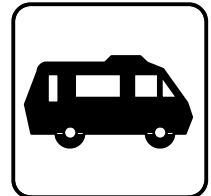


Service Parts

Mobile Generator Sets



Models:

7CCO

7CCOZ

10CCO

10CCOZ

KOHLER®
POWER SYSTEMS

ISO 9001
KOHLER
GENERATORS
INTERNATIONALLY REGISTERED
U.S.A. Plant ISO Registered

Specification Series 190

TP-5596 9/01b

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Notes

Introduction

This manual contains a complete list of engine and generator service replacement parts for Kohler 7 and 10CCO/CCOZ Kubota-powered generator sets.

This manual includes the following main sections:

- **Table of Contents:** Lists the sections of this catalog.
- **Introduction (and other information sections):** Contains introductory material followed by sections on specification numbers, part numbers, and hardware.
- **Index:** Indexes specifications and their groups.
- **Group Parts Lists:** Lists part numbers of parts in the groups. Illustrations are given for most parts.
- **Kit List and kit sections:** Lists kits (by model) and their parts.
- **Appendices:** Includes Glossary of Abbreviations, Common Hardware Application Guidelines, Common Hardware Identification, General Torque Specifications, and Common Hardware List.

Number Significance

This catalog uses a variety of numbering systems. A description of these follows:

- **Specification Number:** The generator specification number (spec number) is six digits with a PA-, PB- or PE- prefix (Specification Number Index does not show prefixes). The first three digits designate generator size and engine model (specification series). The remaining digits are in sequence and identify a particular spec in a series. Spec numbers break down into groups.
- **Group Number:** A group consists of parts needed to perform one or more related functions. For example, the 101 group is the generator set Air Intake group.
- **Variation Number:** A group might have several variations. Parts comprising each variation perform the same function, but parts lists vary. For example, a 50 Hz generator alternator and 60 Hz generator alternator both perform the same function. However, they are constructed of different parts. Each of these differences necessitates the assignment of a group variation number.
- **Part Number:** The part number identifies an individual assembly, subassembly, component, or accessory kit.

Exploded View Drawings

- **Exploded view drawings:** One or more drawings which best represent a range of variations accompanies each Group Parts List in this catalog. The drawings are a guide to part identification—they are not intended for assembly, disassembly, or maintenance. **Use generator set service and other manuals for assembly and maintenance.**

Some parts are drawn out of proportion to display distinguishing characteristics. Some common parts are not drawn in detail. For example, the image of a hex cap screw represents a range of screws. Use the text description and part number to positively identify a part.

How to Find Part Numbers

FOLLOW THESE STEPS to identify a part:

STEP 1: Turn to the Specification Number Index in the front of the catalog. There is a table of spec numbers (grouped by model and listed vertically on the left) and the variations that comprise the groups of each spec number (listed horizontally). Locate a spec number and read across the page to see the variation numbers for the groups (identified by column headings).

STEP 2: Using the page number in the Table of Contents, turn to the group parts list in which the desired part belongs. Use the drawings and itemized text to locate the part and its part number.

Hardware Grades

When replacing hardware do not substitute inferior grade hardware. All hex. head screws are hardness grade 5, except where noted. Socket head screws are similar to grade 8. All replacement hardware should be at least equal to original manufacturer's hardware quality. Refer to Common Hardware Application Guidelines and Common Hardware Identification in the back of the manual.

Hardware References

Many common hardware items will appear in parts catalogs as **common hardware entries** or **hardware references**. A *common hardware entry* refers to the size of common hardware to apply in accordance with hardware guidelines. For example, item 2 (nut) in Figure 1 below would appear as "3/8-16 hardware" in the text. It indicates that the nut is 3/8-16 size. See Common Hardware Application Guidelines.

A *hardware reference* has the abbreviation "ref." in the part's description. Hardware references specify common hardware items; however, size or some other characteristic requires specification in that application. For example, item 1 in Figure 1 below might appear in the text as:

Screw, 3/8-16 x 1, ref. X-6021-1

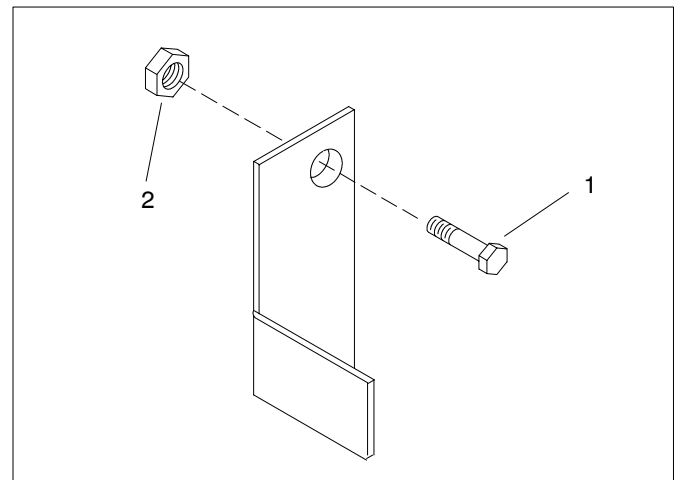


Figure 1. Hardware References

Specification Number Index

GROUP TITLE & NUMBER	Crankcase	Oil Pan	Cylinder Head	Gear Case	Water Pump	Main Bearing Case	Cylinder Head Cover	Intake & Exhaust Manifold	Rocker Arm & Valves	Camshaft	Crankshaft & Piston	Flywheel	Starter	Fuel Injection pipes
	1	2	3	4	5	6	7	9	11	12	13	14	15	16
SPEC NO.	VARIATION NUMBER													
7 kW														
190001	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190003	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190005	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190007	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190009	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190012	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190013	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190014	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190018	1	1	1	1	1	1	1	3	1	1	1	1	3	1
190019	1	1	1	1	1	1	1	3	1	1	1	1	3	1
190020	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190021	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 kW														
190002	2	2	2	2	2	2	2	2	2	2	2	2	2	2
190004	2	2	2	2	2	2	2	2	2	2	2	2	2	2
190006	2	2	2	2	2	2	2	2	2	2	2	2	2	2
190008	2	2	2	2	2	2	2	2	2	2	2	2	2	2
190010	2	2	2	2	2	2	2	2	2	2	2	2	2	2
190011	2	3	2	2	2	2	2	2	2	2	2	2	2	2
190015	2	3	2	2	2	2	2	2	2	2	2	2	2	2
190016	2	3	2	2	2	2	2	2	2	2	2	2	2	2
190017	2	3	2	2	2	2	2	2	2	2	2	2	2	2
190022	2	3	2	2	2	2	2	2	2	2	2	2	2	2
190023	2	3	2	2	2	2	2	2	2	2	2	2	2	2
190024	2	3	2	2	2	2	2	2	2	2	2	2	2	2

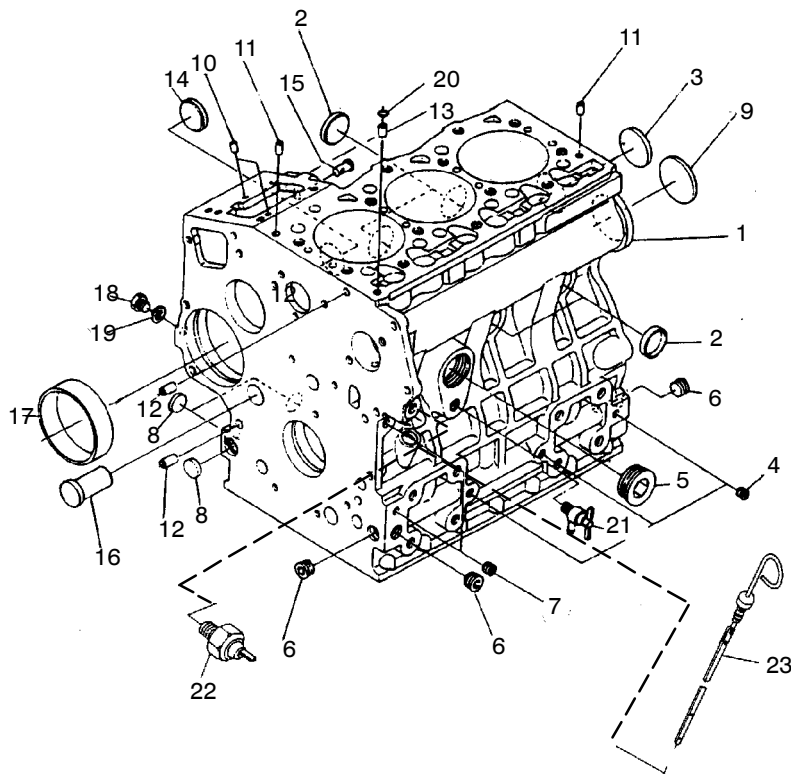
Specification Number Index

GROUP TITLE & NUMBER	Nozzle Component Parts	Fuel Injection Pump	Fuel Injection Parts	Fuel Camshaft	Fuel Shut-off Solenoid	Governor Plate	Governor	Alternator Mounting	Alternator Component Parts	Water Flange	Fuel Filter & Fuel Pump	Gasket Sets		
	17	18	19	20	21	22	23	24	25	26	29	30		
SPEC NO.	VARIATION NUMBER													
7 kW														
190001	1	1	1	1	1	1	1	1	1	1	1	1		
190003	1	1	1	1	1	1	1	1	1	1	1	1		
190005	1	1	1	1	1	1	1	1	1	1	1	1		
190007	1	1	1	1	1	1	1	1	1	1	1	1		
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190012	1	1	1	1	1	1	1	1	1	1	1	1		
190013	1	1	1	1	1	1	1	1	1	1	1	1		
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190019	1	1	1	1	1	1	1	1	1	1	1	1		
190020	1	1	1	1	1	1	1	1	1	1	1	1		
190021	1	1	1	1	1	1	1	1	1	1	1	1		
10 kW														
190002	2	2	2	2	1	2	2	2	2	1	1	2		
190004	2	2	2	2	1	2	2	2	2	1	1	2		
190006	2	2	2	2	1	2	2	2	2	1	1	2		
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190011	2	2	2	2	1	2	2	2	2	3	1	2		
190015	2	2	2	2	1	2	2	2	2	1	1	2		
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190022	2	2	2	2	1	2	2	2	2	1	1	2		
190023	2	2	2	2	1	2	2	2	2	1	1	2		
190024	2	2	2	2	1	2	2	2	2	1	1	2		

Specification Number Index

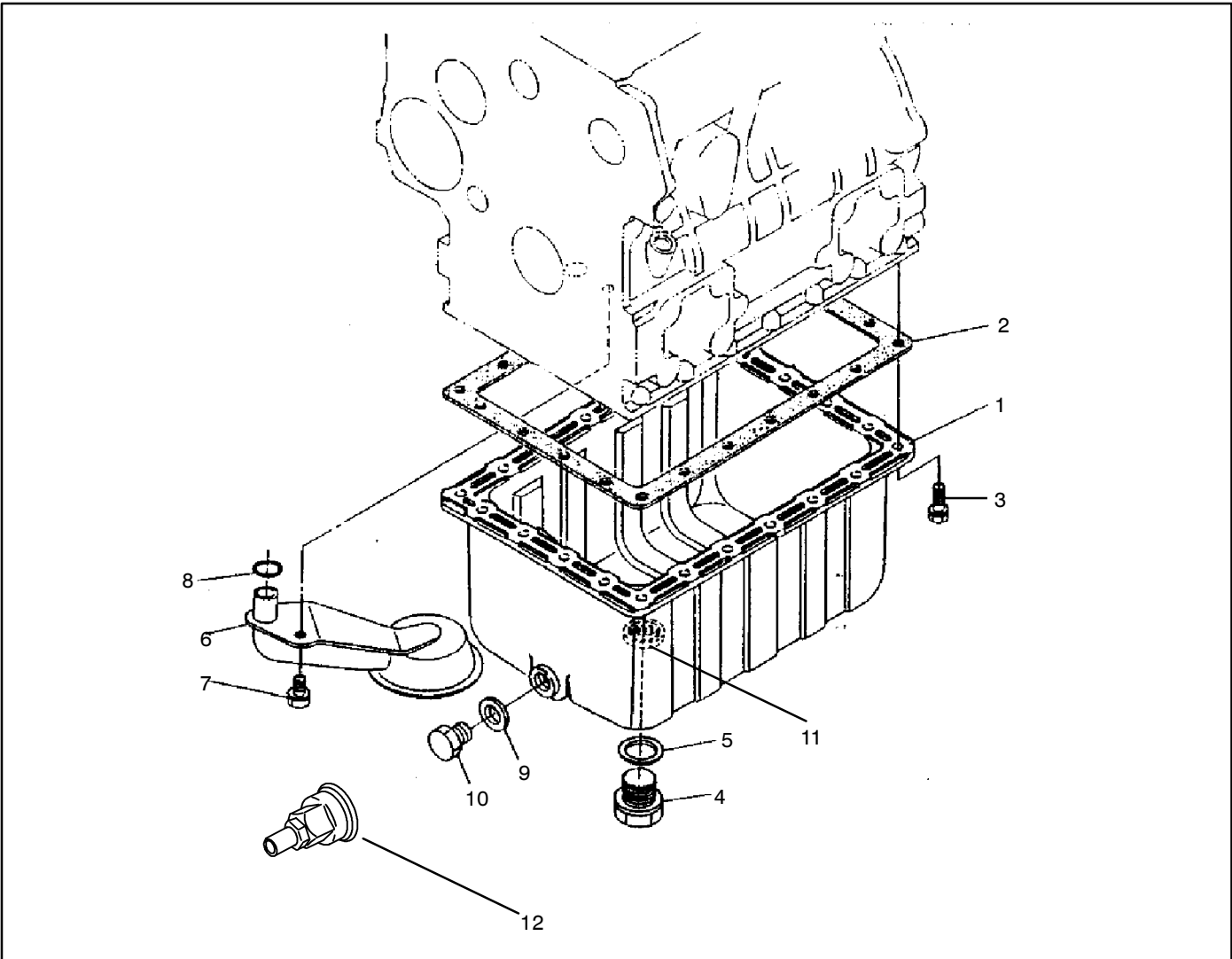
GROUP TITLE & NUMBER														
	Air Intake	Cooling System	Engine	Nameplate and Decals	Oil Pressure Gauge & Switch	Skid and Plant Mounting	Generator and Mounting	Controller and Mounting	Literature					
	101	104	105	107	108	109	201	301	701					
SPEC NO.	VARIATION NUMBER													
7 kW														
190001	1	1	1	1	-	1	1	4	1					
190003	1	3	1	7	-	1	1	4	1					
190005	1	1	1	3	-	1	3	2	1					
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190009	1	3	1	5	-	1	5	4	1					
190012	1	5	1	14	-	1	1	4	1					
190013	1	5	1	10	-	1	3	2	1					
190014	1	5	1	10	-	1	5	4	1					
190018	4	7	5	12	99	4	8	5	3					
190019	5	1	6	13	-	1	12	4	1					
190020	1	1	1	3	-	1	9	2	1					
190021	1	5	1	17	-	1	9	2	1					
10 kW														
190002	2	2	2	2	-	2	2	4	1					
190004	2	3	2	8	-	2	2	4	1					
190006	2	2	2	4	-	2	4	2	1					
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190022	2	2	2	4	-	2	10	2	1					
190023	2	6	4	16	-	2	10	2	1					
190024	-	4	3	9	1	3	11	3	1					

Group 1: Crankcase



Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	1	Complete Crankcase (Includes items 2-20)	322532	11	2	Pin, Straight 1, 2	322041
	1	Complete Crankcase (Includes items 2-20)	322510	12	2	Pin, Pipe 1, 2	322071
2	4	Cap, Sealing 1	322085	13	1	Pin, Pipe 1, 2	322307
	6	Cap, Sealing 2	322085	14	1	Plug 1	322364
3	1	Cap, Sealing 1, 2	322062		2	Plug	322364
4	3	Plug 1	322079	15	1	Pin, Start Spring 1	322403
	4	Plug 2	322079		1	Pin, Start Spring 2	322403
5	1	Plug 1, 2	322449	16	1	Plug 1, 2	322455
6	3	Plug 1, 2	322362	17	1	Bush, Governor Gear 1, 2	322434
7	2	Plug 1, 2	322109	18	1	Plug 1, 2	322063
8	3	Plug, Expansion 1, 2	322490	19	1	Gasket 1, 2	322059
9	1	Plug, Expansion 1, 2	322450	20	1	O-Ring 1, 2	322064
10	1	Pin, Straight 1	322040	21	1	Cock Assembly, Drain 1, 2	322137
	2	Pin, Straight 2	322040	22	1	Switch, Oil Pressure 1, 2	322112
				23	1	Dipstick, Oil 1, 2	322376

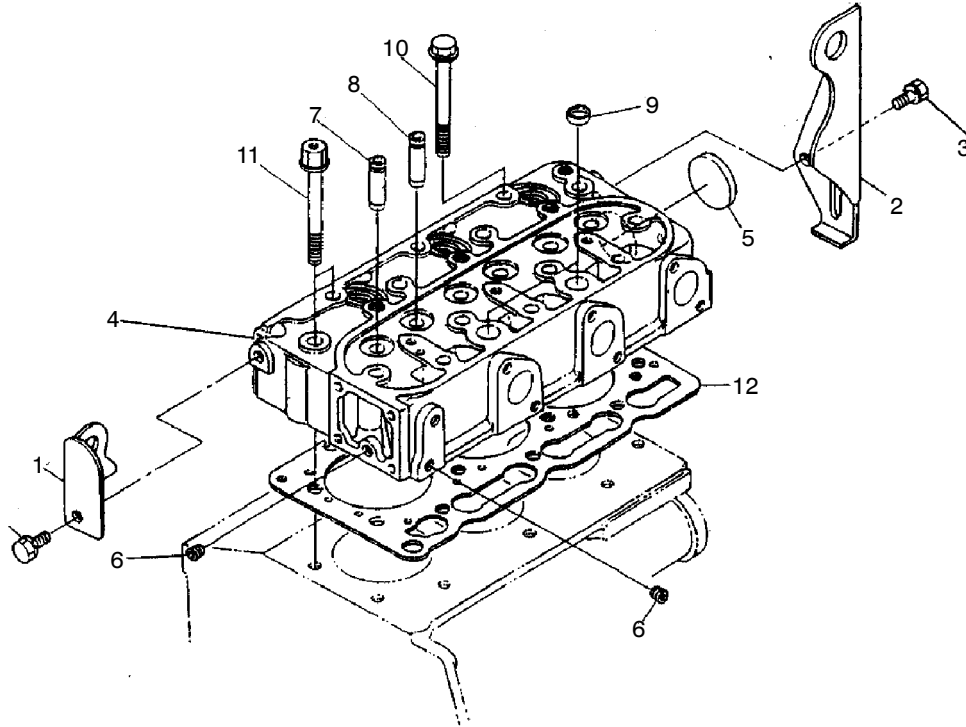
Group 2: Oil Pan



Item	Qty.	Description Variation	Part No.
1	1	Complete Oil Pan 1	322464
	1	Complete Oil Pan 2, 3	322465
2	1	Gasket, Oil Pan 1	322231
	1	Gasket, Oil Pan 2, 3	322236
3	22	Bolt 1	322001
	26	Bolt 2, 3	322001
4	1	Plug, Drain 1, 2, 3	322084

Item	Qty.	Description Variation	Part No.
5	1	Gasket 1, 2, 3	322086
6	1	Filter, Oil 1, 2, 3	322306
7	1	Bolt 1, 2, 3	322012
8	1	O-Ring 1, 2, 3	322035
9	1	Gasket 1, 2	322539
10	1	Plug 1, 2	322065
11	1	Nut, Drain 1, 2, 3	322457
12	1	Valve, Oil Drain 3	225696

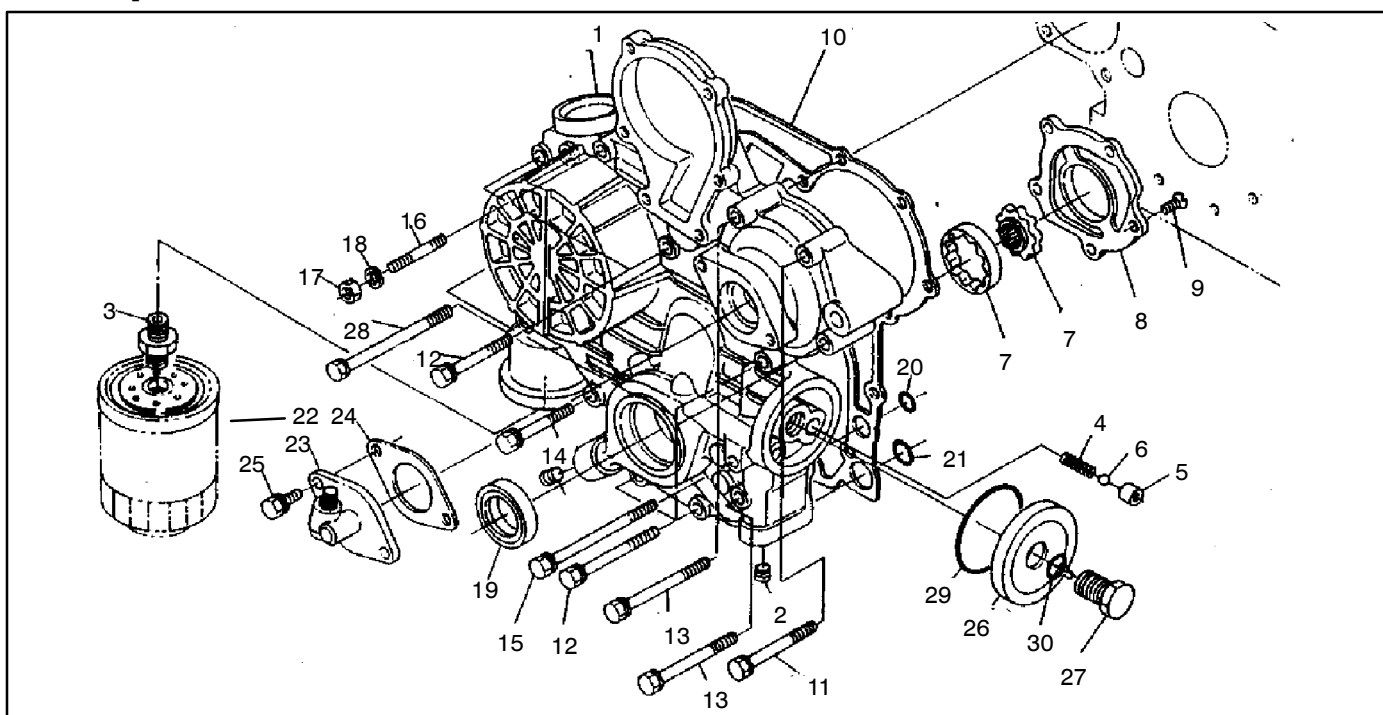
Group 3: Cylinder Head



Item	Qty.	Description Variation	Part No.
1	1	Hook, Engine 1 1, 2	322237
2	1	Hook, Engine 2 1, 2	322238
3	2	Bolt 1, 2	322011
4	1	Cylinder Head (Includes items 5-9) 1	322229
	1	Cylinder Head (Includes items 5-9) 2	322369
5	1	Cap, Sealing 1, 2	322080
6	2	Plug 1, 2	322079
7	3	Guide, Inlet Valve 1	322261
	4	Guide, Inlet Valve 2	322261

Item	Qty.	Description Variation	Part No.
8	3	Guide, Exhaust Valve 1	322262
	4	Guide, Exhaust Valve 2	322262
9	2	Cap, Sealing 1	322073
	3	Cap, Sealing 2	322073
10	12	Bolt, Cylinder Head 1	322239
	16	Bolt, Cylinder Head 2	322239
11	2	Bolt, Cylinder Head 1, 2	322410
12	1	Gasket, Cylinder Head 1	322225
	1	Gasket, Cylinder Head 2	322409

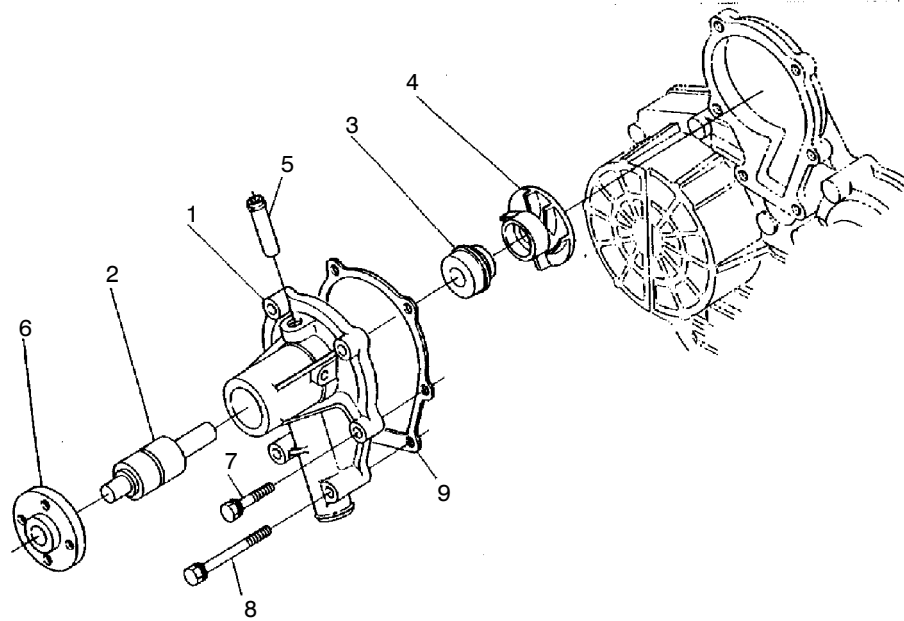
Group 4: Gear Case



Item	Qty.	Description Variation	Part No.
1	1	Complete Case, Gear (Includes items 2-9) 1, 2	322371
2	4	Plug 1	322363
	2	Plug 2	322363
3	1	Joint, Pipe 1, 2	322072
4	1	Spring 1, 2	322311
5	1	Seat, Valve 1, 2	322310
6	1	Ball 1, 2	322046
7	1	Rotor, Oil Pump 1, 2	322308
8	1	Cover, Oil Pump 1, 2	322375
9	5	Screw 1, 2	322357
10	1	Gasket, Gear Case 1, 2	322241
11	3	Bolt 1, 2	322007
12	6	Bolt 1	322008
	4	Bolt 2	322008
13	2	Bolt 1, 2	322009
14	1	Bolt 1, 2	322139

Item	Qty.	Description Variation	Part No.
15	2	Bolt 1, 2	322351
16	1	Stud 1, 2	322021
17	1	Nut 1, 2	322023
18	1	Washer, Spring 1, 2	322030
19	1	Seal, Oil 1, 2	322372
20	2	O-Ring 1, 2	322036
21	2	O-Ring 1, 2	322034
22	1	Cartridge Assembly, Oil 1, 2	322422
23	1	Cover 1, 2	322462
24	1	Gasket, H/Meter Unit 1, 2	322349
25	2	Bolt w/Washer 1, 2	322002
26	1	Cover 1, 2	322373
27	1	Bolt 1, 2	322374
28	1	Bolt 1, 2	322535
29	1	O-Ring 1, 2	322039
30	1	O-Ring 1, 2	322034

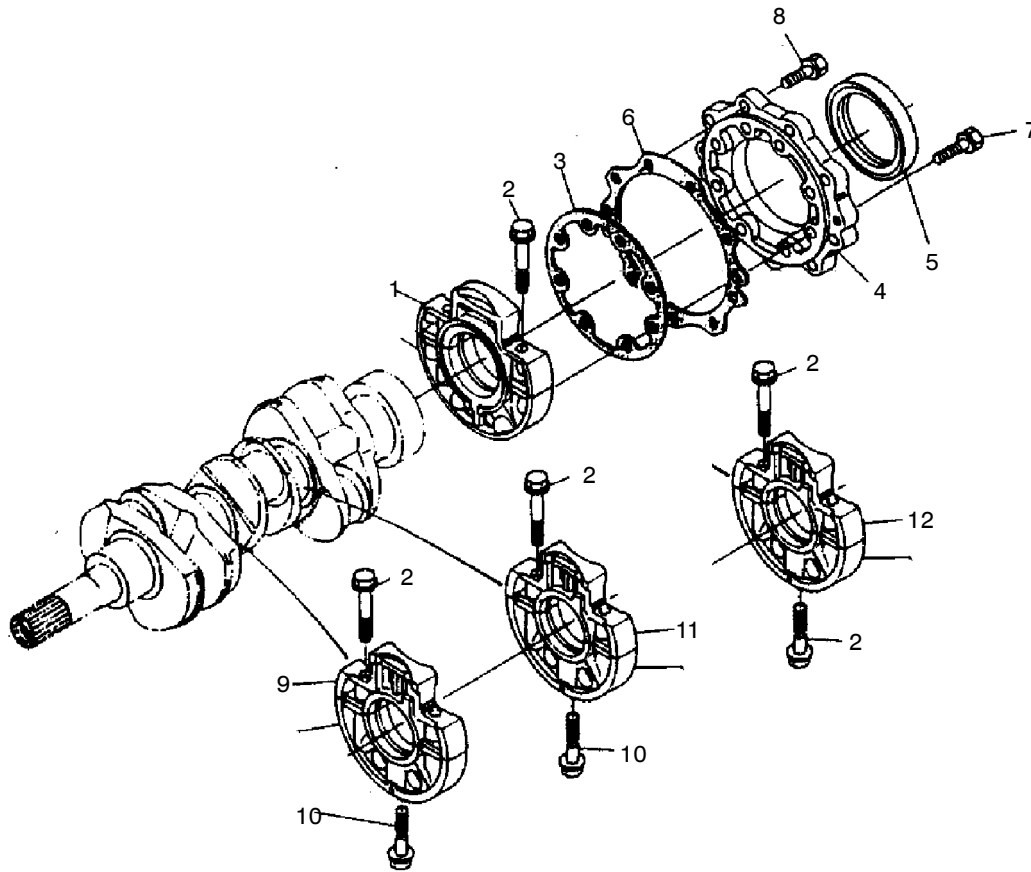
Group 5: Water Pump



Item	Qty.	Description Variation	Part No.
1	1	Water Pump Assembly (Includes items 2-6) 1, 2	322379
2	1	Bearing, Ball 1, 2	322383
3	1	Assy Seal, Mechanical 1, 2	322088
4	1	Impeller, Water Pump 1, 2	322381

Item	Qty.	Description Variation	Part No.
5	1	Pipe, Water Return 1 1, 2	322344
6	1	Flange, Water Pump 1	322382
	1	Flange, Water Pump 2	322526
7	4	Bolt 1, 2	322006
8	2	Bolt 1, 2	322010
9	1	Gasket, Water Pump 1, 2	322380

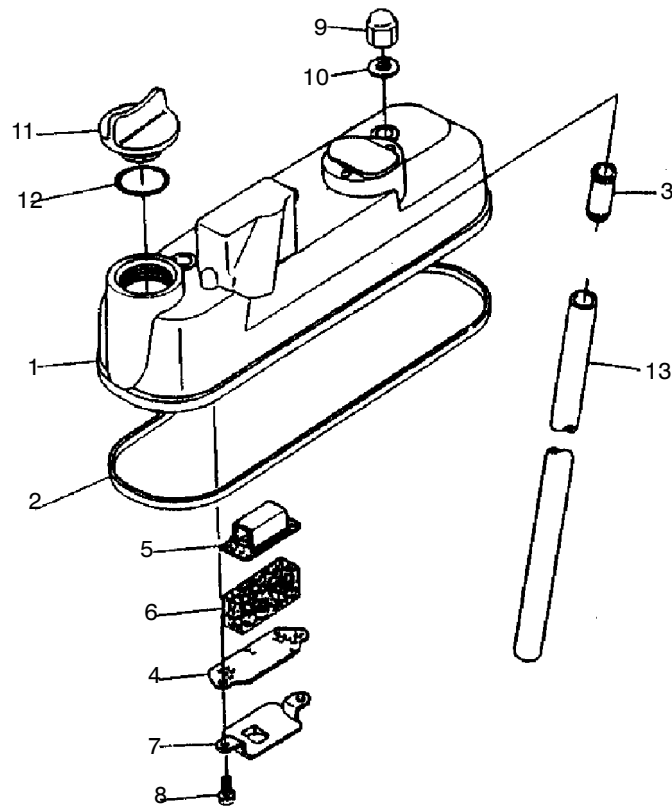
Group 6: Main Bearing Case



Item	Qty.	Description Variation	Part No.
1	1	Case, Main Bearing 1, 2	322240
2	6	Bolt, Bearing Case 1 1	322244
	8	Bolt, Bearing Case 1 2	322224
3	1	Gasket, Bearing Case 1, 2	322242
4	1	Cover, Bearing Case 1, 2	322246
5	1	Seal, Oil 1, 2	322243
6	1	Gasket, Bearing Case Cover 1, 2	322247

Item	Qty.	Description Variation	Part No.
7	8	Bolt 1, 2	322005
8	9	Bolt 1, 2	322004
9	1	Case, Main Bearing 1 1, 2	322411
10	2	Bolt, Bearing Case 2 1	322245
	3	Bolt, Bearing Case 2 2	322245
11	1	Case, Main Bearing 2 1, 2	322412
12	1	Case, Main Bearing 3 2	322413

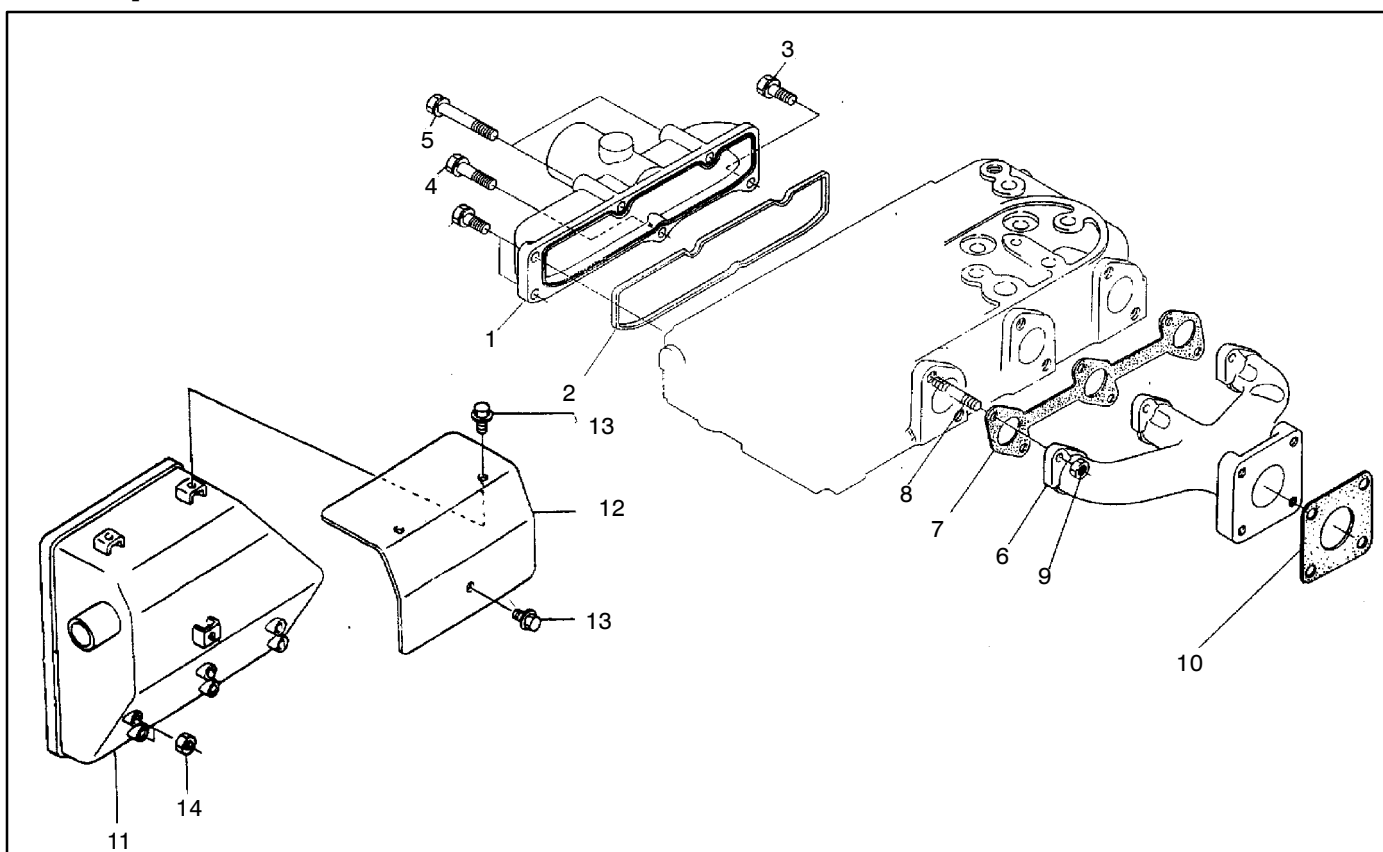
Group 7: Cylinder Head Cover



Item	Qty.	Description Variation	Part No.
1	1	Cover, Cylinder Head 1	322527
	1	Cover, Cylinder Head 2	322272
2	1	Gasket, Head Cover 1	322528
	1	Gasket, Head Cover 2	322273
3	1	Joint, Breather Pipe 1, 2	322252
4	1	Plate, Element 1 1, 2	322248
5	1	Plate, Element 2 1, 2	322249
6	1	Element, Breather 1, 2	322253
7	1	Oil Shield, Breather 1, 2	322250

Item	Qty.	Description Variation	Part No.
8	2	Screw, with Washer 1, 2	322025
9	3	Nut, Cap 1	322224
	4	Nut, Cap 2	322224
10	3	Gasket 1	322223
	4	Gasket 2	322223
11	1	Plug, Oil Filter 1	322194
	2	Plug, Oil Filter 2	322524
12	1	O-Ring 1	322038
	2	O-Ring 2	322038
13	1	Pipe, Breather 1, 2	322251

Group 9: Intake & Exhaust Manifold



Item	Qty.	Description Variation	Part No.
------	------	--------------------------	----------

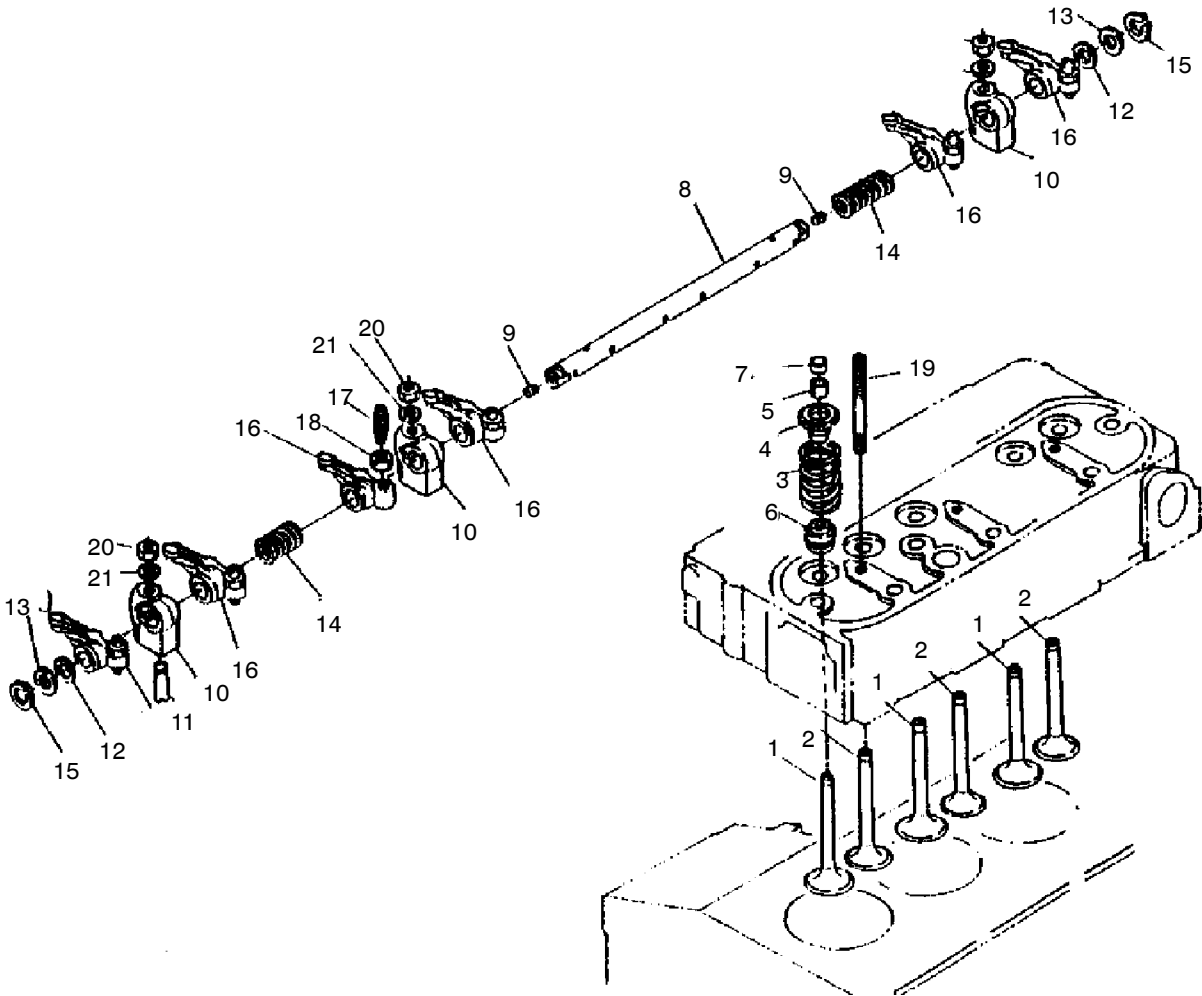
1	1	Manifold, Intake 1, 3	322385
1	1	Manifold, Intake 2	322414
2	1	Gasket, Intake Manifold 1, 3	322386
1	1	Gasket, Intake Manifold 2	322254
3	3	Bolt 1, 2, 3	322003
4	1	Bolt 1, 3	322006
	2	Bolt 2	322006
5	2	Bolt 1, 3	322008
	3	Bolt 2	322008
6	1	Manifold, Exhaust 1	322489
	1	Manifold, Exhaust 2	322467

Item	Qty.	Description Variation	Part No.
------	------	--------------------------	----------

7	1	Gasket, Exhaust Manifold 1, 3	322387
	1	Gasket, Exhaust Manifold 2	322255
8	6	Stud 1	322353
	8	Stud 2	322353
	3	Stud, Long 3	322613
	3	Stud, Short 3	322614
9	6	Nut 1	322447
	8	Nut 2	322447
10	1	Gasket, Muffler 1, 2	322081
11	1	Muffler/manifold combination 3	322584
12	1	Muffler Cover 3	225998
13	3	Bolt 3	X-6049-8
14	6	Nut 3	322447

Notes

Group 11: Rocker Arm & Valves

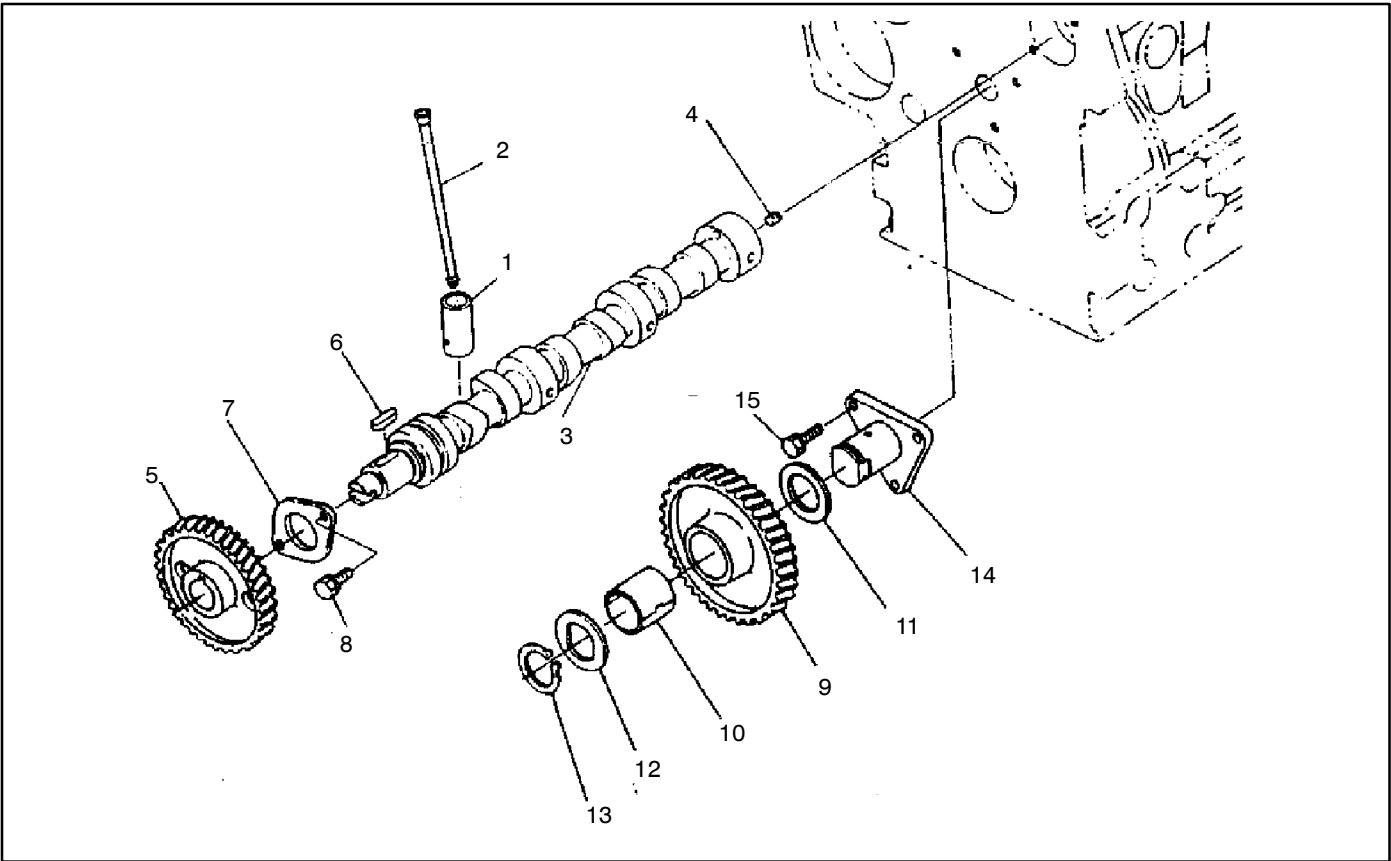


Group 11: Rocker Arm & Valves

Item	Qty.	Description Variation	Part No.
1	3	Valve, Inlet 1	322256
	4	Valve, Inlet 2	322256
2	3	Valve, Exhaust 1	322257
	4	Valve, Exhaust 2	322257
3	6	Spring, Valve 1	322415
	8	Spring, Valve 2	322415
4	6	Retainer, Valve Spring 1	322260
	8	Retainer, Valve Spring 2	322260
5	6	Collet, Valve Spring 1	322074
	8	Collet, Valve Spring 2	322074
6	6	Seal, Valve Stem 1	322258
	8	Seal, Valve Stem 2	322258
7	6	Cap, Valve 1	322259
	8	Cap, Valve 2	322259
8	1	Shaft, Rocker Arm (Includes item 9) 1	322388
	1	Shaft, Rocker Arm 2	322264
9	2	Screw, Set 1, 2	322027
10	3	Bracket, Rocker Arm 1	322268
	4	Bracket, Rocker Arm 2	322268
11	1	Screw, Set 1, 2	322075

Item	Qty.	Description Variation	Part No.
12	2	Washer 1 1, 2	322270
13	2	Washer 2 1, 2	322271
14	2	Spring, Rocker Arm 1	322267
	3	Spring, Rocker Arm 2	322267
15	2	Cir-Clip, External 1, 2	322534
16	6	Assembly, Rocker Arm (Includes items 17 & 18) 1	322263
	8	Assembly, Rocker Arm (Includes items 17 & 18) 2	322263
17	6	Screw, Adjusting 1	322265
	8	Screw, Adjusting 2	322265
18	6	Nut 1	322266
	8	Nut 2	322266
19	3	Stud 1	322269
	4	Stud 2	322269
20	3	Nut 1	322077
	4	Nut 2	322077
21	3	Washer, Plain 1	322078
	4	Washer, Plain 2	322078

Group 12: Camshaft



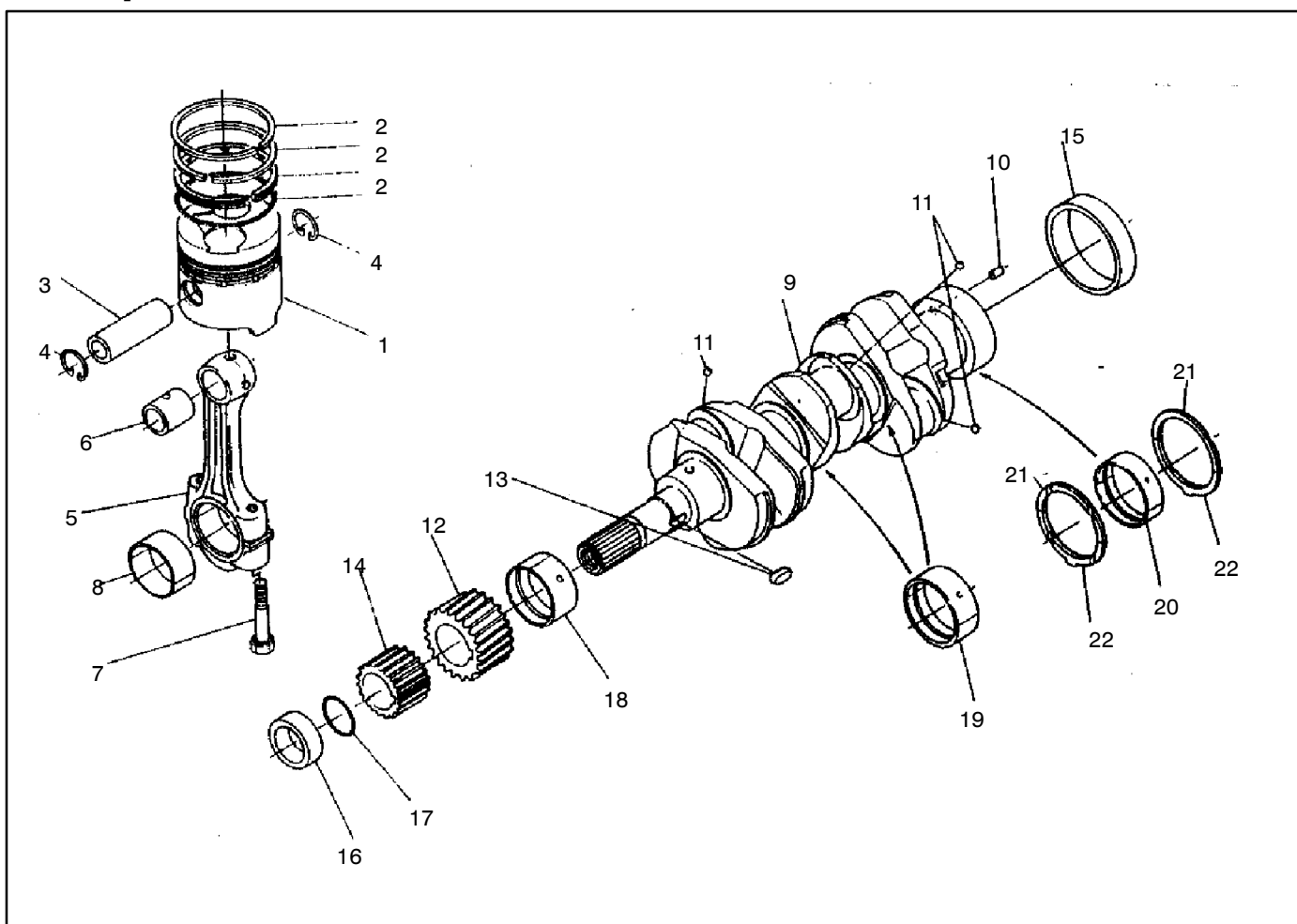
Item	Qty.	Description Variation	Part No.
1	6	Tappet	322389
		1	
	8	Tappet	322389
		2	
2	6	Push Rod	322274
		1	
	8	Push Rod	322274
		2	
3	1	Camshaft Assembly (Includes items 4-8)	322390
		1	
	1	Camshaft	X
		2	
4	1	Screw, Set	X
		1,2	
5	1	Gear, Camshaft	X
		1,2	
6	1	Key, Feather	X
		1,2	

Item	Qty.	Description Variation	Part No.
7	1	Stopper, Camshaft	X
		1,2	
8	2	Bolt	X
		1,2	
9	1	Complete Idle Gear 1 (Includes item 10)	322420
		1,2	
10	1	Bushing, Idle Gear	322421
		1,2	
11	1	Collar, Idle Gear 1	322303
		1,2	
12	1	Collar, Idle Gear 2	322304
		1,2	
13	1	Cir-Clip, Idle Gear	322302
		1,2	
14	1	Shaft, Idle Gear 1	322301
		1,2	
15	3	Bolt With Washer	322002
		1	

X Part not available separately.

Notes

Group 13: Crankshaft & Piston



Item	Qty.	Description Variation	Part No.
1	3	Piston Std	322226
		1	
	4	Piston Std	322367
		2	
	3	Piston +0.5	322227
		1	
	4	Piston +0.5	322368
		2	
2	3	Piston Ring Assembly Std	322221
		1	
	4	Piston Ring Assembly Std	322418
		2	
	3	Piston Ring Assembly +0.5mm	322222
		1	
	4	Piston Ring Assembly +0.5mm	322419
		2	
3	3	Pin, Piston	322279
		1	
	4	Pin, Piston	322279
		2	

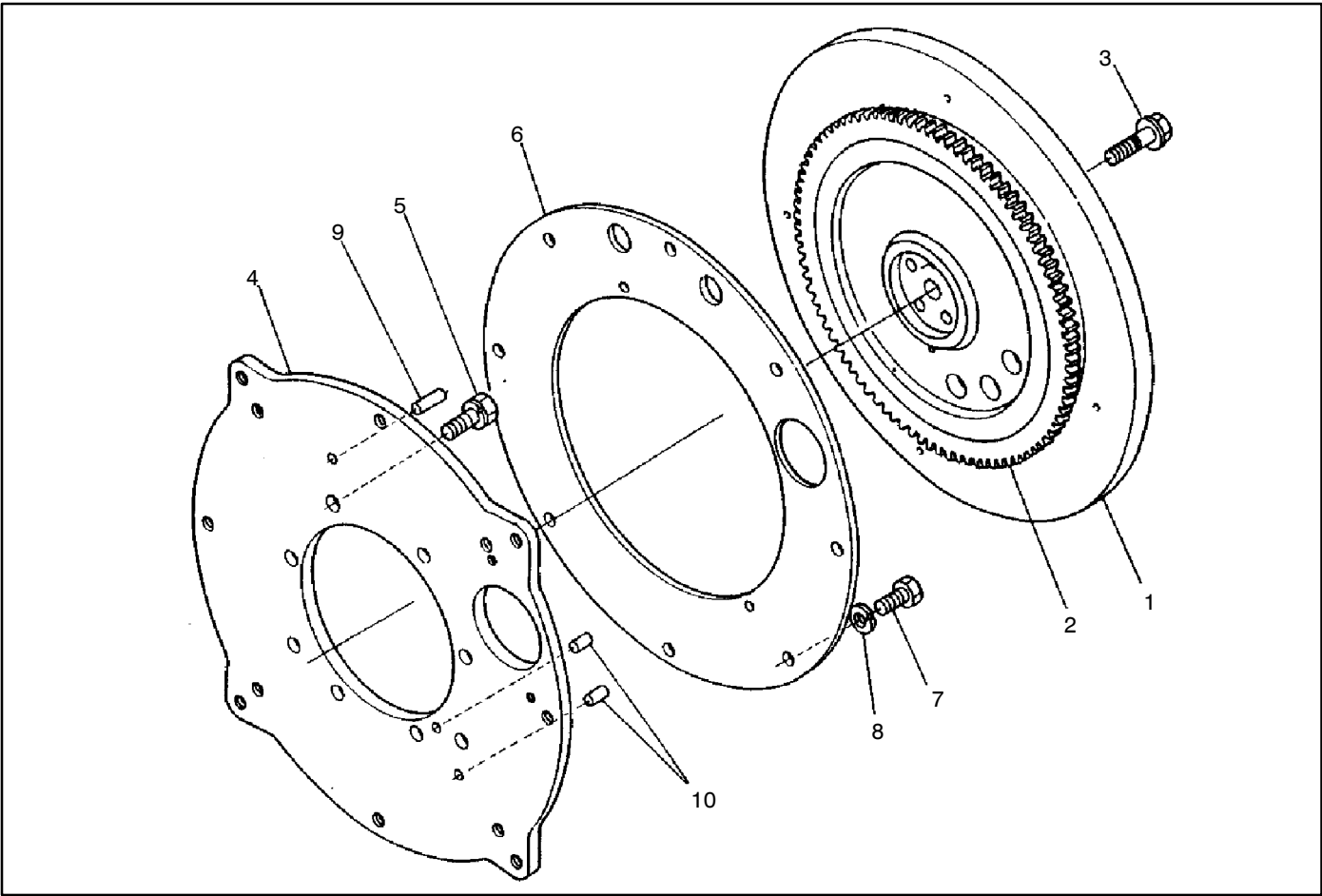
Item	Qty.	Description Variation	Part No.
4	6	Cir-Clip, Piston Pin	322280
		1	
	8	Cir-Clip, Piston Pin	322280
		2	
5	3	Connecting Rod Assembly (Includes items 6-8)	322283
		1	
	4	Connecting Rod Assembly (Includes items 6-8)	322283
		2	
6	3	Bushing, Piston Pin	322282
		1	
	4	Bushing, Piston Pin	322282
		2	
7	6	Bolt, Connecting Rod	322284
		1	
	8	Bolt, Connecting Rod	322284
		2	

Group 13: Crankshaft & Piston

Item	Qty.	Description Variation	Part No.
8	3	Bushing, Crankpin Std 1	322285
	4	Bushing, Crankpin Std 2	322285
	3	Bushing, Crankpin -0.2mm (Set) 1	322286
	4	Bushing, Crankpin -0.2mm (Set) 2	322286
	3	Bushing, Crankpin -0.4mm (Set) 1	322287
	4	Bushing, Crankpin -0.4mm (Set) 2	322287
9	1	Complete Crankshaft (Includes items 10-15) 1	322235
	1	Complete Crankshaft (Includes items 10-15) 2	322288
10	1	Pin, Straight 1, 2	322040
11	3	Ball 1	322047
	4	Ball 2	322047
12	1	Gear, Crankshaft 1, 2	322300
13	1	Key 1, 2	322448
14	1	Gear, Oil Pump Drive 1, 2	322309
15	1	Sleeve, Crankshaft 1, 2	322290
16	1	Collar, Crankshaft 1, 2	322289
17	1	O-Ring 1, 2	322037

Item	Qty.	Description Variation	Part No.
18	1	Bushing, Crankshaft 1 Std 1, 2	322291
	1	Bushing, Crankshaft 1 -0.2mm 1, 2	322296
	1	Bushing, Crankshaft 1 -0.4mm 1, 2	322297
19	2	Bushing, Crankshaft 2 Std (Set) 1	322292
	3	Bushing, Crankshaft 2 Std (Set) 2	322292
	2	Bushing, Crankshaft 2 -0.2mm (Set) 1	322298
	3	Bushing, Crankshaft 2 -0.2mm (Set) 2	322298
	2	Bushing, Crankshaft 2 -0.4mm (Set) 1	322299
	3	Bushing, Crankshaft 2 -0.4mm (Set) 2	322299
20	1	Bushing, Crankshaft 3 Std (Set) 1, 2	322293
	1	Bushing, Crankshaft 3 -0.2mm (Set) 1, 2	322294
	1	Bushing, Crankshaft 3 -0.4mm (Set) 1, 2	322295
21	2	Bushing, Side 1 Std 1, 2	322105
	2	Bushing, Side 1 +0.2mm 1, 2	322106
	2	Bushing, Side 1 +0.4mm 1, 2	322107
22	2	Bushing, Side 2 Std 1, 2	322497
	2	Bushing, Side 2 +0.2mm 1, 2	322498
	2	Bushing, Side 2 +0.4mm 1, 2	322499

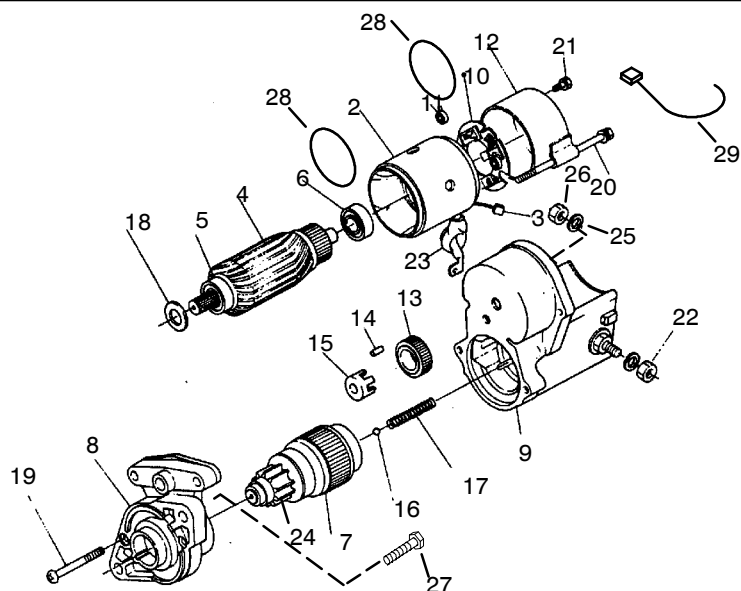
Group 14: Flywheel



Item	Qty.	Description Variation	Part No.
1	1	Complete Flywheel (Includes item 2) 1	322496
	1	Complete Flywheel (Includes item 2) 2	322513
2	1	Gear, Ring 1, 2	322404
3	6	Bolt, Flywheel 1, 2	322305
4	1	Plate, Rear End 1, 2	322512

Item	Qty.	Description Variation	Part No.
5	10	Bolt 1, 2	322076
6	1	Locator 1, 2	322511
7	8	Bolt 1, 2	322518
8	8	Washer, Spring 1, 2	322031
9	1	Pin, Straight 1, 2	322043
10	2	Pin, Straight 1, 2	322042

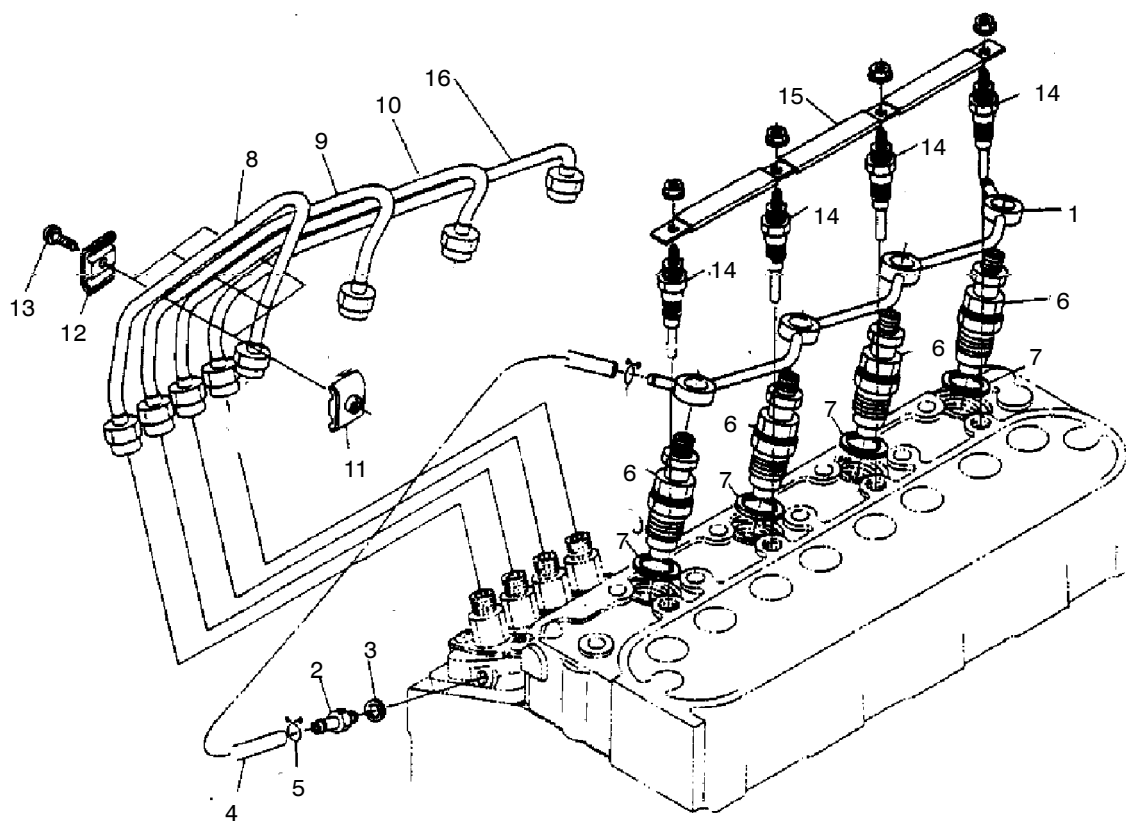
Group 15: Starter Component Parts



Item	Qty.	Description Variation	Part No.
1	1	Starter (Includes items 2-26, 28)	
		1	322098
		2	322439
		3	322585
2	1	Yoke	
		1	322090
		2	322441
		3	322586
3	2	Brush	
		1, 2, 3	322093
4	1	Armature	
		1	322089
		2	322440
		3	322587
5	1	Bearing, Ball	
		1	322103
		2	322530
		3	322588
6	1	Bearing, Ball	
		1	322104
		2	322444
		3	322589
7	1	Clutch	
		1, 2	322101
		3	322590
8	1	Housing	
		1, 2	322100
		3	322591
9	1	Switch, Magnetic	
		1	322099
		2	322525
		3	322592
10	1	Holder, Brush	
		1	322094
		2	322443
		3	322593
11	4	Spring, Brush	
		1, 2	322540
		3	322594
12	1	Frame, End	
		1, 2	322091
		3	322595

Item	Qty.	Description Variation	Part No.
13	1	Gear	
		1, 2	322082
		3	322596
14	5	Roller	
		1, 2, 3	322502
15	1	Retainer	
		1, 2	322503
		3	322597
16	1	Ball	
		1, 2, 3	322505
17	1	Spring	
		1, 2	322504
		3	322598
18	1	Washer, Felt	
		1	322097
19	2	Screw, Pan Head	
		1, 2	322096
	2	Bolt	
		3	322599
20	2	Bolt, Through	
		1, 2	322092
		3	322600
21	2	Bolt	
		1, 2	322095
		3	322601
22	1	Nut, Hexagon	
		1, 2	322057
		3	322602
23	1	Cover, Cord	
		1, 2	322102
		3	322603
24	1	Pinion, Bevel	
		2	322442
25	1	Washer, Spring	
		2	322523
26	1	Nut, Hexagon	
		2	322515
27	2	Bolt	
		1, 2, 3	322015
28	2	O-Ring	
		3	322604
29		Cord, Stop Solenoid	
		1, 3	322605

Group 16: Fuel Injection Pipes

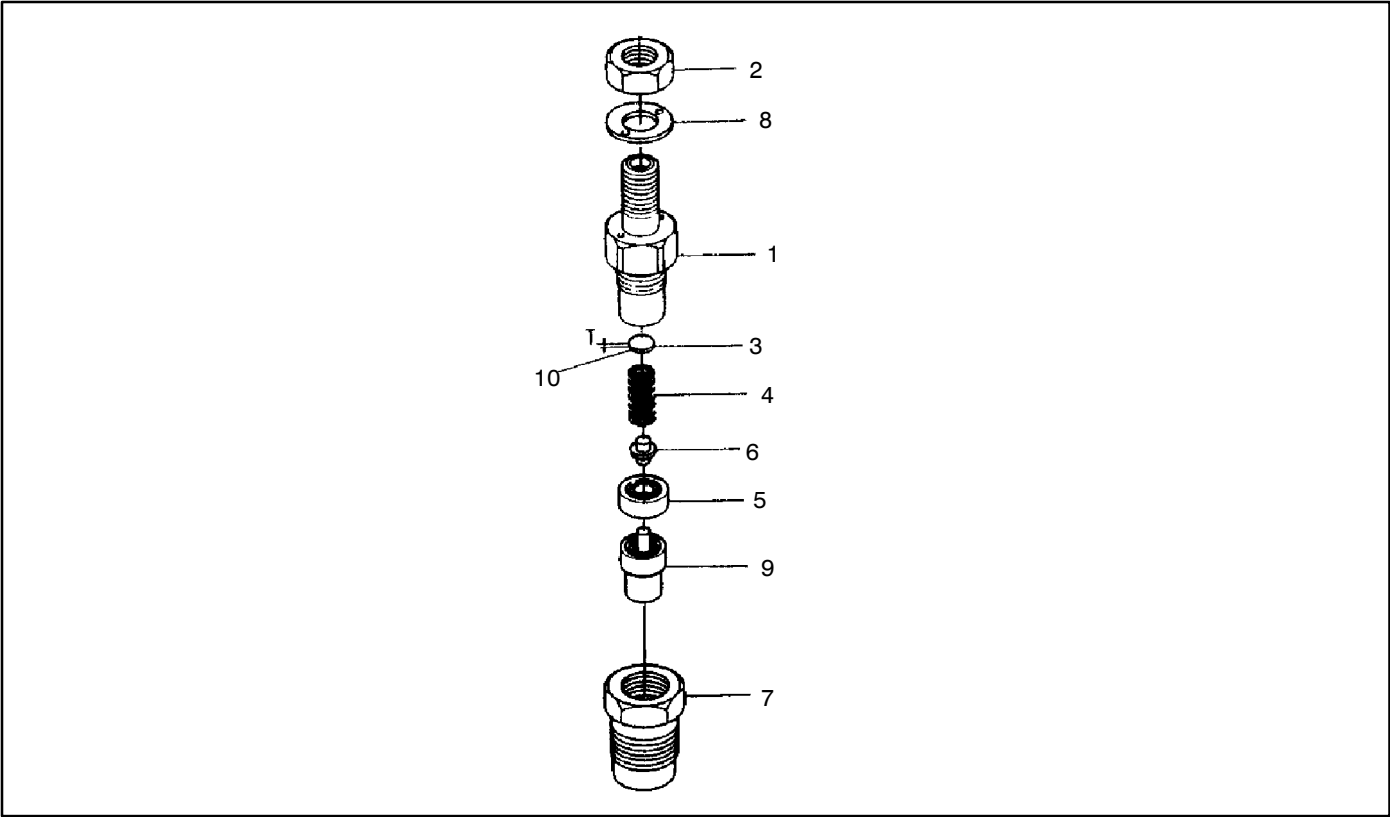


Group 16: Fuel Injection Pipes

Item	Qty.	Description Variation	Part No.
1	1	Pipe, Overflow 1	322392
1	1	Pipe, Overflow 2	322424
2	1	Screw Air Breather 1,2	322123
3	1	Gasket 1,2	322110
4	1	Pipe Assembly, Overflow (Includes item 5) 1,2	322423
5	2	Band, Pipe 1,2	322312
6	3	Holder, Nozzle 1	322400
	4	Holder, Nozzle 2	322400
7	3	Gasket 1	322134
	4	Gasket 2	322134
8	1	Pipe, Injection 1 1,2	322430

Item	Qty.	Description Variation	Part No.
9	1	Pipe, Injection 2 1,2	322431
10	1	Pipe, Injection 3 1,2	322432
11	2	Clamp, Pipe 1 1	322135
	3	Clamp, Pipe 1 2	322135
12	2	Clamp, Pipe 2 1	322136
	3	Clamp, Pipe 2 2	322136
13	2	Screw, w/Washer 1	322026
	3	Screw, w/Washer 2	322026
14	3	Plug, Glow (engine serial numbers before 489915)	322405
14	3	Plug, Glow (engine serial numbers after 489915) 1	225464
	4	Plug, Glow 2	322341
15	1	Cord, Glow Plug 1	322406
	1	Cord, Glow Plug 2	322445
16	1	Pipe, Injection 4 2	322433

Group 17: Nozzle Component Parts



Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	3	Holder, Nozzle (Includes items 2-9)	322400	6	3	Push Rod	322128
	1				4	Push Rod	322128
	4	Holder, Nozzle (Includes items 2-9)	322400		2		
	2			7	3	Nut, Nozzle	322132
2	3	Nut	322142		1		
	1			4	4	Nut, Nozzle	322132
	4	Nut	322142		2		
	2			8	3	Washer	322146
3	3	Washer, Adjusting	322130		1		
	1			4	4	Washer	322146
	4	Washer, Adjusting	322130		2		
	2			9	3	Piece, Nozzle	322401
4	3	Spring, Nozzle	322129		1		
	1			4	4	Piece, Nozzle	322401
	4	Spring, Nozzle	322129		2		
	2			10	1	Assembly Washer (Includes 1 of each of the adjusting washers which follow)	322151
5	3	Piece, Distance	322133			1,2	
	1						
	4	Piece, Distance	322133				
	2						

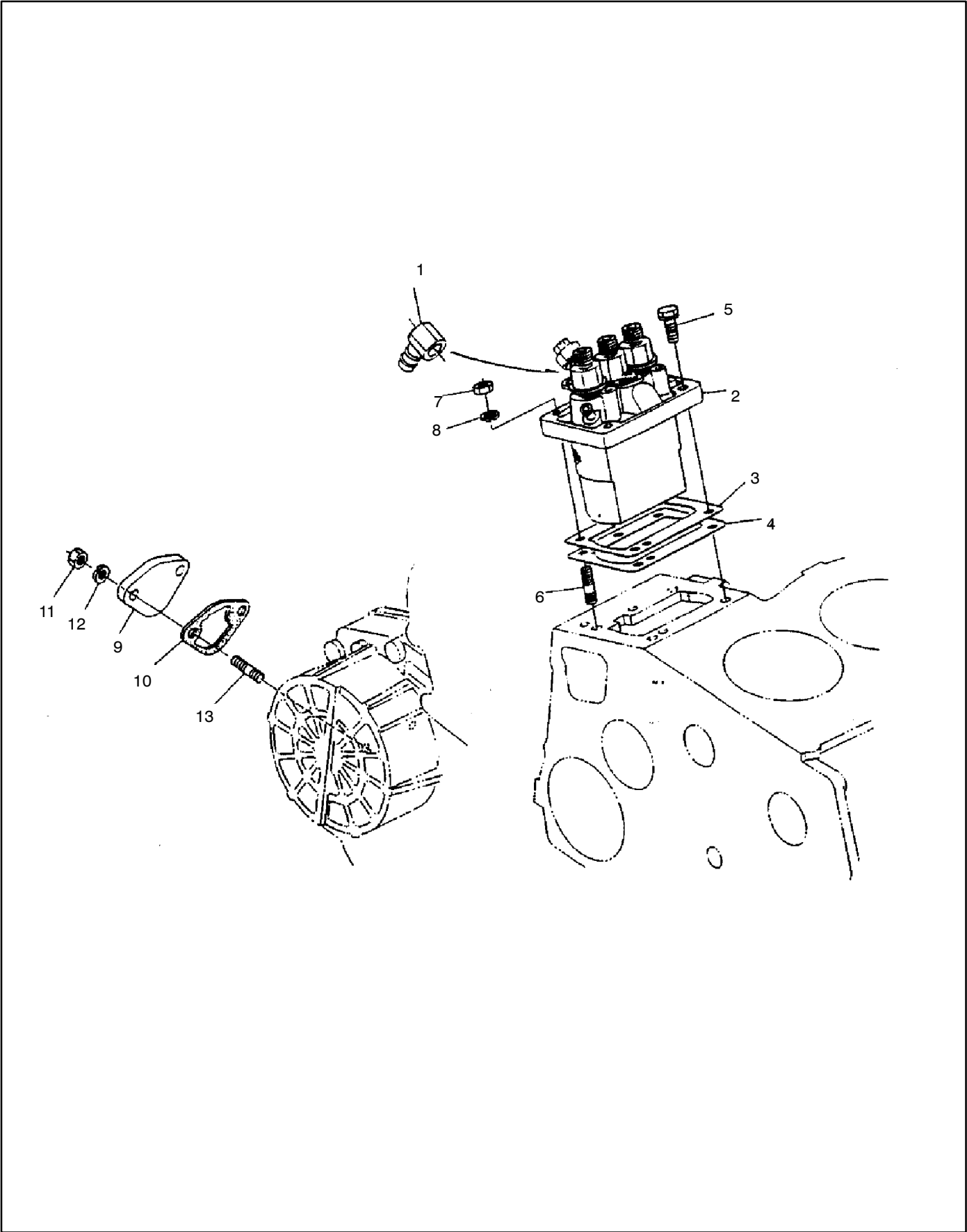
Group 17: Nozzle Component Parts

Item	Qty.	Description Variation	Part No.
		Washer, Adjusting T=0.900mm	322131
		Washer, Adjusting T=0.925mm	322152
		Washer, Adjusting T=0.950mm	322153
		Washer, Adjusting T=0.975mm	322154
		Washer, Adjusting T=1.000mm	322155
		Washer, Adjusting T=1.025mm	322156
		Washer, Adjusting T=1.050mm	322157
		Washer, Adjusting T=1.075mm	322158
		Washer, Adjusting T=1.100mm	322159
		Washer, Adjusting T=1.125mm	322160
		Washer, Adjusting T=1.150mm	322161
		Washer, Adjusting T=1.175mm	322162
		Washer, Adjusting T=1.200mm	322163
		Washer, Adjusting T=1.225mm	322164
		Washer, Adjusting T=1.250mm	322165
		Washer, Adjusting T=1.275mm	322166
		Washer, Adjusting T=1.300mm	322167
		Washer, Adjusting T=1.325mm	322168
		Washer, Adjusting T=1.350mm	322169
		Washer, Adjusting T=1.375mm	322170
		Washer, Adjusting T=1.400mm	322171
		Washer, Adjusting T=1.425mm	322172
		Washer, Adjusting T=1.450mm	322173

Item	Qty.	Description Variation	Part No.
		Washer, Adjusting T=1.475mm	322174
		Washer, Adjusting T=1.500mm	322175
		Washer, Adjusting T=1.525mm	322176
		Washer, Adjusting T=1.550mm	322177
		Washer, Adjusting T=1.575mm	322178
		Washer, Adjusting T=1.600mm	322179
		Washer, Adjusting T=1.625mm	322180
		Washer, Adjusting T=1.650mm	322181
		Washer, Adjusting T=1.675mm	322182
		Washer, Adjusting T=1.700mm	322183
		Washer, Adjusting T=1.725mm	322184
		Washer, Adjusting T=1.750mm	322185
		Washer, Adjusting T=1.775mm	322186
		Washer, Adjusting T=1.800mm	322187
		Washer, Adjusting T=1.825mm	322188
		Washer, Adjusting T=1.850mm	322189
		Washer, Adjusting T=1.875mm	322190
		Washer, Adjusting T=1.900mm	322191
		Washer, Adjusting T=1.925mm	322192
		Washer, Adjusting T=1.950mm	322193

Note: T= Thickness in millimeters

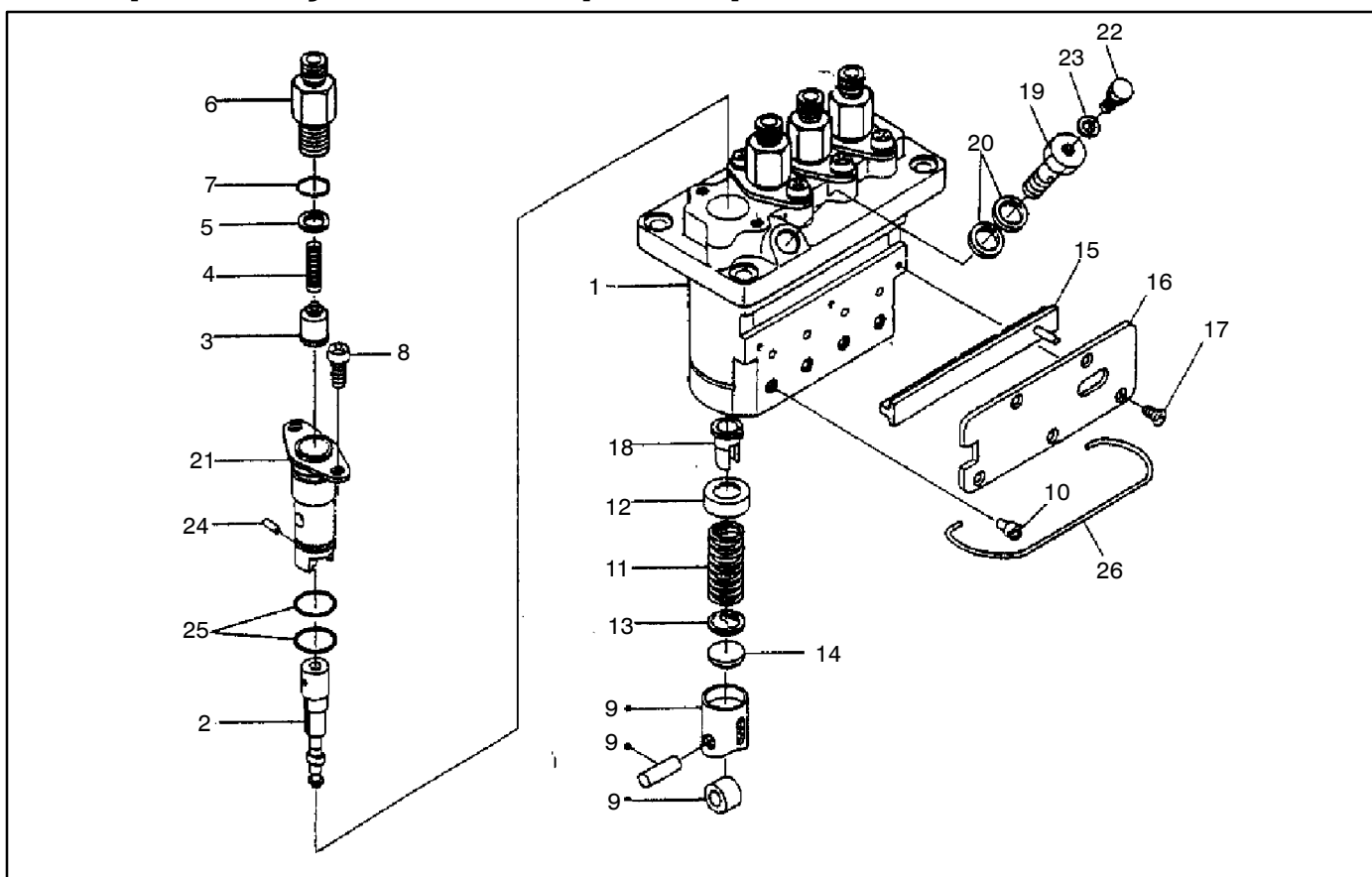
Group 18: Fuel Injection Pump



Group 18: Fuel Injection Pump

Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	1	Joint	322361	7	2	Nut	322023
		1, 2				1	
2	1	Pump, Injection	322407		3	Nut	322023
		1				2	
	1	Pump, Injection (Engine serial numbers 489916 and above)	322606	8	2	Washer, Spring	322030
		1			6	Washer, Spring	322030
	1	Pump, Injection	322458			2	
		2		9	1	Cover	322195
3	1	Shim, Injection Pump	322196			1, 2	
		1		10	1	Gasket, Fuel Pump	322127
	1	Shim, Injection Pump (.20mm)	322199			1, 2	
		2		11	2	Nut	322023
	1	Shim, Injection Pump (.30mm)	322615			1, 2	
		2		12	2	Washer, Spring	322030
4	2	Shim, Injection Pump	322197			1, 2	
		1		13	2	Stud	322020
	2	Shim, Injection Pump (0.25mm)	322323			1, 2	
		2					
	2	Shim, Injection Pump (.30mm)	322615				
		2					
5	2	Bolt	322004				
		1					
	3	Bolt	322019				
		2					
6	2	Stud	322140				
		1					
	3	Stud	322140				
		2					

Group 19: Injection Pump Component Parts



Item	Qty.	Description Variation	Part No.
1	1	Pump, Injection (Includes items 2-26)	322407
	1	Pump, Injection*	322606
	1	Pump, Injection (Includes items 2-26)	322458
2	3	Plunger, Pump	322394
	1	Plunger, Pump*	322607
	4	Plunger, Pump	322452
3	3	Valve, Delivery	322393
	1	Valve, Delivery*	322113
	4	Valve, Delivery	322113
4	3	Spring, Deliv. Valve	322397
	1	Spring, Deliv. Valve*	322116
	3	Spring, Deliv. Valve	322116
	4	Spring, Deliv. Valve	322116

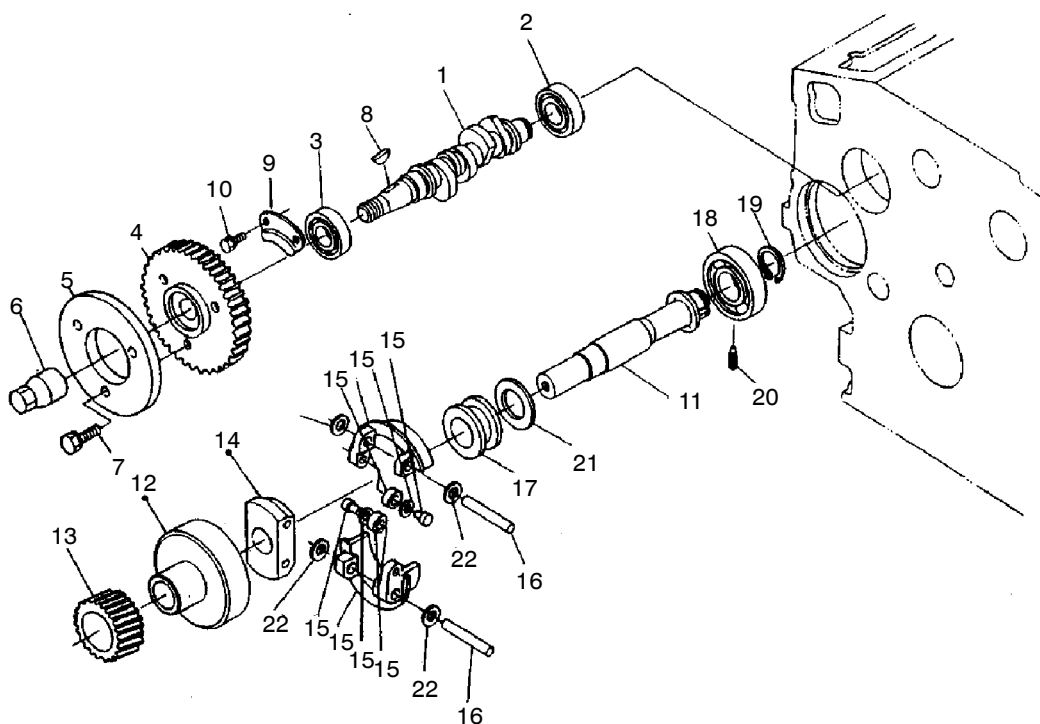
Item	Qty.	Description Variation	Part No.
5	3	Gasket, Deliv. Valve	322538
	1	Gasket, Deliv. Valve*	322117
	4	Gasket, Deliv. Valve	322117
6	3	Holder, Deliv. Valve	322396
	1	Holder, Deliv. Valve*	322426
	4	Holder, Deliv. Valve	322426
7	3	O-Ring	322366
	1	O-Ring*	322150
	4	O-Ring	322150
8	6	Screw	322352
	1	Screw*	322198
	1	Screw	322198
	8	Screw	322198

Group 19: Injection Pump Component Parts

Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
9	3	Tappet	322313	18	3	Sleeve, Control	322321
		1				1	
	3	Tappet*	322114		3	Sleeve, Control*	322124
		1				1	
	4	Tappet	322114		4	Sleeve, Control	322124
		2				2	
10	3	Pin, Tappet Guide	322315	19	1	Screw, Hollow	322319
		1				1	
	3	Pin, Tappet Guide*	322118		1	Bolt, Joint*	322610
		1				1	
	4	Pin, Tappet Guide	322118		1	Screw, Hollow	322459
		2				2	
11	3	Spring, Plunger	322398	20	2	Gasket	322537
		1				1	
	3	Spring, Plunger*	322120		2	Gasket*	322148
		1				1	
	4	Spring, Plunger	322120		2	Gasket	322148
		2				2	
12	3	Seat, Spring Upper	322316	21	3	Set Plate	322318
		1				1	
	3	Seat, Spring Upper*	322119		3	Flange, Sleeve*	322126
		1				1	
	4	Seat, Spring Upper	322119		4	Flange, Sleeve	322126
		2				2	
13	3	Seat, Spring Lower	322317	22	1	Screw	322320
		1				1	
	3	Seat, Spring Lower*	322121		1	Screw*	322122
		1				1	
	4	Seat, Spring Lower	322121		1	Screw	322122
		2				2	
14	1	Shim	322322	23	1	Gasket	322365
		1				1	
	1	Shim*	322125		1	Gasket*	322149
		1				1	
	1	Shim	322125		1	Gasket	322149
		2				2	
15	1	Rack, Control	322395	24	4	Pin, Joint	322147
		1				1*, 2	
	1	Rack, Control*	322608	25	8	O-Ring	322115
		1				1*, 2	
	1	Rack, Control	322425	26	1	Pin, Clamp	322427
		2				2	
16	1	Plate	322399	27	1	Plug	322611
		1				1*	
	1	Plate*	322609	28	1	Gasket	322612
		1				1*	
	1	Plate	322428				
		2					
17	4	Screw	322356				
		1					
	4	Screw*	322145				
		1					
	5	Screw	322145				
		2					

* Use this part number for generator sets using variation 1 and engine serial numbers 489916 and above.

Group 20: Fuel Camshaft

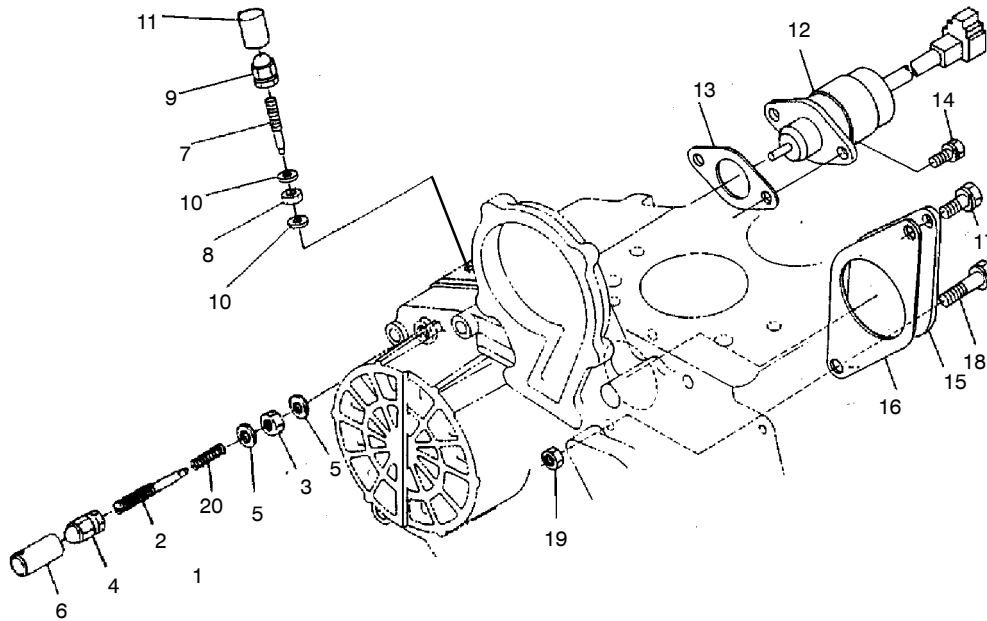


Item	Qty.	Description Variation	Part No.
1	1	Camshaft, Fuel 1	322391
	1	Camshaft, Fuel 2	322275
2	1	Bearing, Ball 1, 2	322053
3	1	Bearing, Ball 1, 2	322054
4	1	Gear, Injection Pump 1, 2	322451
5	1	Cam, Fuel 1 1, 2	322314
6	1	Nut, Cap 1, 2	322355
7	3	Bolt 1, 2	322003
8	1	Key, Woodruff 1, 2	322360
9	1	Stopper 1, 2	322277
10	2	Bolt 1, 2	322001
11	1	Shaft Assembly, Governor (Includes items13-17) 1	322494
	1	Shaft Assembly, Governor (Includes items13-17) 2	322495

Item	Qty.	Description Variation	Part No.
12	1	Holder, Governor Gear 1, 2	X
13	1	Gear, Governor 1, 2	X
14	1	Holder, Gov. Weight 1, 2	X
15	2	Complete Weight, Governor 1, 2	X
16	2	Shaft, Gov. Weight 1, 2	X
17	1	Sleeve, Governor 1, 2	X
18	1	Bearing, Ball 1, 2	322052
19	1	Cir-Clip, Gov. Shaft 1, 2	322476
20	1	Screw, Set 1, 2	322327
21	1	Collar, Gov. Holder 1, 2	322478
22	4	Washer, Gov. Weight 1, 2	322479

X Part not available separately.

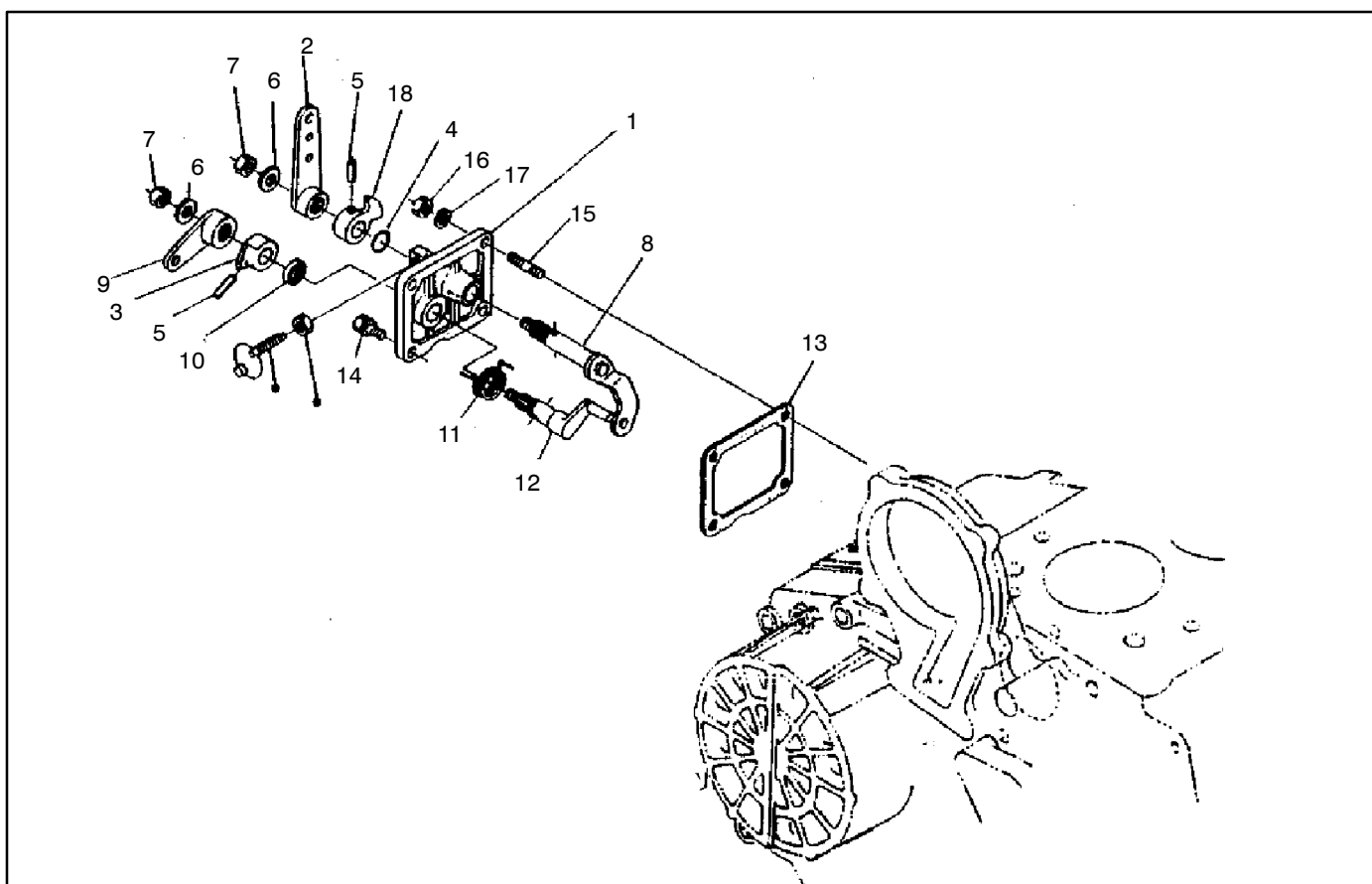
Group 21: Fuel Shut-off Solenoid



Item	Qty.	Description Variation	Part No.
1	1	Idle, Apparatus (Includes items 2-6)	322377
		1	
2	1	Bolt, Adjusting (Includes item 20)	322378
		1	
3	1	Nut	322141
		1	
4	1	Nut, Cap	322144
		1	
5	2	Gasket	322110
		1	
6	1	Cap	322325
		1	
7	1	Bolt, Adjusting	322324
		1	
8	1	Nut	322141
		1	
9	1	Nut, Cap	322144
		1	
10	2	Gasket	322110
		1	

Item	Qty.	Description Variation	Part No.
11	1	Cap	322325
		1	
12	1	Fuel Shut Off Solenoid	322469
		1	
13	1	Gasket, Solenoid Cover	322438
		1	
14	2	Bolt	322533
		1	
15	1	Cover, Hydraulic Pump	322454
		1	
16	1	Gasket	322453
		1	
17	1	Bolt	322013
		1	
18	1	Bolt	322016
		1	
19	1	Nut	322024
		1	
20	1	Spring	322460
		1	

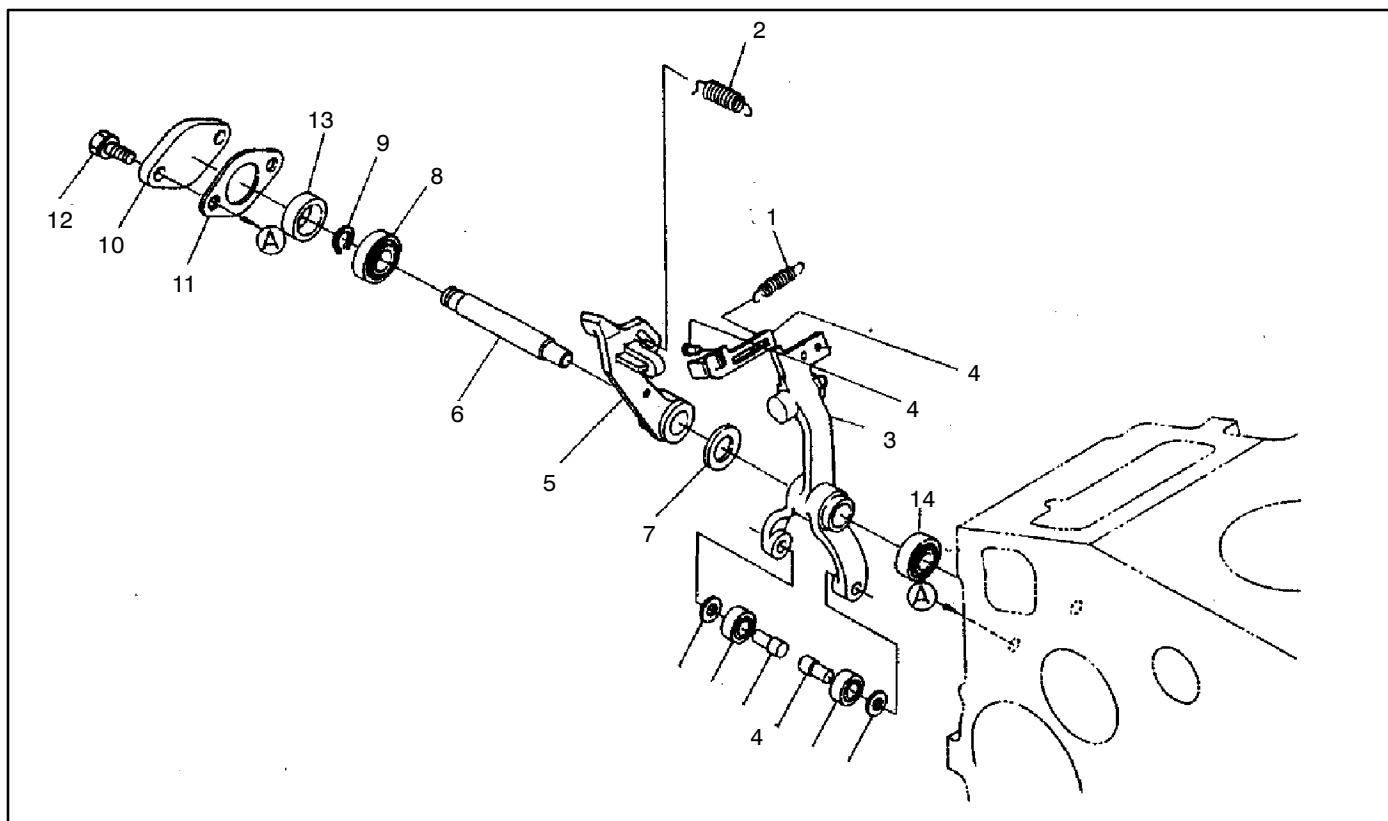
Group 22: Governor Plate



Item	Qty.	Description Variation	Part No.
1	1	Control Plate Assembly (Includes items 2-12) 1, 2	322484
2	1	Lever, Speed Control 1, 2	322435
3	1	Lever, Speed Control 1, 2	322334
4	1	O Ring 1, 2	322033
5	2	Pin, Spring 1, 2	322044
6	2	Washer, Plain 1, 2	322359
7	2	Nut 1, 2	322354
8	1	Complete Lever, Governor 1, 2	322480

Item	Qty.	Description Variation	Part No.
9	1	Lever, Engine Stop 1, 2	322436
10	1	Seal, Oil 1, 2	322087
11	1	Spring, Return 1, 2	322228
12	1	Shaft, Stop Lever 1, 2	322437
13	1	Gasket 1, 2	322335
14	2	Bolt w/Washer 1, 2	322002
15	2	Stud 1, 2	322020
16	2	Nut 1, 2	322023
17	2	Washer, Spring 1, 2	322030
18	1	Lever, Speed Control 1, 2	322485

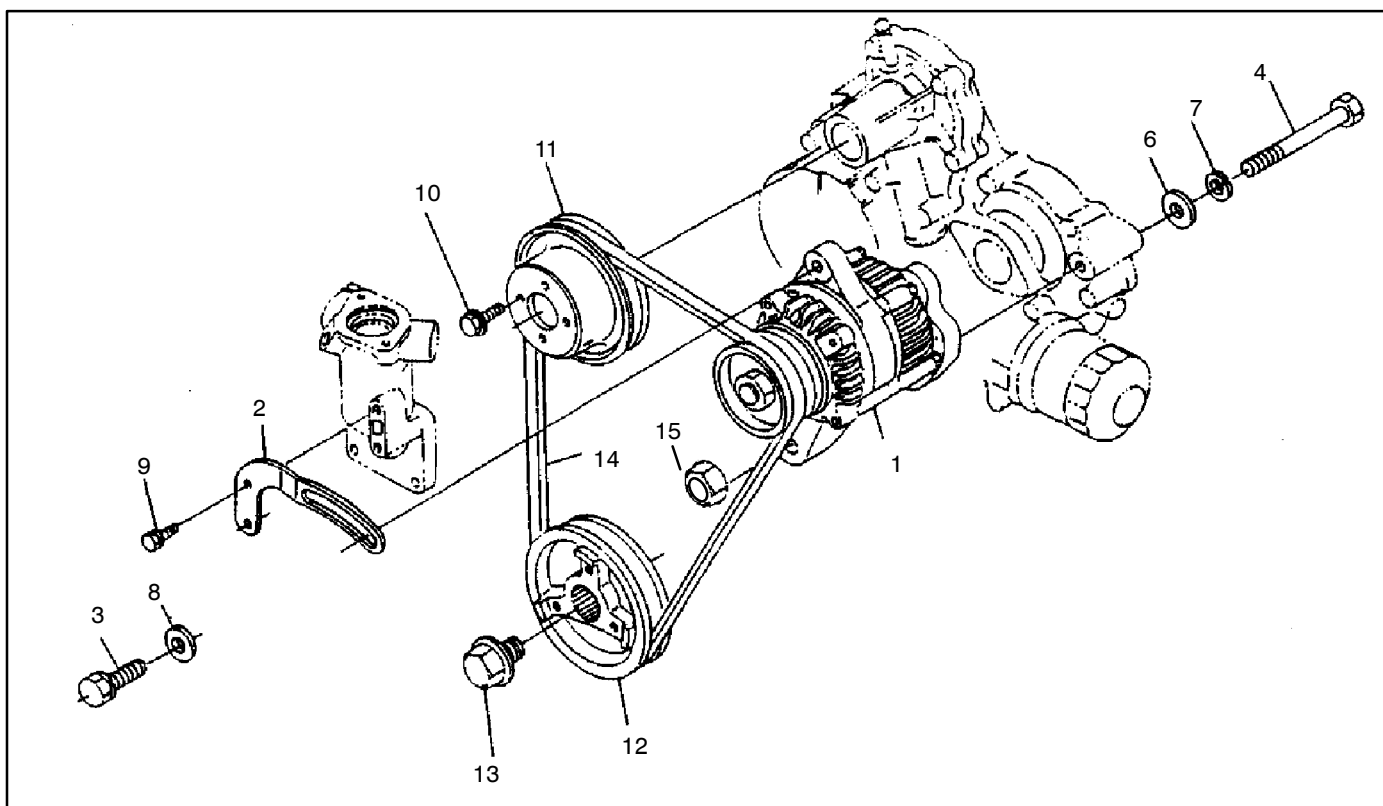
Group 23: Governor



Item	Qty.	Description Variation	Part No.
1	1	Spring, Start 1	322408
	1	Spring, Start 2	322461
2	1	Spring, Governor 1	322531
	1	Spring, Governor 2	322486
3	1	Fork Lever Assembly (Includes items 4-9) 1, 2	322482
4	1	Complete Lever, Fork 1, 2	322481
5	1	Lever, Fork 2 1, 2	322483
6	1	Shaft, Fork Lever 1, 2	322328

Item	Qty.	Description Variation	Part No.
7	1	Washer, Plain 1, 2	322358
8	1	Bearing, Ball 1, 2	322332
9	1	Cir-Clip, External 1, 2	322032
10	1	Cover, Fork Lever Shaft 1, 2	322330
11	1	Gasket 1, 2	322331
12	2	Bolt 1, 2	322533
13	1	Collar 1 1, 2	322329
14	1	Bearing, Ball 1, 2	322333

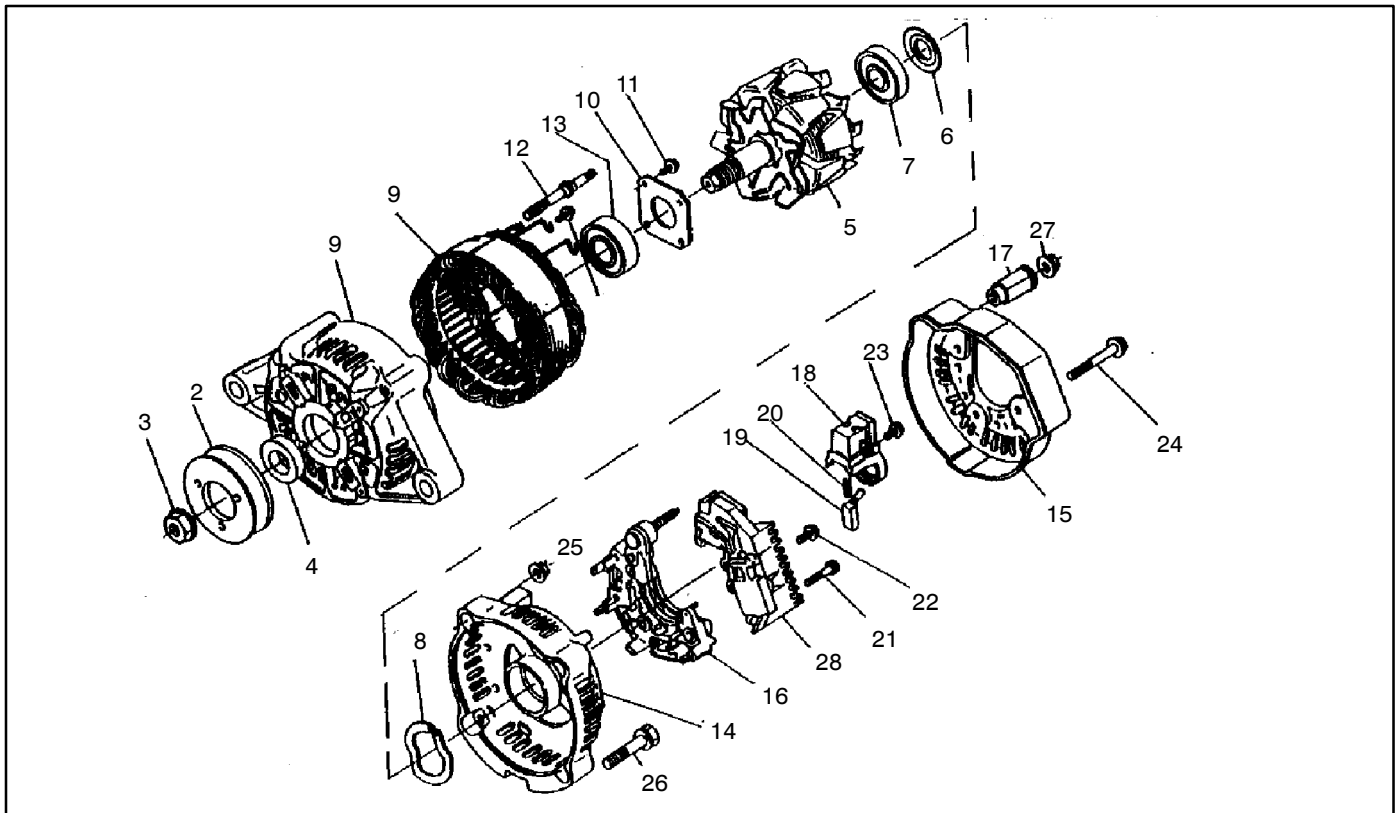
Group 24: Alternator Mounting



Item	Qty.	Description Variation	Part No.
1	1	Alternator	322232
		1, 2	
2	1	Alternator Adjustment Arm	322339
		1, 2	
3	1	Bolt	322015
		1, 2	
4	1	Bolt	322018
		1, 2	
5	1	Cover, Belt	322468
		1, 2	
6	1	Washer, Plain	322028
		1, 2	
7	1	Washer, Spring	322031
		1, 2	
8	1	Washer, Plain	322029
		1, 2	

Item	Qty.	Description Variation	Part No.
9	1	Bolt	322002
		1, 2	
10	4	Bolt, Flange	322022
		1, 2	
11	1	Pulley, Fan	322348
		1, 2	
12	1	Pulley, Fan Drive	322491
		1	
	1	Pulley, Fan Drive	322492
		2	
13	1	Bolt	322350
		1, 2	
14	1	V Belt	322456
		1, 2	
15	1	Nut, Hex M10 x 1.25	X-6053-5
		1, 2	

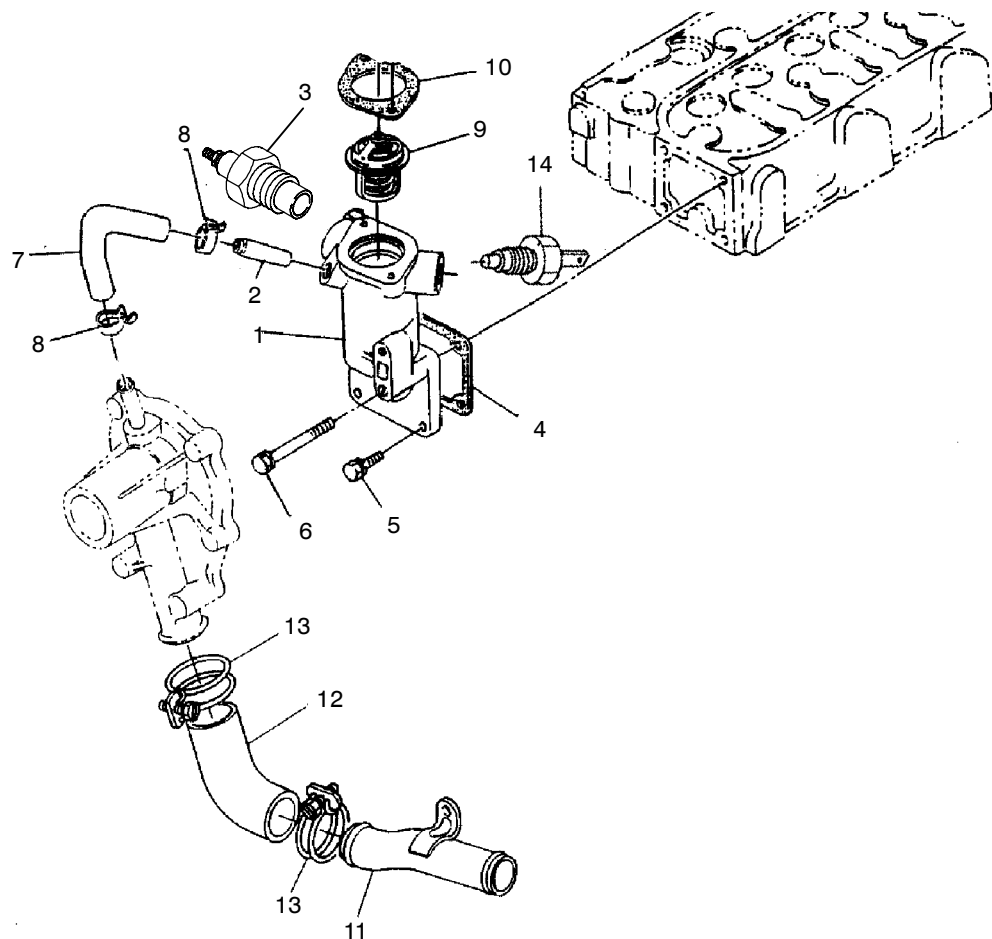
Group 25: Alternator Component Parts



Item	Qty.	Description Variation	Part No.
1	1	Alternator (Includes items 2-28)	322232
2	1	Pulley, Alternator	322202
3	1	Nut	322215
4	1	Collar	322203
5	1	Rotor	322200
6	1	Cover, Bearing	322211
7	1	Bearing, Ball	322209
8	1	Washer, Thrust	322212
9	1	Frame, Drive End	322233
10	1	Plate, Retainer	322208
11	4	Screw, Round Head	322217
12	2	Bolt, Through	322204
13	1	Bearing, Ball	322210
14	1	Frame, End	322337

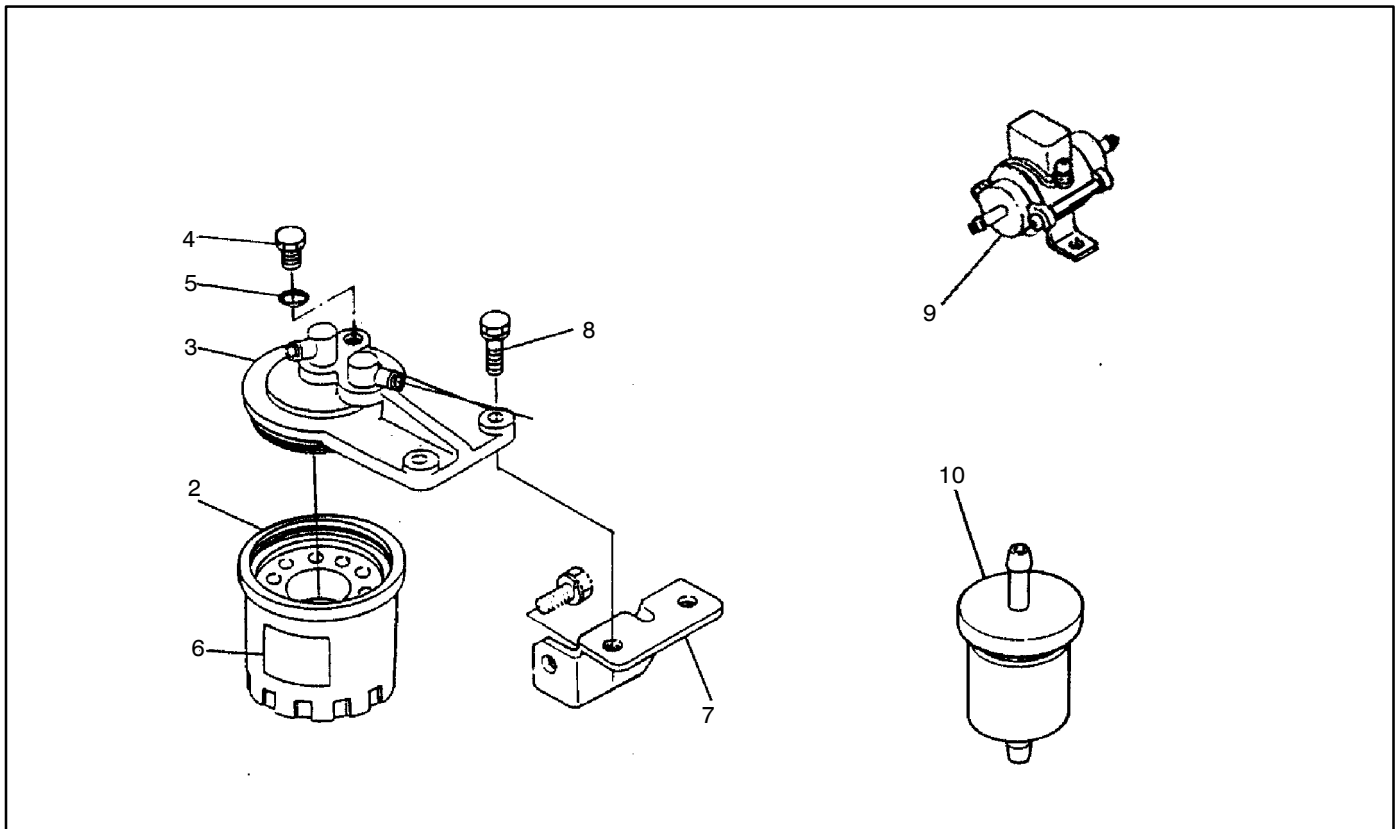
Item	Qty.	Description Variation	Part No.
15	1	Cover, End	322338
16	1	Rectifier	322234
17	1	Bush, Insulation	322340
18	1	Holder, Brush	322205
19	2	Brush	322201
20	2	Spring, Brush	322206
21	2	Screw, Round Head	322218
22	6	Screw, Round Head	322219
23	1	Screw, Round Head	322220
24	3	Bolt	322213
25	2	Nut	322216
26	2	Bolt	322214
27	1	Nut	322058
28	1	Regulator	322207

Group 26: Water Flange



Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	1	Flange, Water (Includes item 2) 1, 3	322470	7	1	Pipe, Water Return 2 1, 3	322345
2	1	Pipe, Water Return 1 1, 3	322347	8	2	Band, Pipe 1, 3	322346
3	1	Plug 1	322507	9	1	Thermostat 1, 3	322501
	1	Sender, Temperature 3	255240	10	1	Gasket 1, 3	322487
4	1	Gasket, Water Flange 1, 3	322343	11	1	Pipe, Water 2 1, 3	322488
5	3	Bolt 1, 3	322002	12	1	Pipe, Water 3 1, 3	322342
6	1	Bolt 1, 3	322009	13	2	Clamp 1, 3	322520
				14	1	Switch, Temperature 1, 3	322514
				15	1	Bushing (Not Shown) 1, 3	D-228

Group 29: Fuel Filter & Fuel Pump



Item	Qty.	Description Variation	Part No.
1	1	Filter Assembly, Fuel (Includes items 2-6) 1, 2	322068
2	1	Element, Filter 1, 2	322536
3	1	Cover, Filter 1, 2	322069
4	1	Plug, Filter Breather 1, 2	322506
5	1	O-Ring 1, 2	322060

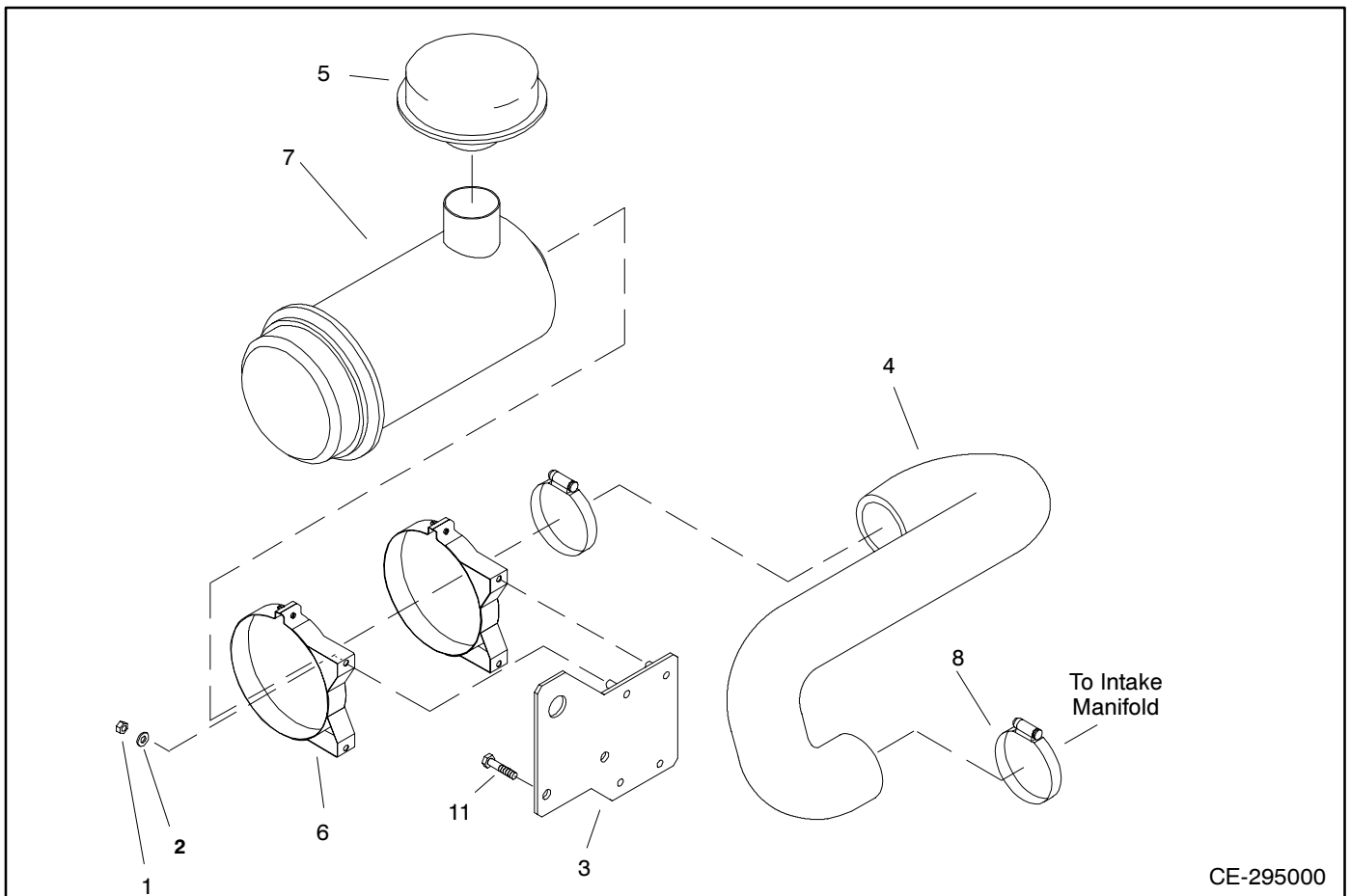
Item	Qty.	Description Variation	Part No.
6	1	Mark, Form 1, 2	322070
7	1	Holder, Fuel Filter 1, 2	322463
8	2	Bolt 1, 2	322014
9	1	Pump, Fuel 1, 2	322521
10	1	Filter, Fuel Pump 1, 2	322056

Group 30: Gasket Sets

Description			
Item	Qty.	Variation	Part No.
1	1	Upper Gasket Set	322551
		1	
	1	Upper Gasket Set	322553
		2	

Description			
Item	Qty.	Variation	Part No.
2	1	Lower Gasket Set	322552
		1	
	1	Lower Gasket Set	322554
		2	

Group 101: Air Intake



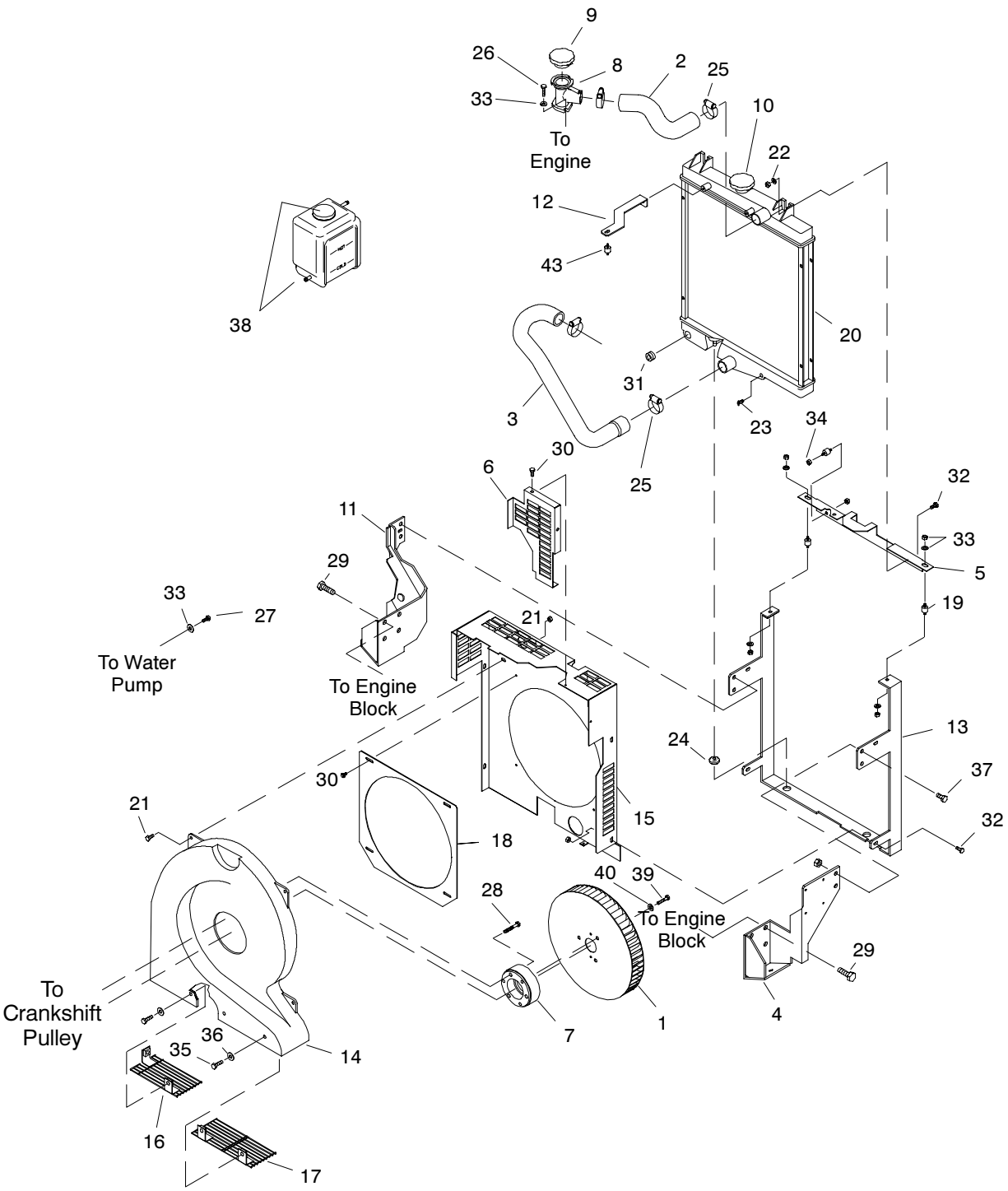
Item	Qty.	Description Variation	Part No.
1	8	Nut, 1/4-20 1, 2, 4, 5	#
2	1	Washer, 1/4 1, 2, 4, 5	#
3	1	Bracket, Air Cleaner 1 2 4, 5	225509 225549 225976
4	1	Hose, Air Intake 1 2 4, 5	225510 225517 225977
5	1	Cap, Air Cleaner 1, 5	258563
6	2	Bracket, Mounting 1, 4, 5	258564
	2	Band, Mounting 2	258708

Item	Qty.	Description Variation	Part No.
7	1	Air Cleaner Assembly 1, 4, 5	A-258576
	1	Filter Element 1, 4, 5	258577
	1	Air Cleaner Assembly 2	A-258643
	1	Filter Element 2	258646
8	2	Clamp, Hose 1-9/16 x 2 1, 4, 5	X-426-6
9	1	Clamp, Hose 1-9/16 x 2 2	X-426-6
10	1	Clamp, Hose (Item not shown) 2	X-426-16
11	2	Screw, H.C. M8-1.25 1, 2	X-6050-8

Common Hardware Procure Locally

Group 104: Cooling System

Illustration of variation 1 only



CE-250000

Group 104: Cooling System

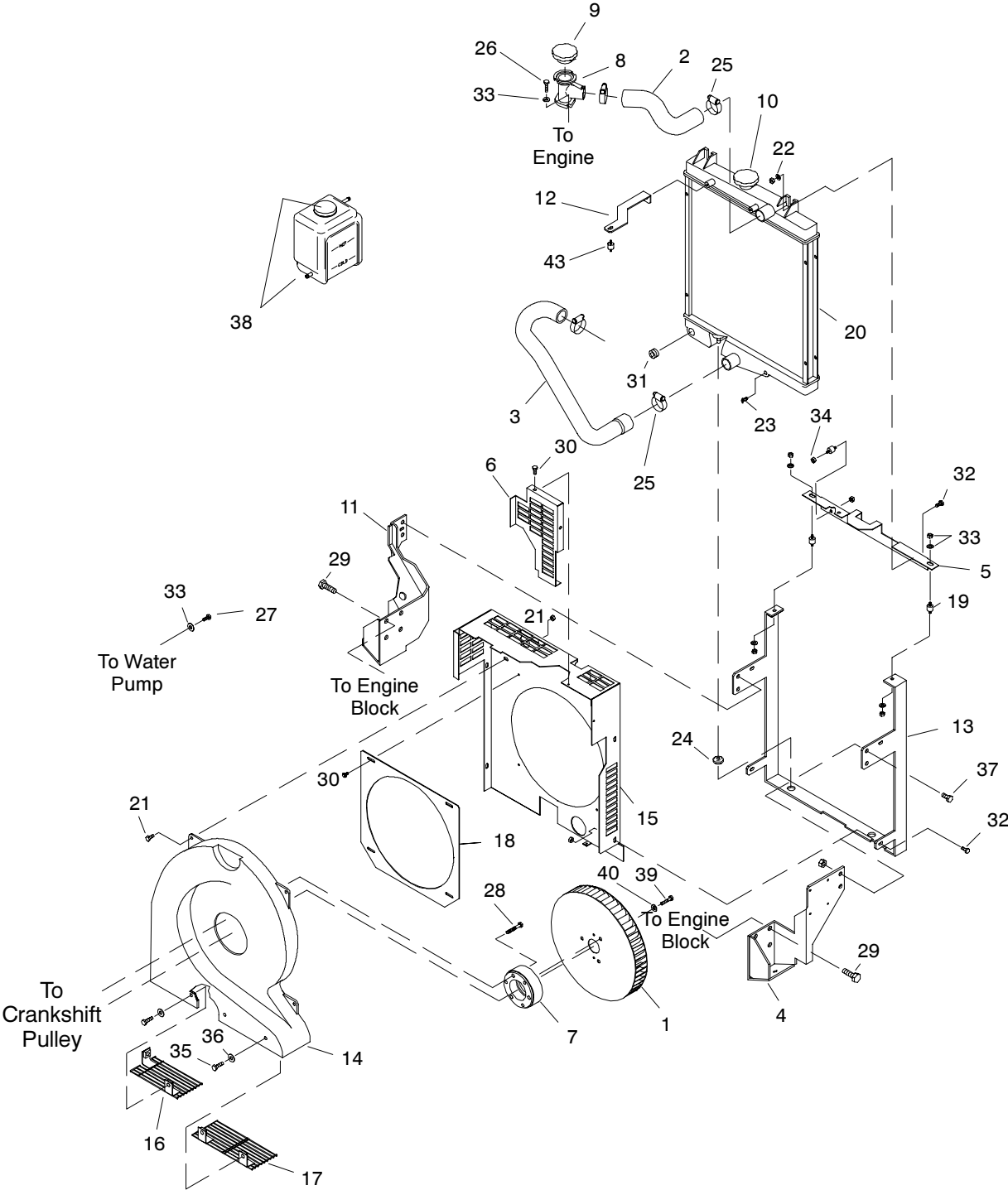
Item	Qty.	Description Variation	Part No.
1	1	Fan, Suction 1, 7	225617
	1	Fan, Blower 2	225214
	1	Fan, Pusher 4	225771
		5	225324
		6	225954
	1	Plate, Fan Mounting (Item not shown) 2	225540
	4	Nut, Elastic 10-32 (Item not shown) 2	X-101-12
	1	Spacer, Fan (Not shown) 4	225689
		5, 6	225325
2	1	Hose, Upper Radiator 1, 7	225507
		2	225557
		4	225698
		5, 6	225327
3	1	Hose, Lower Radiator 1, 7	225508
		2	225518
		4	225697
		5, 6	225328
4	1	Bracket, Engine Mounting (Right) 1, 5, 6, 7	225511
		2	225558
		4	225688
	1	Bracket, Radiator Support 5, 6	225329
5	1	Bracket, Radiator Mounting 1, 7	225514
6	1	Guard, Fan Right 1, 7	225535
7	1	Hub 1, 7	225612
		2	225539
		4	225689
8	1	Tube, Coolant Fill 1, 7	225547
	1	Tube, Coolant Fill 2, 3, 4	225562
9	1	Cap, Fill Tube Pressure (7 PSI) 1, 2, 3	276954
	1	Cap, Fill Tube Pressure (14 PSI) 1, 2, 3	226734
10	1	Cap, Radiator 1, 7	225550

Item	Qty.	Description Variation	Part No.
11	1	Bracket, Engine Mounting (Left) 1, 3, 5, 6, 7	225611
		2	225559
		4	225690
	1	Bracket, Radiator Support 5, 6	225330
12	1	Bracket, Radiator Support 1, 7	225613
		2	225560
	1	Bracket, Radiator Mounting (Upper Left) 5, 6	225332
	1	Bracket, Radiator Mounting (Upper Right) 5, 6	225333
	1	Screw, H.C. M6 x 1 x 20 (Item not shown) (attaches bkt. to alt. arm) 2	X-6049-5
	1	Screw, H.C. M10-101.25 (Item not shown) 2	X-6050-8
13	1	Bracket, Radiator Mounting 1, 7	225614
		5, 6	225331
	2	Bracket, Radiator Support 1	225691
	1	Shroud, Radiator (Item not shown) 2	225561
	4	Screw, 1/4-20 x 1 1/2 ref. (Item not shown) 2	X-465-6
	2	Button, Plug (Item not shown) 2	X-301-24
	1	Mount, Vibro (Item not shown) 2	239497
	2	Screw, 5/16-18 x 1 1/2 ref. (Item not shown) 2	X-125-33
	2	Washer, Plain .384 x 1.628 x .188 (Item not shown) 2	X-25-129
14	1	Shroud, Fan 1, 7	225615
		4	225066
		5	225336
		6	225955
	1	Guard, Wire (Item not shown) 4	225314
	4	Nut, well (Item not shown) 4	X-6365-1

Common Hardware Procure Locally

Group 104: Cooling System

Illustration of variation 1 only



CE-250000

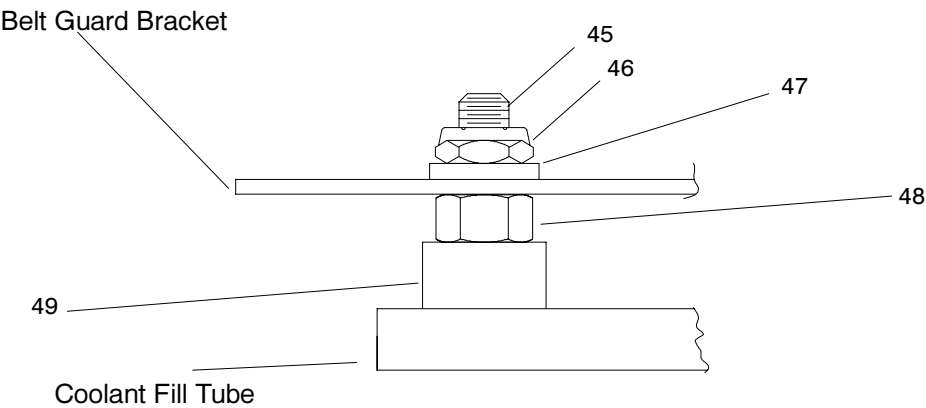
Group 104: Cooling System

Item	Qty.	Description Variation	Part No.
15	1	Cover, Fan Shroud	
		1, 7	225616
	1	Guard, Belt (Item not shown)	
		2 (Right)	225520
		2 (Left)	225551
		4	225687
		5 (Top)	225334
		6 (Top)	225956
		5, 6 (Bottom)	225957
		Screw, Phillips Head (Item not shown)	
	9	1, 2	X-6216-1
	10	5, 6	X-6216-1
	7	7	X-6216-1
16	1	Guard, Fan (Left)	
		1, 7	225619
17	1	Guard, Fan (Right)	
		1, 7	225620
18	1	Baffle, Fan	225628
		1, 7	
	1	Baffle, Air (Item not shown)	
		2	225541
	8	Screw, r.h.m.10-32 x 1/2 (Item not shown)	
		2	X-50-1
	8	Nut, Elastic 10-32 (Item not shown)	
		2	X-101-12
19	2	Mount, Controller	
		1, 7	246267
	1	Mount, Controller	
		2	241769
		Bumper (Item not shown)	
	1	2	259632
	4	5, 6	292834
20	1	Radiator Assembly	
		1, 7	A-225515
		2	A-225537
		4	A-225686
		5	A-225965
		6	A-225972
	1	Switch Assembly, Coolant Level	
		4	273404
21	3	Hardware, 1/4-20	
		1, 7	#
22	2	Washer, Plain .266 x 1 x .062	
		1, 7	X-25-73
23	1	Valve, Drain 1/4	
		2, 4, 5, 6, 7	X-256-3
	1	Elbow, Street (Item not shown)	
		2, 4	X-555-1

Item	Qty.	Description Variation	Part No.
24	1	Grommet	
		1, 7	X-284-35
25	4	Clamp, Hose 1 15/16 x 1 3/16	
		1,2, 4, 5, 6, 7	X-426-8
26	2	Screw, H.C. M6 x 1 x 16	
		1, 2, 3, 7	X-6049-2
27	4	Screw, H.C. M6 x 1 x 10	
		1, 7	X-6049-8
28	3	Screw, H.C. M8-1.25	
		1, 4, 7	X-6050-15
29	8	Screw, H.C. M10-1.25	
		1, 2, 3, 4, 7	X-6068-1
30	7	Screw, Phillips	
		1, 7	X-6216-1
31	1	Plug, Pipe1/2	
		1, 2, 7	X-75-3
32	2	Bolt, 1/4-20	
		1, 7	#
33	4	Washer, 1/4	
		1, 7	#
34	4	Nut, 1/4	
		1, 7	#
35	4	Bolt, 5/16-18	
		1, 7	#
36	7	Washer, 5/16-18	
		1, 7	#
37	7	Hardware, 3/8-16	
		1, 7	#
38	1	Bottle, Overflow (includes 14 PSI cap no. 226734)	
		1, 2, 3, 4, 5, 6, 7	249396
	2	Clamp, Hose (Item not shown)	
		1, 2, 3, 4, 5, 6, 7	X-426-9
39	3	Screw, 5/16-18 x 1.25, ref.	
		1, 7	X-125-24
	3	Screw, H.C.	
		1, 7	X-6050-15
	4	Screw, H.C.	
		5	X-6049-3
40	3	Washer, 5/16	
		1, 7	#
	3	Washer, Hardened	
		2	X-801-4
	4	Washer, 1/4	
		5	#
41	1	Bracket, Top Belt Guard (Item not shown)	
		3	225609
42	1	Bracket, Right Belt Guard (Item not shown)	
		3	225610
43	1	Bumper	
		1, 7	255443

Common Hardware Procure Locally

Group 104: Cooling System



Variation 4 Only

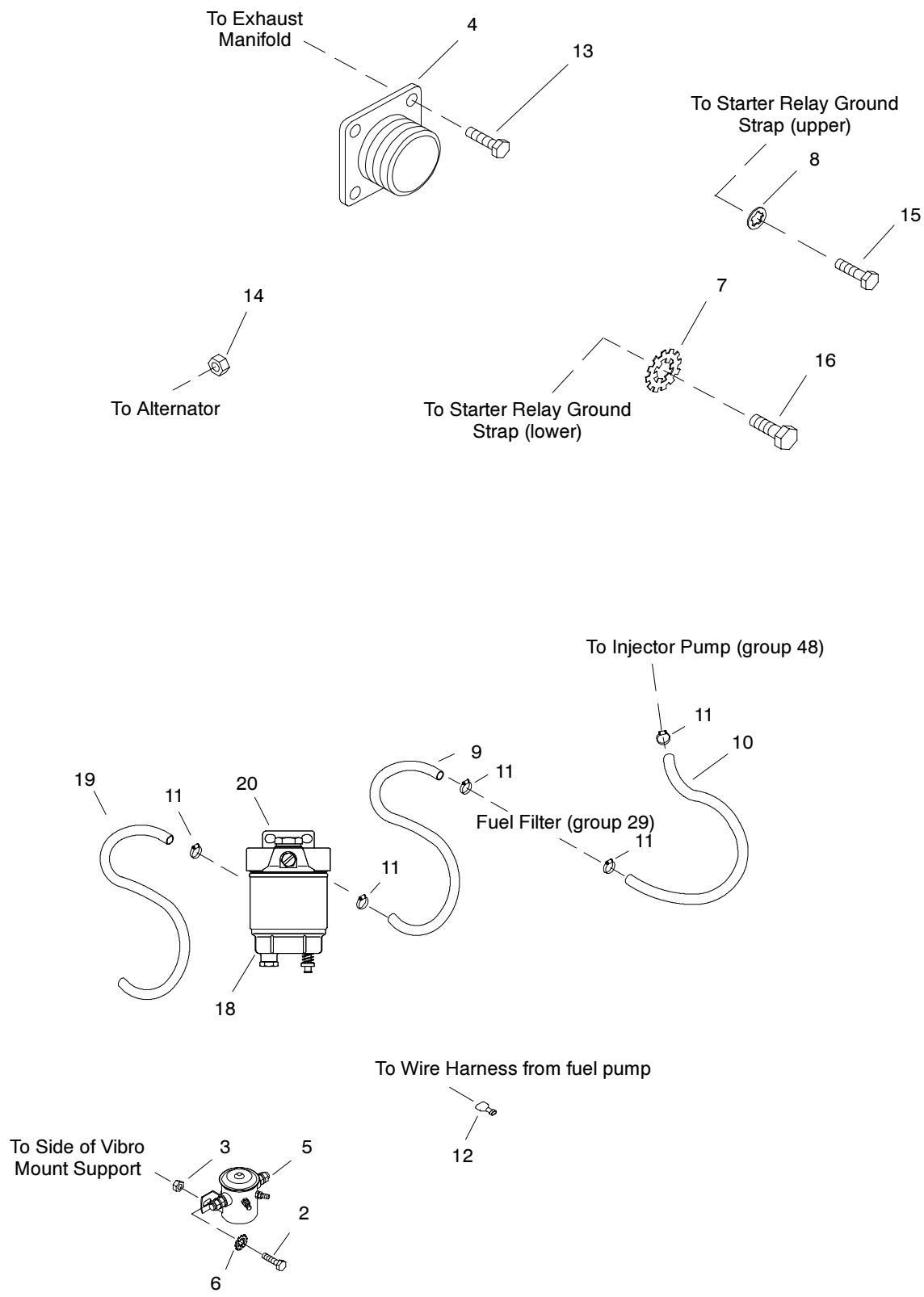
Group 104: Cooling System

Item	Qty.	Description Variation	Part No.
44	1	Guard, Belt (Item not shown)	
		3	225608
	1	Guard, Belt (Item not shown)	
		4	225689
45	2	Stud	
		4	322384

Item	Qty.	Description Variation	Part No.
46	4	Washer, 1/4	
		4	#
47	4	Nut, Elastic	
		4	X-101-25
48	4	Nut, M6 x 1	
		4	X-6053-1
49	7	Spacer, 1/20 x 9/32 x 1/4	
		4	X-400-31

Common Hardware Procure Locally

Group 105: Engine



CE-295000

Group 105: Engine

Item	Qty.	Description Variation	Part No.
1	1	Engine Assembly (V905BG) 1	A-225502
	1	Engine Assembly (V1305BG) 2, 3, 4	A-225503
	1	Engine Assembly (D905BG) 5, 6	A-225985
2	1	1/4-20 x 5/8 Bolt 1, 2, 3, 4, 5, 6	#
3	1	1/4-20 Nut 1, 2, 3, 4, 5, 6	#
4	1	Flange, Exhaust Outlet 1, 2, 3, 4	225548
5	1	Relay 1, 2, 3, 4, 5, 6	233442
6	2	Washer, Shakeproof 1, 3, 4, 5, 6	X-22-12
7	1	Washer, Shakeproof 3/8 1, 2, 3, 4, 5, 6	X-22-14
8	1	Washer, Lock Shakeproof 1, 5, 6	X-22-5
9	1	Line, Fuel 1, 2, 3, 4, 6	X-386-93
	1	Line, Fuel 5	X-386-101
	2	Hose Connector, Elbow (not shown) 5	X-391-25

Item	Qty.	Description Variation	Part No.
10	1	Line, Fuel 1, 5, 6	X-386-95
	1	Line, Fuel 2, 3, 4	X-386-93
11	4	Clamp, Hose 1, 2, 4, 6	X-426-9
	6	Clamp, Hose 5	X-426-9
12	2	Terminal (Fuel Pump Leads) 1, 2, 3, 4, 5, 6	X-431-29
13	4	Screw, H.C. M8-1.25 1, 2, 3, 4	X-6050-3
14	1	Nut, hex. M6 x 1 1, 2, 3, 4, 5, 6	X-6053-1
15	1	Nut, hex. M8 x 1.25 1, 5, 6	X-6053-2
16	1	Screw, H.C. M10-1.25 1, 2, 3, 4, 5, 6	X-6068-1
17	1	Clamp, Breather Hose (Item not shown) 2, 3	X-672-3
18	1	Water Separator Filter 5	225455
	1	Filter Element 5	225259
	2	Pipe Plug (not shown) 5	X-75-41
19	1	Fuel Line 5	X-386-34
20	1	Bracket, Water Separator 5	225604
21	1	Muffler Cover (not shown) 5, 6	225998
22	1	Pipe Plug (1/8 NPT) (not shown) 1, 2	X-75-23

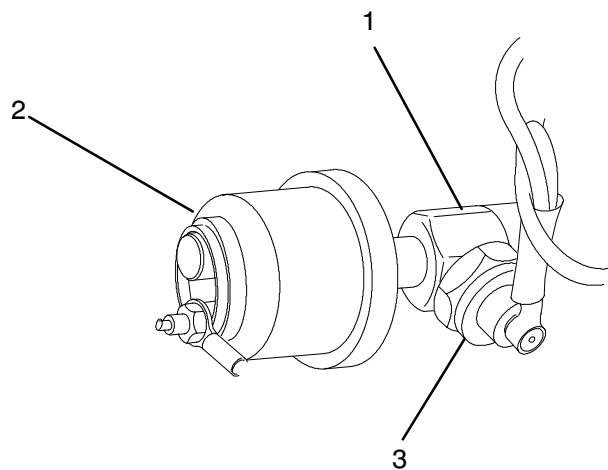
Common Hardware Procure Locally

Group 107: Nameplate and Decals

Item	Qty.	Description Variation	Part No.
1	1	Decal, 1-800 Number all	224233
2	1	Decal, Model 1, 3, 5, 7, 10, 12, 13, 14, 17	225553
	1	Decal, Model 2, 4, 6, 8, 9, 11, 15, 16	225554
3	1	Marker, Adhesive all	238162
4	1	Decal, Ground all	344295
5	1	Nameplate all	359446
6	1	Decal, Warning <i>Backfeed</i> 1, 2, 5-11, 14-17	258815
7	1	Decal, warning <i>Fire Hazard</i> all	239773
8	1	Decal, <i>10 Amp</i> 1, 2, 5-8, 10, 11, 13-17	241771

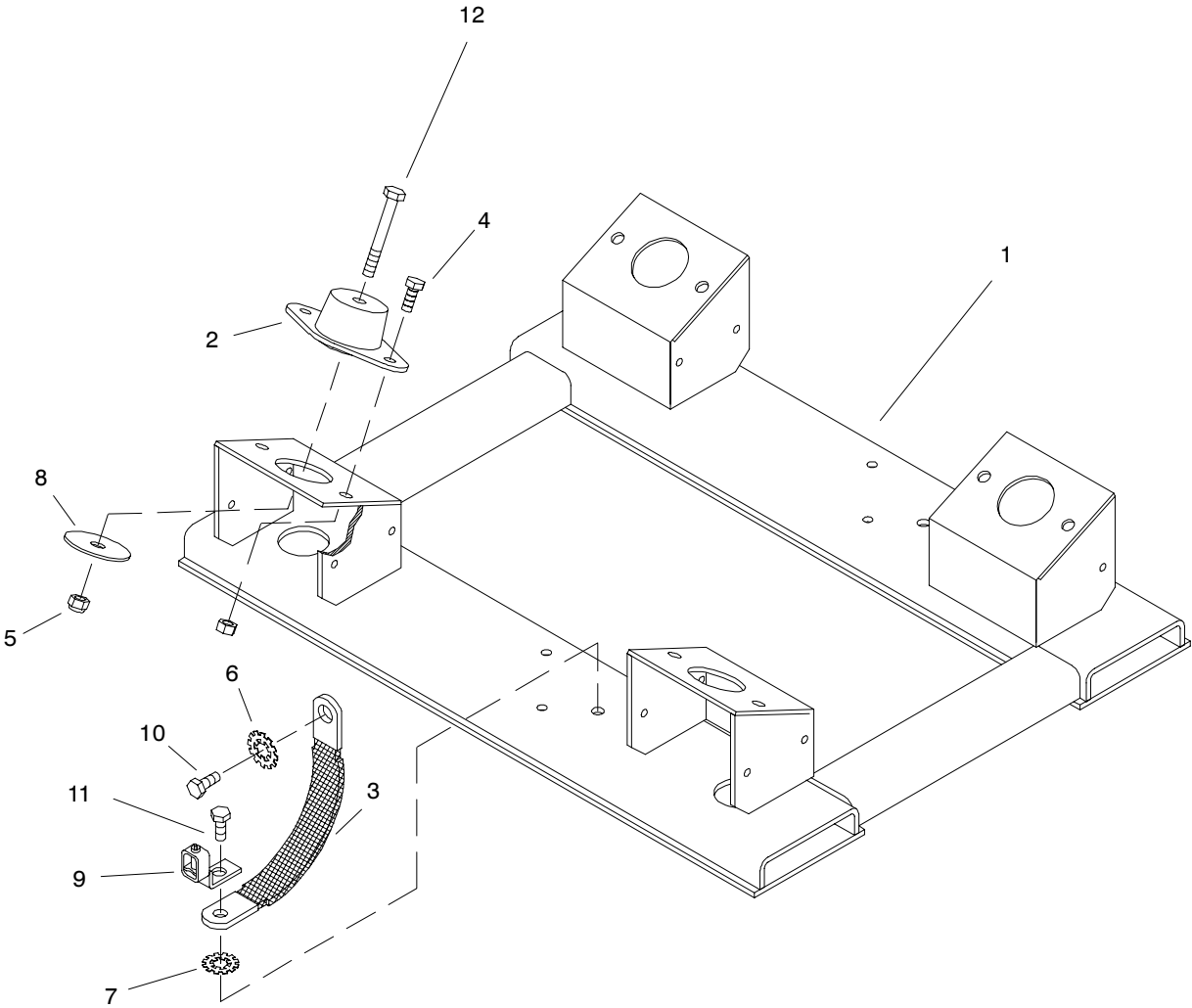
Item	Qty.	Description Variation	Part No.
9	1	Decal, warning <i>Rotating Parts</i> all	249808
10	1	Decal, Warning <i>Hot Engine</i> 1-11	249809
11	1	Decal, Warning <i>Hot Coolant</i> all	249810
12	1	Decal, <i>RV Listed</i> 1, 2, 7, 8	259282
13	1	Decal, Stripe all	278433
14	2	Decal, Drain all	GM14167
15	1	Logo, Kohler all	X-6276-3
16	1	Decal, CSA 1, 2, 3, 4, 7, 8	225165
17	1	Decal, Standby Connection 3, 4	255885
18	1	Decal, CE 3, 4, 9	344486
19	1	Decal, US Testing 14, 15	227990

Group 108: Oil Pressure Gauge & Switch



Item	Qty.	Description Variation	Part No.
1	1	Adapter, Sender 1, 99	225307
2	1	Sender, Oil Pressure Gauge 1	264390
2	1	Sender, Oil Pressure Gauge 99	344305
3	1	Switch, Oil Pressure (supplied with engine) 1, 99	322112

Group 109: Skid and Plant Mounting



CF-295000

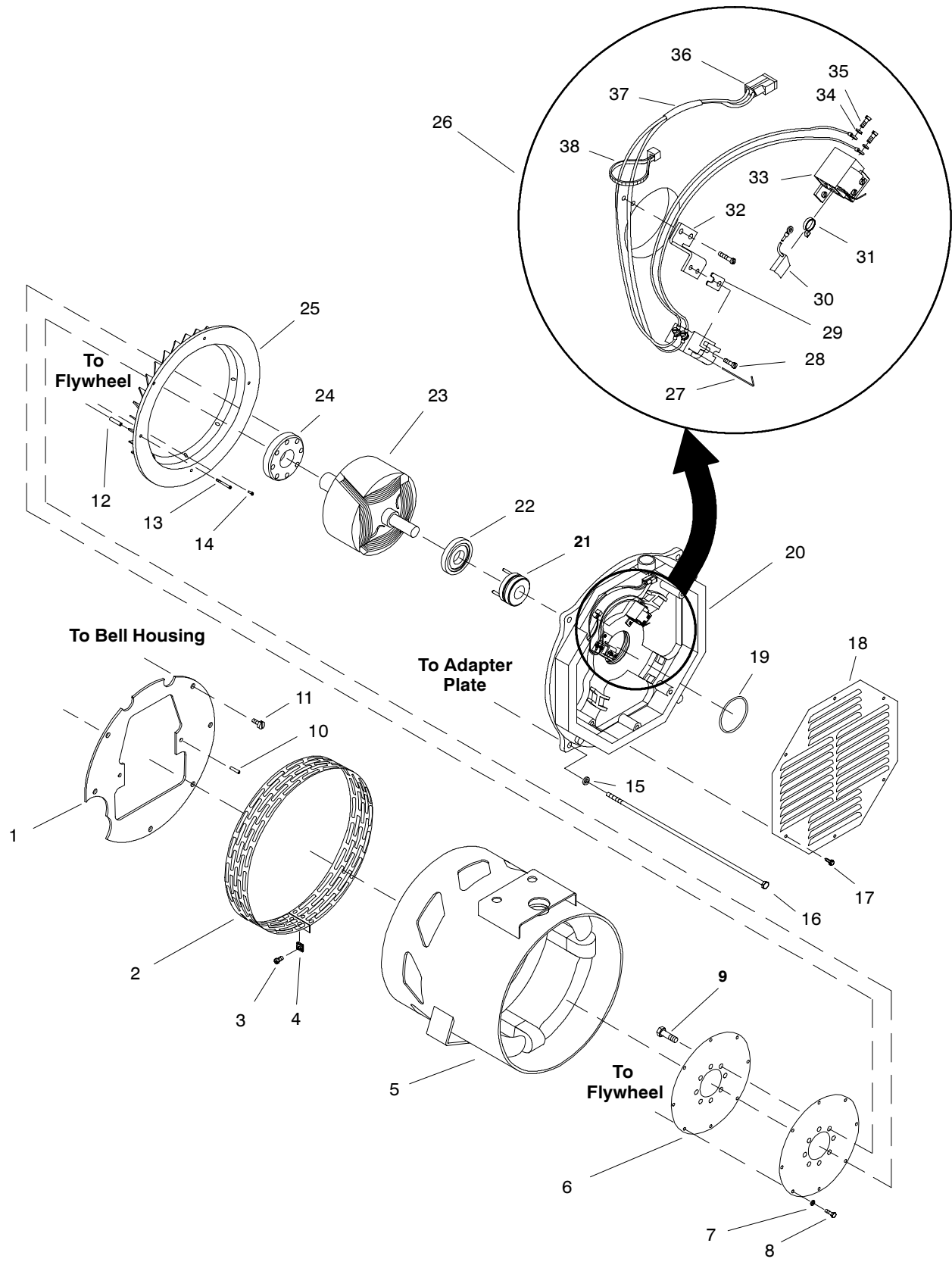
Group 109: Skid and Plant Mounting

Item	Qty.	Description Variation	Part No.
1	1	Skid	225519
		1, 4	
	1	Skid	225521
		2	
	1	Skid	225694
		3	
2	4	Mount, Vibro	278322
		1, 4	
	2	Mount, Vibro (Engine End)	229127
		2, 3	
	2	Mount, Vibro (Generator End)	225124
		2, 3	
3	1	Strap, Ground	287363
		1, 4	
	1	Strap, Ground	290418
		2, 3	
4	8	Hardware, 5/16	#
		1	

Item	Qty.	Description Variation	Part No.
5	4	Nut, Elastic Stop 5/16-18	X-101-16
		1, 2, 4	
6	1	Washer, Shakeproof 3/8	X-22-14
		1, 2, 3, 4	
7	1	Washer, Lock 5/16	X-22-16
		1, 2, 3, 4	
8	4	Washer, Plain .406x2 x.188	X-25-96
		1, 2, 3, 4	
9	1	Terminal, Grounding	X-377-11
		1, 2, 3, 4	
10	1	Screw, H.C. M10-1.25	X-6068-1
		1, 2, 3, 4	
11	1	Hex Head Cap Screw 5/16-18 x .875	X-125-31
		1,3, 4	
12	1	Bolt, 5/16	#
		1, 4	

Common Hardware Procure Locally

Group 201: Generator and Mounting



CJ-295000

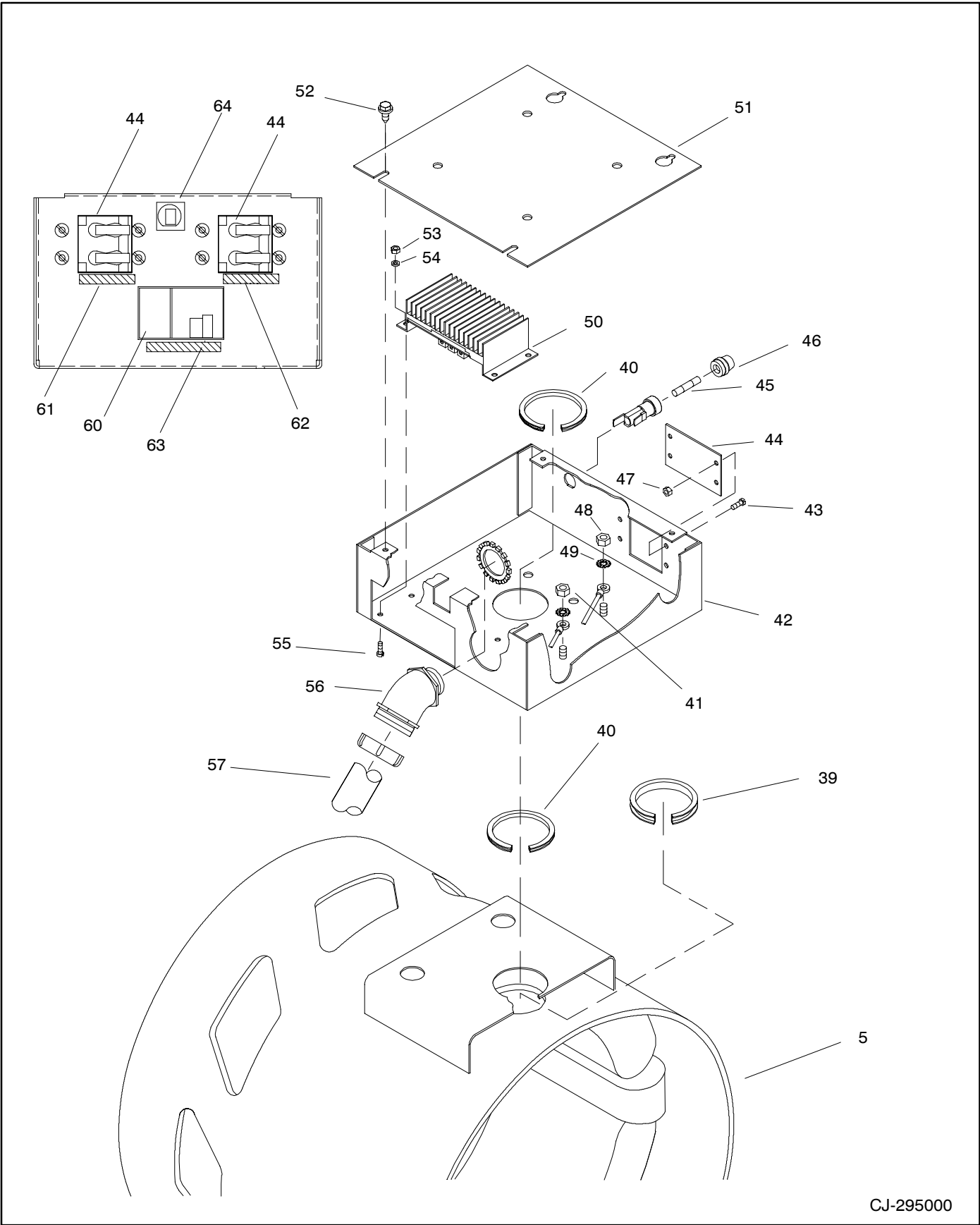
Group 201: Generator and Mounting

Item	Qty.	Description Variation	Part No.
1	1	Plate, Locator 1	229097
		See group 14 for locator plate in other variations	
2	1	Guard, Generator Fan 1, 2, 5, 6, 8, 12	229109-BLK
3	1	Screw, Self-Tapping 10-24 1, 2, 5, 6, 8, 12	X-67-125
4	1	Clip, Speed 1, 2, 5, 6, 8, 12	257442
5	1	Stator Assembly 1, 5, 8, 12	225277
	1	Stator Assembly 2, 6	225278
6	2	Disc, Armature Drive 1, 2, 5, 6, 8, 12	257017
7	8	Washer, 5/16 1, 2, 5, 6, 8, 12	#
8	8	Screw, H.C. M8-1.25 1, 2, 5, 6, 8, 12	X-6050-8
9	8	Cap Screw, 3/8-16 1, 2, 5, 6, 8, 12	X-6238-3
10	2	Pin, Knurled 1	229356
11	7	Screw, H.C. M8-1.5 1	X-6051-13
12	4	Spacer 1, 2, 5, 6, 8, 12	X-400-189
13	4	Screw, Pan Head Metric 1, 2, 5, 6, 8, 12	X-6284-1
14	4	Screw, Pan Head Metric 1, 2, 5, 6, 8, 12	X-6284-2
15	4	Washer, Hardened 1, 2, 5, 6, 8, 12	X-801-3
16	4	Bolt, Over 2, 6	X-6051-17
	4	Bolt, Over 1, 5, 8, 12	X-6051-15
	4	Cap, Plastic (Item not shown) 1, 2, 5, 6, 8, 12	X-6214-4
17	6	Screw, Self-Tapping 10-32 1, 2, 5, 6, 8, 12	X-67-113

Item	Qty.	Description Variation	Part No.
18	1	Panel, End Bracket 1, 2, 5, 6, 8, 12	225545
19	1	O-Ring 1, 2, 5, 6, 8, 12	229110
20	1	Bracket, End 1, 2, 5, 6, 8, 12	225531
21	1	Collector Ring 1, 2, 5, 6, 8, 12	238134
22	1	Bearing, Ball 1, 2, 5, 6, 8, 12	X-758-15
23	1	Rotor Assembly (Includes items 21, 22, 24) 1, 5, 8, 12	A-225273
	1	Rotor Assembly (Includes items 21, 22, 24) 2, 6	A-225274
24	1	Hub, Drive 1, 2, 5, 6, 8, 12	229060
25	1	Fan, Generator 1, 2, 5, 6, 8, 12	225215
26	1	Bracket Assembly, Engine (Includes items 19, 20, 27-38) 1, 2, 5, 6, 8, 12	A-225532
27	2	Retainer, Wire 1, 2, 5, 6, 8, 12	238247
28	4	Screw, Hex Eead Machine #10-32 1, 2, 5, 6, 8, 12	X-97-13
29	2	Shim, Brush Holder 1, 2, 5, 6, 8, 12	238248
30	4	Brush 1, 2, 5, 6, 8, 12	239282
31	4	Spring 1, 2, 5, 6, 8, 12	238150
32	2	Bracket, Brush Holder 1, 2, 5, 6, 8, 12	229178
33	2	Holder, Brush 1, 2, 5, 6, 8, 12	239247
34	4	Washer, Lock #6 1, 2, 5, 6, 8, 12	X-22-6
35	4	Screw, r.h.m. 6-32x5 1, 2, 5, 6, 8, 12	X-49-1
36	1	Terminal 1, 2, 5, 6, 8, 12	269166
37	1	Sleeve, Insulating 1, 2, 5, 6, 8, 12	X-415-2

Common Hardware Procure Locally

Group 201: Generator and Mounting



CJ-295000

Group 201: Generator and Mounting

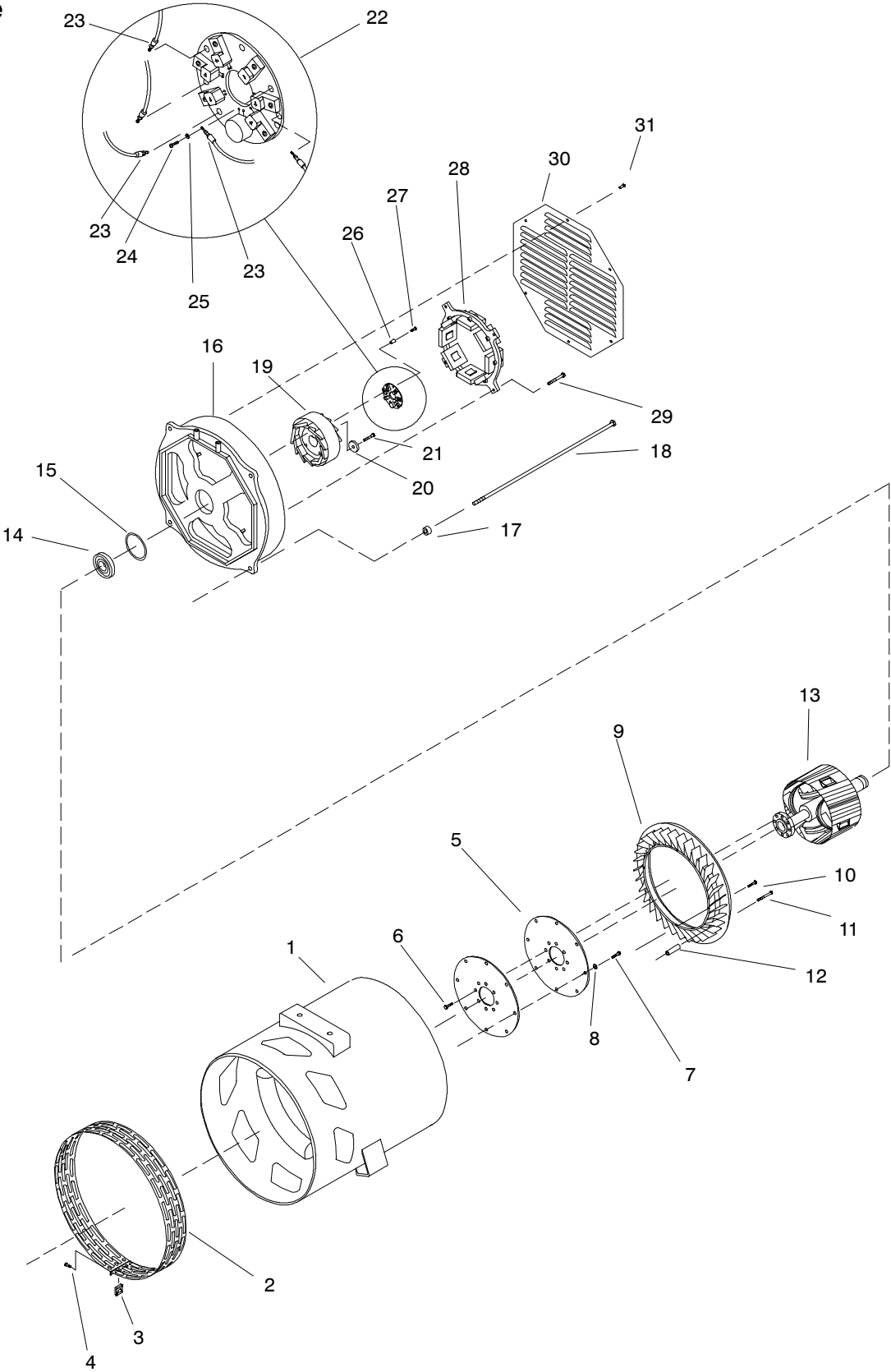
Item	Qty.	Description Variation	Part No.
38	1	Tie, Cable 1, 2, 5, 6, 8, 12	X-468-6
39	1	Grommet, Nylon 1	X-6028-1
40	1	Grommet, Nylon 1, 2, 5, 6, 8, 12	X-6033-6
41	1	Nut, Hex (Green) 1, 2, 5, 6, 8, 12	X-81-8
42	1	Box, Junction 1, 2, 5, 6, 12	225529
	1	Box, Junction 8	225988
43	4	Screw, r.h.m. 6-32x1/4 1, 2, 5, 6, 8, 12	X-49-25
44	1	Plate, Cover 1, 2, 5, 6	245264-BLK
	2	Breaker, Circuit 8	X-506-36
	1	Breaker, Circuit 12	X-506-36
	1	Terminal, Jumper 12	249956
45	1	Fuse, 10 amp 1, 2, 5, 6, 12	223316
46	1	Holder, Fuse 1, 2, 5, 6, 12	238426
47	4	Nut, #6-32 1, 12	#
48	2	Nut, 1/4-20 1, 8, 12	#
49	2	Washer, Shakeproof 1/4 1, 2, 5, 6, 8, 12	X-22-12
50	1	Voltage Regulator, PBIIE 1, 2, 5, 6, 8, 12	F-278598
51	1	Cover, Junction Box 1, 2, 5, 6, 8, 12	225530
52	4	Screw, Phillips Hex Crimptite 1, 2, 5, 6, 8, 12	X-6216-1
53	4	Nut, #8-32 1, 8, 12	#

Item	Qty.	Description Variation	Part No.
54	4	Washer, #8 1, 8, 12	#
55	2	Screw, 1/4-20 1, 8, 12	#
56	1	Conduit Connector 1	X-6027-10
	1	Conduit Connector 1	X-6027-9
57	1	Harness, Wiring (AC) 1, 2, 5, 6, 12	225506
	1	Harness, Wiring (AC) 8	225984
	4	Terminal 1, 2, 5, 6	X-283-12
58	1	Box Assembly, Junction (Includes items 42, 43, 44, 47) 1, 2, 5, 6, 12	A-225287
	1	Box Assembly, Junction (Includes items 42, 43, 44, 47) 8	A-225989
59	1	Button, Plug 1-3/8 (non-CSA specs) 5, 6 (Item not shown)	X-301-7
60	1	Breaker, GFI 8	225466
	1	Bracket, Breaker Mountng 8	225465
	1	Base, GFI 8	225467
61	1	Decal, 30 amp Main 8	228697
62	1	Decal, 30 amp Lights 8	228698
63	1	Decal, 30 amp Receptacle 8	228699
64	1	Breaker, Circuit 8	250719
65	1	Controller Extension Harness (not shown) 8	225993
66	1	AC Extension Harness (from junction box to rear of controller) (not shown) 8	225994

Common Hardware Procure Locally

Group 201: Generator and Mounting

3 Phase Mobile



BY-250000

3 Phase Mobile

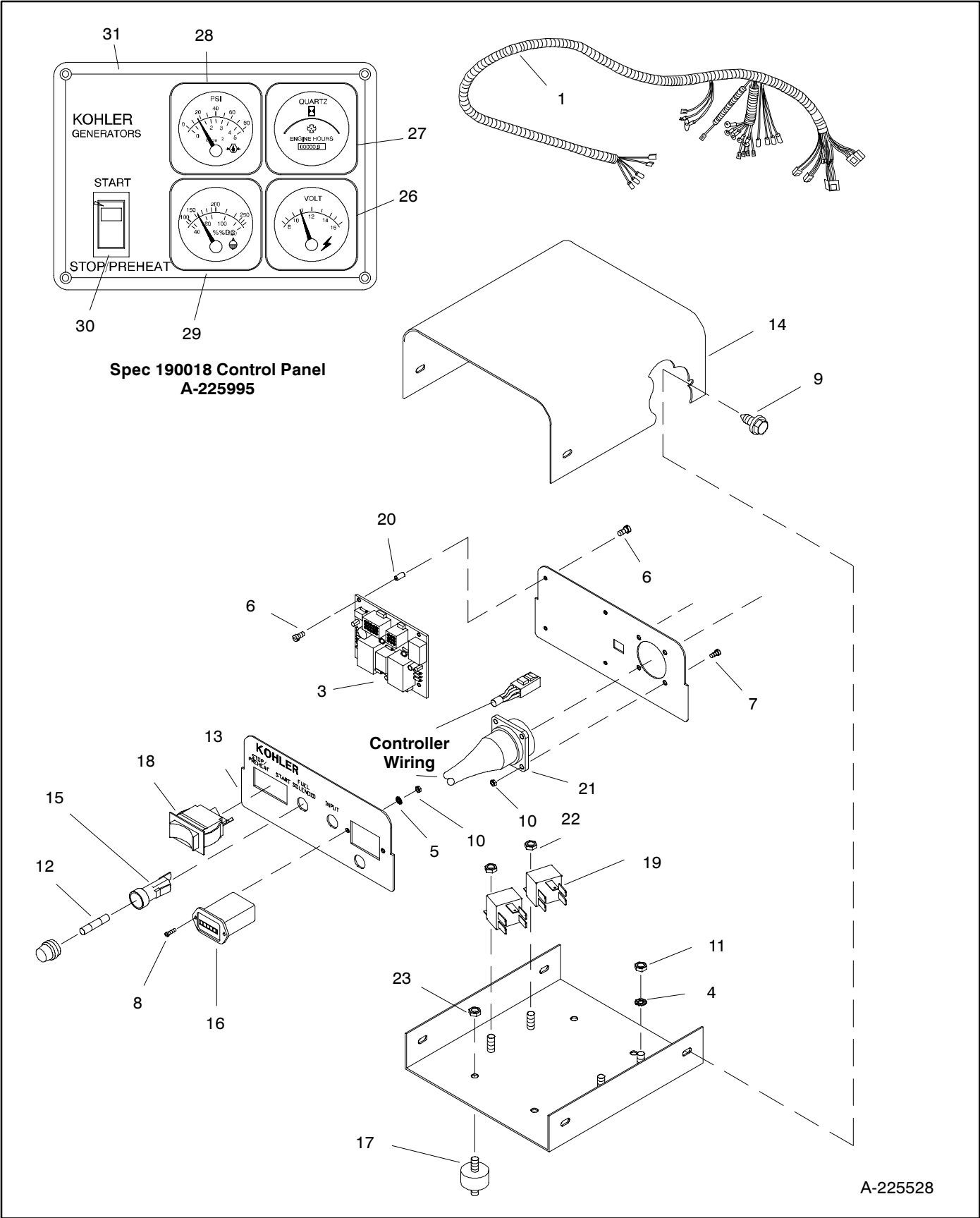
Group 201: Generator and Mounting

Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	1	Stator Assembly 3, 9	225283	17	4	Washer, Hardened 3, 4, 7	X-801-3
	1	Stator Assembly 4, 10	225284	18	4	Screw, H.C. M10 x 1.5 4, 7, 10, 11	X-6051-17
	1	Stator Assembly 7, 11	225695		4	Screw, H.C. M10 3, 9	X-6051-16
2	1	Guard, Generator Fan 3, 4, 7, 9, 10, 11	229109-BLK	19	1	Exciter, Armature 3, 4, 7	229098
3	1	Clip, Speed 3, 4, 7, 9, 10, 11	257442		1	Exciter, Armature 9, 10, 11	344567
4	1	Screw, Self-Tapping 3, 4, 7, 9, 10, 11	X-67-125	20	1	Washer, Plain 3, 4, 7, 9, 10, 11	X-25-129
5	2	Disc, Armature Drive 3, 4, 7, 9, 10, 11	257017	21	1	Screw, 3/8-16 x .875 3, 4, 7, 9, 10, 11	X-6238-3
6	8	Screw, 3/8-16 x .875 3, 4, 7, 9, 10, 11	X-6238-3	22	1	Circuit Board Assy. 3, 4, 7, 9, 10, 11	A-229152
7	8	Screw, H. C., M8-1.25 3, 4, 7, 9, 10, 11	X-6050-8	23	3	Terminal 3,7	X-283-7
8	8	Washer, 5/16 3, 4, 7, 9, 10, 11			3	Terminal 9, 11	X-283-2
9	1	Fan, Generator 3, 4, 7, 9, 10, 11	225215	24	5	Screw, 8-32 x .75 3, 4, 7, 9, 10, 11	X-51-8
10	4	Screw, M5 x .8 x 10mm 3, 4, 7, 9, 10, 11	X-6284-1	25	5	Washers, Lock #8 3, 4, 7, 9, 10, 11	X-22-7
11	4	Screw, M5 x .8 x 45mm 3, 4, 7, 9, 10, 11	X-6284-2	26	3	Spacer 3, 4, 7, 9, 10, 11	X-712-17
12	4	Spacer 3, 4, 7, 9, 10, 11	X-400-189	27	3	Screw, Self-Tapping 3, 4, 7, 9, 10, 11	X-67-135
13	1	Rotor Assembly (includes item 14) 3, 9	A-229146	28	1	Exciter Assembly, Field 3,4,7	A-229276
	1	Rotor Assembly (includes item 14) 4,7, 10, 11	A-229148		1	Exciter Assembly, Field 3,4,7	344569
14	1	Bearing, Ball 3, 4, 7, 9, 10, 11	X-758-15	29	4	Screw, Hex. Head 3, 4, 7, 9, 10, 11	X-97-15
15	1	O-Ring 3, 4, 7, 9, 10, 11	229110	30	1	Panel, End Bracket 3, 4, 7, 9, 10, 11	225545
16	1	Bracket, End 3, 4, 7	229090	31	6	Screw, Self-Tapping 3, 4, 7, 9, 10, 11	X-67-113
	1	Bracket, End 9, 10, 11	344566				

Specs
PA-190005
PA-190006
PA-190011
PA-190013
PA-190016
See Parts Bulletin PB-100

[Click Here](#)

Group 301: Controller & Mounting

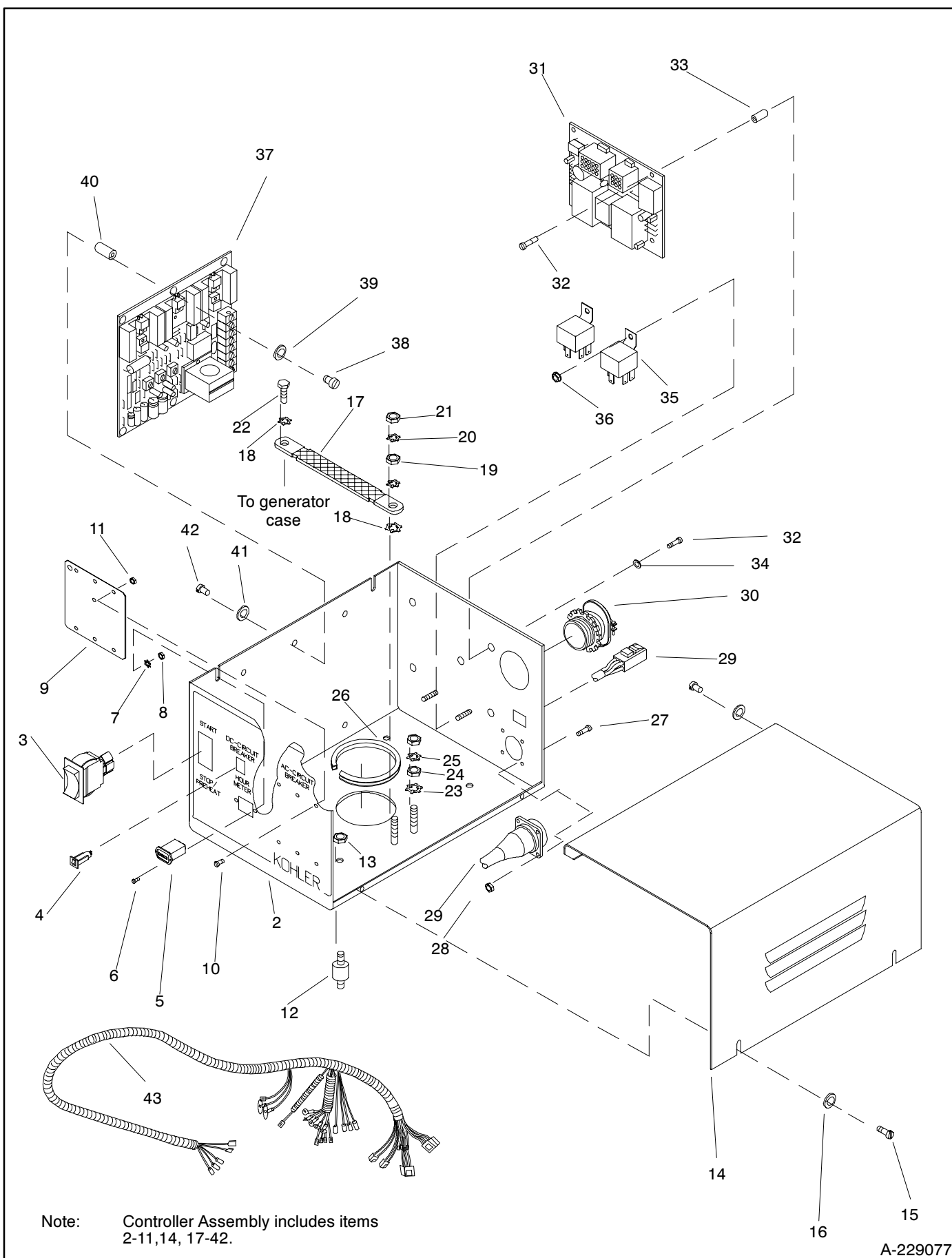


Group 301: Controller & Mounting

Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	1	Engine Wiring Harness (Includes the following not shown)		15	2	Holder, Fuse	238426
		4	225310		2	Breaker, Circuit	250719
		5	225986		5		
	1	Diode, 6 Amp. 100V	233959	16	1	Meter, Hour	238736
	1	Conector, Plug	239493		4, 5		
	A/R	Pin, Female Gold Plated	292838	17	4	Mount, Controller	241769
	A/R	Pin, Female	287783		4, 5		
	1	Terminal, 2 Position	269165	18	1	Switch, Rocker	249406
	A/R	Pin, Female	273661		4		
	1	Connector, 2 Position	269166		1	Switch, Rocker	229997
	1	Connector, 6 Position	269190		5		
	A/R	Pin, Female Gold Plated	241606	19	2	Relay	259391
	1	Boot	290262		4, 5		
2	1	Controller Assembly (Includes items 3-23)	A-225312	20	5	Spacer, Circuit Board	287948
		4			4, 5		
	1	Controller Assembly (Includes items 3-23)	A-225992	21	1	Controller Wiring Harness (Includes the following not shown)	
		5			4		225308
					5		225997
3	1	Circuit board, Universal	H-239563		4	Diode, 6 Amp., 100V	233959
		4, 5			1	Connector, Receptacle	239496
4	1	Washer, Lock 1/4	X-22-11		A/R	Pin, Male	287782
		4, 5			A/R	Pin, Male Gold Plated	292839
5	2	Washer, Lock #6	X-22-6		1	Connector, 9 Position	259689
		4, 5			A/R	Pin, Female Gold Plated	241606
6	10	Screw, r.h.m. #6-32	X-49-25		1	Connector, 6 Position	269190
		4, 5			1	Connector, 15 Position	269366
7	4	Screw, r.h.m. #6-32	X-49-26	22	2	Nut, #10-32	#
		4, 5			4, 5		
8	2	Screw, Pan Head #6-32	X-49-39	23	4	Nut, 1/4-20	#
		4, 5			4, 5		
9	4	Screw, Phillips Hex	X-6216-1	24	1	Ring, Lock	151511
		4, 5			5		
10	6	Nut, hex #6-32	X-71-2	25	1	Switch, Toggle (Prime)	268042
		4, 5			5		
11	1	Nut, Hex (green)	X-81-8	26	1	Gauge, volt	344037
		4, 5			5		
12	2	Fuse, 10 Amp.	223316	27	1	Gauge, houmeter	344038
		4			5		
13	1	Box, Silkscreened	225313	28	1	Gauge, oil pressure	344036
		4			5		
	1	Box, Silkscreened	225991	29	1	Gauge, temperature	344035
		5			5		
14	1	Cover, Controller	225527	30	1	Switch, rocker	229997
		4, 5			5		
				31	1	Panel, control	344030
					5		

Common Hardware Procure Locally

Group 301: Controller and Mounting



3 Phase Mobile

Group 301: Controller and Mounting

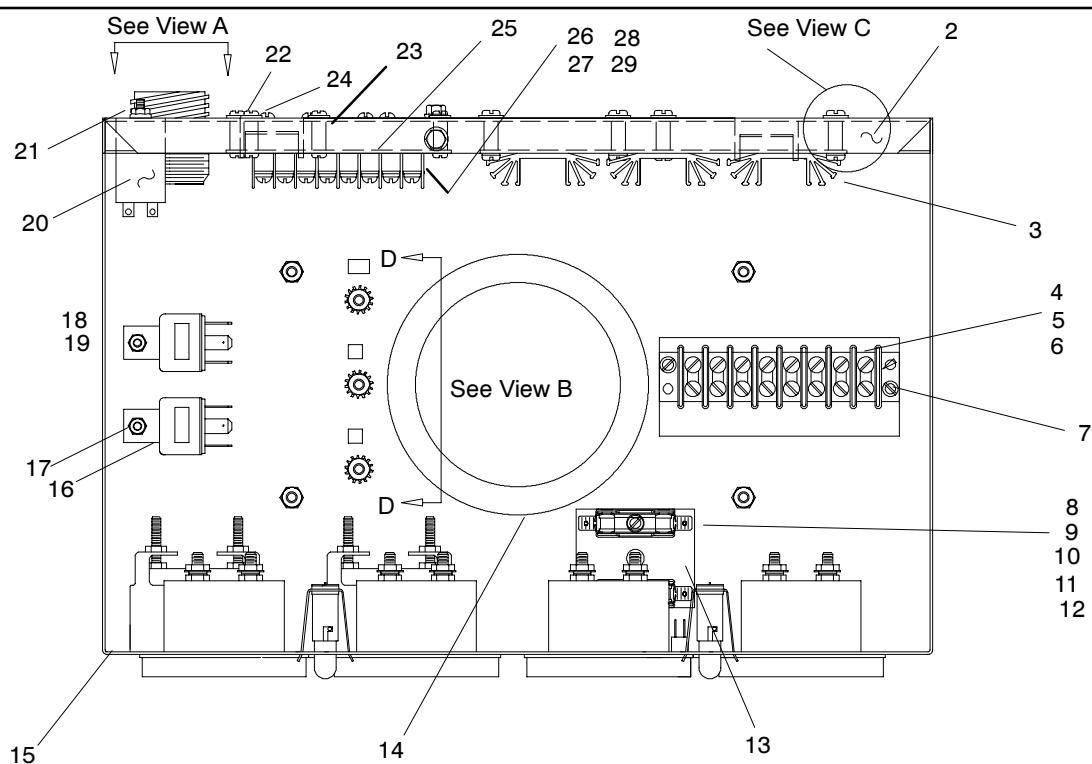
Item	Qty.	Description Variation	Part No.
1	1	Controller Assembly	See chart below
	2		
2	1	Box, Silkscreen	229075
	2		
3	1	Switch, Rocker	249406
	2		
4	1	Breaker, Circuit, 10 Amp. (DC)	250719
	2		
5	1	Meter, Hour	238736
	2		
6	6	Screw, 6-32 x .625	X-49-26
	2		
7	5	Washer, Lock #6	X-22-6
	2		
8	2	Nut, Hex. 6-32	X-71-2
	2		
9	1	Plate, Cover	246434
	2		
10	6	Screw, 6-32 x 5	X-49-1
	2		
11	6	Nut, 6-32	#
	2		
12	4	Mount, Controller	229353
	2		
13	4	Nut, 1/4-20	#
	2		
14	1	Cover, Controller	GM10538
	2		
15	2	Screw, 10-24 X 1/2	X-67-126
	2		
16	2	Washers, #10	#
	2		
17	1	Strap, Ground	246083
	2		
18	2	Washer, Shakeproof	X-22-12
	2		
19	1	Nut, hex. 1/4-20	X-76-2
	2		
20	3	Washer, Lock 1/4	X-22-11
	2		
21	1	Nut, hex 1/4-20 (green)	X-81-8
	2		
22	1	Bolt, 1/4-20	#
	2		
23	2	Washer, 1/4 #8-32 Int.-Ext. tooth	X-22-12
	2		
24	2	Nut, hex 1/4-20	X-76-2
	2		
25	3	Washer, Lock 1/4	X-22-11
	2		
26	1	Grommet, Nylon	X-6033-4
	2		
27	4	Nut, 6-32	#
	2		

Item	Qty.	Description Variation	Part No.
28	6	Screw, 6-32 x 1/2	X-49-26
	2		
29	1	Harness, Controller (Includes the following not shown)	See chart below
	1	Fuse, 10 Amp.	223316
	1	Fuse, 8 Amp.	258405
	4	Diode, 6 Amp. 100V	233959
	1	22 Pin Connector	239496
	1	6 Pin Connector P3	241616
	1	6 Pin Connector	241617
	1	12 Pin Connector	254852
	1	9 Pin Connector	259689
	2	In-line Fuse Holder	322557
	1	15 Pin Connector	269366
	2		
30	1	Connector, Cable	X-6266-1
	2		
31	1	Circuit Board, Universal	H-239563
	2		
32	10	Screw, 6-32 x 1/4	X-49-25
	2		
33	5	Spacer, Circuit Board	287948
	2		
34	5	Washer, #6	#
	2		
35	2	Relay	259391
	2		
36	2	Nut, #10-32	
	2		
37	1	Voltage regulator, PB5	B-258296
	2		
38	6	Screw, #8-32 x 1/4	X-51-8
	2		
39	6	Washer, Nylon	239665
	2		
40	6	Spacer	229357
	2		
41	2	Washer, #8	#
	2		
	4	Washer, Lock #8	X-22-7
	2		
42	6	Screw, # 8-32 x 3/8	X-51-12
	2		
43	1	Harness, Engine Wiring	225658
	2		

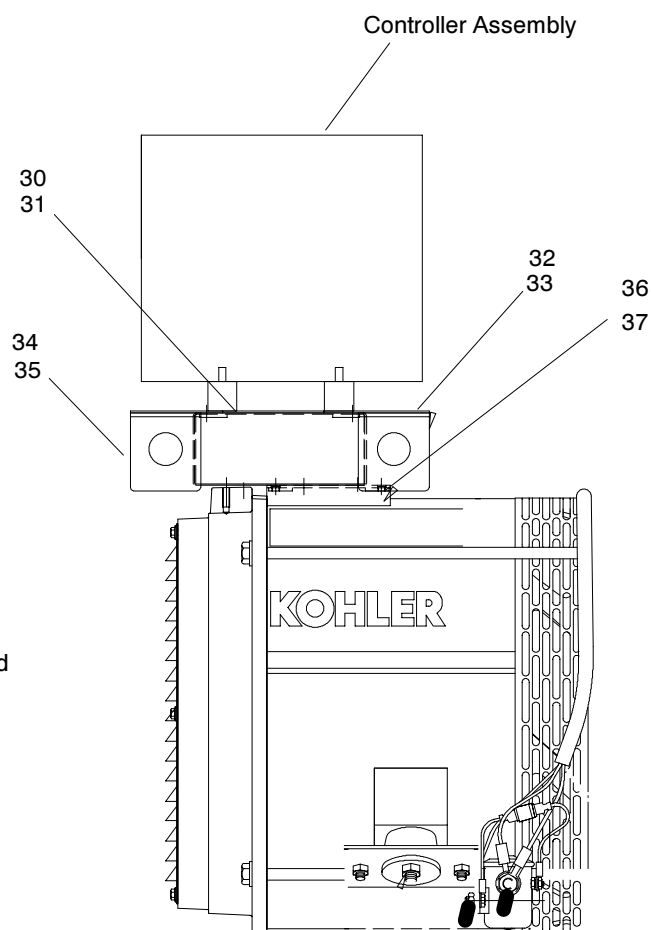
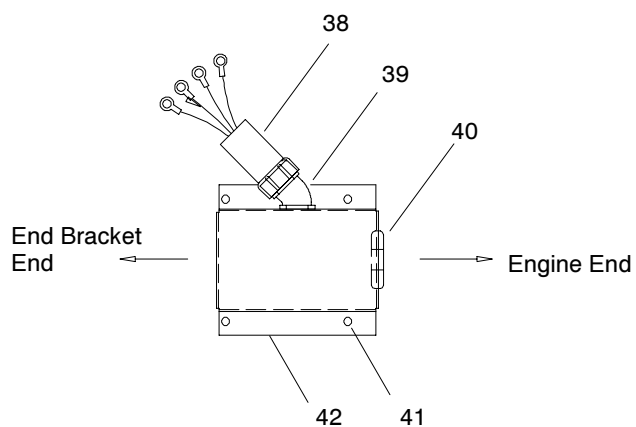
Description	Part Number	
	Serial Numbers before 344383	Serial Numbers 344383 and after
Controller assembly	A-229077	A-225459
Controller wiring harness	229129	225460
Full flashing resistor (10 ohm)	Not Used	226666

Group 301: Controller and Mounting

Spec 190011 Only



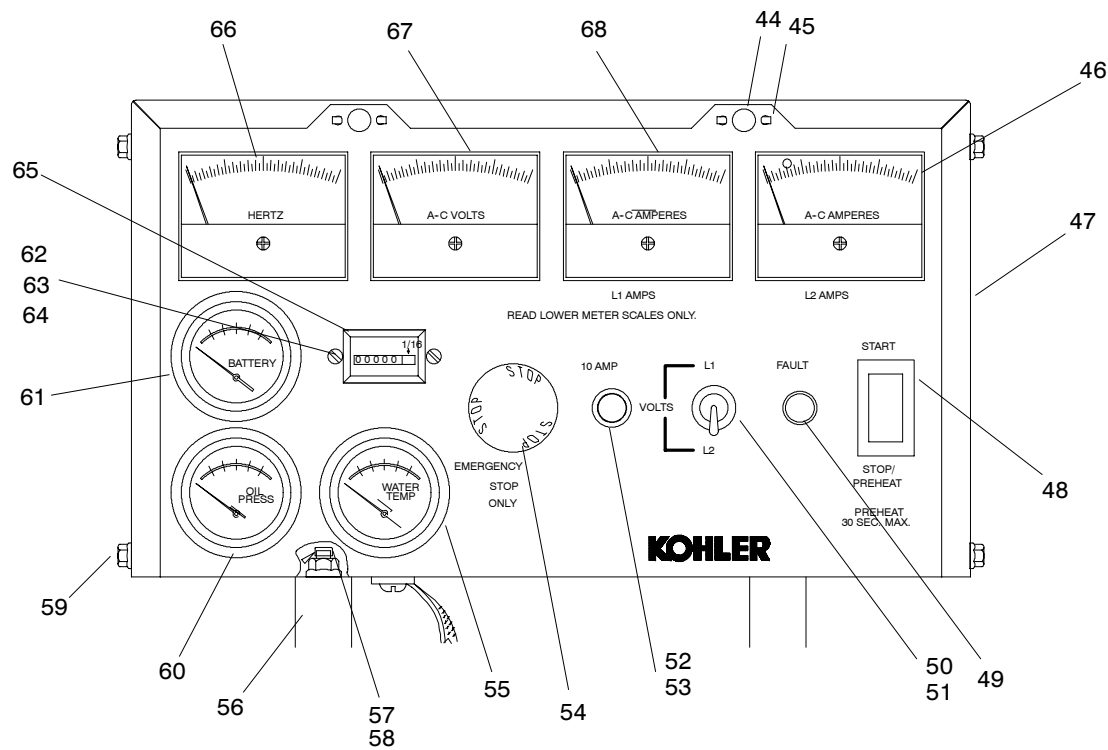
Top View of Conduit Connection Bracket



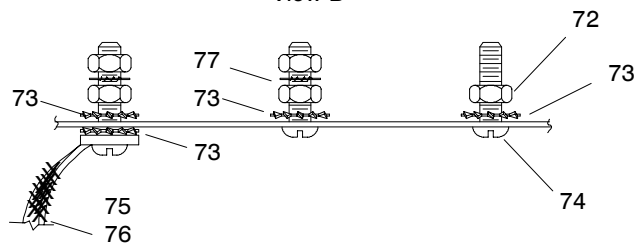
Group 301: Controller and Mounting

Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
1	1	Controller Assembly (Includes item 2-29, 44-82) 3	A-225296	22	10	Screw, 6-32 x 1/4 3	X-49-25
2	1	Plate, Hinge 3	225298	23	5	Spacer, Circuit Board 3	287948
3	1	Voltage Regulator Assembly (PB5) 3	B-258296	24	5	Washer, #6 3	#
4	1	Block, Terminal 3	246115	25	1	Universal Circuit Board 3	H-239563
5	2	Screw, 8-32 3	X-51-53	26	1	Circuit Board Assembly 3	B-258296
6		Nut, 8-32 3	#	27	8	Screw, 6-32 x 1/4 3	X-49-25
7	1	Strip, Marker 3	225301	28	4	Spacer, Circuit Board 3	287948
8	1	Holder, Fuse 3	292821	29	4	Washer, #6 3	#
9	1	Fuse, 1.5 Amp 3	291207	30	4	Screw, 5/16-18 x .50 3	X-125-33
10	2	Screw, 6-32 x 3/8 3	X-49-2	31	4	Washer, 5/16 3	259391
11	2	Washer, Lock #6 3	X-22-6	32	1	Plate, Controller mounting 3	225305
12	2	Nut, 6-32 3	#	33	2	1/4 Hardware 3	#
13	1	Marker, Strip 3	225939	34	2	Transformer, Current 3	254786
14	1	Grommet 3	X-284-31		4	Bracket, CT Mounting 3	225161
15	1	Box, Controller 3	225302	35	2	Hardware, 1/4 3	#
16	2	Relay 3	259391	36	1	Washer, Shakeproof 3	X-22-12
17	2	Hardware, 10-32 3	#	37	1	Bolt, 1/4-20 3	#
18	2	Relay 3	259391	38	1	Conduit, Flexible 3	X-6026-13
19	1	Hardware, 10-32 3	#		1	Bushing (not shown) 3	X-6344-12
20	2	Relay 3	241736	39	1	Connector, Conduit 3	X-6027-10
21		Nut, 6-32 3	#	40	1	Grommet, 1 3/4 3	X-284-4
				41	1	Bracket, Conduit Connection 3	225306
				42	4	Hardware, 1/4 3	#
				43	4	Harness, Wiring 3	225692

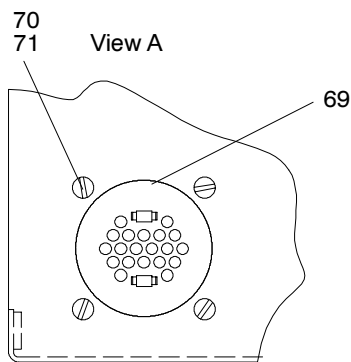
Common Hardware Procure Locally



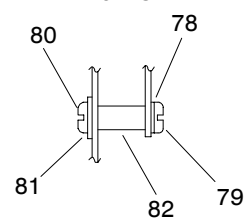
View B



View A



View C



Group 301: Controller and Mounting

Item	Qty.	Description Variation	Part No.	Item	Qty.	Description Variation	Part No.
44	2	Lamp 3	255126	65	1	Meter, Hour 3	238736
45	2	Socket, Lamp 3	284990	66	1	Meter, Frequency 3	295069
46	1	Ammeter 3	225174	67	1	Voltmeter 3	282814
47	1	Cover, Controller 3	225304	68	1	Ammeter 3	225174
48	1	Switch, rocker 3	249406	69	1	Harness, Controller (Includes the following not shown)	225303
49	1	Lamp 3	269373		1	Fuse, 10 Amp	223316
50	1	Switch, Toggle 3	238357		5	Diode, 6 Amp, 100 volt	223959
51	1	Ring, Lock 3	151511		1	Connector, Receptacle	239496
52	1	Holder, Fuse 3	238426		1	Connector, 12 Position	254852
53	1	Fuse, 10 Amp 3	223316		1	Connector, 9 Position	259689
54	1	Switch, Stop 3	225941		1	Holder, Fuse	269216
55	1	Gauge, Water Temperature 3	282898		1	Connector, 15 Position	269366
56	4	Bumper 3	292834		1	Resistor, Field Flashing 3	226666
57	4	Nut, 5/16-18 3	#	70	4	Screw, 6-32 x 1/2 3	X-49-26
58	4	Plug, Cap 3	X-519-1	71	4	Nut, 6-32 3	#
59	9	Screw, Crimptight 3	X-6216-1	72	5	Nut, Hex 10-24 3	X-6234-6
60	1	Gauge, Oil Pressure 3	282897	73	4	Washer, Lock 3	X-22-50
61	1	Gauge, Voltage 3	253329	74	3	Screw, 10-24 x 1 3	X-50-70
62	2	Nut, Hex 6-32 3	X-71-2	75	1	Sleeve 3	X-696-5
63	2	Washer, Lock #6 3	X-22-6	76	1	Strap, Ground 3	X-6046-2
64	2	Screw, Pan Head 6-32 x 1/2 3	X-49-39	77	2	Washer, External Tooth #10 3	X-22-22
				78	6	Washer, Nylon 3	239665
				79	6	Screw, 8-32 x 1/4 3	X-51-8
				80	6	Screw, 8-32 x 3/8 3	X-51-12
				81	6	Washer, Lock #8 3	X-22-7
				82	6	Spacer 3	229357

Common Hardware Procure Locally

Group 701: Literature

Item	Qty.	Description Variation	Part No.
1	1	Guide, Safety 1, 2 , 3	TP-5251
2	1	RV Warranty 1	TP-5376
3	1	Service Manual, Kubota Engine 1, 2, 3	TP-5546

Item	Qty.	Description Variation	Part No.
4	1	Operation Manual 1	TP-5594
	1	Operation Manual 2 3	TP-5647
5	1	Generator Service Manual 1	TP-5595
	1	Generator Service Manual 2 3	TP-5648
6	1	Parts Catalog, Engine and Generator 1,2 , 3	TP-5596
	1	Operation Manual, Kubota Engine 3	TP-5971

Kit List

	7 KW	10 KW
Circuit Breaker Kits		
100 volt, 2 wire, 60 hz.	PA-229186	N/A
100/200 volt, 3 wire, 50 hz.	PA-229394	PA-229393
100/200 volt, 3 wire, 60 hz.,	PA-229392	PA-229542
110/220 volt, 3 wire, 50 hz.	PA-229394	PA-229393
110/220 volt, 3 phase	PA-225673	PA-260110
120/240 volt, 3 wire, 50 hz.	PA-225630	PA-229392
120/240 volt, 3 wire, 60 hz.	PA-229394	PA-229393
220 volt, 2 wire, 50 hz.	PA-225639	PA-225640
240/416 volt, 3 phase	PA-225669	PA-260109
600 volt, 3 phase	PA-260111	PA-260111
220/480 volt, 4 wire	PA-225670	N/A
Cooling System		
Block heater	PA-225680	PA-225680
Remote radiator assembly	PA-225299	PA-225300
Exhaust System Kits		
Exhaust Installation Kit	PA-225627	PA-225627
Flexible Exhaust Connector	PA-225607	PA-225607
Muffler	PA-225606	PA-225606
Silencer	PA-225321	PA-225321
Spark Arrestor	PA-225323	PA-225323
Fuel System Kits		
Flexible fuel line	PA-225677	PA-225677
Fuel water separator	PA-225624	PA-225624
Heavy-duty fuel pump	PA-225463	PA-225463
Harness Kits		
Remote, 7.5 foot extension 1 phase models	PA-225552	PA-225552
Remote, 12 foot, 1 phase models	PA-225536	PA-225536
Remote, 12 foot, 3 phase models	PA-249941	PA-249941
Remote, 15 feet 1 phase models	PA-225563	PA-225563
Remote, 15 foot, 3 phase models	PA-249334	PA-249334
Extension harness, 15 feet 1 phase models	PA-225580	PA-225580
Extension harness, 25 feet 1 phase models	PA-225581	PA-225581
Extension harness, 25 feet 3 phase models	PA-249336	PA-249336
Remote Start Kits		
Remote Start Panel	PA-225576	PA-225576
Remote Start and 2 Meter Panel	PA-225585	PA-225585
Remote Start and 2 Meter Panel	PA-344040	PA-344040
Remote Start and 4 Meter Panel	PA-225588	PA-225588
Remote Start and 4 Meter Panel	PA-344041	PA-344041
Senders, engine	PA-225618	PA-225618
Paint and Miscellaneous Kits		
Black spray paint	221292	221292
Black touch-up	GM19488	GM19488
Kit, battery	N/A	PA-273660

N/A Not Applicable

Kit Parts Lists

Qty.	Description	Kit/Part No.
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Circuit Breaker Kits

Circuit breaker	PA-225630
1 Decal, notice	246242
1 Terminal, jumper	249956
1 Breaker, Circuit, 25 Amp.	X-506-40
1 Installation Instructions	TT-875

Circuit breaker	PA-225639
1 Decal, notice	246242
1 Plate, cover	229183
1 Breaker, Circuit, 30 Amp.	X-506-49
1 Installation Instructions	TT-875

Circuit breaker	PA-225640
1 Decal, notice	246242
1 Plate, cover	229183
1 Breaker, Circuit, 40 Amp.	X-506-50
1 Installation Instructions	TT-875

Circuit breaker	PA-225669
1 Decal, notice	246242
1 Breaker, Circuit, 25 Amp.	225168
1 Installation Instructions	TT-799
3 Boot	238915

Circuit breaker	PA-225670
1 Decal, notice	246242
1 Breaker, Circuit	250575
1 Installation Instructions	TT-799

Circuit breaker	PA-225673
1 Decal, notice	246242
1 Breaker, Circuit, 12 Amp.	225672
1 Installation Instructions	TT-799

Circuit breaker	PA-229186
1 Decal, notice	246242
1 Plate, cover	229183
1 Breaker, Circuit, 70 Amp.	X-506-48
1 Installation Instructions	TT-875

Circuit breaker	PA-229392
1 Decal, notice	246242
1 Breaker, Circuit, 35 Amp.	X-506-42
1 Installation Instructions	TT-875

Circuit breaker	PA-229393
1 Decal, notice	246242
1 Terminal, jumper	249956
1 Breaker, Circuit, 42 Amp.	X-506-43
1 Installation Instructions	TT-875

Circuit breaker	PA-229394
1 Decal, notice	246242
1 Terminal, jumper	249956
1 Breaker, Circuit, 30 Amp., 2 pole	X-506-36
1 Installation Instructions	TT-875

Circuit breaker	PA-229542
1 Decal, notice	246242
1 Terminal, jumper	249956
1 Breaker, Circuit, 50 Amp.	X-506-38
1 Installation Instructions	TT-875

Circuit breaker	PA-260109
1 Decal, notice	246242
1 Breaker, Circuit, 30 Amp.	269250
1 Installation Instructions	TT-799
3 Boot	238915

Qty.	Description	Kit/Part No.
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Circuit breaker	PA-260110
1 Decal, notice	246242
1 Breaker, Circuit, 40 Amp.	269252
1 Installation Instructions	TT-799
3 Boot	238915

Circuit breaker	PA-260111
1 Decal, notice	246242
1 Breaker, Circuit, 20 Amp.	269251
1 Installation Instructions	TT-799

Cooling System Kits

Block Heater	PA-225292
1 Installation Instructions	TT-1009
2 Washer, plain	X-25-40
2 Hose	X-312-52
6 Clamp, Hose 1/2-1 13/16	X-426-3
2 Clamp, Hose 1 15/16	X-426-8
1 Connector, Hose	X-582-1
1 Bushing, Reducer 1/2	168848
1 Connector, Hose	225250
1 Bracket, Block Heater	225293
1 Hose, Molded	225294
1 Bracket, Block Heater	225297
1 Block Heater	276358

Remote Radiator Assembly	PA-225299
1 Radiator assembly remote	A-225668
1 Harness, wiring	225682
1 Harness, wiring	225683
1 Harness, wiring	225684
1 Relay	259391
1 Holder, in-line fuse	269216
1 Fuse, 15 Amp.	238645
2 Insulink	X-367-3
1 Terminal	X-431-25
1 Screw, r.h.m. 10-32 x 1/2	X-50-1
1 Nut, Whiz	X-6210-1

Remote Radiator Assembly	PA-225300
1 Radiator assembly	A-225664
1 Harness, wiring	225682
1 Harness, wiring	225683
1 Harness, wiring	225684
1 Relay	259391
1 Holder, in-line fuse	269216
1 Fuse, 15 Amp.	238645
2 Insulink	X-367-3
1 Terminal	X-431-25
1 Screw, r.h.m. 10-32 x 1/2	X-50-1
1 Nut, Whiz	X-6210-1

Exhaust System Kits

Muffler Kit	PA-225606
1 Muffler, exhaust	225603
1 Adapter, hose	286831
1 Clamp, muffler	288827

Flexible Exhaust Connector	PA-225607
1 Elbow, 90 degrees	151771
1 Connector, exhaust	254972

Exhaust Installation Kit	PA-225627
1 Elbow, 90 Degrees	151771
1 Nipple, Pipe 1 1/2 x 2	155029

Kit Parts Lists

Qty.	Description	Kit/Part No.
Silencer		
1	Muffler, exhaust	PA-225321 225316
1	Adapter, exhaust	X-570-22
Spark Arrestor		
1	Clamp, muffler	PA-225323 X-722-4
1	Arrestor, Spark	225319
1	Connector	225320
1	Clamp, muffler	277706
Fuel System Kits		
Flexible Fuel Line		
1	Line, flexible fuel	PA-225677 225675
1	Line, flexible fuel	225676
2	Clamp, hose	X-426-9
1	Elbow, 1/2-20 x 1/4	X-447-6
1	Elbow, oil line connector	X-447-7
Fuel/water Separator		
1	Filter, water separator	PA-225624 225251
1	Bracket, separator filter	225604
2	Washer, plain	X-25-40
1	Line, flex fuel	X-386-101
1	Line, fuel	X-386-95
2	Connector, hose elbow	X-391-25
2	Clamp, hose	X-426-9
2	Screw, H.C.	X-465-16
2	Screw, H.C. (Metric)	X-6068-1
2	Plug, pipe	X-75-41
Heavy-Duty Fuel Pump		
1	Installation Instructions	PA-225463 TT-1138
3	Nut, elastic stop	X-101-25
11	Washer, plain	X-25-40
3	Grommet	X-284-29
2	Insulink	X-367-3
1	Flexible Fuel Line	X-386-74
1	Flexible Fuel Line	X-386-99
2	Connector, Hose Elbow	X-391-20
4	Clamp, hose	X-426-9
2	Screw, Hex. Head Cap	X-6049-1
2	Union, banjo	X-6288-1
1	Bracket, fuel pump mounting	225462
1	Pump, fuel	229051
2	Lead, wire	229056
Harness Kits		
12-Inch Remote Harness (pigtail)		
1	Harness	PA-225536 225536
7.5-Foot Remote Harness		
1	Harness	PA-225552 225552
15-Foot Remote Harness		
1	Harness, remote 15 feet	PA-225563 225563
15-Foot Remote Harness		
1	Harness, extension 15 feet	PA-225580 225580
25-Foot Remote Harness		
1	Harness, extension 25 feet	PA-225580 225581
12-Inch Remote Harness (Pigtail)		
1	Harness	PA-249941 249941
15-Foot Remote Harness		
1	Harness	PA-249334 243934
25-Foot Remote Harness		
1	Harness	PA-249336 243936

Qty.	Description	Kit/Part No.
Remote Start Kits		
Remote Start Panel		
1	Installation Instructions	PA-225576 TT-872
1	Panel assembly remote (Includes the following)	A-225574
1	Connector, plug 6 position	241617
1	Panel, remote	260105
1	Switch, rocker	269296
Remote Start And 2-Meter Panel		
1	Installation Instructions	PA-225585 TT-874
1	Panel, control (Includes the following)	A-225584
1	Panel, silkscreened	225583
1	Switch, rocker	249330
1	Harness, wiring	249331
1	Gauge, oil pressure	249438
1	Gauge, water temperature	249440
Remote Start And 2-Meter Panel		
1	Installation Instructions	PA-344040 TT-1072
1	Decal, warning	249494
1	Panel, control (Includes the following)	A-344033
1	Panel, control	344029
1	Switch, rocker	344039
1	Harness, wiring	344031
1	Gauge, oil pressure	344036
1	Gauge, water temperature	344035
Remote Start And 4-Meter Panel		
1	Installation Instructions	PA-225588 TT-873
1	Panel, control (Includes the following)	A-225587
1	Panel, silkscreened	225586
1	Switch, rocker	249330
1	Gauge, oil pressure	249438
1	Gauge, water temperature	249440
1	Meter, hour	249461
1	Voltmeter, battery	249462
1	Harness, panel	249467
Remote Start And 4-Meter Panel		
1	Installation Instructions	PA-344041 TT-1073
1	Decal, warning	249494
1	Panel, control (Includes the following)	A-344034
1	Panel, control	344030
1	Switch, rocker	344039
1	Harness, wiring	344032
1	Gauge, oil pressure	344036
1	Gauge, water temperature	344035
1	Meter, hour	344038
1	Voltmeter, battery	344037
Engine Sender		
1	Sender, water temperature	PA-225618 249348
1	Sender, oil pressure	344305
1	Adapter, sender	225307
1	Installation Instructions	TT-885
Miscellaneous Kits		
Black Spray Paint		
1	Spray Can	221292
1	Touch-up	GM19488
Battery Kit		
1	Battery	PA-273660 291918

Notes

Appendix A Abbreviations

The following list contains abbreviations that may appear in this publication.

A, amp	ampere	CG	center of gravity	fglass.	fiberglass
ABDC	after bottom dead center	CID	cubic inch displacement	FHM	flat head machine (screw)
AC	alternating current	CL	centerline	fl. oz.	fluid ounce
A/D	analog to digital	cm	centimeter	flex.	flexible
ADC	analog to digital converter	CMOS	complementary metal oxide substrate (semiconductor)	freq.	frequency
adj.	adjust, adjustment			FS	full scale
ADV	advertising dimensional drawing	cogen.	cogeneration	ft.	foot, feet
AHWT	anticipatory high water temperature	Com	communications (port)	ft. lbs.	foot pounds (torque)
AISI	American Iron and Steel Institute	conn.	connection	ft./min.	feet per minute
ALOP	anticipatory low oil pressure	cont.	continued	g	gram
alt.	alternator	CPVC	chlorinated polyvinyl chloride	ga.	gauge (meters, wire size)
Al	aluminum	crit.	critical	gal.	gallon
ANSI	American National Standards Institute (formerly American Standards Association, ASA)	CRT	cathode ray tube	gen.	generator
		CSA	Canadian Standards Association	genset	generator set
		CT	current transformer	GFI	ground fault interrupter
		Cu	copper	GND, ⊕	ground
AO	anticipatory only	cu. in.	cubic inch	gov.	governor
API	American Petroleum Institute	cw.	clockwise	gph	gallons per hour
approx.	approximate, approximately	CWC	city water-cooled	gpm	gallons per minute
AR	as required, as requested	cyl.	cylinder	gr.	grade, gross
AS	as supplied, as stated, as suggested	D/A	digital to analog	GRD	equipment ground
ASE	American Society of Engineers	DAC	digital to analog converter	gr. wt.	gross weight
ASME	American Society of Mechanical Engineers	dB	decibel	H x W x D	height by width by depth
assy.	assembly	dBA	decibel (A weighted)	HC	hex cap
ASTM	American Society for Testing Materials	DC	direct current	HCHT	high cylinder head temperature
		DCR	direct current resistance	HD	heavy duty
ATDC	after top dead center	deg., °	degree	HET	high exhaust temperature
ATS	automatic transfer switch	dept.	department	hex	hexagon
auto.	automatic	dia.	diameter	Hg	mercury (element)
aux.	auxiliary	DI/EO	dual inlet/end outlet	HH	hex head
A/V	audiovisual	DIN	Deutsches Institut für Normung e. V. (also Deutsche Industrie Normenausschuss)	HHC	hex head cap
avg.	average			HP	horsepower
AVR	automatic voltage regulator	DIP	dual inline package	hr.	hour
AWG	American Wire Gauge	DPDT	double-pole, double-throw	HS	heat shrink
AWM	appliance wiring material	DPST	double-pole, single-throw	hsg.	housing
bat.	battery	DS	disconnect switch	HVAC	heating, ventilation, and air conditioning
BBDC	before bottom dead center	DVR	digital voltage regulator		
BC	battery charger, battery charging	E, emer.	emergency (power source)	HWT	high water temperature
BCA	battery charging alternator	EDI	electronic data interchange	Hz	hertz (cycles per second)
BCI	Battery Council International	EFR	emergency frequency relay	IC	integrated circuit
BDC	before dead center	e.g.	for example (<i>exempli gratia</i>)	ID	inside diameter, identification
BHP	brake horsepower	EG	electronic governor	IEC	International Electrotechnical Commission
blk.	black (paint color), block (engine)	EGSA	Electrical Generating Systems Association	IEEE	Institute of Electrical and Electronics Engineers
blk. htr.	block heater	EIA	Electronic Industries Association	IMS	improved motor starting
BMEP	brake mean effective pressure	EI/EO	end inlet/end outlet	in.	inch
bps	bits per second	EMI	electromagnetic interference	in. H ₂ O	inches of water
br.	brass	emiss.	emission	in. Hg	inches of mercury
BTDC	before top dead center	eng.	engine	in. lbs.	inch pounds
Btu	British thermal unit	EPA	Environmental Protection Agency	Inc.	incorporated
Btu/min.	British thermal units per minute			ind.	industrial
C	Celsius, centigrade	EPS	emergency power system	int.	internal
cal.	calorie	ER	emergency relay	int./ext.	internal/external
CARB	California Air Resources Board	ES	engineering special, engineered special	I/O	input/output
CB	circuit breaker	ESD	electrostatic discharge	IP	iron pipe
cc	cubic centimeter	est.	estimated	ISO	International Organization for Standardization
CCA	cold cranking amps	E-Stop	emergency stop	J	joule
ccw.	counterclockwise	etc.	et cetera (and so forth)	JIS	Japanese Industry Standard
CEC	Canadian Electrical Code	exh.	exhaust	k	kilo (1000)
cfh	cubic feet per hour	ext.	external	K	kelvin
cfm	cubic feet per minute	F	Fahrenheit, female	KA	kiloampere
				KB	kilobyte (2 ¹⁰ bytes)

kg	kilogram	MW	megawatt	rms	root mean square
kg/cm ²	kilograms per square centimeter	mW	milliwatt	rnd.	round
kgm	kilogram-meter	μF	microfarad	ROM	read only memory
kg/m ³	kilograms per cubic meter	N, norm.	normal (power source)	rot.	rotate, rotating
kHz	kilohertz	NA	not available, not applicable	rpm	revolutions per minute
kJ	kilojoule	nat. gas	natural gas	RS	right side
km	kilometer	NBS	National Bureau of Standards	RTV	room temperature vulcanization
kOhm, kΩ	kilo-ohm	NC	normally closed	SAE	Society of Automotive Engineers
kPa	kilopascal	NEC	National Electrical Code	scfm	standard cubic feet per minute
kph	kilometers per hour	NEMA	National Electrical Manufacturers Association	SCR	silicon controlled rectifier
kV	kilovolt	NFPA	National Fire Protection Association	s, sec.	second
kVA	kilovolt ampere	Nm	newton meter	SI	<i>Système international d'unites</i> , International System of Units
kVAR	kilovolt ampere reactive	NO	normally open	SI/EO	side in/end out
kW	kilowatt	no., nos.	number, numbers	sil.	silencer
kWh	kilowatt-hour	NPS	National Pipe, Straight	SN	serial number
kWm	kilowatt mechanical	NPSC	National Pipe, Straight-coupling	SPDT	single-pole, double-throw
L	liter	NPT	National Standard taper pipe thread per general use	SPST	single-pole, single-throw
LAN	local area network	NPTF	National Pipe, Taper-Fine	spec, specs	specification(s)
L x W x H	length by width by height	NR	not required, normal relay	sq.	square
lb.	pound, pounds	ns	nanosecond	sq. cm	square centimeter
lbm/ft ³	pounds mass per cubic feet	OC	overcrank	sq. in.	square inch
LCB	line circuit breaker	OD	outside diameter	SS	stainless steel
LCD	liquid crystal display	OEM	original equipment manufacturer	std.	standard
ld. shd.	load shed	OF	overfrequency	stl.	steel
LED	light emitting diode	opt.	option, optional	tach.	tachometer
Lph	liters per hour	OS	oversize, overspeed	TD	time delay
Lpm	liters per minute	OSHA	Occupational Safety and Health Administration	TDC	top dead center
LOP	low oil pressure	OV	overvoltage	TDEC	time delay engine cooldown
LP	liquefied petroleum	oz.	ounce	TDEN	time delay emergency to normal
LPG	liquefied petroleum gas	p., pp.	page, pages	TDES	time delay engine start
LS	left side	PC	personal computer	TDNE	time delay normal to emergency
L _{wa}	sound power level, A weighted	PCB	printed circuit board	TDOE	time delay off to emergency
LWL	low water level	pF	picofarad	TDON	time delay off to normal
LWT	low water temperature	PF	power factor	temp.	temperature
m	meter, milli (1/1000)	ph., ∅	phase	term.	terminal
M	mega (10 ⁶ when used with SI units), male	PHC	Phillips head crimp (screw)	TIF	telephone influence factor
m ³	cubic meter	PHH	Phillips hex head (screw)	TIR	total indicator reading
m ³ /min.	cubic meters per minute	PHM	pan head machine (screw)	tol.	tolerance
mA	milliampere	PLC	programmable logic control	turbo.	turbocharger
man.	manual	PMG	permanent-magnet generator	typ.	typical (same in multiple locations)
max.	maximum	pot	potentiometer, potential	UF	underfrequency
MB	megabyte (2 ²⁰ bytes)	ppm	parts per million	UHF	ultrahigh frequency
MCM	one thousand circular mils	PROM	programmable read-only memory	UL	Underwriter's Laboratories, Inc.
MCCB	molded-case circuit breaker	psi	pounds per square inch	UNC	unified coarse thread (was NC)
meggar	megohmmeter	pt.	pint	UNF	unified fine thread (was NF)
MHz	megahertz	PTC	positive temperature coefficient	univ.	universal
mi.	mile	PTO	power takeoff	US	undersize, underspeed
mil	one one-thousandth of an inch	PVC	polyvinyl chloride	UV	ultraviolet, undervoltage
min.	minimum, minute	qt.	quart	V	volt
misc.	miscellaneous	qty.	quantity	VAC	volts alternating current
MJ	megajoule	R	replacement (emergency) power source	VAR	voltampere reactive
mJ	millijoule	rad.	radiator, radius	VDC	volts direct current
mm	millimeter	RAM	random access memory	VFD	vacuum fluorescent display
mOhm, mΩ	milliohm	RDO	relay driver output	VGA	video graphics adapter
MOhm, MΩ	megohm	ref.	reference	VHF	very high frequency
MOV	metal oxide varistor	rem.	remote	W	watt
MPa	megapascal	RFI	radio frequency interference	WCR	withstand and closing rating
mpg	miles per gallon	RH	round head	w/	with
mph	miles per hour	RHM	round head machine (screw)	w/o	without
MS	military standard	rly.	relay	wt.	weight
m/sec.	meters per second			xfrm	transformer
MTBF	mean time between failure				
MTBO	mean time between overhauls				
mtg.	mounting				

Appendix B Common Hardware Application Guidelines

Use the information below and on the following pages to identify proper fastening techniques when no specific reference for reassembly is made.

Bolt/Screw Length: When bolt/screw length is not given, use Figure 1 as a guide. As a general rule, a minimum length of one thread beyond the nut and a maximum length of 1/2 the bolt/screw diameter beyond the nut is the preferred method.

Washers and Nuts: Use split lock washers as a bolt locking device where specified. Use SAE flat washers with whiz nuts, spirallock nuts, or standard nuts and preloading (torque) of the bolt in all other applications.

See Appendix C, General Torque Specifications, and other torque specifications in the service literature.

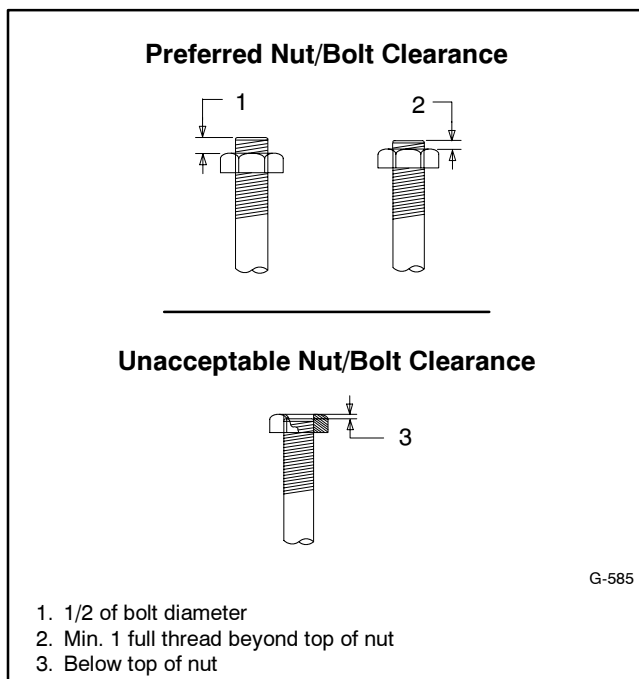


Figure 1 Acceptable Bolt Lengths

Steps for common hardware application:

1. Determine entry hole type: round or slotted.
2. Determine exit hole type: fixed female thread (weld nut), round, or slotted.

For round and slotted exit holes, determine if hardware is greater than 1/2 inch in diameter, or 1/2 inch in diameter or less. Hardware that is *greater than 1/2 inch* in diameter takes a standard nut and SAE washer. Hardware *1/2 inch or less* in diameter can take a properly torqued whiz nut or spirallock nut. See Figure 2.

3. Follow these SAE washer rules after determining exit hole type:
 - a. Always use a washer between hardware and a slot.
 - b. Always use a washer under a nut (see 2 above for exception).
 - c. Use a washer under a bolt when the female thread is fixed (weld nut).
4. Refer to Figure 2, which depicts the preceding hardware configuration possibilities.

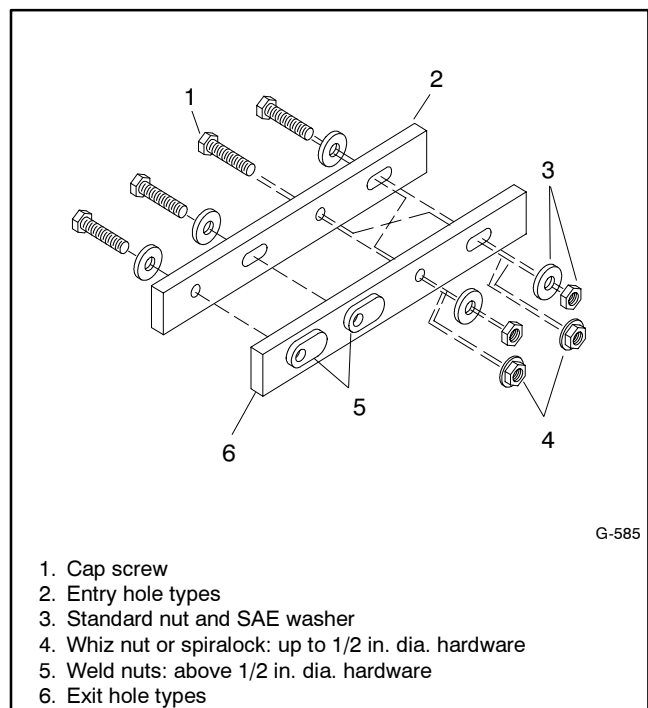


Figure 2 Acceptable Hardware Combinations

Appendix C General Torque Specifications















Use the following torque specifications when service literature instructions give no specific torque values. The charts list values for new plated, zinc phosphate, or











oiled threads. Increase values by 15% for nonplated threads. All torque values are +0%/-10%.






American Standard Fasteners Torque Specifications					
Size	Torque Measurement	Assembled into Cast Iron or Steel			Assembled into Aluminum Grade 2 or 5
		Grade 2	Grade 5	Grade 8	
8-32	Nm (in. lb.)	1.8 (16)	2.3 (20)	—	1.8 (16)
10-24	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	2.9 (26)
10-32	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	2.9 (26)
1/4-20	Nm (in. lb.)	6.8 (60)	10.8 (96)	14.9 (132)	6.8 (60)
1/4-28	Nm (in. lb.)	8.1 (72)	12.2 (108)	16.3 (144)	8.1 (72)
5/16-18	Nm (in. lb.)	13.6 (120)	21.7 (192)	29.8 (264)	13.6 (120)
5/16-24	Nm (in. lb.)	14.9 (132)	23.1 (204)	32.5 (288)	14.9 (132)
3/8-16	Nm (ft. lb.)	24.0 (18)	38.0 (28)	53.0 (39)	24.0 (18)
3/8-24	Nm (ft. lb.)	27.0 (20)	42.0 (31)	60.0 (44)	27.0 (20)
7/16-14	Nm (ft. lb.)	39.0 (29)	60.0 (44)	85.0 (63)	—
7/16-20	Nm (ft. lb.)	43.0 (32)	68.0 (50)	95.0 (70)	—
1/2-13	Nm (ft. lb.)	60.0 (44)	92.0 (68)	130.0 (96)	—
1/2-20	Nm (ft. lb.)	66.0 (49)	103.0 (76)	146.0 (108)	—
9/16-12	Nm (ft. lb.)	81.0 (60)	133.0 (98)	187.0 (138)	—
9/16-18	Nm (ft. lb.)	91.0 (67)	148.0 (109)	209.0 (154)	—
5/8-11	Nm (ft. lb.)	113.0 (83)	183.0 (135)	259.0 (191)	—
5/8-18	Nm (ft. lb.)	128.0 (94)	208.0 (153)	293.0 (216)	—
3/4-10	Nm (ft. lb.)	199.0 (147)	325.0 (240)	458.0 (338)	—
3/4-16	Nm (ft. lb.)	222.0 (164)	363.0 (268)	513.0 (378)	—
1-8	Nm (ft. lb.)	259.0 (191)	721.0 (532)	1109.0 (818)	—
1-12	Nm (ft. lb.)	283.0 (209)	789.0 (582)	1214.0 (895)	—

Metric Fasteners Torque Specifications, Measured in Nm (ft. lb.)				
Size (mm)	Assembled into Cast Iron or Steel			Assembled into Aluminum Grade 5.8 or 8.8
	Grade 5.8	Grade 8.8	Grade 10.9	
M6 x 1.00	5.6 (4)	9.9 (7)	14.0 (10)	5.6 (4)
M8 x 1.25	13.6 (10)	25.0 (18)	35.0 (26)	13.6 (10)
M8 x 1.00	21.0 (16)	25.0 (18)	35.0 (26)	21.0 (16)
M10 x 1.50	27.0 (20)	49.0 (35)	68.0 (50)	27.0 (20)
M10 x 1.25	39.0 (29)	49.0 (35)	68.0 (50)	39.0 (29)
M12 x 1.75	47.0 (35)	83.0 (61)	117.0 (86)	—
M12 x 1.50	65.0 (48)	88.0 (65)	125.0 (92)	—
M14 x 2.00	74.0 (55)	132.0 (97)	185.0 (136)	—
M14 x 1.50	100.0 (74)	140.0 (103)	192.0 (142)	—
M16 x 2.00	115.0 (85)	200.0 (148)	285.0 (210)	—
M16 x 1.50	141.0 (104)	210.0 (155)	295.0 (218)	—
M18 x 2.50	155.0 (114)	275.0 (203)	390.0 (288)	—
M18 x 1.50	196.0 (145)	305.0 (225)	425.0 (315)	—

Appendix D Common Hardware Identification

Screw/Bolts/Studs	
Head Styles	
Hex Head or Machine Head	
Hex Head or Machine Head with Washer	
Flat Head (FHM)	
Round Head (RHM)	
Pan Head	
Hex Socket Head Cap or Allen™ Head Cap	
Hex Socket Head or Allen™ Head Shoulder Bolt	
Sheet Metal Screw	
Stud	
Drive Styles	
Hex	
Hex and Slotted	
Phillips®	
Slotted	
Hex Socket	

Nuts	
Nut Styles	
Hex Head	
Lock or Elastic	
Square	
Cap or Acorn	
Wing	
Washers	
Washer Styles	
Plain	
Split Lock or Spring	
Spring or Wave	
External Tooth Lock	
Internal Tooth Lock	
Internal-External Tooth Lock	

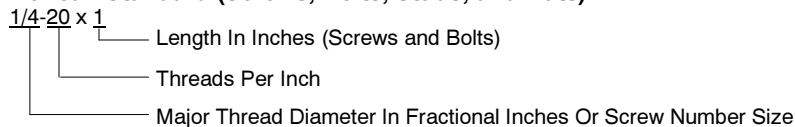
Hardness Grades	
American Standard	
Grade 2	
Grade 5	
Grade 8	
Grade 8/9 (Hex Socket Head)	
Metric	
Number stamped on hardware; 5.8 shown	

Allen™ head screw is a trademark of Holo-Krome Co.

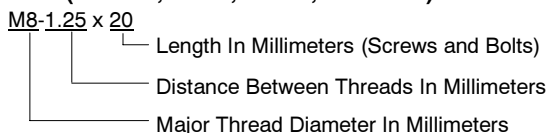
Phillips® screw is a registered trademark of Phillips Screw Company.

Sample Dimensions

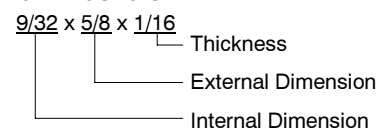
American Standard (Screws, Bolts, Studs, and Nuts)



Metric (Screws, Bolts, Studs, and Nuts)



Plain Washers



Lock Washers



Appendix E Common Hardware List

The Common Hardware List lists part numbers and dimensions for common hardware items.

American Standard

Part No.	Dimensions	Part No.	Dimensions	Part No.	Dimensions	Type
Hex Head Bolts (Grade 5)		Hex Head Bolts, cont.		Hex Nuts		
X-465-17	1/4-20 x .38	X-6024-5	7/16-14 x .75	X-6009-1	1-8	Standard
X-465-6	1/4-20 x .50	X-6024-2	7/16-14 x 1.00	X-6210-3	6-32	Whiz
X-465-2	1/4-20 x .62	X-6024-8	7/16-14 x 1.25	X-6210-4	8-32	Whiz
X-465-16	1/4-20 x .75	X-6024-3	7/16-14 x 1.50	X-6210-5	10-24	Whiz
X-465-18	1/4-20 x .88	X-6024-4	7/16-14 x 2.00	X-6210-1	10-32	Whiz
X-465-7	1/4-20 x 1.00	X-6024-11	7/16-14 x 2.75	X-6210-2	1/4-20	Spiralock
X-465-8	1/4-20 x 1.25	X-6024-12	7/16-14 x 6.50	X-6210-6	1/4-28	Spiralock
X-465-9	1/4-20 x 1.50	X-129-15	1/2-13 x .75	X-6210-7	5/16-18	Spiralock
X-465-10	1/4-20 x 1.75	X-129-17	1/2-13 x 1.00	X-6210-8	5/16-24	Spiralock
X-465-11	1/4-20 x 2.00	X-129-18	1/2-13 x 1.25	X-6210-9	3/8-16	Spiralock
X-465-12	1/4-20 x 2.25	X-129-19	1/2-13 x 1.50	X-6210-10	3/8-24	Spiralock
X-465-14	1/4-20 x 2.75	X-129-20	1/2-13 x 1.75	X-6210-11	7/16-14	Spiralock
X-465-21	1/4-20 x 5.00	X-129-21	1/2-13 x 2.00	X-6210-12	1/2-13	Spiralock
X-465-25	1/4-28 x .38	X-129-22	1/2-13 x 2.25	X-6210-15	7/16-20	Spiralock
X-465-20	1/4-28 x 1.00	X-129-23	1/2-13 x 2.50	X-6210-14	1/2-20	Spiralock
X-125-33	5/16-18 x .50	X-129-24	1/2-13 x 2.75	X-85-3	5/8-11	Standard
X-125-23	5/16-18 x .62	X-129-25	1/2-13 x 3.00	X-88-12	3/4-10	Standard
X-125-3	5/16-18 x .75	X-129-27	1/2-13 x 3.50	X-89-2	1/2-20	Standard
X-125-31	5/16-18 x .88	X-129-29	1/2-13 x 4.00	Washers		
X-125-5	5/16-18 x 1.00	X-129-30	1/2-13 x 4.50	Part No.	ID	OD
X-125-24	5/16-18 x 1.25	X-463-9	1/2-13 x 5.50			Thick.
X-125-34	5/16-18 x 1.50	X-129-44	1/2-13 x 6.00			Bolt/ Screw
X-125-25	5/16-18 x 1.75	X-129-51	1/2-20 x .75	X-25-46	.125	.250
X-125-26	5/16-18 x 2.00	X-129-45	1/2-20 x 1.25	X-25-9	.156	.375
230578	5/16-18 x 2.25	X-129-52	1/2-20 x 1.50	X-25-48	.188	.438
X-125-29	5/16-18 x 2.50	X-6021-3	5/8-11 x 1.00	X-25-36	.219	.500
X-125-27	5/16-18 x 2.75	X-6021-4	5/8-11 x 1.25	X-25-40	.281	.625
X-125-28	5/16-18 x 3.00	X-6021-2	5/8-11 x 1.50	X-25-85	.344	.687
X-125-22	5/16-18 x 4.50	X-6021-1	5/8-11 x 1.75	X-25-37	.406	.812
X-125-32	5/16-18 x 5.00	273049	5/8-11 x 2.00	X-25-34	.469	.922
X-125-35	5/16-18 x 5.50	X-6021-5	5/8-11 x 2.25	X-25-26	.531	1.062
X-125-36	5/16-18 x 6.00	X-6021-6	5/8-11 x 2.50	X-25-15	.656	1.312
X-125-40	5/16-18 x 6.50	X-6021-7	5/8-11 x 2.75	X-25-29	.812	1.469
X-125-43	5/16-24 x 1.75	X-6021-12	5/8-11 x 3.75	X-25-127	1.062	2.000
X-125-44	5/16-24 x 2.50	X-6021-11	5/8-11 x 4.50			
X-125-30	5/16-24 x .75	X-6021-10	5/8-11 x 6.00			
X-125-39	5/16-24 x 2.00	X-6021-9	5/8-18 x 2.50			
X-125-38	5/16-24 x 2.75	X-6239-1	3/4-10 x 1.00			
X-6238-2	3/8-16 x .62	X-6239-8	3/4-10 x 1.25			
X-6238-10	3/8-16 x .75	X-6239-2	3/4-10 x 1.50			
X-6238-3	3/8-16 x .88	X-6239-3	3/4-10 x 2.00			
X-6238-11	3/8-16 x 1.00	X-6239-4	3/4-10 x 2.50			
X-6238-4	3/8-16 x 1.25	X-6239-5	3/4-10 x 3.00			
X-6238-5	3/8-16 x 1.50	X-6239-6	3/4-10 x 3.50			
X-6238-1	3/8-16 x 1.75	X-792-1	1-8 x 2.25			
X-6238-6	3/8-16 x 2.00	X-792-5	1-8 x 3.00			
X-6238-17	3/8-16 x 2.25	X-792-8	1-8 x 5.00			
X-6238-7	3/8-16 x 2.50					
X-6238-8	3/8-16 x 2.75					
X-6238-9	3/8-16 x 3.00					
X-6238-19	3/8-16 x 3.25					
X-6238-12	3/8-16 x 3.50					
X-6238-20	3/8-16 x 3.75					
X-6238-13	3/8-16 x 4.50					
X-6238-18	3/8-16 x 5.50					
X-6238-25	3/8-16 x 6.50					
X-6238-14	3/8-24 x .75					
X-6238-16	3/8-24 x 1.25					
X-6238-21	3/8-24 x 4.00					
X-6238-22	3/8-24 x 4.50					

Hex head bolts are hardness grade 8.8 unless noted.

* This metric hex bolt's hardness is grade 10.9.
† This metric hex nut's hardness is grade 8.

TP-5596 9/01b

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