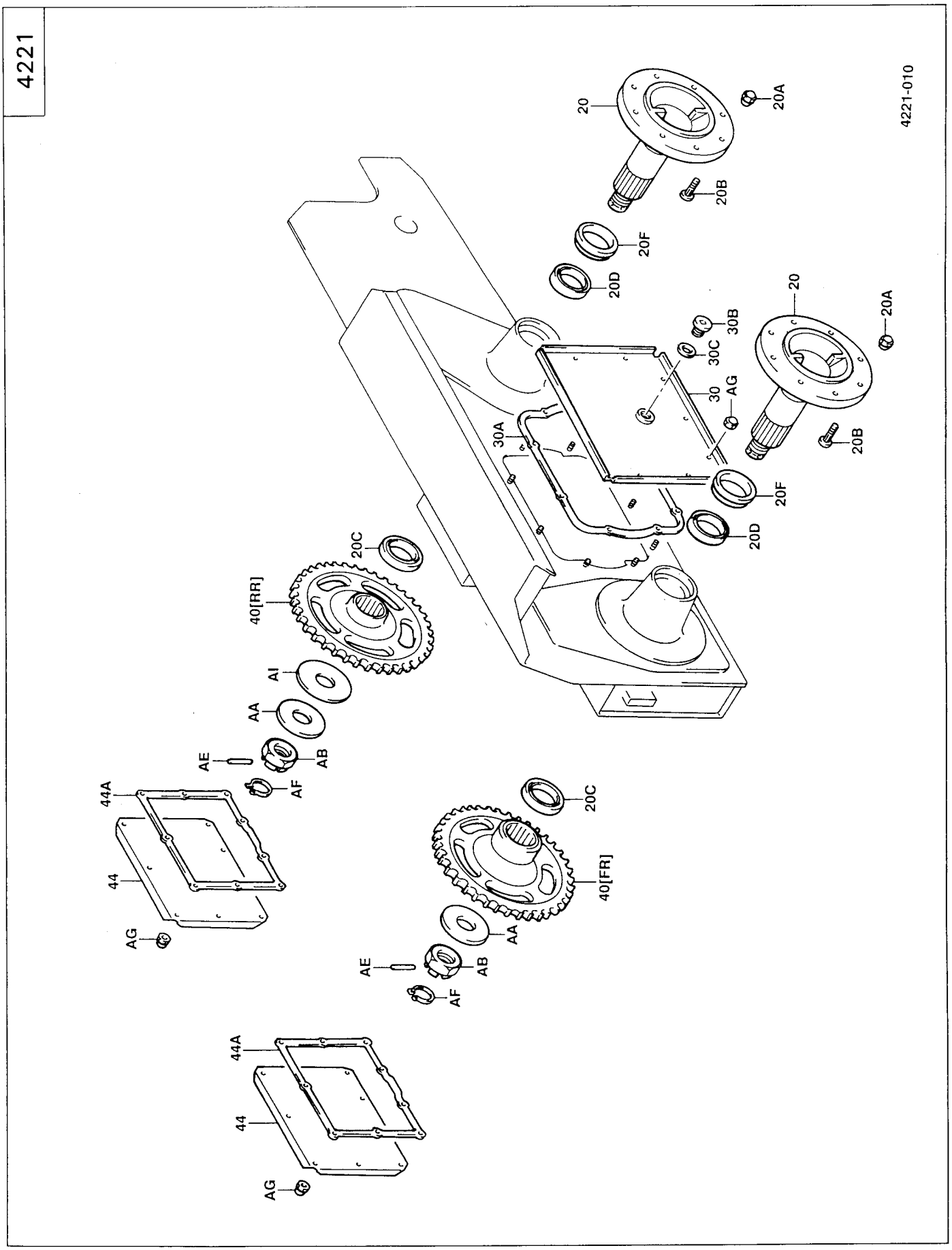
4SDK5



4SDK6·8

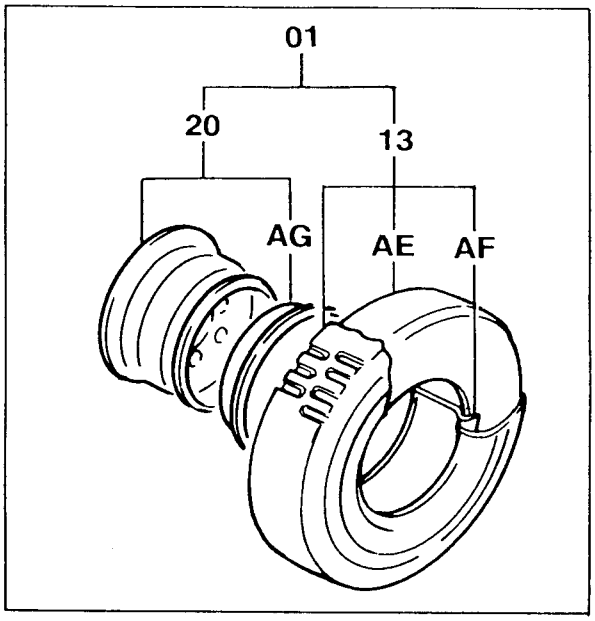


COMPONENTS

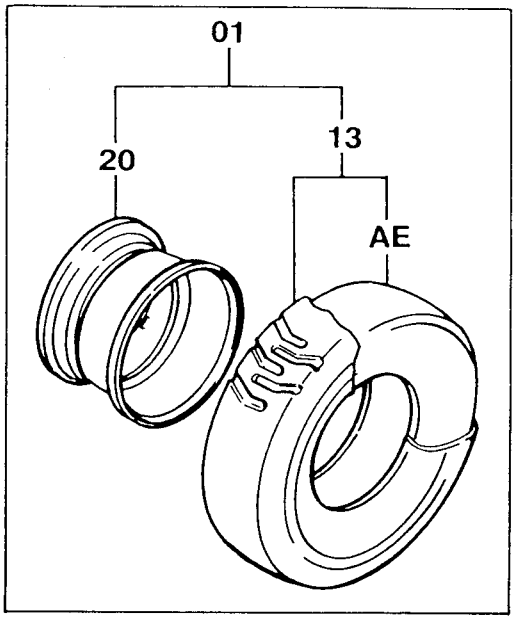


4401

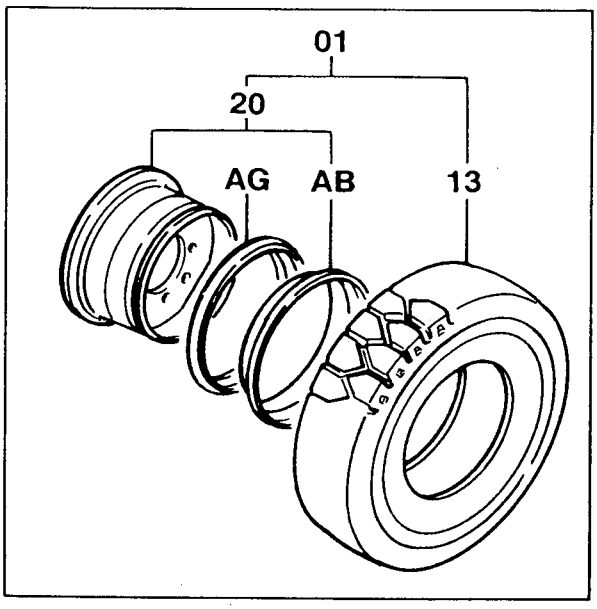
(NARROW)



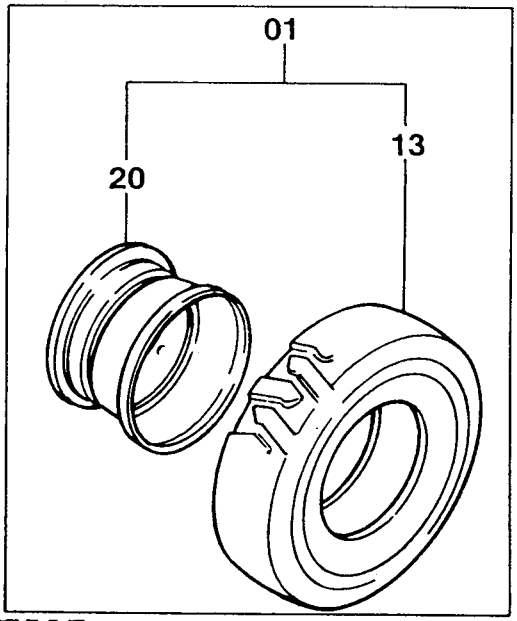
[W/TUBE] / (SANDY TYPE)

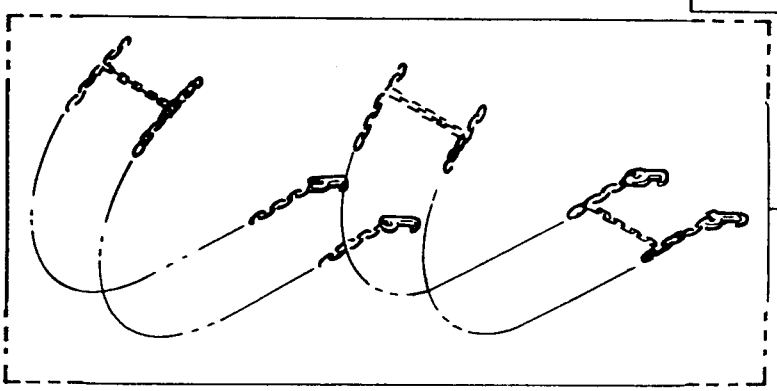


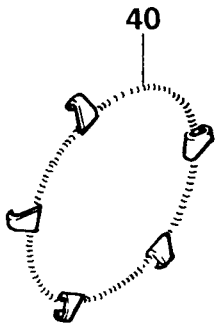
(J-LUG NON PUNC)



(TUBE LESS) / (WIDE)







4401-090

SPECIFICATIONS

Tire Size and Tire Inflating Pressure

4SDK5

Type		Tire size	Rim size	Inflating pressure kPa (kgf/cm²)
Pneumatic tire	STD	27 × 8.50-15-4PR with tube	15 × 7JA DC	245 (2.45)
	OPT	27 × 8.50-15-4PR tubeless		
	OPT narrow	5.50-15-6-PR with tube	15 × 4.50E SDC	475 (4.75)
Puncture-free tire	OPT	5.50-15	15 × 4.50E SDC	

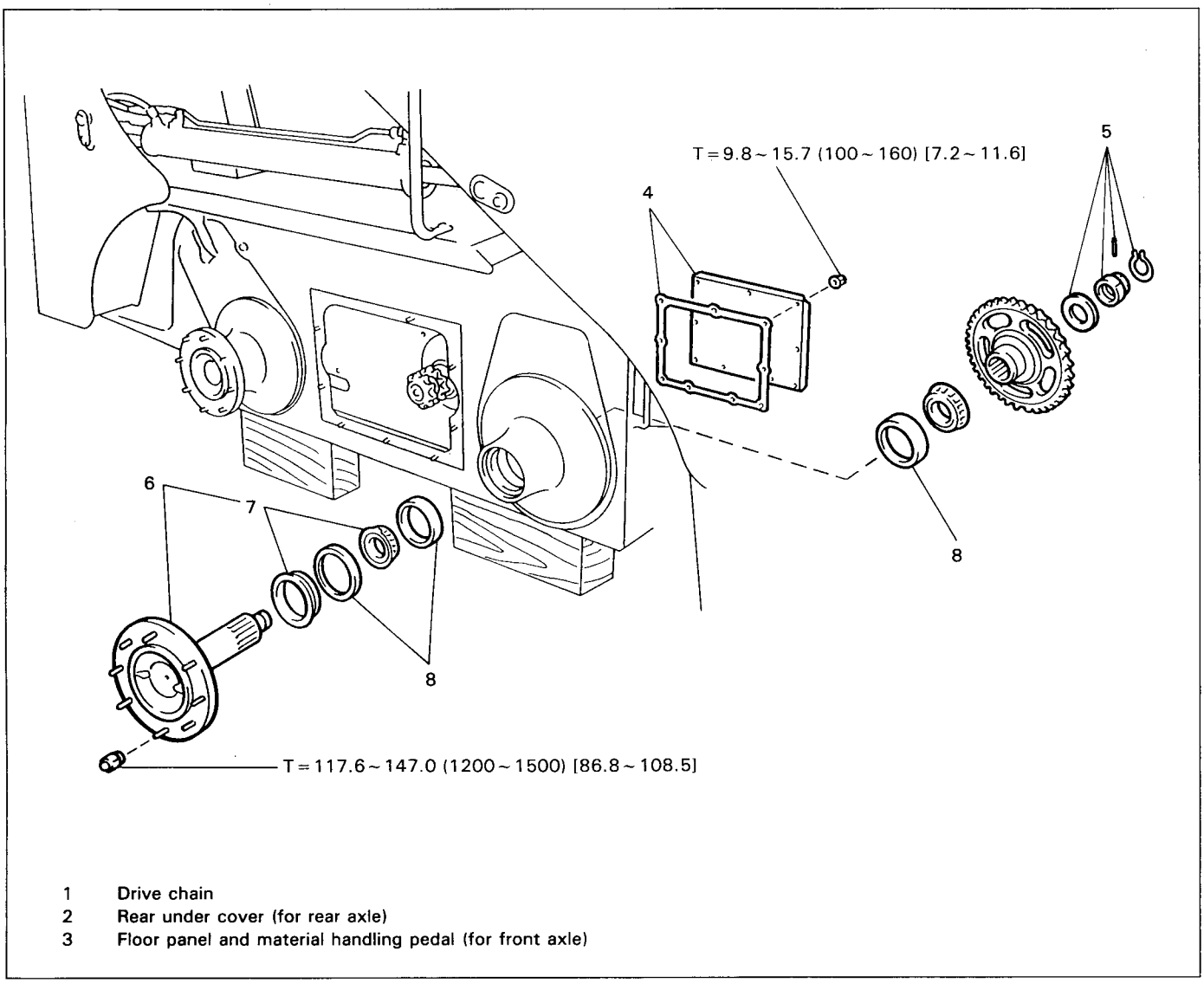
4SDK6·8

Type		Tire size	Rim size	Inflating pressure kPa (kgf/cm²)
Pneumatic tire	STD	10-16.5-4PR with tube	16.5 × 8.25 15° DC	220 (2.2)
	OPT	10-16.5-4PR tubeless		
		10-16.5-6PR tubeless		
	OPT narrow	7.00-15-6-PR with tube	15 × 5.50F SDC	400 (4.0)
	OPT wide	12-16.5-8PR tubeless	16.5 × 9.75 DC	350 (3.5)
	OPT flotation pattern	12-16.5-8PR with tube		
Puncture-free tire	OPT	7.00-15	15 × 5.50F SDC	

AXLE SHAFT

REMOVAL·INSTALLATION

T = N·m (kgf-cm) [ft-lbf]



1 Drive chain
2 Rear under cover (for rear axle)
3 Floor panel and material handling pedal (for front axle)

Removal Procedure

1 Remove the drive chain. (See page 3-6.)

2 Remove the rear under cover. (Only for operation on the rear axle side)

3 Remove the floor panel and the material handling pedal on the operating side. (Only for operation on the front axle side)

4 Remove the service hole cover.

5 Remove the snap ring, pin, lock nut and washer. **[Point 1]**

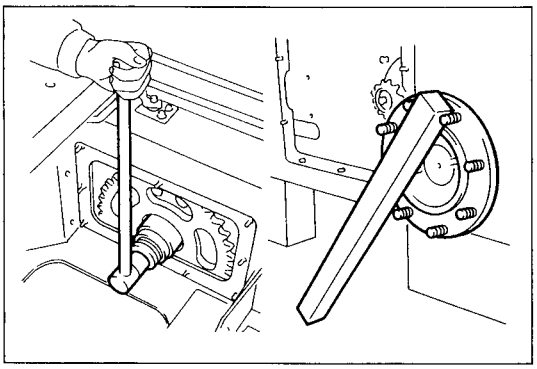
6 Remove the axle shaft.

7 Remove the bearing and oil seal shaft from the axle shaft. **[Point 2]**

8 Remove the oil seal and bearing outer race. **[Point 3]**

Installation Procedure

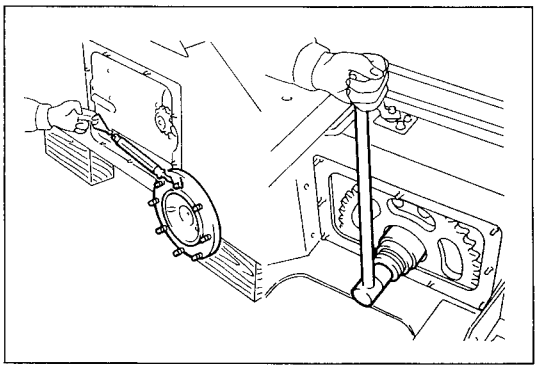
The installation procedure is the reverse of the removal procedure.



Point Operations

[Point 1]

Removal·Installation: Lock the axle shaft by an appropriate means and remove the lock nut.



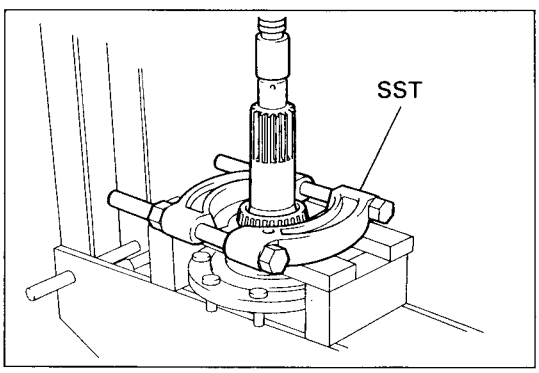
Installation: Measure the axle shaft starting force.

1. Loosen the lock nut after tightening it once to a torque of 117.7 ~ 137.3 N·m (1200 ~ 1400 kgf-cm) [86.8 ~ 101.3 ft-lbf].
2. Tighten the lock nut while checking smooth rotation of the axle shaft.
3. Hook a spring scale on the hub bolt, and measure the no-load starting force.

   4SDK5: 9.8 ~ 19.6 N (1.0 ~ 2.0 kgf) [2.21 ~ 4.41 lbf]
   4SDK6·8: 11.8 ~ 29.4 N (1.2 ~ 3.0 kgf) [2.65 ~ 6.61 lbf]

   If the standard is not satisfied, perform reassembly and check satisfaction of the standard again.
4. Tighten the lock nut further and check the final starting force.

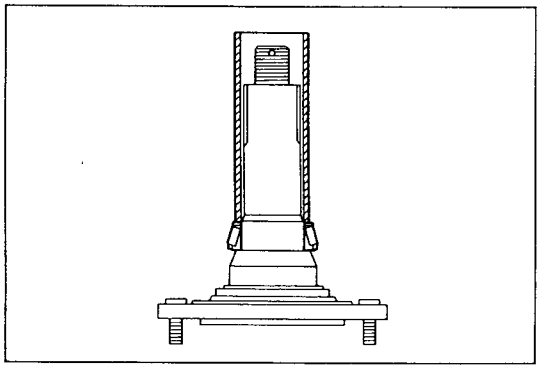
   4SDK5: 14.7 ~ 29.4 N (1.5 ~ 3.0 kgf) [3.31 ~ 6.62 lbf]
   4SDK6·8: 9.8 ~ 19.6 N (1.0 ~ 2.0 kgf) [2.21 ~ 4.41 lbf]



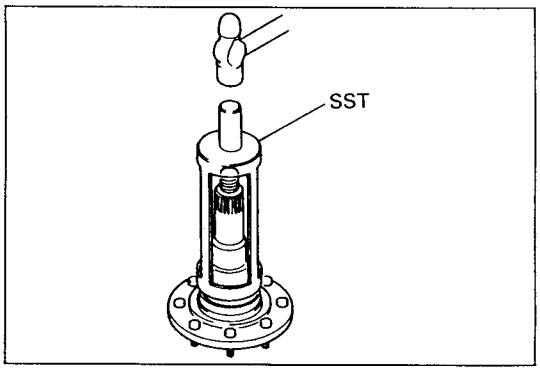
[Point 2]

Removal: Use the SST and press to remove the bearing.

SST 09420-23000-71

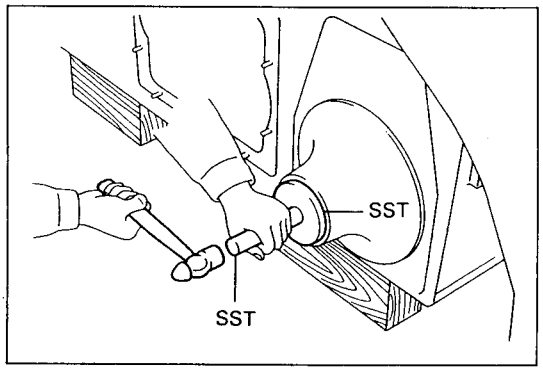


Installation: Use a steel pipe whose inside diameter is 65 mm (2.56 in), and press the bearing in.



Removal: Use a straight-edge screwdriver to remove the oil seal.

Installation: SST 09421-42800-71



[Point 3]

Installation: Oil seal installation

1. Use the SST to install the oil seal.

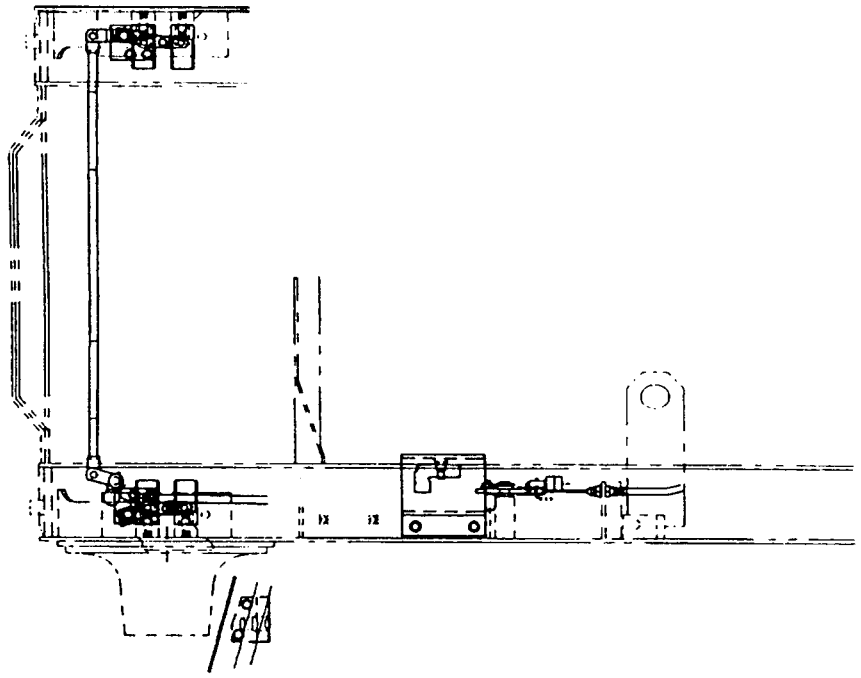
   SST 09950-76020-71
   (SST 09950-70010)
   SST 09320-10410-71

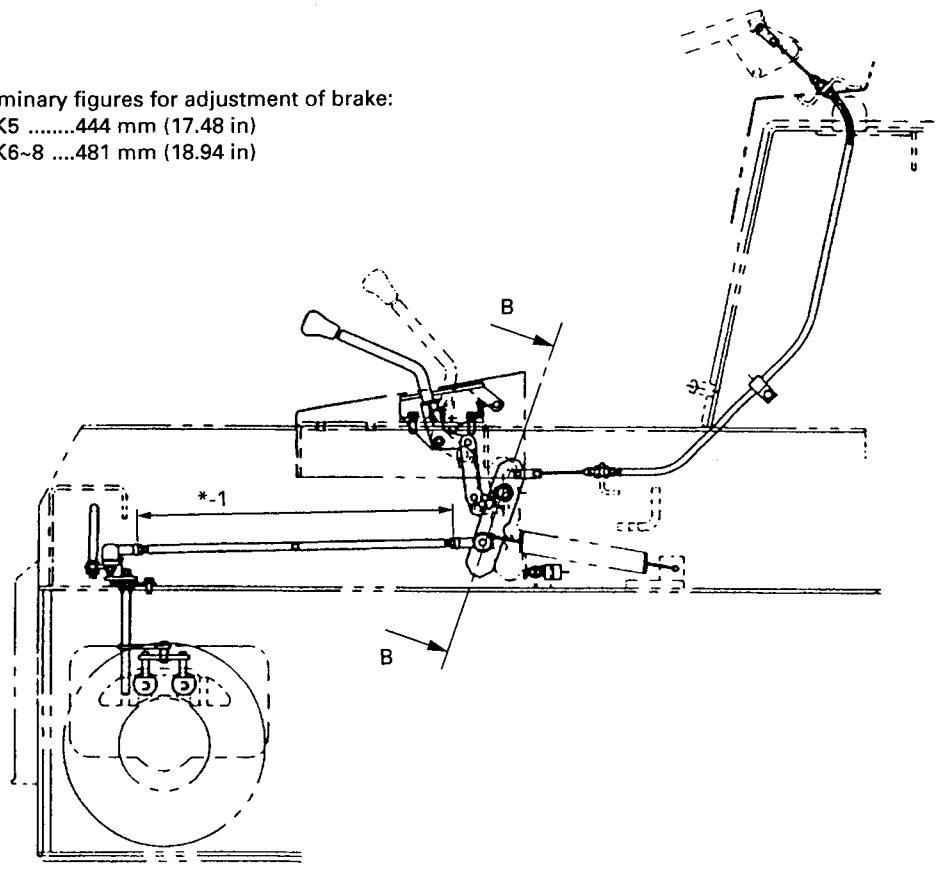
2. Apply grease on the oil seal lip portion.

BRAKE

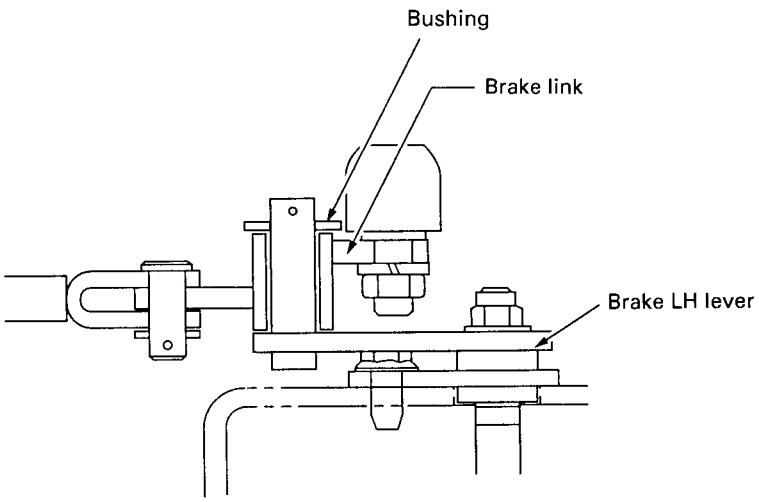
GENERAL

Only the parking brake is provided for the 4SDK5, 4SDK6 and 4SDK8.

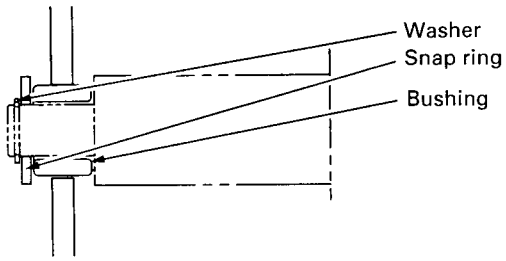




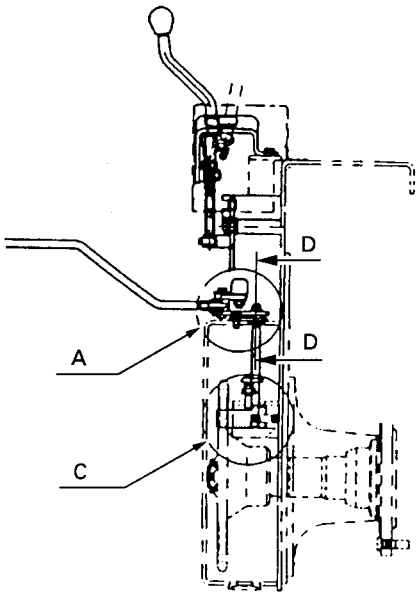
*-1 Preliminary figures for adjustment of brake:
4SDK5 .....444 mm (17.48 in)
4SDK6~8 ....481 mm (18.94 in)

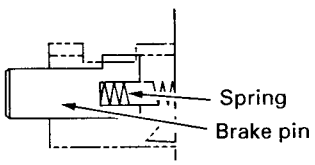


A



B - B

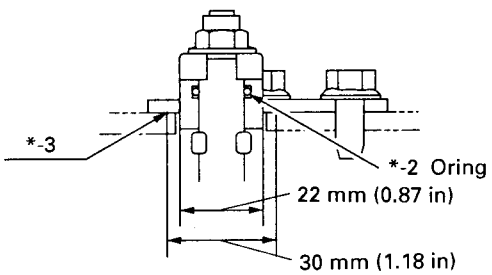




C

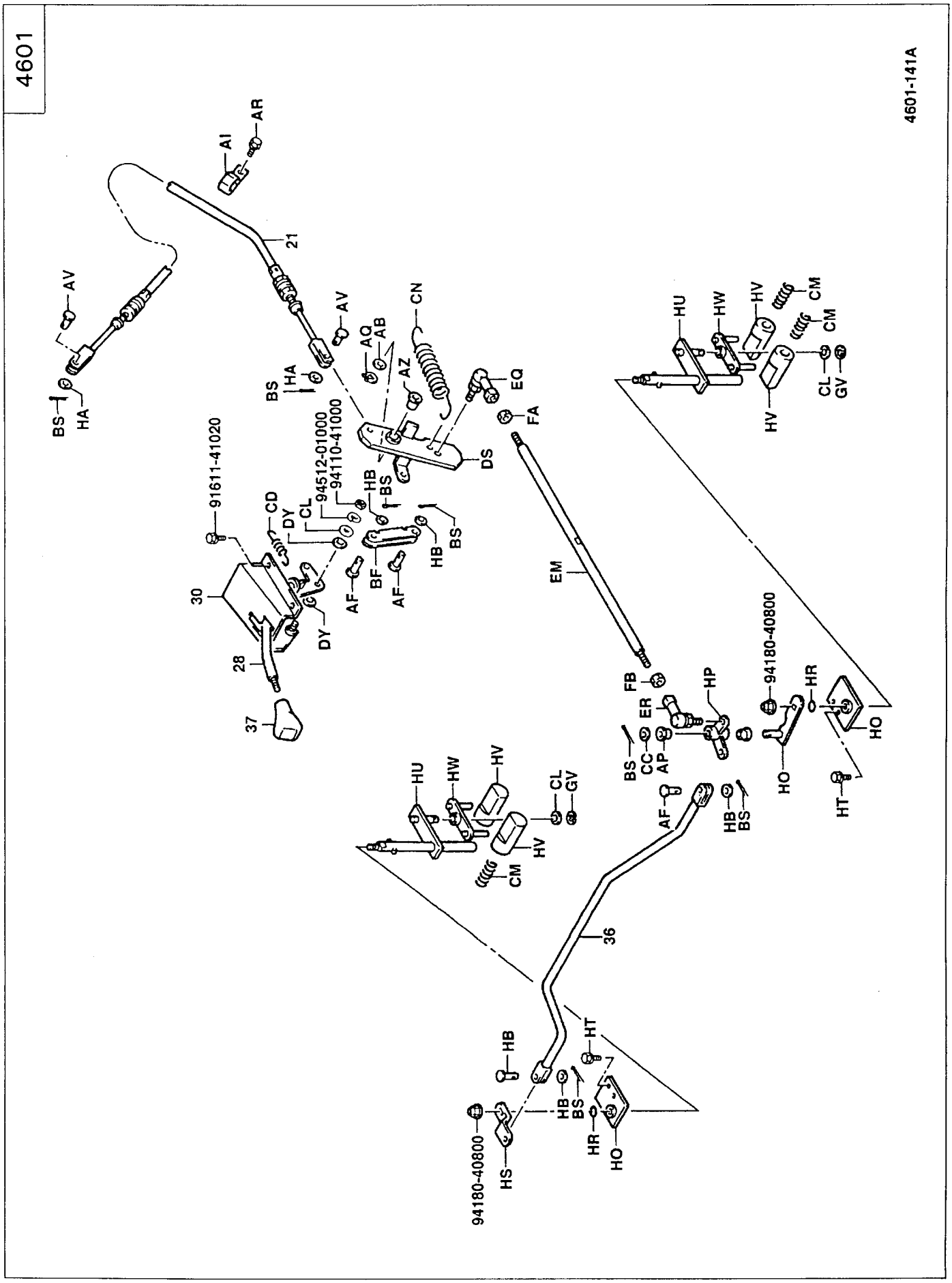
*-2 Smear MP grease before installing the shaft.

*-3 Smear sealant 08826-76002-71 (08826-00090) on the whole area between the boss 22 mm (0.87 in) dia. and contact surface 30 mm (1.18 in) dia.



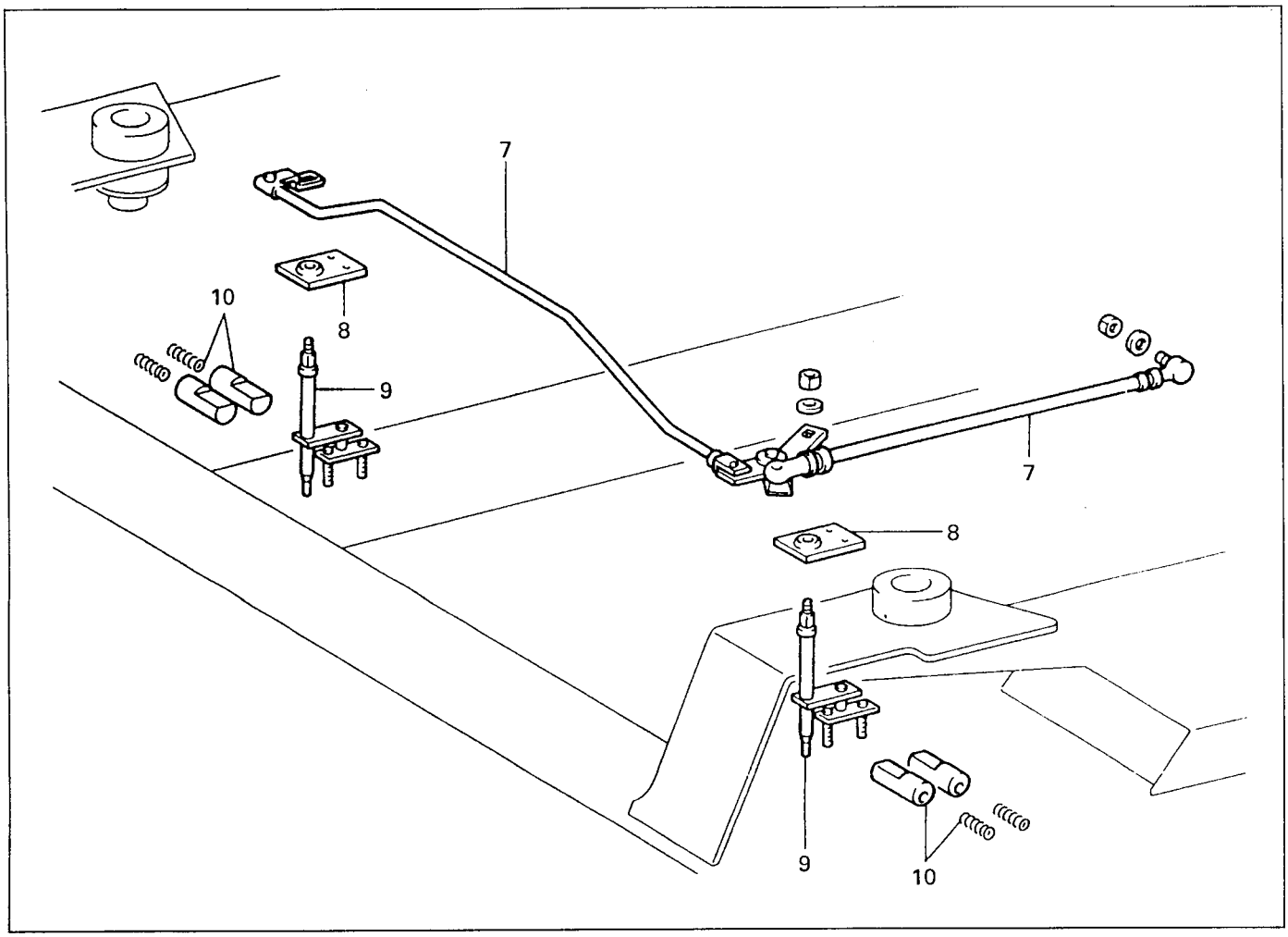
D - D

COMPONENTS



PARKING BRAKE

REMOVAL·INSTALLATION



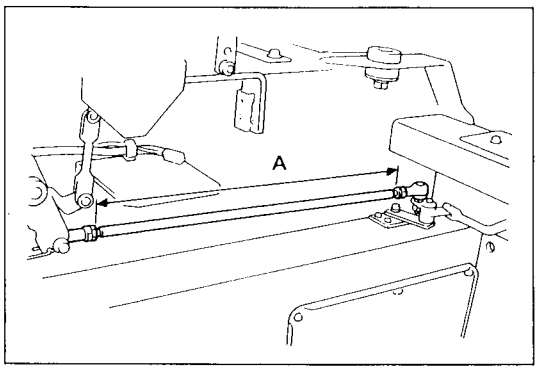
Removal Procedure

1 Open the operator guard. (See 7-7, 7-8.)
2 **Drain reduction gear oil.**
3 Remove the service hole cover. (See 3-6, 5-3.)
4 **Remove the front axle shaft. (See 5-6.)**
5 **Remove the drive sprocket.**
6 Remove the side panel. (See 5-3.)
7 **Remove the rod.**
8 **Remove the bracket.**
9 **Remove the operating link. [Point 2]**
10 Remove the brake lock pin.
11 **Remove the parking brake wire.**

Note:
See the axle section (5) for steps 4 and 5 above.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

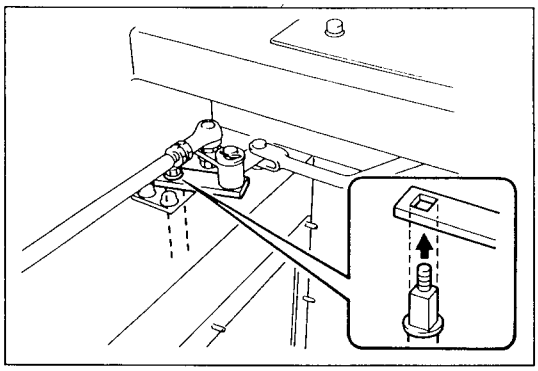


Point Operations

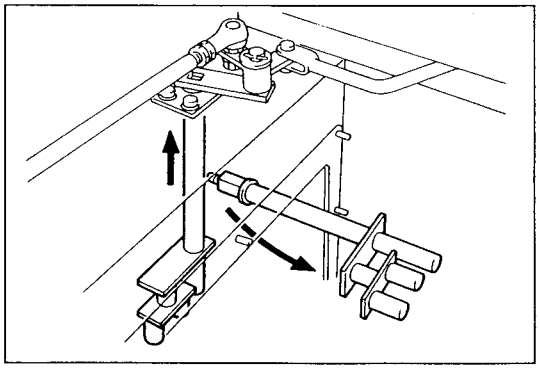
[Point 1]

Installation: Temporarily set the link length to illustrated dimension A, and perform final adjustment after installation. (See 6-7.)

Dimension A:
4SDK5: 444 mm (17.48 in)
4SDK6 · 8: 481 mm (18.94 in)



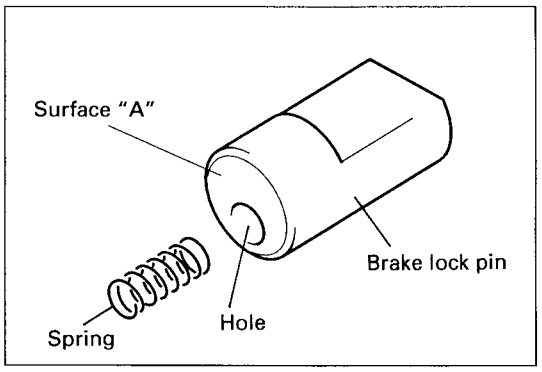
Installation: Before installing the link on the bracket, match the link position with the bracket hole.



[Point 2]

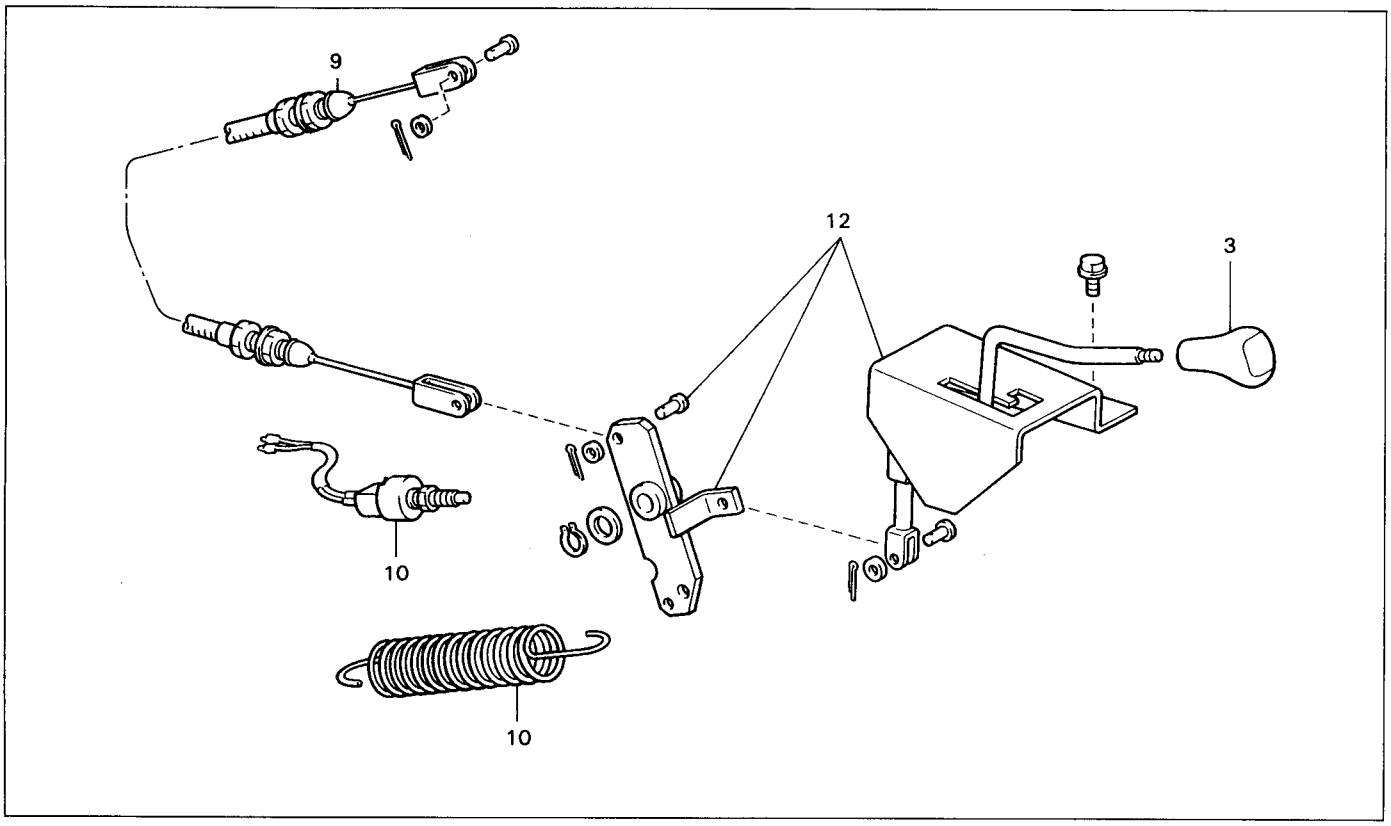
Removal: Push the link upward and extract the brake lock pin from the lower side, and remove the link from the lower side.

Installation: Use care so that the brake lock springs are always kept in position inside the lock pin hole.
(If dislocated and lodged on surface "A" as in illustration, it will change the pin thrusting distance.)
When installing the brake lock pin into the frame casing, ensure that the pin with the spring installed can be shifted with ease as isolated from the linkage connection.
At the time, if the spring is left out, the lock pin can not be taken out again.
Use care for the spring installation.



PARKING BRAKE LEVER

REMOVAL·INSTALLATION



Removal Procedure

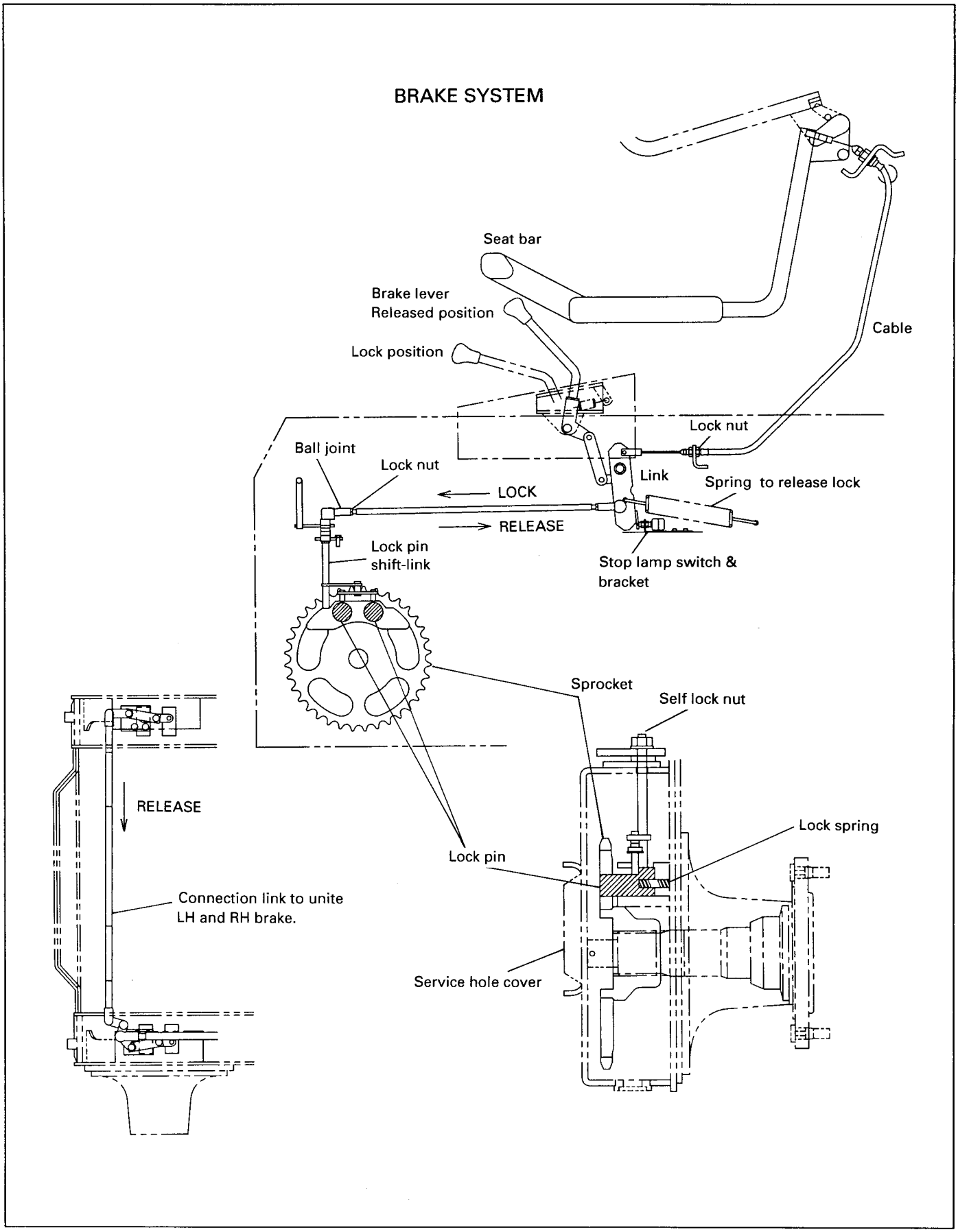
1 Remove the operator guard. (See 7-7, 7-8.)
2 Remove the side panel. (See 3-6, 5-3.)
3 Remove the steering brake lever knob.
4 Remove the parking brake lever knob.
5 Remove the bush.
6 Remove the upper boot.
7 Remove the lower boot.
8 Remove the steering shift lever case.
9 Remove the parking brake cable.
10 Remove the parking brake switch.
11 Remove the spring.
12 Remove the parking brake lever W/case.

Note:
See the steering section (4) for the steering linkage on P4-6 and P4-8.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

BRAKE ADJUSTMENT

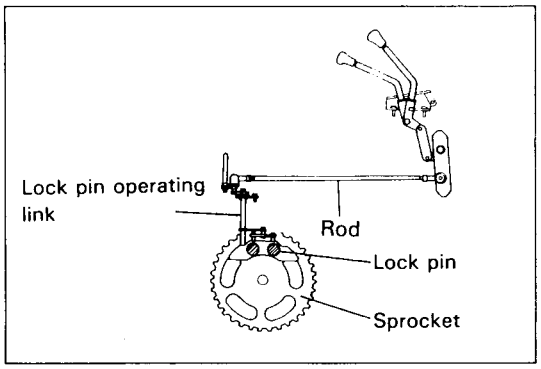


Preparation for adjustment

(1) Drain reduction gear oil.
(2) Open the operator guard. (See 7-7, 7-8.)
(3) Remove the side cover and the service hole cover. (See 5-3.)

Note:

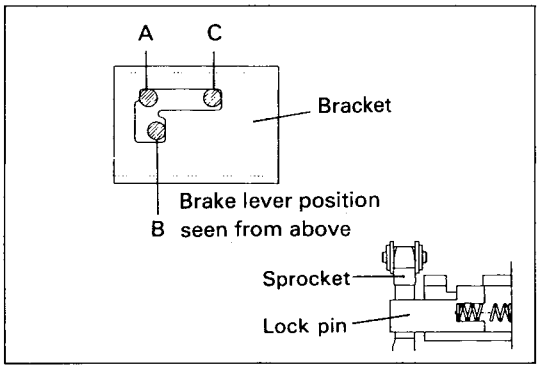
1. **Check to confirm in advance that the brake lock pin by disconnecting from the linkage, can manually be shifted with ease through the pin guide hole in the frame. (Clean there as to be free from metal chips or dust.) At the time, don't miss the spring in the lock pin since it cannot be taken out.**
2. **Before connecting the seat bar cable and service hole cover, fabricate the linkage between the brake pin and the brake lever. As alining the opening furnished in the sprocket gear with two brake lock pins either on LH side and RH side by the brake lever shifting, check to confirm the status of the lock pin engagement and disengagement, such as for stiffiness, depth of engagement, stick.**
3. **The distance of the shifting for the brake lock pin is determined by the length adjustment of the parking brake rod (by loosening the ball joint lock nut and turning the rod).**
   Take note that from then on, the service hole cover will be closed and oil will be filled, disabling the check for the lock pin engagement.



Adjust the rod to the temporary setting length for each vehicle model.

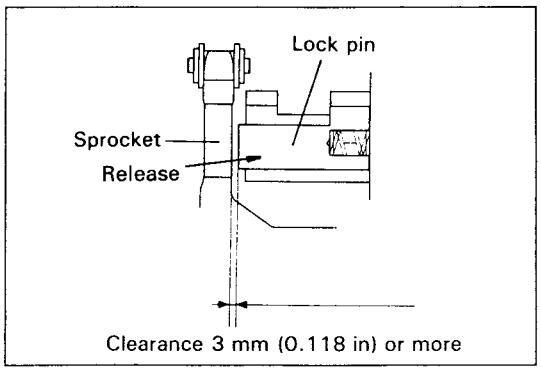
Temporary setting length:
4SDK5: 444 mm (17.48 in)
4SDK6 · 8: 481 mm (18.94 in)

Loosen the lock nuts of the ball joints at both ends for length adjustment.



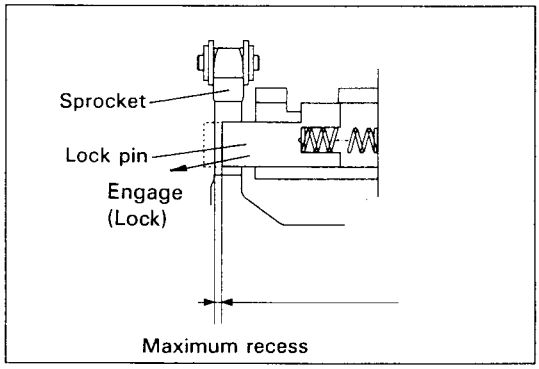
Lock Pin Adjustment Procedure

(1) Shift the lever to position "C" (at released position). Turn to adjust the parking brake rod so that all of four lock pins will retract, and the link will start to apart from the switch bracket.
Then tighten the self lock nut locating at the top of the lock pin shift-link.
(This aims at pulling the LH brake link and RH brake link tight toward the releasing side).



Check the clearance between the sprocket and lock pin when the brake is set in position C.

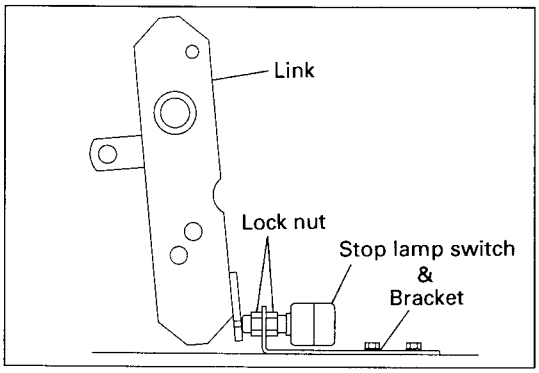
Standard: 3 mm (0.118 in) or more



(2) The brake lock pins at LH side, rear, have the smallest distance of the engagement vs. the sprocket.

Check the maximum recess of there lock pin (LH Rear) when the brake lever is set in position B (Lock position).

4SDK5: 5 mm (0.197 in) max.
4SDK6·8: 3 mm (0.118 in) max.

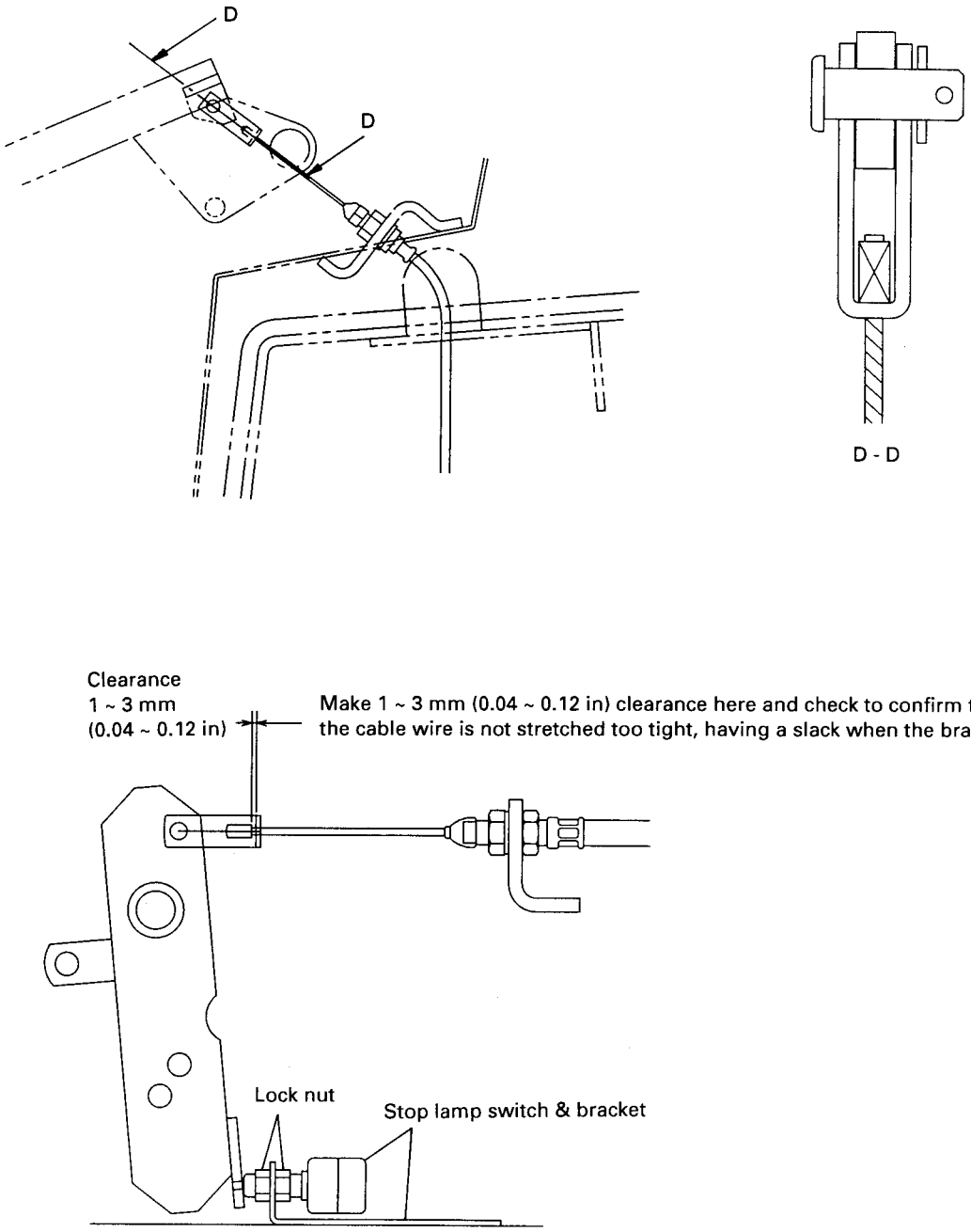


(3) Install the stop lamp switch on the position where the stop lamp switch will be turned off at the time however, take care so that the stop lamp switch may not obstruct the link stroke. The switch position can be adjusted by the switch bracket.

(4) Shift the brake lever one after another to the position C→A→B→C in order, and check to confirm that there are no fault in the brake lock pin engagement and release.

(5) If there is a derangement of the brake lock pin engagement and release as specified in the preceding explanation at "B", "C", adjust the parking brake length evenly in view of balance.

4. Seat Bar Connection with Activation Cable



(1) Cable connection at upper part.

1) Connect the cable at the upper clevis end to the seat bar and secure the cable tube with a nut.

2) Lower the seat bar, and connect the cable lower clevis end to the link under the condition that the brake lever position at "C" and tighten the cable tube temprarily with a nut.

At the time, as shown in the illustration, provide the cable wire with a little slack, (that means the wire must not be tense when the brake is released) by adjusting with a lock nut, and secure the lock nut.

5. Inspection for stop lamp switch when engaging the brake on one side (either to LH or RH).

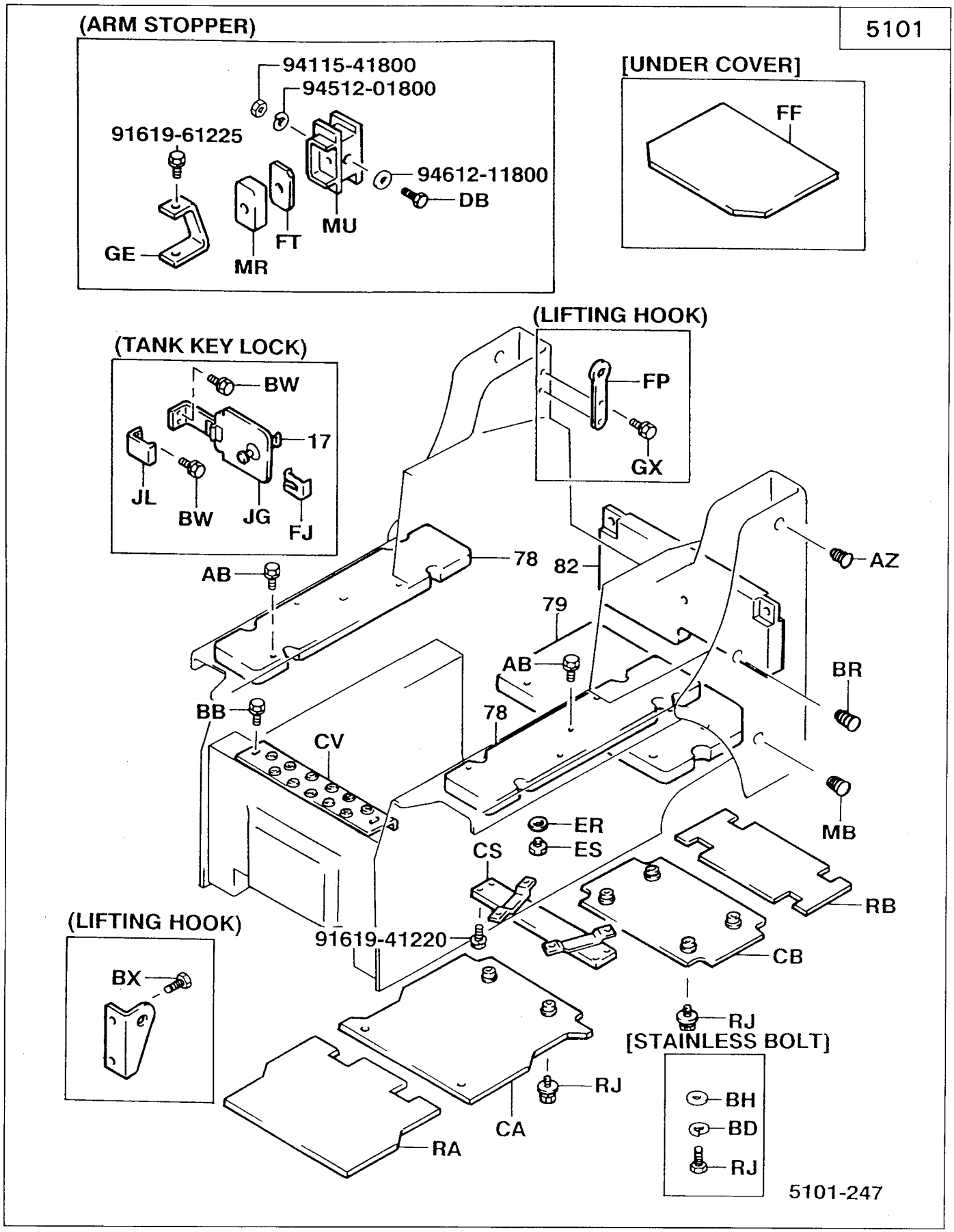
(1) Get on the truck and lower the seat bar, and turn on the brake warning lamp by locking the brake.lever. To engage the brake on one side, drive the vehicle by a short distance with a travel control lever on one side. As placing the load on the lock pin on one side, release the brake lever while releasing the brake on the other side to make the one sided brake status. At the time, check to confirm that the brake alarm lamp will keep lighting on.

(2) With the brake lever released, drive the vehicle by a short distance with travel control levers to release the one sided brake engagement. At the time, check to confirm that the brake warning lamp will go off.

Preceding step (1), (2) should be repeated in succession, and perform the test either LH side or RH side.

BODY

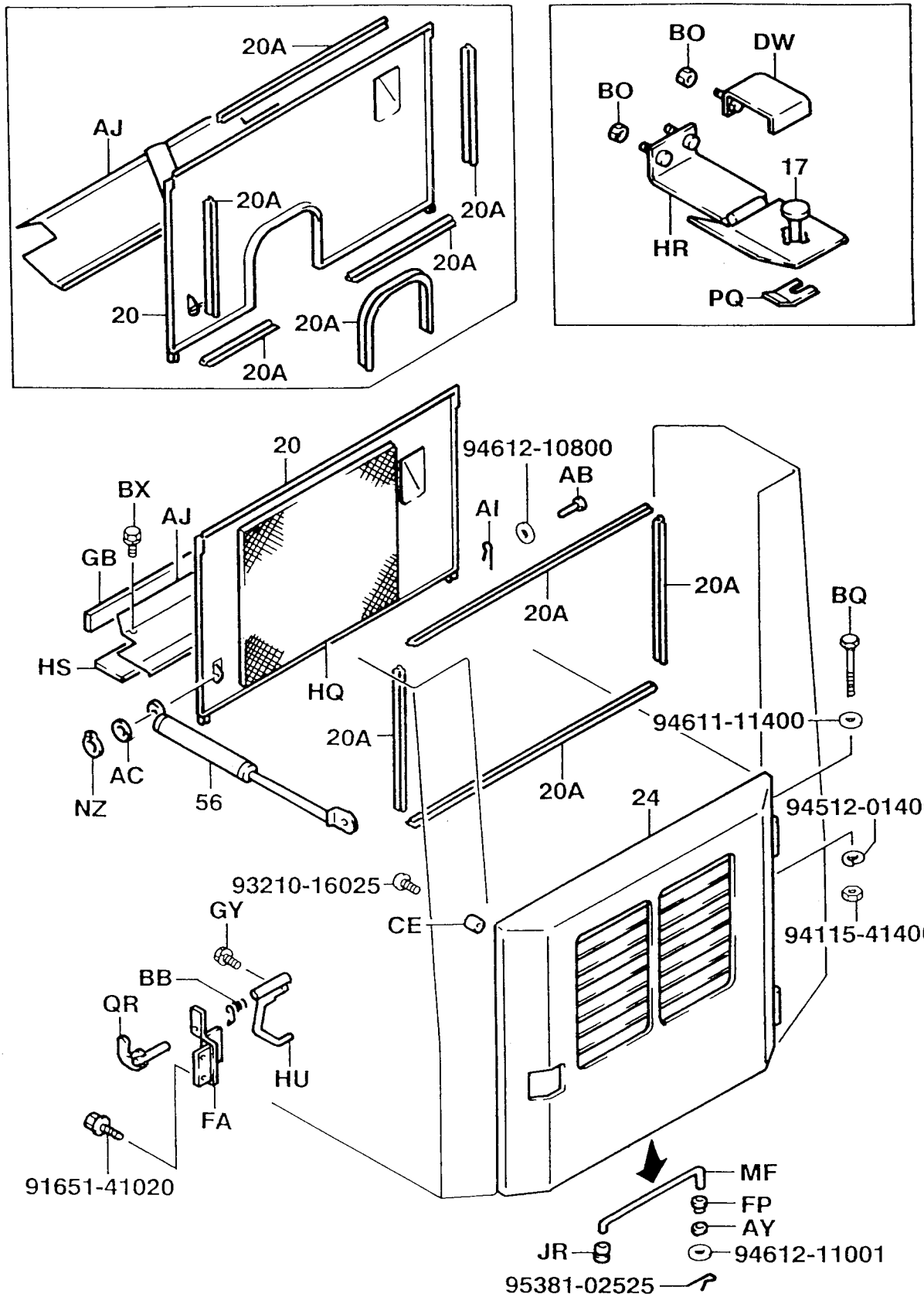
COMPONENTS



5201

[PRE-CLEANER]

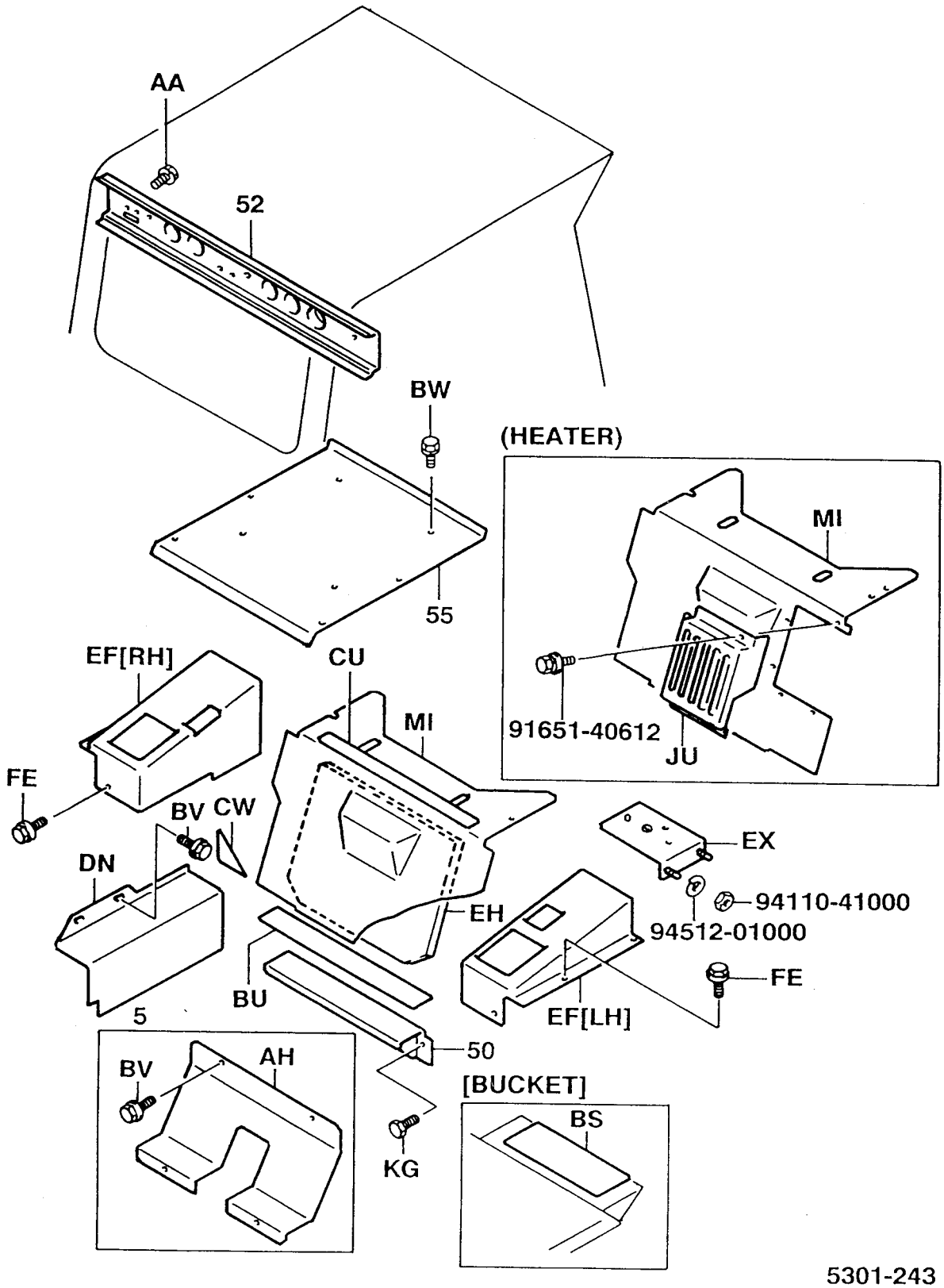
[GRILL KEY LOCK]

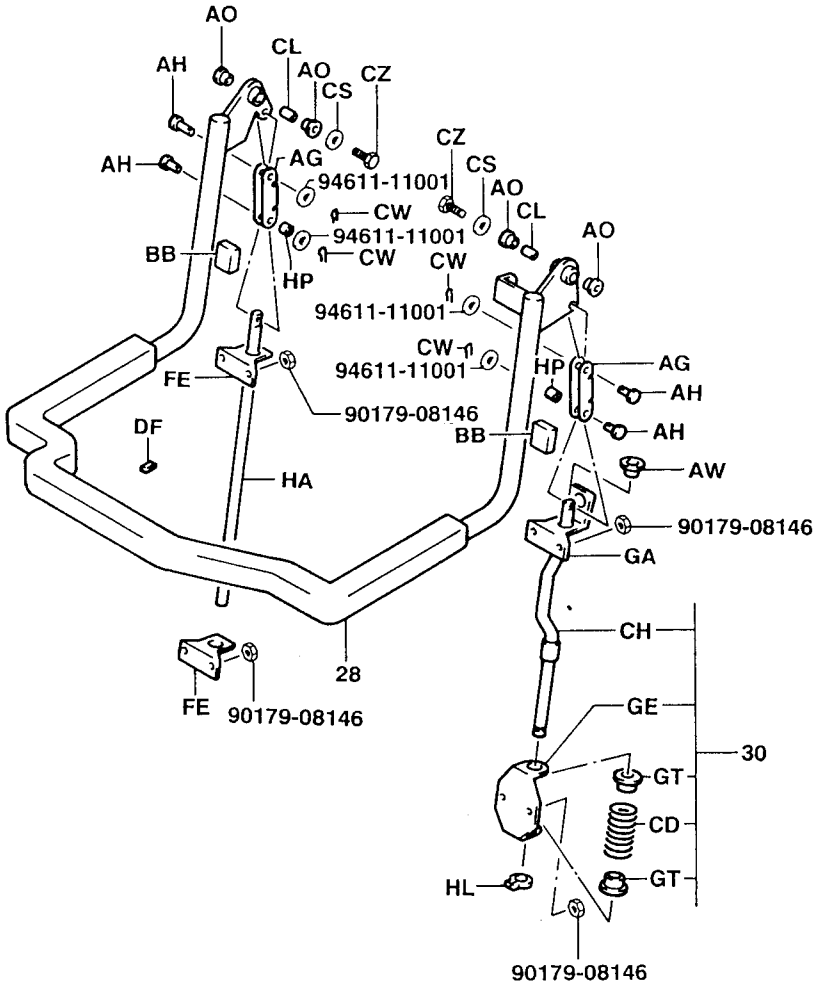


5201-181

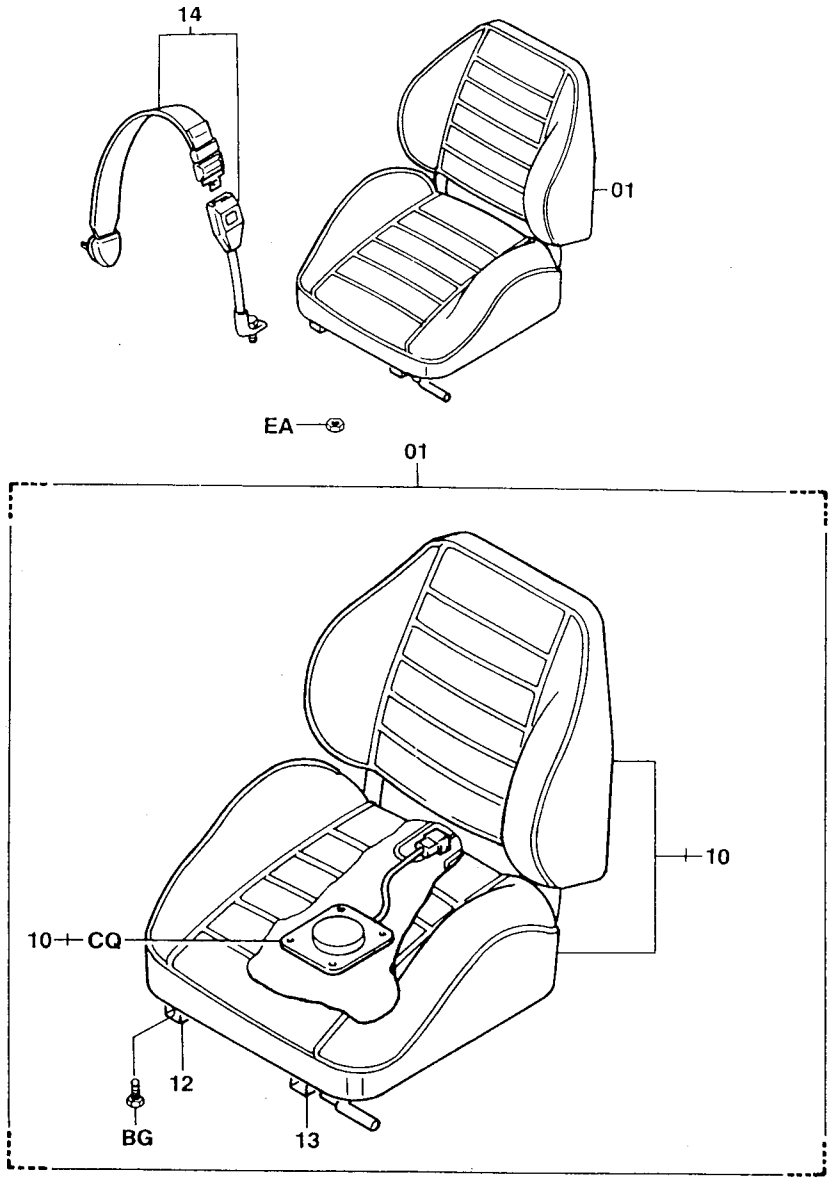
7

5301



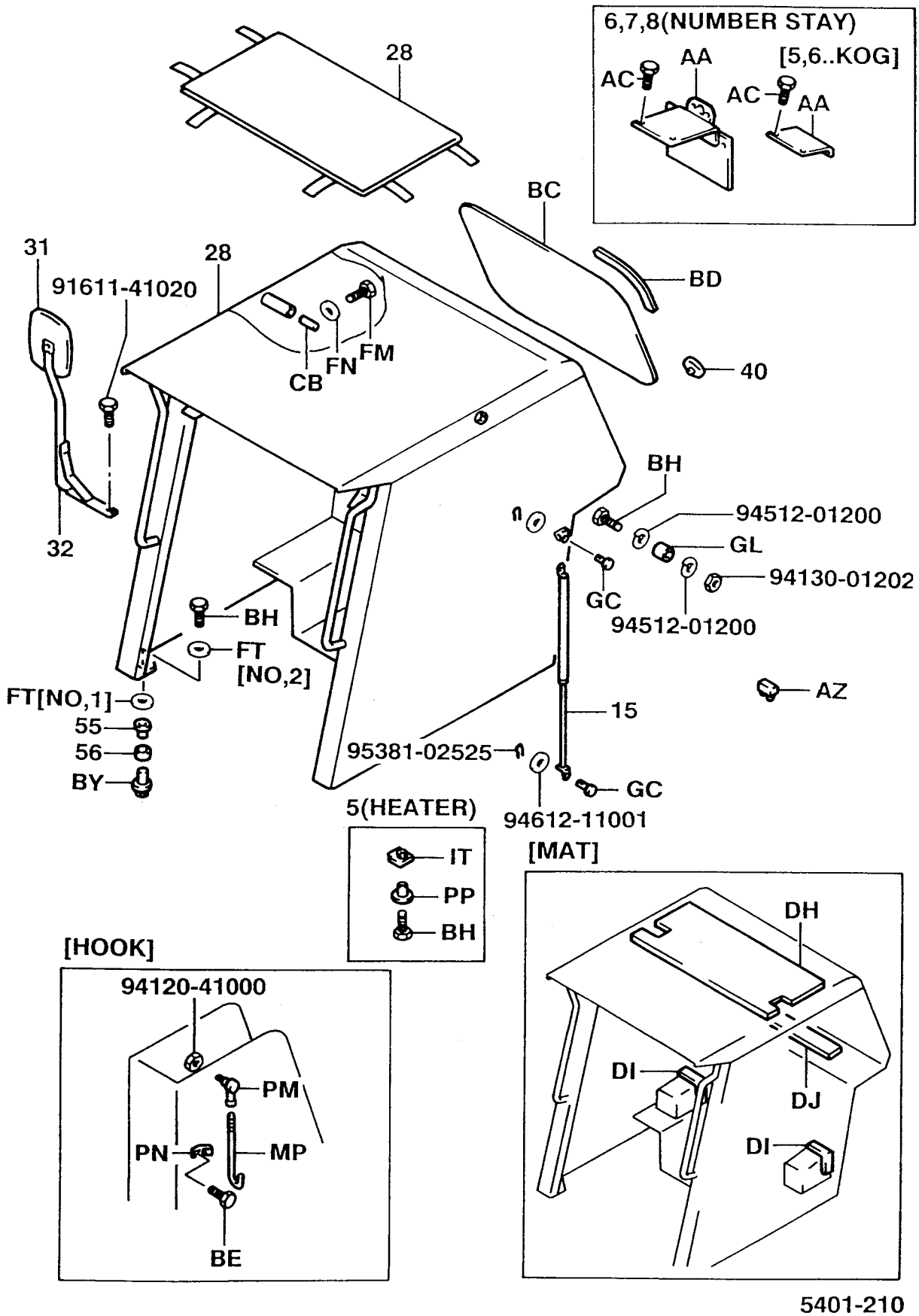


5308-207



5308-206

5401

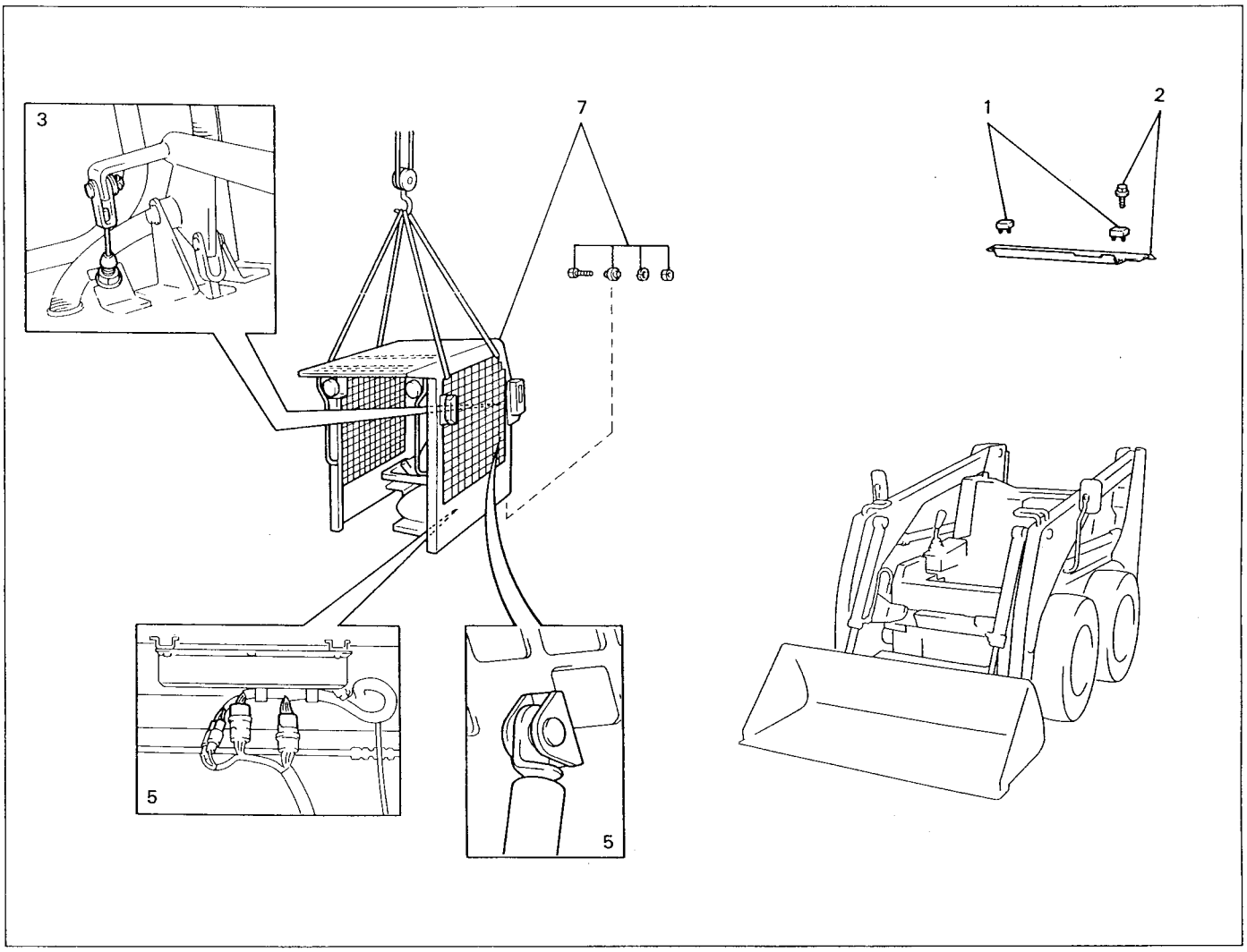


5401-210

OPERATOR GUARD

Caution:
Before opening the operator guard, lower the lift arm fully until the bucket comes into contact with the ground, and support the rear side of the frame with a jack. When it is opened, use the stay and lock it securely. After the operator guard is opened, never operate the lift arm upward.

REMOVAL·INSTALLATION



Removal Procedure

1 Remove the cushion rubber.

2 Remove the rear upper cover.

3 Disconnect the parking brake wire (seat bar side).

4 Open the operator guard. **[Point 1]**

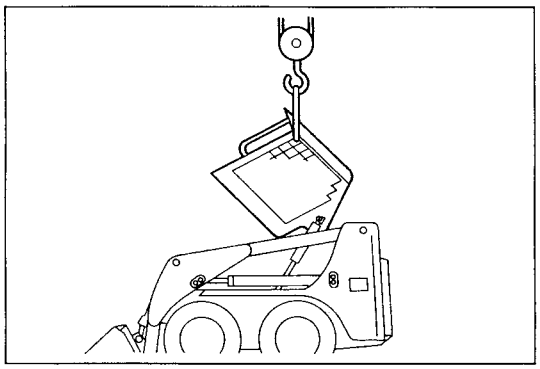
5 Disconnect the connector and damper stay. **[Point 2]**

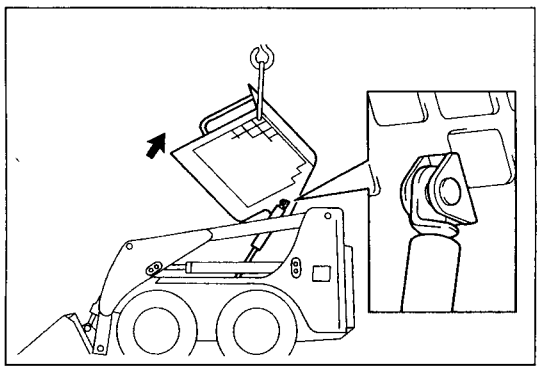
6 Close the operator guard.

7 Remove the operator guard.

Installation Procedure

The installation procedure is the reverse of the removal procedure.





Point Operations

[Point 1]

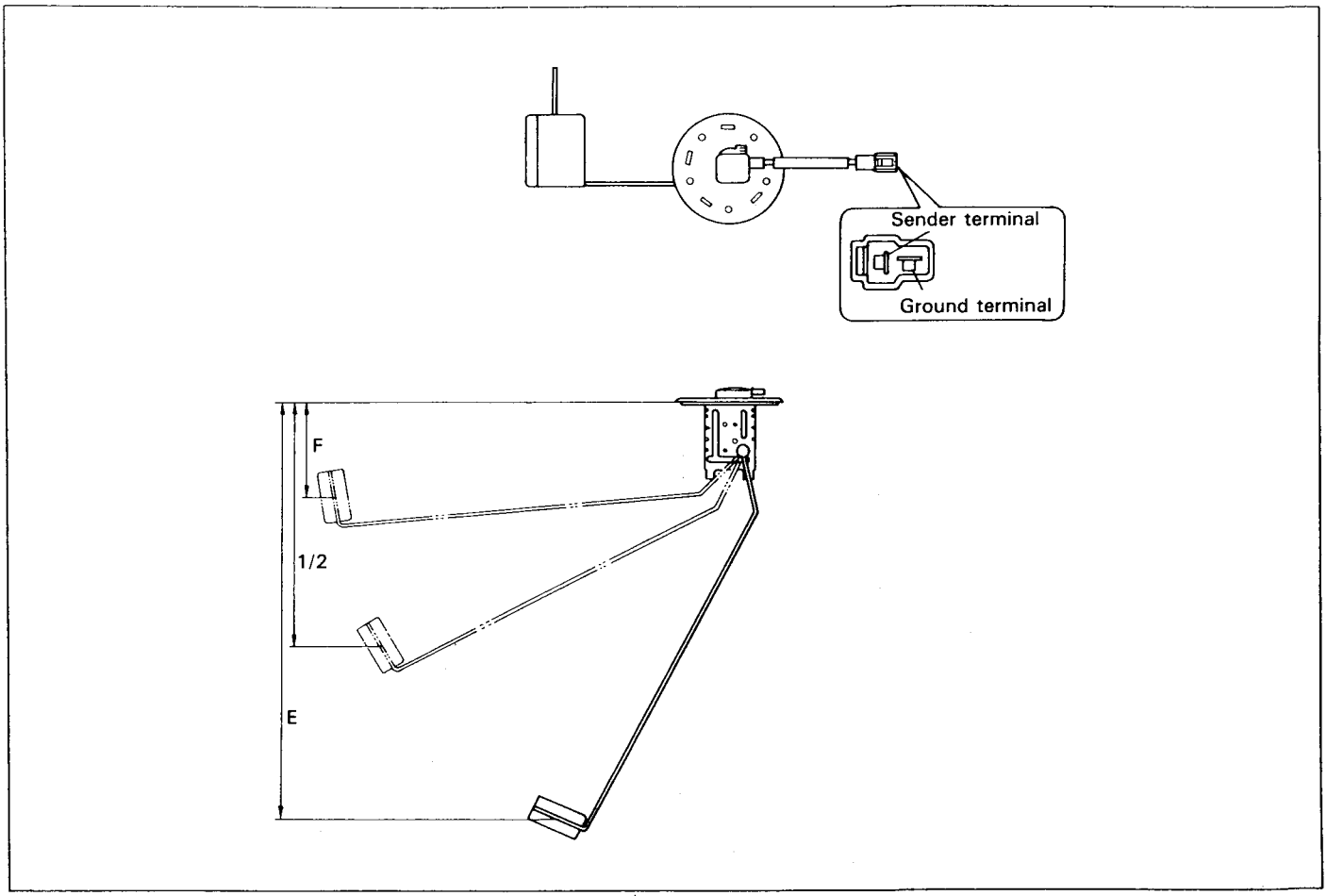
Removal: Hold the operator guard with a hoist to prevent it from falling down.

[Point 2]

Removal·Installation: Raise the operator guard until the damper stay is fully extended before removing or installing the pin.

FUEL SENDER GAGE

INSPECTION



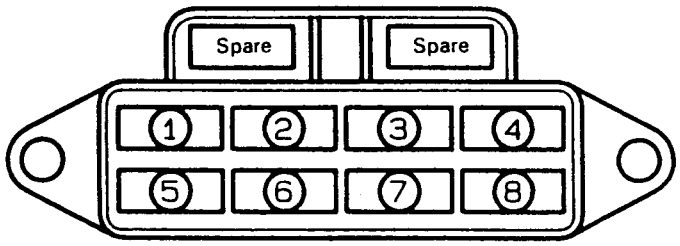
1. Measure the resistance.
   (1) Check to see that the float moves smoothly.
   (2) Measure the resistance between the sender positive terminal and sender negative (body grounding) terminal while the float position is moved from point F to point E. Also check continuous variation of the resistance value.

Note:
- **Measure with the float being lowered in the direction from point F to point E.**
- **The resistance at each of point F and point E shall be measured with the arm in contact with the stopper.**

Standard

Float position mm (in)		Resistance Ω
F	150.6 ± 8 (5.93 ± 0.31)	3 ± 2
1/2	310.7 (12.23) (Reference value)	32.5 (Reference value)
E	428.9 ± 8 (16.89 ± 0.31)	110 ± 7

FUSE



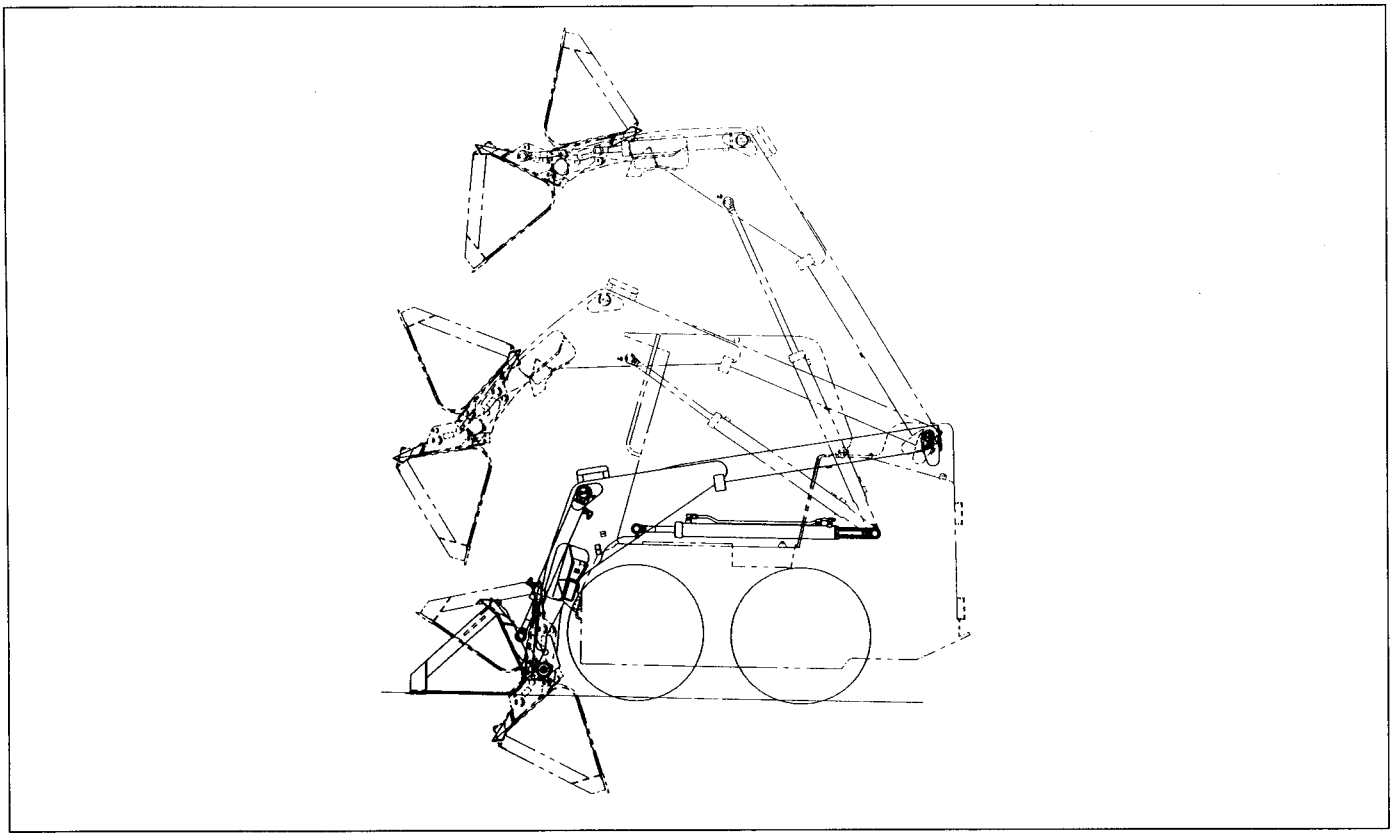
Portions protected by fuses

No.	Name	Capacity	Main protected portion
① (OPT)	HEATER	10 A	Heater
②	STOP	10 A	Stop lamp
③	TURN	10 A	Turn signal lamp
④	BACK	10 A	Backup lamp·Backup buzzer
⑤ (OPT)	WIPER	20 A	Wiper
⑥	LAMP	20 A	Head lamps·Clearance lamps·Tail lamps·Rear working lamp·Meter lamps
⑦	HORN	10 A	Horn
⑧	METER	10 A	Meter·Warning lamps

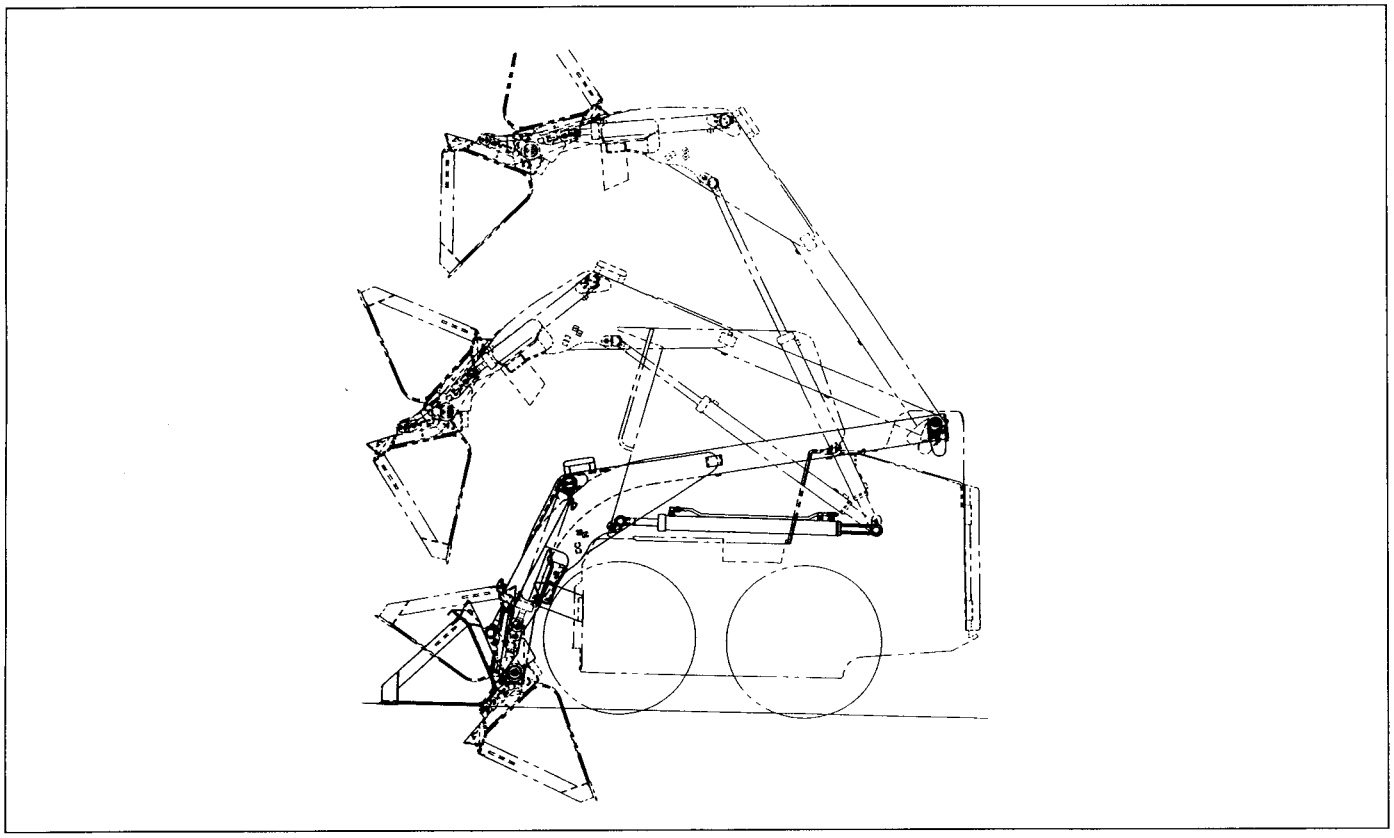
LIFT ARM & BUCKET BRACKET

GENERAL

4SDK5

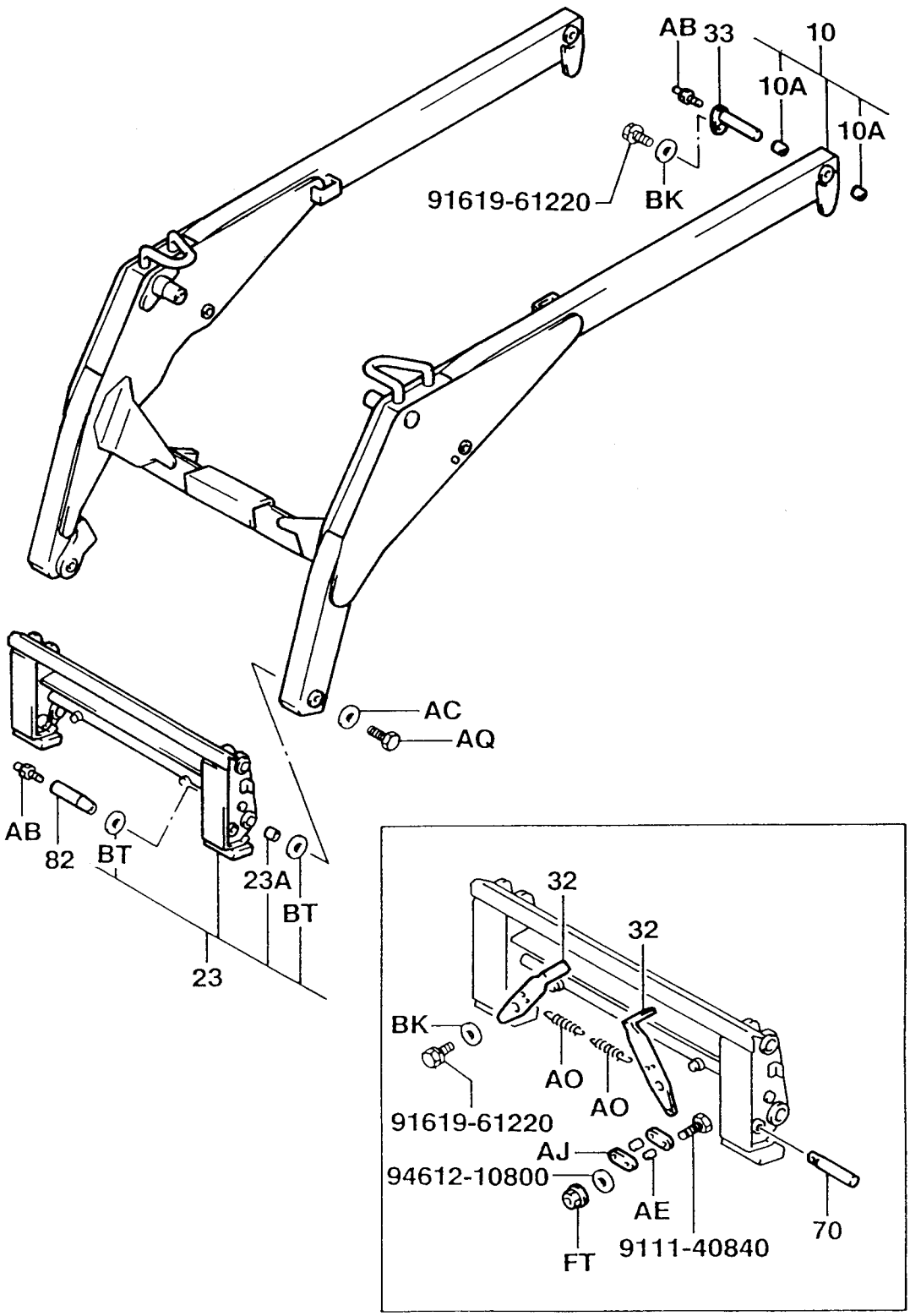


4SDK6·8



COMPONENTS

6111

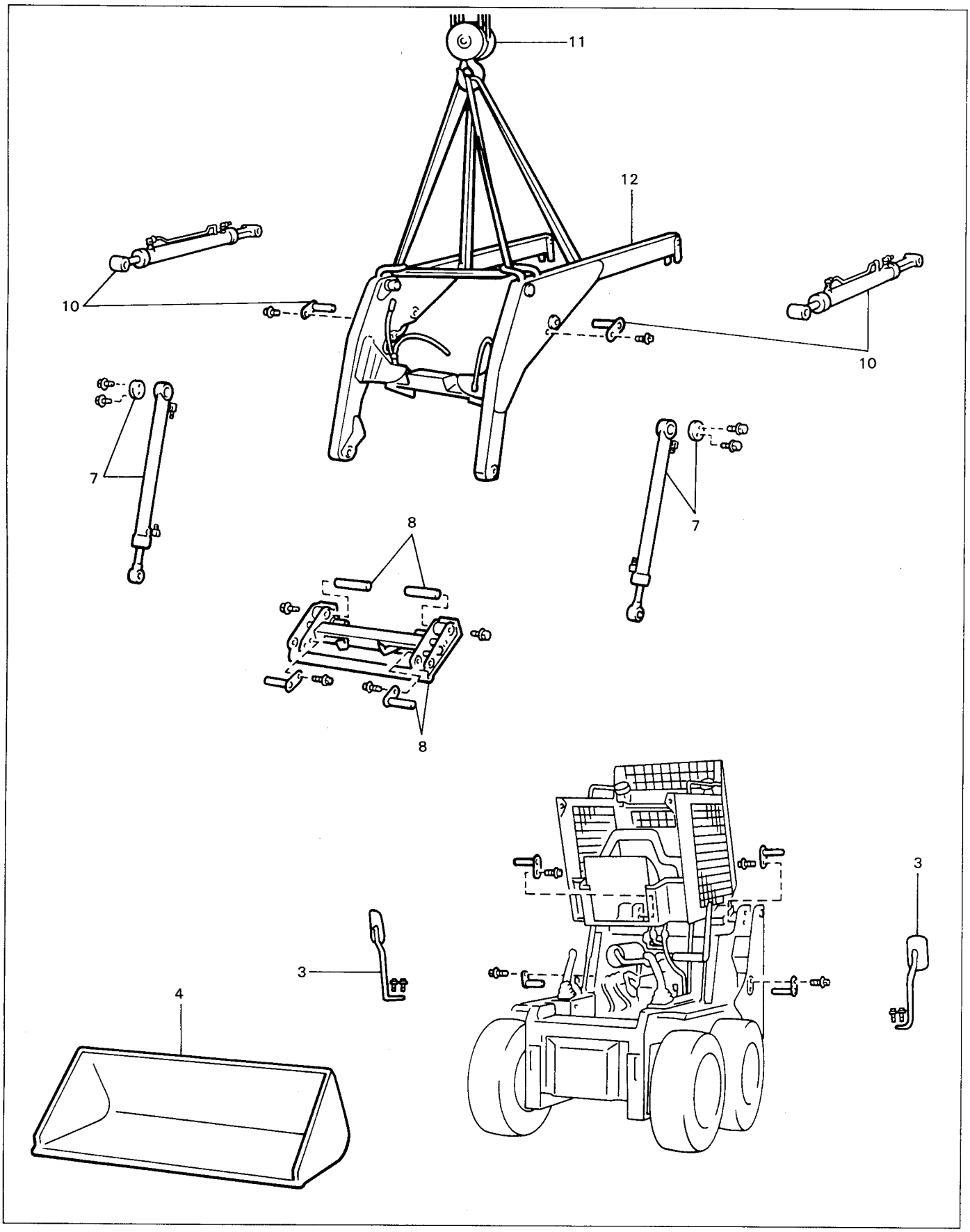


6111-051

8

LIFT ARMS

REMOVAL·INSTALLATION



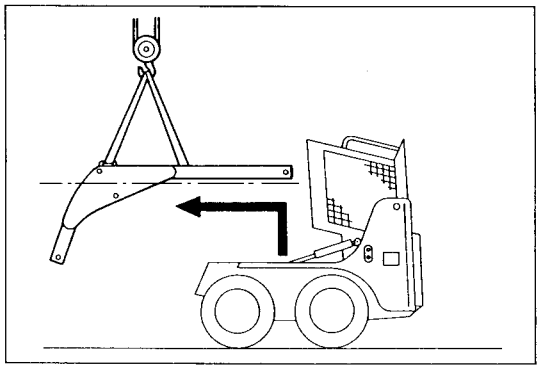
Removal Procedure

1 Lower the lift arm until the bucket comes into contact with the ground.
2 Support the rear side of the frame with a jack.
3 Remove the rearview mirror.
4 Remove the bucket.
5 Bring the bucket bracket into contact with the ground.
6 Disconnect two dump cylinder pipings.
7 Remove the dump cylinder. (See page 9-8.)
8 Remove the bucket bracket.(See page 8-6.)
9 Disconnect two lift cylinder pipings.
10 Remove the lift cylinder. (See page 9-5.)
11 Slightly hoist the lift arm.
12 Remove the lift arm. **[Point 1]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

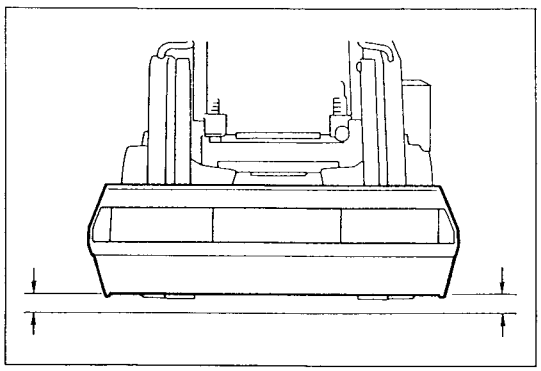
Notes:
- **Coat Castle MP grease on each support pin before installation.**
- **Bleed air from the hydraulic circuit. (See page 12-5.)**
- **Inspect the lift arm without removing it from the vehicle.**



Point Operations

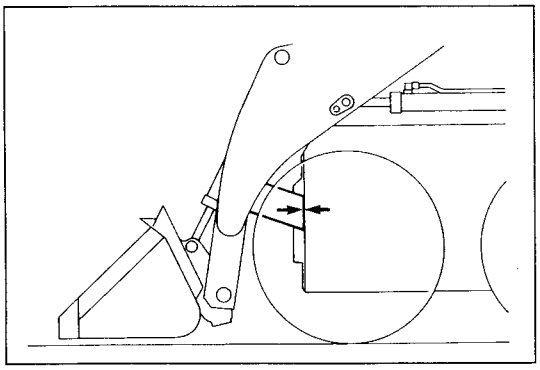
[Point 1]

Removal: When hoisting the lift arm, hoist it gradually. Remove the arm when hoisted horizontally from the front side of the vehicle.



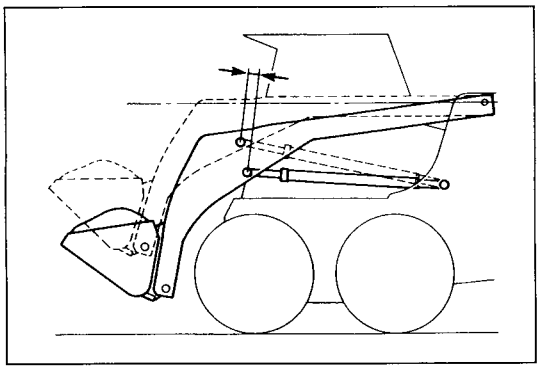
Inspection: Lift arm leveling inspection
Lower the arm fully with the bucket facing upward, and check if the bottom of the bucket is parallel with the ground surface.

Limit of difference between left and right:
15 mm (0.59 in)



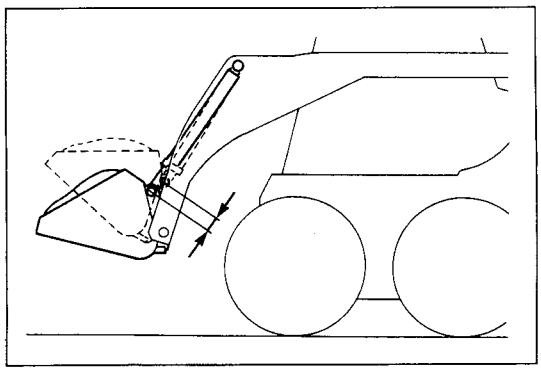
Inspection: Lift arm stopper clearance check
Inspect the lift arm stopper clearance.

Lift arm stopper clearance standard:
0 to 3 mm (0 to 0.12 in)



Inspection: Natural drop and natural forward tilt inspection
Place normal load on the bucket with the lift arm and bucket in horizontal state, and measure the extension/contraction of each cylinder rod in 15 minutes.

Natural drop: 60 mm (2.36 in) [Measure at the lift cylinder rod.]

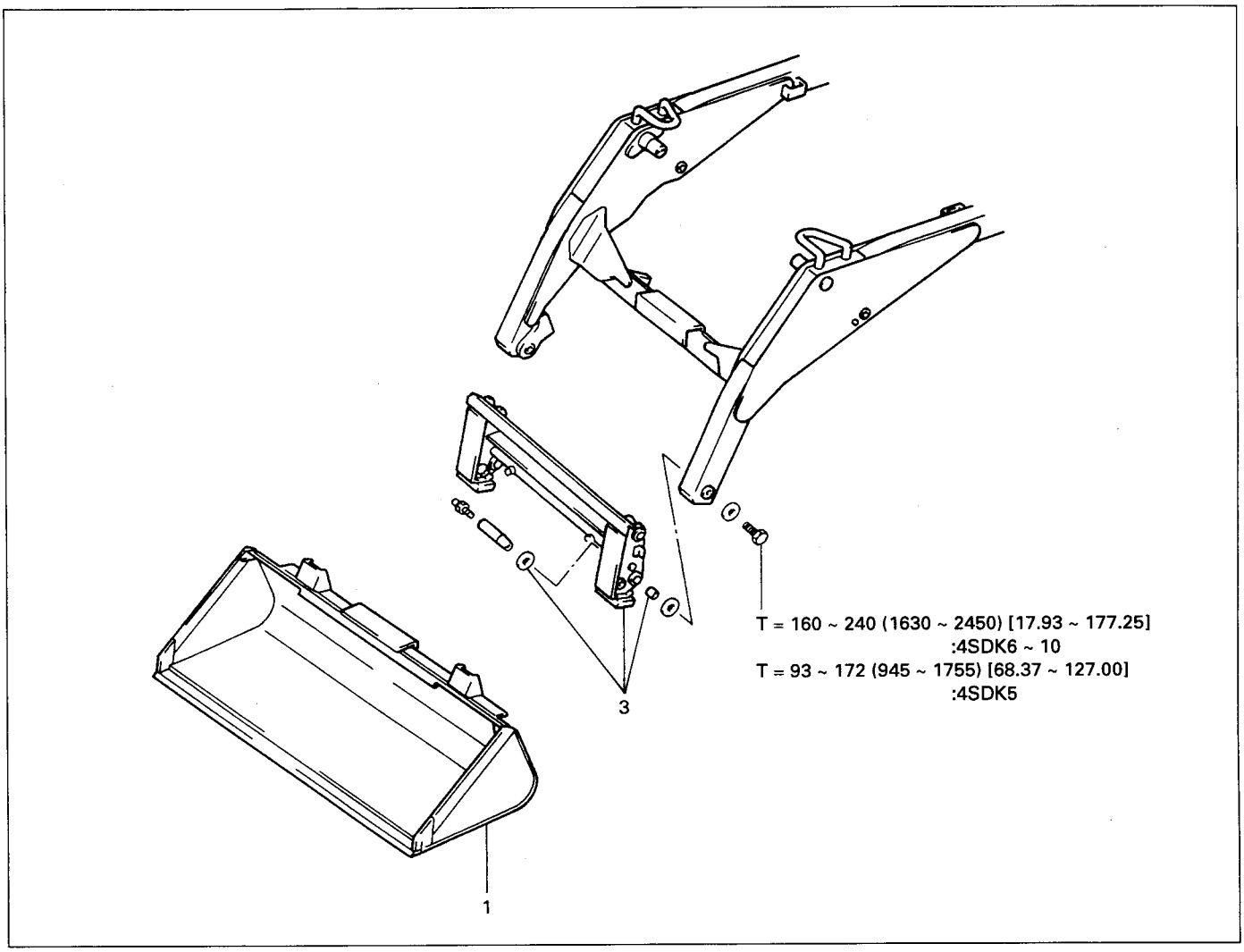


Natural forward tilt:
60 mm (2.36 in) [Measure at the dump cylinder rod.]

BUCKET BRACKET

REMOVAL·INSTALLATION

T = N·m (kgf-cm) [ft-lbf]



Removal Procedure

1 Remove the bucket. **[Point 1]**

2 Bring the bucket bracket into contact with the ground.

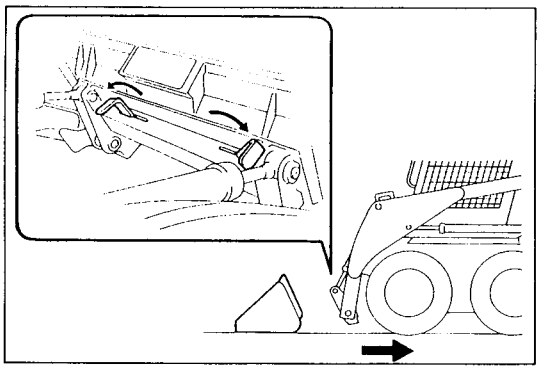
3 Remove the bucket bracket. **[Point 2]**

4 Remove the stopper lever.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

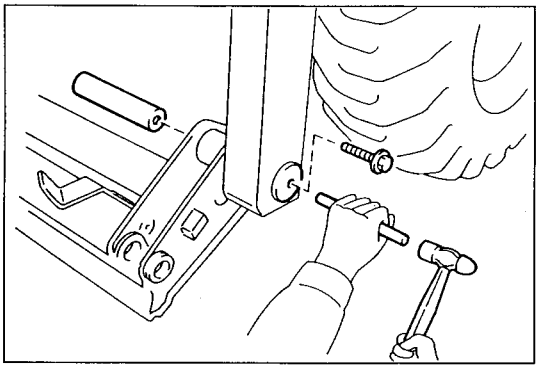
Notes:
- **Coat MP grease on the bucket bracket support pin before installing it.**
- **Coat locking agent 08833-76003-71 (08833-00080) on the bucket bracket support pin stopper bolt before tightening it.**



[Point 1]

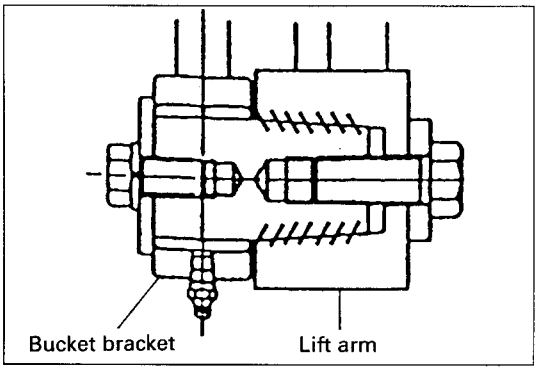
Removal: Remove the bucket from the vehicle.

1. Bring the bucket into contact with the ground.
2. Unlock the bucket lock lever.
3. Move the vehicle in the reverse direction and remove the bucket.



[Point 2]

Removal: Remove the support pin carefully so as not to damage the support pin threading.

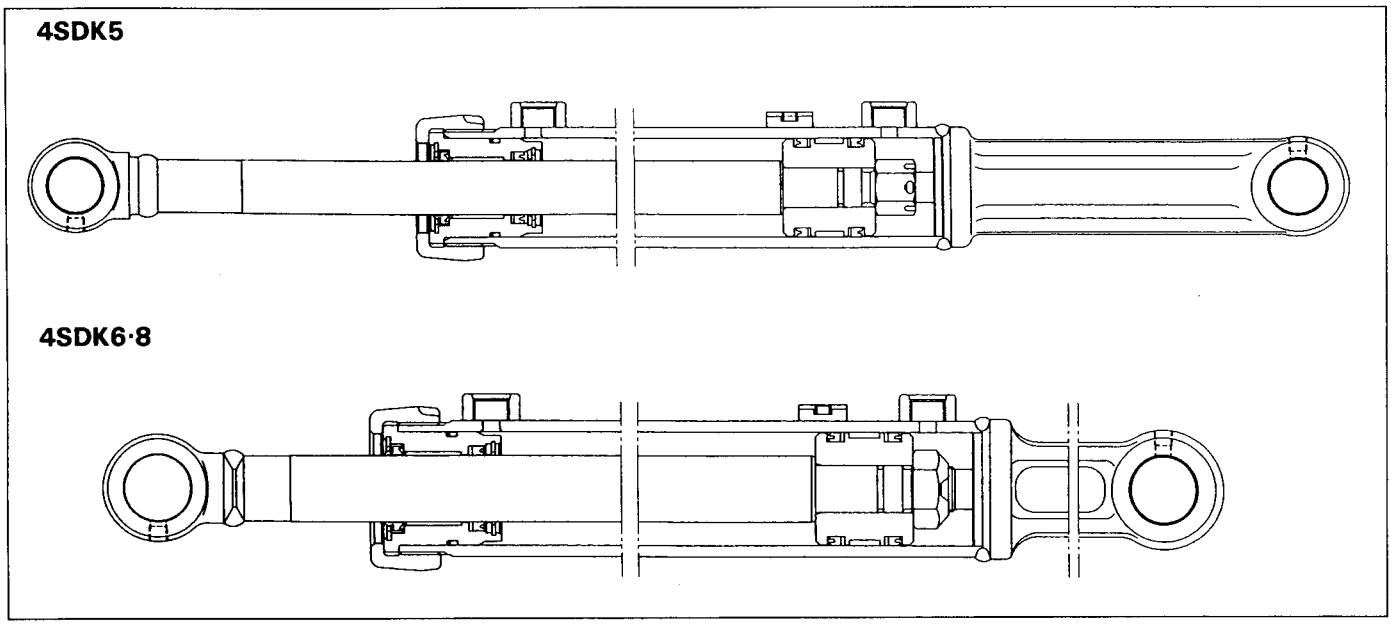


(3) When to drive the pin into the place, it is likely to be the case that the arm surface is smeared with a sticky, greasy or dirty substance due to the over spread grease from the grease nipple, clean the arm surface first. The tapered portion of the pin must be free from oil and grease.

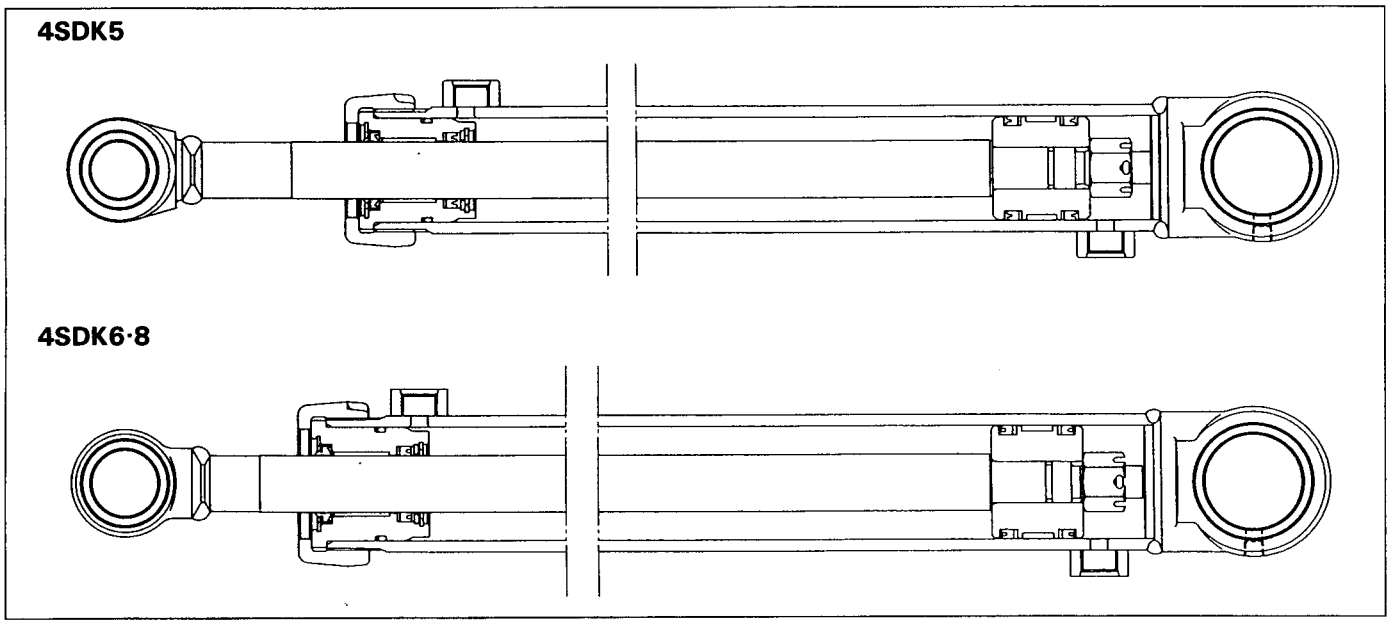
CYLINDERS

GENERAL

Lift Cylinder



Dump Cylinder



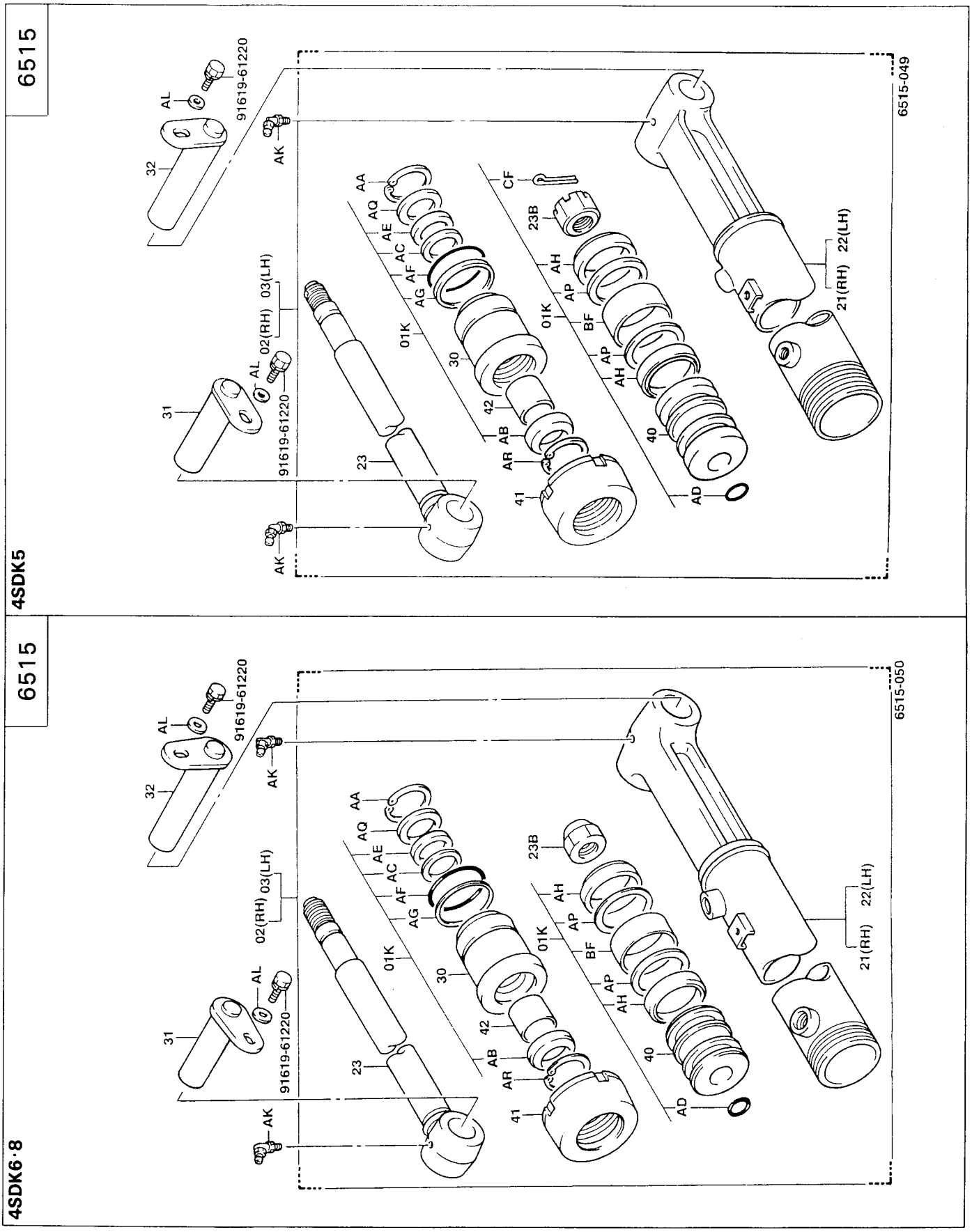
SPECIFICATIONS

Lift Cylinder, Dump Cylinder

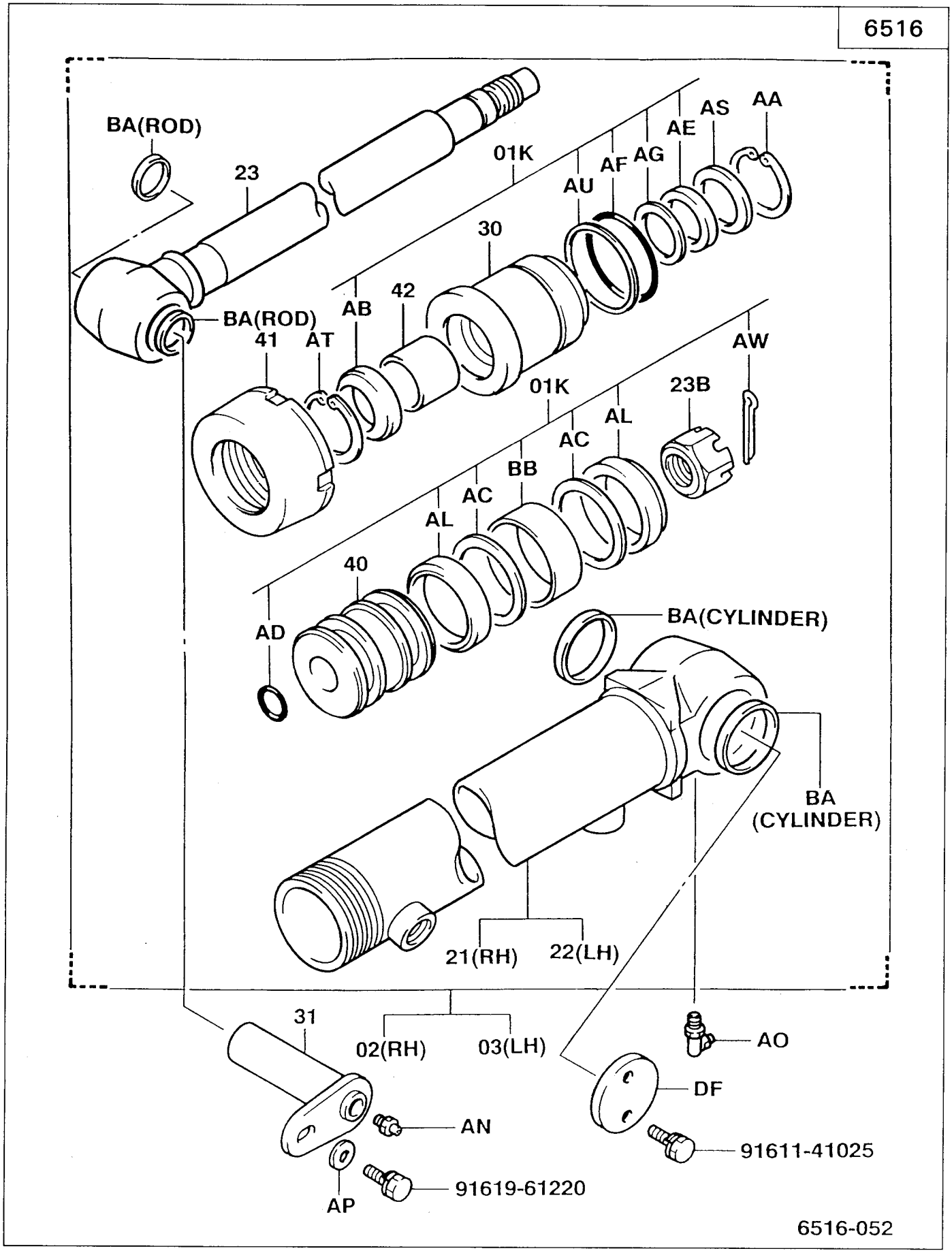
Type			4SDK5	4SDK6·4SDK8
Piston seal type			U-Packing	←
Rod seal type			U-Packing	←
Piston stroke	mm (in)	Lift Cylinder	635 (25.0)	729 (28.7)
		Dump Cylinder	390 (15.4)	470 (18.5)
Cylinder inside diameter	mm (in)		55 (2.17)	60 (2.36)
Piston rod outside diameter	mm (in)	Lift Cylinder	30 (1.18)	35 (1.38)
		Dump Cylinder	30 (1.18)	←

COMPONENTS

Lift Cylinder

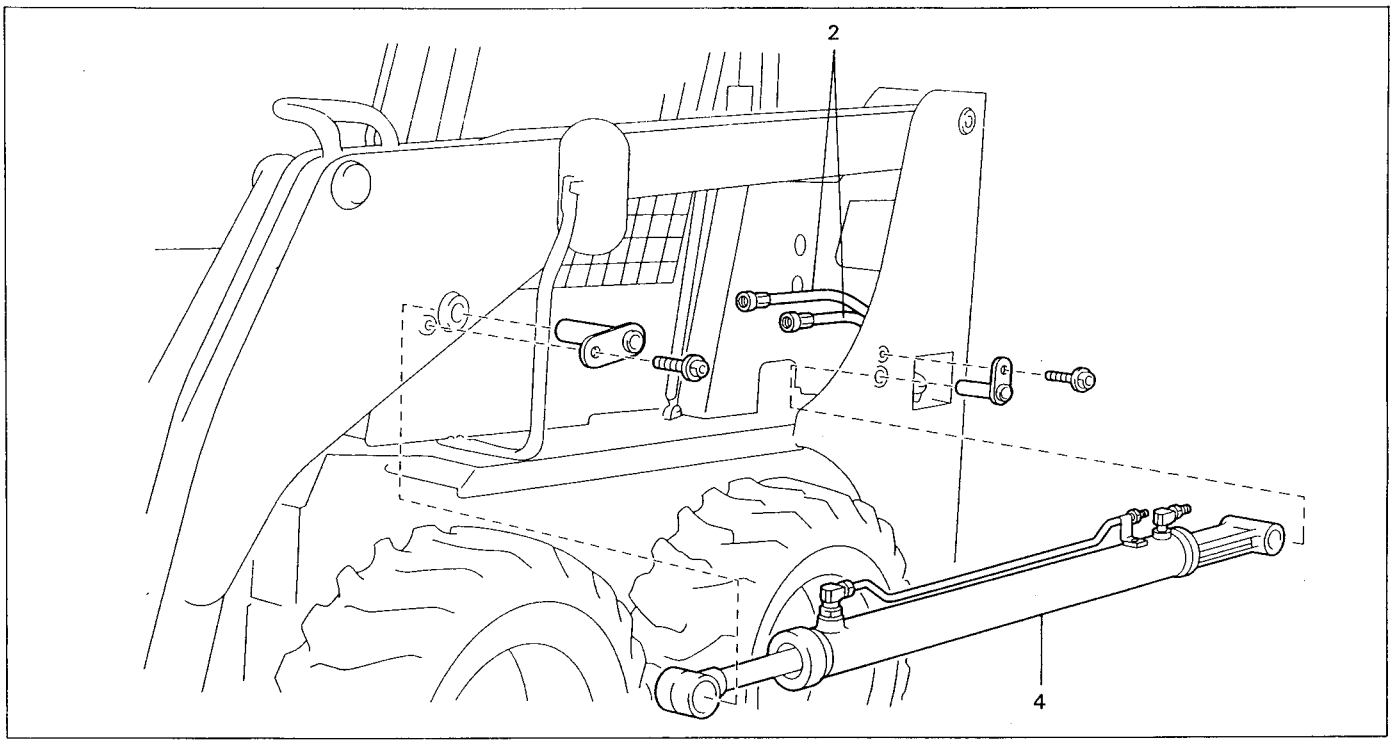


Dump Cylinder



LIFT CYLINDER

REMOVAL·INSTALLATION



Removal Procedure

1 Raise the lift arm to the position where the lift cylinder can be extracted.

2 Hoist the lift arm and support it with a wooden stand.

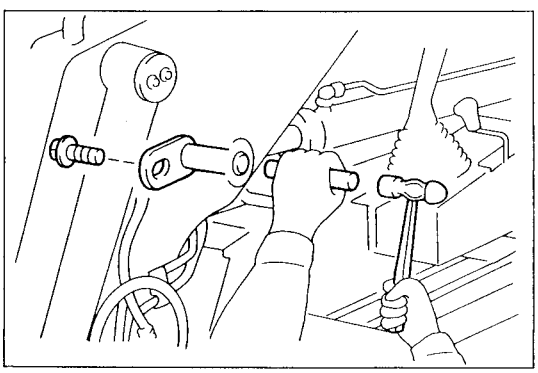
3 Disconnect two lift cylinder pipings.

4 Remove the lift cylinder. **[Point 1]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Notes:
- **Coat MP grease on the lift cylinder support pin and the mating hole.**
- **Repeat full stroke operation without load for air bleeding while checking normal functioning.**
- **Inspect the level of hydraulic oil and add it if insufficient.**
- **Bleed air from the hydraulic circuit. Refer to the "Air Bleeding from Hydraulic Piping and Hydraulic Circuit" section (on page 12-5) for the air bleeding procedure.**



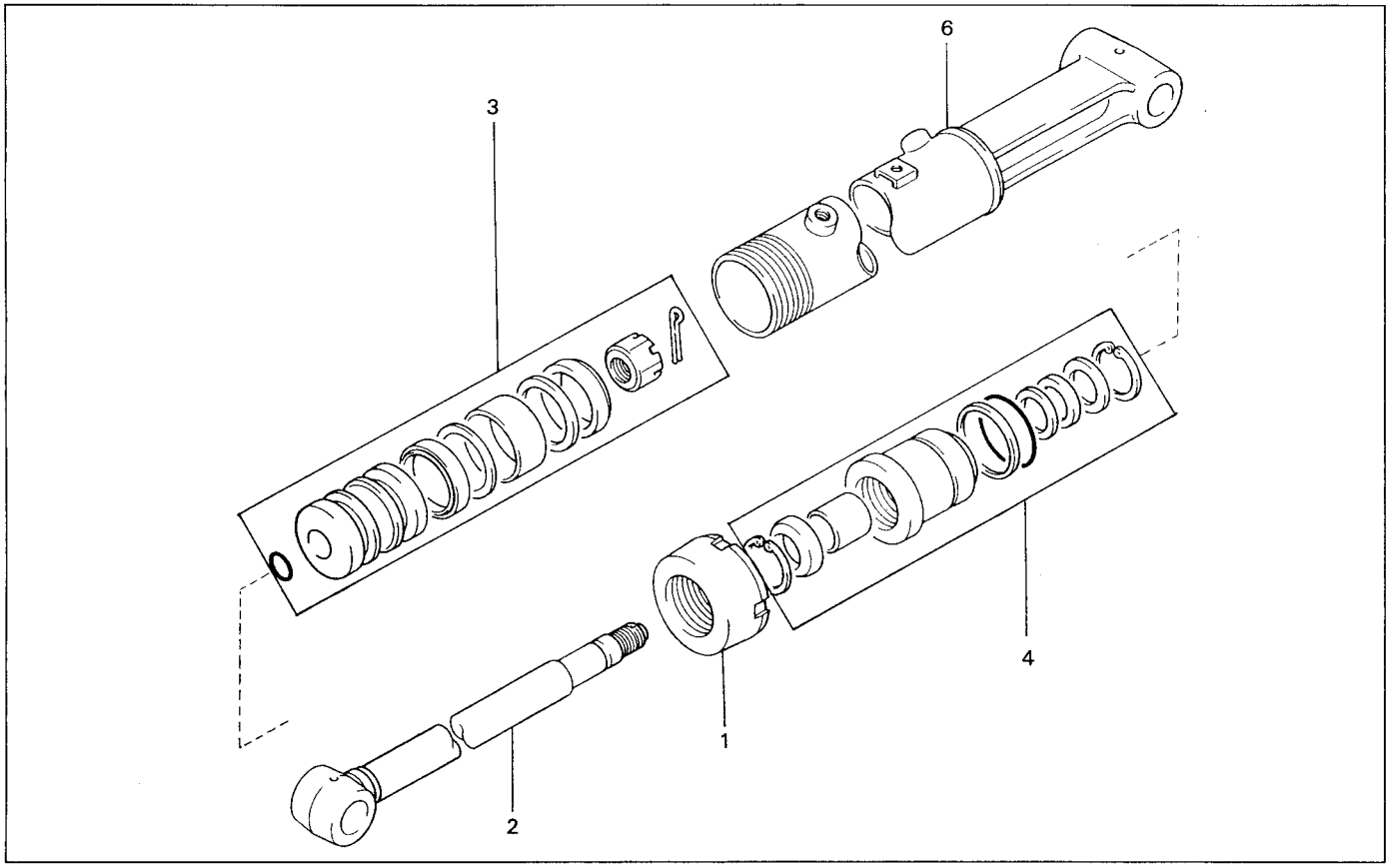
Point Operation

[Point 1]

Removal: Remove the stopper bolt, apply a brass bar on the cylinder support pin, and drive the pin out by tapping with a hammer.

DISASSEMBLY·INSPECTION·REASSEMBLY

Notes:
- **Oil will leak if the U packing or dust seal at the rod guide portion is defective.**
- **Natural drop will occur if the U packing at the piston portion is defective.**



Disassembly Procedure

1 Remove the cylinder cover. **[Point 1]**

2 Extract the piston rod W/piston.

3 Remove the piston from the piston rod. **[Point 2]**

4 Remove the rod guide. **[Point 3]**

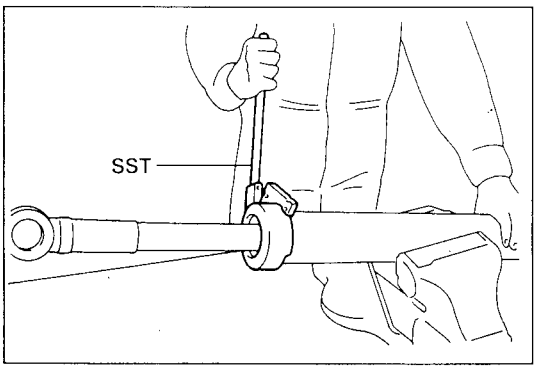
5 Remove the cylinder cover.

6 Inspect the lift cylinder. **[Point 4]**

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

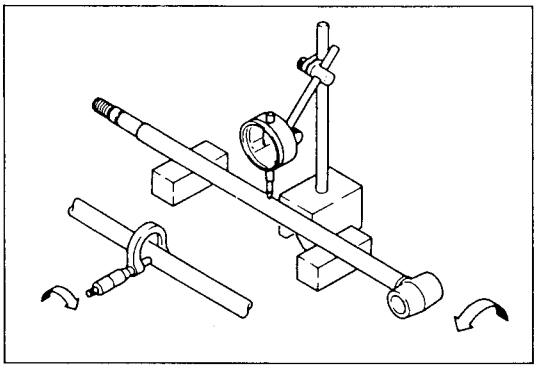
Notes:
- **Do not install dry parts but apply hydraulic oil before reassembly.**
- **Apply liquid packing 08833-76002-71 (08833-00080) on the threaded portion of the cylinder cover before tightening.**



Point Operations

[Point 1]

Disassembly·Reassembly: SST 09620-10100-71



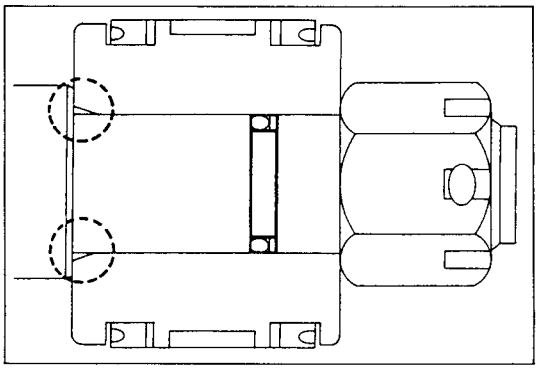
[Point 2]

Inspection: Measure the piston rod outside diameter.

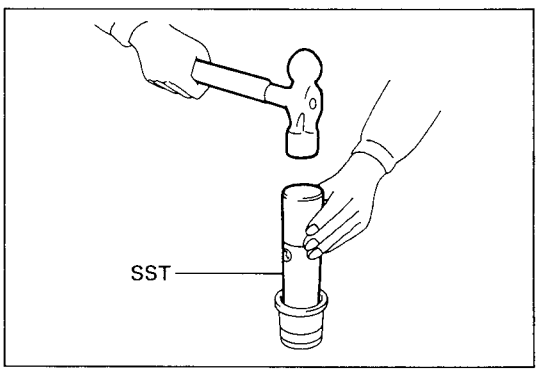
Piston rod outside diameter standard
4SDK5: 30.00 mm (1.181 in)
4SDK6/4SDK8: 35.00 mm (1.378 in)
Piston rod outside diameter wear limit
4SDK5: 29.92 mm (1.178 in)
4SDK6/4SDK8: 34.92 mm (1.375 in)

Inspection: Measure the piston rod bend.

Piston rod bend limit: 1.0 mm (0.039 in)

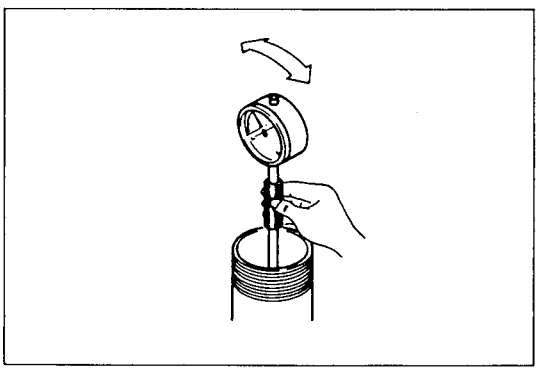


Reassembly: Pay attention to the backup ring and piston mounting directions.



[Point 3]

Reassembly: SST 09608-76005-71
(SST 09608-06041)



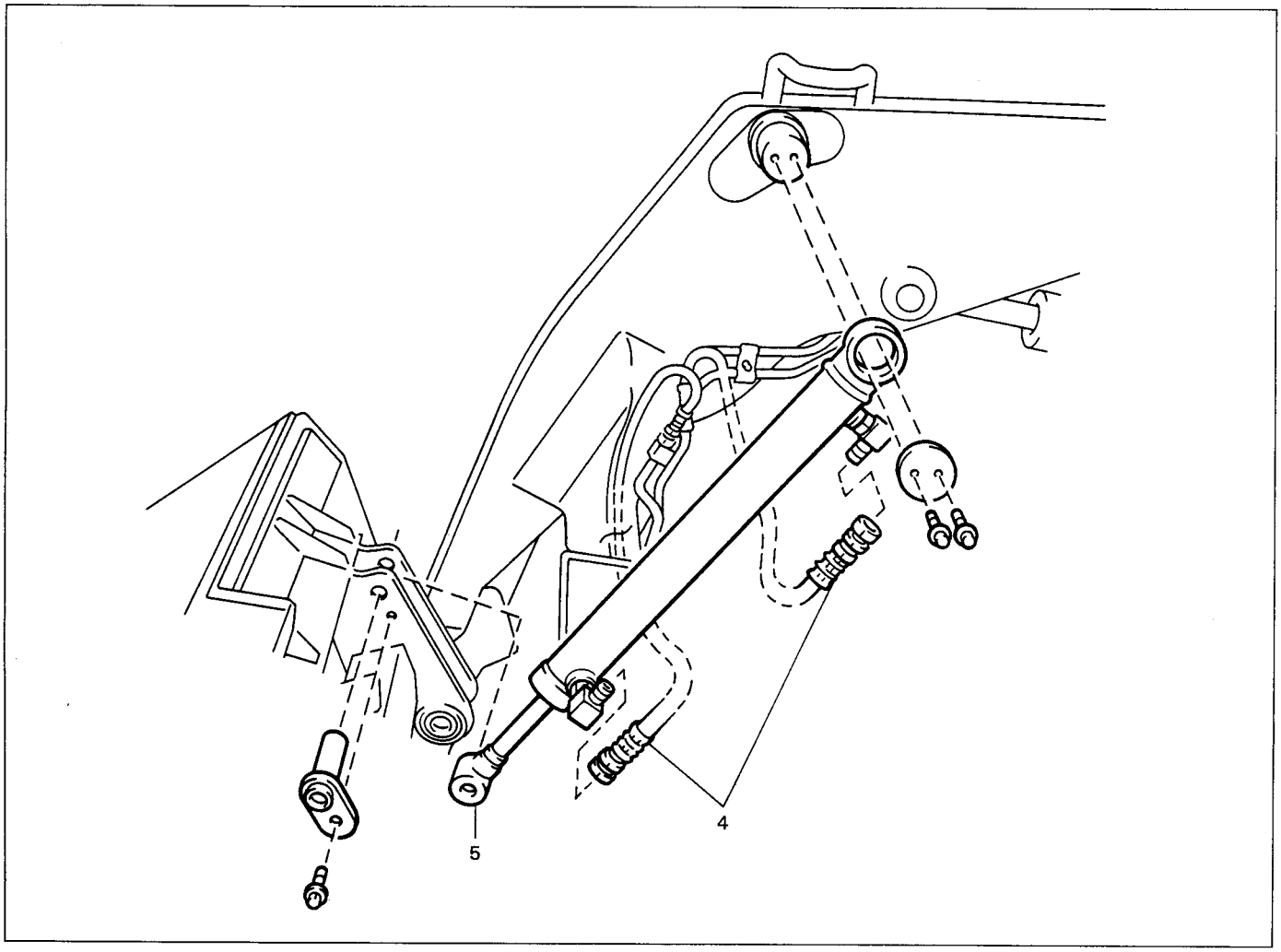
[Point 4]

Inspection: Measure the cylinder bore.

Cylinder bore standard
4SDK5: 55.00 mm (2.17 in)
4SDK6/4SDK8: 60.00 mm (2.36 in)
Cylinder bore wear limit
4SDK5: 55.35 mm (2.18 in)
4SDK6/4SDK8: 60.35 mm (2.38 in)

DUMP CYLINDER

REMOVAL·INSTALLATION



Removal Procedure

1 Lower the lift arm fully until the bucket comes into contact with the ground.

2 Remove the bucket. (See page 8-6.)

3 Bring the bucket bracket into contact with the ground.

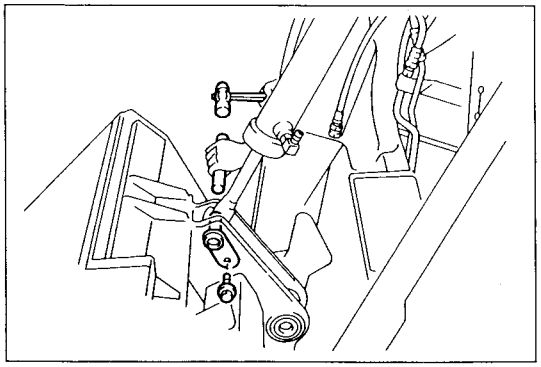
4 Disconnect two dump cylinder pipings.

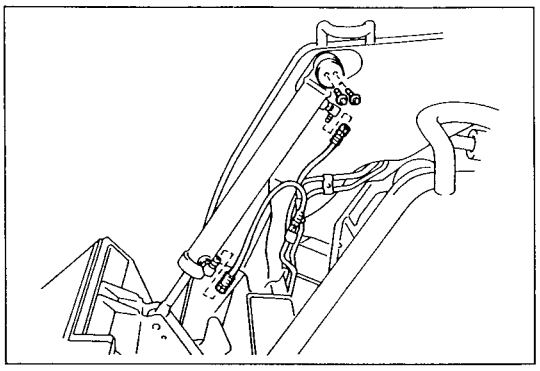
5 Remove the dump cylinder. **[Point 1]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Notes:
- **Coat MP grease on the lift cylinder support pin and the mating hole.**
- **Repeat full stroke operation without load for air bleeding while checking normal functioning.**
- **Inspect the level of hydraulic oil and add it if insufficient.**
- **Bleed air from the hydraulic circuit. Refer to the "Air Bleeding from Hydraulic Piping and Hydraulic Circuit" section (on page 12-5) for the air bleeding procedure.**





Point Operation

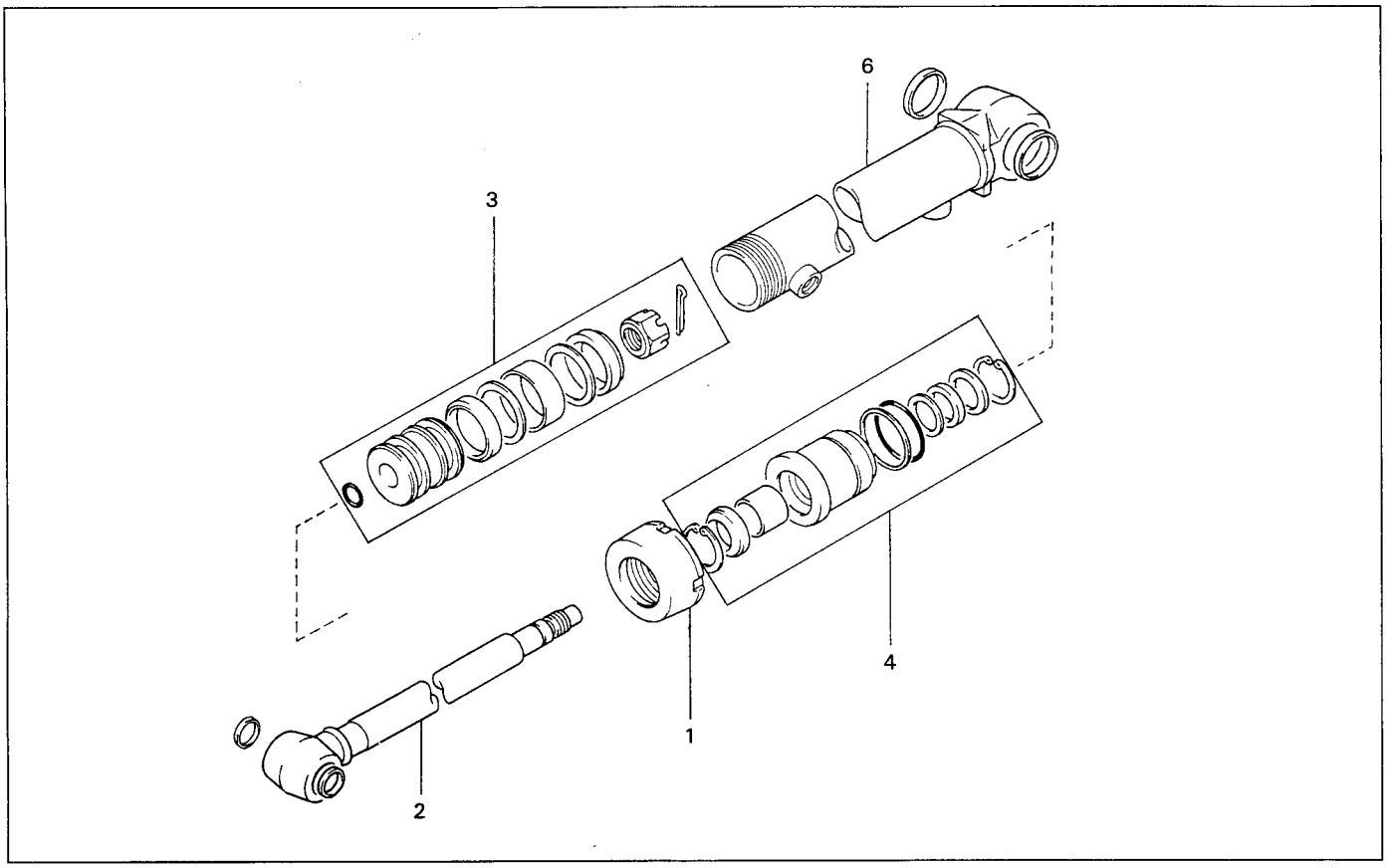
[Point 1]

Removal: Dump cylinder removal from the vehicle

1. Remove the stopper bolt.
2. Apply a brass bar on the dump cylinder on the dump cylinder rod pin, and drive the pin out by tapping with a hammer.
3. Remove the stopper bolts and stopper.
4. Remove the dump cylinder.

DISASSEMBLY·INSPECTION·REASSEMBLY

Notes:
- **Oil will leak if the U packing or dust seal at the rod guide portion is defective.**
- **Natural drop will occur if the U packing at the piston portion is defective.**



Disassembly Procedure

1 Remove the cylinder cover. **[Point 1]**

2 Extract the piston rod W/piston.

3 Remove the piston from the piston rod. **[Point 2]**

4 Remove the rot guide. **[Point 3]**

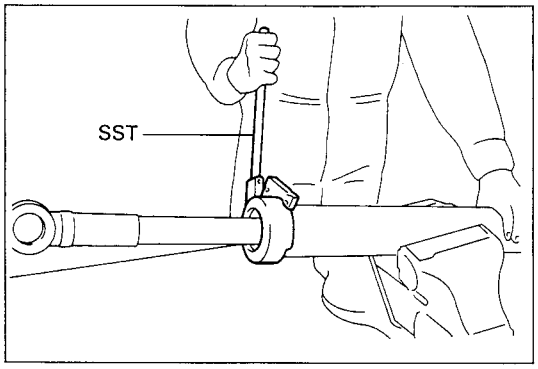
5 Remove the cylinder cover.

6 Inspect the lift cylinder. **[Point 4]**

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

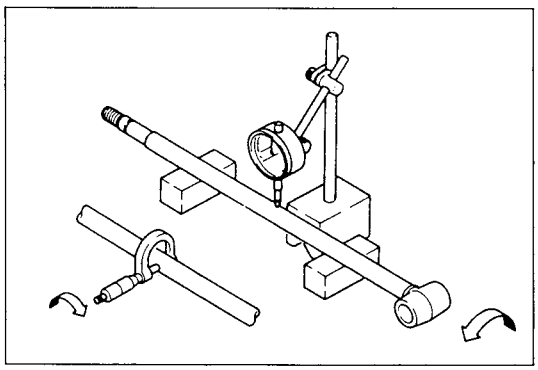
Notes:
- **Do not install dry parts but apply hydraulic oil before reassembly.**
- **Apply liquid packing 08833-76002-71 (08833-00080) on the threaded portion of the cylinder cover before tightening.**



Point Operations

[Point 1]

Disassembly·Reassembly: SST 09620-10100-71



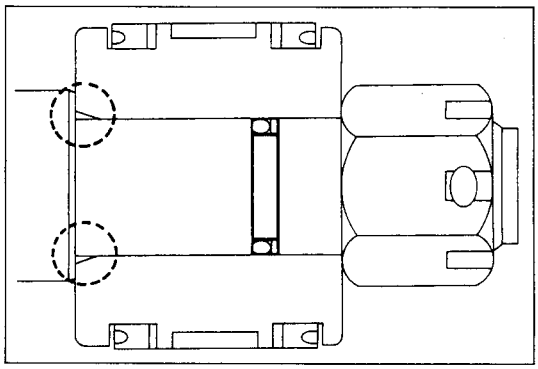
[Point 2]

Inspection: Measure the piston rod outside diameter.

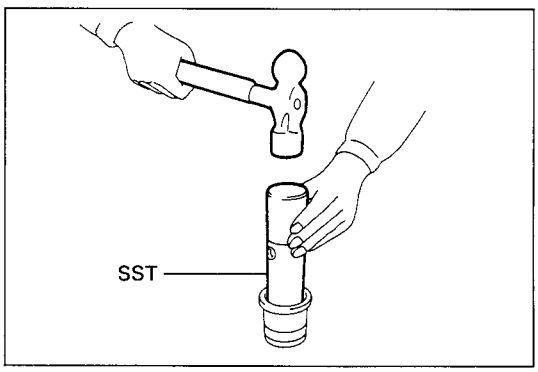
Piston rod outside diameter standard:
30.00 mm (1.181 in)
Piston rod outside diameter wear limit:
29.92 mm (1.178 in)

Inspection: Measure the piston rod bend.

Piston rod bend limit: 1.0 mm (0.039 in)

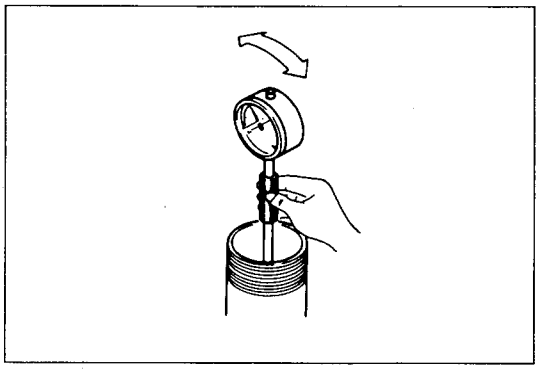


Reassembly: Pay attention to the backup ring and piston mounting directions.



[Point 3]

Reassembly: SST 09608-76005-71
(SST 09608-06041)



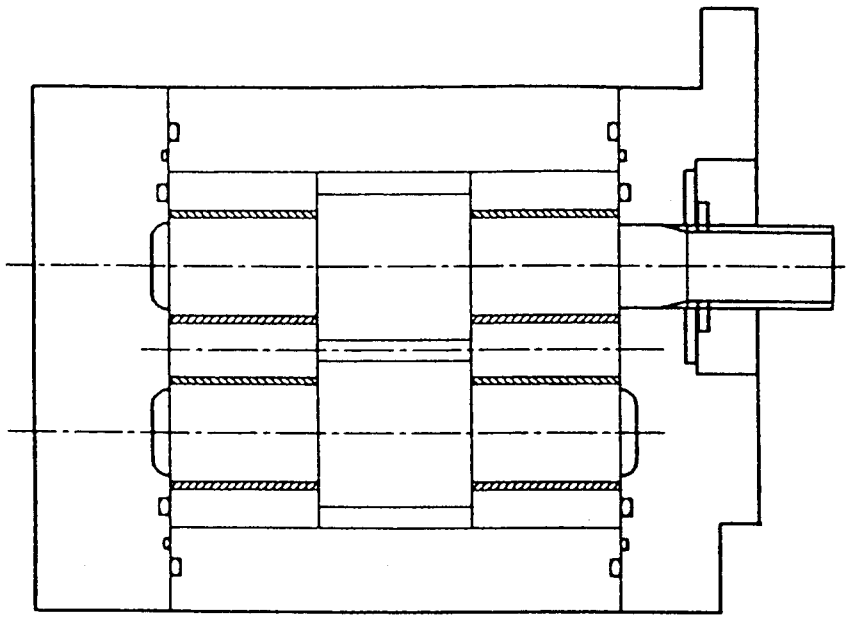
[Point 4]

Inspection: Measure the cylinder bore.

Cylinder bore standard
4SDK5: 55.00 mm (2.17 in)
4SDK6/4SDK8: 60.00 mm (2.36 in)
Cylinder bore wear limit
4SDK5: 55.35 mm (2.18 in)
4SDK6/4SDK8: 60.35 mm (2.38 in)

OIL PUMP

GENERAL

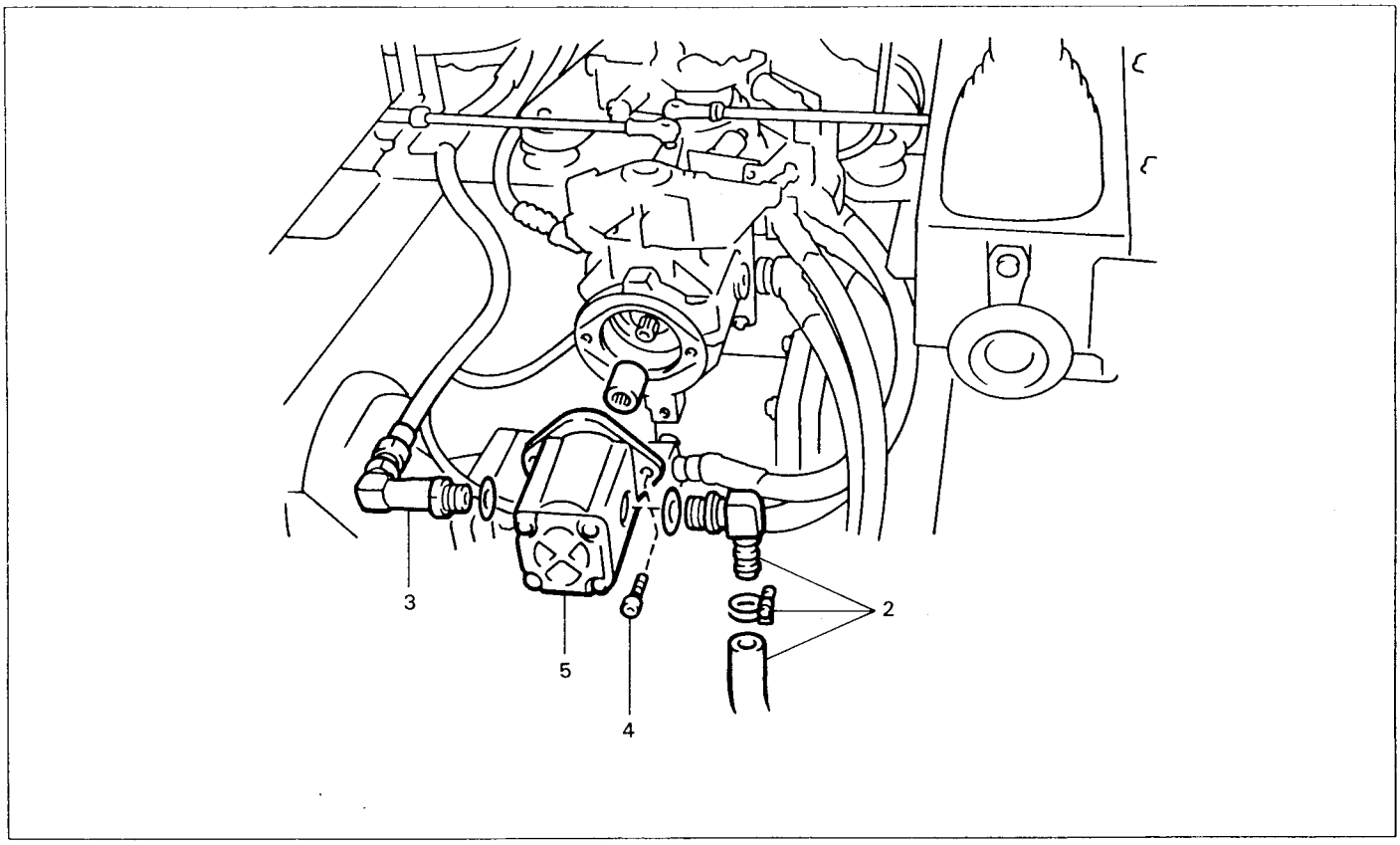


SPECIFICATIONS

Item		Gear pump
Pump type		Gear type
Drive method		HST pump drive
Discharge volume	cc/rev	4SDK5: 20.5 4SDK6·8: 25.7
Discharge volume	(pump at 1500 rpm) l/min (US gal/min)	4SDK5: 29.8 (7.87) 4SDK6·8: 37.4 (9.87)
Revolving speed ratio to engine speed		1.0

OIL PUMP ASSY

REMOVAL·INSTALLATION



Removal Procedure

1 Drain hydraulic oil from the oil tank.

2 Disconnect the high pressure hose.

3 Disconnect the inlet hose.

4 Remove the oil pump set bolts.

5 Remove the oil pump ASSY.

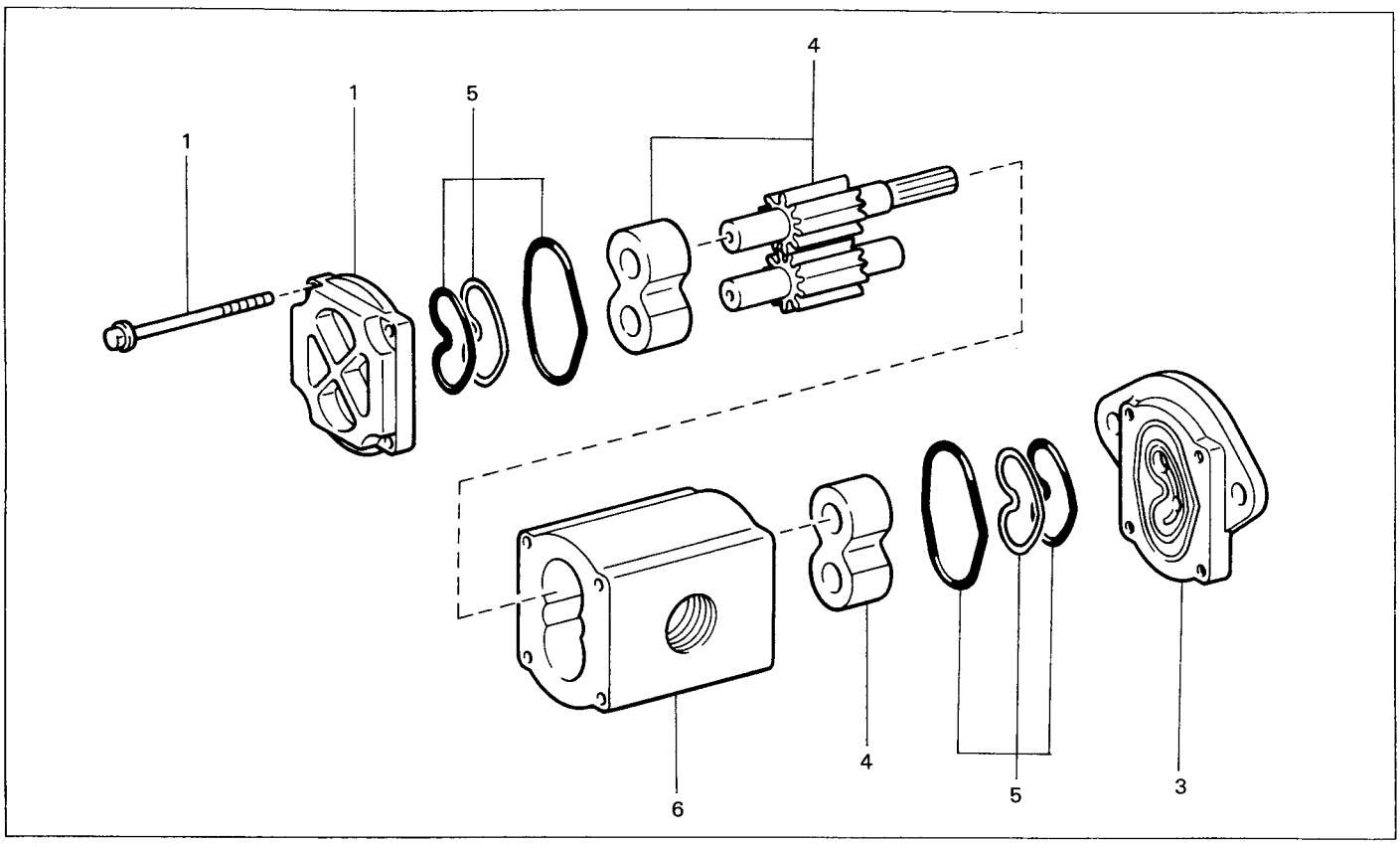
Installation Procedure

The installation procedure is the reverse of the removal procedure.

Notes:
- **Apply grease (molybdenum disulfide grease) on the pump spline portion before installation.**
- **Clean the fitting mounting portion thoroughly to prevent damage to the O-ring.**

DISASSEMBLY·INSPECTION·REASSEMBLY

T = N·m (kg-cm) [ft-lb]



Disassembly Procedure

1 Remove the cover. **[Point 1]**

2 Remove the snap ring.

3 Remove the mounting flange. **[Point 1]**

4 Remove the gear and bushing set. **[Point 2] [Point 3]**

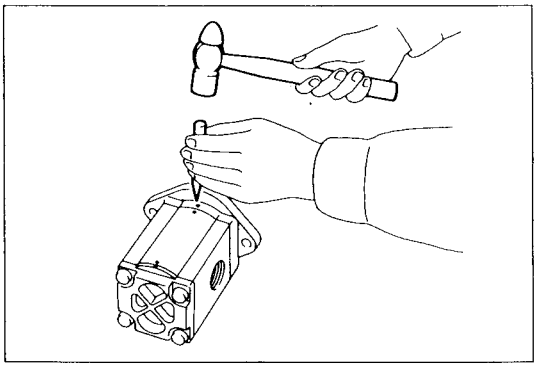
5 Remove the body seal, packing ring and bush seal.

6 Inspect the body inner face contact. **[Point 4]**

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

Notes:
- **Wash each part, blow with compressed air and apply hydraulic oil before reassembly.**
- **Use new seals for reassembly.**

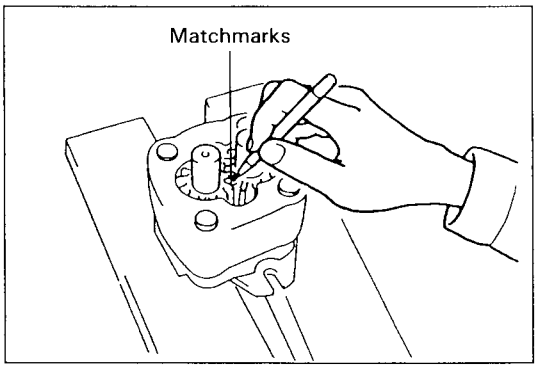


Point Operations

[Point 1]

Disassembly: Put a match mark.

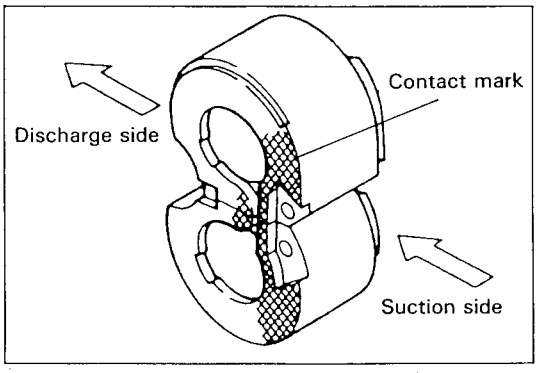
Reassembly: Align the match marks for reassembly.



[Point 2]

Disassembly: Put a match mark on the surfaces of drive and driven gear teeth. Do not use a punch that damages the surface.

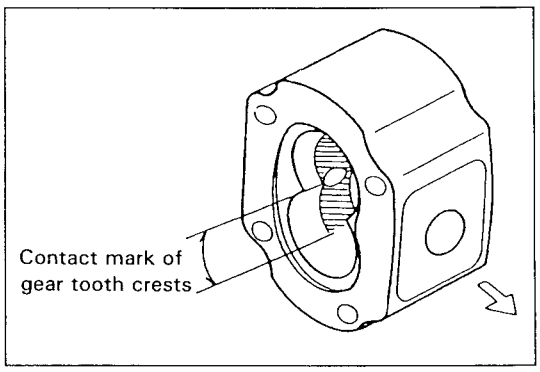
Reassembly: Align the match marks for reassembly.



[Point 3]

Inspection: Inspect the bushing contact.

Inner sliding contact face
Normal: Glossy at about half of the suction side
Side surface contact
Normal: Contact trace on whole area



[Point 4]

Inspection: Inspect the body inner face contact on the suction side.

Limit: Contact trace exceeding half of the circumference

TEST METHOD

Note:
A bench test is necessary for strict testing. For actual service work, install the oil pump on the vehicle and judge appropriateness of the oil pump delivery by means of the cylinder lifting speed.

1. Set an oil pressure gauge (0 to 250 kg/cm^2) on the oil control valve.
2. Set an engine tachometer.
3. Start the engine.
4. With the oil control valve pedal in the neutral position, run the engine at 800 to 1000 rpm for 10 minutes.
5. If no oil pump abnormality is detected, run the engine further at 1500 to 2000 rpm for 10 minutes.

Note:
If any abnormality is detected in step 4 or 5 above, immediately stop the engine and disassemble the oil pump again.

6. Check to see if the oil control valve relief set pressure is as specified. See the "Oil Control Valve Relief Pressure Adjustment" section for details.
7. Check if the engine speed is as specified.

   See the "Engine-Engine Tune-up" section for details.
8. Judge the oil pump delivery quality on the engine side by means of the lift cylinder lifting time.

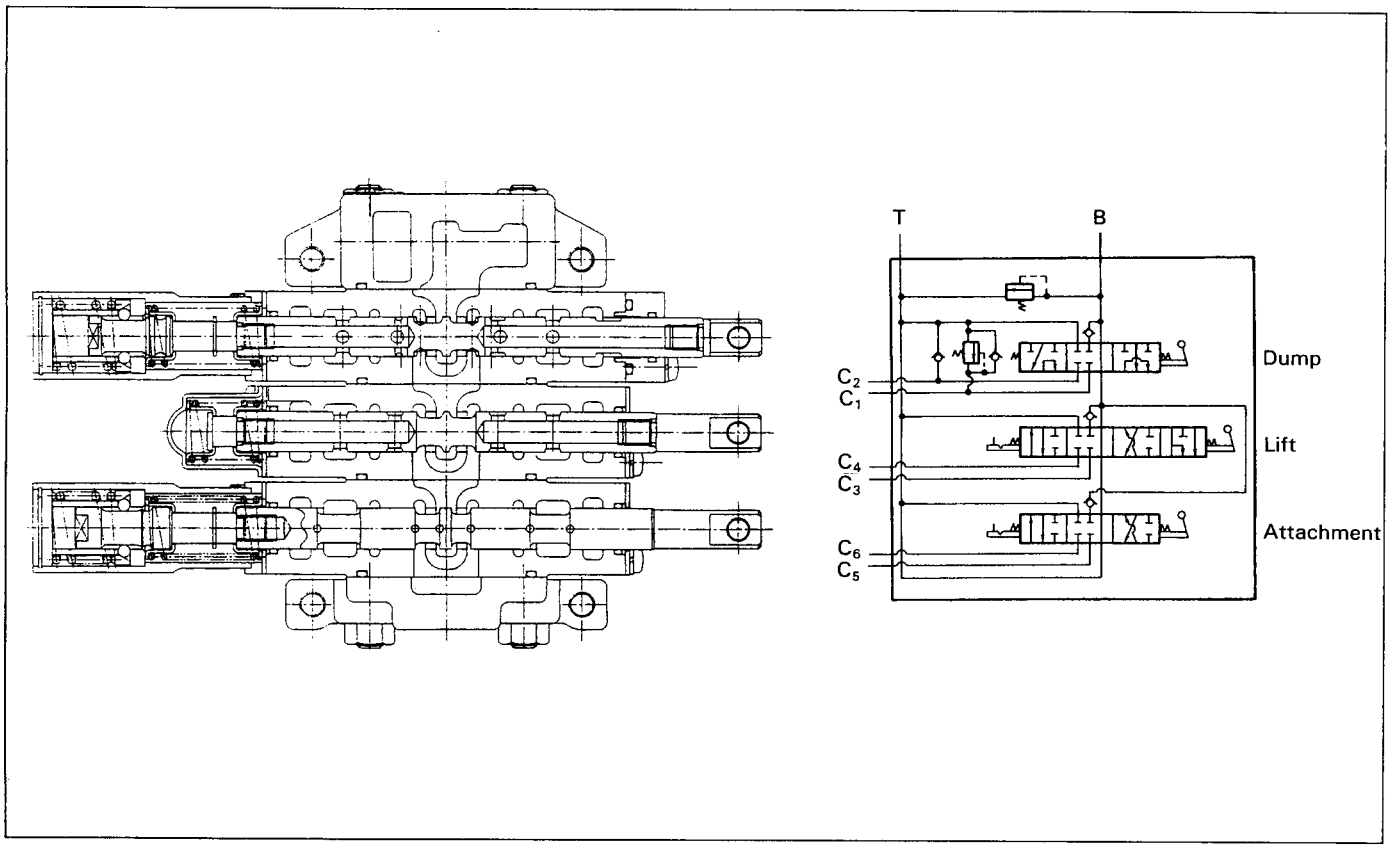
   - Measure the lift cylinder full-stroke operation time at the maximum engine speed when the hydraulic oil temperature is between 45 (122°F) and 55°C (131°F).

     Lifting time (no-load): 4 seconds

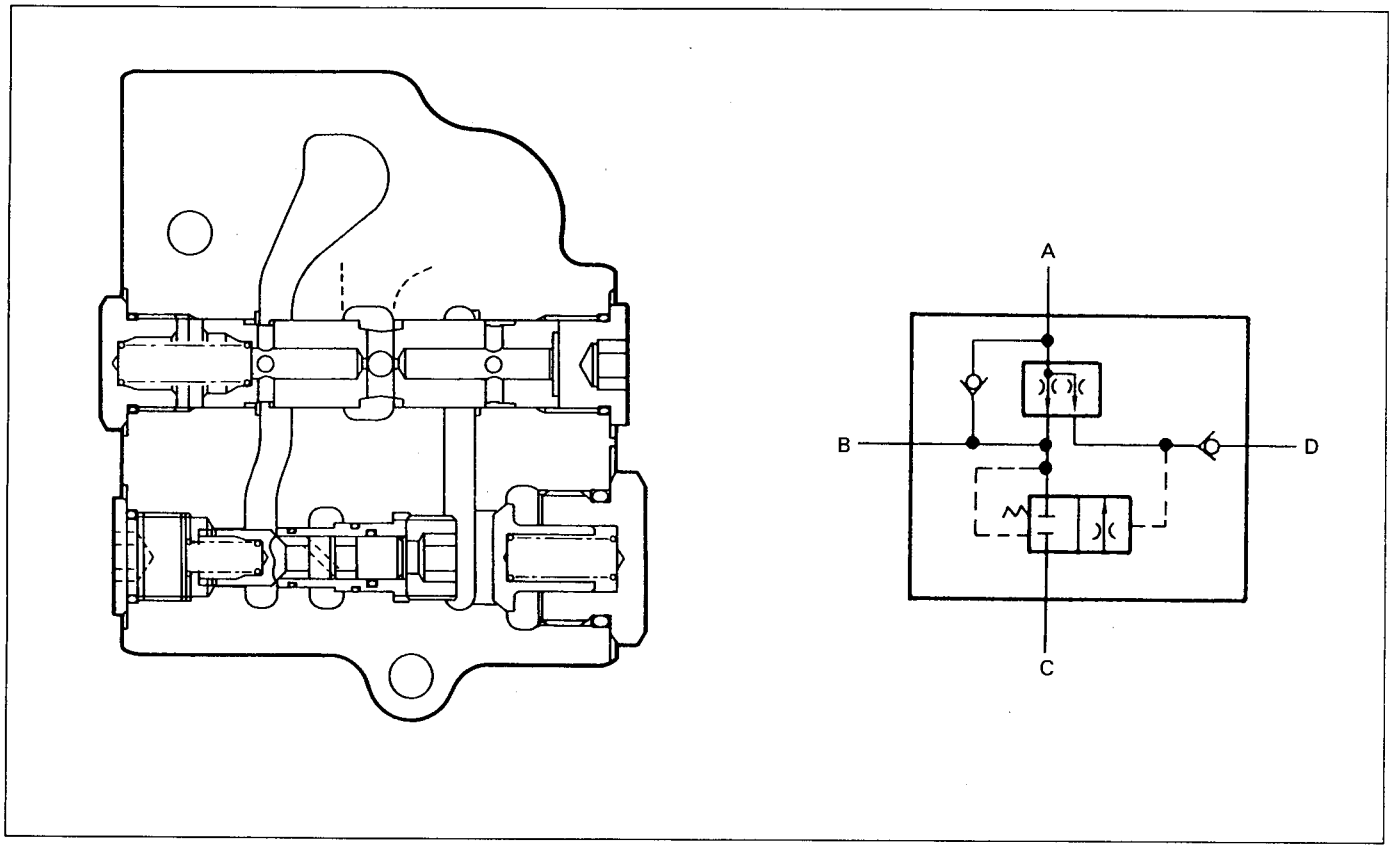
OIL CONTROL VALVE

GENERAL

Oil Control Valve

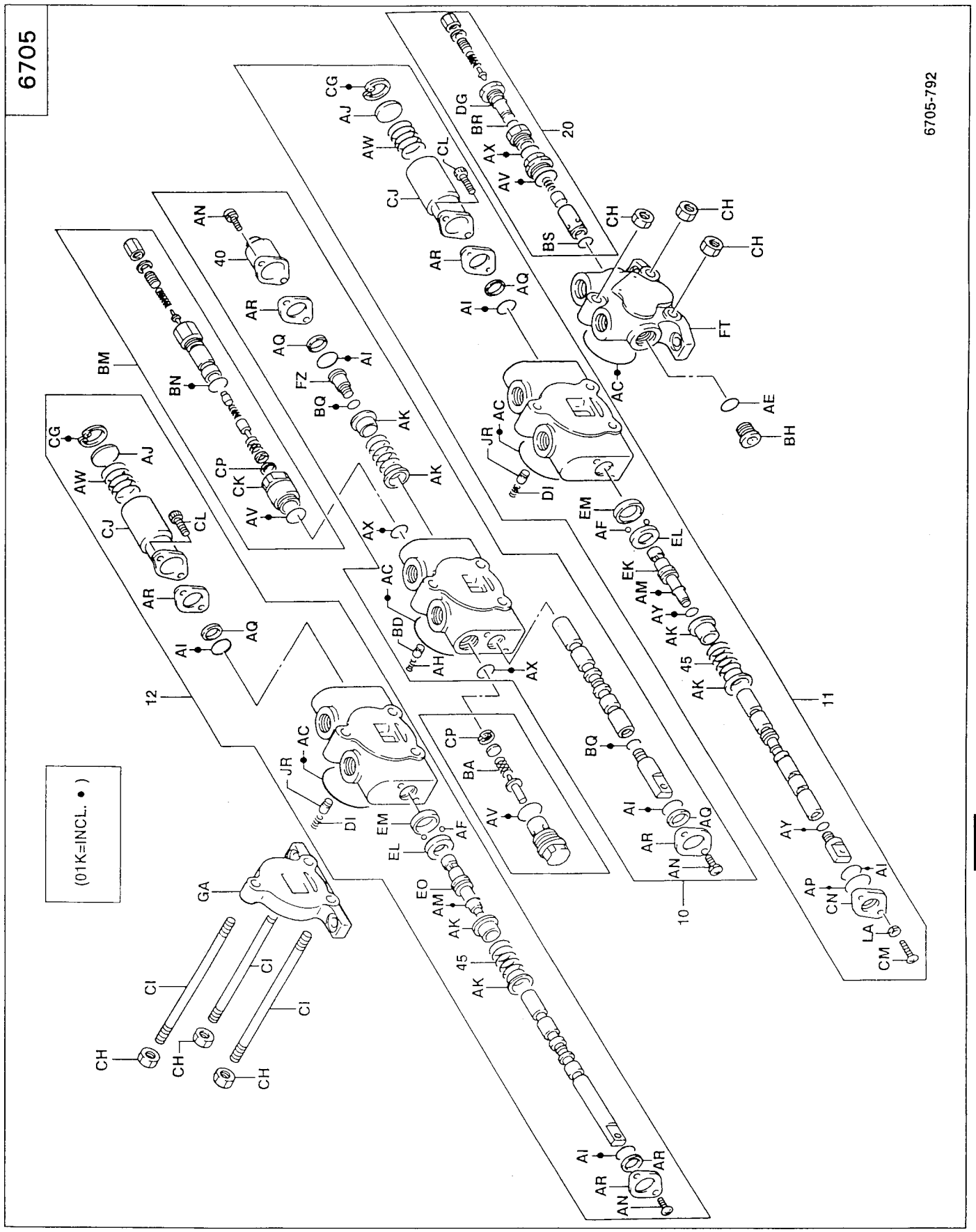


Self-Leveling Valve

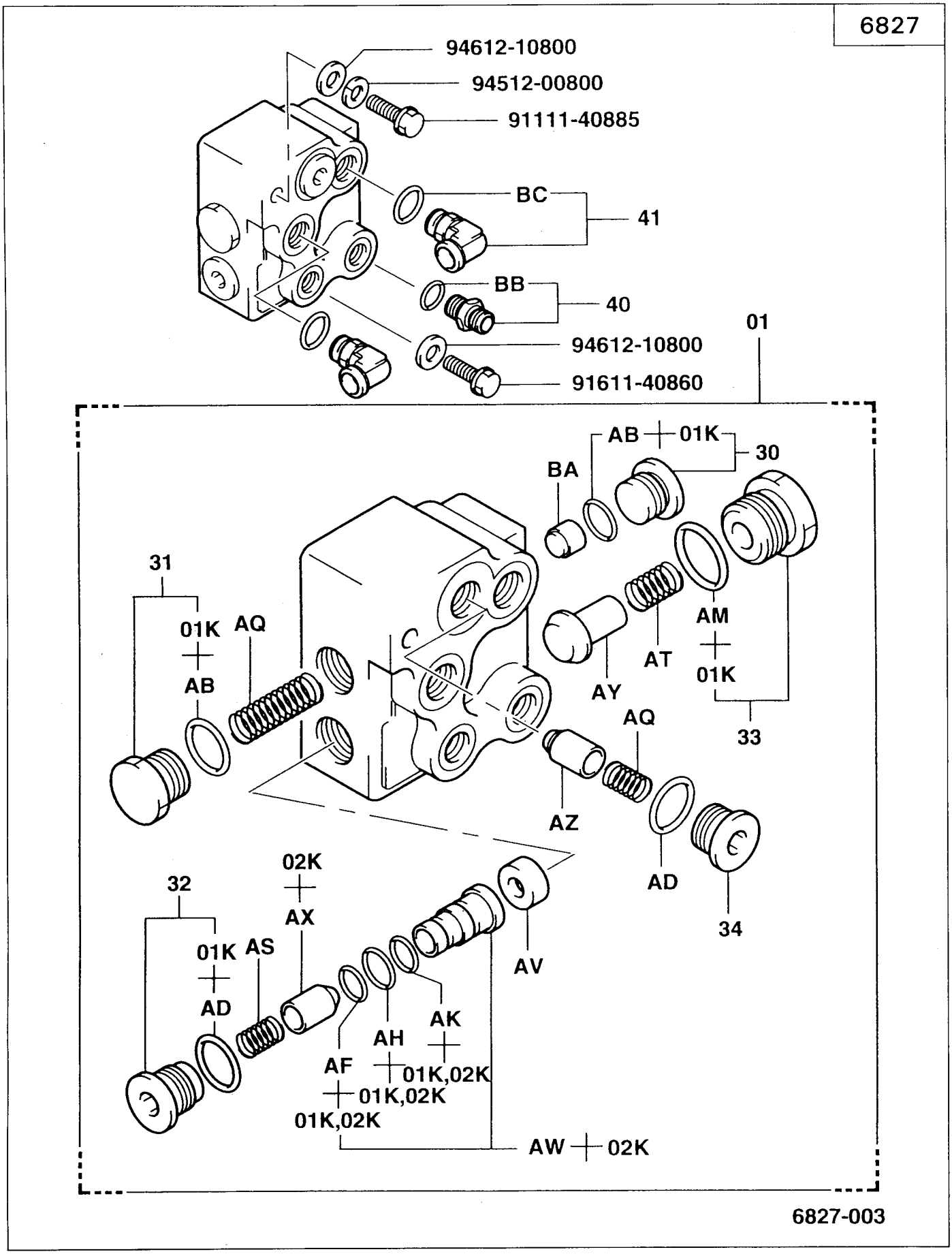


COMPONENTS

Oil control valve

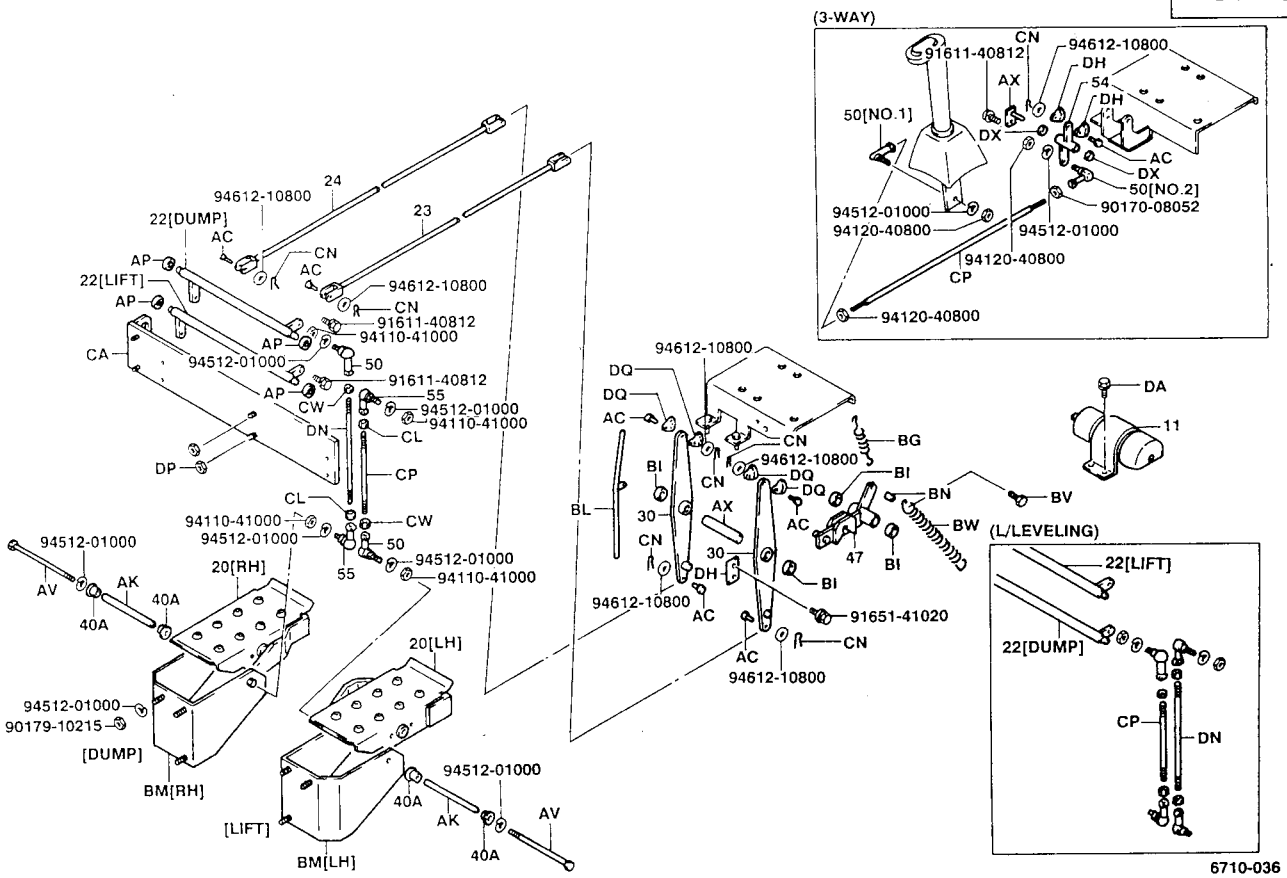


Self leveling valve



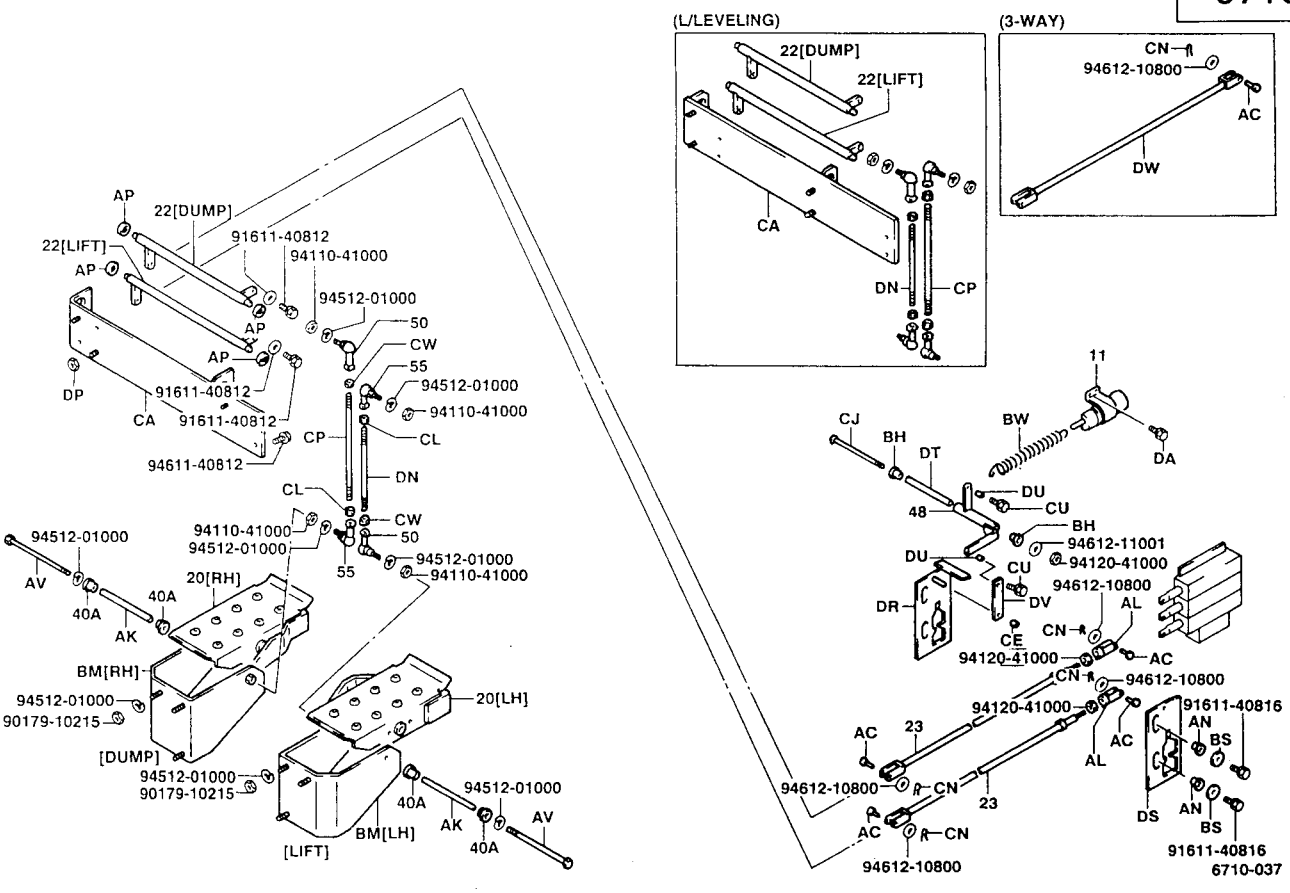
4SDK5

6710



4SDK6·8

6710

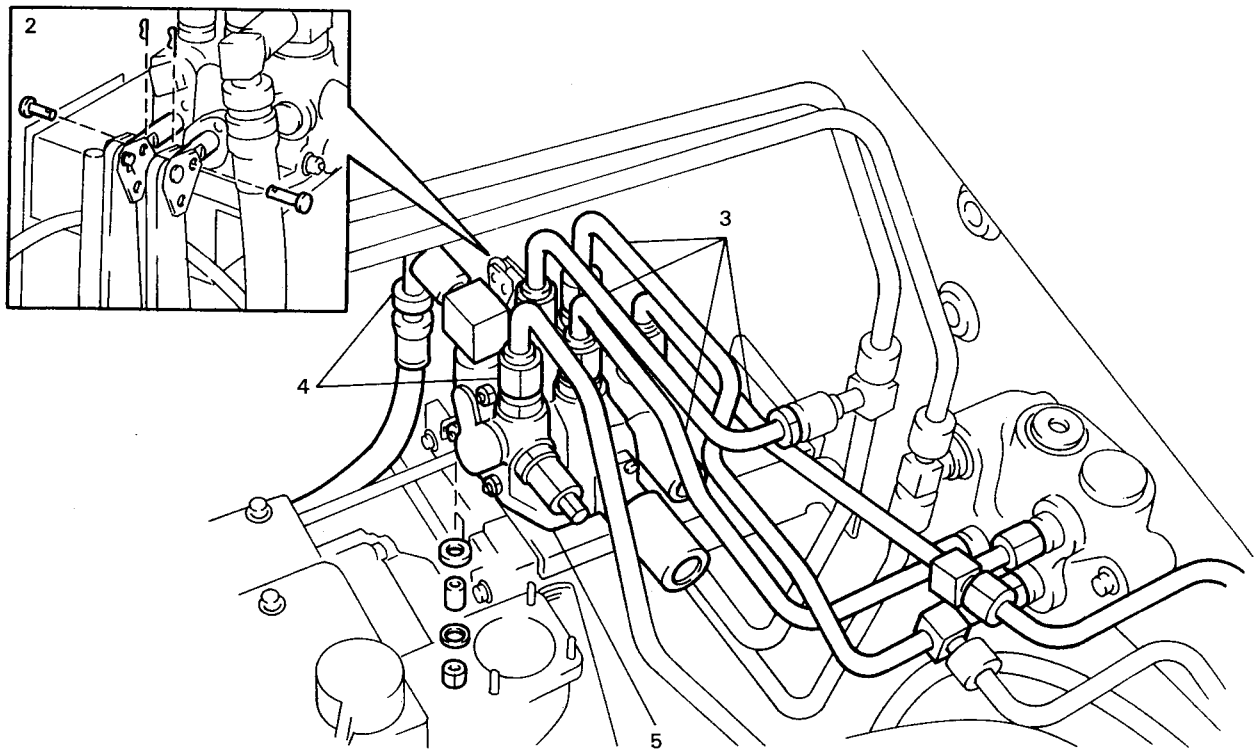


OIL CONTROL VALVE

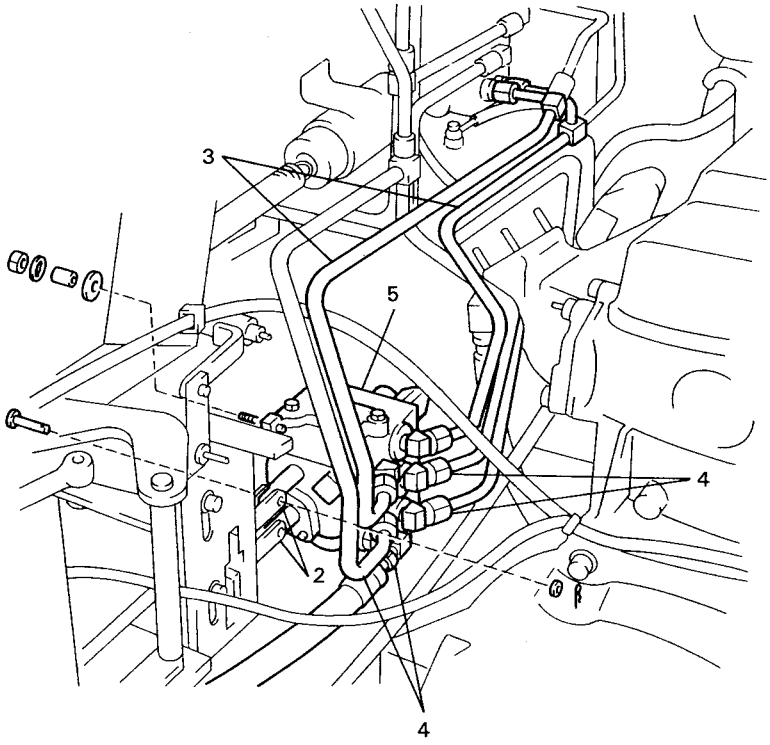
REMOVAL·INSTALLATION

Note:
Prevent dust entrance by covering each pipe joint with a nylon cap.

4SDK5



4SDK6·8



Removal Procedure

1 Remove the muffler. (See page 1-17.)

2 Disconnect the oil control valve link.

3 Remove the hydraulic piping.

4 Disconnect the hydraulic piping.

5 Remove the oil control valve.

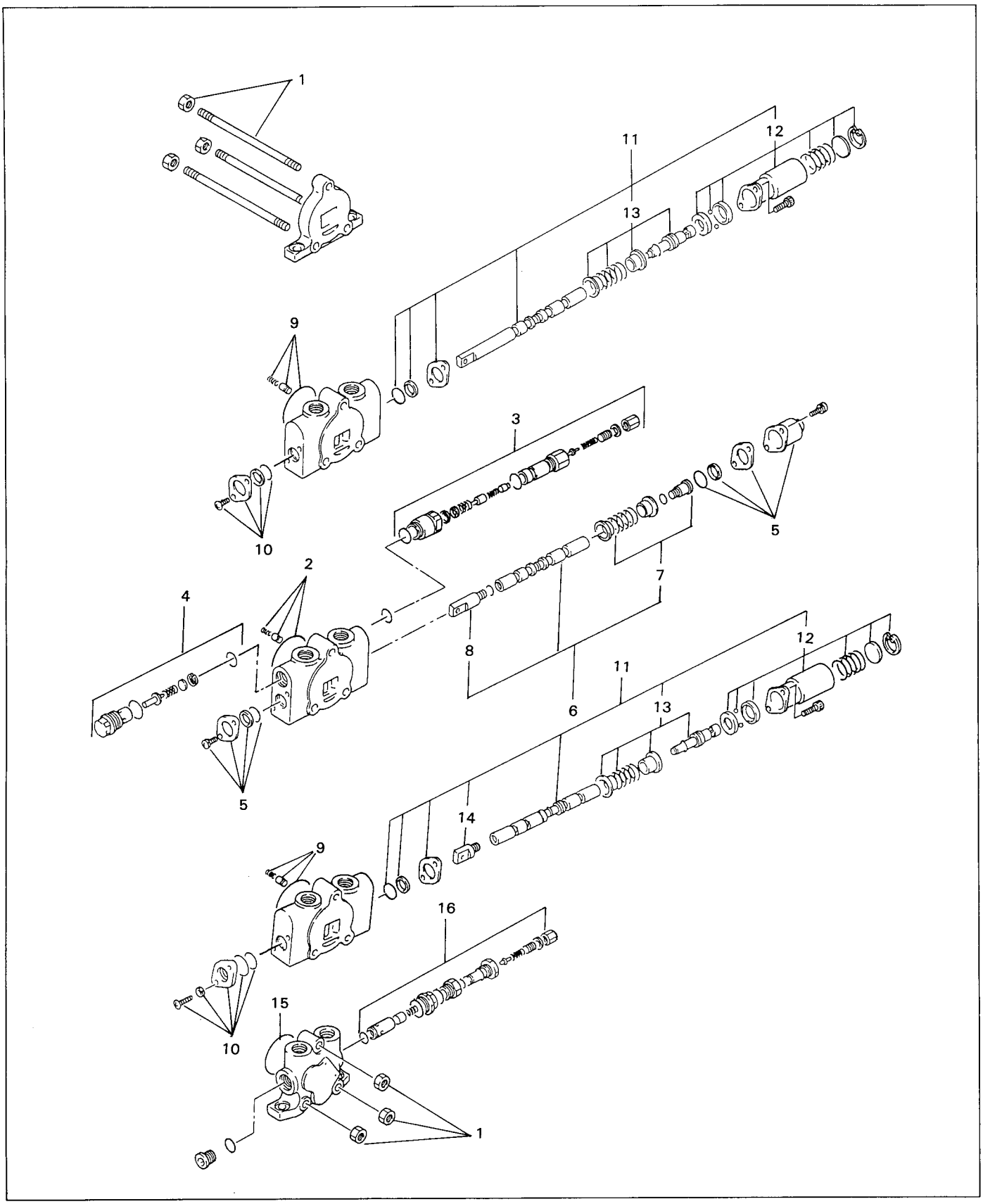
6 Remove the fitting.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

DISASSEMBLY·INSPECTION·REASSEMBLY

Notes:
- **Select a clean location for operation.**
- **As each part is finished with high precision, carefully prevent any damage.**



Disassembly Procedure

1 Remove the valve tie rod, and disassemble into the outlet housing, dump plunger, lift plunger and inlet housing sections.

[Dump plunger disassembly]

2 Remove the spring, poppet and O-ring.

3 Remove the port relief valve.

4 Remove the anti-void valve.

5 Remove the seal plate and cap

6 Remove the dump plunger.

7 Remove the cap screw, spring seat and spring. **[Point 1]**

8 Remove the plunger head. **[Point 2]**

[Lift plunger disassembly]

9 Remove the spring, poppet and O-ring.

10 Remove the seal plate.

11 Remove the float detent case set bolt, and remove the lift plunger W/detent case.

12 Remove the float detent case. **[Point 3]**

13 Remove the detent pin, spring seat and spring. **[Point 4]**

14 Remove the plunger head. **[Point 2]**

[Inlet housing disassembly]

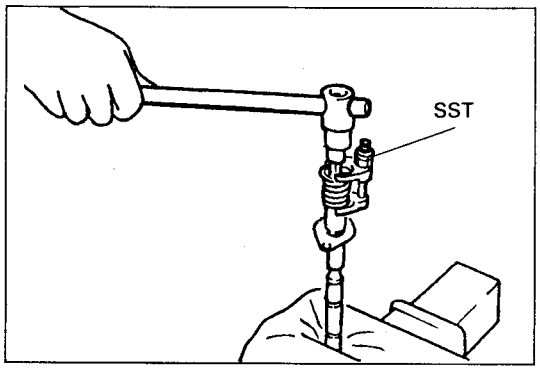
15 Remove the O-ring.

16 Remove the main relief valve.

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

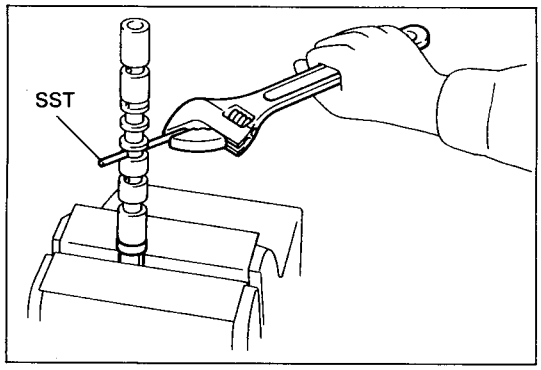
Notes:
- **Wash each part thoroughly, blow with compressed air and coat hydraulic oil before reassembly.**
- **Fully loosen the relief valve adjusting screw before reassembly.**



Point Operations

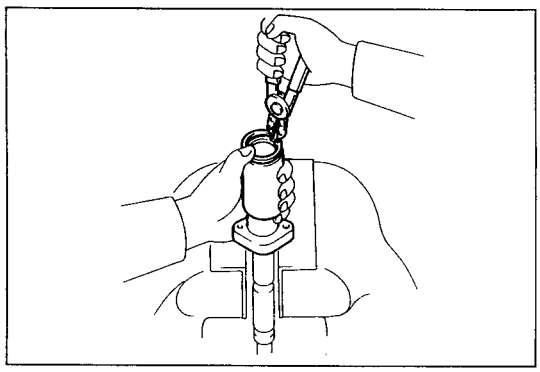
[Point 1]

Disassembly·Reassembly: SST 09610-10161-71



[Point 2]

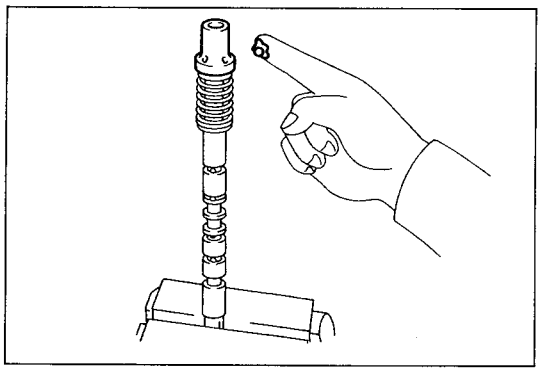
Disassembly·Reassembly: Fix the plunger head in a vise, and remove the plunger head with the SST.
SST 09700-30200-71



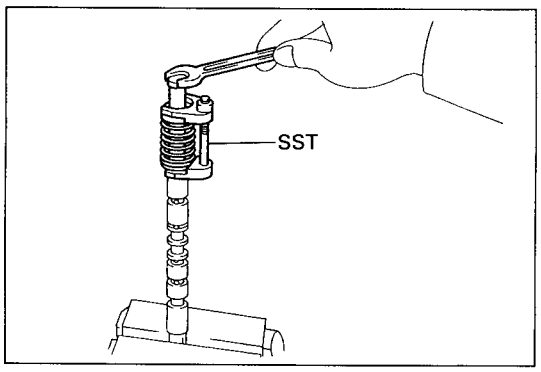
[Point 3]

Disassembly·Reassembly: Remove or install the snap ring while holding the float detent case and spacer.

Reassembly: The float detent case shall not be freed after reassembly.



Reassembly: Coat grease on the steel ball to prevent it from falling.



[Point 4]

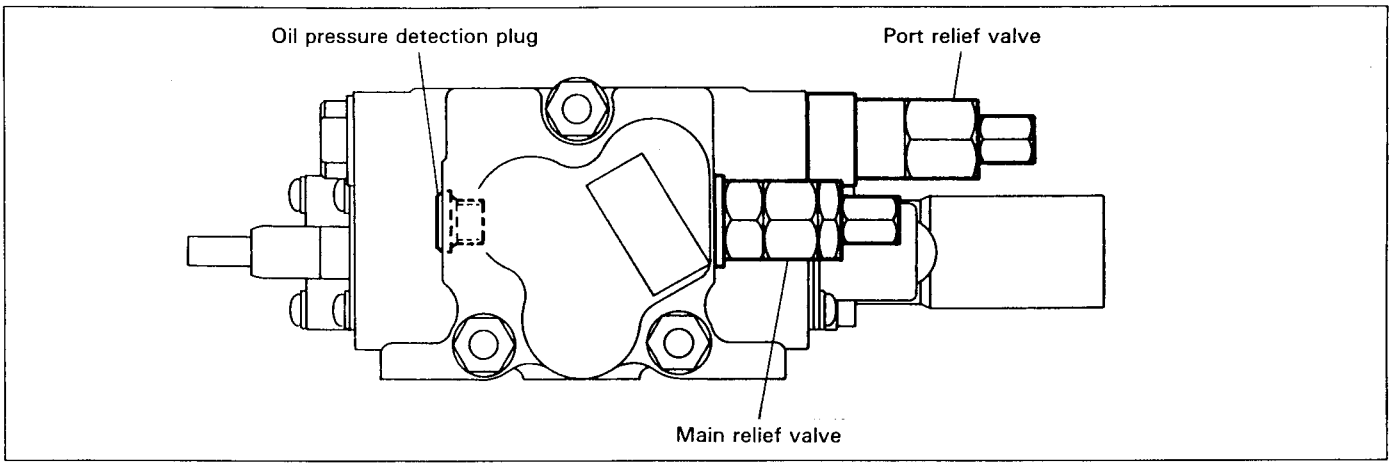
Removal·Installation: SST 09610-10161-71

RELIEF PRESSURE ADJUSTMENT

Note:
Adjust the relief valve according to the procedure shown below after it is disassembled. Defective pressure adjustment from careless operation may cause damage to hydraulic units such as the oil pump. No adjustment is needed if the relief valve was not disassembled or replaced with a new one.

1. Remove the pressure check port plug (PT9/16-18UNF-2B) on one side of the oil control valve, and install a pressure gauge.

2. Start and warm up the engine until the hydraulic oil temperature rises to 50 to 55°C (122 to 131°F) while checking no oil leak or abnormal sound.



3. Main relief pressure adjustment
   (1) Loosen the main relief valve lock nut.
   (2) Operate the lift pedal for up or down, and increase the engine speed while reading the oil pressure gauge.
   (3) While depressing the pedal for either the highest or lowest position, increase the engine speed gradually to the maximum level. Adjust the oil pressure then (relief set pressure) to the standard level by gradually turning the adjusting screw.

   Clockwise turn: Increase the pressure
   Counterclockwise turn: Decrease the pressure

Notes:
- **See that the no-load maximum pressure is as specified. (See the "Engine-Engine Tune-up" section)**
- **If the specified pressure is exceeded, return the pedal immediately to the neutral position.**

4. Port relief pressure adjustment
   (1) Loosen the port relief valve lock nut.
   (2) Depress the dump pedal forward (for bucket forward tilt), and raise the engine speed while observing the oil pressure gauge.
   (3) While depressing the pedal, run the engine at the maximum speed, and turn the adjusting screw until the oil pressure then (relief set pressure) satisfies the standard.

   Clockwise turn: Increase the pressure
   Counterclockwise turn: Decrease the pressure

Notes:
- **Check to see if the no-load maximum speed satisfies the standard. (See the "Engine- Engine Tune-up" section)**
- **If the standard is exceeded, immediately return the pedal to the neutral position.**

5. Lock the adjusting screw by the lock nut after oil pressure adjustment.

6. Remove the oil pressure gauge, and install the pressure check port plug after wrapping it with seal tape.

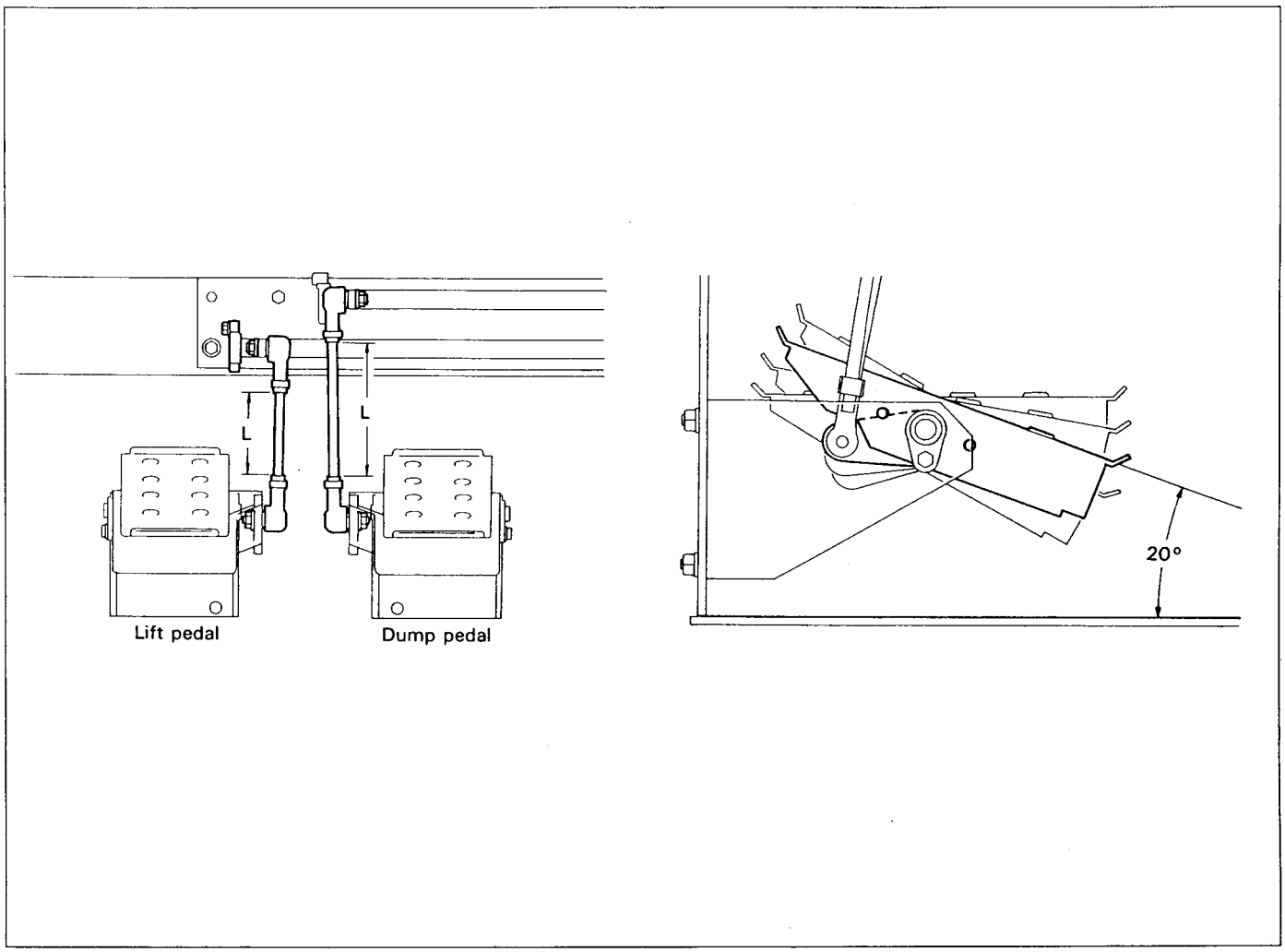
Standard Unit: MPa (kgf/cm²) [psi]

	Main relief set pressure	Port relief set pressure
4SDK5·6	15.7 (160) [2275.2]	10.8 (110) [1564.2]
4SDK8	17.7 (180) [2559.6]	14.7 (150) [2133.0]

The standard values above are those for adjustment upon mounting on the vehicle. For bench adjustment of each individual oil control valve, the standard is −98 kPa (−10 kg/cm²) [14.2 psi] each.

OIL CONTROL VALVE LINK

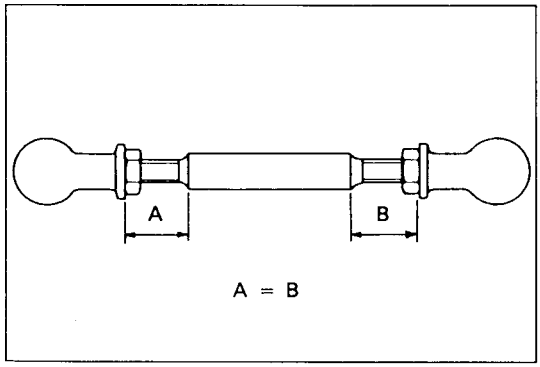
MATERIAL HANDLING PEDAL ADJUSTMENT



1. The pedal surface inclination after adjusting each connecting rod length L to the standard shall be approx. 20°.

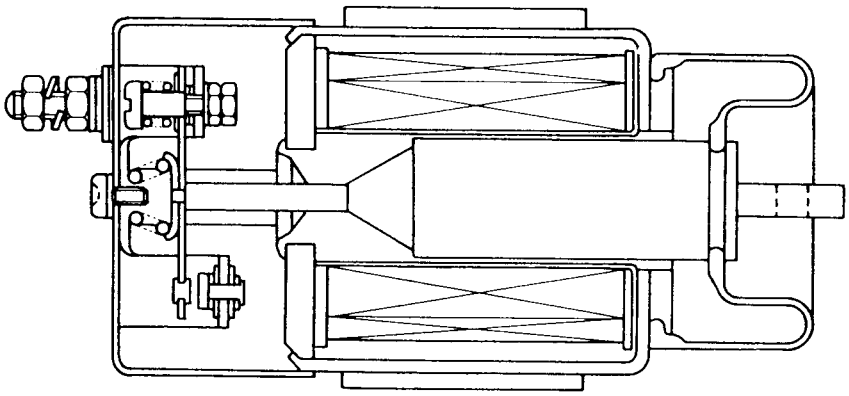
Standard Unit: mm (in)

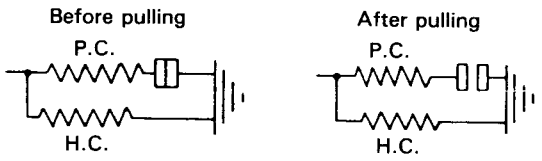
	Lift pedal rod	Dump pedal rod
4SDK5	150 (5.91)	195 (7.68)
4SDK6·8	95 (3.74)	150 (5.91)



Note:
The rod ends shall be screwed in equally on both sides.

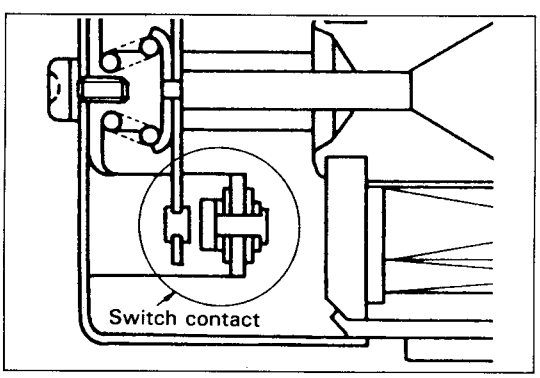
SOLENOID





Specifications

Rated voltage	12 V
Current	Pull coil (P.C.): 25 A or less Holding coil (H.C.): 5 A or less
Operating voltage Stroke: 27 mm (1.1 in) at a load of 1 kg (2.2 lbs)	12 V



Inspection

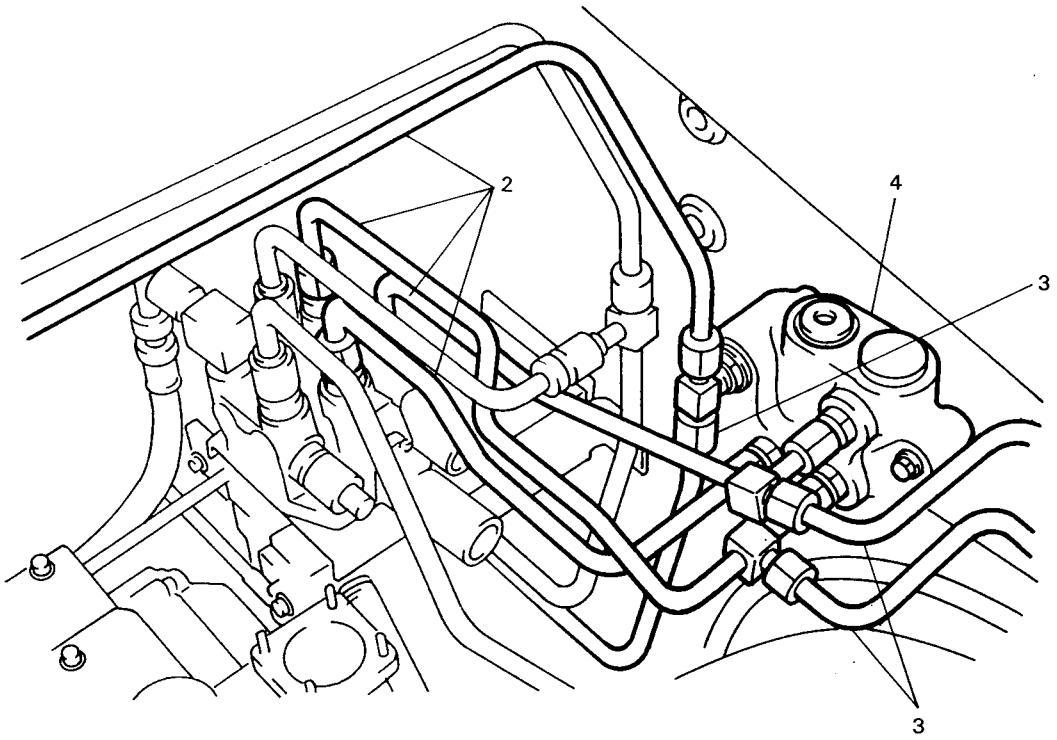
1. Remove the switch cover.
2. Check that the switch contact is open when the solenoid valve is supplied with a current. If closed, the P.C. valve may be burnt.

SELF-LEVELING VALVE

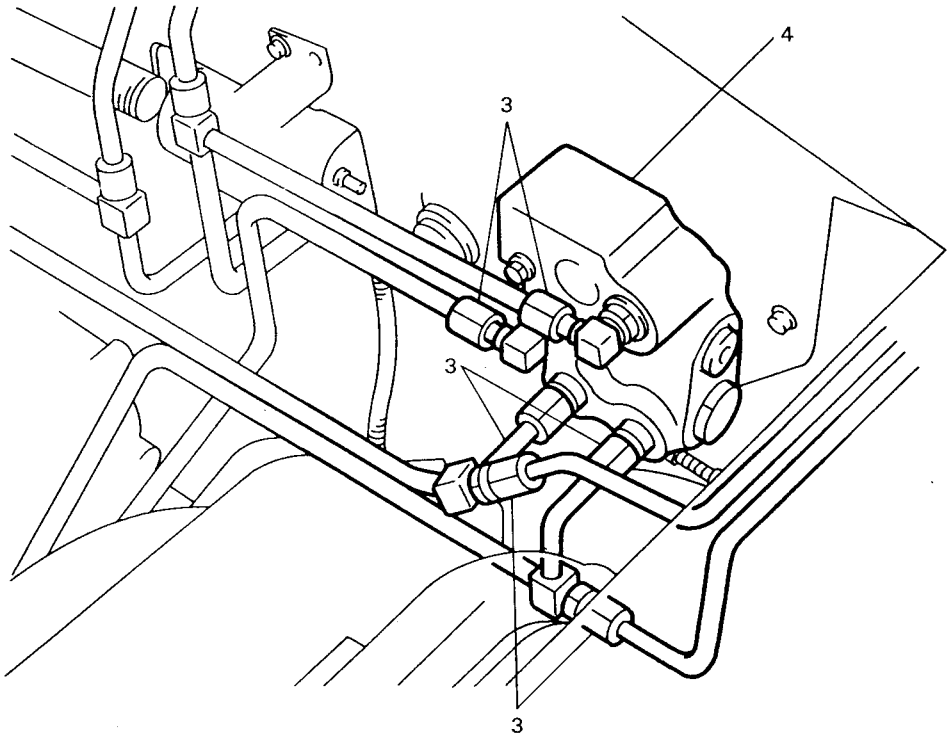
REMOVAL·INSTALLATION

Note:
Prevent dust entrance by covering each pipe joint with a nylon cap.

4SDK5



4SDK6·8



Removal Procedure

1 Remove the muffler. (See page 1-17.)

2 Remove the hydraulic piping.

3 Disconnect the hydraulic piping.

4 Remove the self-leveling valve.

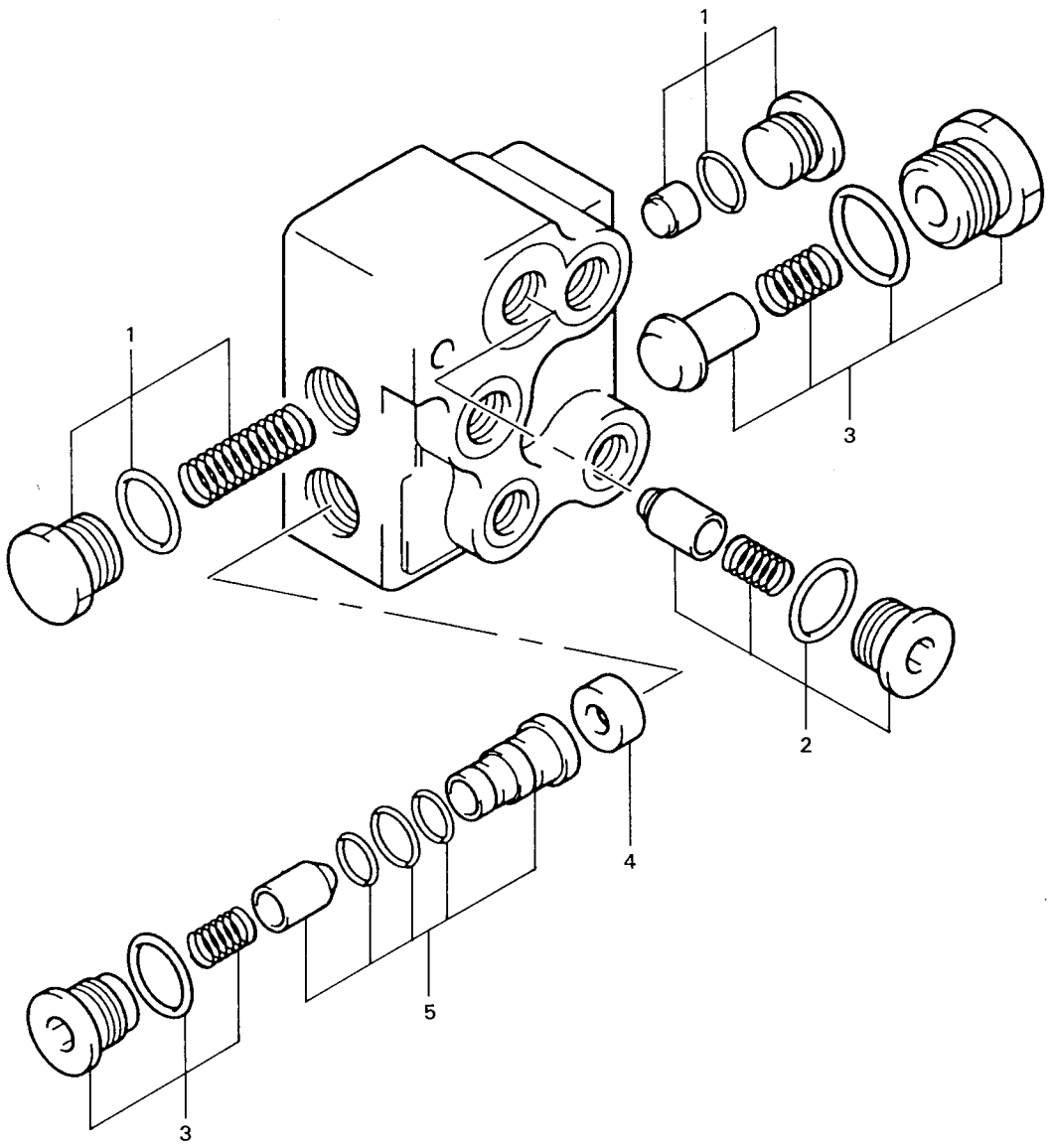
5 Remove the fitting.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

DISASSEMBLY·INSPECTION·REASSEMBLY

Notes:
- **Select a clean location for operation.**
- **As each part is finished with high precision, carefully prevent any damage.**



Disassembly Procedure

1 Remove the plug, poppet and spring.

2 Remove the plug, spring and spool.

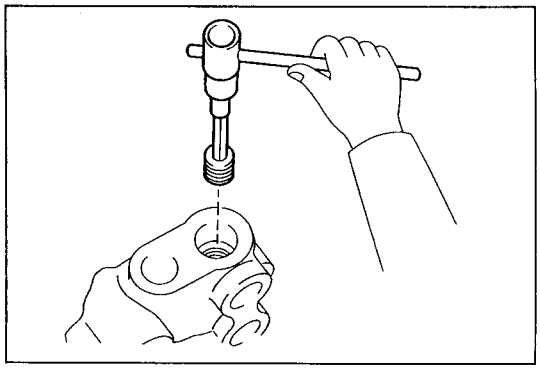
3 Remove the plug, spring and poppet.

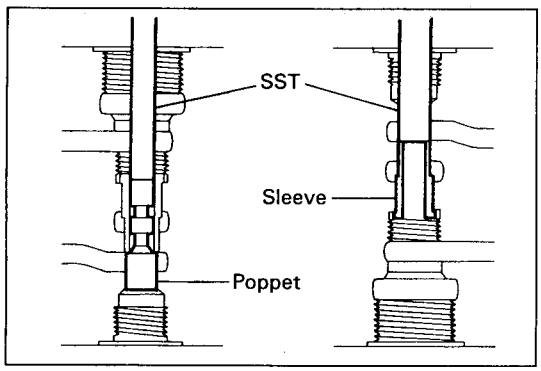
4 Remove the stopper plug. **[Point 1]**

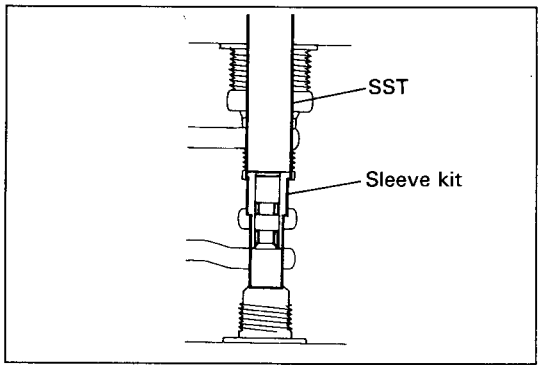
5 Remove the sleeve kit. **[Point 2]**

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly proceduce.







Point Operations

[Point 1]

Reassembly: Coat locking agent 08833-76001-71 (08833-00070) on the threaded portion of the stopper plug before installation.

[Point 2]

Disassembly: Remove the sleeve kit.

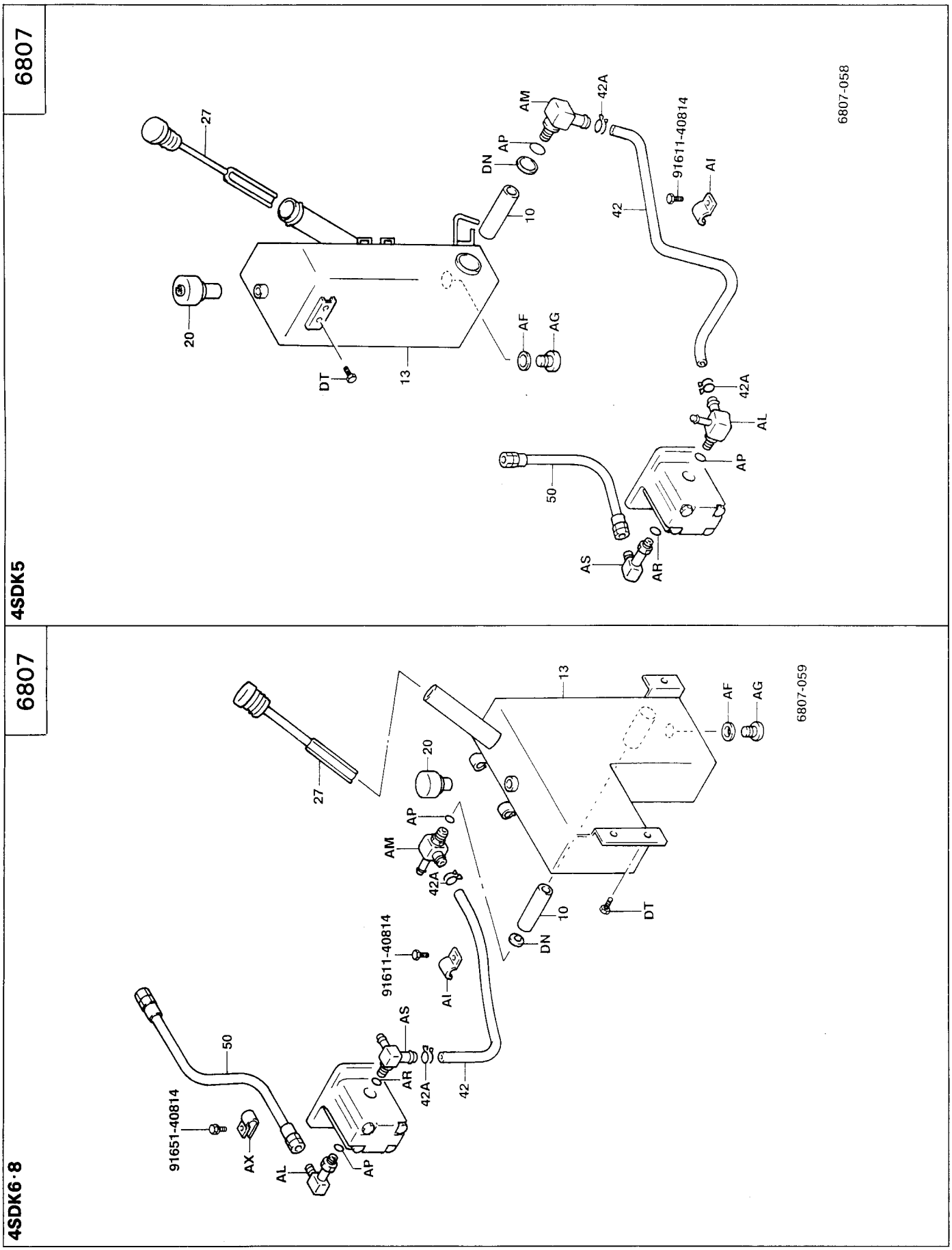
1. Using SST, remove the poppet.
   SST 09700-30200-71

2. Using SST, remove the sleeve.
   SST 09700-30200-71

Reassembly: Using SST, install the sleeve kit.
SST 09700-30200-71

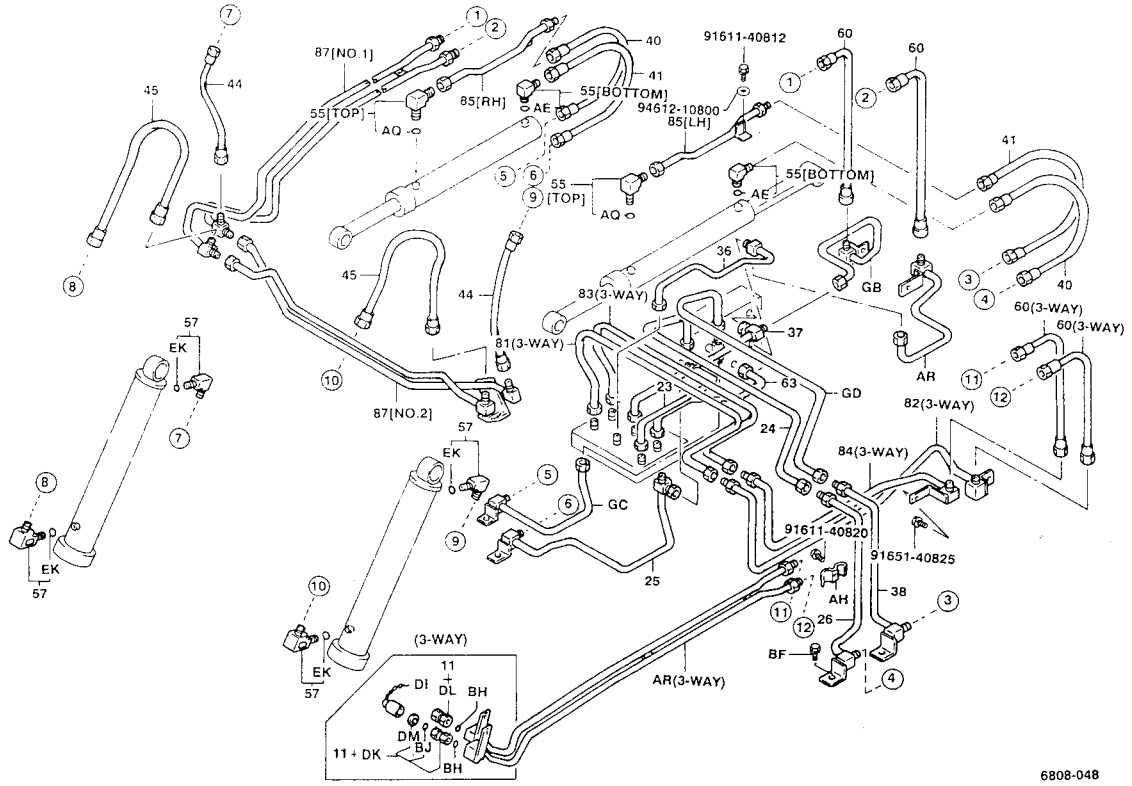
HYDRAULIC SYSTEM

HYDRAULIC PIPING



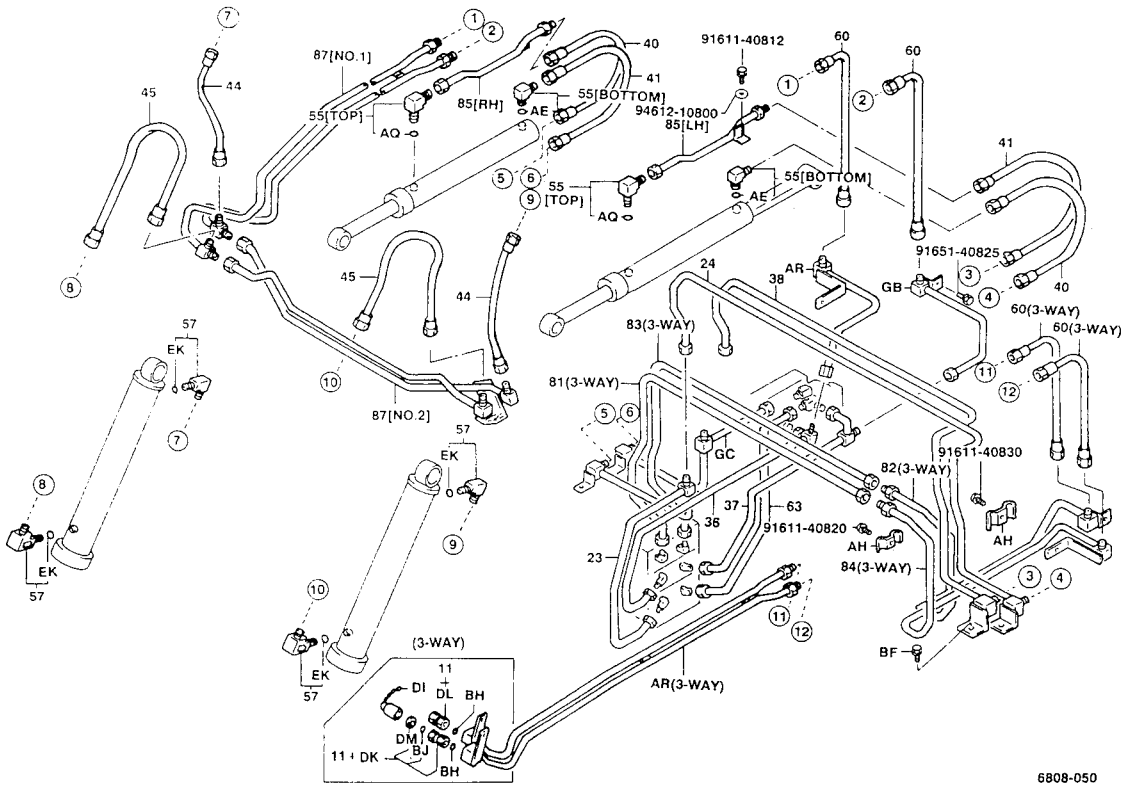
4SDK5

6808



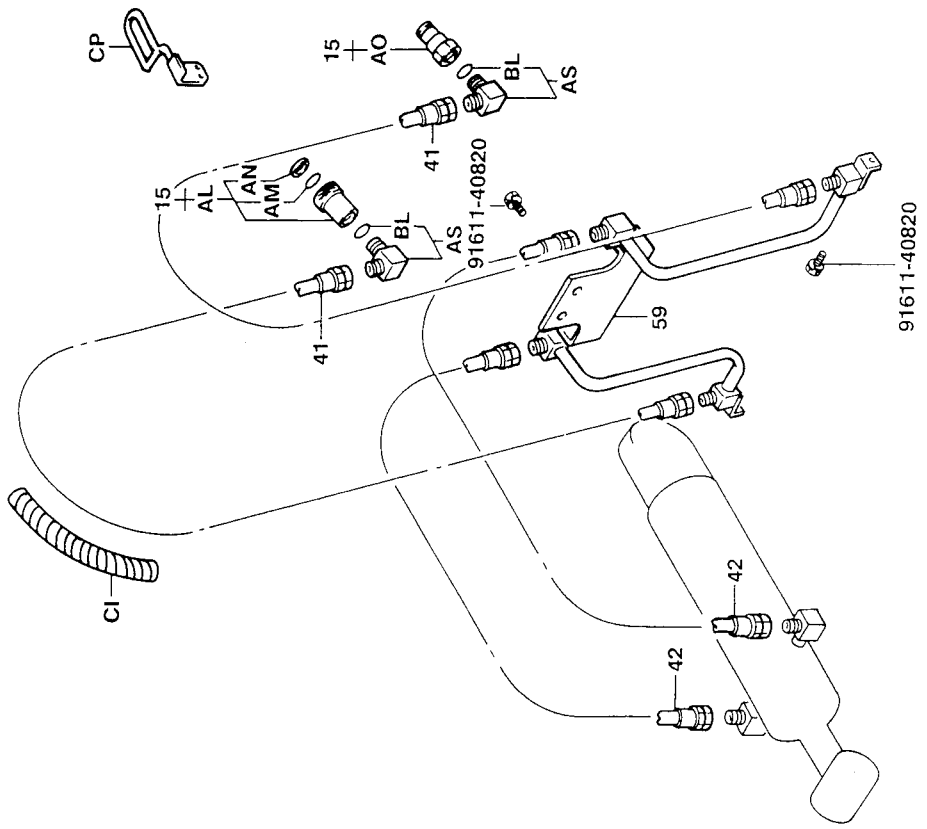
4SDK6·8

6808



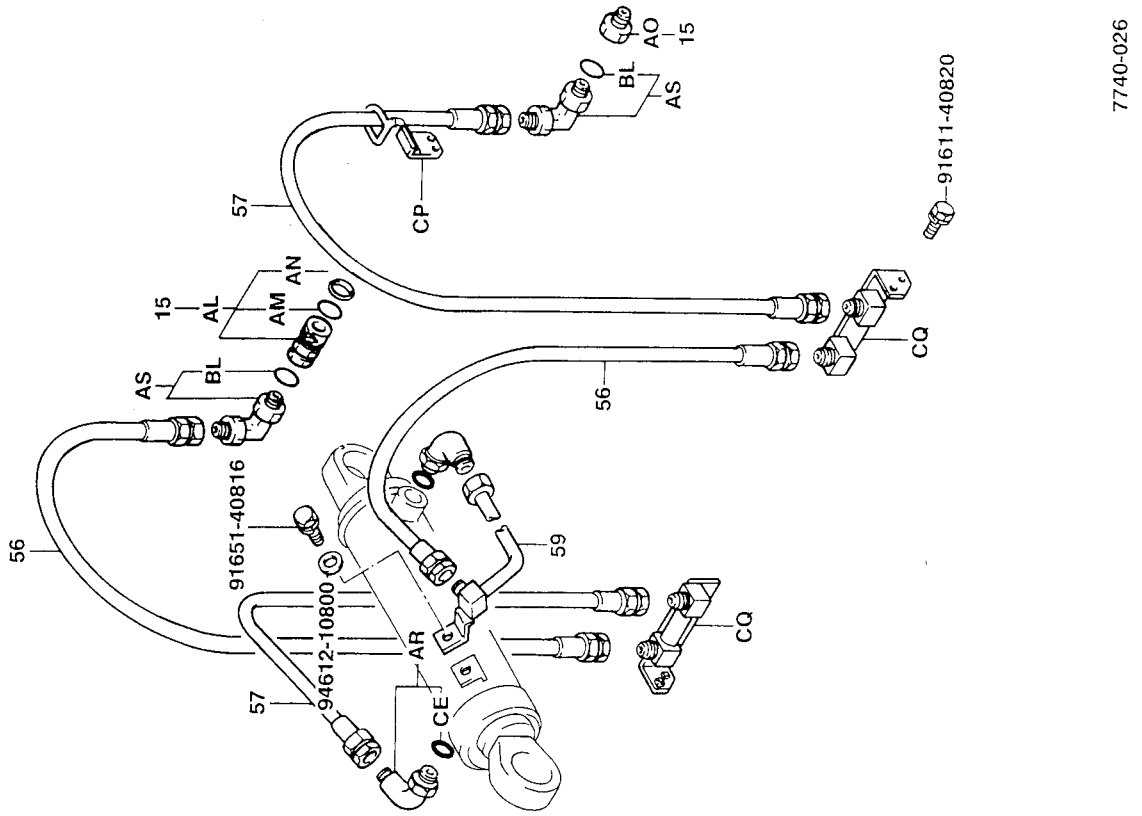
7740

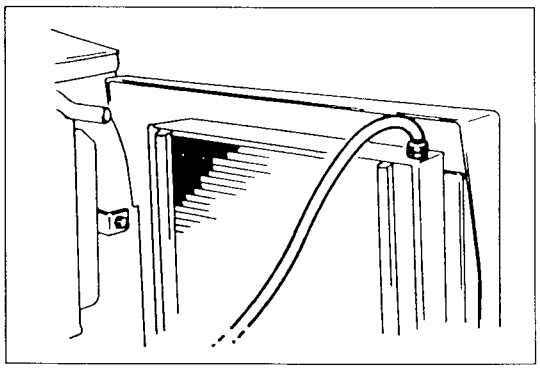
4SDK5

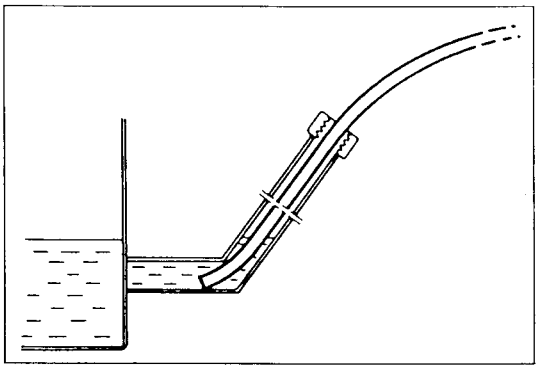


7740

4SKD6·8







BLEEDING AIR FROM HYDRAULIC CIRCUIT

When reconnecting the hydraulic piping after disconnection, bleed air as described below.

1. Remove the oil cooler air vent plug.

2. Connect a hose (inside diameter = 6 mm, 2 m in length) to the union (9/16-18UNF), and install them on the oil cooler air vent hole.

Note:
A transparent hose should be used to make air bleeding status visible.

3. Remove the filler cap from the hydraulic oil tank and insert the hose.

Note:
The hose must be put into the oil.

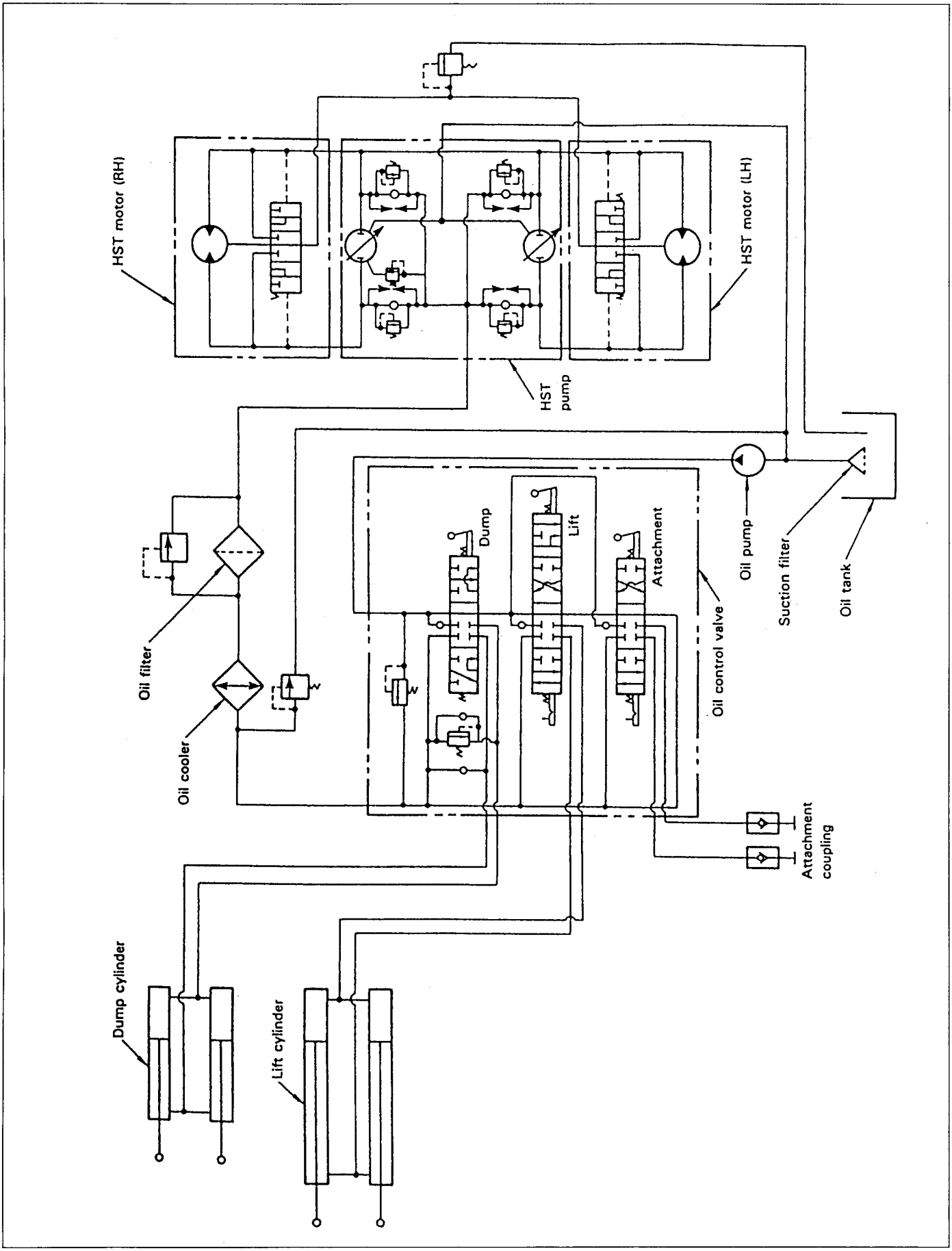
4. Start the engine and warm it up at the idle speed.

5. Increase the engine speed to about 2000 rpm and bleed air according to the following steps.
   (1) Depress and release the material handling pedal several times.
   (2) Move the steering lever back and forth several times.
   (3) Repeat full stroke operation by depressing and releasing the material handling lever.
   (4) Repeat forward and backward traveling by operating the steering control levers.

Caution:
Since travel feeling is worsened when air is mixed in the hydraulic circuit, careful operation is necessary during traveling.

6. After confirming no air bubble in the oil flowing through the hose, remove the union with hose and install the air vent plug, after wrapping tape around it, to the oil cooler.

HYDRAULIC CIRCUIT DIAGRAM



APPENDIXES

SST LIST

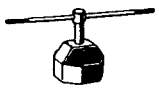
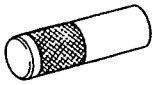
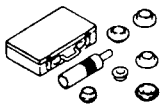
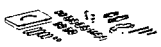
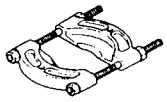
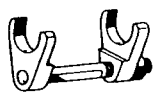
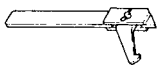
Illustration	Part No.	Part name	Section
	09090–76001–71 (09090–04010)	Engine sling device	1
	09509–76003–71 (09509–55030)	Rear wheel bearing nut wrench	3
	09608–76005–71 (09608–06041)	Front hub inner bearing cone replacer	9
	09316–76007–71 (09316–60010)	Transmission & transfer bearing replacer	2
	09950–76013–71 (09950–40010)	Puller B set	2 · 3
	09950–76018–71 (09950–60010)	Replacer set	2
	09950–76019–71 (09950–60020)	Replacer set, No. 2	3
	09950–76020–71 (09950–70010)	Handle set	2 · 5

Illustration	Part No.	Part name	Section
	09320–10410–71	Front axle hub inner bearing replacer	5
	09420–23000–71	Bearing remover	5
	09421–42800–71	Axle shaft oil seal replacer	5
	09610-10161-71	Oilcontrol valve spring remover & replacer	11
	09620–10100–71	Cylinder cap remover & replacer	9
	09700–30200–71	Spring pin tool remover	11

LIST OF SERVICE STANDARDS

ENGINE

Item			4SDK5	4SDK6	4SDK8
Engine					
Idling speed		rpm	1200 ± 50		970 ± 50
No-load maximum speed		rpm	2600 ± 50		2600 ± 50
Injection timing degrees		degree	B.T.D.C. 14°		0
Compression kPa (kgf/cm²) [psi]/rpm		Standard	3240 (33) [470]/250		2650 (27) [384]/260
		Limit	2550 (26) [370]/250		1960 (20) [280]/260
		Difference between cylinders	196 (2) [28]		
Fan belt flexure: when pushed with a force of 98 N (10 kgf) [22.0 lbf]		mm (in)	7 ~ 9 (0.29 ~ 0.35)		8 ~ 13 (0.29 ~ 0.51)
Air cleaner					
Vacuum switch inspection: Continuity check with negative pressure application to vacuum switch			7473 ± 569 Pa (762 ± 58 mmH_2O) [56.0 ± 4.3 mmHg]: Continuity shall exist		
Radiator					
Radiator cap valve opening pressure kPa (kgf/cm²)		Standard	73.5 ~ 103.0 (0.75 ~ 1.05)		
		Limit	58.8 (0.6)		
Battery					
Battery electrolyte specific gravity: at 20°C (68°F)			1.250 ~ 1.280		

HST

Item			4SDK5	4SDK6	4SDK8
HST Pump					
Charge pressure kPa (kgf/cm²) [psi]	Standard	at idling	343 (3.5) [49.8] or more		
		at maximum speed	461.0 (4.7) [66.8] or more		
Relief pressure			21.0 (214)	26.0 (265)	30.0 (306)
Piston to cylinder block clearance mm (in)		Limit	0.06 (0.002)		
Clearance between piston and shoe mm (in)		Limit	0.3 (0.012)		
Piston shoe thickness mm (in)		Limit	3.5 (0.138)		
Tightening Torque (HST Pump)			**N·m (kgf-cm) [ft-lbf]**		
Bypass valve			41 ~ 94 (418 ~ 958) [30.2 ~ 69.3]		
Check and high pressure relief valve			54 ~ 135 (550 ~ 1377) [40 ~ 100]		
Pump joint bolt			47 ~ 61 (479 ~ 622) [35 ~ 45]		
HST pump set bolt			56.8 ~ 86.2 (580 ~ 880) [42.0 ~ 63.7]		

Item	4SDK5	4SDK6	4SDK8
Tightening Torque (HST Motor)			**N·m (kgf-cm) [ft-lbf]**
HST motor set bolt	63.7 ~ 88.2 (6.6 ~ 9.0) [47.7 ~ 65.1]		

POWER TRAIN

Item		4SDK5	4SDK6	4SDK8
Drive Chain				
Drive chain elongation mm (in)	Limit	116.0 (4.567)	154.7 (6.090)	←
Drive Unit				
Motor shaft no-load starting force N (kgf) [lbf]	Standard	—	13.8 ~ 36.3 (1.5 ~ 3.7) [3.31 ~ 8.16]	
Motor shaft starting force N (kgf) [lbf]	Standard	—	No load starting force + 11.9 ~ 24.2 (1.2 ~ 2.5) [2.65 ~ 5.51]	
Tightening Torque				**N·m (kgf-cm) [ft-lbf]**
Drive unit set bolt		56.8 ~ 86.2 (580 ~ 880) [42.0 ~ 63.7]		

AXLE

Item		4SDK5	4SDK6	4SDK8
Axle				**N · m (kgf-cm) [ft-lbf]**
Axle shaft no-load starting force N (kgf) [lbf]	Standard	9.8 ~ 19.6 (1.0 ~ 2.0) [2.21 ~ 4.41]	11.8 ~ 29.4 (1.2 ~ 3.0) [2.65 ~ 6.61]	
Axle shaft starting force N (kgf) [lbf]	Standard	No load starting force + 14.7 ~ 29.4 (1.5 ~ 3.0) [3.31 ~ 6.62]	No load starting force + 9.8 ~ 19.6 (1.0 ~ 2.0)[2.21 ~ 4.41]	
Tightening Torque				**N · m (kgf-cm) [ft-lbf]**
Hub nut		117.6 ~ 147.0 (1200 ~ 1500) [86.8 ~ 108.5]		

BRAKE SYSTEM

Item	4SDK5	4SDK6	4SDK8
Brake System			
Lock pin recess upon brake locking (from outer end face of sprocket) mm (in)	5 (0.197) or less	3 (0.118) or less	
Clearance between sprocket and lock pin upon brake release mm (in)	3 (0.118) or more		

BODY FRAME

Item	4SDK5	4SDK6	4SDK8
Tightening Torque			**N·m (kgf-cm) [ft-lbf]**
Service hole cover set nut	9.8 ~ 15.7 (100 ~ 160) [7.2 ~ 11.6]		
Axle shaft service hole cover set nut	9.8 ~ 15.7 (100 ~ 160) [7.2 ~ 11.6]		

LIFT ARM·BUCKET BRACKET

Item		4SDK5	4SDK6	4SDK8
Lift Arm				
Natural drop (at lift cylinder rod) mm (in)/at 15 min.	Limit	60 (2.36) or less		
Lift arm stopper clearance mm (in)	Standard	0 ~ 3 (0 ~ 0.118)		
Lift arm levelness (difference between left and right) mm (in)	Limit	15 (0.59) or less		
Bucket Bracket				
Natural forward tilt (at dump cylinder rod) mm (in)/at 15 min.	Limit	60 (2.36) or less		
				N·m (kgf-cm) [ft-lbf]
Bracket support pin lock bolt		93 ~ 172 (945 ~ 1755) [68.37 ~ 127.00]	160 ~ 240 (1630 ~ 2450) [17.93 ~ 177.25]	←

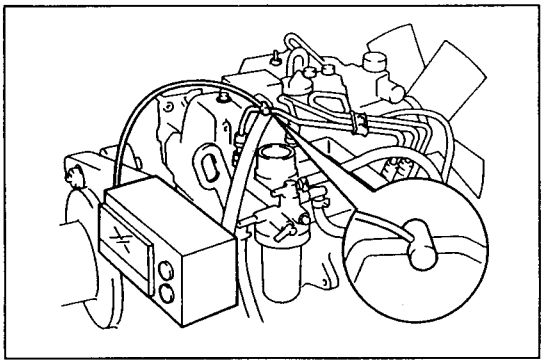
CYLINDERS

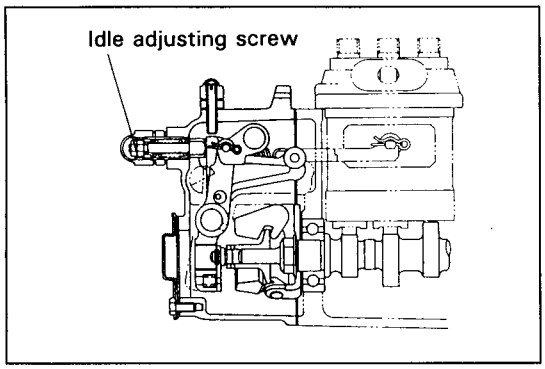
Item		4SDK5	4SDK6	4SDK8
Lift Cylinder				
Cylinder bore mm (in)	Standard	55.00 (2.17)	60.00 (2.36)	←
	Limit	55.35 (2.18)	60.35 (2.38)	←
Piston rod outside diameter mm (in)	Standard	30.00 (1.181)	35.00 (1.378)	←
	Limit	29.92 (1.178)	34.92 (1.375)	←
Piston rod bend mm (in)	Limit	1.0 (0.039)	←	←
Dump Cylinder				
Cylinder bore mm (in)	Standard	55.00 (2.17)	60.00 (2.36)	←
	Limit	55.35 (2.18)	60.35 (2.38)	←
Piston rod outside diameter mm (in)	Standard	30.00 (1.181)	←	←
	Limit	29.92 (1.178)	←	←
Piston rod bend mm (in)	Limit	1.0 (0.039)	←	←
Tightening Torque				**N·m (kgf-cm) [ft-lbf]**
Piston rod castle nut		117.7 ~ 176.5 (1200 ~ 1800) [86.8 ~ 130.2]	284.4 ~ 343.2 (2900 ~ 3500) [209.8 ~ 253.2]	
Piston rod guide		441.3 ~ 539.4 (4500 ~ 5500) [325.6 ~ 397.9]	441.3 ~ 539.4 (4500 ~ 5500) [325.6 ~ 397.9]	

OIL CONTROL VALVE

Item		4SDK5	4SDK6	4SDK8
Oil Control Valve				
Main relief set pressure MPa (kgf/cm²) [psi]	Standard	15.7 (160) [2275.2]	←	17.7 (180) [2559.6]
Port relief set pressure MPa (kgf/cm²) [psi]	Standard	10.8 (110) [1564.2]	←	14.7 (150) [2133.0]
Lift pedal connecting rod length mm (in)	Standard	150 (5.91)	95 (3.74)	←
Dump pedal connecting rod length mm (in)	Standard	195 (7.68)	150 (5.91)	←

4SDK3·4





ENGINE

ENGINE SPEED ADJUSTMENT

Idling speed inspection and adjustment

1. Warm up the engine.

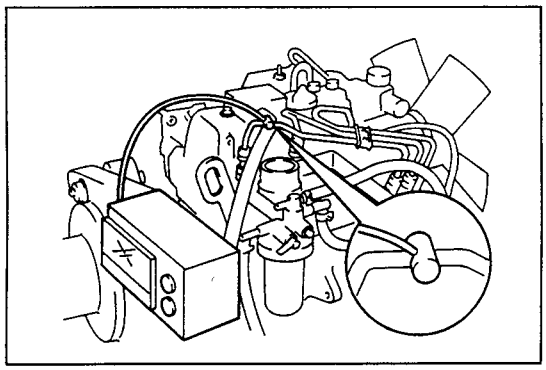
   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

2. Install the engine tachometer.

3. Inspect the idling speed.

   Standard: 1000 ± 50 rpm

4. Adjust the idling speed.
   (1) Loosen the lock nut, and make adjustment by means of the idle adjusting screw.



No-load maximum speed inspection and adjustment

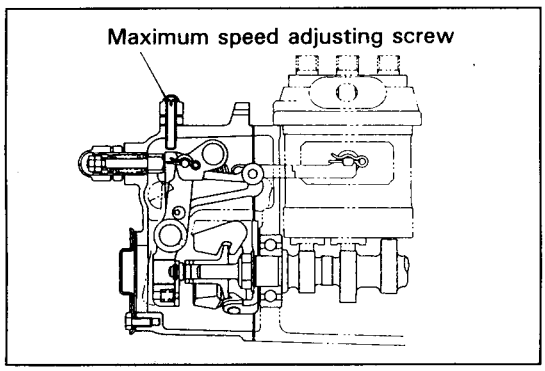
1. Warm up the engine.

   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

2. Install the engine tachometer.

3. Inspect the no-load maximum speed.
   (1) Fully forward the accelerator lever and inspect the no-load maximum speed.

   Standard: 3140 ± 50 rpm



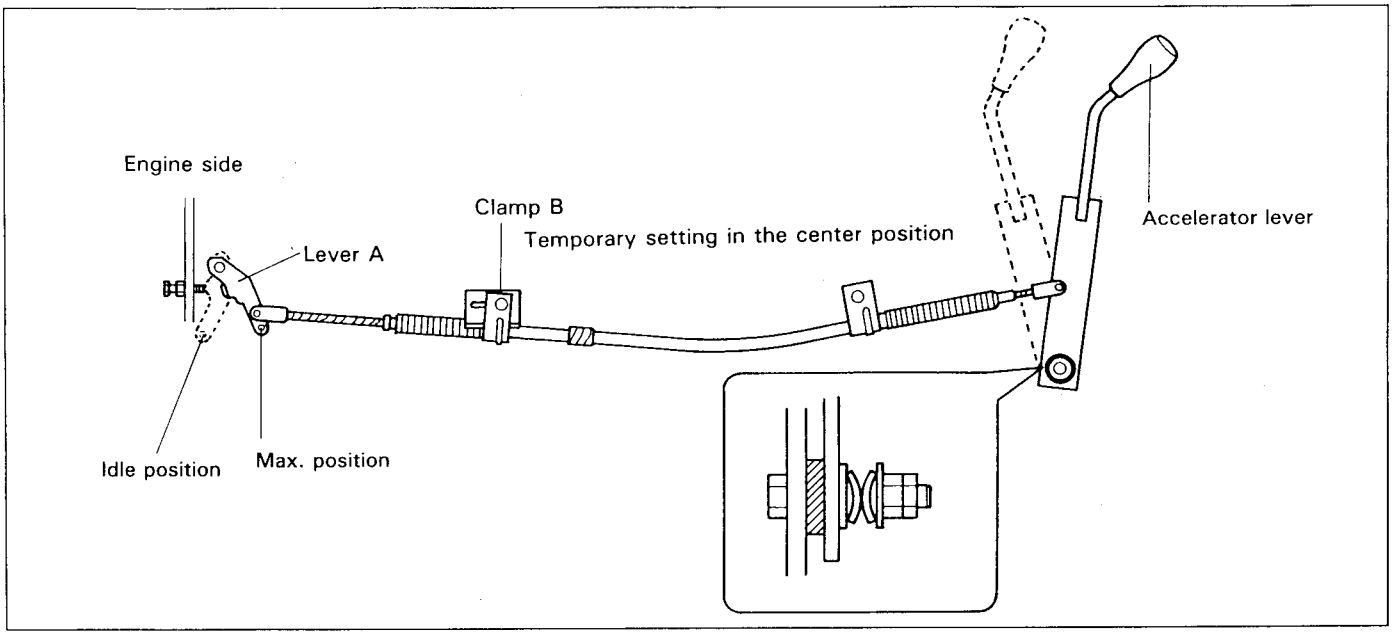
4. Adjust the no-load maximum speed.
   (1) Remove the seal.
   (2) Make adjustment by means of the maximum speed adjusting screw.

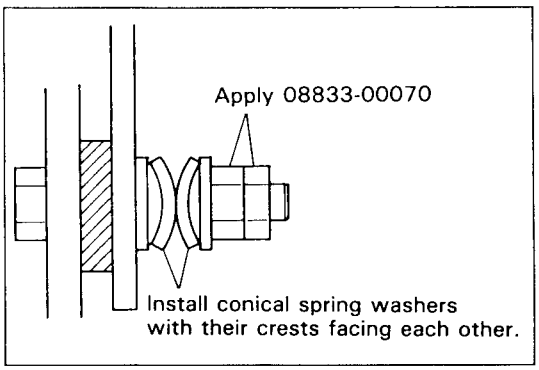
   Standard: 3140 rpm

5. Seal after adjustment.

ACCELERATOR

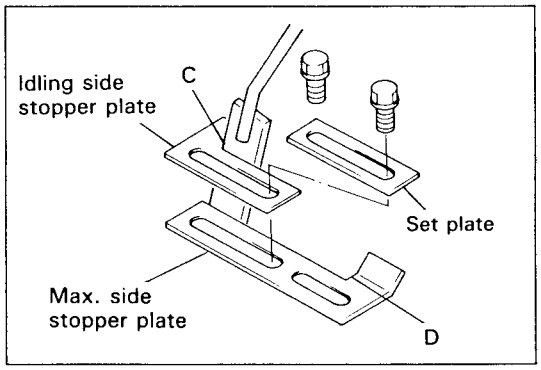
Accelerator Lever Adjustment





Adjustment Procedure

1. With the wire installed, tighten the lever set nut for an operating force of 39.2 to 58.8 N (4 to 6 kgf). Install the conical spring washers as illustrated at left.



2. With lever A on the engine side in contact with the idle adjusting screw, set the stopper plate at the position where portion C of the idling side stopper plate is in contact with the idle adjusting screw.

3. Throw the accelerator lever until lever A on the engine side comes to the max. position, and set the stopper plate at the position where portion D of the max. side stopper plate is in contact with the lever.

4. If there is unevenness when the accelerator lever is operated, make fine adjustment after loosening clamp B.

APPENDIX

LUBRICANT CAPACITIES AND TYPES

Item		Quantity ℓ (US gal)		Type
		4SDK3	4SDK4	
Engine oil		3.0 (0.79)	3.3 (0.87)	Diesel engine oil SAE 10W-30 API CC or better (SAE 5W-30 in cold area)
Hydraulic oil		13 (3.43)		Auto fluid special (ATF type F)
Reduction gear	RH	8.2 (2.16)		Diesel engine oil SAE 10W-30 API CC or better
	LH	10.2 (2.69)		
	Total	18.4 (4.86)		
Fuel tank		25 (6.60)		
Greasing point		Proper quantity		MP grease
Engine cooling water		3.2 (0.84)	3.4 (0.90)	Soft water (containing radiator antirust at 5%) (LLC shall be added at a ratio of 30 or 50% in the cold season.)

SERVICE STANDARDS LIST

ENGINE

Engine		
Idling speed rpm		1000 ± 50
No-load maximum speed rpm		3140 ± 50
Ignition timing degrees		B.T.D.C. 16
Compression kPa (kgf/cm²) [psi]/rpm	Standard	3240 (33) [470]/260
	Limit	2550 (26) [370]/260
	Difference between cylinders	196 (2) [28]
Fan belt flexure when pushed with a force of [98 N (10 kgf)] mm (in)		10 ~ 15 (0.39 ~ 0.59)
Radiator		
Radiator cap valve opening pressure kPa (kgf/cm²)	Standard	73.5 ~ 103.0 (0.75 ~ 1.05)
	Limit	58.8 (0.6)
Battery		
Battery electrolyte specific gravity [at 68°F (20°C)]		1.250 ~ 1.280
Accelerator		
Accelerator lever operating force N (kgf)		34.3 ~ 49.0 (3.5 ~ 5.0)

HST

HST pump			
Clearance between cylinder block and piston mm (in)	Limit	0.05 (0.002)	
Piston to shoe looseness mm (in)	Limit	0.25 (0.001)	
Piston shoe thickness mm (in)	Limit	2.8 (0.11)	
Charge pressure kPa (kgf/cm²)	Standard	At idling	392 (4.0) or above
		At maximum speed	530 (5.4) or above
HST oil filter			
Filtering precision μ	5		
Tightening torque (HST pump)			**N·m (kgf-cm) [ft-lbf]**
Check and high pressure relief valve	58.8 ~ 68.6 (600 ~ 700) [43.4 ~ 50.6]		
Bypass valve	30.9 ~ 37.8 (315 ~ 385) [22.8 ~ 27.9]		
Charge relief valve set screw	10.1 ~ 12.3 (103 ~ 125) [7.45 ~ 9.04]		
Front/rear pump set bolt	83.0 ~ 101.4 (846 ~ 1034) [61.2 ~ 74.8]		
Oil pump set bolt	8.4 ~ 10.3 (86 ~ 105) [6.2 ~ 7.6]		
Tightening torque (HST motor)			**N·m (kgf-cm) [ft-lbf]**
Valve housing set bolt	49.0 ~ 53.9 (500 ~ 550) [36.2 ~ 39.8]		
HST motor set bolt	47.1 ~ 70.6 (480 ~ 720) [34.7 ~ 52.1]		

REDUCTION GEAR

Drive chain and tensioner		
Drive chain elongation mm (in)	Limit	Length between 6 links of rollers: 116 (4.57)
Drive chain flexure [when pushed with a force of 196N (20 kgf)] mm (in)	Standard	10 (0.39)
Drive unit		
Drive gear starting force (using SST) N (kgf)	Standard	9.8 ~ 13.8 (1.0 ~ 1.4)
Driven shaft no-load starting force (using SST) N (kgf)	Standard	19.7 ~ 39.4 (2.0 ~ 4.0)
Driven shaft starting force N (kgf)	Standard	No-load starting force + 7.4 ~ 14.8 (0.75 ~ 1.5)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Chain tensioner base set bolt	56.9 ~ 86.3 (580 ~ 880) [42.0 ~ 63.7]	
HST motor sprocket set bolt	41.2 ~ 62.8 (420 ~ 640) [30.4 ~ 46.3]	

AXLE

Axle		
Axle shaft no-load starting force N (kgf)	Standard	9.8 ~ 19.7 (1.0 ~ 2.0)
Axle shaft starting force N (kgf)	Standard	No-load starting force + 14.8 ~ 29.5 (1.5 ~ 3.0)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Hub nut	117.7 ~ 147.1 (1200 ~ 1500) [86.8 ~ 108.5]	

BRAKE

Disc brake		
Disc pad thickness mm (in)	Standard	6.0 (0.24)
	Limit	5.5 (0.22)
Brake link		
Brake pedal height (with pad) mm (in)	Standard	155 (6.10)
Brake pedal play mm (in)	Standard	25 ~ 35 (0.98 ~ 1.38)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Brake block set bolt		53.9 ~ 86.3 (550 ~ 880) [40.0 ~ 63.7]

BODY FRAME

Tightening torque	**N·m (kgf-cm) [ft-lbf]**
Service hole cover set nut	9.8 ~ 15.7 (100 ~ 160) [7.2 ~ 11.6]
Axle shaft service hole cover set nut	9.8 ~ 15.7 (100 ~ 160) [7.2 ~ 11.6]

LIFT ARM AND BUCKET BRACKET

Lift arm		
Natural drop mm (in)	Limit	50 (1.97) or less
Lift arm stopper clearance mm (in)	Standard	0 ~ 13 (0 ~ 0.51)
Lift arm levelness (difference between left and right) mm (in)	Limit	15 (0.59)
Bucket bracket		
Natural forward tilt (at dump cylinder rod) mm (in)/15 min.	Limit	4SDK3 series: 40 (1.57) or less 4SDK4 series: 50 (1.97) or less
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Bucket bracket support pin stopper bolt		92.7 ~ 172.1 (945 ~ 1755) [68.4 ~ 127.0]

CYLINDERS

Lift cylinder		
Cylinder bore mm (in)	Standard	45.00 (1.772)
	Limit	45.05 (1.774)
Piston rod outside diameter mm (in)	Standard	25.00 (0.984)
	Limit	24.92 (0.981)
Piston rod bend mm (in)	Limit	1.5 (0.059)
Dump cylinder		
Cylinder bore mm (in)	Standard	45.00 (1.772)
	Limit	45.02 (1.774)
Piston rod outside diameter mm (in)	Standard	25.00 (0.984)
	Limit	24.92 (0.981)
Piston rod bend mm (in)	Limit	1.0 (0.039)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Piston rod castle nut		117.7 ~ 176.5 (1200 ~ 1800) [86.8 ~ 130.2]
Piston rod guide		284.1 ~ 343.2 (2900 ~ 3500) [209.8 ~ 253.2]

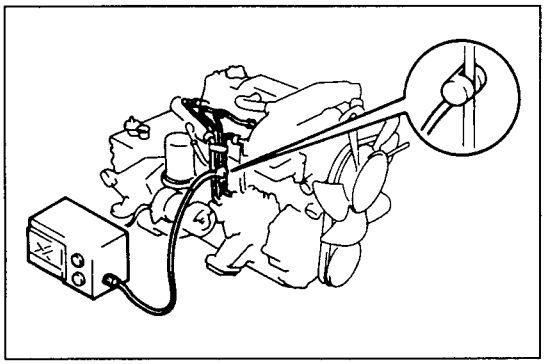
OIL PUMP

Oil pump		
Gear plate inner face flaw depth mm (in)	Limit	0.15 (0.006)
Gear shaft diameter mm (in)	Limit	14.96 (0.589)
Cylinder full stroke rise time (full load) Second	Standard	5.2
Tightening Torque		**N·m (kgf-cm) [ft-lbf]**
Oil pump cover set bolt		34.3 ~ 39.2 (350 ~ 400) [25.3 ~ 28.9]
Oil pump inlet (Suction side)		60 ~ 70 (610 ~ 710) [44.13~ 51.37]

OIL CONTROL VALVE

Oil control valve		
Main relief valve set pressure kPa (kgf/cm^2) [psi]	Standard	14612 (149) [2119]
Port relief valve set pressure 4SDK4 only kPa (kgf/cm^2) [psi]	Standard	10690 (109) [1550]
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Lift plunger detent pin		21.6 (220) [15.9]
Valve tie rod set nut		19.0 (194) [14.0]
Main relief valve		49.0 (500) [36.2]
Port relief valve		49.0 (500) [36.2]

4SDK10



ENGINE

ENGINE SPEED ADJUSTMENT

Idling speed inspection and adjustment

1. Warm up the engine.

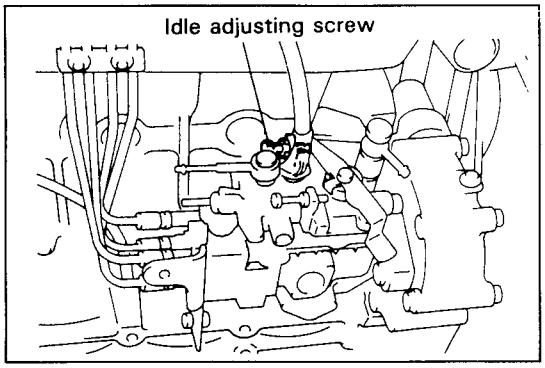
   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

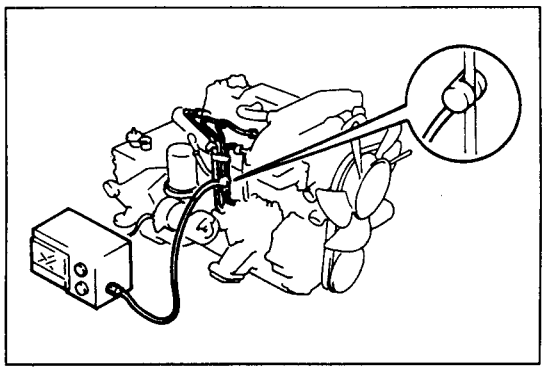
2. Install the engine tachometer.

3. Inspect the idling speed.

   Standard: 750 ± 25 rpm

4. Adjust the idling speed.
   (1) Loosen the lock nut, and make adjustment by means of the idle adjusting screw.





No-load maximum speed inspection and adjustment

1. Warm up the engine.

   Coolant temperature: 80°C (176°F) or above
   Hydraulic oil temperature: 60°C (140°F) or above

2. Install the engine tachometer.

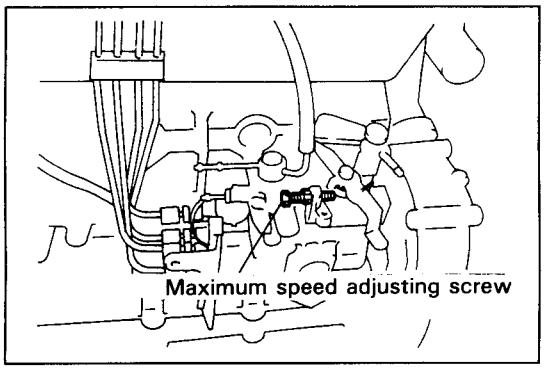
3. Inspect the no-load maximum speed.
   (1) Fully forward the accelerator lever and inspect the no-load maximum speed.

   Standard: 2600 ± 50 rpm

4. Adjust the no-load maximum speed.
   (1) Remove the seal.
   (2) Make adjustment by means of the maximum speed adjusting screw.

   Standard: 2600 rpm

5. Seal after adjustment.



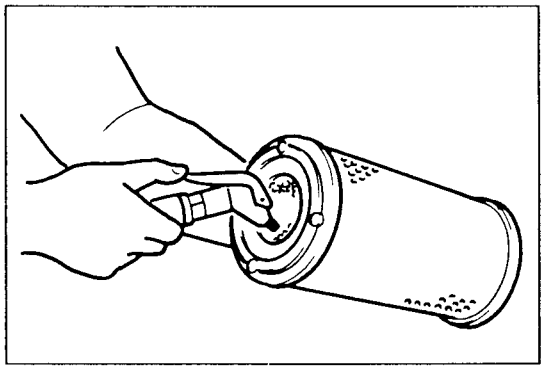
AIR CLEANER

Cleaning·Inspection

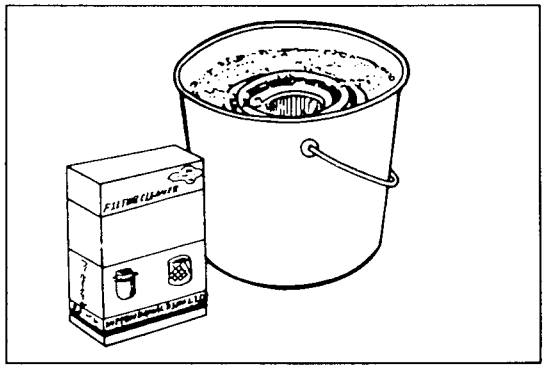
1. Open the engine hood.

2. Remove the element.

Note:
In case of the double element type, do not remove the inner element for other than replacement.

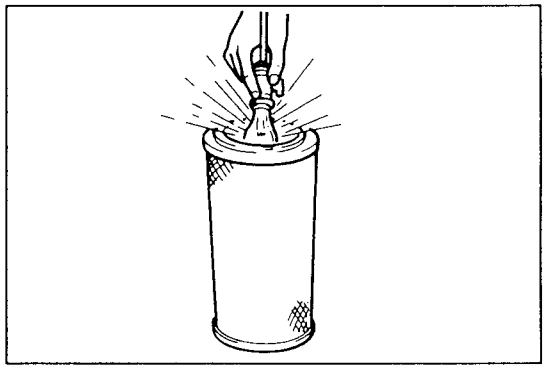


3. Clean the element.
   (1) For ordinary cleaning, blow with compressed air [690 kPa (7 kg/cm²) [100 psi] or less] vertically along the pleats from the inside of the element.
   If heavily contaminated, washing is possible.
   (2) Element washing method
   Dissolve neutral detergent in tepid water (approx. 40°C (104°F)) and immerse the element in it for about 30 minutes. Then, rinse the element well with clear water. [Water pressure: 275 kPa (2.8 kg/cm²) [40 psi] or less]
   After washing, naturally dry the element or dry the element with a dryer (cold air).



Notes:
- **Do not damage the element during washing.**
- **Never use compressed air or hot air for drying.**

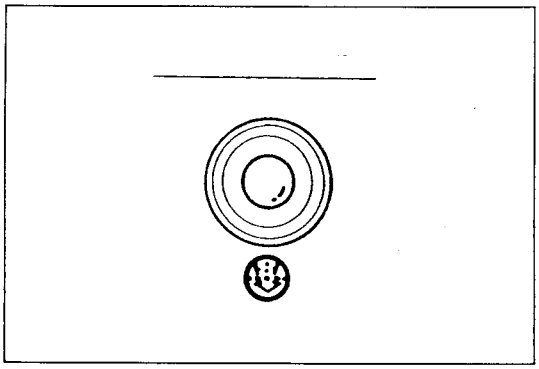
4. Clean the evacuator valve (dust discharge valve).
   (1) Hold the tip end of the evacuator valve and discharge dust and dirt from the inside of the valve.



5. Inspect the element.
   (1) After cleaning, place an electric bulb in the element to inspect any damage in the element. If any pinhole, tear or damage is found, replace it with a new element.

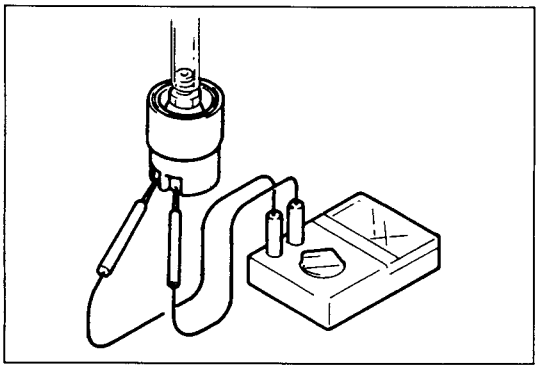
6. Element replacement

   Replace the element after it is washed six times or generally at intervals of 12 months.



CLOGGING WARNING SYSTEM INSPECTION

1. Warning lamp inspection
   (1) See that the air cleaner warning lamp comes on when the ignition switch is turned ON and goes out when the engine starts.

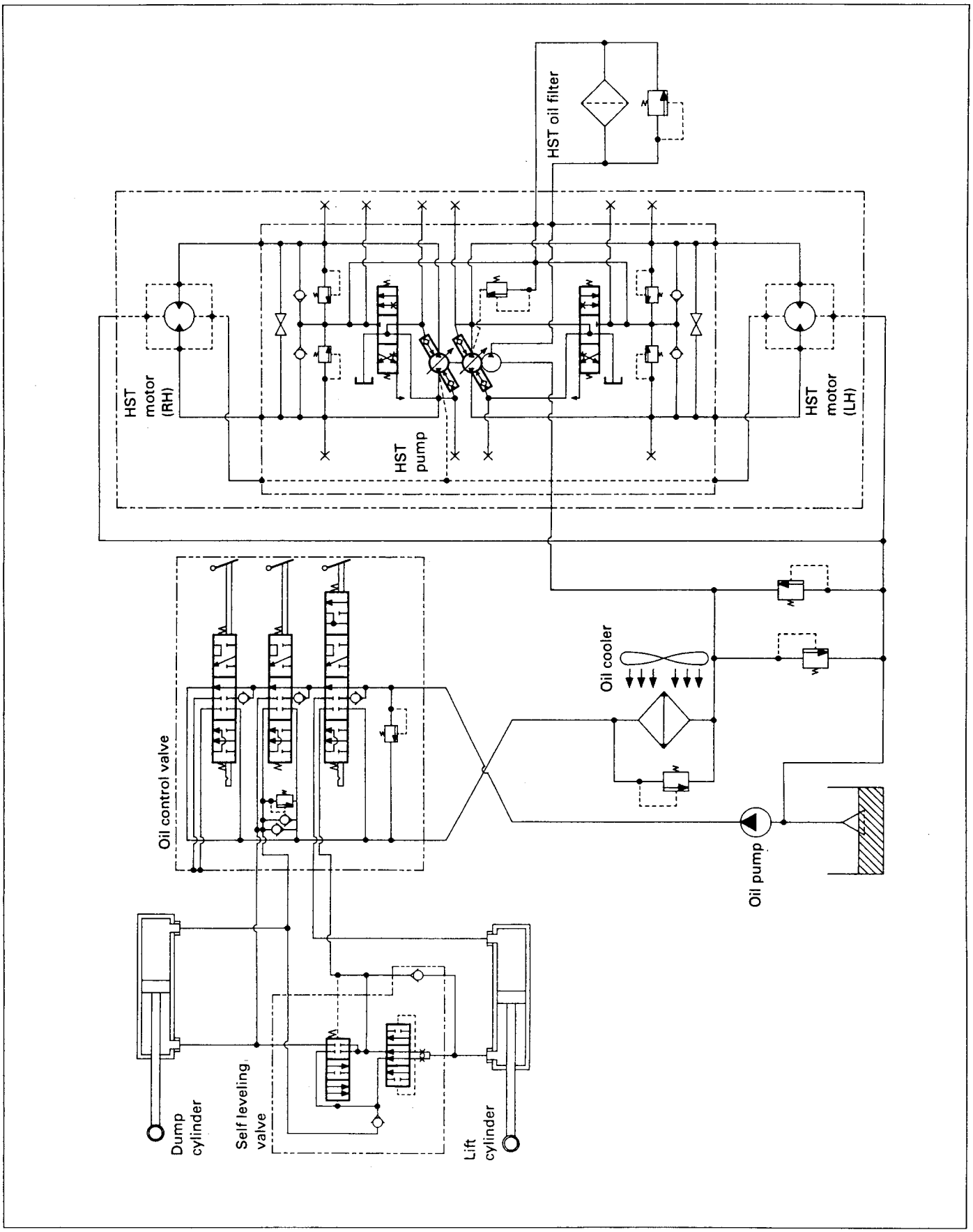


2. Individual inspection
   (1) Use a mity vac to apply a negative pressure to the vacuum switch, and inspect conduction.

   Standard:
   7473 ± 569 Pa (762 ± 58 mmH_2O)
   [56.0 ± 4.3 mmHg]: Continuity shall exist.

APPENDIX

HYDRAULIC CIRCUIT DIAGRAM



ATTACHED TABLES

LUBRICANT CAPACITIES AND TYPES

Item		Quantity ℓ (US gal)	Type
Engine oil		9.0 (2.38)	Diesel engine oil SAE 10W-30 API CC or better (SAE 5W-30 in cold area)
Hydraulic oil		33 (8.71)	Auto fluid special (ATF type F)
Reduction gear	RH	29 (7.66)	Diesel engine oil SAE 10W-30 API CC or better
	LH	29 (7.66)	
	Total	58 (15.31)	
Fuel tank		85 (22.44)	
Greasing point		Proper quantity	MP grease
Engine cooling water		9.6 (2.53)	Soft water (containing radiator antirust at 5%) (Shall be added at a ratio of 30 or 50% in the cold season.)
Radiator reservoir tank		1.1 (0.29) (at FULL position)	

SERVICE STANDARDS LIST

ENGINE

Engine		
Idling speed rpm		750 ± 25
No-load maximum speed rpm		2600 ± 50
Injection timing degrees		0
Compression kPa (kgf/cm²)/rpm	Standard	3230 (33)/260
	Limit	1960 (20)/260
	Difference between cylinders	196 (2)/260
Fan belt flexure [when pushed with a force of 98 N (10 kgf)] mm (in)		8 ~ 13 (0.31 ~ 0.51)
Air cleaner		
Vacuum switch conduction test (conduction base)	Standard	7473 ± 569 Pa (762 ± 58 mmH_2O) [56.0 ± 4.3 mmHg]: Continuity shall exist.
Radiator		
Radiator cap valve opening pressure kPa (kgf/cm²)	Standard	73.5 ~ 103.0 (0.75 ~ 1.05)
	Limit	58.8 (0.6)
Battery		
Battery electrolyte specific gravity [at 68°F (20°C)]		1.250 ~ 1.280
Accelerator		
Accelerator lever operating force N (kgf)		34.3 ~ 49.0 (3.5 ~ 5.0)

HST

HST pump			
Charge pressure kPa (kgf/cm²)	Standard	At idling	153 (15.6)
		At maximum speed	253 (25.8)
Relief pressure kPa (kgf/cm²)	Standard	3001 (306)	
Tightening torque (HST pump)			**N·m (kgf-cm) [ft-lbf]**
Spring bracket set bolt		10.8 ~ 14.7 (110 ~ 150) [8.0 ~ 10.9]	
Control valve handle set nut		16.7 (170) [12.3] or less	
Bypass valve		9.8 ~ 13.7 (100 ~ 140) [7.2 ~ 10.1]	
Relief valve No.1 plug		41.2 ~ 95.1 (420 ~ 970) [30.4 ~ 70.2]	
Relief valve No. 2 plug LH·RH		95.1 ~ 230.5 (970 ~ 2350) [70.2 ~ 170.0]	
Servo piston set nut		15.7 ~ 16.7 (160 ~ 170) [11.6 ~ 12.3]	
Tightening torque (HST motor)			**N·m (kgf-cm) [ft-lbf]**
HST motor set bolt		47.1 ~ 70.6 (480 ~ 720) [34.7 ~ 52.1]	

REDUCTION GEAR

Drive chain		
Drive chain elongation mm (in)	Limit	Length between 6 links of rollers: 193.3 (7.61)
Drive unit		
Drive shaft starting force N (kgf)	Standard	29.4 ~ 44.1 (3.0 ~ 4.5)
Countershaft bearing starting force N (kgf)	Standard	No-load starting force + 3.9 ~ 5.9 (0.4 ~ 0.6)
Driven shaft bearing starting force N (kgf)	Standard	No-load starting force + 11.8 ~ 14.7 (1.2 ~ 1.5)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Drive unit set bolt		56.9 ~ 86.3 (580 ~ 880) [42.0 ~ 63.7]

AXLE

Axle		
Axle shaft no-load starting force N (kgf)	Standard	9.8 ~ 19.6 (1.0 ~ 2.0)
Axle shaft starting force N (kgf)	Standard	No-load starting force + 11.8 ~ 29.4 (1.2 ~ 3.0)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Hub nut		117.7 ~ 147.1 (1200 ~ 1500) [86.8 ~ 108.5]

BRAKE

Disc brake		
Disc pad thickness mm (in)	Standard	6.0 (0.24)
	Limit	5.5 (0.22)
Brake link		
Brake pedal height mm (in)	Standard	154 (6.06)
Brake pedal play mm (in)	Limit	35 (1.38)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Brake block set bolt		56.9 ~ 86.3 (580 ~ 880) [42.0 ~ 63.7]

BODY FRAME

Tightening torque	N·m (kgf-cm) [ft-lbf]
Service hole cover set nut	19.6 ~ 35.3 (200 ~ 360) [14.5 ~ 26.0]
Axle shaft service hole cover set nut	19.6 ~ 38.2 (200 ~ 390) [14.5 ~ 28.2]

LIFT ARM AND BUCKET BRACKET

Lift arm		
Natural drop (at lift cylinder rod) mm (in)/15 min.	Limit	60 (2.36) or less
Lift arm stopper clearance mm (in)	Standard	0 ~ 3 (0 ~ 0.12)
Lift arm levelness (difference between left and right) mm (in)	Limit	15 (0.59)
Bucket bracket		
Natural forward tilt (at dump cylinder rod) mm (in)/15 min.	Limit	60 (2.36) or less
Tightening Torque		N·m (kgf-cm) [ft-lbf]
Bucket bracket support pin stopper bolt		92.7 ~ 172.1 (945 ~ 1755) [68.4 ~ 127.0]

CYLINDERS

Lift cylinder		
Cylinder bore mm (in)	Standard	65.00 (2.559)
	Limit	65.35 (2.573)
Piston rod outside diameter mm (in)	Standard	40.00 (1.575)
	Limit	39.92 (1.572)
Piston rod bend mm (in)	Limit	1.5 (0.059)
Dump cylinder		
Cylinder bore mm (in)	Standard	60.00 (2.362)
	Limit	60.35 (2.376)
Piston rod outside diameter mm (in)	Standard	35.00 (1.378)
	Limit	34.92 (1.375)
Piston rod bend mm (in)	Limit	1.5 (0.059)
Tightening torque		N·m (kgf-cm) [ft-lbf]
Piston rod castle nut		28.4 ~ 34.3 (290 ~ 350) [21.0 ~ 25.3]
Piston rod guide		44.1 ~ 53.9 (450 ~ 550) [32.6 ~ 39.8]

OIL PUMP

Oil pump		
Gear plate inner face flaw depth mm (in)	Limit	0.1 (0.004)
Gear shaft diameter mm (in)	Limit	18.935 (0.7455)
Bush axial length mm (in)	Limit	26.411 (1.0398)
Bush inside diameter mm (in)	Limit	19.123 (0.7529)
Cylinder full stroke rise time (full load) Seconds	Standard	4
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Oil pump cover set bolt		46.1 ~ 48.6 (470 ~ 496) [34.0 ~ 35.9]

OIL CONTROL VALVE

Oil control valve		
Main relief valve set pressure kPa (kgf/cm^2)	Standard	1620 (165)
Port relief valve set pressure kPa (kgf/cm^2)	Standard	2060 (210)
Tightening torque		**N·m (kgf-cm) [ft-lbf]**
Detent guide		29.4 ~ 34.3 (300 ~ 350) [21.7 ~ 25.3]
Plunger set nut		23.6 (600) [43.4]
Main relief valve		29.4 ~ 34.3 (300 ~ 350) [21.7 ~ 25.3]
Port relief valve		29.4 ~ 34.3 (300 ~ 350) [21.7 ~ 25.3]

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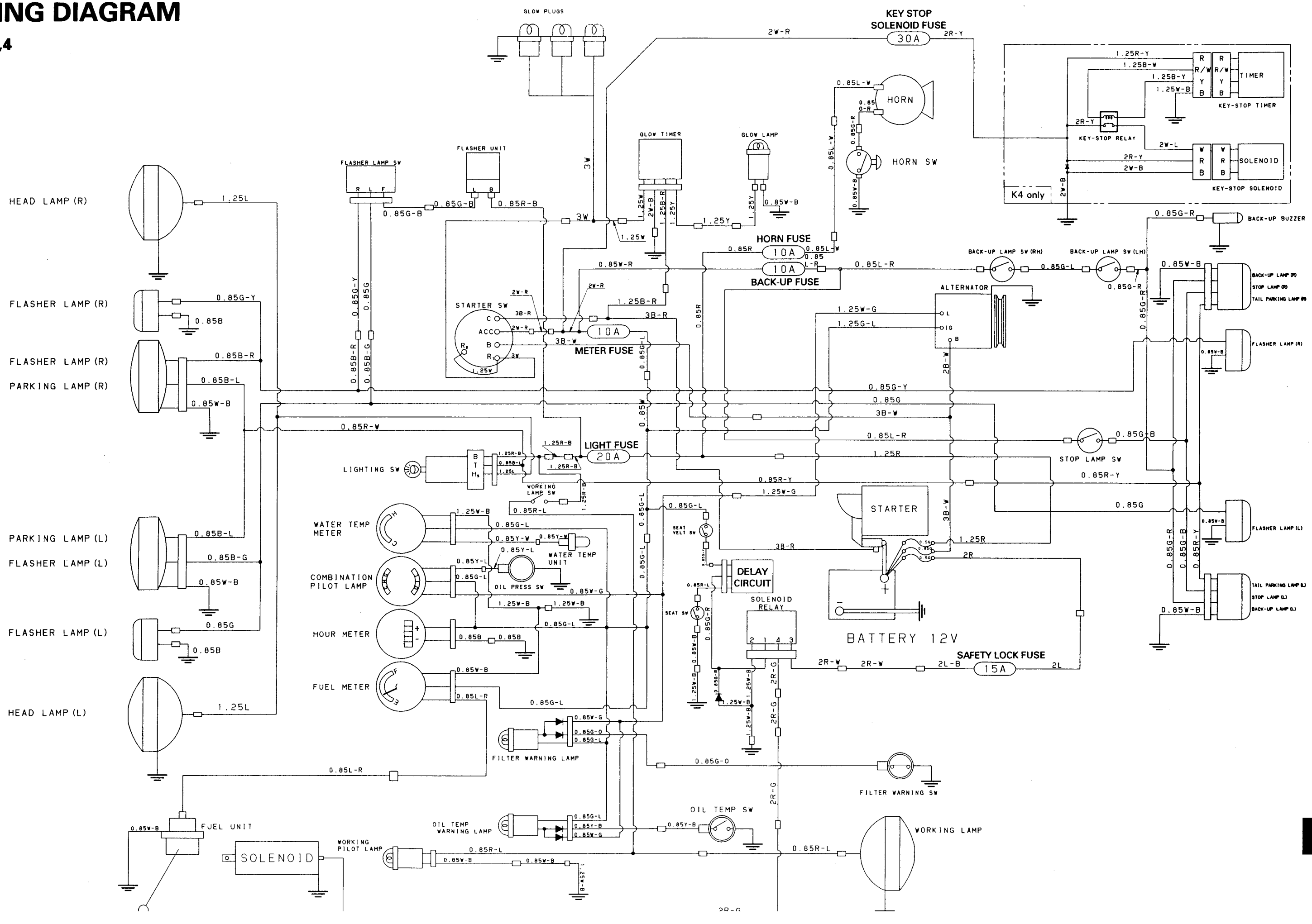
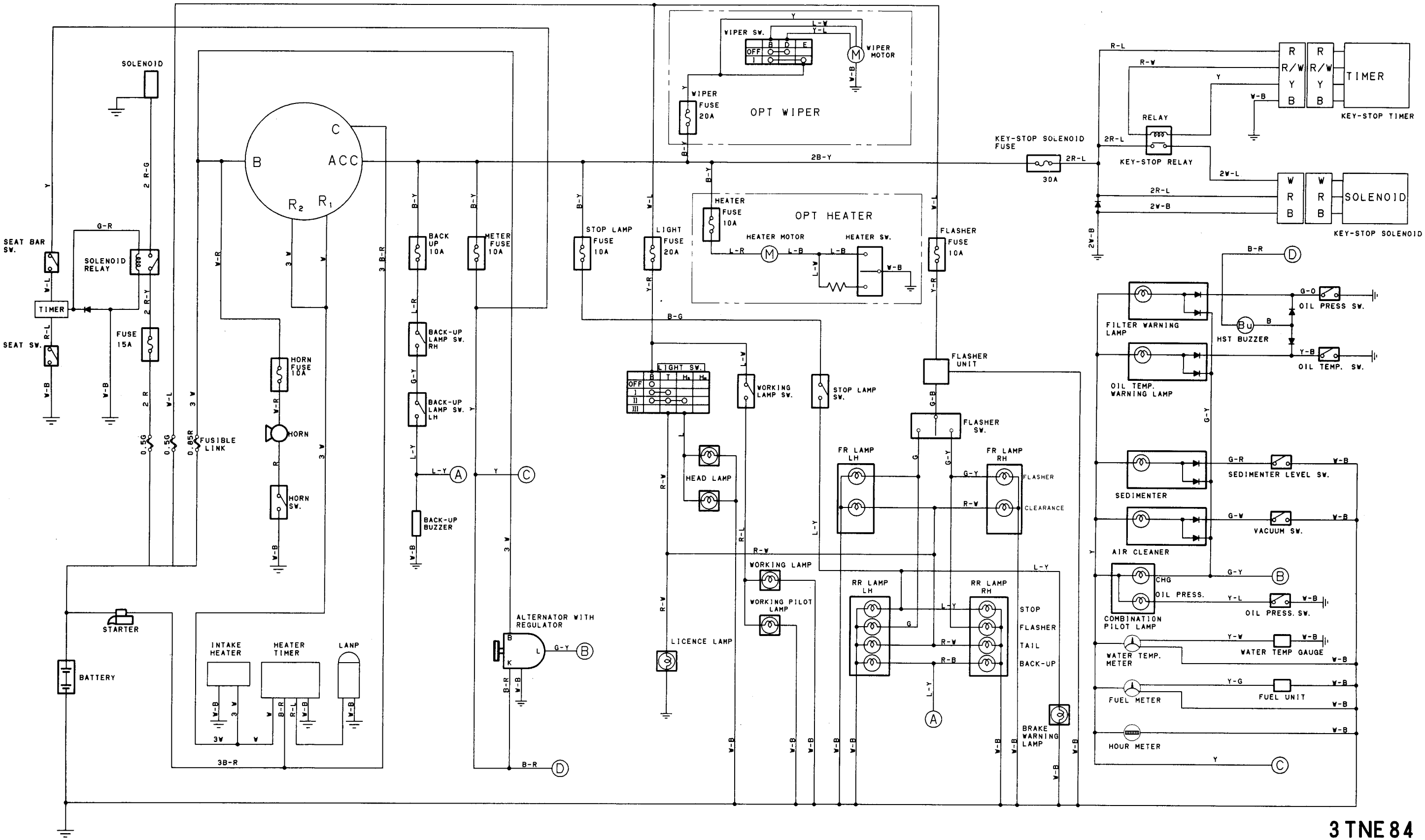
WIRING DIAGRAM

4SDK3,4



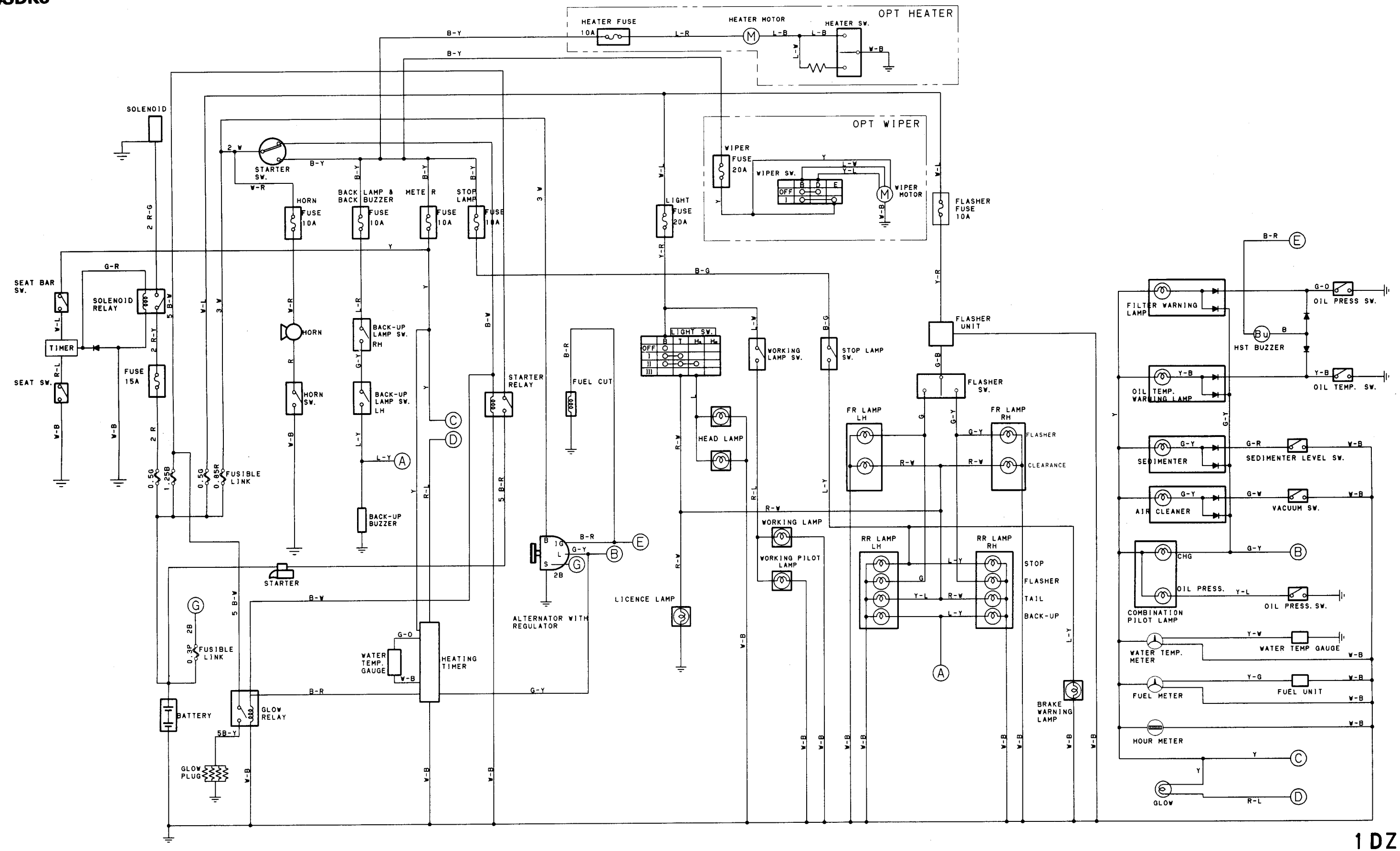
4SDK5,6



3 TNE 84

Note: The cable diameter is 0.85 or 1.25 unless specified otherwise.

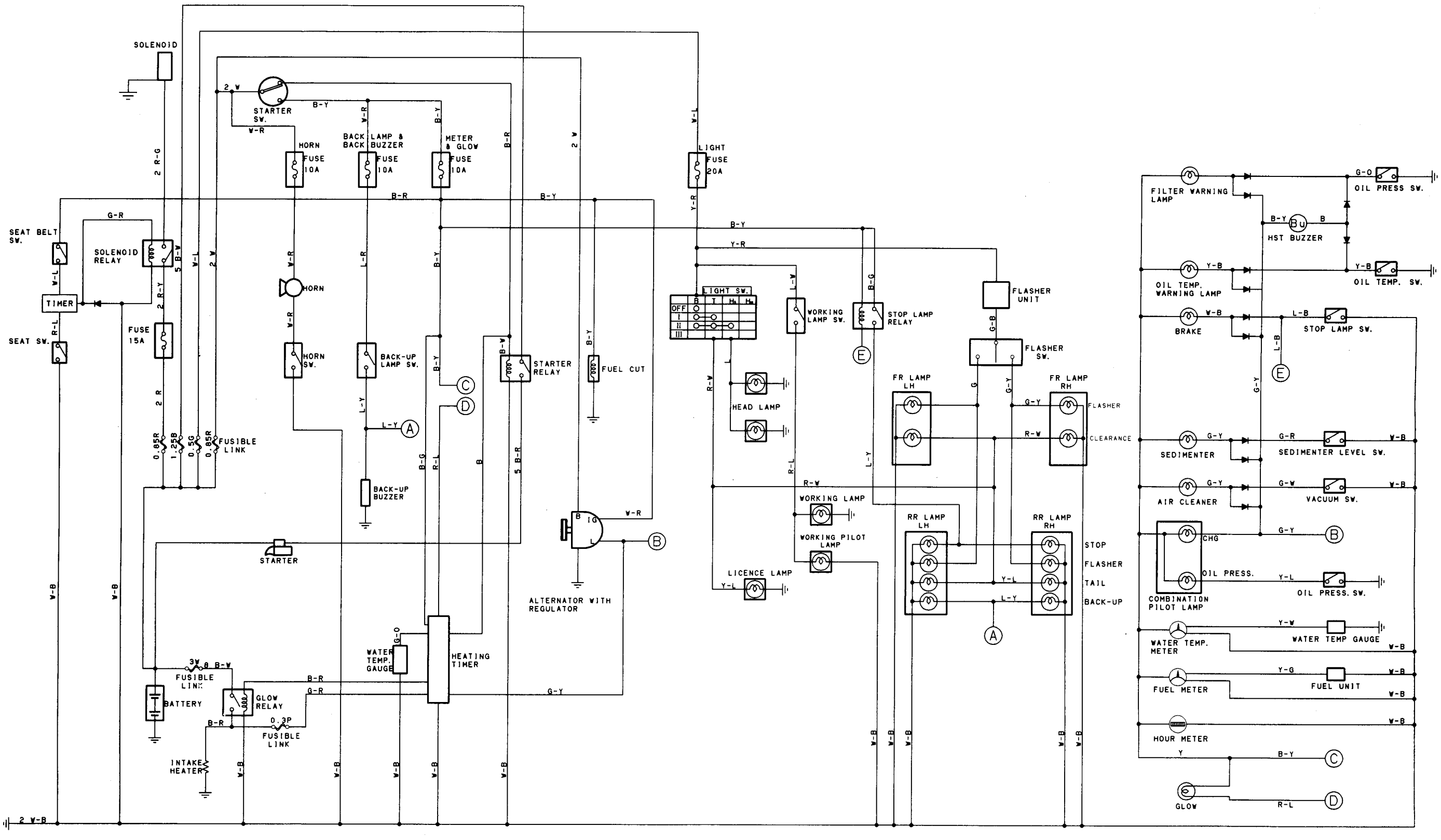
4SDK8



1DZ

Note: The cable diameter is 0.85 or 1.25 unless specified otherwise.

4SDK10



Note: The cable diameter is 0.85 or 1.25 unless specified otherwise.