

Service Parts

Marine Generator Sets



Models:

3.5EFOZ/4EOZ

KOHLER[®]
POWER SYSTEMS

ISO 9001
KOHLER
POWER SYSTEMS
NATIONALLY REGISTERED

TP-6138 5/02

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Introduction

This manual lists service replacement parts for 4 kW generator sets.

At the time of print this manual applied to the generator set specification (spec) numbers listed in the Specification Number Index. On occasion this manual may apply to specs not listed in the Specification Number Index.

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This manual includes the following main sections:

Table of Contents. Lists the sections of the manual.

Introduction (and other information sections). Contains introductory material about part numbers, illustrations, and hardware.

Specification Number Index. Lists the generator set specs and groups.

Group Parts Lists. List the part numbers of parts in the groups.

Kit Sections. List modules and accessories and their parts.

Appendices. Include Abbreviations, Common Hardware Application Guidelines, General Torque Specifications, Common Hardware Identification, and Common Hardware List.

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Numbering System Significance

This manual uses the following numbering systems:

Specification Number. The product identification number located on the generator set nameplate. Specification numbers break down into groups.

Group Number. A unique number representing a parts group needed to assemble a generator set function. For example, Group 101 is the Air Intake group.

Variation or Module Number. A group might have several variations. Each variation performs the same function with different parts lists. For example, a 50 Hz generator alternator and a 60 Hz generator alternator both perform the same function; however, with different parts. Each difference requires a group variation or module number.

Part Number. The part number identifies an individual assembly, subassembly, component, or accessory kit.

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Illustrations

Illustrations (or exploded-view drawings) best representing the widest range of variations accompany most groups in this manual. Illustrations do not depict all details and may not show all parts. Do not use illustrations for assembly or disassembly.

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How to Find Part Numbers

Use the following steps to locate a service replacement part.

1. Locate the generator set nameplate to **identify the generator set spec number**.
2. Locate a second generator set nameplate listing accessories to **identify installed modules**. On some models the accessory nameplate is mounted inside the generator junction box.
3. **Turn to the Specification Number Index**. The first column lists the generator set spec numbers. The headings identify the groups of parts that make up the generator set.
4. **Identify the group** most likely to include the service part number.
5. **Find the group variation number** at the intersection of the spec number row and the group column. Note the variation number.
6. **Page forward to locate the group** identified in step 4 or find the appropriate page in the Table of Contents.
7. **Find the part on the illustration** and note the item number of the part or **find the part description in the parts list**.
8. Select **the part number that corresponds to your group variation**. The first column lists the illustration item number. Find the variation identified in the Specification Number Index or the module number found on the generator set nameplate in the appropriate column on the right side of the parts list table. Find the quantity used at the intersection of the item number row and the variation column. A blank space at the intersection means the variation/module does not use that part number.

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Hardware References

Many common hardware items do not appear in parts manuals or will appear as common hardware entries. A common hardware entry lists the size of the hardware. For example, an item that appears as "Hardware, 3/8-16" in the text means that the piece is 3/8-16 size. Obtain common hardware locally or, if contacting the factory, use the Common Hardware List in the appendix to identify the common hardware part number and specifications. See Common Hardware Application Guidelines in the appendix for mating hardware instructions.

Some hardware items require a specific size or some other characteristic. In that case, use the part number listed in the text.

When replacing hardware, do not substitute inferior grade hardware. Replacement hardware grade should be equal to or better than the grade of the manufacturer's original hardware. Use the Common Hardware List in the appendix to identify the common hardware hardness.

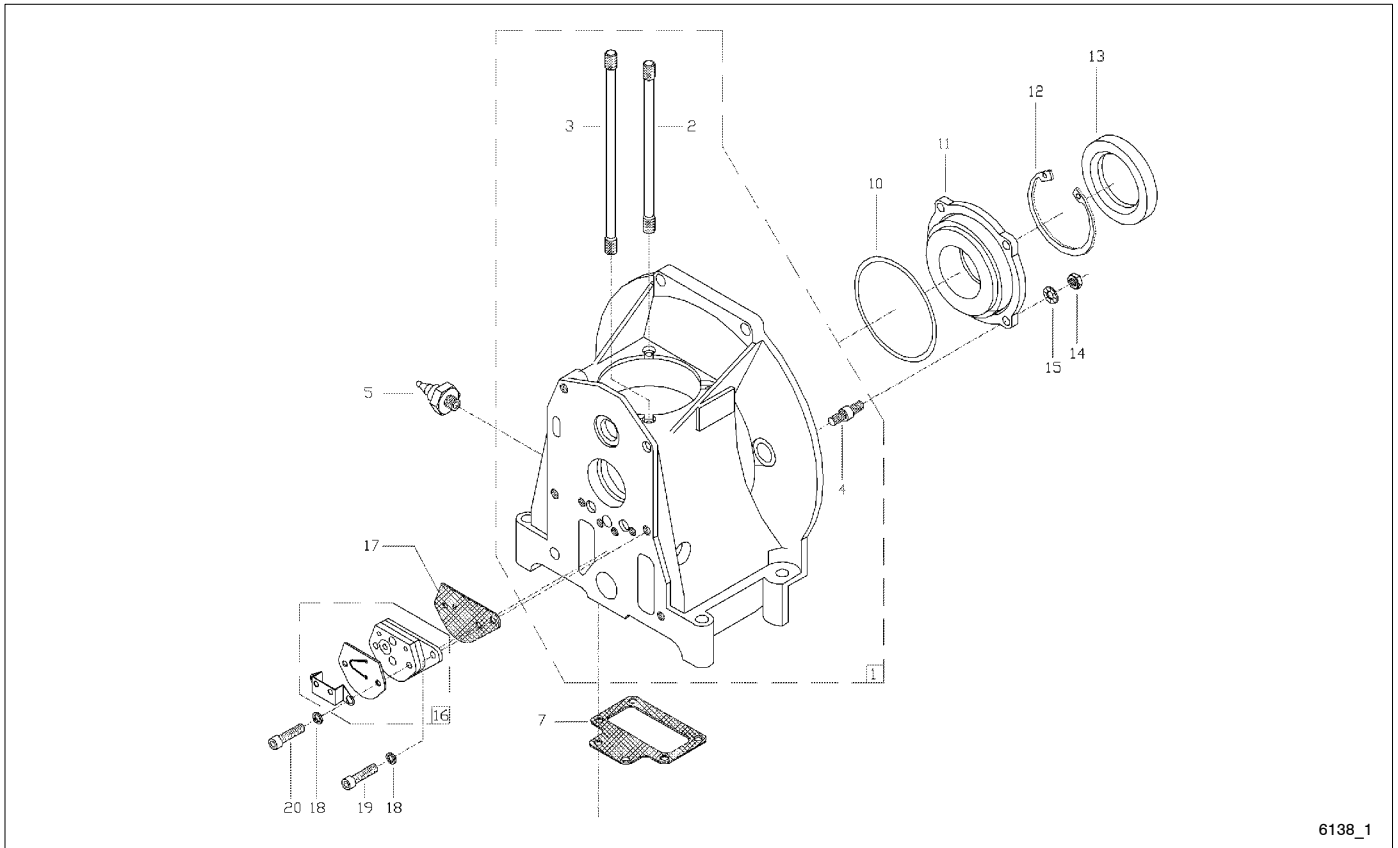
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Specification Number Index

Group Title													
<i>Crankcase</i>													
<i>Crankshaft and Piston</i>													
<i>Cylinder Head</i>													
<i>Gear Timing and Cover</i>													
<i>Speed Control Shaft</i>													
<i>Fuel Lines</i>													
<i>Flywheel</i>													
<i>Starter Motor</i>													
<i>Exhaust System</i>													
<i>Oil Cooler and Lines</i>													
<i>Seawater Pump</i>													
<i>Oil Draining Lines</i>													
<i>Fuel Filter and Pump</i>													
Group No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Spec. No.	VARIATION NUMBER												
3.5EFOZ													
GM20642-SA1	1	2	1	1	1	1	1	1	1	1	1	1	1
4EOZ													
GM20641-SA1	1	1	1	1	1	1	1	1	1	1	1	1	1

Group Title													
<i>Air Intake Filter</i>													
<i>Gasket Set</i>													
<i>Base and Mounting</i>													
<i>Sound Shield</i>													
<i>Generator and Mounting</i>													
<i>Controller and Mounting</i>													
<i>Control Panel</i>													
<i>Siphon Break and Lines</i>													
<i>Literature</i>													
<i></i>													
<i></i>													
<i></i>													
<i></i>													
Group No.	14	15	16	17	18	19	20	21	22				
Spec. No.	VARIATION NUMBER												
3.5EFOZ													
GM20642-SA1	1	1	1	1	2	2	1	1	1				
4EOZ													
GM20641-SA1	1	1	1	1	1	1	1	1	1				

Group 1: Crankcase

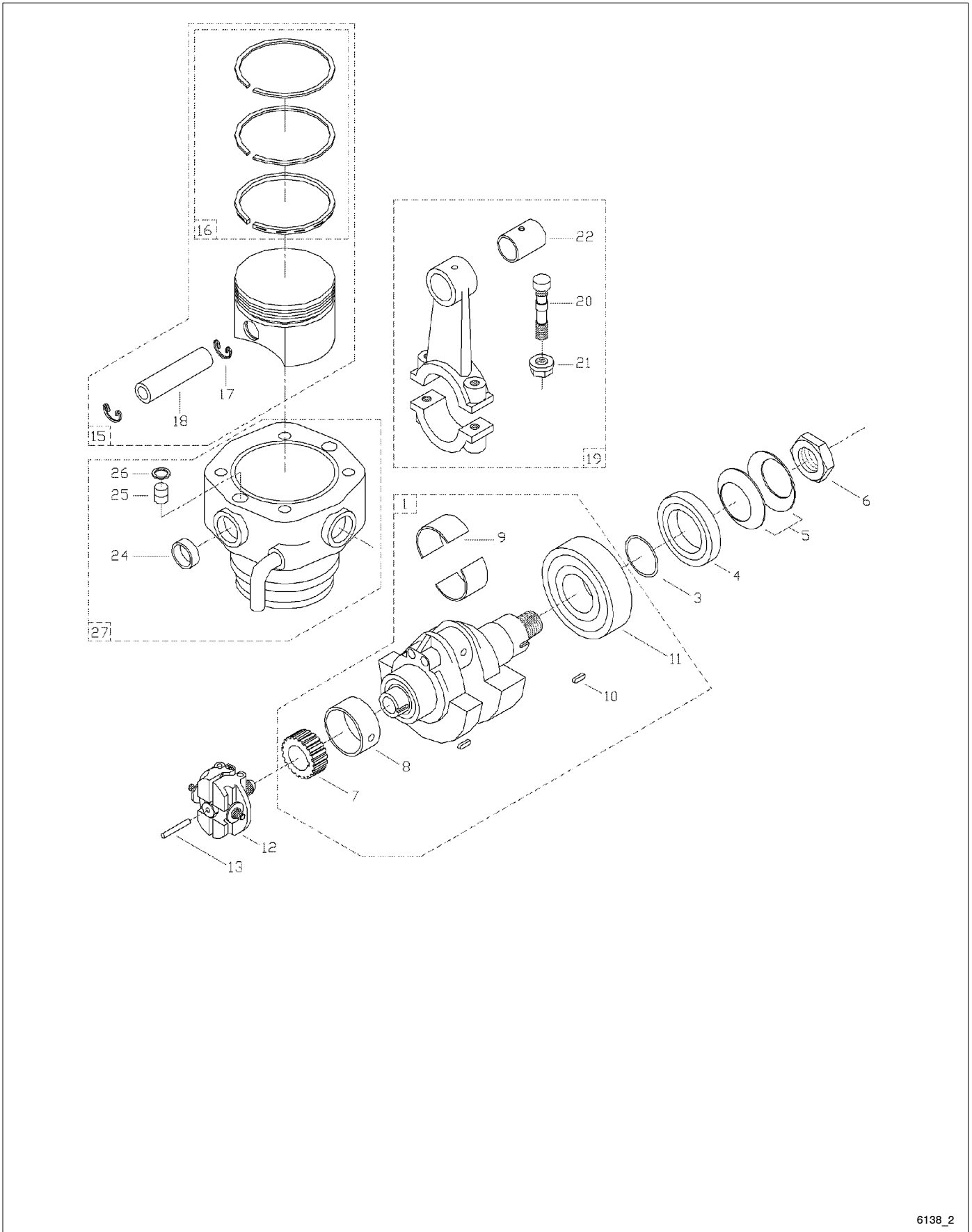


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Item	Part Number	Description	Quantity
			Variation No.
1	GM24007	Crankcase Assembly	1
2	GM23884	Stud, Cylinder Block	2
3	GM23885	Stud, Cylinder Block	2
4	GM23886	Stud, Crankcase	4
5	GM23870	Switch, Oil Pressure	1
7	GM23934	Gasket, Crankcase	1
10	GM23955	O-ring, 99 x 3 mm	1
11	GM23927	Housing, Main Bearing	1
12	GM23965	Retainer, Ring	1
13	GM23973	Seal, Oil, 60 x 80 x 8 mm	1
14	#	Nut, Hex Head, M8	4
15	#	Washer, Tooth, 18 mm	4
16	GM23925	Pump Assembly, Oil	1
17	GM23937	Gasket, Oil Pump	1
18	#	Washer, Split, 6 mm ID	3
19	#	Screw, Hex Head Cap, M6 x 20	1
20	#	Screw, Hex Head Cap, M6 x 30	2

Common hardware; procure locally.

Group 2: Crankshaft and Piston



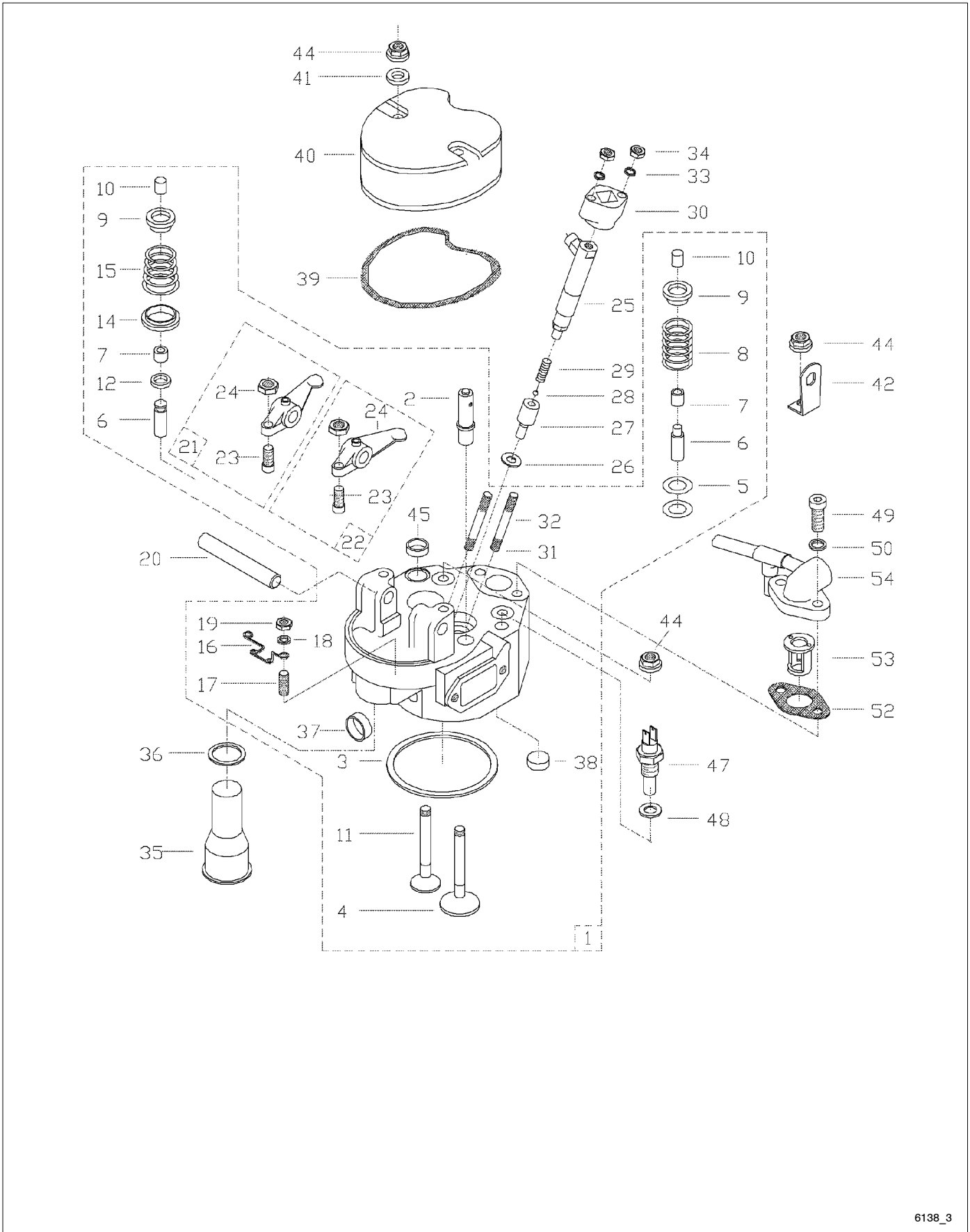
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Group 2: Crankshaft and Piston

Item	Part Number	Description	Quantity	
			Variation No.	
			1	2
1	GM24009	Crankshaft Assembly	1	1
3	GM23954	O-ring, 32 x 2 mm	1	1
4	GM23893	Ring, Angle	1	1
5	GM23946	Washer, Spring, 52 x 36 x 1.2 mm	2	2
6	GM23891	Nut, Flywheel	1	1
7	GM23879	Gear, Timing Crankshaft	1	1
8	GM23942	Bushing, Main (Standard)	1	1
8	GM23943	Bushing, Main (0.25 mm Undersize)	1	1
8	GM23944	Bushing, Main (0.50 mm Undersize)	1	1
9	GM24000	Bearing (Standard)	1	1
9	GM24001	Bearing (0.25 mm Undersize)	1	1
9	GM24002	Bearing (0.50 mm Undersize)	1	1
10	GM23975	Key, 6 x 4 x 12 mm	2	2
11	GM23945	Bearing, Main	1	1
12	GM23906	Governor Assembly (RPM=3000E)		1
12	GM23907	Governor Assembly (RPM=3000)		1
12	GM23908	Governor Assembly (RPM=3600E)	1	
13	GM23974	Pin, 4 x 27.8 mm	1	1
15	GM24010	Piston Assembly	1	1
16	GM24006	Set, Piston Ring	1	1
17	GM23983	Clip, Piston Pin	2	2
18	GM23874	Pin, Piston	1	1
19	GM23926	Rod Assembly, Connecting	1	1
20	GM23883	Bolt, Connecting Rod	2	2
21	GM23890	Nut, Collar	2	2
22	GM23882	Bushing, Connecting Rod	1	1
24	#	Plug, 22 mm	4	4
25	GM23997	Connector, Water Tube	2	2
26	GM23953	O-ring, 10 x 2.2 mm	2	2
27	GM24011	Cylinder Assembly	1	1

Common hardware; procure locally.

Group 3: Cylinder Head



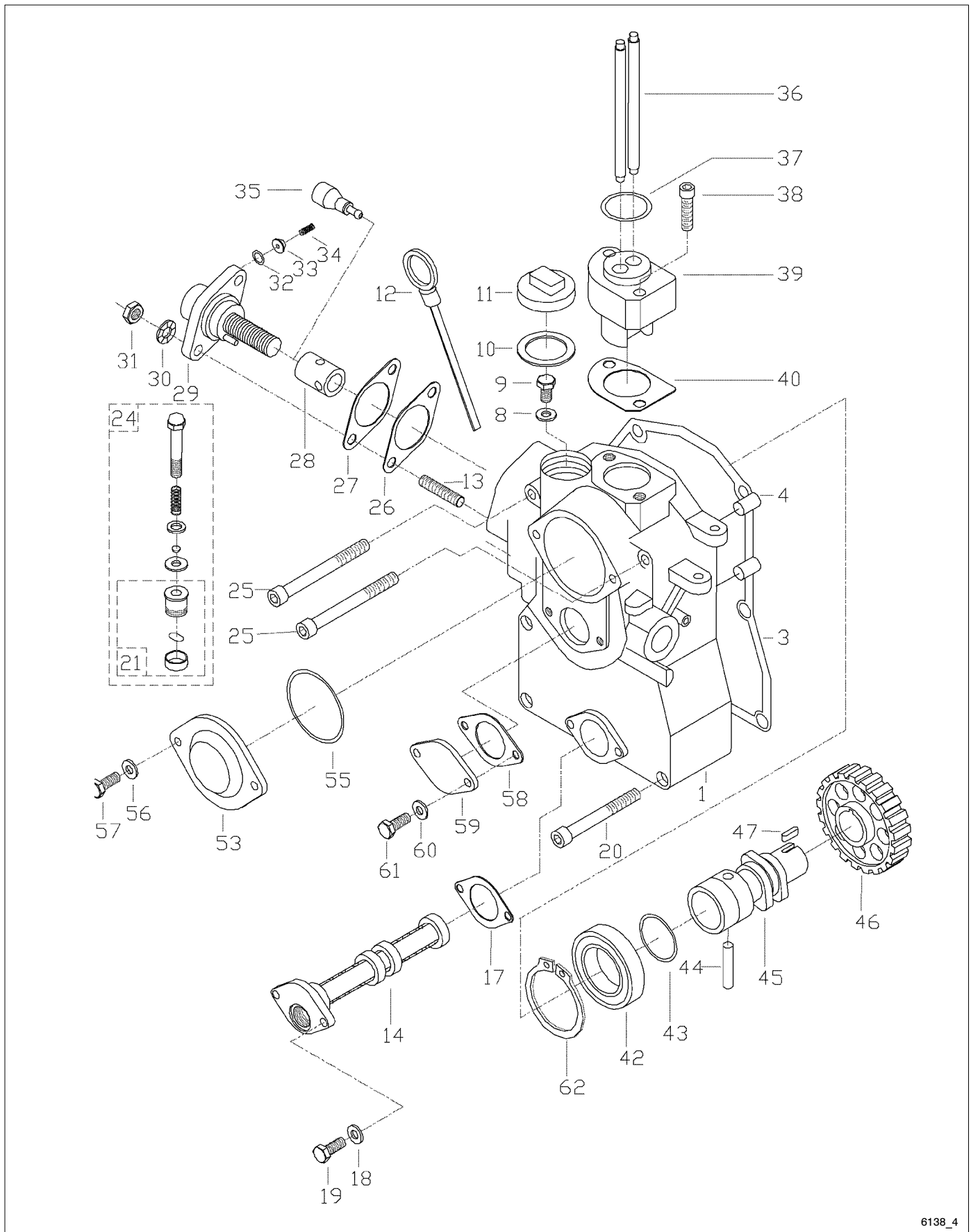
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Group 3: Cylinder Head

Item	Part Number	Description	Quantity
			Variation No. 1
1	GM24012	Head Assembly, Cylinder	1
2	GM23921	Valve, Breather	1
3	GM23941	Gasket, Cylinder Head	1
4	GM23878	Valve, Intake	1
5	GM23990	Washer	2
6	GM23876	Guide, Valve	2
7	GM23964	Guide, Oil Seal	2
8	GM23947	Spring, Valve	1
9	GM23895	Retainer, Valve Spring	2
10	GM24005	Valve, Cotter	2
11	GM23877	Valve, Exhaust	1
12	GM23894	Ring	1
14	GM23911	Rotocap, Valve	1
15	GM23948	Spring, Valve	1
16	GM23951	Spring, Retainer	1
17	GM23967	Stud, M5 x 10	2
18	#	Washer, 5 mm ID	2
19	#	Nut, Hex Head, M5	2
20	GM23872	Shaft, Rocker Arm	1
21	GM23919	Arm Assembly, Rocker	1
22	GM23918	Arm Assembly, Rocker	1
23	GM23889	Screw, Adjusting	2
24	#	Nut, Hex Head, M7	1
25	GM23902	Injector, Fuel	1
26	GM23962	Washer	1
27	GM23903	Nozzle, Fuel Injector	1
28	GM23904	Seat, Spring	1
29	GM23905	Spring, Nozzle	1
30	GM23991	Flange, Injector	1
31	GM23972	Stud, M6 x 50	1
32	GM23971	Stud, M6 x 45	1
33	#	Washer, Split, 6 mm ID	2
34	#	Nut, Hex Head, M6	2
35	GM23987	Tube, Push Rod	1
36	GM23956	O-ring, 24 x 3.5 mm	1
37	#	Plug, 22 mm	2
38	#	Plug, 18 mm	1
39	GM23932	Gasket, Rocker Cover	1
40	GM23920	Cover, Rocker	1
41	#	Washer, 5 mm ID	2
42	GM23989	Bracket, Lifting	1
44	GM23890	Nut, Collar	6
45	#	Plug, 18 mm	1
47	GM23914	Switch, Temperature Alarm	1
48	GM23981	Washer, Copper, 14 mm ID	1
49	#	Screw, Hex Head Cap, M8 x 20	2
50	#	Washer, Split, 8 mm ID	2
52	GM23931	Gasket	2
53	GM23912	Thermostat	1
54	GM24140	Cover, Thermostat	1

Common hardware; procure locally.

Group 4: Gear Timing and Cover



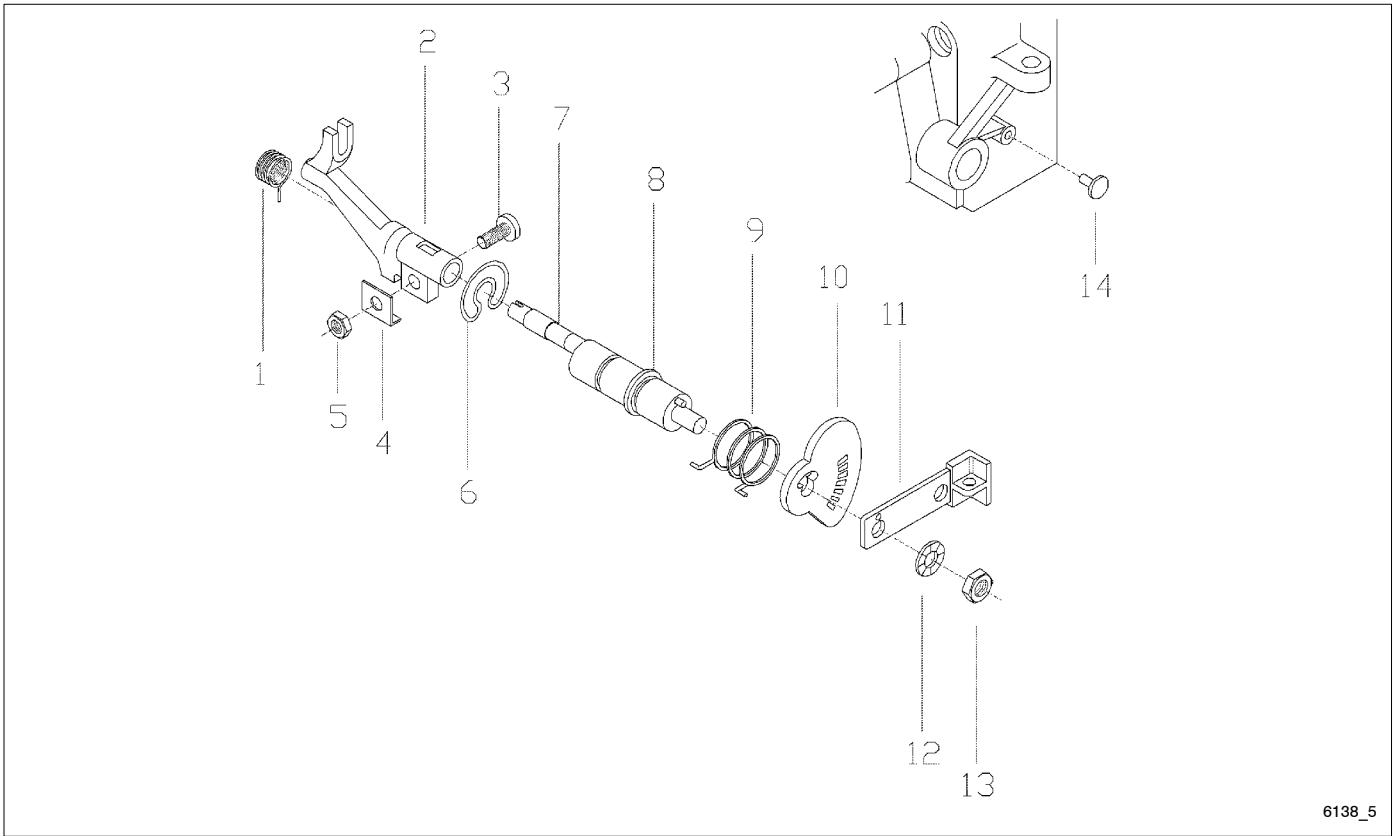
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Group 4: Gear Timing and Cover

Item	Part Number	Description	Quantity
			Variation No. 1
1	GM23923	Cover, Timing Gear	1
3	GM23933	Gasket, Cover	1
4	GM23976	Pin, 10 x 16 mm	2
8	#	Washer, Split, 5 mm ID	1
9	GM23887	Screw, Hex Head	1
10	GM23958	Gasket	1
11	GM24003	Cap, Oil Filler	1
12	GM23929	Dipstick	1
13	GM23968	Stud, M8 x 20	2
14	GM24013	Screen Assembly, Oil Filter	1
17	GM23938	Gasket, Oil Filter	1
18	GM23977	Washer, Copper, 6 mm ID	2
19	#	Screw, Hex Head, M6 x 20	2
20	#	Screw, Hex Head Cap, M8 x 70	2
21	GM24004	Handle	1
24	GM24008	Primer Assembly	1
25	#	Screw, Hex Head Cap, M8 x 80	3
26	GM23993	Shim, Adjusting, 0.2 mm	1
26	GM23994	Shim, Adjusting, 0.5 mm	1
26	GM23995	Shim, Adjusting, 0.4 mm	1
26	GM23996	Shim, Adjusting, 1.0 mm	1
27	GM23939	Gasket	1
28	GM23901	Roller, Tappet	1
29	GM23896	Pump, Fuel Injection	1
30	#	Washer, Split, 8 mm ID	1
31	#	Nut, Hex Head, M8	2
32	GM23897	Washer	1
33	GM23900	Valve	1
34	GM23898	Spring, Valve	1
35	GM23899	Plunger, Fuel	1
36	GM23875	Push Rod	2
37	GM23957	O-ring, 32 x 3 mm	1
38	#	Screw, Hex Head Cap, M5 x 30	2
39	GM23922	Release, Compression	1
40	GM23936	Gasket, Plate, 0.3 mm	1
40	GM23940	Gasket, Plate, 0.4 mm	1
42	GM23966	Bearing, Grooved Ball	1
43	GM23960	O-ring, 32.7 x 1.3 mm	1
44	GM23873	Bolt	1
45	GM23924	Camshaft	1
46	GM23880	Gear	1
47	GM23975	Key, 6 x 4 x 12 mm	1
53	GM23917	Cover	1
55	GM23961	O-ring, 57 x 2.5 mm	1
56	#	Washer, Split, 6 mm ID	2
57	#	Screw, Hex Head, M6 x 16	2
58	GM23930	Gasket, Plate	1
59	GM23985	Cover	1
60	GM23979	Washer, Copper, 5 mm ID	2
61	#	Screw, Hex Head, M5 x 16	2
62	GM24511	Ring, snap	1

Common hardware; procure locally.

Group 5: Speed Control Shaft

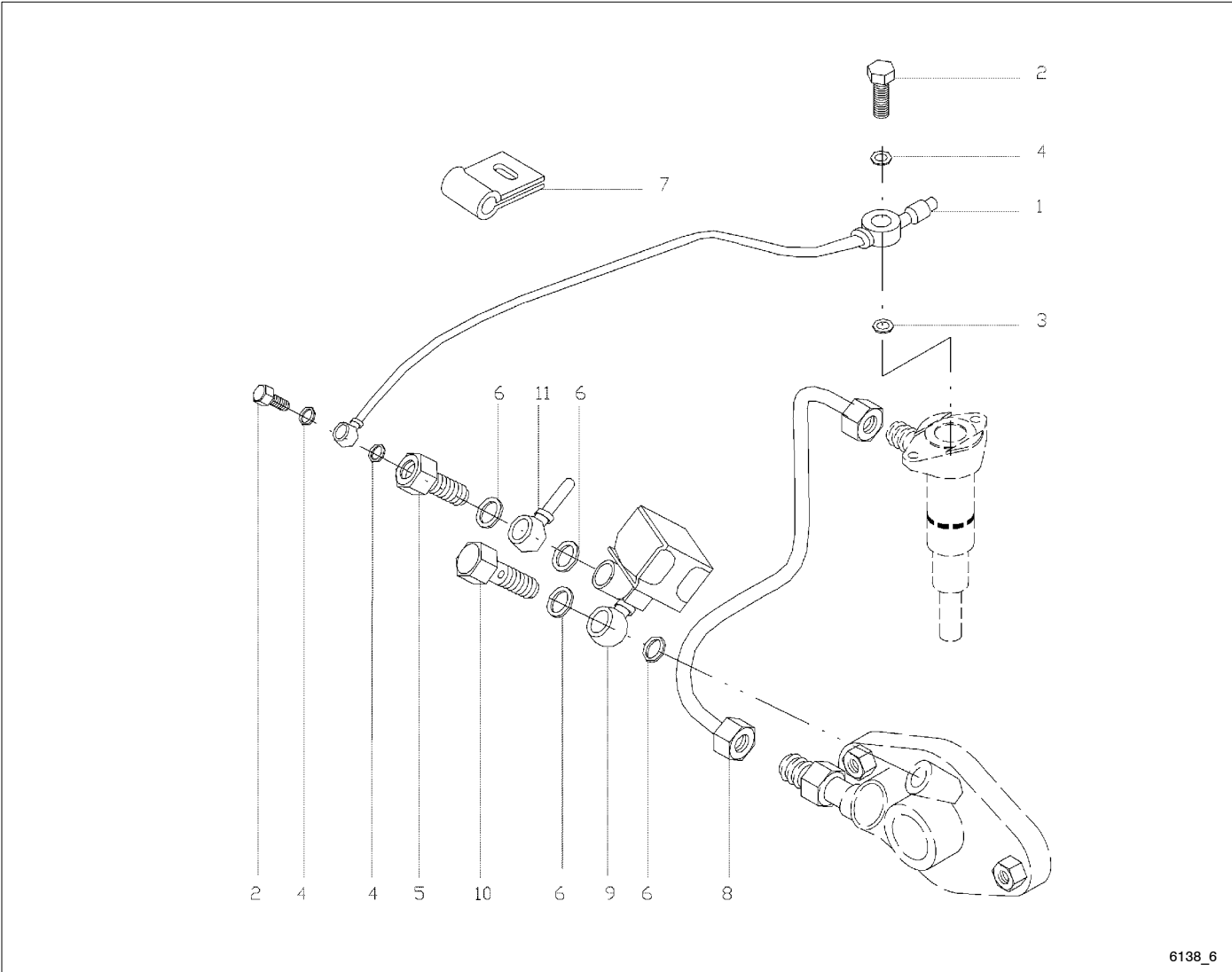


6138_5

Item	Part Number	Description	Quantity
			Variation No.
1	GM23949	Spring, Torsion Return	1
2	GM23916	Arm, Governor	1
3	GM23888	Screw, Adjustment	1
4	GM23992	Tab, Locking	1
5	#	Nut, Hex Head, M6	1
6	GM23952	Retainer	1
7	GM23871	Shaft, Speed Control	1
8	GM23953	O-ring, 10 x 2.2 mm	1
9	GM23950	Spring, Torsion Return	1
10	GM23986	Plate, Control	1
11	GM23984	Lever	1
12	#	Washer, Tooth, 8 mm	1
13	#	Nut, Hex Head, M8	1
14	GM23913	Bolt	1

Common hardware; procure locally.

Group 6: Fuel Lines

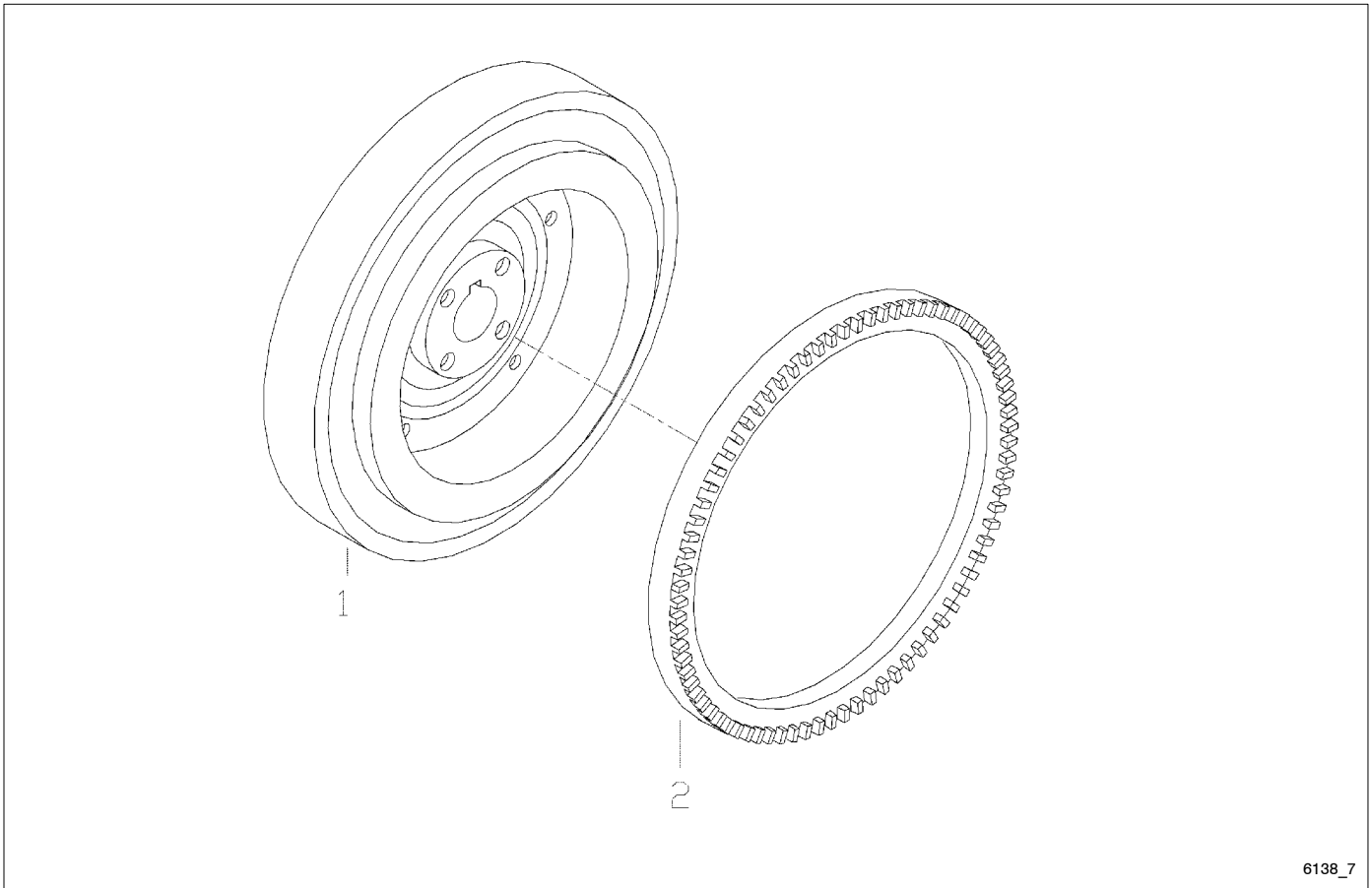


6138_6

Item	Part Number	Description	Quantity
			Variation No.
1	GM23999	Line, Return Fuel	1
2	GM23982	Bolt, Banjo Union	2
3	GM23959	Washer, Copper, 8 mm ID	1
4	GM23978	Washer, Copper, 8 mm ID	3
5	GM23892	Connector	1
6	GM23980	Washer, Copper, 12 mm ID	4
7	GM23988	Clamp, Fuel Line	1
8	GM23998	Pipe, Fuel Injector	1
9	GM24072	Solenoid, Shutoff	1
10	GM24099	Bolt, Banjo Union	1
11	# X-6288-1	Eye, Fuel Supply Line	1

~~# Common hardware, procure locally.~~

Group 7: Flywheel

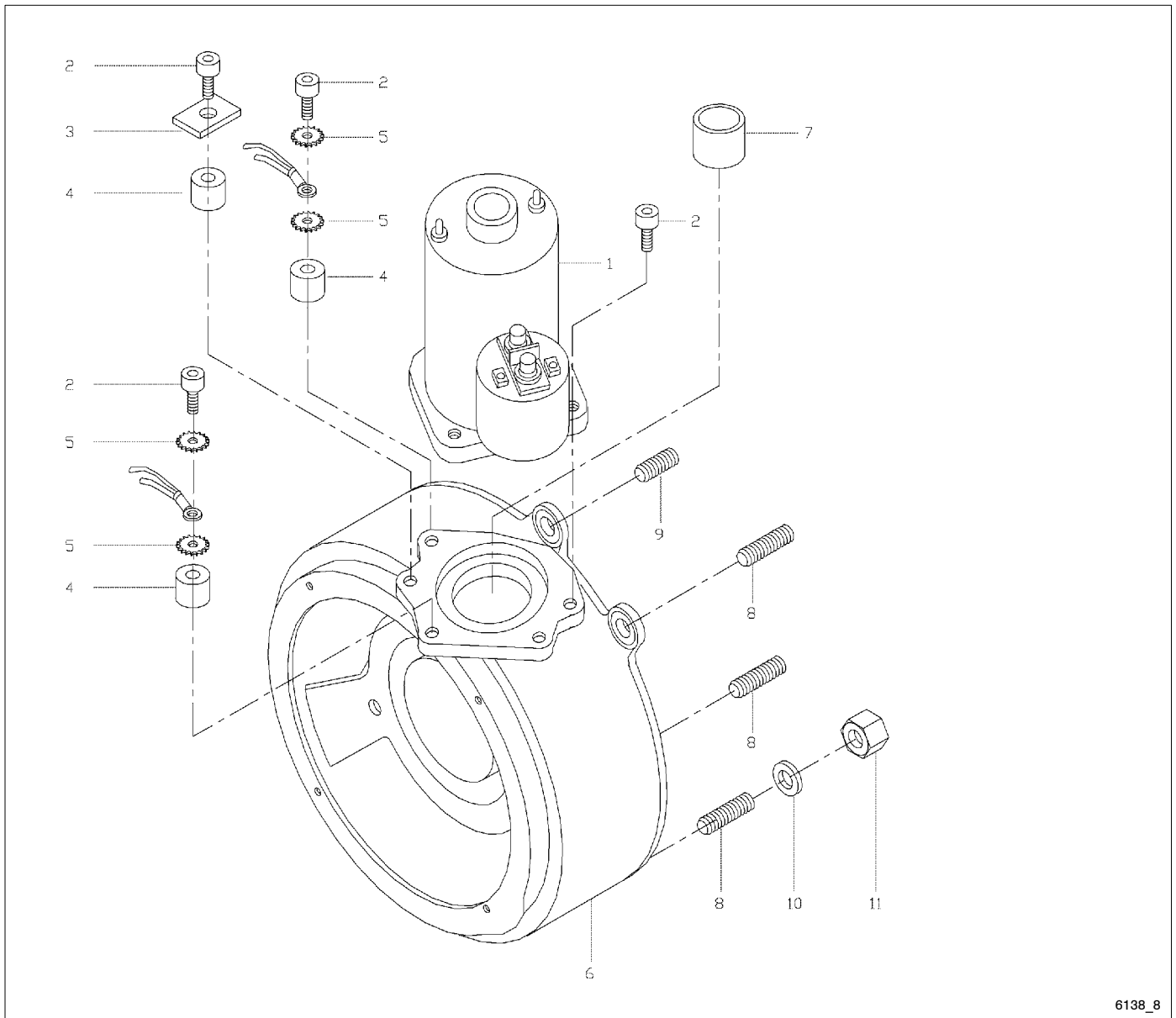


6138_7

Item	Part Number	Description	Quantity
			Variation No.
1	GM23928	Flywheel	1
2	GM23881	Gear	1

Common hardware; procure locally.

Group 8: Starter Motor

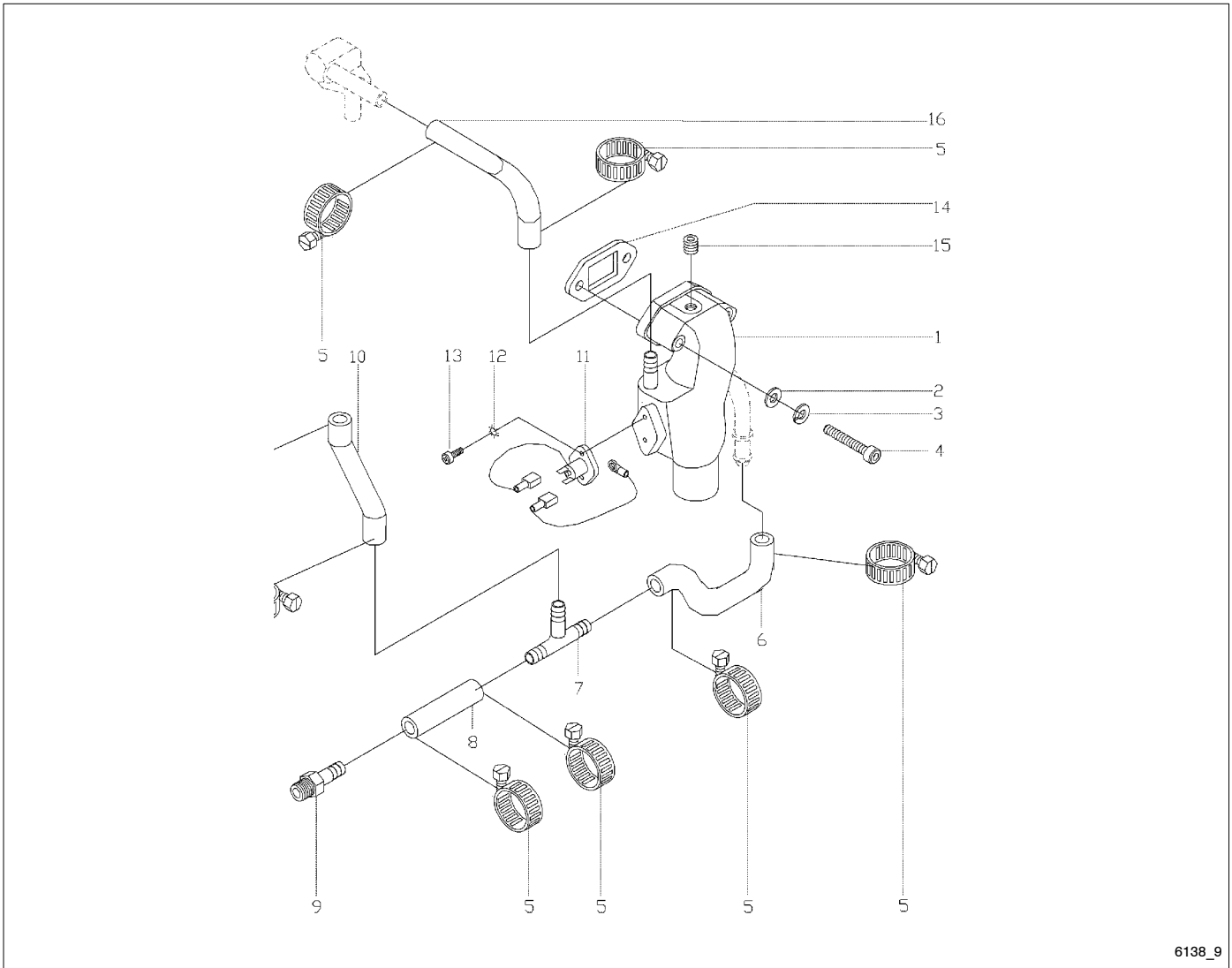


6138_8

Item	Part Number	Description	Quantity
			Variation No.
1	GM23910	Starter Assembly, 12 Volt	1
2	#	Screw, Hex Head Cap, M8 x 20	4
3	GM24083	Plate, Connecting	1
4	GM24109	Spacer	3
5	#	Washer, Tooth, 8 mm ID	4
6	GM24097	Housing, Flywheel	1
7	GM23909	Bushing	1
8	GM23969	Stud, M10 x 25	3
9	GM23970	Stud, M10 x 25	1
10	#	Washer, Spring, 10 mm ID	4
11	#	Nut, Hex Head, M10	4

Common hardware; procure locally.

Group 9: Exhaust System

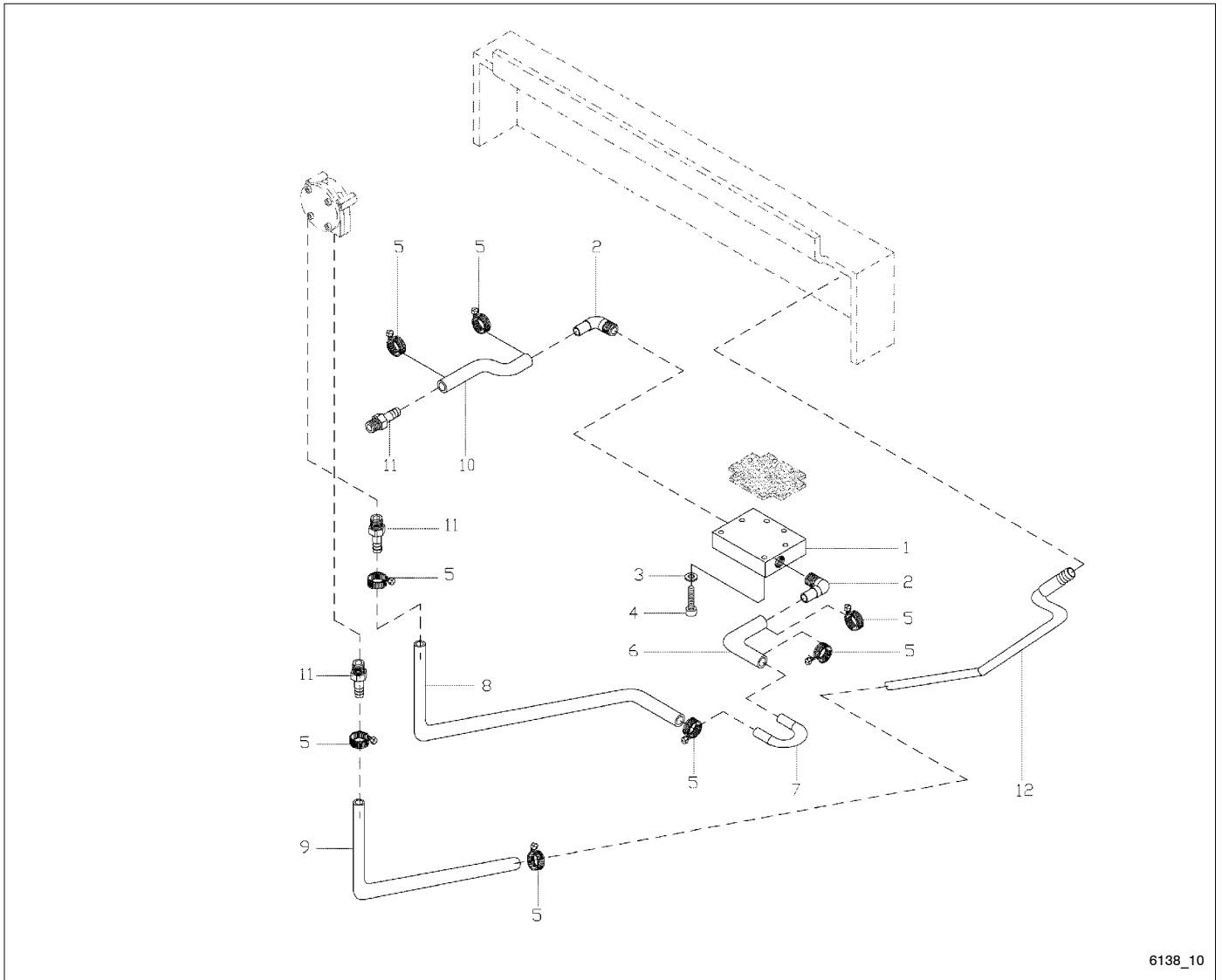


6138_9

Item	Part Number	Description	Quantity
			Variation No.
1	GM24074	Tube, Mixing	1
2	#	Washer, Plain, 8 mm ID	2
3	#	Washer, Split, 8 mm ID	2
4	#	Screw, Hex Head Cap, M8 x 55	2
5	GM24021	Clamp, Hose	8
6	GM24120	Hose	1
7	GM24103	Nipple	1
8	GM24512	Hose	1
9	GM24119	Adapter, Rubber Tube	1
10	GM24063	Hose	1
11	GM24051	Switch, Temperature Alarm	1
12	#	Washer, Tooth, 3 mm ID	2
13	#	Screw, Round Phillips Head, M3 X 6	1
14	GM23935	Gasket	1
15	#	Plug, Cap, 1/8	1
16	GM24124	Hose	1

Common hardware; procure locally.

Group 10: Oil Cooler and Lines

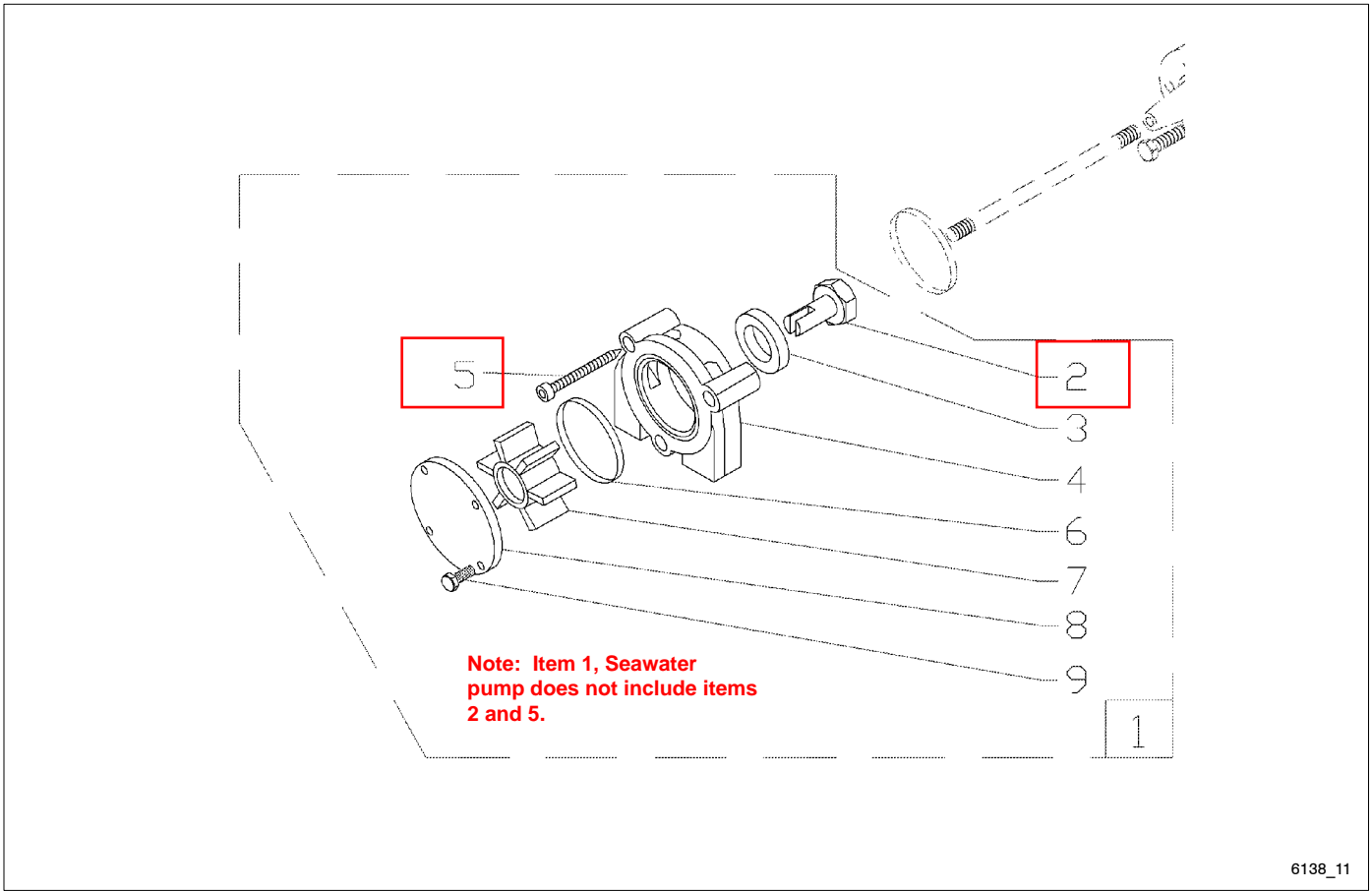


6138_10

Item	Part Number	Description	Quantity
			Variation No.
			1
1	GM24114	Element, Oil Cooler	1
2	GM24112	Elbow	2
3	#	Washer, Tooth, 6 mm ID	6
4	#	Screw, Hex Head Cap, M6 x 30	6
5	GM24021	Clamp, Hose	8
6	GM24121	Hose	1
7	GM24104	Tube	1
8	GM24122	Hose	1
9	GM24118	Hose	1
10	GM24116	Hose	1
11	GM24027	Adapter, Rubber Hose	3
12	GM24102	Tube	1

Common hardware; procure locally.

Group 11: Seawater Pump

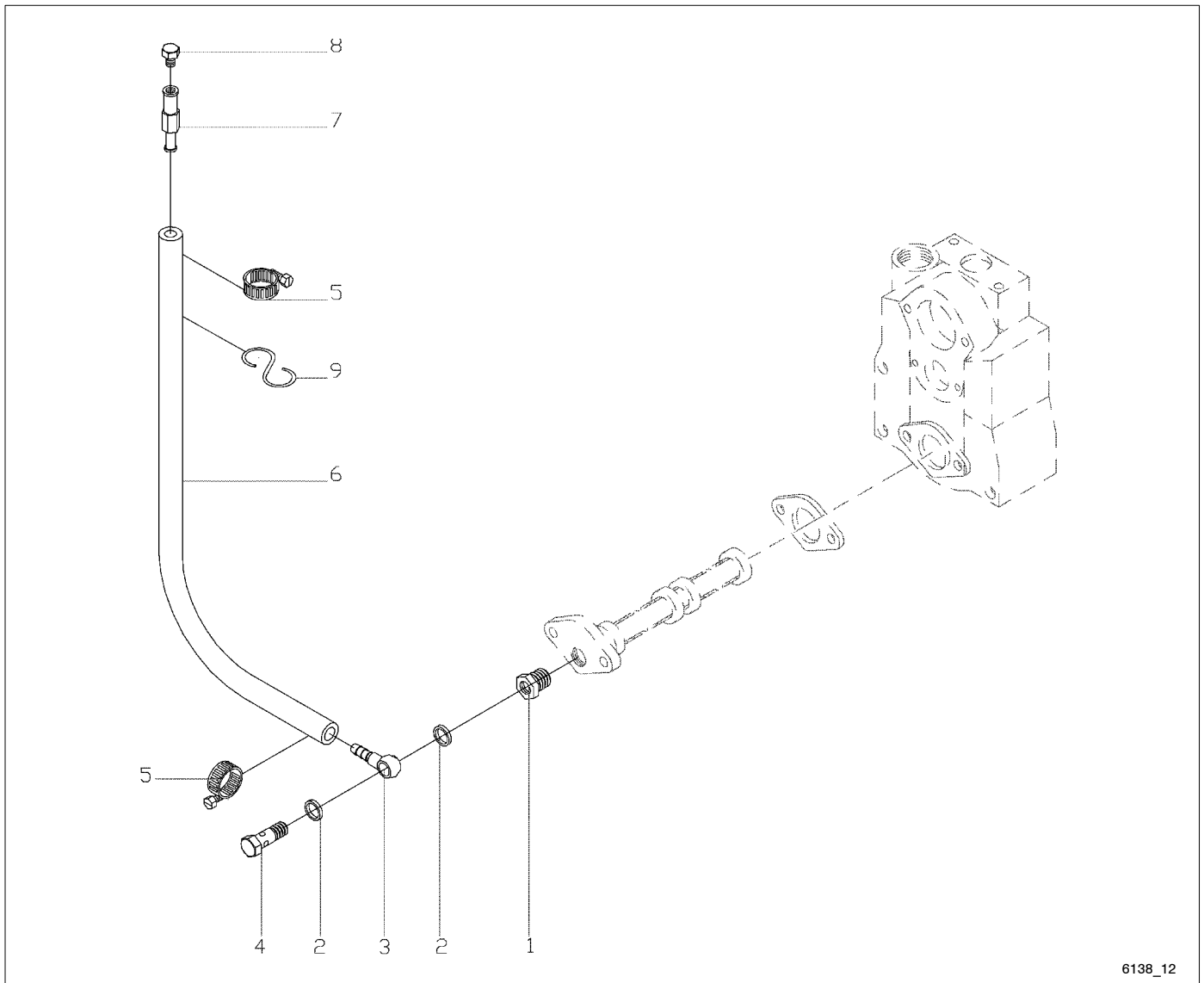


6138_11

Item	Part Number	Description	Quantity
			Variation No.
1	GM24052	Pump Assembly, Seawater	1
2	GM24106	Shaft, Seawater Pump	1
3	GM24032	Seal	1
4	GM24053	Housing, Seawater Pump	1
5	#	Screw, Hex Head Cap, M5 x 40	3
6	GM24031	O-ring	1
7	GM20852	Impeller	1
8	GM24054	Cover, Seawater Pump	1
9	#	Screw, Hex Head, M4 x 8	4

Common hardware; procure locally.

Group 12: Oil Draining Lines

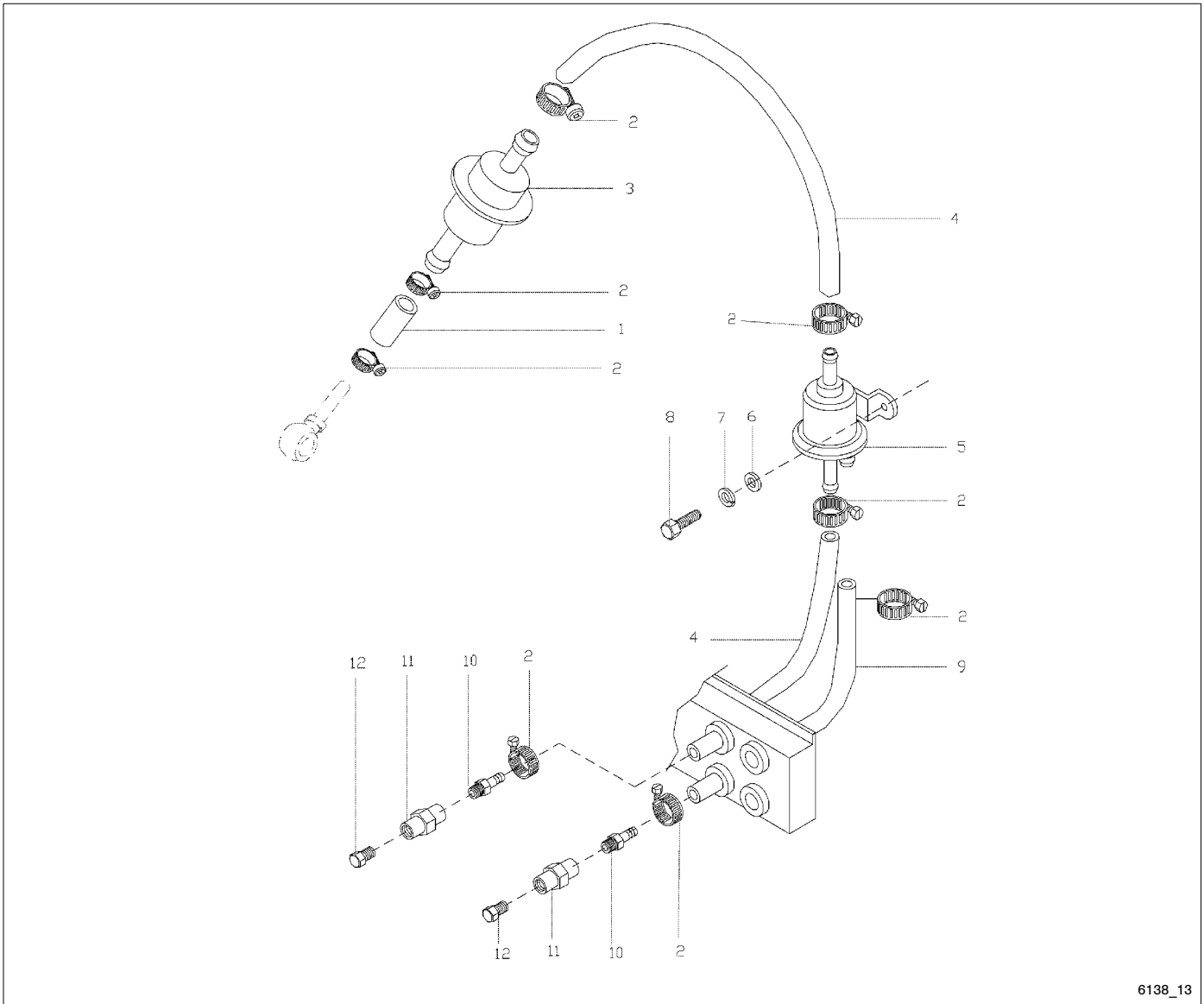


6138_12

Item	Part Number	Description	Quantity
			Variation No.
1	GM24143	Bushing, Reducer	1
2	GM23980	Washer, Copper, 12 mm ID	2
3	GM24142	Eye, Banjo Union	1
4	GM24141	Bolt, Banjo Union	1
5	GM24020	Clamp, Hose	2
6	GM24117	Hose, Oil Draining	1
7	GM24111	Adapter, Rubber Hose	1
8	GM24113	Plug, M8 x 10	1
9	GM24513	Clip, hose	1

Common hardware; procure locally.

Group 13: Fuel Filter and Pump

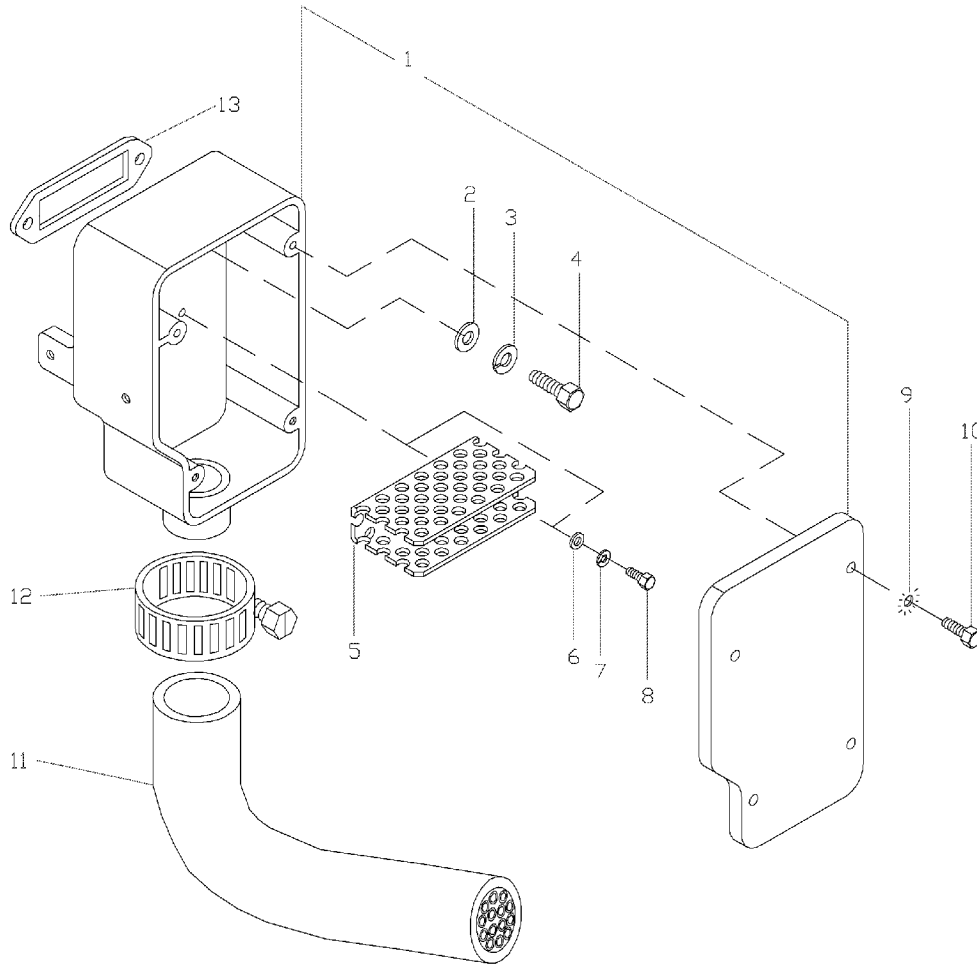


6138_13

Item	Part Number	Description	Quantity
			Variation No.
1	GM24125	Hose, Fuel	1
2	GM24020	Clamp, Hose	8
3	GM20850	Filter, Fuel	1
4	GM24126	Hose, Fuel Supply	2
5	GM24055	Pump, Fuel	1
6	#	Washer, Plain, 6 mm ID	2
7	#	Washer, Split, 6 mm ID	2
8	#	Screw, Hex Head, M6 x 16	2
9	GM24127	Hose, Fuel Return	1
10	GM24025	Adapter, Fuel Hose	2
11	GM24024	Connector, Fuel Hose	2
12	#	Plug, 1/4 NPT	2

Common hardware; procure locally.

Group 14: Air Intake Filter

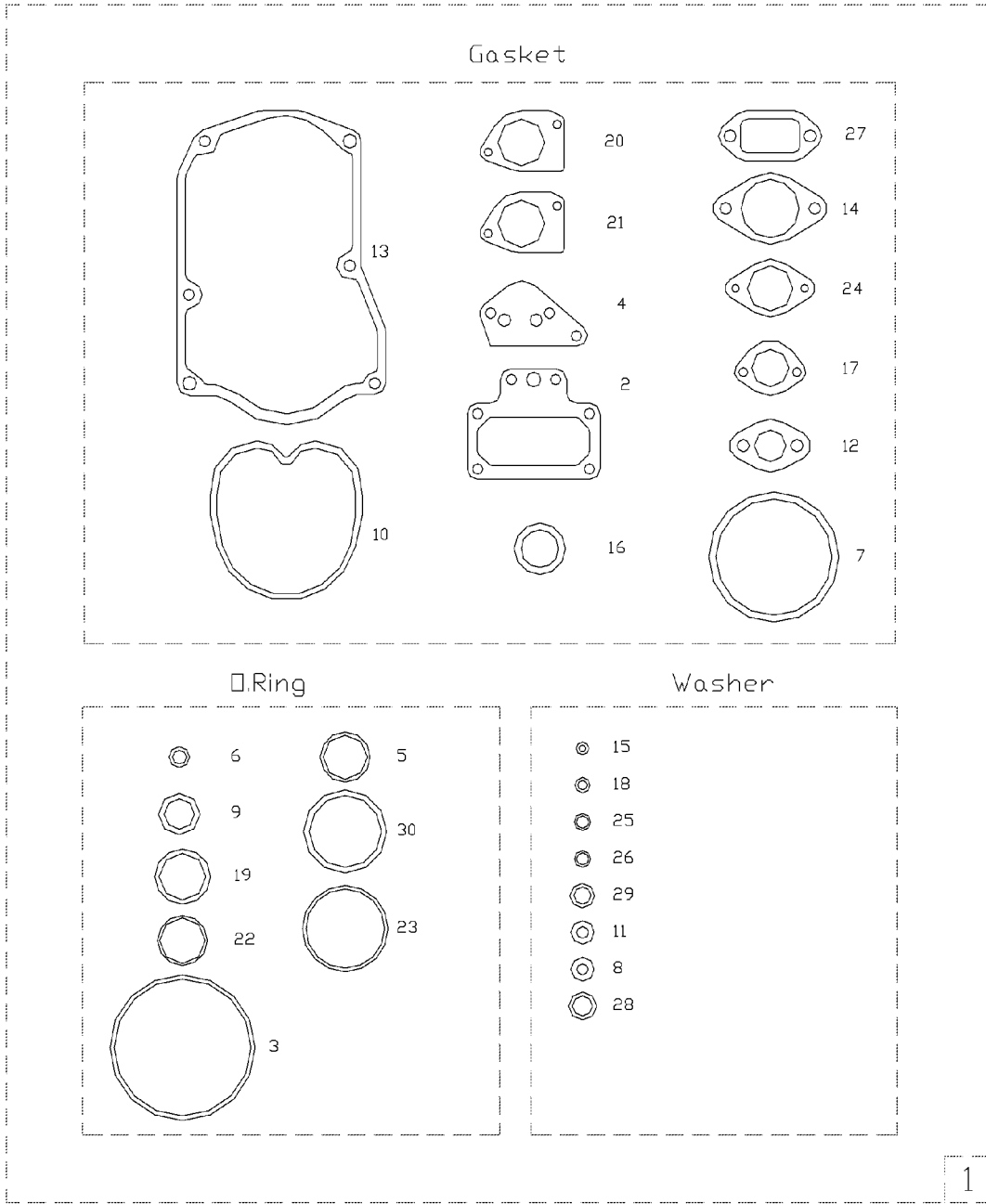


6138_14

Item	Part Number	Description	Quantity
			Variation No. 1
1	GM24073	Screen, Air Intake	1
2	#	Washer, Plain , 8 mm ID	2
3	#	Washer, Split , 8 mm ID	2
4	#	Screw, Hex Head, M8 x 25	2
5	GM20848	Screen	1
6	#	Washer, Plain, 5 mm ID	2
7	#	Washer, Split, 5 mm ID	2
8	#	Screw, Hex Head, M5 x 12	2
9	#	Washer, Tooth, 5 mm ID	6
10	#	Screw, Hex Head, M5 x 25	6
11	GM24144	Hose, Air Intake	1
12	GM24022	Clamp, Hose	1
13	GM23935	Gasket	1

Common hardware; procure locally.

Group 15: Gasket Set

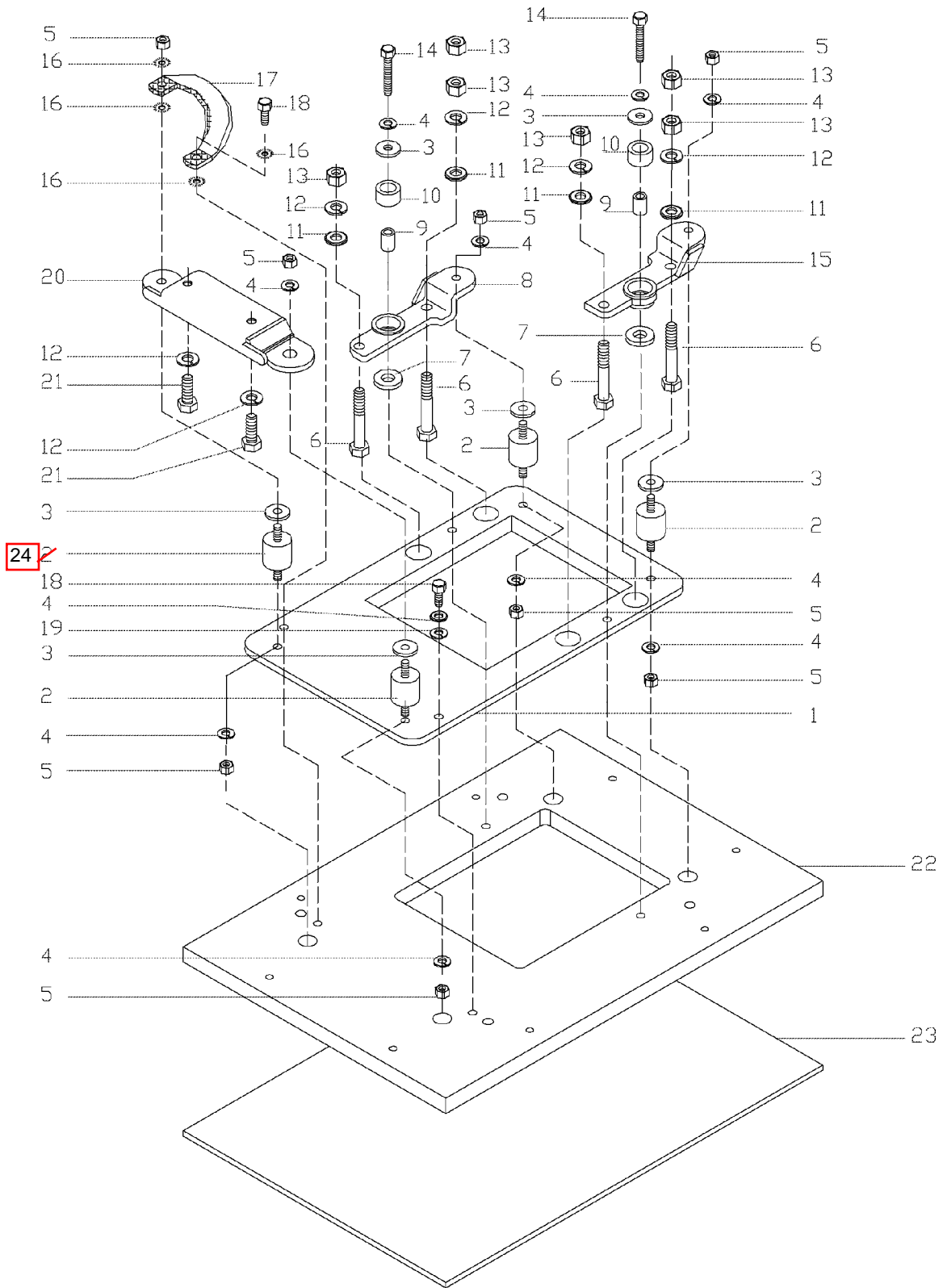


Group 15: Gasket Set

Item	Part Number	Description	Quantity
			Variation No. 1
1	GM24014	Set, Gasket	1
2	GM23934	Gasket, Crankcase	1
3	GM23955	O-ring, 99 x 3 mm	1
4	GM23937	Gasket, Oil Pump	1
5	GM23954	O-ring, 32 x 2 mm	1
6	GM23953	O-ring, 10 x 2.2 mm	3
7	GM23941	Gasket, Cylinder Head	1
8	GM23962	Washer	1
9	GM23956	O-ring, 24 x 3.5 mm	1
10	GM23932	Gasket, Rocker Cover	1
11	#	Washer, 5 mm ID	2
12	GM23931	Gasket	2
13	GM23933	Gasket, Cover	1
14	GM23939	Gasket	1
15	GM23979	Washer, Copper, 5 mm ID	2
16	GM23958	Gasket	1
17	GM23938	Gasket, Oil Filter	1
18	GM23977	Washer, Copper, 6 mm ID	2
19	GM23957	O-ring, 32 x 3 mm	1
20	GM23936	Gasket, Plate, 0.3 mm	1
21	GM23940	Gasket, Plate, 0.4 mm	1
22	GM23960	O-ring, 32.7 x 1.3 mm	1
23	GM23961	O-ring, 57 x 2.5 mm	1
24	GM23930	Gasket, Plate	1
25	GM23959	Washer, Copper, 8 mm ID	1
26	GM23963	Washer, Copper, 8 mm ID	3
27	GM23935	Gasket	2
28	GM23981	Washer, Copper, 14 mm ID	1
29	GM23980	Washer, Copper, 12 mm ID	6
30	GM24029	O-Ring	1

Common hardware; procure locally.

Group 16: Base and Mounting



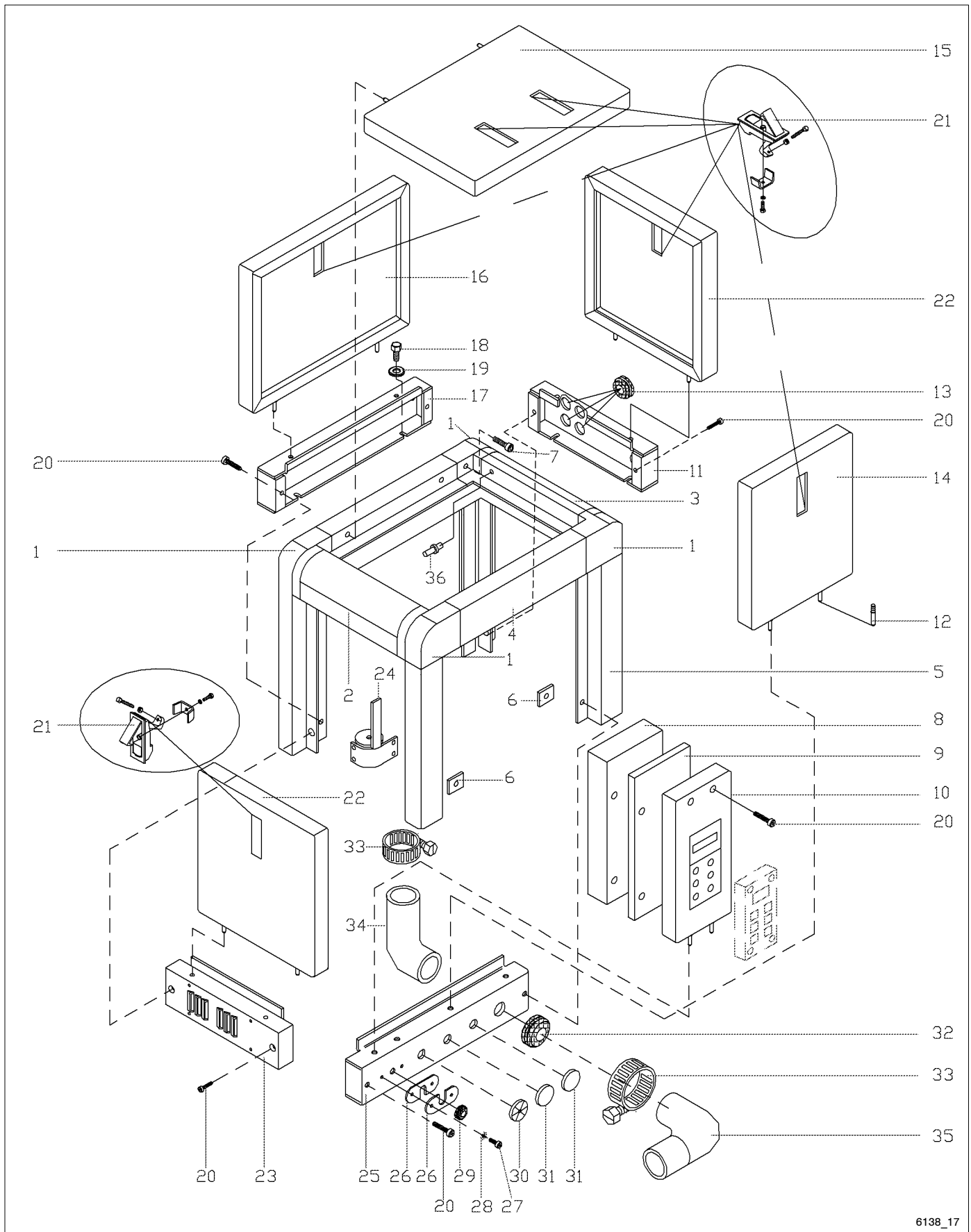
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Group 16: Base and Mounting

Item	Part Number	Description	Quantity
			Variation No.
1	GM24080	Tray	1
2	GM24044	Vibromount M8 x 14mm, M8 x 14mm	4
3	#	Washer, Plain	6
4	#	Washer, Split, 8 mm ID	11
5	#	Nut, Hex Head , M8	8
6	#	Screw, Hex Head, M10 x 70	4
7	GM24047	Ring, Rubber	2
8	GM24078	Bracket, Engine Right	1
9	GM24110	Spacer	2
10	GM24046	Bushing, Rubber	2
11	#	Washer, Plain, 10 mm ID	4
12	#	Washer, Split, 10 mm ID	6
13	#	Nut, Hex Head, M10	6
14	#	Screw, Hex Head, M8 x 40	2
15	GM24079	Bracket, Engine Left	1
16	#	Washer, Tooth, 8 mm ID	4
17	GM24056	Strap, Ground	1
18	#	Screw, Hex Head, M8 x 20	2
19	#	Washer, Plain, 8 mm ID	1
20	GM24084	Bracket, Generator	1
21	#	Screw, Hex Head , M10 x 25	2
22	GM24115	Base	1
23	GM24139	Plate, Sound Shield	1
24	GM63002	Vibromount (M8 x 14mm, M8 x 23mm)	1

Common hardware, procure locally.

Group 17: Sound Shield



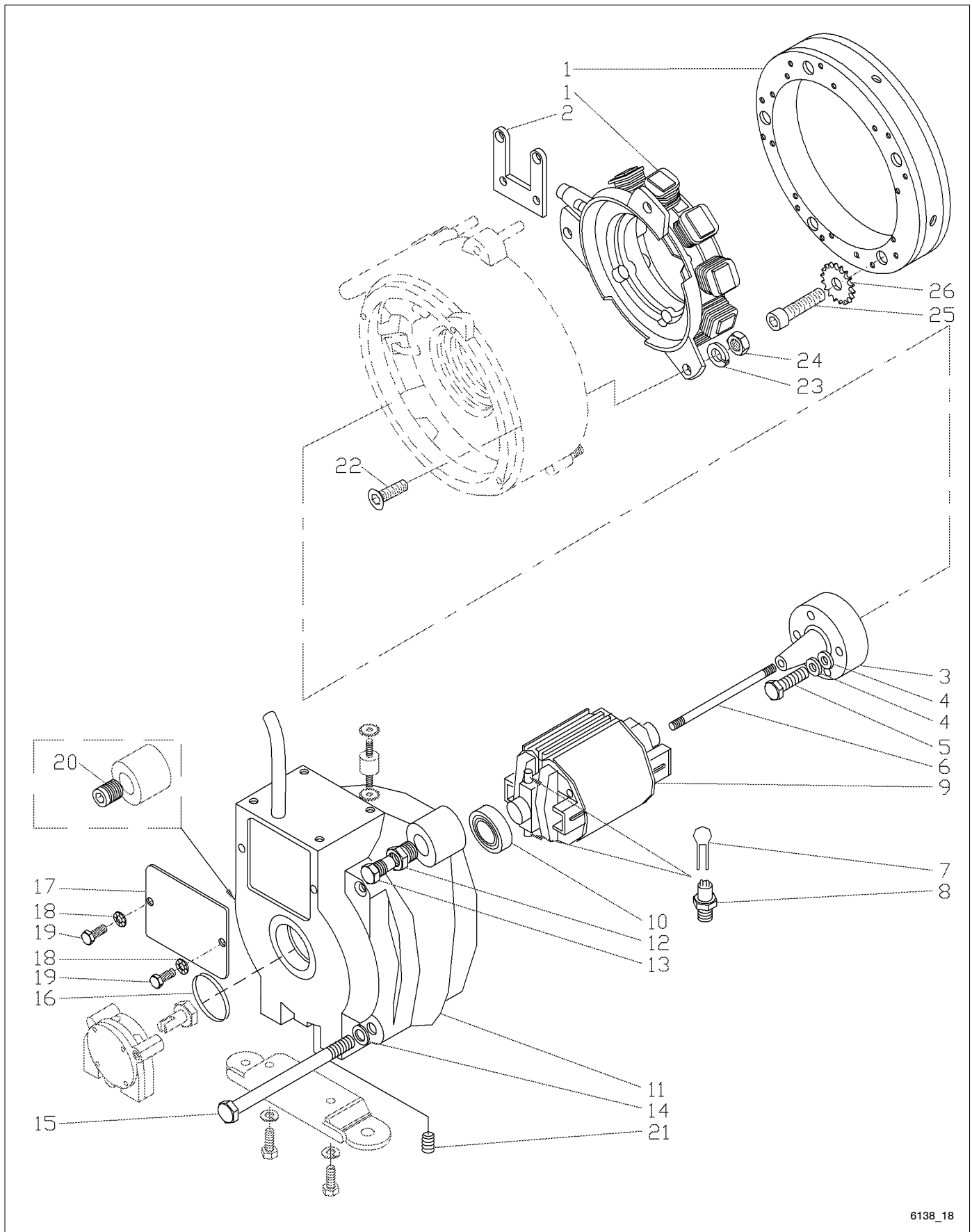
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Group 17: Sound Shield

Item	Part Number	Description	Quantity
			Variation No. 1
1	GM24159	Junction, Corner	4
2	GM24145	Mounting, Upper Rear	1
3	GM24148	Mounting, Upper Front	1
4	GM24146	Mounting, Upper Left, Right	2
5	GM24147	Mounting, Vertical	4
6	GM24019	Clip	10
7	#	Screw, Self-Threading	8
8	GM24095	Housing, Electrical Board	1
9	GM24094	Plate, Connecting	1
10	GM24089	Panel, Electrical Board	1
11	GM24077	Base, Sound Shield Front	1
12	GM24160	Stud, Coupling	12
13	GM24035	Grommet	5
14	GM24088	Panel, Left Removable	1
15	GM24090	Panel, Top Removable	1
16	GM24087	Panel, Right Removable	1
17	GM24082	Base, Sound Shield Right	1
18	#	Screw, Hex Head, M6 x 20	8
19	#	Washer, Plain, 6 mm ID	8
20	#	Screw, Flat Phillips Head, M6 x 45	10
21	GM24158	Latch	6
22	GM24086	Panel, Front, Rear	2
23	GM24076	Base, Sound Shield Rear	1
24	GM24081	Base, Capacitor	1
25	GM24075	Base, Sound Shield Left	1
26	GM24096	Cover, Grooved	2
27	#	Screw, Round Phillips Head, M5 x 14	2
28	#	Washer, Tooth, 5 mm ID	1
29	GM24039	Grommet	1
30	GM24041	Grommet	1
31	GM24042	Plug	2
32	GM24037	Grommet	1
33	GM24022	Clamp, Hose	2
34	GM24123	Tube, Exhaust	1
35	GM24107	Elbow, Exhaust Tube, 40/50 mm OD	1
35	GM24108	Elbow, Exhaust Tube, 40 mm OD	1
36	GM24048	Rivet	13
Items Not Shown			
	GM24017	Nut, Jaw, M6	8
	GM24018	Nut, Jaw, M8	4
	GM24049	Gasket, Adhesive, 20 mm wide x 3 mm high	
	GM24050	Gasket, Adhesive, 30 mm wide x 3 mm high	
	GM24128	Gasket, Sealing Tar Base Front, Rear	2
	GM24129	Gasket, Sealing Tar Base Right, Left	2
	GM24130	Foam, Acoustic Front Base	1
	GM24130	Foam, Acoustic Front Base	2
	GM24131	Foam, Acoustic Rear Base	1
	GM24132	Foam, Acoustic Left Base	1
	GM24133	Foam, Acoustic Right Base	1
	GM24134	Foam, Acoustic Left Panel	1
	GM24135	Foam, Acoustic Control Panel	1
	GM24136	Foam, Acoustic Right Panel	1
	GM24137	Foam, Acoustic Top Panel	1
	GM24138	Foam, Acoustic Upper and Vertical Mounting	1

Common hardware; procure locally.

Group 18: Generator and Mounting



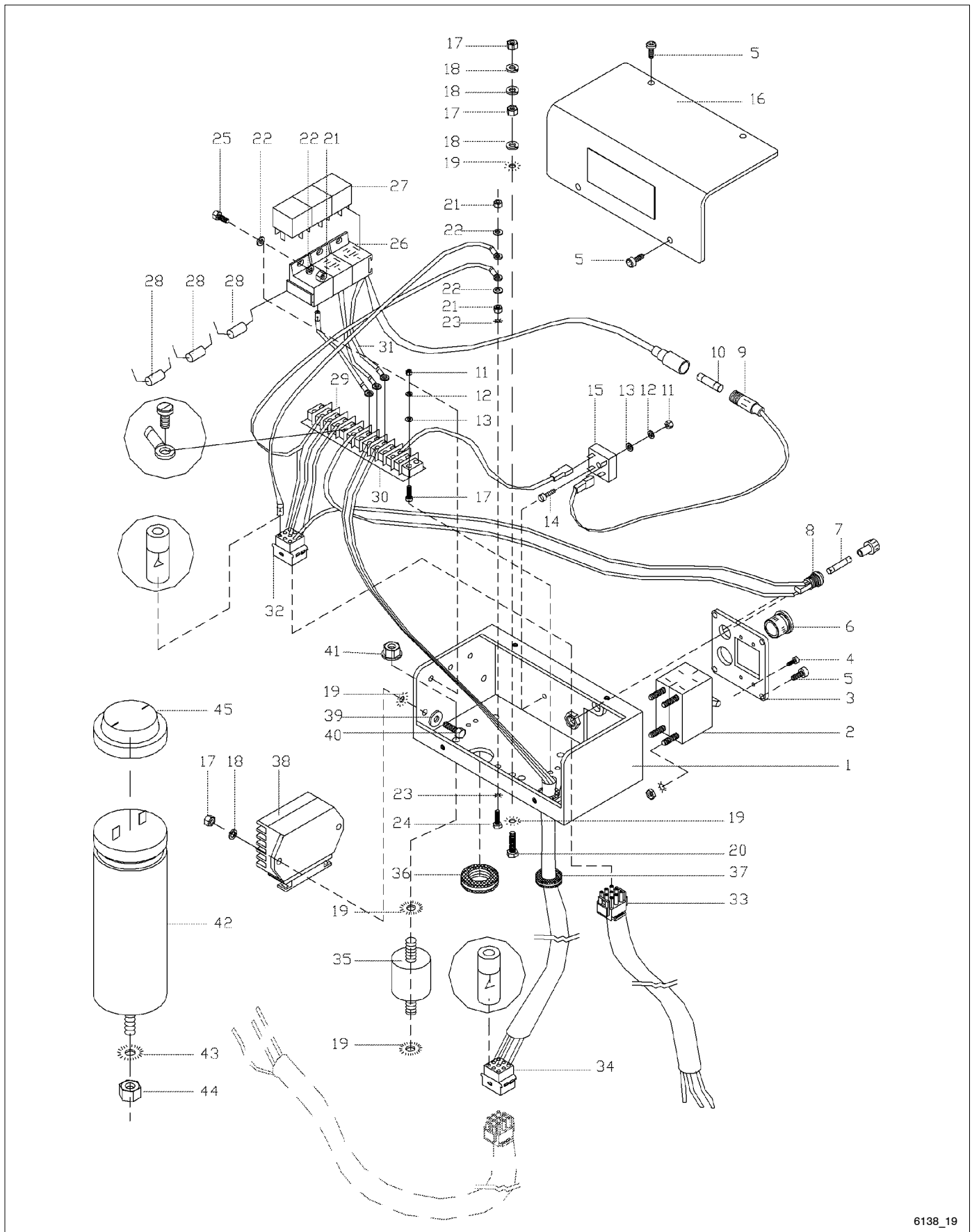
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Group 18: Generator and Mounting

Item	Part Number	Description	Quantity	
			Variation No.	
			1	2
1	GM24070	Alternator, Engine Charging	1	1
2	GM24085	Bracket, Lifting	1	1
3	GM24100	Hub, Engine-Stator Connection	1	1
4	#	Washer, Special Notch, 8 mm ID	4	4
5	#	Screw, Hex Head, M8 x 35	4	4
6	GM24101	Stud	1	1
7	GM24065	Varistor	2	2
8	GM24066	Diode	2	2
9	GM24151	Rotor Assembly	1	1
10	GM24033	Bearing	1	1
11	GM24149	Stator Assembly, 50 Hz		1
X-758-1	GM24150	Stator Assembly, 60 Hz	1	
12	GM24028	Bushing, Reducing, 3/8-1/4	1	1
13	GM20853	Plug, Zinc Electrode	1	1
14	#	Washer, Plain, 10 mm ID	4	4
15	#	Screw, Hex Head, M10 x 140	4	4
16	GM24030	O-ring	1	1
17	GM24091	Cover	1	1
18	#	Washer, Tooth, 5 mm ID	2	2
19	#	Screw, Hex Head, M5 x 12	2	2
20	#	Plug, 3/8	1	1
21	#	Plug, M10	1	1
22	#	Screw, Flat Head Cap, M6 x 16	3	3
23	#	Washer, Split, 6 mm ID	3	3
23	#	Screw, Hex Head Cap, M8 x 55	3	3
24	#	Nut, Hex Head, M6	3	3
25	#	Screw, Hex Head Cap, M6 x 30	5	5
26	#	Washer, Tooth, 6 mm ID	5	5

Common hardware; procure locally.

Group 19: Controller and Mounting



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Group 19: Controller and Mounting

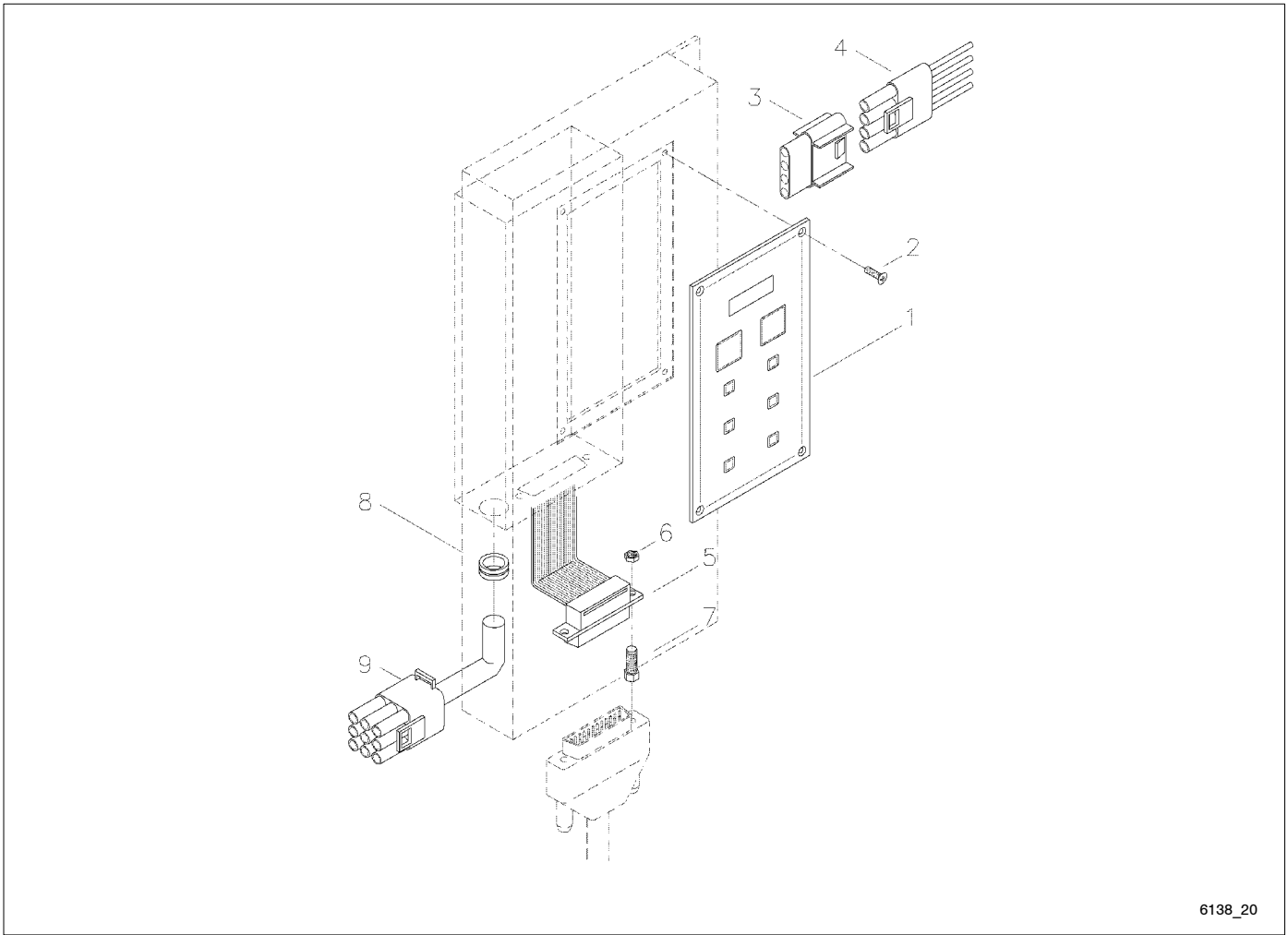
Item	Part Number	Description	Quantity	
			Variation No.	
			1	2
	1 GM24098	Box, Controller	1	1
X-506-68	2 GM24015	Breaker, Circuit, 15 Amp 2 Pole	18 amp	1
X-506-46	2 GM24016	Breaker, Circuit, 16 Amp 2 Pole	35 amp	1
	3 GM24093	Plate, Circuit Breaker	1	1
	4 #	Screw, Round Phillips Head, M3 x 6	4	4
	5 #	Screw, Round Phillips Head, M5 x 12	8	8
	6 GM24040	Grommet	1	1
	7 GM20851	Fuse, 25 Amp	1	1
	8 GM24062	Carrier, Fuse	1	1
	9 GM24061	Carrier, Fuse	1	1
	10 GM20849	Fuse, 10 Amp	1	1
	11 #	Nut, Hex Head, M4	5	5
	12 #	Washer, Split, 4 mm ID	5	5
	13 #	Washer, Plain, 4 mm ID	5	5
	14 #	Screw, Hex Head, M4 x 16	5	5
	15 GM24067	Rectifier Assembly	1	1
	16 GM24092	Cover, Controller Box	1	1
	17 #	Nut, Hex Head, M6	4	4
	18 #	Washer, Plain, 6 mm ID	5	5
	19 #	Washer, Tooth, 6 mm ID	12	12
	20 #	Screw, Hex Head, M6 x 25	1	1
	21 #	Nut, Hex Head, M5	4	4
	22 #	Washer, Plain, 5 mm ID	6	6
	23 #	Washer, Tooth, 5 mm ID	2	2
	24 #	Screw, Hex Head, M5 x 20	1	1
	25 #	Screw, Hex Head, M5 x 10	2	2
	26 GM24060	Base, Relay	3	3
	27 GM24059	Relay	3	3
	28 GM24064	Diode, 3 Amp, 400 Volt	3	3
	29 GM24057	Base, Electrical Connection	1	1
	30 GM24058	Plate, Electrical Connection	1	1
	31 GM24157	Harness, Control Box	1	1
	32 GM24153	Harness, Control Box to Engine	1	1
	33 GM24154	Harness, Engine	1	1
	34 GM24155	Harness, Control Box to Panel	1	1
	35 GM24045	Vibromount	4	4
	36 GM24036	Grommet	1	1
	37 GM24038	Grommet	1	1
	38 GM24071	Voltage Regulator	1	1
	39 #	Washer, Plain, 6 mm ID	2	2
	40 #	Screw, Hex Head, M6 x 20	2	2
	41 #	Nut, Collar, M6	4	4
	42 GM24068	Capacitor (60 Hz gen.)	1	1
	43 #	Washer, Tooth, 8 mm ID	1	1
	44 #	Nut, Hex Head, M8	1	1
	45 GM24043	Protector, Rubber	1	1

Common hardware; procure locally.

42 GM30673 Capacitor (50 Hz gen.)

1

Group 20: Control Panel

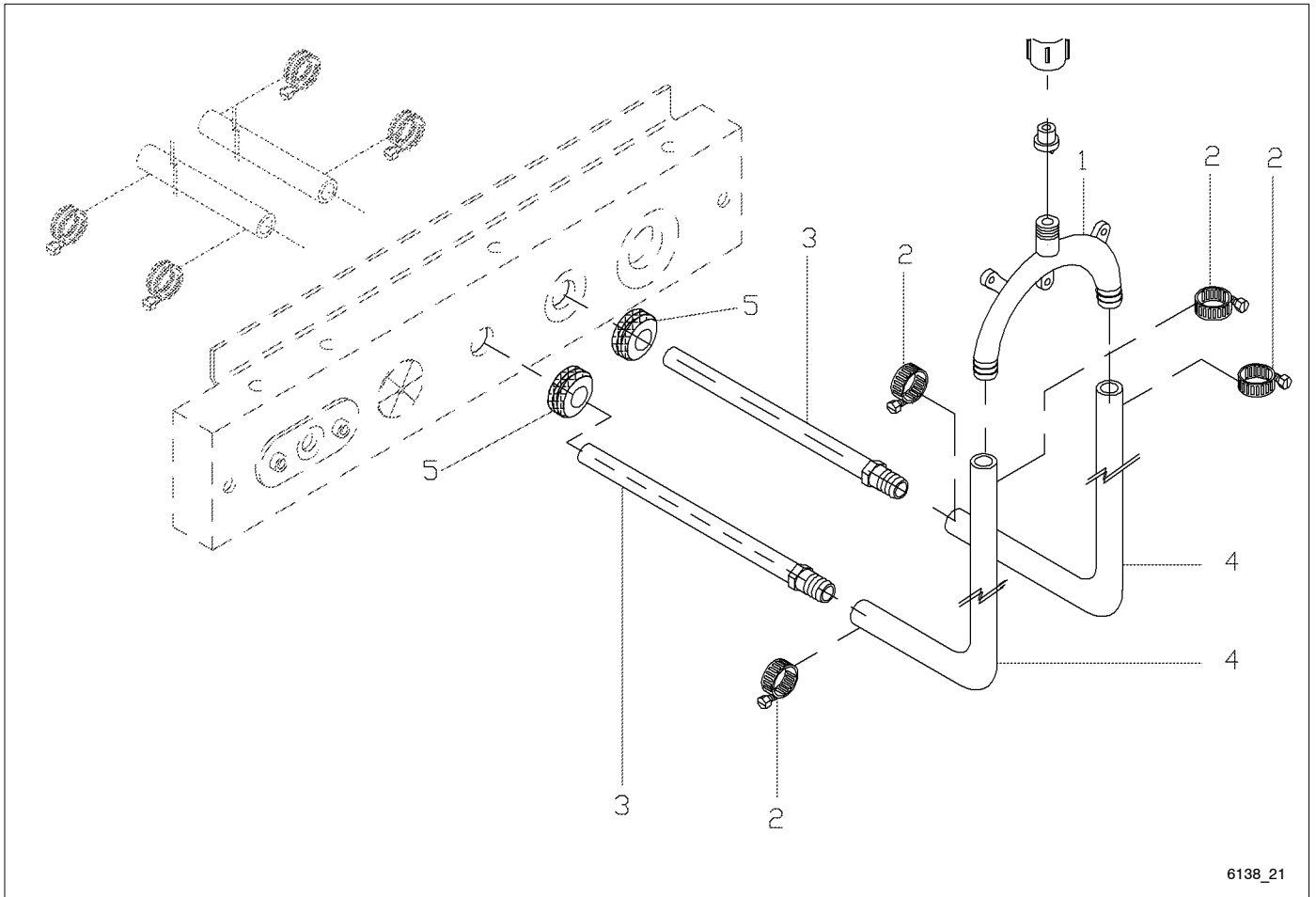


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Item	Part Number	Description	Quantity
			Variation No.
			1
1	GM24161	Panel, Control	1
2	#	Screw, Flat Phillips Head, M3 x 12	4
3	GM24069	Connector	1
4	GM24156	Connector to Remote Start/Stop Switch Harness	1
5	GM24152	Connector to Remote Control Panel Harness	1
6	#	Nut, Hex Head, M3	2
7	#	Screw, Special Head, M3 x 12	2
8	GM24034	Grommet Control Box Harness GM34930	1
9	GM24156	Connector to Remote Start/Stop Switch Harness	1
10	GM24514	Fuse, 0.63 Amp	1

Common hardware; procure locally.

Group 21: Siphon Break and Lines



6138_21

Item	Part Number	Description	Quantity
			Variation No.
1	PA-229928	Kit, Siphon Break	1
2	GM24021	Clamp, Hose	4
3	GM24105	Connection, Hose	2
4	GM24023	Hose	2
5	GM24035	Grommet	2

Group 22: Literature

Item	Part Number	Description	Quantity
			Variation No.
1	TP-5620	Safety Precautions, Marine	1
2	TP-6069	I/M 3.5-150EOZ/EFOZ, Marine	1
3	TP-6134	O/M 3.5EFOZ/4EOZ, Marine	1
4	TP-6137	S/M 4EOZ/3.5EFOZ, Marine	1
5	TP-6138	P/C 4EOZ/3.5EFOZ Farymann 18W	1
6	TP-6143	O/M Farymann 18W	1
7	TP-6149	Warranty, 4EOZ/3.5EFOZ, Marine	1
8	TP-6163	S/M Farymann 18W (903.04.08 1.5)	1

Paint and Miscellaneous Parts

Paint, White, Gallon	221334
Paint, White, Spray Can	221335
Paint, White, .75 oz. Bottle w/Brush	GM19490

Accessories

Qty.	Description	Part No.
------	-------------	----------

Harness, Control Wiring to Plug (Remote Start)

GM22474-KP1
GM22474

1 Harness, Wiring

Harness, Remote Panel, 15 Ft.

PA-249334

1 Harness, Wiring Extension 249334

Harness, Remote Panel, 25 Ft.

PA-249336

1 Harness, Wiring Extension 249336

Panel, Remote Start

PA-359581

1 Decal, Warning 249494
 1 Installation Instructions, Remote Start Panel TT-1245
 1 Panel Assembly (includes the following) A-226965
 1 Panel, Control 226964
 1 Harness, Wiring 226979
 1 Meter, Run Time 238736
 1 Switch, Rocker 344039
 2 Screw, Pan Head, M3 x 12 M7982A-03012-20
 2 Nut, Hex, 3 mm M934-03-50
 2 Washer, Lock, .146 ID x .285 in. OD X-22-6

Harness, Remote (for GM20770-KP1), 25 Ft. GM20971-KP1

1 Cable, RS-232 GM23202

Panel, Remote Start

GM20770-KP1

1 Panel Assembly, Remote GM0768

Ship-to-Shore Switch

PAA-246617

1 Switch, Transfer A-246617
 1 Installation Instructions, Ship-to-Shore Transfer Switch TT-535


Strainer, Seawater

PA-359579

1 Filter, Water, 1/2 x 1/2 in. NPT X-661-1

Appendix A Abbreviations

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

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

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

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.

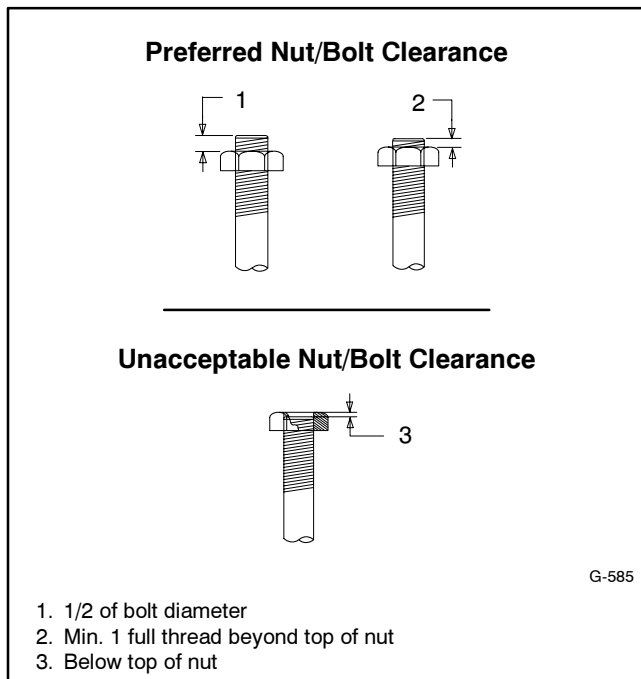


Figure 1 Acceptable Bolt Lengths

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.

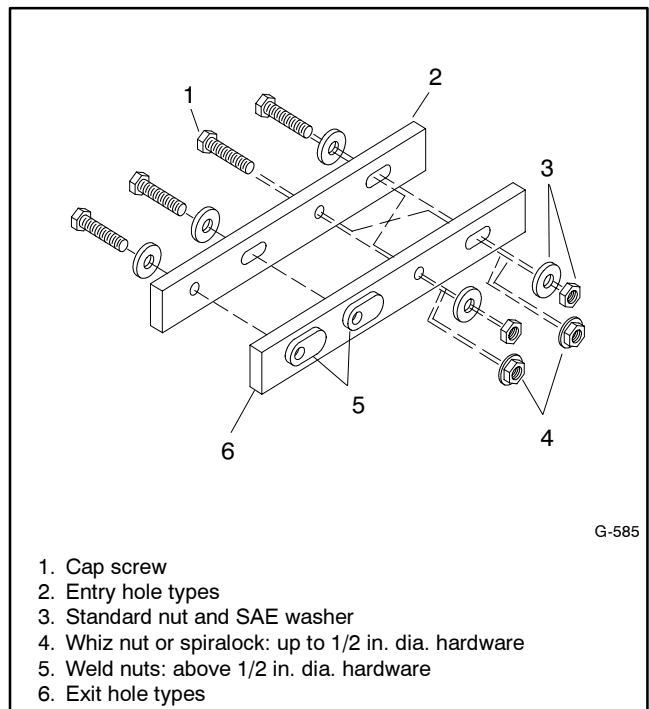


Figure 2 Acceptable Hardware Combinations

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	

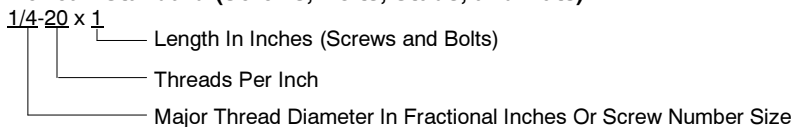
Hardness Grades	
American Standard	
Grade 2	
Grade 5	
Grade 8	
Grade 8/9 (Hex Socket Head)	
Metric	
Number stamped on hardware; 5.8 shown	

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

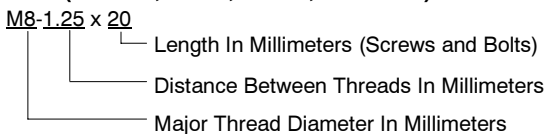
Phillips® screw is a registered trademark of Phillips Screw Company.

Sample Dimensions

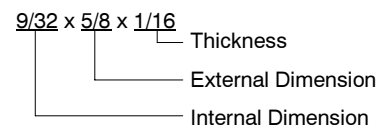
American Standard (Screws, Bolts, Studs, and Nuts)



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					
X-125-5	5/16-18 x 1.00	X-129-30	1/2-13 x 4.50	Washers				
X-125-24	5/16-18 x 1.25	X-463-9	1/2-13 x 5.50	Part No.	ID	OD	Thick.	Bolt/ Screw
X-125-34	5/16-18 x 1.50	X-129-44	1/2-13 x 6.00	X-25-46	.125	.250	.022	#4
X-125-25	5/16-18 x 1.75	X-129-51	1/2-20 x .75	X-25-9	.156	.375	.049	#6
X-125-26	5/16-18 x 2.00	X-129-45	1/2-20 x 1.25	X-25-48	.188	.438	.049	#8
230578	5/16-18 x 2.25	X-129-52	1/2-20 x 1.50	X-25-36	.219	.500	.049	#10
X-125-29	5/16-18 x 2.50	X-6021-3	5/8-11 x 1.00	X-25-40	.281	.625	.065	1/4
X-125-27	5/16-18 x 2.75	X-6021-4	5/8-11 x 1.25	X-25-85	.344	.687	.065	5/16
X-125-28	5/16-18 x 3.00	X-6021-2	5/8-11 x 1.50	X-25-37	.406	.812	.065	3/8
X-125-22	5/16-18 x 4.50	X-6021-1	5/8-11 x 1.75	X-25-34	.469	.922	.065	7/16
X-125-32	5/16-18 x 5.00	273049	5/8-11 x 2.00	X-25-26	.531	1.062	.095	1/2
X-125-35	5/16-18 x 5.50	X-6021-5	5/8-11 x 2.25	X-25-15	.656	1.312	.095	5/8
X-125-36	5/16-18 x 6.00	X-6021-6	5/8-11 x 2.50	X-25-29	.812	1.469	.134	3/4
X-125-40	5/16-18 x 6.50	X-6021-7	5/8-11 x 2.75	X-25-127	1.062	2.000	.134	1
X-125-43	5/16-24 x 1.75	X-6021-12	5/8-11 x 3.75					
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							

Metric

Hex head bolts are hardness grade 8.8 unless noted.

Part No.	Dimensions	Part No.	Dimensions	Part No.	Dimensions	Type	
Hex Head Bolts (partial thread)		Hex Head Bolts (full thread)		Hex Nuts			
M931-05055-60	M5-0.80 x 55	M933-04006-60	M4-0.70 x 6	M934-03-50	M3-0.50	Standard	
M931-06040-60	M6-1.00 x 40	M933-05035-60	M5-0.80 x 35	M934-035-50	M3.5-0.50	Standard	
M931-06055-60	M6-1.00 x 55	M933-05050-60	M5-0.80 x 50	M934-04-50	M4-0.70	Standard	
M931-06060-60	M6-1.00 x 60	M933-06010-60	M6-1.00 x 10	M934-05-50	M5-0.80	Standard	
M931-06070-60	M6-1.00 x 70	M933-06014-60	M6-1.00 x 14	M982-05-80	M5-0.80	Elastic Stop	
M931-06070-SS	M6-1.00 x 70	M933-06016-60	M6-1.00 x 16	M934-06-60	M6-1.00	Standard	
M931-06075-60	M6-1.00 x 75	M933-06020-60	M6-1.00 x 20	M934-06-64	M6-1.00	Std. (Green)	
M931-06090-60	M6-1.00 x 90	M933-06025-60	M6-1.00 x 25	M6923-06-80	M6-1.00	Spirallock	
M931-06150-60	M6-1.00 x 150	M933-06040-60	M6-1.00 x 40	M982-06-80	M6-1.00	Elastic Stop	
M931-08035-60	M8-1.25 x 35	M933-06050-60	M6-1.00 x 50	M934-08-60	M8-1.25	Standard	
M931-08040-60	M8-1.25 x 40	M933-08012-60	M8-1.25 x 12	M6923-08-80	M8-1.25	Spirallock	
M931-08040-82	M8-1.25 x 40*	M933-08016-60	M8-1.25 x 16	M982-08-80	M8-1.25	Elastic Stop	
M931-08045-60	M8-1.25 x 45	M933-08020-60	M8-1.25 x 20	M934-10-60	M10-1.50	Standard	
M931-08050-60	M8-1.25 x 50	M933-08025-60	M8-1.25 x 25	M934-10-60F	M10-1.25	Standard	
M931-08055-60	M8-1.25 x 55	M933-08030-60	M8-1.25 x 30	M6923-10-80	M10-1.50	Spirallock	
M931-08055-82	M8-1.25 x 55*	M933-08030-82	M8-1.25 x 30*	M6923-10-62	M10-1.50	Spirallock†	
M931-08060-60	M8-1.25 x 60	M933-10012-60	M10-1.50 x 12	M982-10-80	M10-1.50	Elastic Stop	
M931-08070-60	M8-1.25 x 70	M961-10020-60	M10-1.25 x 20	M934-12-60	M12-1.75	Standard	
M931-08070-82	M8-1.25 x 70*	M933-10020-60	M10-1.50 x 20	M934-12-60F	M12-1.25	Standard	
M931-08075-60	M8-1.25 x 75	M933-10025-60	M10-1.50 x 25	M6923-12-80	M12-1.75	Spirallock	
M931-08080-60	M8-1.25 x 80	M961-10030-60	M10-1.25 x 30	M982-12-80	M12-1.75	Elastic Stop	
M931-08090-60	M8-1.25 x 90	M933-10030-60	M10-1.50 x 30	M982-14-80	M14-2.00	Elastic Stop	
M931-08095-60	M8-1.25 x 95	M933-10030-82	M10-1.50 x 30*	M6923-16-80	M16-2.00	Spirallock	
M931-08100-60	M8-1.25 x 100	M961-10035-60	M10-1.25 x 35	M982-16-80	M16-2.00	Elastic Stop	
M931-08120-60	M8-1.25 x 120	M933-10035-60	M10-1.50 x 35	M934-18-80	M18-2.5	Standard	
M931-08130-60	M8-1.25 x 130	M933-12016-60	M12-1.75 x 16	M982-18-80	M18-2.50	Elastic Stop	
M931-08140-60	M8-1.25 x 140	M933-12020-60	M12-1.75 x 20	M934-20-80	M20-2.50	Standard	
M931-10040-82	M10-1.25 x 40*	M933-12025-60	M12-1.75 x 25	M982-20-80	M20-2.50	Elastic Stop	
M931-10040-60	M10-1.50 x 40	M933-12025-82	M12-1.75 x 25*	M934-22-60	M22-2.50	Standard	
M931-10045-60	M10-1.50 x 45	M961-12030-60	M12-1.25 x 30	M934-24-80	M24-3.00	Standard	
M931-10050-60	M10-1.50 x 50	M933-12030-60	M12-1.75 x 30	M982-24-80	M24-3.00	Elastic Stop	
M931-10055-60	M10-1.50 x 55	M933-12035-60	M12-1.75 x 35	M934-30-80	M30-3.50	Standard	
M931-10060-60	M10-1.50 x 60	M961-12040-82	M12-1.25 x 40*				
M931-10065-60	M10-1.50 x 65	M933-12040-60	M12-1.75 x 40	Washers			
M931-10070-60	M10-1.50 x 70	M933-12040-82	M12-1.75 x 40*	Part No.	ID	OD	Bolt/ Thick. Screw
M931-10080-60	M10-1.50 x 80	M961-14025-60	M14-1.50 x 25	M125A-03-80	3.2	7.0	0.5 M3
M931-10090-60	M10-1.50 x 90	M933-14025-60	M14-2.00 x 25	M125A-04-80	4.3	9.0	0.8 M4
M931-10090-82	M10-1.50 x 90*	M961-16025-60	M16-1.50 x 25	M125A-05-80	5.3	10.0	1.0 M5
M931-10100-60	M10-1.50 x 100	M933-16025-60	M16-2.00 x 25	M125A-06-80	6.4	12.0	1.6 M6
M931-10110-60	M10-1.50 x 110	M961-16030-82	M16-1.50 x 30*	M125A-08-80	8.4	16.0	1.6 M8
M931-10120-60	M10-1.50 x 120	M933-16030-82	M16-2.00 x 30*	M125A-10-80	10.5	20.0	2.0 M10
M931-10130-60	M10-1.50 x 130	M933-16035-60	M16-2.00 x 35	M125A-12-80	13.0	24.0	2.5 M12
M931-10140-60	M10-1.50 x 140	M961-16040-60	M16-1.50 x 40	M125A-14-80	15.0	28.0	2.5 M14
M931-10180-60	M10-1.50 x 180	M933-16040-60	M16-2.00 x 40	M125A-16-80	17.0	30.0	3.0 M16
M931-12045-60	M12-1.75 x 45	M933-16050-60	M16-2.00 x 50	M125A-18-80	19.0	34.0	3.0 M18
M960-12050-60	M12-1.25 x 50	M933-16050-82	M16-2.00 x 50*	M125A-20-80	21.0	37.0	3.0 M20
M960-12050-82	M12-1.25 x 50*	M933-16060-60	M16-2.00 x 60	M125A-24-80	25.0	44.0	4.0 M24
M931-12050-60	M12-1.75 x 50	M933-18035-60	M18-2.50 x 35				
M931-12055-60	M12-1.75 x 55	M933-18050-60	M18-2.50 x 50				
M931-12060-60	M12-1.75 x 60	M933-18060-60	M18-2.50 x 60				
M931-12065-60	M12-1.75 x 65	M933-20050-60	M20-2.50 x 50				
M931-12075-60	M12-1.75 x 75	M933-20055-60	M20-2.50 x 55				
M931-12080-60	M12-1.75 x 80	Pan Head Machine Screws					
M931-12090-60	M12-1.75 x 90	M7985A-03010-20	M3-0.50 x 10				
M931-12100-60	M12-1.75 x 100	M7985A-03012-20	M3-0.50 x 12				
M931-12110-60	M12-1.75 x 110	M7985A-04010-20	M4-0.70 x 10				
M960-16090-60	M16-1.50 x 90	M7985A-04020-20	M4-0.70 x 20				
M931-16090-60	M16-2.00 x 90	M7985A-04100-20	M4-0.70 x 100				
M931-16100-60	M16-2.00 x 100	M7985A-05010-20	M5-0.80 x 10				
M931-20065-60	M20-2.50 x 65	M7985A-05012-20	M5-0.80 x 12				
M931-20120-60	M20-2.50 x 120	M7985A-05016-20	M5-0.80 x 16				
M931-20160-60	M20-2.50 x 160	M7985A-05100-20	M5-0.80 x 100				
M931-22090-60	M22-2.50 x 90	M7985A-06100-20	M6-1.00 x 100				
M931-22120-60	M22-2.50 x 120						
M931-22160-60	M22-2.50 x 160	Flat Head Machine Screws					
M931-24090-60	M24-3.00 x 90	M965A-04012-SS	M4-0.70 x 12				
M931-24120-60	M24-3.00 x 120	M965A-05012-SS	M5-0.80 x 12				
M931-24160-60	M24-3.00 x 160	M965A-05016-20	M5-0.80 x 16				

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

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

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