

Service Parts

Marine Generator Sets



Models:

27EFOZ/32EOZ

23EFOZ/28EOZ

KOHLER[®]
POWER SYSTEMS

ISO 9001
KOHLER
POWER SYSTEMS
NATIONALLY REGISTERED

TP-5998 9/02f

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Introduction

This manual lists service replacement parts for 23–32 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.

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 instructions.

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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>Cylinder Block</i>	<i>Gear Housing</i>	<i>Flywheel Housing & Oil Pan</i>	<i>Cylinder Head & Cover</i>	<i>Intake Manifold</i>	<i>Camshaft & Drive Gear</i>	<i>Crankshaft & Piston</i>	<i>Oil System</i>	<i>Cooling Water System</i>	<i>Fuel Injection Pump</i>	<i>Governor</i>	<i>Fuel Injection Valve</i>	<i>Fuel Line</i>
Group No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Spec. No.	VARIATION NUMBER												
23EFOZ/ 28EOZ													
126212	1	1	1	1	1	1	1	1	1	1	1	1	1
126213	1	1	1	1	1	1	1	1	2	1	1	1	1
126214	1	1	1	1	1	1	1	1	1	1	1	1	1
126215	1	1	1	1	1	1	1	1	2	1	1	1	1
GM24459-GA1	1	1	1	1	1	1	1	1	1	1	1	1	1
GM24459-GA2	1	1	1	1	1	1	1	1	2	1	1	1	1
GM24459-GA3	1	1	1	1	1	1	1	1	1	1	1	1	1
GM24459-GA4	1	1	1	1	1	1	1	1	2	1	1	1	1
27EFOZ/ 32EOZ													
126177	1	1	1	1	1	1	1	1	1	1	1	1	1
126178	1	1	1	1	1	1	1	1	1	1	1	1	1
126185	1	1	1	1	1	1	1	1	2	1	1	1	1
126186	1	1	1	1	1	1	1	1	2	1	1	1	1
GM24459-GA5	1	1	1	1	1	1	1	1	1	1	1	1	1
GM24459-GA6	1	1	1	1	1	1	1	1	2	1	1	1	1
GM24459-GA7	1	1	1	1	1	1	1	1	1	1	1	1	1
GM24459-GA8	1	1	1	1	1	1	1	1	2	1	1	1	1

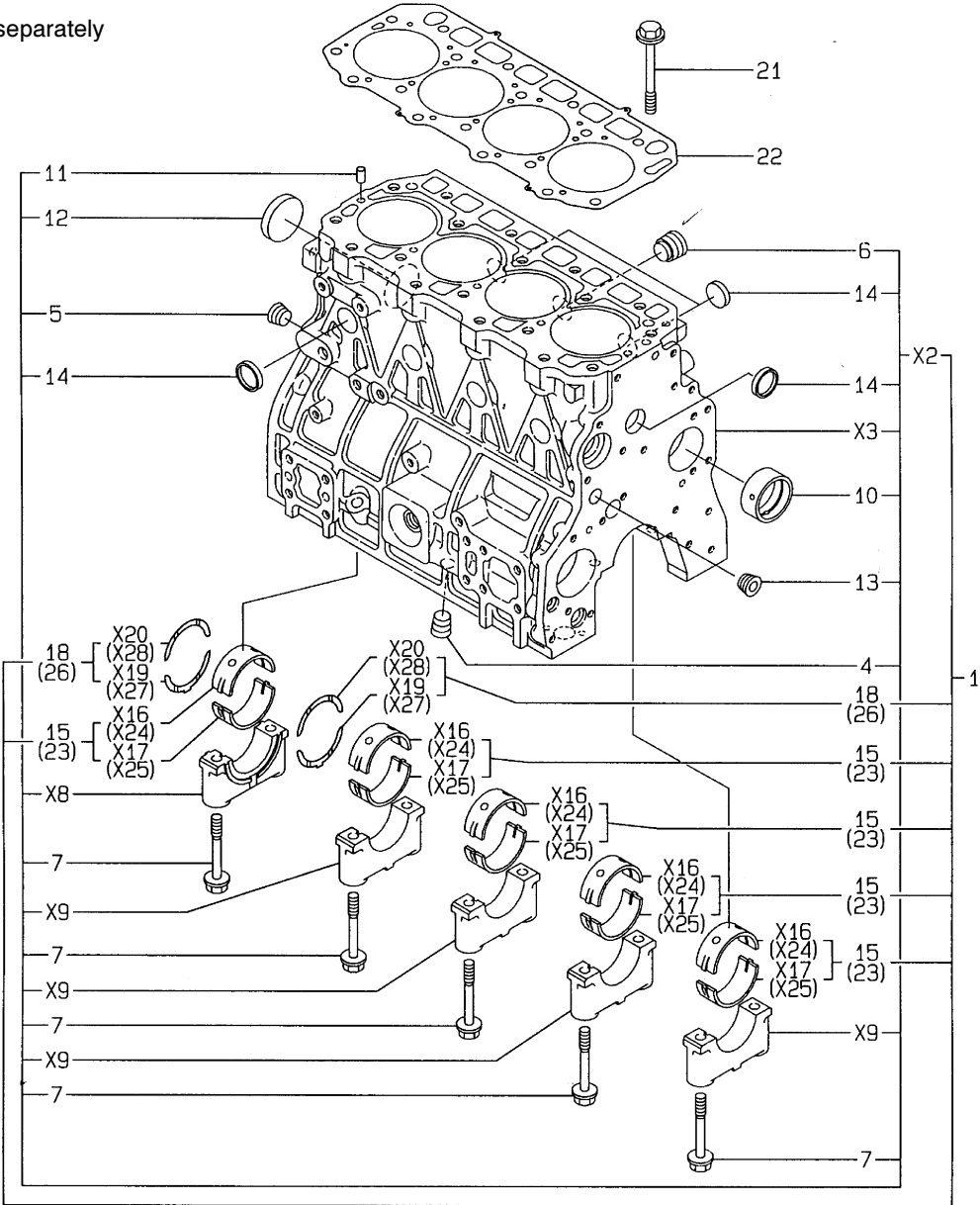
Specification Number Index

Group Title	<i>Engine Stop Device</i>	<i>Starting Motor</i>	<i>Gasket Set</i>	<i>Air Intake</i>	<i>Fuel System</i>	<i>Cooling System</i>	<i>Engine</i>	<i>Nameplates and Decals</i>	<i>Skid and Plant Mounting</i>	<i>Generator and Mounting</i>	<i>Controller and Mounting</i>	<i>Literature</i>	
Group No.	14	15	16	101	103	104	105	107	109	201	301	701	
Spec No.	VARIATION NUMBER												
23EFOZ/ 28EOZ													
PA-126212	1	1	1	5	11	19	36	15	13	33	45	39	
PA-126213	2	2	1	5	12	25	37	15	13	33	47	39	
PA-126214	1	1	1	5	11	19	36	16	13	34	46	40	
PA-126215	2	2	1	5	12	25	37	15	13	34	47	40	
GM24459-GA1	1	1	1	GR1	GR2	GR4	GR5	GR7	GR9	GR10	GR12	39	
GM24459-GA2	2	2	1	GR1	GR3	GR4	GR6	GR7	GR9	GR10	GR13	39	
GM24459-GA3	1	1	1	GR1	GR2	GR4	GR5	GR8	GR9	GR11	GR12	40	
GM24459-GA4	2	2	1	GR1	GR3	GR4	GR6	GR8	GR9	GR10	GR13	40	
27EFOZ/ 32EOZ													
PA-126177	1	1	1	5	11	19	36	15	13	33	45	16	
PA-126178	1	1	1	5	11	19	36	16	13	34	46	17	
PA-126185	2	2	1	5	12	25	37	15	13	33	47	16	
PA-126186	2	2	1	5	12	25	37	15	13	34	47	17	
GM24459-GA5	1	1	1	GR1	GR2	GR4	GR5	GR7	GR9	GR10	GR12	39	
GM24459-GA6	1	1	1	GR1	GR3	GR4	GR6	GR7	GR9	GR10	GR13	39	
GM24459-GA7	2	2	1	GR1	GR2	GR4	GR5	GR8	GR9	GR11	GR12	40	
GM24459-GA8	2	2	1	GR1	GR3	GR4	GR6	GR8	GR9	GR11	GR13	40	

Notes

Group 1: Cylinder Block

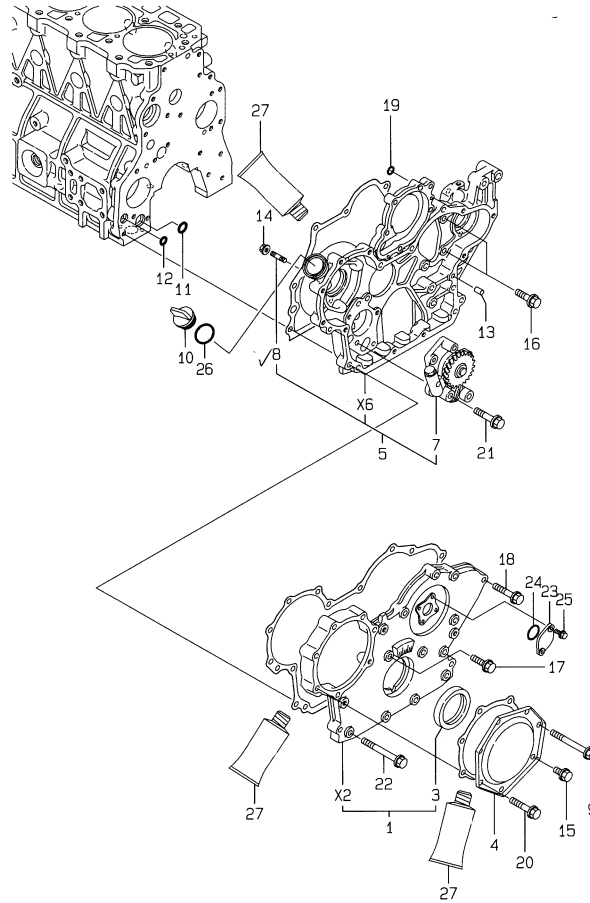
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Item	Part No.	Description	Qty.
			Var.
1	363233	Block assembly, cylinder	1
4	250975	Plug, PT3/8, screw	1
5	250975	Plug, PT3/8, screw	1
6	252566	Plug	1
7	363104	Bolt, metal cap	10
10	363106	Bush, camshaft	1
11	250963	Spring pin, 6 x 12	2
12	363215	Plug, 55	1
13	250975	Plug, PT3/8, screw	1
14	225924	Plug, 30	8
15	363107	Bearing assembly, main	5
18	363108	Bearing assembly, thrust	5
21	363098	Bolt, head	18
22	363171	Gasket, cylinder head	1
23	363105	Bearing, main, 0.25 US	5
26	363109	Bearing, thrust, 0.25 OS	2

Group 2: Gear Housing



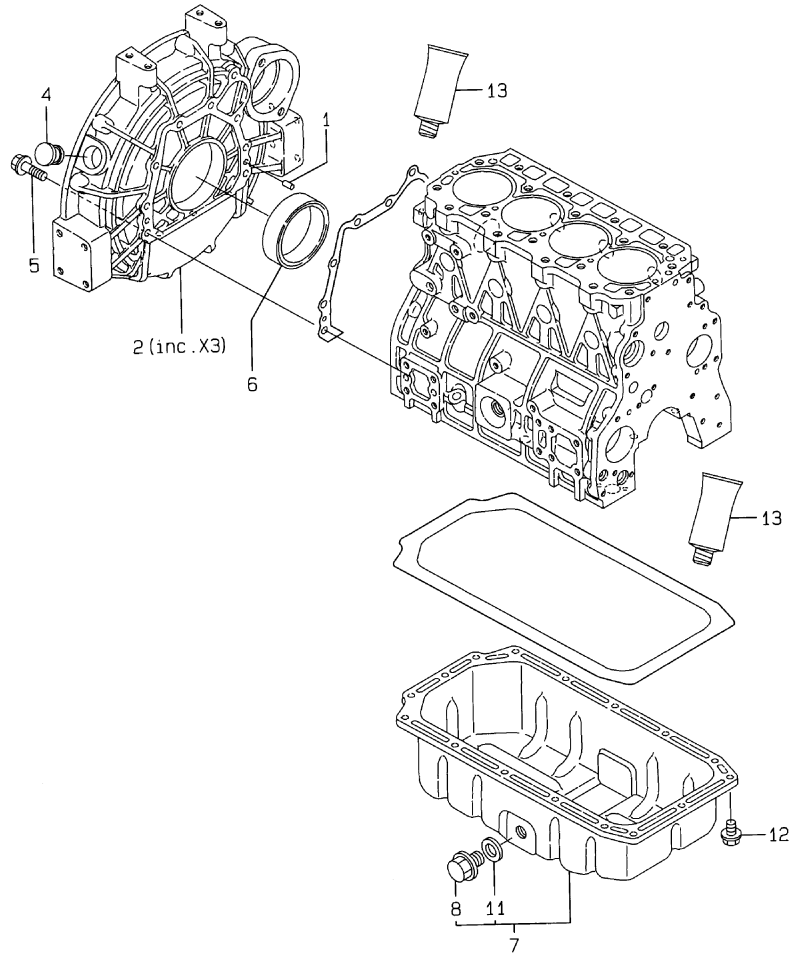
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Item	Part No.	Description	Qty.
			Var.
1	363231	Cover, gear housing	1
3	363100	Seal, oil	1
4	363099	Cover, fuel injection pump	1
5	363101	Housing, gear	1
7	363142	Pump assembly, lube oil	1
8	#	Stud bolt, M10 x 30	4
9	#	Bolt, M8 x 70	1
10	250837	Cap, lube oil supply	1
11	363143	O-ring, P20	1
12	363145	O-ring, P14	1
13	250960	Parallel pin, 8 x 16	4
14	229772	Nut, M10	4
15	252696	Bolt, M8 x 16	1
16	252697	Bolt, M8 x 20	3
17	225819	Bolt, M8 x 30	1
18	252702	Bolt, M8 x 40	5
19	250800	O-ring, 7.0	1
20	252702	Bolt, M8 x 40	5
21	252703	Bolt, M8 x 45	3
22	#	Bolt, M8 x 70	6
23	252750	Cover, blind	1
24	256796	O-ring, 24.0	1
25	252693	Bolt, M6 x 16	2
26	250802	O-ring, 35.0	1
27	252998	Gasket, liquid	1

Common hardware; procure locally.

Group 3: Flywheel Housing and Oil Pan



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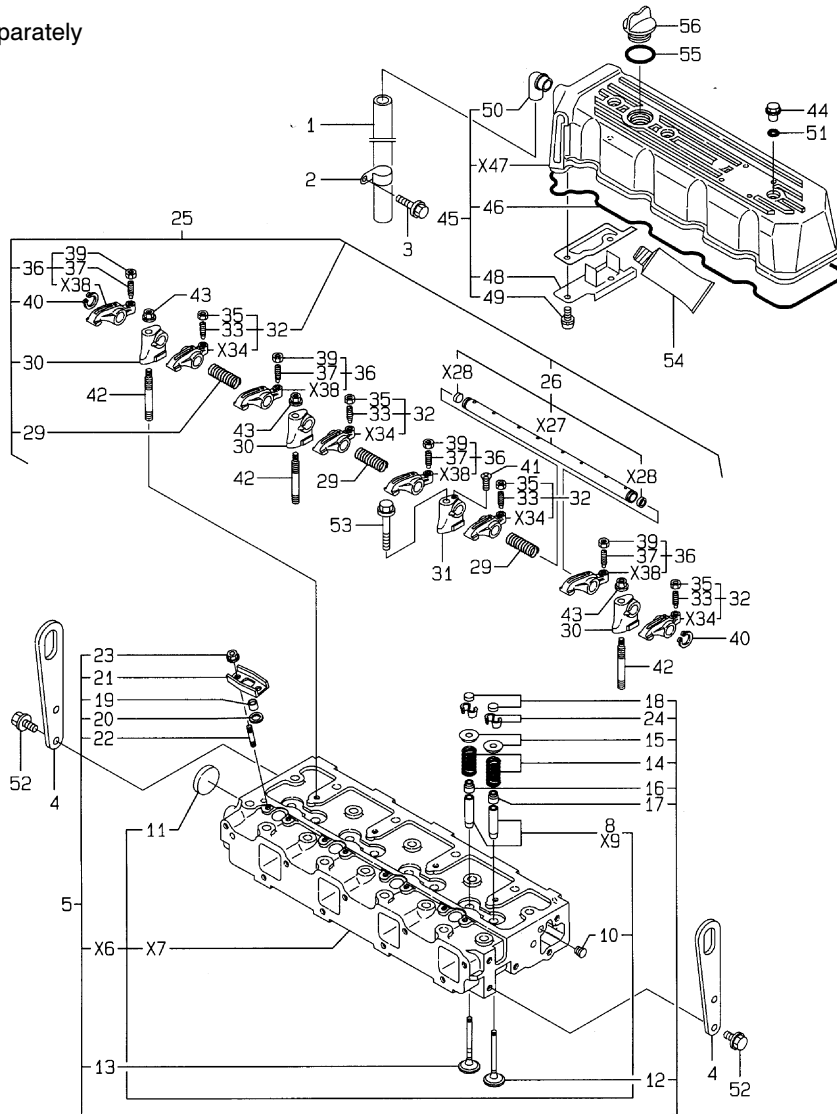
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Item	Part No.	Description	Qty.
			Var.
1	256750	Parallel pin, 8 x 16	2
2	363187	Housing, flywheel	1
4	363011	Plug, rubber, 25	1
5	#	Bolt, M10 x 35	9
6	363094	Seal	1
7	363172	Sump assembly, oil	1
8	225386	Plug, drain, M22	1
11	X-25-145	Washer, seal, 22s	1
12	252695	Bolt, M8 x 12	21
13	252998	Gasket, liquid	1

Common hardware; procure locally.

Group 4: Cylinder Head and Valve Cover

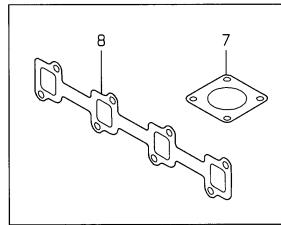
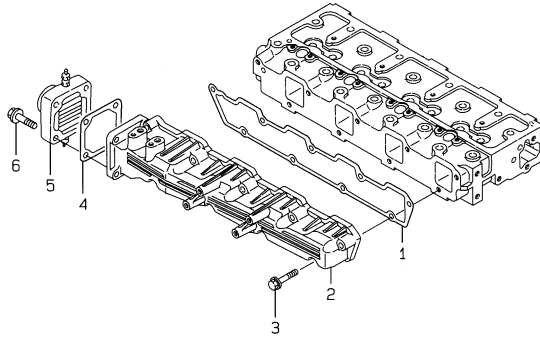
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Item	Part No.	Description	Qty.		Item	Part No.	Description	Qty.	
			1	Var.				1	Var.
1	363202	Pipe	1		30	363119	Support	3	
2	252808	Retainer	1		31	363120	Support	1	
3	252695	Bolt, M8 x 12	1		32	363123	Arm kit, intake rocker	4	
4	363110	Lifter, engine	2		33	229844	Screw, valve	4	
5	363232	Head assembly, cylinder	1		35	252817	Nut, M8	4	
8	256768	Guide, valve	8		36	363124	Arm kit, exhaust rocker	4	
10	363204	Plug, PT, 1/16	1		37	229844	Screw, valve	4	
11	252732	Plug, 40	1		39	252817	Nut, M8 x P1.0	4	
12	363111	Valve, intake	4		40	363198	Circlip, 18	2	
13	363112	Valve, exhaust	4		41	363212	Screw, M4 x 12	1	
14	363113	Spring, valve	8		42	363121	Bolt, stud	3	
15	252935	Retainer, spring	8		43	229772	Nut, M10	3	
16	252754	Seal, valve stem	4		44	252470	Knob	3	
17	256578	Seal, valve stem	4		45	363118	Bonnet assembly	1	
18	256717	Cap, valve	8		46	363117	Gasket, bonnet	1	
19	252743	Protector, nozzle	4		48	363122	Plate	1	
20	252744	Seat, nozzle	4		49	363201	Screw, tapping, 5 x 10	2	
21	252745	Retainer	4		50	363013	Joint, breather	1	
22	252717	Stud, M6 x 20	8		51	250801	O-ring, 12.0	3	
23	250989	Nut, M6	8		52	252696	Bolt, M8 x 16	4	
24	363216	Cotter 8	16		53	363211	Bolt, M10 x 65	1	
25	363114	Support assembly, rocker arm	1		54	252998	Gasket, liquid	1	
26	363115	Shaft assembly, rocker arm	1		55	252684	O-ring, 32.0	1	
29	363116	Spring	3		56	250837	Cap, lube oil supply	1	

Group 5: Intake Manifold

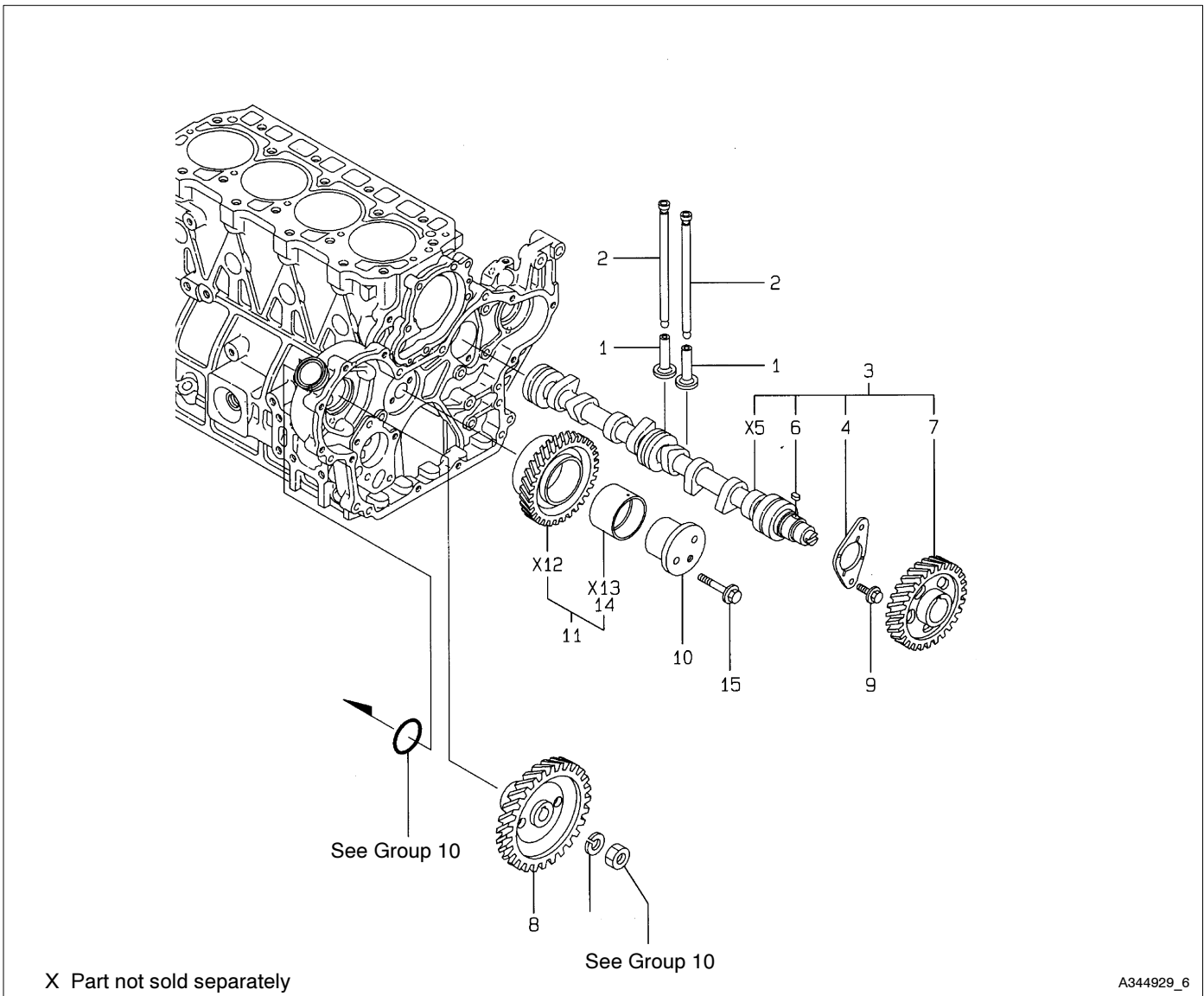


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Item	Part No.	Description	Qty.
			Var.
1	363126	Gasket, intake manifold	1
2	363125	Manifold, intake	1
3	252701	Bolt, M8 x 35	9
4	363089	Gasket	1
5	363186	Heater, air	1
6	252701	Bolt, M8 x 35	4
7	225934	Gasket	1
8	363127	Gasket	1

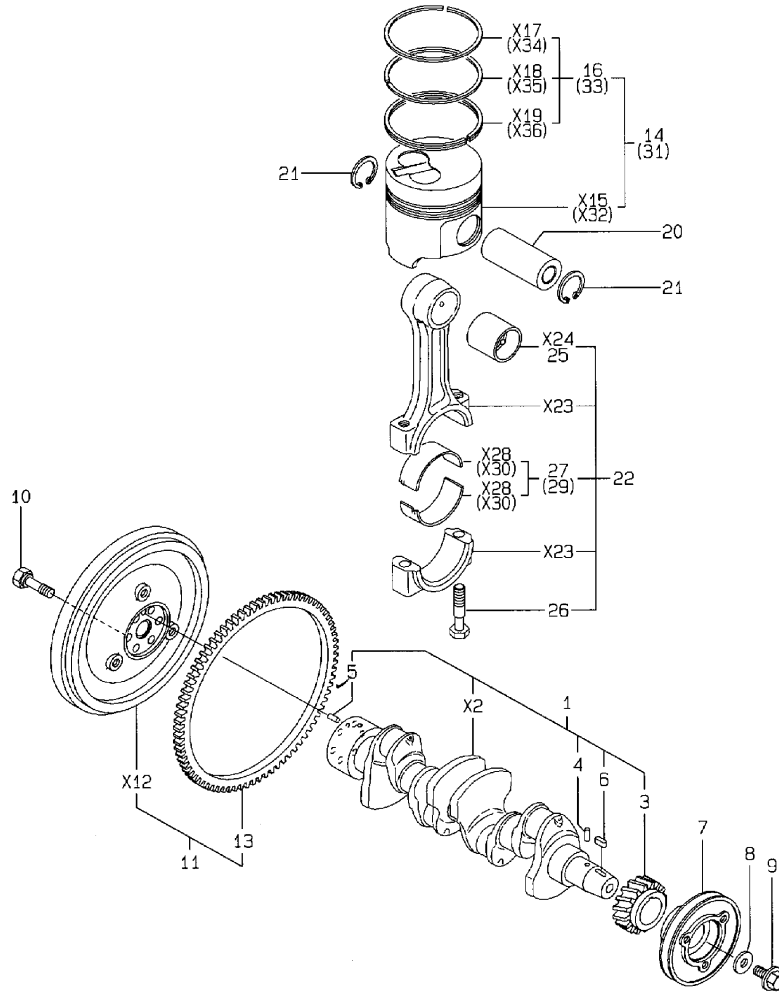
Group 6: Camshaft and Piston



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Item	Part No.	Description	Qty.
			Var.
1	252819	Tappet	8
2	363129	Rod, push	8
3	363130	Camshaft assembly	1
4	252804	Thrust, metal	1
6	252669	Key, 7 x 14	1
7	363128	Gear, camshaft	1
8	363141	Gear, fuel injection pump	1
9	252696	Bolt, M8 x 16	2
10	363139	Shaft, idler	1
11	363140	Gear assembly, idle	1
14	252825	Bush, idle gear	1
15	256798	Bolt, M8 x 55	2

Group 7: Crankshaft and Piston

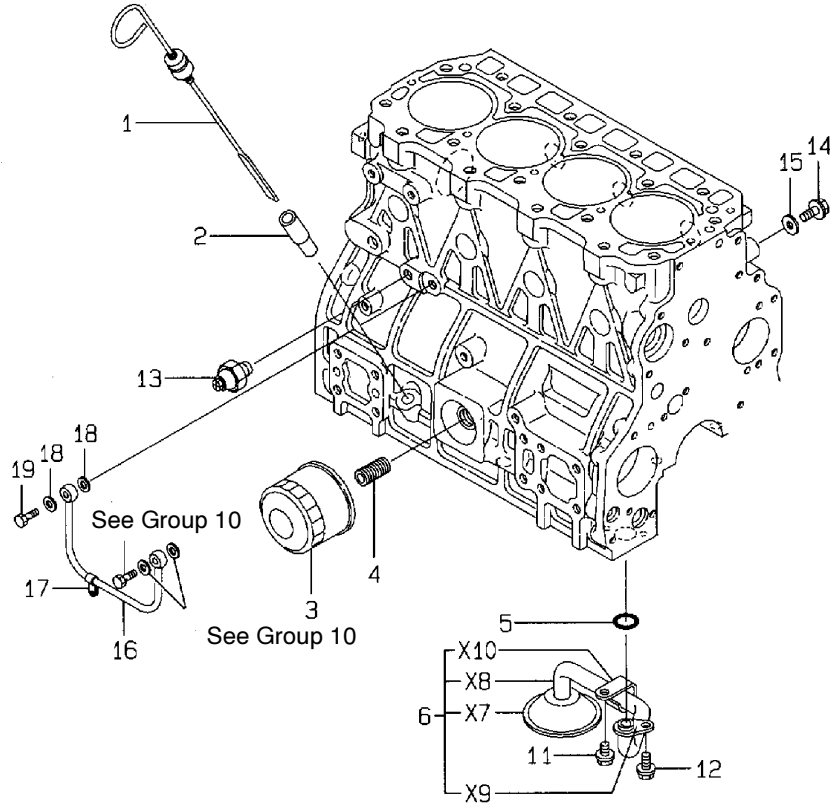


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Item	Part No.	Description	Qty.
			Var. 1
1	363173	Crankshaft, complete	1
3	363131	Gear, crankshaft	1
4	363085	Pin, parallel	1
5	363086	Pin, parallel, 10 x 22	1
6	252669	Key, 7 x 14	1
7	363133	V-pulley	1
8	363132	Washer	1
9	252763	Bolt, V-pulley	1
10	363084	Bolt, flywheel	6
11	363174	Flywheel assembly	1
13	363095	Gear, ring	1
14	363176	Piston with ring	1
15	X 363175	Piston	4
16	363182	Ring set	4
20	363082	Pin, piston	1
21	252347	Circlip, 30	8
22	363134	Rod assembly, connecting	4
25	363138	Bush, piston pin	4
26	363135	Bolt, rod	8
27	363136	Metal assembly, crankpin	4
29	363137	Bearing, pin, 0.25 US	4
31	363177	Piston with ring, 0.25 OS	4
33	363183	Ring set, 0.25 OS	4

Group 8: Oil System

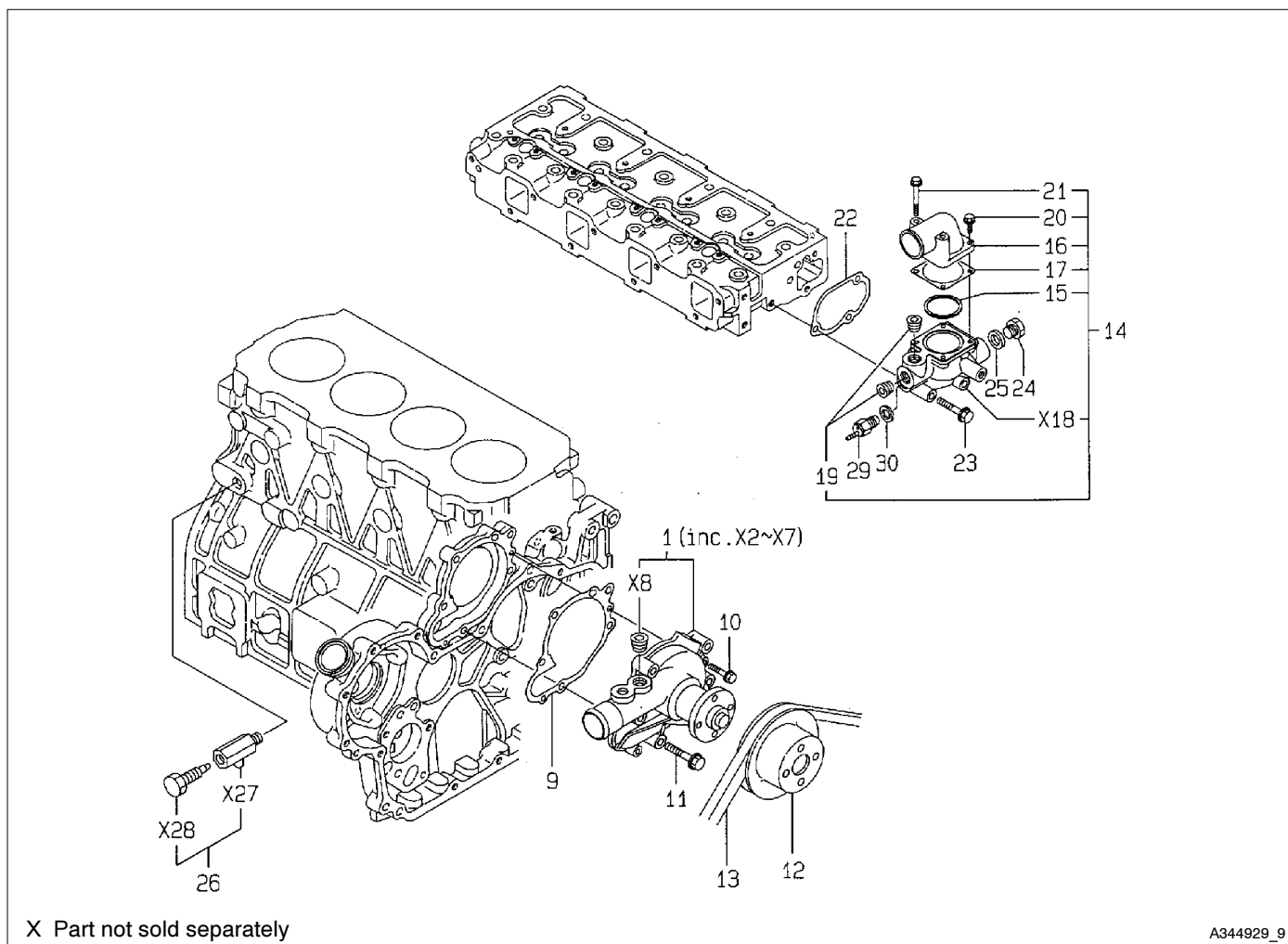


X Part not sold separately

A344929_8

Item	Part No.	Description	Qty.
			Var.
1	363146	Dipstick	1
2	252759	Guide, dipstick	1
3	252834	Filter	1
4	363012	Stud, lube oil filter	1
5	363143	O-ring	1
6	363147	Pipe assembly, oil	1
11	252695	Bolt, M8 x 12	1
12	252696	Bolt, M8 x 16	1
13	363083	Sender, oil pressure	1
14	252695	Bolt, M8 x 12	1
15	252734	Washer, seal, 8s	1
16	363148	Pipe, lube oil	1
17	363203	Retainer, 6 x 8	1
18	250967	Gasket 8, round	2
19	252677	Joint bolt, 3	1

Group 9: Cooling Water System

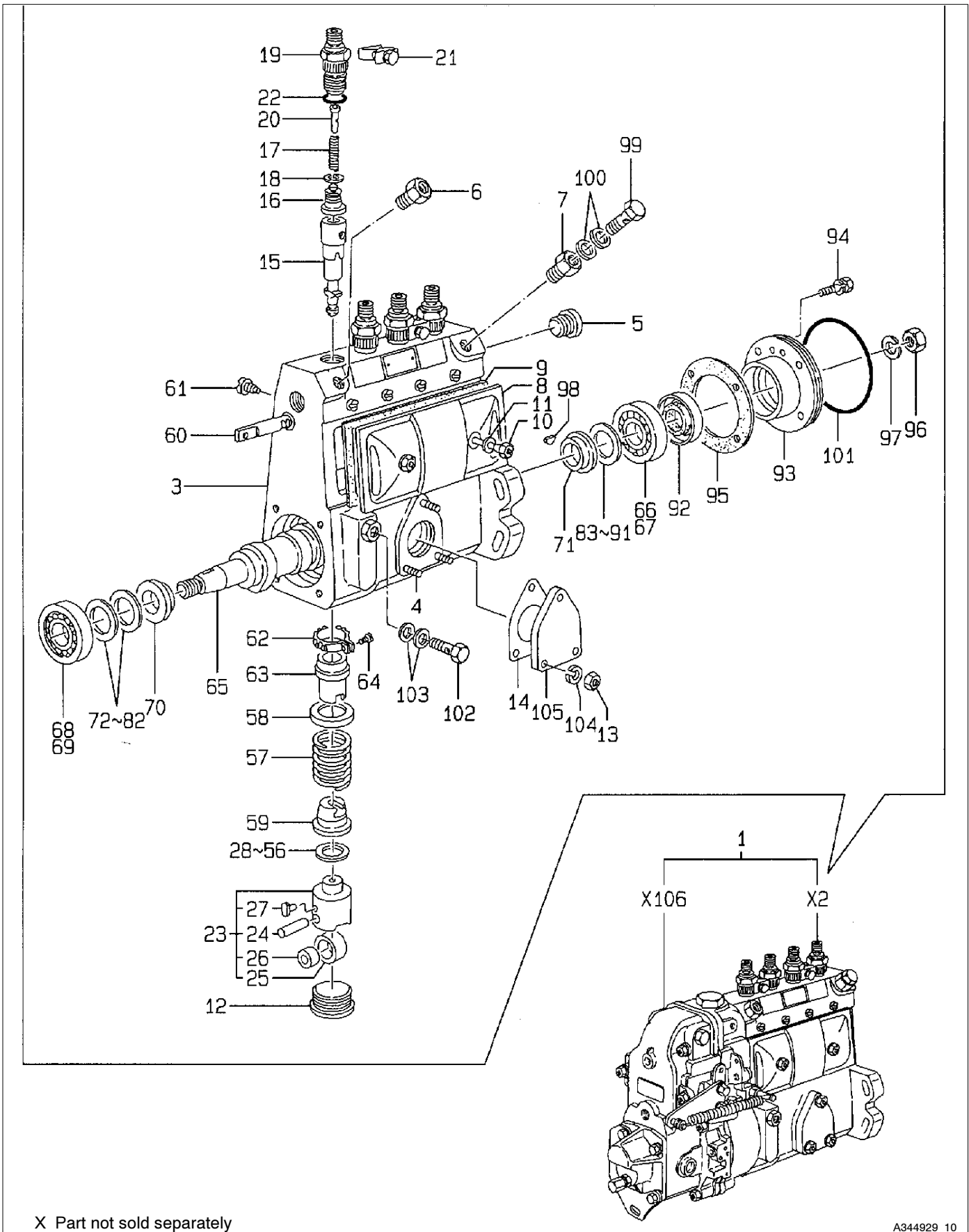


A344929_9

Item	Part No.	Description	Quantity	
			Variation Number 1	Variation Number 2
1	363149	Pump, cooling water	1	1
9	363150	Gasket, cooling water pump	1	1
10	229763	Bolt, M6 x 30	2	2
11	256798	Bolt, M8 x 55	5	5
12	363151	Pulley	1	1
13	363205	V-belt	1	
13	258955	V-belt, 24 V		1
14	363189	Case, thermostat	1	1
15	363088	Gasket, thermostat	1	1
16	GM23575	Cover, thermostat	1	1
17	363087	Gasket, thermostat	1	1
19	250975	Plug, screw, PT3/8	2	2
20	225817	Bolt, M6 x 20	2	2
21	363206	Bolt, M6 x 55	2	2
22	363153	Gasket, case	1	1
23	#	Bolt, M8 x 70	3	3
24	252757	Plug, M16	1	1
25	252773	Gasket, 16	1	1
26	225704	Drain cock assembly, 1/4	1	1
29	252752	Switch, thermostat, 110°	1	1
30	252773	Gasket, 16	1	1

Common hardware; procure locally.

Group 10: Fuel Injection Pump



X Part not sold separately

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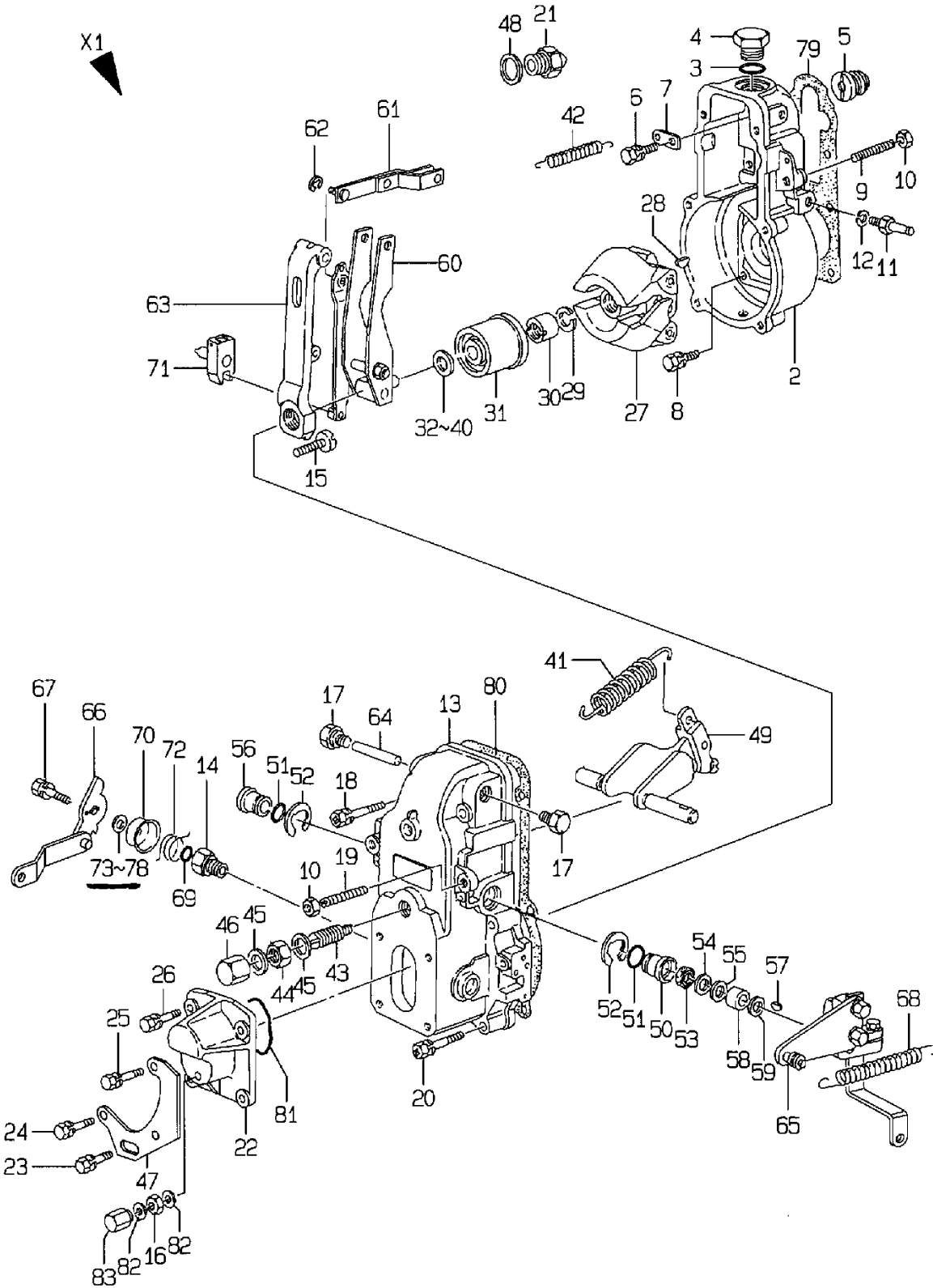
Group 10: Fuel Injection Pump

Item	Part No.	Description	Qty.
			Var. 1
1	363190	Pump, fuel injection	1
3	363340	Housing, flanged	1
4	363260	Stud	3
5	363366	Plug	1
6	363333	Cap	1
7	363333	Cap	1
8	363336	Cover	1
9	363334	Gasket	1
10	363335	Screw	2
11	363322	Gasket	2
12	363337	Plug	4
13	363236	Nut	3
14	363339	Gasket	1
15	363346	Plunger	4
16	363347	Valve, delivery	4
17	363341	Spring	4
18	363342	Gasket	4
19	363343	Holder	4
20	363344	Stopper	4
21	363345	Plate	2
22	363327	O-ring	4
23	363348	Tappet	4
24	363349	Pin	4
25	363350	Roller	4
26	363351	Bush	4
27	363352	Guide	4
28	363263	Shim	1
29	363264	Shim	1
30	363265	Shim	1
31	363266	Shim	1
32	363267	Shim	1
33	363268	Shim	1
34	363269	Shim	1
35	363270	Shim	1
36	363271	Shim	1
37	363272	Shim	1
38	363273	Shim	1
39	363274	Shim	1
40	363278	Shim	1
41	363279	Shim	1
42	363280	Shim	1
43	363281	Shim	1
44	363282	Shim	1
45	363283	Shim	1
46	363284	Shim	1
47	363285	Shim	1
48	363286	Shim	1
49	363287	Shim	1
50	363294	Shim	1
51	363295	Shim	1
52	363296	Shim	1
53	363297	Shim	1
54	363298	Shim	1
55	363299	Shim	1

Item	Part No.	Description	Qty.
			Var. 1
56	363300	Shim	1
57	363353	Spring	4
58	363354	Seat, spring	4
59	363355	Seat, spring	4
60	363360	Rack, control	1
61	363356	Screw	1
62	363357	Pinion	4
63	363358	Sleeve, control	4
64	363359	Screw	4
65	363365	Camshaft	1
66	363243	Bearing	1
67	363257	Bearing	1
68	363242	Bearing	1
69	363256	Bearing	1
70	363361	Ring	1
71	363362	Ring	1
72	363302	Shim	1
73	363303	Shim	1
74	363304	Shim	1
75	363305	Shim	1
76	363306	Shim	1
77	363307	Shim	1
78	363308	Shim	1
79	363309	Shim	1
80	363310	Shim	1
81	363311	Shim	1
82	363374	Shim	1
83	363312	Shim	1
84	363313	Shim	1
85	363314	Shim	1
86	363315	Shim	1
87	363316	Shim	1
88	363317	Shim	1
89	363318	Shim	1
90	363319	Shim	1
91	363375	Shim	1
92	363324	Seal, oil	1
93	363364	Cover	1
94	363245	Bolt	4
95	363363	Gasket	1
96	363237	Nut	1
97	363321	Washer, spring	1
98	363323	Key, Woodruff	1
99	363332	Eyebolt	1
100	363254	Gasket	2
101	363330	O-ring	1
102	363331	Eyebolt	1
103	363252	Gasket	2
104	363238	Washer, spring	3
105	363338	Cover	1
106	363191	Governor assembly	1

Group 11: Governor

X1

X Part not sold separately

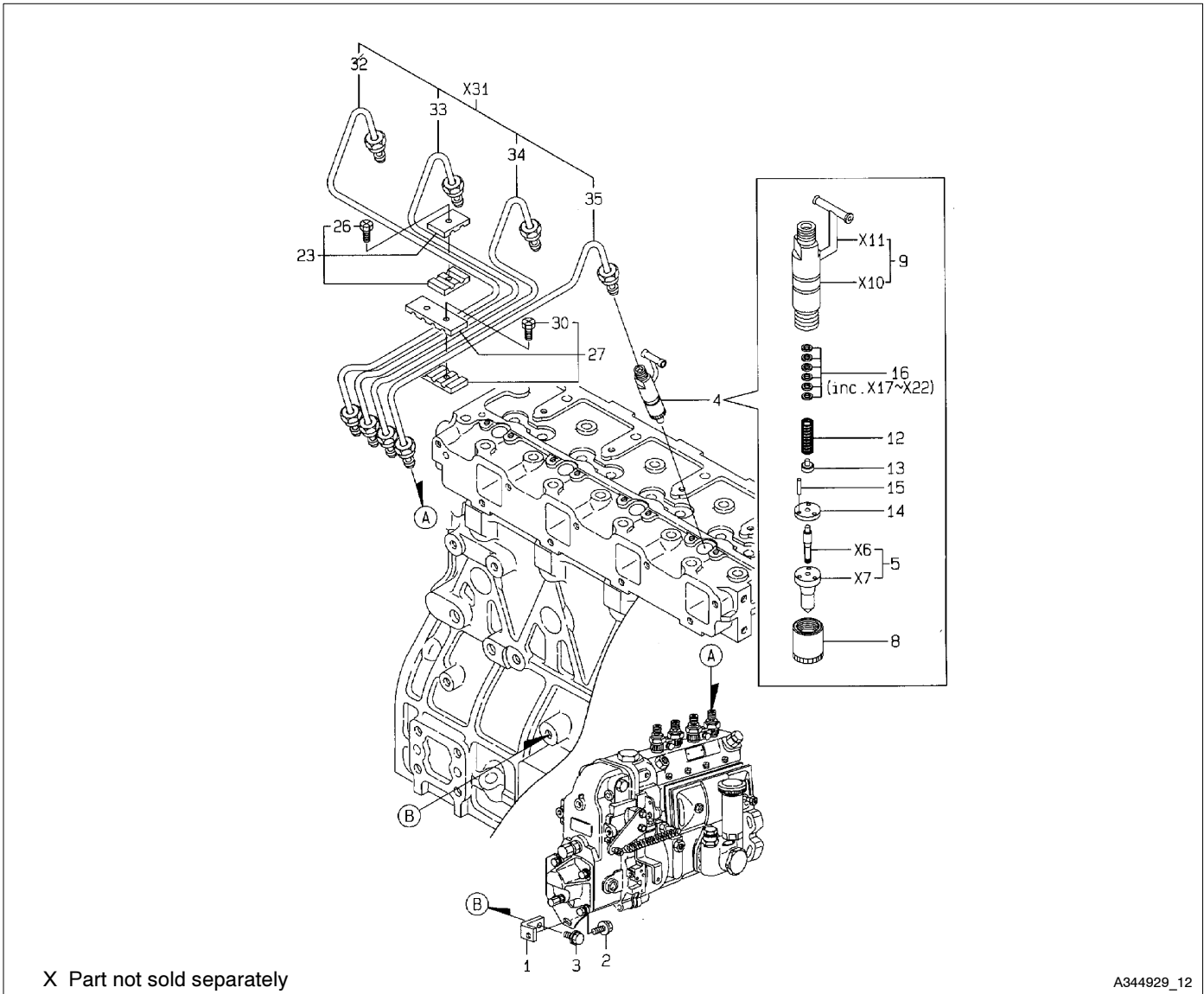
A344929_11

Group 11: Governor

Item	Part No.	Description	Qty.
			Var. 1
1	363191	Governor assembly	1
2	363378	Housing, flanged	1
3	363328	O-ring	1
4	363380	Plug	1
5	363379	Adapter	1
6	363246	Bolt	1
7	363410	Plate	1
8	363258	Bolt	6
9	363382	Screw	1
10	363383	Nut	2
11	363385	Bolt	1
12	363239	Washer, spring	1
13	363416	Cover	1
14	363406	Bush	1
15	363386	Screw	1
16	363367	Nut	1
17	363388	Plug	2
18	363248	Bolt	2
19	363381	Screw	1
20	363247	Bolt	4
21	363377	Limitter	1
22	363389	Cover	1
23	363259	Bolt	1
24	363259	Bolt	1
25	363245	Bolt	1
26	363244	Bolt	1
27	363390	Flyweight assembly	1
28	363250	Key, Woodruff	1
29	363320	Washer, spring	1
30	363261	Nut	1
31	363391	Sleeve	1
32	363262	Shim	1
33	363275	Shim	1
34	363276	Shim	1
35	363277	Shim	1
36	363368	Shim	1
37	363369	Shim	1
38	363370	Shim	1
39	363371	Shim	1
40	363372	Shim	1
41	363392	Spring	1
42	363393	Spring	1

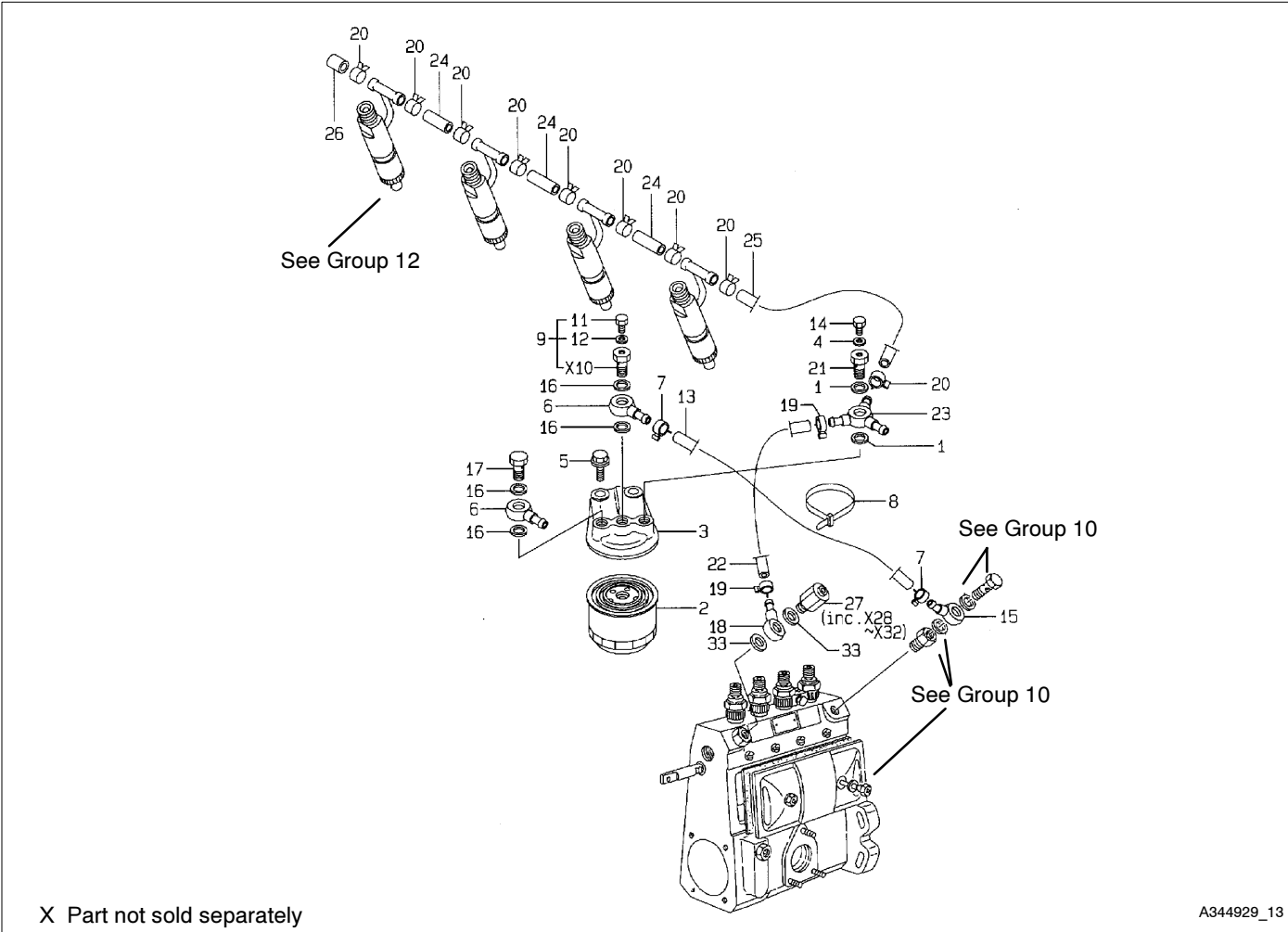
Item	Part No.	Description	Qty.
			Var. 1
43	363394	Capsule, spring	1
44	363384	Nut	1
45	363253	Gasket	2
46	363395	Nut, cap	1
47	363413	Bracket	1
48	363255	Gasket	1
49	363396	Lever	1
50	363397	Bush	1
51	363326	O-ring	2
52	363241	Ring, snap	2
53	363376	Seal, oil	1
54	363373	Shim	1
55	363301	Shim	1
56	363398	Bush	1
57	363249	Key, Woodruff	1
58	363400	Collar	1
59	363399	Washer	1
60	363401	Lever assembly, guide	1
61	363402	Link	1
62	363240	Ring, snap	1
63	363403	Lever, tension	1
64	363404	Pin	1
65	363415	Lever	1
66	363414	Lever	1
67	363244	Bolt	1
68	363405	Spring	1
69	363325	O-ring	1
70	363407	Cap	1
71	363408	Lever assembly	1
72	363409	Spring	1
73	363288	Shim	1
74	363289	Shim	1
75	363290	Shim	1
76	363291	Shim	1
77	363292	Shim	1
78	363293	Shim	1
79	363411	Gasket	1
80	363412	Gasket	1
81	363329	O-ring	1
82	363251	Gasket	2
83	363387	Nut, cap	1

Group 12: Fuel Injection Valve



Item	Part No.	Description	Qty.
			Var.
1	363102	Bracket	1
2	363103	Bolt, M10 x 14	1
3	252697	Bolt, M8 x 20	1
4	363235	Valve assembly, fuel injection	4
5	363193	Nozzle	4
8	256520	Nut, nozzle case	4
9	252790	Holder assembly, nozzle	4
12	256521	Nozzle, spring	4
13	256522	Seat, nozzle spring	4
14	256523	Plate, stop	4
15	256707	Pin	8
16	256524	Pack, shim	4
23	225374	Retainer	2
26	225418	Bolt, hex socket, M4 x 14	2
27	256708	Retainer	1
30	225418	Bolt, hex socket, M4 x 14	2
32	363178	Pipe No. 1, fuel injection	1
33	363179	Pipe No. 2, fuel injection	1
34	363180	Pipe No. 3, fuel injection	1
35	363181	Pipe No. 4, fuel injection	1

Group 13: Fuel Line

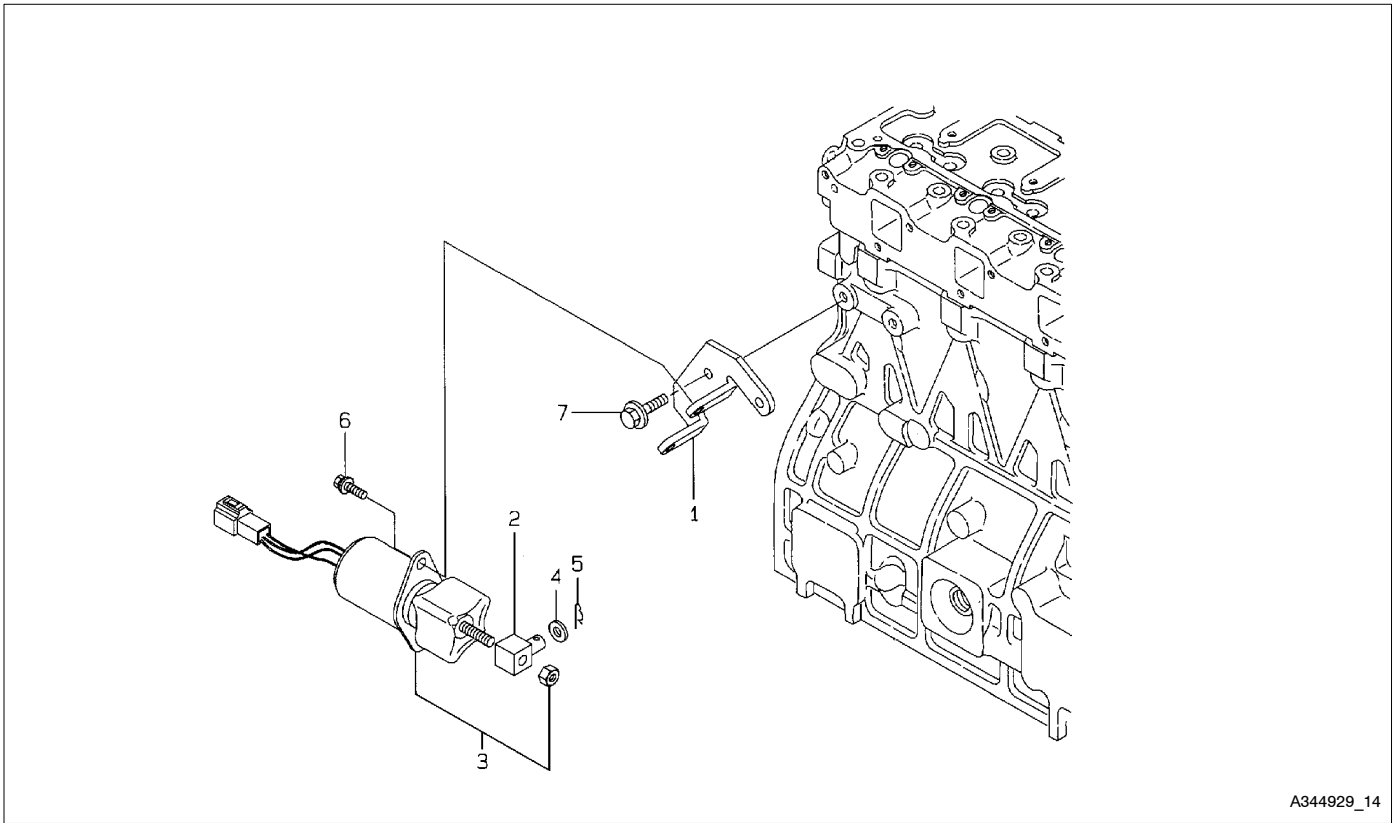


X Part not sold separately

A344929_13

Item	Part No.	Description	Qty.
			Var.
1	363196	Washer, seal, 14s	2
2	363418	Filter, fuel	1
3	225422	Body, fuel filter	1
4	250967	Gasket, round, 8	1
5	363210	Bolt, M10 x 25	2
6	X-6288-1	Union, banjo	2
7	229716	Clamp, 12	2
8	363090	Clamp, pipe	2
9	250996	Bolt with plug and seal	1
11	252081	Plug	1
12	225423	Washer, seal, 6s	1
13	X-386-48	Line, flexible, 1/4 x 23.5	1
14	252694	Bolt, M8 x 10	1
15	X-6288-1	Union, banjo	1
16	225424	Washer, seal, 12	4
17	250972	Bolt, joint, 6	1
18	363091	Joint	1
19	229716	Clamp, 12	2
20	225411	Clamp, 8	9
21	225796	Bolt, pipe joint	1
22	363002	Pipe, fuel oil	1
23	363192	Joint, fuel return pipe	1
24	252753	Pipe, fuel	3
25	363184	Pipe, fuel return	1
26	225419	Cap	1
27	363096	Valve assembly, overflow	1
33	363196	Washer, seal, 14s	2

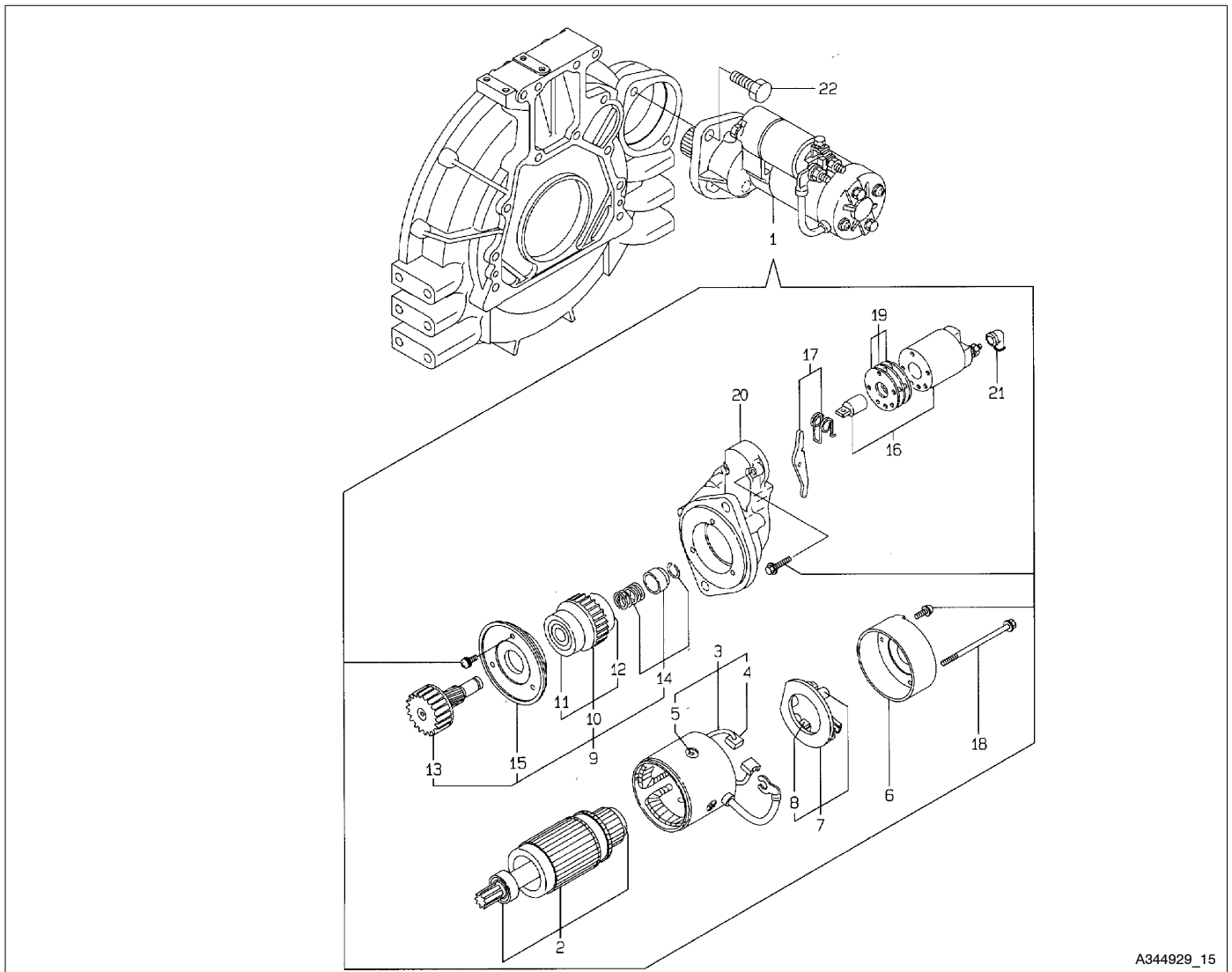
Group 14: Engine Stop Device



A344929_14

Item	Part No.	Description	Quantity	
			Variation Number	
			1	2
1	363185	Bracket, solenoid	1	1
2	363051	Joint	1	1
3	363188	Solenoid, stop	1	
3	359119	Solenoid, stop, 24 V		1
4	363195	Washer, 6	1	1
5	363200	Pin, snap, 6	1	1
6	229498	Bolt, M6 x 10	2	2
7	252696	Bolt, M8 x 16	2	2

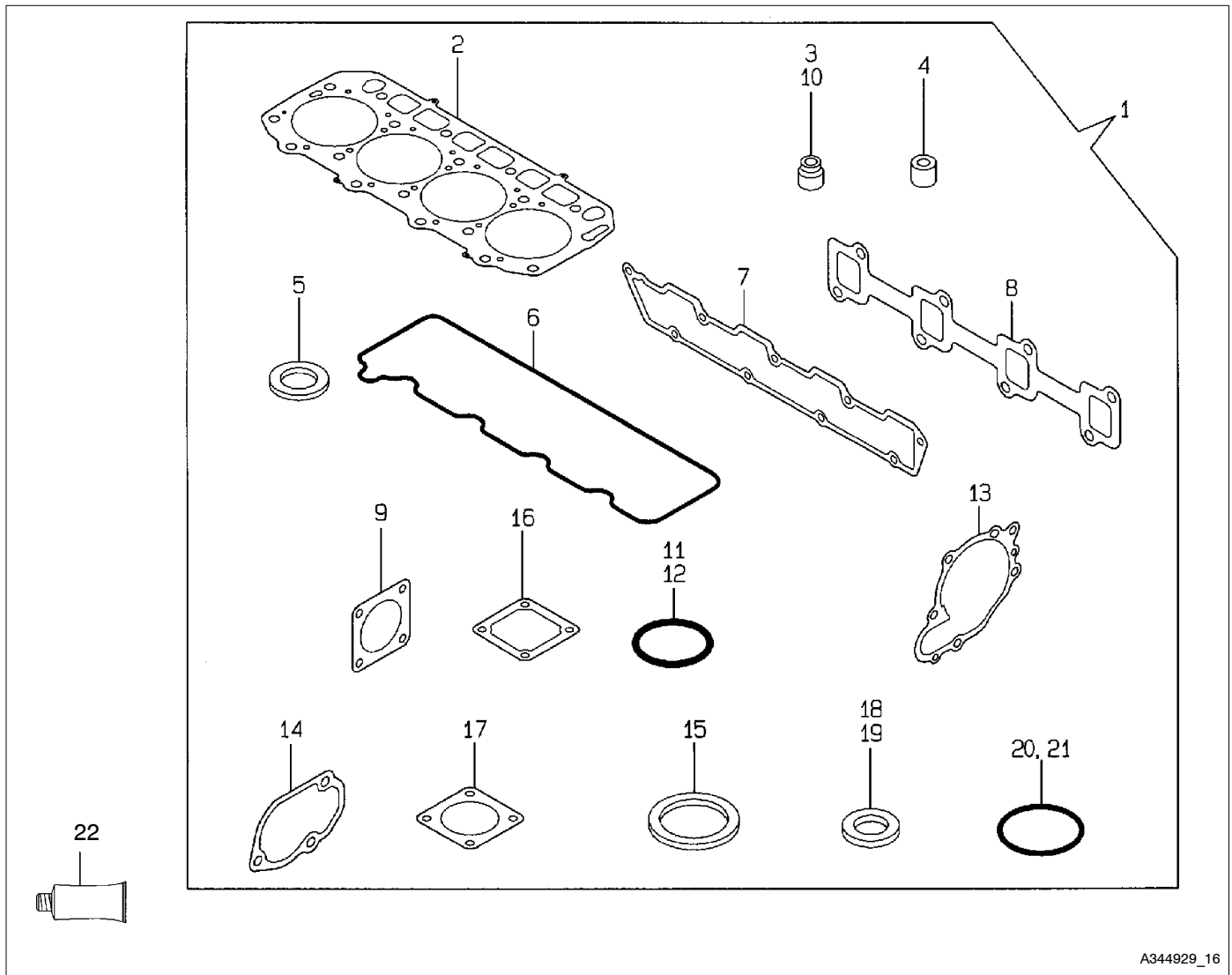
Group 15: Starting Motor



A344929_15

Item	Part No.	Description	Quantity	
			Variation Number 1	Variation Number 2
1	363154	Starter	1	
1	359118	Starter, 24 V		1
2	363155	Armature assembly	1	
3	363156	Coil assembly, field	1	
4	363157	Brush (+)	2	
5	225899	Screw, pole core set	4	
6	363158	Cover, rear	1	
7	363159	Holder assembly, brush	1	
8	363160	Brush (-)	2	
9	363161	Pinion assembly	1	
10	363162	Clutch assembly	1	
11	225915	Bearing, ball, 3	1	
12	225916	Bearing, ball, 4	1	
13	363163	Shaft, pinion	1	
14	363164	Stopper set	1	
15	363166	Retainer, bearing	1	
16	363165	Switch assembly, magnetic	1	
17	363167	Lever set, shift	1	
18	363168	Bolt, through	2	
19	363169	Cover assembly, dust	1	
20	363170	Housing, gear	1	
21	225917	Cover, terminal	1	
22	252713	Bolt, M12 x 30	2	

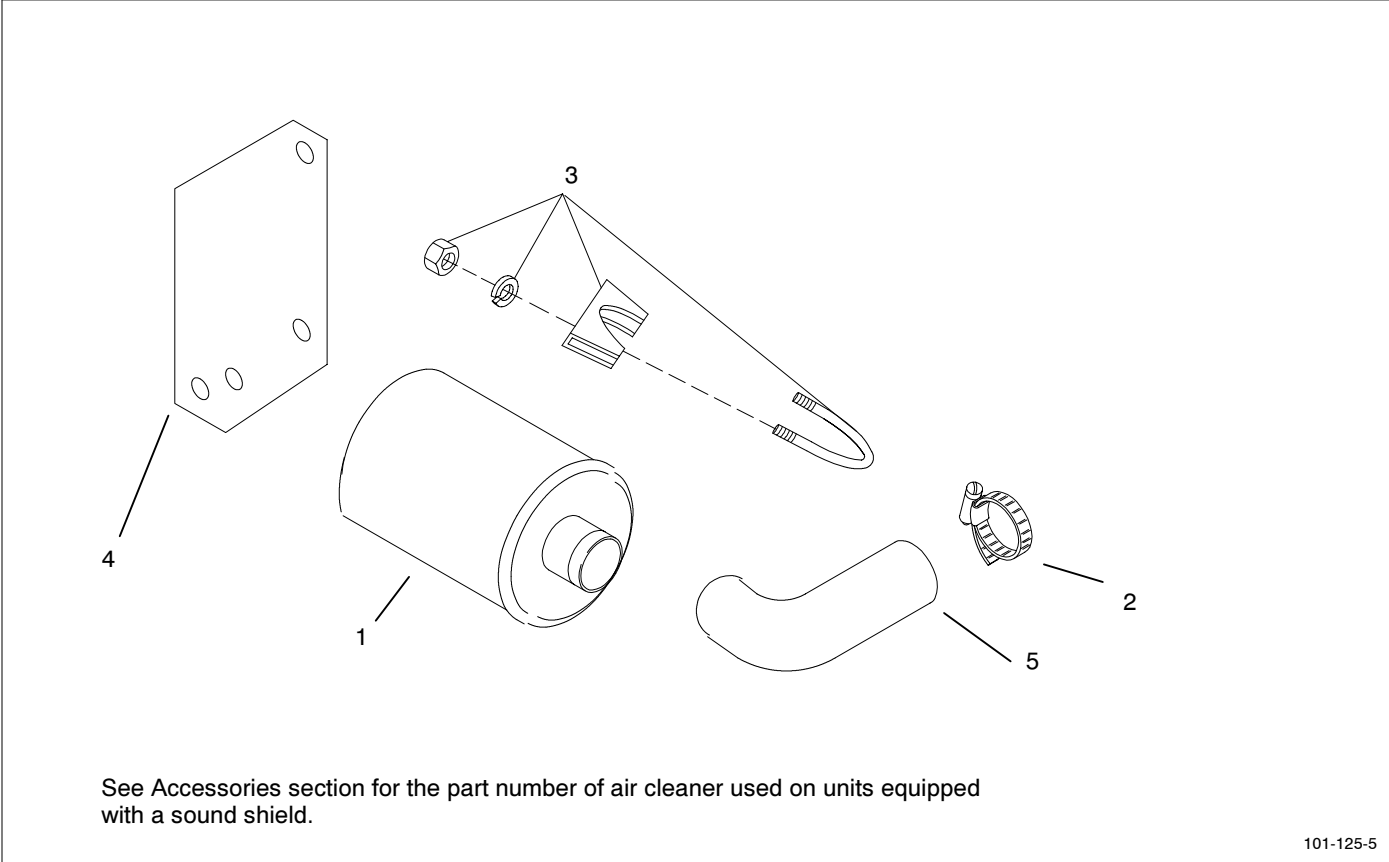
Group 16: Gasket Set



A344929_16

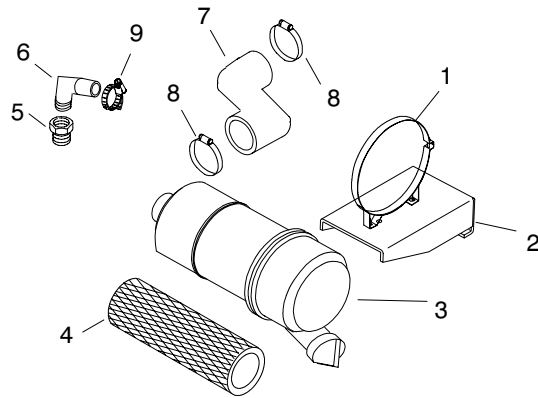
Item	Part No.	Description	Qty.
			Var.
1	363234	Gasket set	1
2	363171	Gasket, cylinder head	1
3	256578	Seal, valve stem	4
4	252743	Protector, nozzle	4
5	252744	Seat, nozzle	4
6	363117	Gasket, bonnet	1
7	363126	Gasket, intake manifold	1
8	363127	Gasket	1
9	225934	Gasket	1
10	252754	Seal, valve stem	4
11	363144	O-ring, P20	2
12	363145	O-ring, P14	1
13	363150	Gasket, water pump	1
14	363153 363152	Gasket, case	1
15	363088	Gasket, thermostat	1
16	363089	Gasket	1
17	363087	Gasket, thermostat	1
18	250967	Gasket, round, 8	3
19	252773	Gasket, 16	2
20	250800	O-ring, P7.0	1
21	250801	O-ring, P12.0	3
22	252998	Gasket, liquid	1

Group 101: Air Intake



Item	Part No.	Description	Qty.
			Var.
1	A-344930	Cleaner assembly, air	1
2	250081	Clamp, hose	1
3	286283	Clamp, exhaust pipe	1
4	344921	Bracket, air cleaner	1
5	344922	Hose, molded air intake	1

Group 101: Air Intake

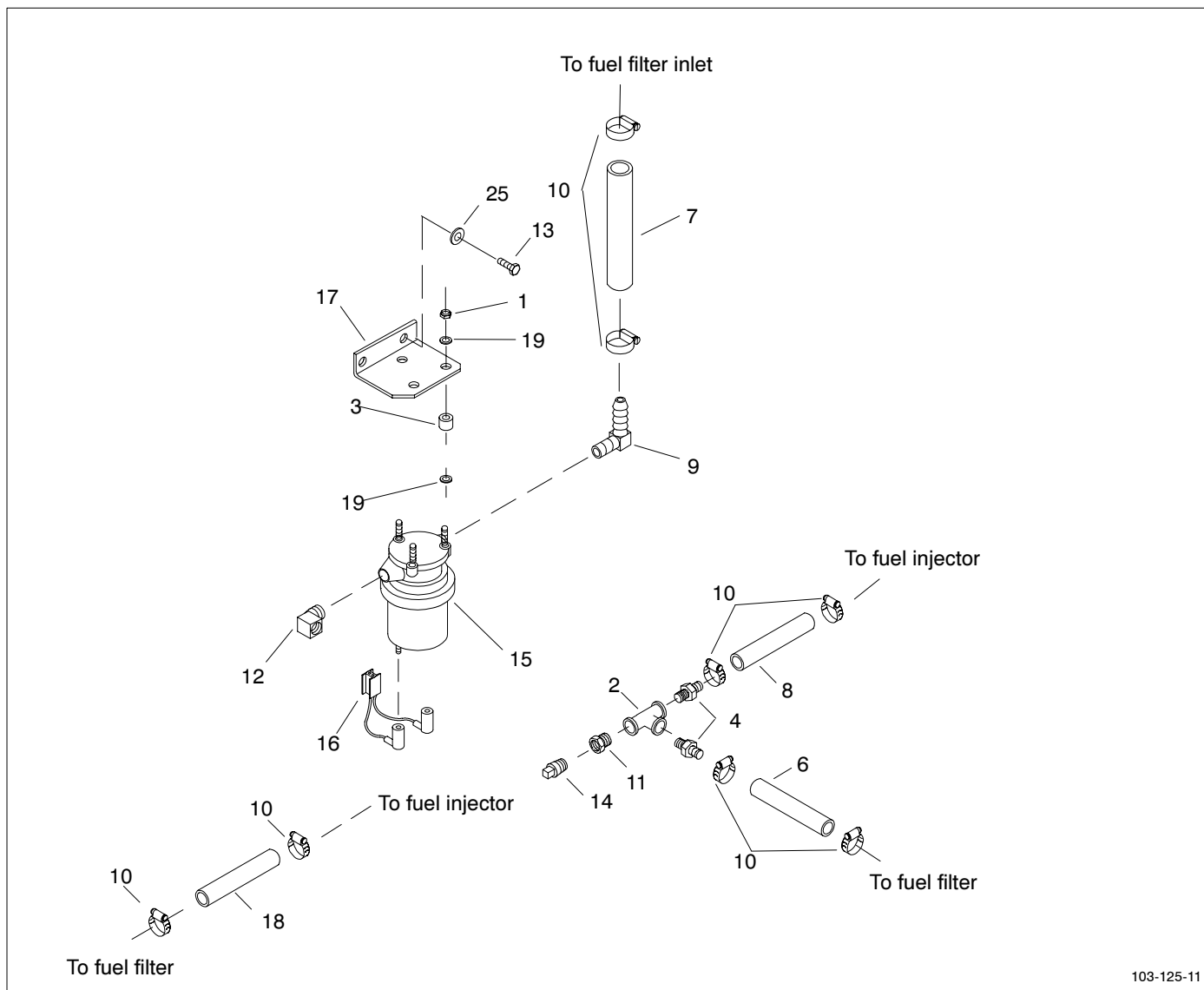


See Accessories section for the part number of air cleaner used on units equipped with a sound shield.

GM24459

Item	Part No.	Description	Qty.
			Var. GR1
1	226956	Mount, air cleaner, 5.72 in. ID	1
2	GM23383	Bracket, air cleaner	1
3	GM23382	Cleaner assembly, air	1
4	GM16944	Element, air cleaner	1
5	GM24867	Bushing, adapter, 3/8-18 to 1/8-27NPT	1
6	X-391-2	Connector, 90 deg., 5/8 in. ID hose	1
7	GM23384	Hose, air cleaner	1
8	250081	Clamp, hose, 2.06/3 in.	2
9	X-426-10	Clamp, hose, .5/1 in.	1

Group 103: Fuel System

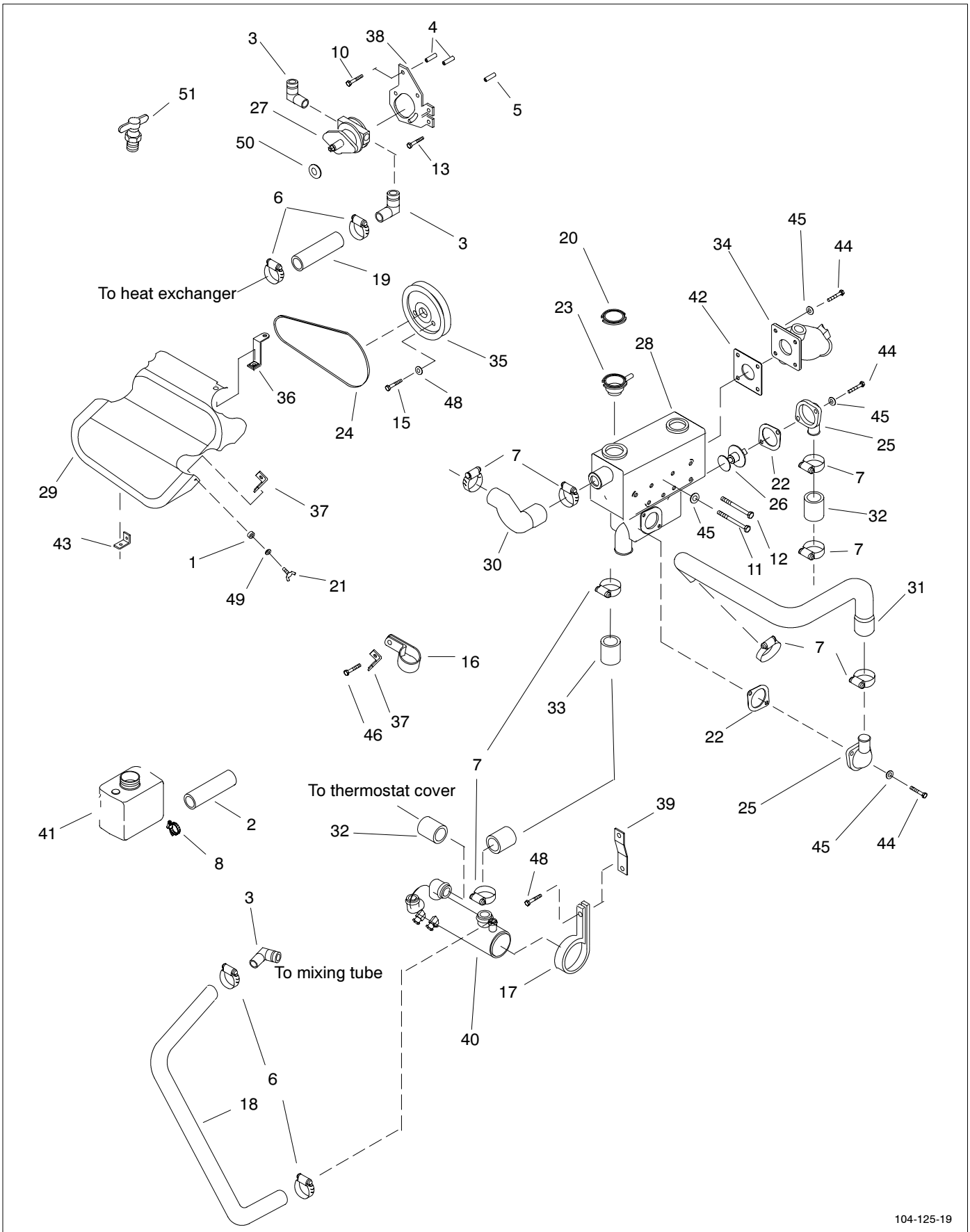


103-125-11

Item	Part No.	Description	Quantity			
			Variation Number			
			11	12	GR2	GR3
1	X-101-25	Nut, hex, elastic stop	3	3	3	3
2	X-203-10	Tee, pipe	1	1	1	1
3	X-284-39	Grommet	3	3	3	3
4	25 326 03	Connector, hose, 1/8 x 1/4	2	2	2	2
6	X-386-45	Line, flexible fuel, 1/4 x 2.00	1	1	1	1
7	X-386-48	Line, flexible fuel, 1/4 x 23.5	1	1	1	1
8	X-386-74	Line, flexible fuel, 1/4 x 17	1	1	1	1
9	X-391-20	Connector, hose elbow	1	1	1	1
10	X-426-9	Clamp, hose	8	8	8	8
11	X-509-1	Adapter, pipe, 1/4 x 1/8	1	1	1	1
12	X-555-1	Elbow, street, 1/4 x 1/4	1	1	1	1
13	M933-10020-60	Screw, hex head cap	2	2	2	2
14	X-75-2	Plug, pipe	2	2	2	2
15	229051	Pump, fuel	1		1	
15	344740	Pump, fuel		1		1
16	229168	Lead assembly	1	1	1	1
17	229290	Bracket, fuel pump	1	1	1	1
18	X-386-105	Line, flexible fuel, .188 x 15	1	1	1	1
19	#	Washer, 1/4	3	3	3	3

Common hardware; procure locally.

Group 104: Cooling System



104-125-19

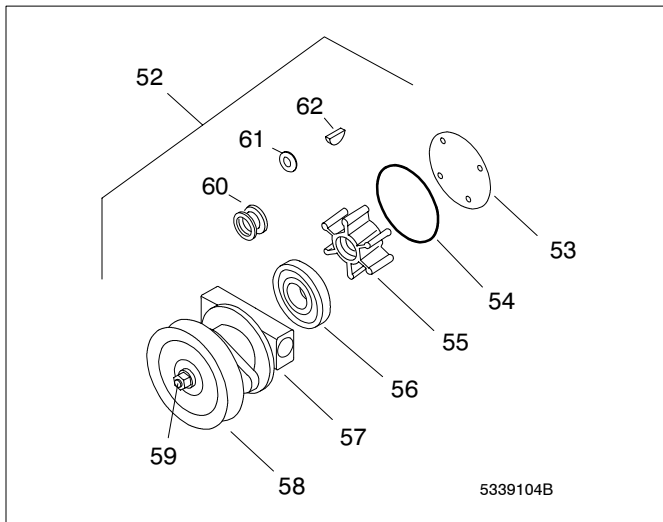
Group 104: Cooling System

Item	Part No.	Description	Qty. Var.		
			19	25	GR4
1	X-284-39	Grommet	3	3	3
2	X-386-36	Line, flexible	1	1	1
3	X-391-27	Connector, hose elbow	3	3	
3	X-391-23	Connector, hose elbow			3
4	X-400-100	Spacer, .344x.625x.656	1	1	1
5	X-400-199	Spacer	2	2	2
6	X-426-12	Clamp, hose, 1.25 maximum	4	4	4
7	X-426-4	Clamp, hose, 1.375x2.1	8	8	8
8	X-426-9	Clamp, hose	2	2	2
9	X-468-4	Tie, cable (not shown)	1	1	1
10	M931-08060-60	Screw, hex head cap	2	2	2
11	M931-08140-60	Screw, hex head cap	6	6	6
12	M931-08130-60	Screw, hex head cap	2	2	2
13	M931-08095-60	Screw, hex head cap	1	1	1
14	M933-08016-60	Screw, hex head cap	2	2	2
15	M933-10025-60	Screw, hex head cap	3	3	3
16	X-672-18	Clamp, insulated	2	2	2
17	X-672-34	Clamp, insulated	2	2	2
18	X-691-26	Hose, .75 in. x 39 in.	1	1	1
19	X-691-38	Hose	1	1	1
20	229980	Cap, radiator	1	1	1
21	229330	Screw, wing	3	3	3
22	229963	Gasket, water outlet	2	2	2
23	241311	Neck	1	1	1
24	249989	Belt, V	1	1	1
25	254885	Housing, thermostat	2	2	2
26	254920	Thermostat	1	1	1

Item	Part No.	Description	Qty. Var.		
			19	25	GR4
27	344089	Pump, seawater; see chart below	1	1	1
28	344848	Manifold, exhaust	1	1	1
29	359351	Guard, belt	1	1	1
30	344910	Hose, molded coolant	1	1	1
31	359350	Hose, molded coolant	1	1	1
32	344912	Hose, molded coolant	1	1	1
33	344913	Hose, molded coolant	1	1	1
34	359375	Tube, wet exhaust mixing	1	1	1
35	344923	Pulley, pump drive	1	1	1
36	359349	Bracket, belt guard	1	1	1
37	344925	Bracket, belt guard left	2	2	2
38	344926	Bracket, seawater pump	1	1	1
39	344927	Bracket, heat exchanger	2	2	2
40	344928	Exchanger, heat	1	1	1
41	359037	Bottle, overflow	1	1	1
42	359095	Gasket, exhaust	1	1	1
43	359281	Bracket, belt guard	1	1	1
44	X-125-5	Screw	2	2	2
45	#	Washer, 5/16	1	1	1
46	X-465-6	Screw	1	1	1
47	#	Washer, 7/16	3	3	3
48	#	Hardware, 1/4-20	1	1	1
49	#	Washer, 1/4	1	1	1
50	X-25-37	Washer	1	1	1
51	X-256-1	Valve, drain, 3/8 in. NPT	1	1	1

Common hardware; procure locally.

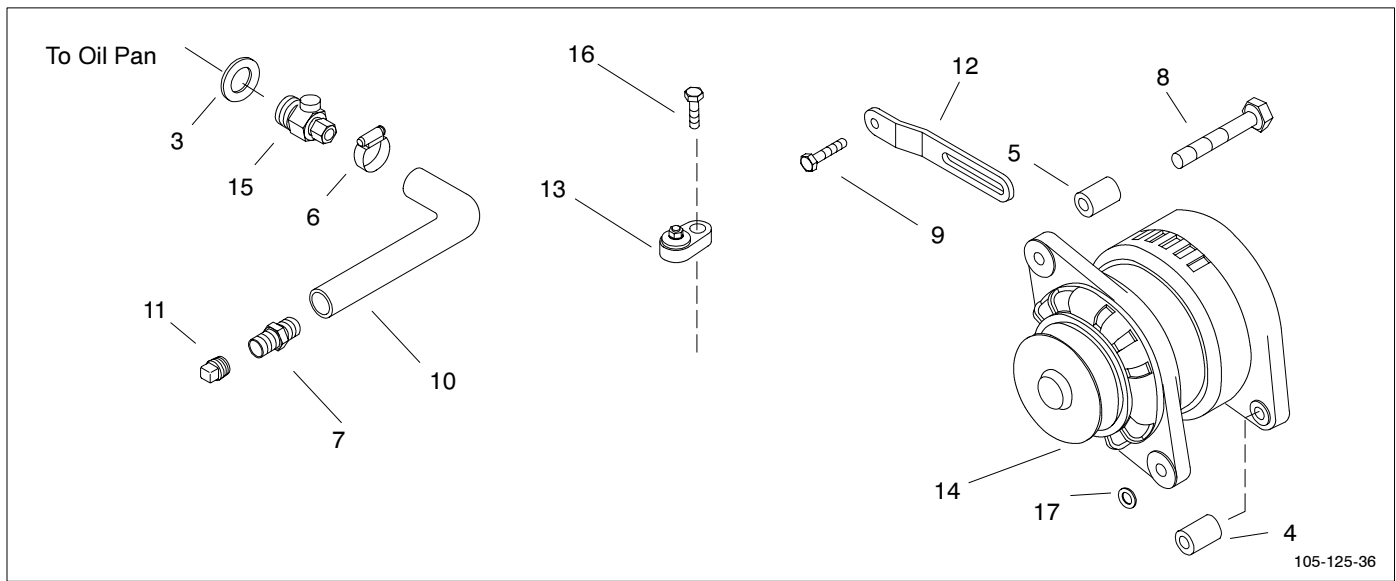
Seawater Pump Components



Seawater Pump Component Parts		
Item	Part No.	Description
52	344089	Seawater pump
53	344306	Plate, cover
54	344584	Gasket
55	229826	Kit, impeller (includes gasket)
56	344043	Bearing, ball
57	344585	Housing
58	Not Available	Pulley
59	344587	Shaft, drive
60	GM16865	Seal
61	GM22995	Seat, ceramic
62	GM17702	Key
—	344107	Plug, plastic, 3/8 in. (not shown)

Note: Replacement pump does not include a pulley. Order pulley part number 344606, if needed.

Group 105: Engine

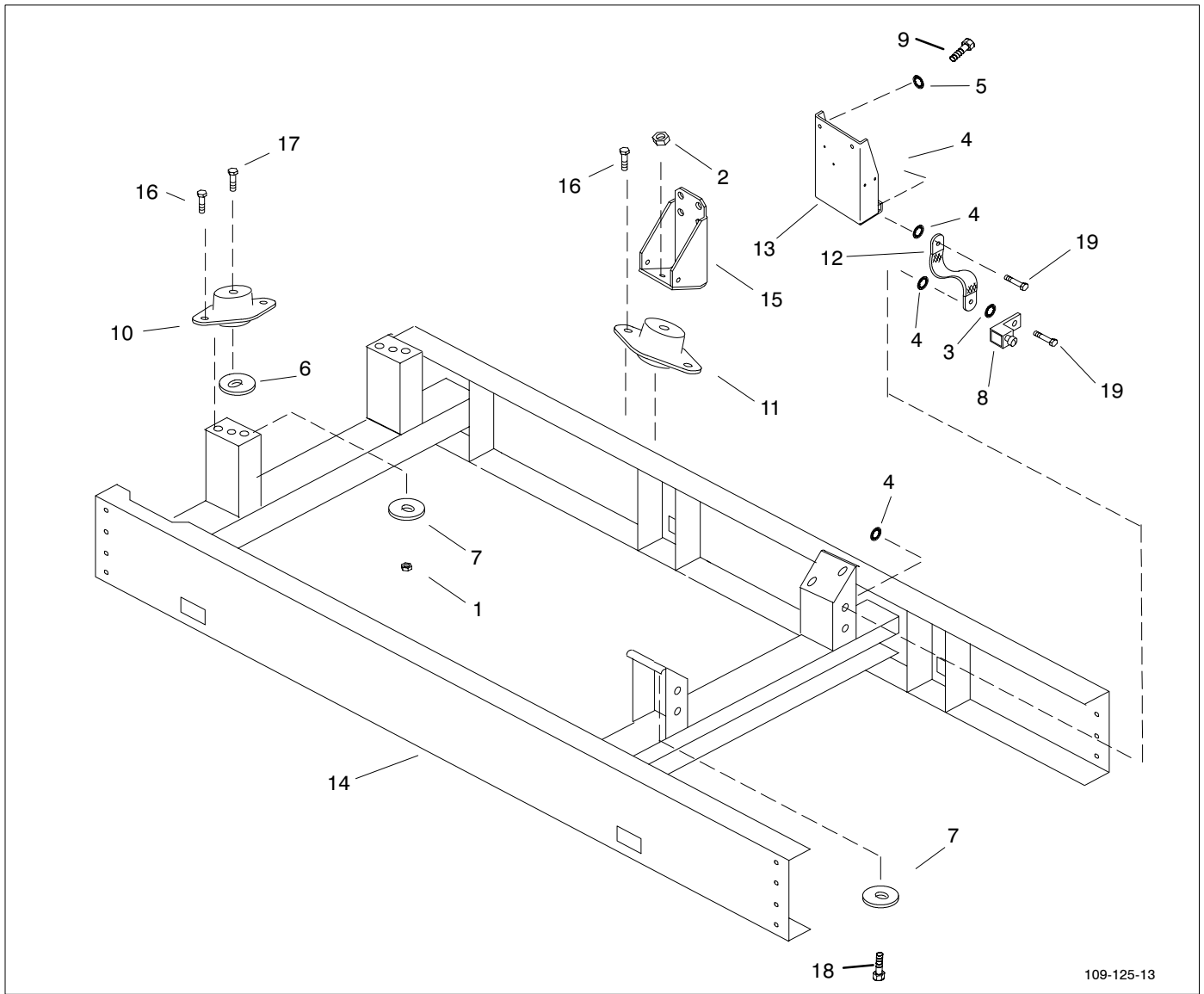


Item	Part No.	Description	Quantity			
			Variation Number			
			36	37	GR5	GR6
1	A-344929	Engine assembly, 4TNE98 (see Groups 1-16)	1	1	1	1
2	X-22-16	Washer, lock, interior/exterior tooth, 5/16 (not shown)	1	1	1	1
3	X-25-145	Washer, plain, .859 ID x 1.185 in. OD	1	1	1	1
4	X-400-152	Spacer, .344 ID x .625 OD x 1.5 in.	1		1	
4	X-400-98	Spacer, .375 ID x 1 OD x 1.375 in.		1		1
5	X-400-41	Spacer, .344 ID x .75 OD x .375 in.	1		1	
5	X-400-233	Spacer, .375 ID x .875 OD x .2 in.		1		1
6	X-426-9	Clamp, hose, .25/.70 in.	2	2	2	2
7	X-582-9	Connector, hose	1	1	1	1
8	M931-08035-60	Screw, hex head cap	1	1	1	1
9	M933-08016-16	Screw, hex head cap	1	1	1	1
10	X-651-38	Hose, rubber	1	1	1	1
11	X-75-55	Plug, pipe, 3/8	1	1	1	1
12	229212	Bracket, alternator adjustment	1		1	
12	324410	Bracket, alternator adjustment		1		1
13	249872	Switch, high temperature cutout	1	1	1	1
14	256924	Alternator	1		1	
14	344742	Alternator, 24 V		1		1
14	344742	Guard, alternator fan (not shown)		1		1
15	344828	Valve, oil drain	1	1	1	1
16	X-123-23	Screw	1	1	1	1
17	X-400-170	Spacer, .344 ID x .625 OD x .143 in.		1		1

Group 107: Nameplate and Decals

Item	Part No.	Description	Quantity			
			Variation Number			
			15	16	GR7	GR8
1	X-6348-3	Decal	1	1	1	1
2	X-793-3	Rivet, pop	4	4	4	4
3	224233	Decal, 1-800 number	1	1	1	1
4	359446	Nameplate	1	1	1	1
5	229831	Decal, reconnection	1		1	
6	229883	Decal, reconnection		1		1
7	Not Available	Nameplate serial number	5	5	5	5
8	GM14167	Decal, drain	3	3	3	3
9	249808	Decal, warning	1	1	1	1
10	249809	Decal, warning	1	1	1	1
11	249810	Decal, warning	1	1	1	1
12	267468	Decal, Coast Guard	1	1	1	1
13	344282	Decal, notice	1	1	1	1
14	344295	Decal, equipment ground	1	1	1	1
15	344486	Decal, CE	1	1	1	1
16	226917	Decal, negative battery connection	1	1	1	1

Group 109: Skid and Plant Mounting

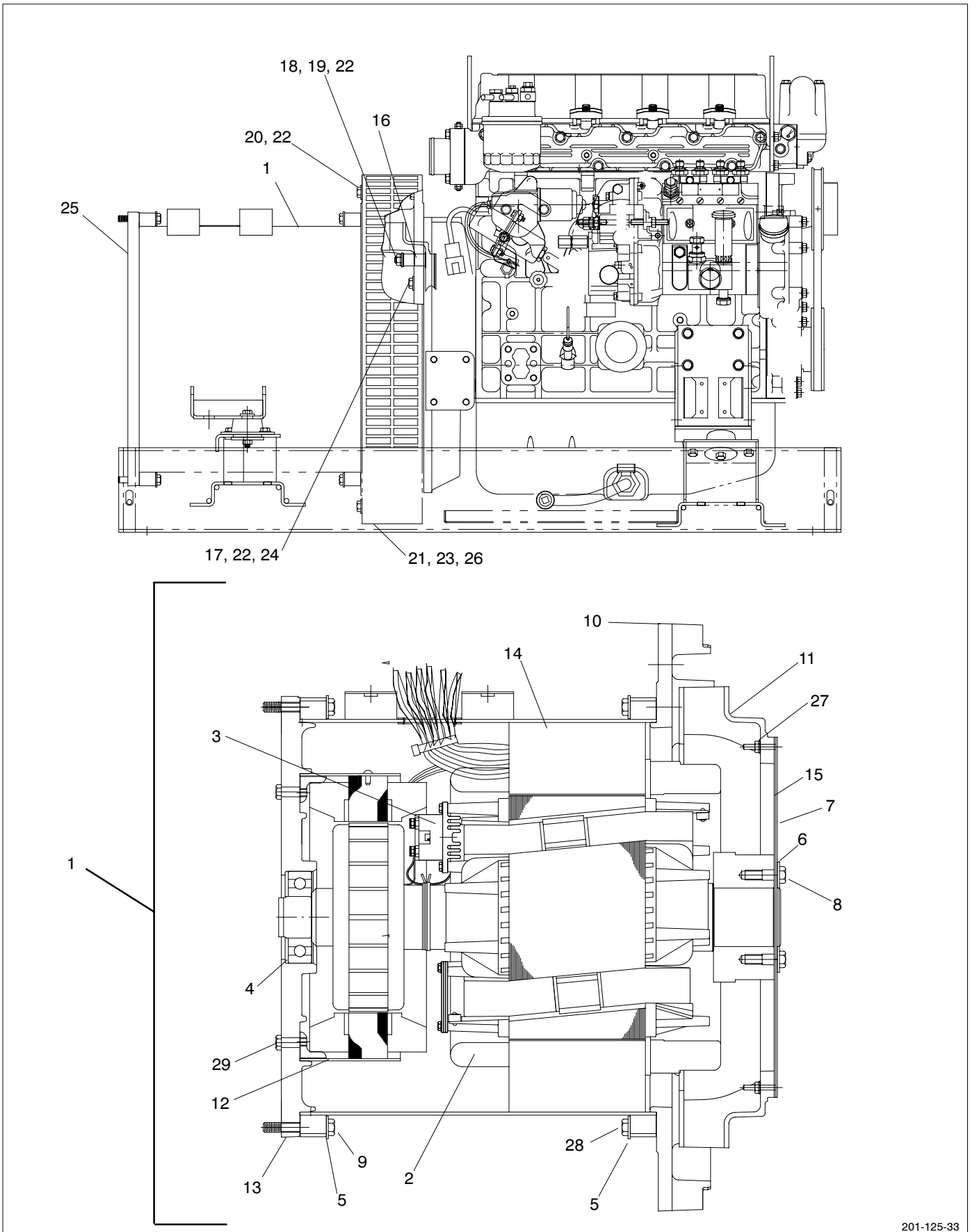


109-125-13

Item	Part No.	Description	Qty.	
			13	GR9
1	X-101-13	Nut, lock	2	2
2	X-101-16	Nut, elastic stop, 5/16-18	2	2
3	X-22-11	Washer, lock, interior tooth, 1/4	1	1
4	X-22-12	Washer, lock, interior/exterior tooth, 1/4	4	4
5	X-22-14	Washer, lock, interior/exterior tooth, 3/8	1	1
6	X-25-38	Washer, plain	2	2
7	X-25-96	Washer, plain	4	4
8	X-377-12	Connector, cable	1	1
9	M933-10020-60	Screw, hex head cap	8	8
10	225125	Vibromount	2	2
11	226458	Vibromount	2	2
12	245297	Strap, ground	1	1
13	344915	Bracket	1	1
14	344916	Skid	1	1
15	359417	Bracket, engine mounting	1	1
16	#	Hardware, 5/16-18	2	2
17	X-6238-17	Screw	2	2
18	230578	Screw	2	2
19	#	Hardware, 1/4-20	2	2

Common hardware; procure locally.

Group 201: Generator and Mounting

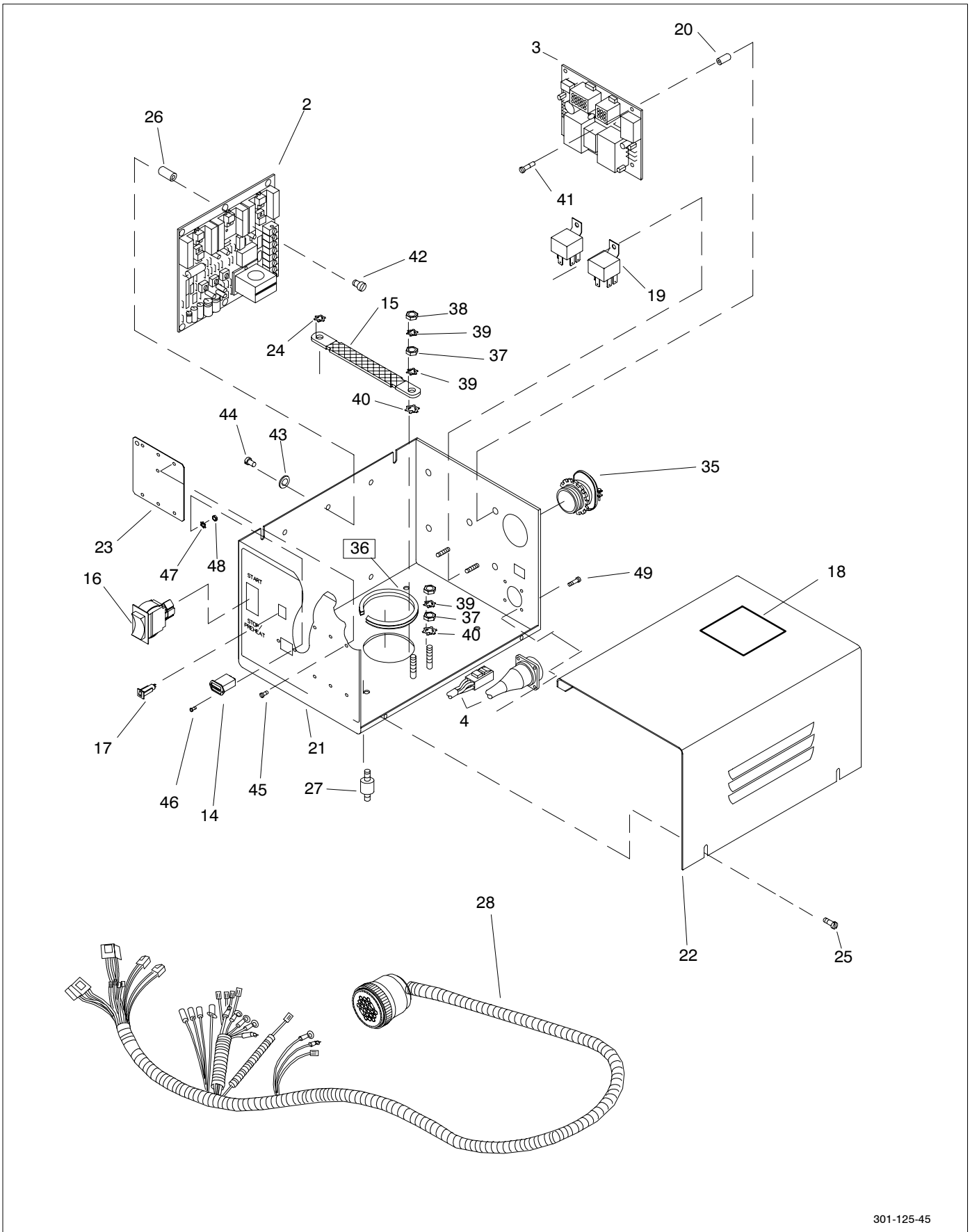


201-125-33

Group 201: Generator and Mounting

Item	Part No.	Description	Quantity			
			Variation Number			
			33	34	GR10	GR11
1	A-359034	Alternator assembly (items 2-15, 27-29)	1		1	
1	A-359008	Alternator assembly (items 2-15, 27-29)		1		1
2	A-344997	Rotor assembly (includes items 3, 4)	1	1	1	1
3	A-257444	Rectifier assembly	1	1	1	1
4	X-758-2	Bearing, ball	1	1	1	1
5	X-25-93	Washer	10	10	10	10
6	X-801-3	Washer, hardened	8	8	8	8
7	257016	Disc, armature drive	1	1	1	1
8	270956	Screw, hexagon head	8	8	8	8
9	273736	Screw, special	4	4	4	4
10	344917	Adapter, alternator	1	1	1	1
11	344919	Fan, alternator	1	1	1	1
12	344993	Exciter assembly, field	1	1	1	1
13	359006	Bracket, end	1	1	1	1
14	344998	Stator assembly		1		1
14	359007	Stator assembly	1		1	
15	359271	Disc, drive assembly	1	1	1	1
16	X-400-229	Spacer	16	16	16	16
17	M933-10030-60	Screw, hex head cap	12	12	12	12
18	M6923-10-62	Nut, hex	8	8	8	8
19	X-6054-15	Stud, metric	8	8	8	8
20	X-6238-38	Bolt, hex cap	12	12	12	12
21	X-67-51	Screw, hex head, 10-24 x 3/4	2	2	2	2
22	X-801-3	Washer, hardened	32	32	32	32
23	257442	Clip, speed	2	2	2	2
24	344918	Adapter, alternator	1	1	1	1
25	344991	Cover, end bracket	1	1	1	1
26	359035	Guard, generator fan	1	1	1	1
27	X-6210-1	Nut, 10-32	4	4	4	4
28	X-6238-1	Screw, 3/8-16 x 1.75	6	6	6	6
29	X-125-5	Screw, 5/16-18 x .88	4	4	4	4

Group 301: Controller and Mounting



301-125-45

Group 301: Controller and Mounting

Item	Part No.	Description	Quantity				
			Variation Number				
			45	46	47	GR12	GR13
1	A-359001	Controller assembly (items 2-23, 26, 35-49)	1	1		1	
1	A-359002	Controller assembly (items 2-23, 26, 35-49)			1		1
2	A-344342	PCB assembly, PBV	1	1	1	1	1
3	H-239563	PCB assembly	1	1		1	
3	A-344753	PCB assembly			1		1
4	359147	Harness, wiring controller (items 5-13)	1	1	1	1	1
5	223316	Fuse, 10 A, 250 V (not shown)	4	4	4	4	4
6	233959	Diode, 6 A, 100 V, inline (not shown)	4	4	4	4	4
7	239496	Connector, panel, 22-position (not shown)	1	1	1	1	1
8	241616	Connector, jack, 6-position (not shown)	1	1	1	1	1
9	241617	Connector, plug, 6-position (not shown)	1	1	1	1	1
10	258405	Fuse, 8 A, 250 V (not shown)	1	1	1	1	1
11	259689	Connector, plug, 9-position (not shown)	1	1	1	1	1
12	322557	Holder, inline fuse (not shown)	2	2	2	2	2
13	269366	Connector, plug, 15-position (not shown)	1	1	1	1	1
14	238736	Hourmeter	1	1	1	1	1
15	LK-0616-1515	Lead	1	1	1	1	1
16	249406	Switch, rocker	1	1	1	1	1
17	250719	Breaker, circuit, 10 A	1	1	1	1	1
18	254831	Decal, reg. adjustment	1	1	1	1	1
19	259391	Relay	2	2		2	
19	272684	Relay			2		2
20	287948	Spacer, aluminum, .25 x .50 6-32	5	5	5	5	5
21	359003	Box, silkscreen	1	1	1	1	1
22	359005	Cover, controller	1	1	1	1	1
23	359025	Plate, cover	1	1	1	1	1
24	X-22-12	Washer, lock, 1/4, interior/exterior tooth	1	1	1	1	1
25	X-67-52	Screw, hex head, 10-24 x 1/2	4	4	4	4	4
26	229357	Spacer	2	2	2	2	2
27	241769	Mount, controller	4	4	4	4	4
28	359104	Harness, engine wiring (items 29-34)	1	1	1	1	1
29	233959	Diode, 6 A, 100 V, inline (not shown)	2	2	2	2	2
30	239493	Connector, plug, 22-position (not shown)	2	2	2	2	2
31	241616	Connector, jack, 6-position (not shown)	2	2	2	2	2
32	290262	Boot (not shown)	2	2	2	2	2
33	292370	Connector, plug, 2-position (not shown)	4	4	4	4	4
34	292371	Connector, jack, 2-position (not shown)	2	2	2	2	2
35	X-6266-1	Grommet, nylon	1	1	1	1	1
36	X-6033-1	Connector, cable	1	1	1	1	1
37	X-76-2	Nut, hex	3	3	3	3	3
38	X-81-8	Nut, hex green	1	1	1	1	1
39	X-22-11	Washer, lock, 1/4, interior tooth	3	3	3	3	3
40	X-22-12	Washer, lock 1/4, interior/exterior tooth	2	2	2	2	2
41	X-49-25	Screw, PHM, 6-32 x .25	10	10	10	10	10
42	X-51-8	Screw	6	6	6	6	6
43	X-22-7	Washer, lock, #8, interior tooth	4	4	4	4	4
44	X-51-12	Screw, PHM, 3-32 x .375	6	6	6	6	6
45	X-51-15	Screw, RHM, 8-32 x 1/2	2	2	2	2	2
46	X-49-15	Screw, RHM, #6 x 9/16	2	2	2	2	2
47	X-22-6	Washer, lock, #6, interior tooth	2	2	2	2	2
48	X-71-2	Nut, hex 6-32, zinc	2	2	2	2	2
49	X-49-26	Screw, PHM, 6-32 x .50	4	4	4	4	4

Group 701: Literature

Item	Part No.	Description	Quantity			
			Variation			
			16	17	39	40
1	TP-5620	Safety Precautions, Marine	1	1	1	1
2	TP-6068	Operation Manual, 5-32EFOZ/EOZ, Marine	1	1	1	1
3	TP-6069	Installation Manual, 5-150EOZ/4-125EFOZ, Marine	1	1	1	1
4	TP-5936	Service Manual, 32EOZ/25EFOZ	1	1	1	1
5	TP-5969	Operation Manual, Yanmar 4TNE98 Series	1	1	1	1
6	TP-5998	Parts Catalog, 25EFOZ/32EOZ	1	1	1	1
7	TP-6054	Service Manual, Yanmar 32EOZ/27EFOZ	1	1	1	1

Accessories

Qty.	Description	Part No.
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Circuit Breaker Kits

Circuit Breaker

1	Installation Instructions	TT-799	PA-344907
6	Screw, pan head	X-49-52	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359026	
1	Breaker, circuit, 90 amp	344905	

Circuit Breaker

1	Installation Instructions	TT-799	PA-344908
6	Screw, pan head	X-49-52	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359026	
1	Breaker, circuit, 100 amp	253226	

Circuit Breaker

1	Installation Instructions	TT-799	PA-359010
2	Washer, plain	X-25-45	
2	Screw, 8-32 x 1/2	X-51-15	
2	Screw, 8-32 x 4	X-51-52	
4	Nut, whiz	X-6210-4	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359027	
1	Breaker, circuit, 125 amp	359029	

Circuit Breaker

1	Installation Instructions	TT-799	PA-359011
2	Washer, plain	X-25-45	
2	Screw, 8-32 x 1/2	X-51-15	
2	Screw, 8-32 x 4	X-51-52	
4	Nut, whiz	X-6210-4	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359027	
1	Breaker, circuit, 150 amp	359030	

Circuit Breaker

1	Installation Instructions	TT-799	PA-359012
2	Washer, plain	X-25-45	
2	Screw, 8-32 x 1/2	X-51-15	
2	Screw, 8-32 x 4	X-51-52	
4	Nut, whiz	X-6210-4	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359027	
1	Breaker, circuit, 175 amp	359031	

Circuit Breaker

1	Installation Instructions	TT-799	PA-359014
2	Washer, plain	X-25-45	
2	Screw, 8-32 x 1/2	X-51-15	
2	Screw, 8-32 x 4	X-51-52	
4	Nut, whiz	X-6210-4	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359027	
1	Breaker, circuit, 125 amp	359033	

Qty.	Description	Part No.
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Circuit Breaker

1	Installation Instructions	TT-799	PA-359106
6	Screw, 8-32 x 4	X-51-52	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359026	
1	Breaker, circuit, 50 amp	269249	

Circuit Breaker

1	Installation Instructions	TT-799	PA-359107
6	Screw, 8-32 x 4	X-51-52	
4	Boot	238915	
1	Decal, notice	246242	
1	Plate, cover	359026	
1	Breaker, circuit, 60 amp	253224	

Conversion Kits

12 to 24 V Conversion

1	PCB assembly, 24 VDC	A-344753	PA-359121
1	Screw, HC	X-125-22	
1	Spacer	X-400-170	
1	Spacer	X-400-233	
1	Spacer	X-400-98	
1	Terminal	X-431-37	
2	Relay	272684	
1	Belt, V, 42 in.	258955	
1	Arm, alternator adjusting	324410	
1	Pump, fuel	344740	
1	Alternator, battery charging	344742	
1	Guard, alternator fan	344815	
1	Motor, starting	359118	
1	Solenoid, stop	359119	
1	Installation Instructions	TT-1271	

Fuel Attachment Block Kits

Fuel Block

1	Installation Instructions	TT-1010	PA-229834
2	Screw	X-125-29	
1	Connector, hose, 1/8	25 326 03	
1	Fuel line, 1/4 in.	X-386-19	
1	Fuel line, 1/2 in.	X-386-57	
2	Elbow, hose connector	X-391-20	
2	Spacer, 0.344 x 0.625 x 0.656	X-400-100	
4	Clamp, hose	X-426-9	
2	Fitting, hose	X-652-3	
1	Block, fuel	229835	

Harness Kits

Harness, Fire System Interface

1	Harness, wiring	229832	PA-229833
1	Installation Instructions	TT-930	

Harness, Remote 12-in. Pigtail

1	Harness, extension	249935	PA-249941
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Harness for Remote Panel, 15 Ft.

1	Strap, wire, 5/8	X-526-3	PA-249334
1	Harness, extension	249334	

Harness for Remote Panel, 25 Ft.

1	Strap, wire, 5/8	X-526-3	PA-249336
1	Harness, extension	249336	

Accessories, continued

Qty.	Description	Part No.
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Mounting Kits

Hydrolastic Mounting

Qty.	Description	Part No.
4	Mount, fluid	344090
1	Skid	359407
1	Bracket, engine mount, LS	359408
1	Bracket, engine mount, RS	359409
8	Screw, hex cap	M933-10020-60
2	Washer, lock, .391 ID x .975 in OD	X-22-14
4	Screw, head head machine	X-6021-14
4	Washer, plain, .656 ID x 1.312 in. OD	X-25-15
7	Washer, plain, .406 ID x .812 in. OD	X-25-37
8	Nut, flange spiralock, 1/2-13	X-6210-12
1	Strap, ground (11 in.)	X-6046-6

Overspeed Shutdown Kits

Overspeed Shutdown

Qty.	Description	Part No.
1	Installation Instructions	TT-911
1	PCB assembly, OS-time delay	B-249812
4	Washer, plain	X-25-9
8	Screw, PHM, 6-32 x 0.25	X-49-25
1	Plate, adapter	229070
1	Harness, overspeed board	229234
3	Spacer	229974
4	Spacer, .25 x .50 6-32	287948

Paint, White, 1 Gallon Can **221334**

Paint, White, Aerosol Can **221335**

Paint, White, Touch-Up **GM19490**

Panel and Meter Kits

Panel, Remote Start

Qty.	Description	Part No.
1	Installation Instructions	TT-642
1	Decal, warning	249494
1	Panel assembly (includes the following)	A-250795
1	Plug, connector, 6-position	241617
1	Panel, remote	250796
1	Switch, rocker	269296

Panel, Remote Start and 2-Meter, 12 V

Qty.	Description	Part No.
1	Installation Instructions	TT-1072
1	Decal, warning	249494
1	Panel assembly (includes the following)	A-344033
1	Panel	344029
1	Harness, wiring	344031
1	Gauge, water temperature	344035
1	Gauge, oil pressure	344036
1	Switch, rocker	344039

Panel, Remote Start and 4-Meter, 12 V

Qty.	Description	Part No.
1	Installation Instructions	TT-1073
1	Decal, warning	249494
1	Panel assembly (includes the following)	A-344034
1	Panel	344030
1	Harness, wiring	344032
1	Gauge, water temperature	344035
1	Gauge, oil pressure	344036
1	Voltmeter	344037
1	Hourmeter	344038
1	Switch, rocker	344039

Qty.	Description	Part No.
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Panel, Remote Start and 2-Meter, 24 V

Qty.	Description	Part No.
1	Installation Instructions	TT-1072
1	Decal, warning	249494
1	Panel assembly (includes the following)	A-344840
1	Panel	344029
1	Harness, wiring	344031
1	Gauge, water temperature	344035
1	Gauge, oil pressure	344036
1	Switch, rocker	344039

Panel, Remote Start and 4-Meter, 24 V

Qty.	Description	Part No.
1	Installation Instructions	TT-1073
1	Decal, warning	249494
1	Panel assembly (includes the following)	A-344841
1	Panel	344030
1	Harness, wiring	344032
1	Gauge, water temperature	344035
1	Gauge, oil pressure	344036
1	Voltmeter	344037
1	Hourmeter	344038
1	Switch, rocker	344039

Panel, Remote Start, 24 V

Qty.	Description	Part No.
1	Installation Instructions	TT-1245
1	Decal, warning	249494
1	Panel assembly (includes the following)	GM23014
1	Panel, control	226964
1	Harness, wiring	226979
1	Hourmeter	238736
1	Switch, rocker	344839

Power Takeoff Kits

Electric Clutch

Qty.	Description	Part No.
8	Screw, HC	X-125-23
2	Screw, 1/2-13	X-129-17
2	Washer, plain	X-25-1
2	Washer, plain	X-25-37
2	Washer, plain	X-25-40
8	Washer, plain	X-25-85
1	Spacer	X-400-199
2	Screw, 1/4-20	X-465-2
1	Screw, HHC	X-6050-8
2	Nut, spiralock	X-6210-9
4	Screw, HC	X-6238-16
2	Screw, 3/8-16	X-6238-7
4	Washer, hardened	X-801-3
1	Grommet, rubber U-shape	257069
2	Washer, hardened	290945
1	Coupling, flexible	359128
1	Clutch, electric	359129
1	Hub, PTO clutch drive	359150
1	Hub, PTO clutch drive	359151
1	Support, PTO, right	359152
1	Support, PTO, left	359153
1	Bracket, PTO mounting	359154
1	Cover, PTO housing	359155
1	Guard, PTO belt	359163

Accessories, continued

Qty.	Description	Part No.
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Preheat Kits

Air Intake Heater, 12 V

1	Washer, shakeproof	X-22-12	PA-229240
2	Washer, plain	X-25-40	
1	Terminal	X-431-38	
1	Screw, HC, 1/4-20 x .75	X-465-16	
1	Screw, HC, 1/4-20 x .50	X-465-6	
2	Nut, whiz lock 1/4-20	X-6210-2	
1	Harness, air heater	229233	
1	Relay	233442	
1	Boot	238915	
1	Installation Instructions	TT-897	

Air Intake Heater Kit, 24 V

1	Washer, shakeproof	X-22-12	PA-344748
2	Washer, plain	X-25-40	
1	Screw, HC, 1/4-20 x .75	X-465-16	
1	Screw, HC, 1/4-20 x .50	X-465-6	
2	Nut, whiz lock, 1/4-20	X-6210-2	
1	Harness, air heater	229233	
1	Solenoid	344741	
1	Heater, air	344903	
2	Gasket, air heater	344904	
1	Boot	238915	
1	Installation Instructions	TT-897	

Air Intake Heater Kit, 24 V

1	Washer, shakeproof	X-22-12	GM24334-KP1
2	Washer, plain	X-25-40	
1	Screw, HC, 1/4-20 x .75	X-465-16	
1	Screw, HC	X-465-2	
1	Conduit, convoluted	X-6003-5	
2	Nut, whiz lock, 1/4-20	X-6210-2	
1	Harness, air heater	229233	
1	Boot	238915	
1	Solenoid	344741	
1	Heater, air	GM24332	
2	Gasket, air heater	GM24333	
1	Installation Instructions	TT-897	

Seawater Strainers

1	Filter, water, 1/2 in.	X-661-1
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Sender Kits

Sender Kit

1	Adapter, sender	229323	PA-229354
1	Sender, oil pressure	267408	
1	Sender, water temperature	249348	
1	Installation Instructions	TT-896	

Ship-To-Shore Switches Kits

Transfer Switch Kit

1	Switch, transfer	A-260086	PAA-260086
1	Installation Instructions	TT-535	

Siphon Break Kits

Transfer Switch Kit

1	Switch, transfer	A-248577	PAA-260086
1	Installation Instructions	TT-535	

Siphon Break Kits

Qty.	Description	Part No.
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Siphon Break Kits

Siphon Break

1	Installation Instructions	TT-927	PA-359331
1	Valve, siphon break	359113	

Siphon Break (Sound Shield)

1	Installation Instructions	TT-1184	PA-359117
2	Grommet	X-284-42	
2	Clamp, 1.25 maximum	X-426-12	
1	Hose, .75 in. x 12 in.	X-691-14	
1	Hose, .75 in. x 46 in.	X-691-15	
2	Connector, hose	359102	
1	Valve, siphon break	359113	

Accessories, continued

Qty.	Description	Part No.
Sound Shield Kits		
Sound Shield PA-344936		
1	Installation Instructions	TT-1180
1	Cleaner assembly, air	A-344931
14	Washer, stainless steel	X-25-142
1	Grommet	X-284-42
1	Line, flexible fuel	X-386-110
1	Line, flexible fuel	X-386-112
8	Clamp, hose, 2 17/32	X-426-1
2	Clamp, hose, 1.25 maximum	X-426-12
2	Clamp, hose	X-426-16
4	Clamp, hose	X-426-9
4	Screw, 1/4-20 x 7/8	X-465-22
14	Screw, HC, 1/4-20	X-465-24
2	Hose, radiator	X-507-7
2	Channel, U	X-6047-22
1	Channel, U	X-6047-26
4	Clip, speed	X-6220-1
6	Nut, hex	X-6234-1
2	Fitting, hose	X-652-1
8	Screw, PHM, 1/4-20 x 2	X-73-33
40	Rivet, pop	X-781-14
8	Washer, fiber	222889
4	Mount, controller	246267
8	Clip, speed	297596
6	Connector, outside corner	344137
2	Connector, inside corner	344138
18	Bracket, corner rail	344635
2	Bracket, corner rail	344636
2	Rail, sound shield	344682
2	Rail, sound shield	344688
2	Connector, hose	344754
2	Panel subassembly, access	344877
1	Insulation, acoustic	344942
2	Rail, sound shield	359041
2	Rail, sound shield	359042
2	Rail, sound shield	359043
2	Rail, sound shield	359044
1	Rail, sound shield front	359045
1	Rail, sound shield rear	359046
1	Base	359047
1	Support, sound shield	359058
1	Support, sound shield	359059
1	Elbow, exhaust	359061
1	Insulation, acoustic	359068
1	Insulation, acoustic	359069
1	Insulation, acoustic	359070
1	Insulation, acoustic	359071
1	Roof subassembly	359082
1	Insert, threaded	344484
1	Roof	359048
1	Insulation, acoustic	359064
1	Roof subassembly	359083
1	Decal, caution not a step	343165
1	Roof	359049
1	Insulation, acoustic	359063
1	Door subassembly	359084
1	Latch, sound shield	344692
1	Door	359050
1	Insulation, acoustic	359065
1	Door subassembly	359085
1	Latch, sound shield	344692
1	Door	359052
1	Insulation, acoustic	359066

Qty.	Description	Part No.
1	Door subassembly	359086
1	Latch, sound shield	344692
1	Door	359054
1	Insulation, acoustic	359067
1	Door subassembly	359087
1	Latch, sound shield	344692
1	Door	359051
1	Insulation, acoustic	359073
1	Insulation, acoustic	359075
1	Insulation, acoustic	359076
1	Insulation, acoustic	359077
1	Insulation, acoustic	359078
1	Insulation, acoustic	359079
1	Insulation, acoustic	359080
1	Insulation, acoustic	359081
1	Panel subassembly	359088
1	Insulation, acoustic	359074
1	Panel, sound shield	359092
1	Panel subassembly	359089
1	Insulation, acoustic	359074
1	Panel, sound shield	359092
1	Door subassembly	359090
1	Insulation, acoustic	359072
1	Door, sound shield rear	359053
1	Duct subassembly	359091
1	Hose, seawater inlet	359093
1	Hose, air intake	359094
1	Connector, hose	359102
1	Silencer, air intake	359126
1	Elbow, exhaust	359219
1	Decal, fuel inlet	359278
1	Decal, fuel return	359279
Sound Shield PA-359601		
1	Air cleaner	A-344931
14	Washer, plain, .281 ID x .625 in. OD	X-25-142
1	Grommet, round	X-284-42
8	Clamp, hose, 2.81/3.75 in.	X-426-1
2	Clamp, hose, .69/1.25 in.	X-426-12
2	Clamp, hose, 1.31/2.25 in.	X-426-4
4	Bolt, hex cap	X-465-22
14	Bolt, hex cap	X-465-24
1	Hose, radiator, straight, 3 in. ID	X-507-9
1	Channel, U	X-6047-1
2	Channel, U	X-6047-22
1	Channel, U	X-6047-33
1	Channel, U	X-6047-34
4	Clip, speed	X-6220-1
6	Nut, hex, 1/4-20	X-6234-1
1	Hose, air intake	X-6292-4
8	Bushing, .938 x 1.187 in. NPT	X-634-14
1	Bushing	X-634-28
1	Decal	X-6348-3
2	Seal, push-on trim	X-6422-10
1	Seal, push-on trim	X-6422-9
1	Seal, push-on trim	X-6423-4
8	Screw, cross recess pan head machine	X-73-33
49	Rivet, pop, .187 in.	X-781-14
8	Washer, fiber, .25 ID x .71 in. OD	222889
4	Mount, controller	246267
1	Decal, warning	249808
10	Clip, speed	297596
1	Decal, caution not a step	343165
6	Connector, outside corner	344137
2	Connector, inside corner	344138
1	Decal, fire extinguisher port	GM10148
16	Insert, threaded, 1/4-20 in.	344484
18	Bracket, corner rail	344635
2	Bracket, corner rail	344636
2	Rail, sound shield	344682
2	Rail, sound shield	344688

Accessories, continued

Qty.	Description	Part No.
Sound Shield		
PA-359601, continued		
4	Latch, sound shield	344692
12	Pin, threaded	345283
2	Rail, sound shield	359041
2	Rail, sound shield	359042
2	Rail, sound shield	359043
3	Rail, sound shield	359044
1	Rail, sound shield, front	359045
1	Base	359047
1	Duct, air outlet, front	359056
1	Duct, air outlet, rear	359057
1	Support, sound shield, RS	359058
1	Support, sound shield, LS	359059
1	Hose, molded coolant, .75" ID	359093
1	Connector, hose, 90 deg. elbow, PVC	359102
1	Decal, fuel inlet	359278
1	Decal, fuel return	359279
1	Fitting, elbow, exhaust	359462
1	Fitting, elbow, exhaust	359463
1	Connector, hose	359546
4	Insulation, acoustic foam	359584
1	Door, sound shield, rear	359590
1	Duct, air intake	359591
2	Panel, sound shield	359592
1	Door, sound shield, alt.	359593
1	Door, sound shield, front	359594
1	Door, sound shield, RH	359595
1	Door, sound shield, LH	359596
1	Roof, sound shield, eng.	359597
1	Roof, sound shield, alt.	359598
1	Rail, sound shield, rear	359599
1	Conduit, convoluted	X-6003-118
1	Hose, radiator, straight, 3 in. ID	X-507-7
1	Insulation, acoustic foam	359600
1	Insulation, acoustic foam	359636
1	Insulation, acoustic foam	359635
1	Insulation, acoustic foam	359637
1	Insulation, acoustic, 19 x 20.81 in.	359066
1	Insulation, acoustic, 19 x 11.53 in.	359067
1	Insulation, acoustic, foam, 19 x 5 in.	359068
2	Insulation, acoustic, 4.37 x 4.5 in.	359069
1	Insulation, acoustic, foam, 33 x 4.5 in	359070
1	Insulation, acoustic, foam, 33 x 4.5 in	359071
1	Insulation, acoustic, foam	359638
1	Insulation, acoustic, 14.62 x 2.25 in.	359073
2	Insulation, acoustic, 11.5 x 10.06 in.	359074
1	Insulation, acoustic, 31.5 x 10 in.	359075
1	Insulation, acoustic, 11.86 x 8.88 in.	359076
1	Insulation, acoustic, 19 x 8.88 in.	359077
1	Insulation, acoustic, 8.44 x 1.3 in.	359078
1	Insulation, acoustic, 8.44 x 2.25 in.	359079
1	Insulation, acoustic, 14.62 x 2.25 in.	359080
1	Insulation, acoustic, 8.44 x .45 in.	359081
1	Insulation, acoustic foam	GM11984


Qty.	Description	Part No.
Sound Shield		
GM22732-KP1		
1	Air cleaner assembly	A-344931
14	Washer, 0.281 x 0.625 x 0.065	X-25-142
2	Clamp, hose, 1.25 x 0.69	X-426-12
8	Clamp, hose, 3.75 x 2.81	X-426-1
14	Screw, hex cap, 1/4-20	X-465-24
8	Screw, PHM, 1/4-20 x 2	X-73-33
1	Hose, exhaust, 3.0 in. ID x 9.75 in.	X-507-9
1	Hose, exhaust, 3.0 in. ID x 6 in.	X-507-7
8	Washer, fiber, 0.25 in. ID x 0.71 in. OD	222889
1	Tube, exhaust, 3.0 in. OD x 11.5 in.	359462
6	Connector, outside	GM15486
2	Connector, inside	GM15487
1	Base, 25 x 51 in.	359047
1	Support, RH service side	GM22704
1	Support, LH nonservice side	GM22705
2	Extruded rail, 17.65 in.	359041
2	Extruded rail, 6.25 in.	344682
2	Extruded rail, 4.35 in.	344688
2	Extruded rail, 31.44 in.	359042
2	Extruded rail, 26.94 in.	359043
3	Extruded rail, 19.55 in.	359044
1	Tube, exhaust, 3.0 in. ID x 9.5 in.	359463
1	Door, engine end, 20.75 x 22.54 in.	359605-S
1	Door, generator end, 20.75 x 13.25 in.	359606-S
1	Door, rear, 20.75 x 7.0 in.	359610-S
1	Door, LH nonservice side, 33.31 x 22.54 in.	359607-S
1	Door, RH service side, 33.31 x 22.54 in.	359604-S
1	Duct, end bracket, 20.5 x 19.22 in.	359611-S
1	Panel, nonservice side, 11.16 x 13.28 in.	359608-S
1	Panel, service side, with decal, 11.16 x 13.28 in.	359609-S
1	Roof, generator, 20.75 x 7.88 in.	359602-S
1	Roof, engine, 33.31 x 20.75 in.	359603-S
1	Rail, engine end, 21 x 5.25 in.	359613-S
1	Rail, generator end, 21 x 5.25 in.	359612-S
44	Screw, drill, #8 stainless steel	X-794-5
10	Clip, speed	297596
1	Hose, 0.75 in. ID x 9.75 in.	359093
4	Screw, hex cap, 1/4-20 x 0.875	X-465-22
1	Conduit, convoluted	X-6003-118
6	Nut, hex, 1/4-20	X-6234-1
2	Insulation, 4.37 x 4.5 in.	359069
1	Insulation, 33 x 4.5 in.	359070
1	Insulation, 33 x 4.5 in.	359071
1	Installation Instructions	TT-1327

Accessories, continued

Qty.	Description	Part No.
Sound Shield		GM22732-KP2
14	Washer, 0.281 x 0.625 x 0.065	X-25-142
2	Clamp, hose, 1.25 x 0.69	X-426-12
8	Clamp, hose, 3.75 x 2.81	X-426-1
14	Screw, hex cap, 1/4-20	X-465-24
8	Screw, PHM, 1/4-20 x 2	X-73-33
1	Hose, exhaust, 3.0 in. ID x 9.75 in.	X-507-9
1	Hose, exhaust, 3.0 in. ID x 6 in.	X-507-7
8	Washer, fiber, 0.25 in. ID x 0.71 in. OD	222889
1	Tube, exhaust, 3.0 in. OD x 11.5 in.	359462
6	Connector, outside	GM15486
2	Connector, inside	GM15487
1	Base, 25 x 51 in.	359047
1	Support, RH service side	GM22704
1	Support, LH nonservice side	GM22705
2	Extruded rail, 17.65 in.	359041
2	Extruded rail, 6.25 in.	344682
2	Extruded rail, 4.35 in.	344688
2	Extruded rail, 31.44 in.	359042
2	Extruded rail, 26.94 in.	359043
3	Extruded rail, 19.55 in.	359044
1	Tube, exhaust, 3.0 in. ID x 9.5 in.	359463
1	Door, engine end, 20.75 x 22.54 in.	359605-S
1	Door, generator end, 20.75 x 13.25 in.	359606-S
1	Door, rear, 20.75 x 7.0 in.	359610-S
1	Door, LH nonservice side, 33.31 x 22.54 in.	GM24896-S
1	Door, RH service side, 33.31 x 22.54 in.	359604-S
1	Duct, end bracket, 20.5 x 19.22 in.	359611-S
1	Panel, nonservice side, 11.16 x 13.28 in.	359608-S
1	Panel, service side, with decal, 11.16 x 13.28 in.	359609-S
1	Roof, generator, 20.75 x 7.88 in.	359602-S
1	Roof, engine, 33.31 x 20.75 in.	359603-S
1	Rail, engine end, 21 x 5.25 in.	359613-S
1	Rail, generator end, 21 x 5.25 in.	359612-S
44	Screw, drill, #8 stainless steel	X-794-5
10	Clip, speed	297596
1	Hose, 0.75 in. ID x 9.75 in.	359093
4	Screw, hex cap, 1/4-20 x 0.875	X-465-22
1	Conduit, convoluted	X-6003-118
6	Nut, hex, 1/4-20	X-6234-1
2	Insulation, 4.37 x 4.5 in.	359069
1	Insulation, 33 x 4.5 in.	359070
1	Insulation, 33 x 4.5 in.	359071
Sound Shield Door, Less 4dBA		GM23546-KP1
4	Clip, spring	344146
1	Panel, cover	GM23581
1	Panel, cover	GM23582
1	Foam, acoustic (28/32 Yanmar)	GM23690
1	Foam, acoustic (28/32 Yanmar)	GM23691
4	Rivet, pop, .187 in.	X-781-14
1	Door subassembly, sound shield (includes the following)	GM23547
2	Insert, threaded, 1/4-20 in.	344484
1	Latch, sound shield	344692
2	Pin, threaded (1/4-20 x 1.18")	345283
1	Door	GM23548
1	Panel, air duct	GM23549
1	Foam, acoustic (28/32 Yanmar)	GM23550
2	Foam, acoustic (28/32 Yanmar)	GM23551
1	Foam, acoustic (28/32 Yanmar)	GM23552
2	Foam, acoustic (28/32 Yanmar)	GM23553
10	Rivet, pop, .187 in.	X-781-14

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.

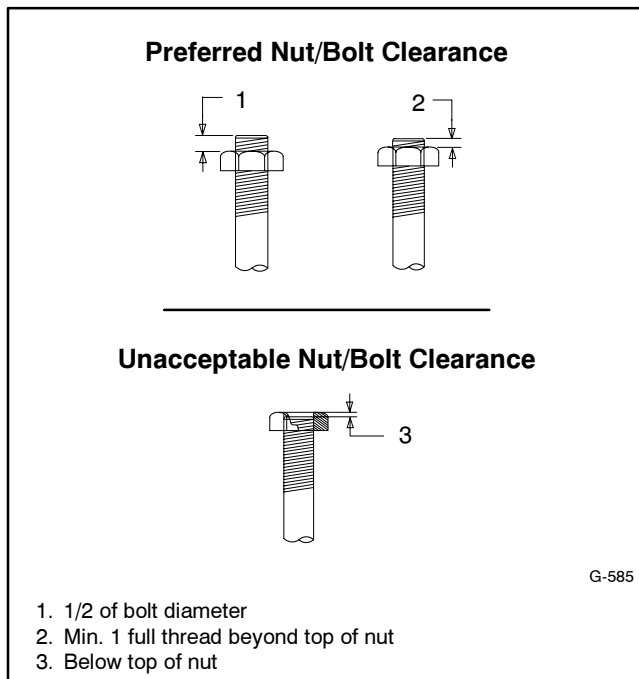


Figure 1 Acceptable Bolt Lengths

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.

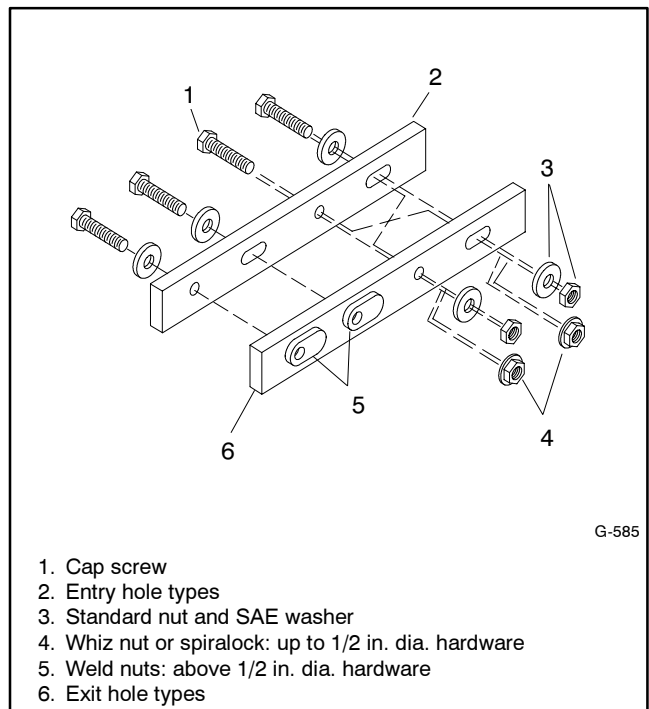


Figure 2 Acceptable Hardware Combinations

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	

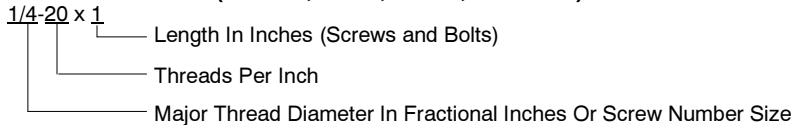
Hardness Grades	
American Standard	
Grade 2	
Grade 5	
Grade 8	
Grade 8/9 (Hex Socket Head)	
Metric	
Number stamped on hardware; 5.8 shown	

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

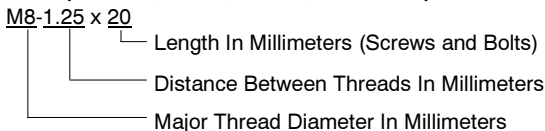
Phillips® screw is a registered trademark of Phillips Screw Company.

Sample Dimensions

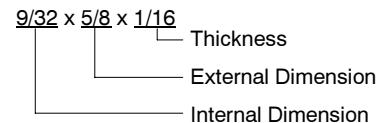
American Standard (Screws, Bolts, Studs, and Nuts)



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 Hex Head Bolts (Grade 5)

X-465-17	1/4-20 x .38
X-465-6	1/4-20 x .50
X-465-2	1/4-20 x .62
X-465-16	1/4-20 x .75
X-465-18	1/4-20 x .88
X-465-7	1/4-20 x 1.00
X-465-8	1/4-20 x 1.25
X-465-9	1/4-20 x 1.50
X-465-10	1/4-20 x 1.75
X-465-11	1/4-20 x 2.00
X-465-12	1/4-20 x 2.25
X-465-14	1/4-20 x 2.75
X-465-21	1/4-20 x 5.00
X-465-25	1/4-28 x .38
X-465-20	1/4-28 x 1.00
X-125-33	5/16-18 x .50
X-125-23	5/16-18 x .62
X-125-3	5/16-18 x .75
X-125-31	5/16-18 x .88
X-125-5	5/16-18 x 1.00
X-125-24	5/16-18 x 1.25
X-125-34	5/16-18 x 1.50
X-125-25	5/16-18 x 1.75
X-125-26	5/16-18 x 2.00
230578	5/16-18 x 2.25
X-125-29	5/16-18 x 2.50
X-125-27	5/16-18 x 2.75
X-125-28	5/16-18 x 3.00
X-125-22	5/16-18 x 4.50
X-125-32	5/16-18 x 5.00
X-125-35	5/16-18 x 5.50
X-125-36	5/16-18 x 6.00
X-125-40	5/16-18 x 6.50
X-125-43	5/16-24 x 1.75
X-125-44	5/16-24 x 2.50
X-125-30	5/16-24 x .75
X-125-39	5/16-24 x 2.00
X-125-38	5/16-24 x 2.75
X-6238-2	3/8-16 x .62
X-6238-10	3/8-16 x .75
X-6238-3	3/8-16 x .88
X-6238-11	3/8-16 x 1.00
X-6238-4	3/8-16 x 1.25
X-6238-5	3/8-16 x 1.50
X-6238-1	3/8-16 x 1.75
X-6238-6	3/8-16 x 2.00
X-6238-17	3/8-16 x 2.25
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

Part No. Dimensions Hex Head Bolts, cont.

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
X-6024-5	7/16-14 x .75
X-6024-2	7/16-14 x 1.00
X-6024-8	7/16-14 x 1.25
X-6024-3	7/16-14 x 1.50
X-6024-4	7/16-14 x 2.00
X-6024-11	7/16-14 x 2.75
X-6024-12	7/16-14 x 6.50
X-129-15	1/2-13 x .75
X-129-17	1/2-13 x 1.00
X-129-18	1/2-13 x 1.25
X-129-19	1/2-13 x 1.50
X-129-20	1/2-13 x 1.75
X-129-21	1/2-13 x 2.00
X-129-22	1/2-13 x 2.25
X-129-23	1/2-13 x 2.50
X-129-24	1/2-13 x 2.75
X-129-25	1/2-13 x 3.00
X-129-27	1/2-13 x 3.50
X-129-29	1/2-13 x 4.00
X-129-30	1/2-13 x 4.50
X-463-9	1/2-13 x 5.50
X-129-44	1/2-13 x 6.00
X-129-51	1/2-20 x .75
X-129-45	1/2-20 x 1.25
X-129-52	1/2-20 x 1.50
X-6021-3	5/8-11 x 1.00
X-6021-4	5/8-11 x 1.25
X-6021-2	5/8-11 x 1.50
X-6021-1	5/8-11 x 1.75
273049	5/8-11 x 2.00
X-6021-5	5/8-11 x 2.25
X-6021-6	5/8-11 x 2.50
X-6021-7	5/8-11 x 2.75
X-6021-12	5/8-11 x 3.75
X-6021-11	5/8-11 x 4.50
X-6021-10	5/8-11 x 6.00
X-6021-9	5/8-18 x 2.50
X-6239-1	3/4-10 x 1.00
X-6239-8	3/4-10 x 1.25
X-6239-2	3/4-10 x 1.50
X-6239-3	3/4-10 x 2.00
X-6239-4	3/4-10 x 2.50
X-6239-5	3/4-10 x 3.00
X-6239-6	3/4-10 x 3.50
X-792-1	1-8 x 2.25
X-792-5	1-8 x 3.00
X-792-8	1-8 x 5.00

Part No. Dimensions Type

Hex Nuts

X-6009-1	1-8	Standard
X-6210-3	6-32	Whiz
X-6210-4	8-32	Whiz
X-6210-5	10-24	Whiz
X-6210-1	10-32	Whiz
X-6210-2	1/4-20	Spiralock
X-6210-6	1/4-28	Spiralock
X-6210-7	5/16-18	Spiralock
X-6210-8	5/16-24	Spiralock
X-6210-9	3/8-16	Spiralock
X-6210-10	3/8-24	Spiralock
X-6210-11	7/16-14	Spiralock
X-6210-12	1/2-13	Spiralock
X-6210-15	7/16-20	Spiralock
X-6210-14	1/2-20	Spiralock
X-85-3	5/8-11	Standard
X-88-12	3/4-10	Standard
X-89-2	1/2-20	Standard

Washers

Part No.	ID	OD	Thick.	Bolt/ Screw
X-25-46	.125	.250	.022	#4
X-25-9	.156	.375	.049	#6
X-25-48	.188	.438	.049	#8
X-25-36	.219	.500	.049	#10
X-25-40	.281	.625	.065	1/4
X-25-85	.344	.687	.065	5/16
X-25-37	.406	.812	.065	3/8
X-25-34	.469	.922	.065	7/16
X-25-26	.531	1.062	.095	1/2
X-25-15	.656	1.312	.095	5/8
X-25-29	.812	1.469	.134	3/4
X-25-127	1.062	2.000	.134	1

Metric

Hex head bolts are hardness grade 8.8 unless noted.

Part No.	Dimensions	Part No.	Dimensions	Part No.	Dimensions
Hex Head Bolts (Partial Thread)					
M931-05055-60	M5-0.80 x 55	Hex Head Bolts (Partial Thread), continued		M961-14025-60	M14-1.50 x 25
M931-06040-60	M6-1.00 x 40	M960-16090-60	M16-1.50 x 90	M933-14025-60	M14-2.00 x 25
M931-06055-60	M6-1.00 x 55	M931-16090-60	M16-2.00 x 90	M961-14050-82	M14-1.50 x 50
M931-06060-60	M6-1.00 x 60	M931-16100-60	M16-2.00 x 100		
M931-06060-SS	M6-1.00 x 60	M931-16120-60	M16-2.00 x 120	M961-16025-60	M16-1.50 x 25
M931-06070-60	M6-1.00 x 70	M931-16150-60	M16-2.00 x 150	M933-16025-60	M16-2.00 x 25
M931-06070-SS	M6-1.00 x 70			M961-16030-82	M16-1.50 x 30*
M931-06075-60	M6-1.00 x 75	M931-20065-60	M20-2.50 x 65	M933-16030-82	M16-2.00 x 30*
M931-06090-60	M6-1.00 x 90	M931-20100-60	M20-2.50 x 100	M933-16035-60	M16-2.00 x 35
M931-06145-60	M6-1.00 x 145	M931-20120-60	M20-2.50 x 120	M961-16040-60	M16-1.50 x 40
M931-06150-60	M6-1.00 x 150	M931-20140-60	M20-2.50 x 140	M933-16040-60	M16-2.00 x 40
		M931-20160-60	M20-2.50 x 160	M961-16045-82	M16-1.50 x 45
M931-08035-60	M8-1.25 x 35	M931-22090-60	M22-2.50 x 90	M933-16045-82	M16-2.00 x 45
M931-08040-60	M8-1.25 x 40	M931-22120-60	M22-2.50 x 120	M933-16050-60	M16-2.00 x 50
M931-08040-82	M8-1.25 x 40*	M931-22160-60	M22-2.50 x 160	M933-16050-82	M16-2.00 x 50*
M931-08045-60	M8-1.25 x 45			M933-16060-60	M16-2.00 x 60
M931-08050-60	M8-1.25 x 50	M931-24090-60	M24-3.00 x 90	M933-16070-60	M16-2.00 x 70
M931-08055-60	M8-1.25 x 55	M931-24120-60	M24-3.00 x 120		
M931-08055-82	M8-1.25 x 55*	M931-24160-60	M24-3.00 x 160	M933-18035-60	M18-2.50 x 35
M931-08060-60	M8-1.25 x 60	Hex Head Bolts (Full Thread)			
M931-08070-60	M8-1.25 x 70	M933-04006-60	M4-0.70 x 6	M933-18050-60	M18-2.50 x 50
M931-08070-82	M8-1.25 x 70*			M933-18060-60	M18-2.50 x 60
M931-08075-60	M8-1.25 x 75	M933-05030-60	M5-0.80 x 30	M933-20050-60	M20-2.50 x 50
M931-08080-60	M8-1.25 x 80	M933-05035-60	M5-0.80 x 35	M933-20055-60	M20-2.50 x 55
M931-08090-60	M8-1.25 x 90	M933-05050-60	M5-0.80 x 50		
M931-08095-60	M8-1.25 x 95			M933-24060-60	M24-3.00 x 60
M931-08100-60	M8-1.25 x 100	M933-06010-60	M6-1.00 x 10	M933-24065-60	M24-3.00 x 65
M931-08110-60	M8-1.25 x 110	M933-06012-60	M6-1.00 x 12	M933-24070-60	M24-3.00 x 70
M931-08120-60	M8-1.25 x 120	M933-06014-60	M6-1.00 x 14	Pan Head Machine Screws	
M931-08130-60	M8-1.25 x 130	M933-06016-60	M6-1.00 x 16	M7985A-03010-20	M3-0.50 x 10
M931-08140-60	M8-1.25 x 140	M933-06020-60	M6-1.00 x 20	M7985A-03012-20	M3-0.50 x 12
M931-08150-60	M8-1.25 x 150	M933-06025-60	M6-1.00 x 25	M7985A-04010-20	M4-0.70 x 10
		M933-06040-60	M6-1.00 x 40	M7985A-04016-20	M4-0.70 x 16
M931-10040-82	M10-1.25 x 40*	M933-06050-60	M6-1.00 x 50	M7985A-04020-20	M4-0.70 x 20
M931-10040-60	M10-1.50 x 40			M7985A-04050-20	M4-0.70 x 50
M931-10045-60	M10-1.50 x 45	M933-07025-60	M7-1.00 x 25	M7985A-04100-20	M4-0.70 x 100
M931-10050-60	M10-1.50 x 50				
M931-10050-82	M10-1.25 x 50	M933-08010-60	M8-1.25 x 10	M7985A-05010-20	M5-0.80 x 10
M931-10055-60	M10-1.50 x 55	M933-08012-60	M8-1.25 x 12	M7985A-05012-20	M5-0.80 x 12
M931-10060-60	M10-1.50 x 60	M933-08016-60	M8-1.25 x 16	M7985A-05016-20	M5-0.80 x 16
M931-10065-60	M10-1.50 x 65	M933-08020-60	M8-1.25 x 20	M7985A-05020-20	M5-0.80 x 20
M931-10070-60	M10-1.50 x 70	M933-08025-60	M8-1.25 x 25	M7985A-05025-20	M5-0.80 x 25
M931-10080-60	M10-1.50 x 80	M933-08030-60	M8-1.25 x 30	M7985A-05030-20	M5-0.80 x 30
M931-10080-82	M10-1.25 x 80	M933-08030-82	M8-1.25 x 30*	M7985A-05080-20	M5-0.80 x 80
M931-10090-60	M10-1.50 x 90			M7985A-05100-20	M5-0.80 x 100
M931-10090-82	M10-1.50 x 90*	M933-10012-60	M10-1.50 x 12	M7985A-06100-20	M6-1.00 x 100
M931-10100-60	M10-1.50 x 100	M961-10020-60	M10-1.25 x 20		
M931-10110-60	M10-1.50 x 110	M933-10020-60	M10-1.50 x 20	Flat Head Machine Screws	
M931-10120-60	M10-1.50 x 120	M933-10025-60	M10-1.50 x 25	M965A-04012-SS	M4-0.70 x 12
M931-10130-60	M10-1.50 x 130	M961-10025-60	M10-1.25 x 25		
M931-10140-60	M10-1.50 x 140	M933-10025-82	M10-1.50 x 25	M965A-05012-SS	M5-0.80 x 12
M931-10180-60	M10-1.50 x 180	M961-10030-60	M10-1.25 x 30	M965A-05016-20	M5-0.80 x 16
M960-10330-60	M10-1.25 x 330	M933-10030-60	M10-1.50 x 30	M965A-06012-20	M6-1.00 x 12
		M933-10030-82	M10-1.50 x 30*		
M931-12045-60	M12-1.75 x 45	M961-10035-60	M10-1.25 x 35		
M960-12050-60	M12-1.25 x 50	M933-10035-60	M10-1.50 x 35		
M960-12050-82	M12-1.25 x 50*	M933-10035-82	M10-1.50 x 35		
M931-12050-60	M12-1.75 x 50	M961-10040-60	M10-1.25 x 40		
M931-12050-82	M12-1.75 x 50				
M931-12055-60	M12-1.75 x 55	M933-12016-60	M12-1.75 x 16		
M931-12060-60	M12-1.75 x 60	M933-12020-60	M12-1.75 x 20		
M931-12060-82	M12-1.75 x 60	M961-12020-60F	M12-1.50 x 20		
M931-12065-60	M12-1.75 x 65	M933-12025-60	M12-1.75 x 25		
M931-12075-60	M12-1.75 x 75	M933-12025-82	M12-1.75 x 25*		
M931-12080-60	M12-1.75 x 80	M961-12030-60	M12-1.25 x 30		
M931-12090-60	M12-1.75 x 90	M961-12030-82F	M12-1.50 x 30		
M931-12100-60	M12-1.75 x 100	M933-12030-60	M12-1.75 x 30		
M931-12110-60	M12-1.75 x 110	M933-12035-60	M12-1.75 x 35		
		M961-12040-82	M12-1.25 x 40*		
		M933-12040-60	M12-1.75 x 40		
		M933-12040-82	M12-1.75 x 40*		

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

Metric, continued

Part No.	Dimensions	Type
Hex Nuts		
M934-03-50	M3-0.50	Standard
M934-04-50	M4-0.70	Standard
M934-05-50	M5-0.80	Standard
M982-05-60	M5-0.80	Elastic Stop
M934-06-60	M6-1.00	Standard
M934-06-64	M6-1.00	Std. (green)
M6923-06-80	M6-1.00	Spirallock
M982-06-80	M6-1.00	Elastic Stop
M934-08-60	M8-1.25	Standard
M6923-08-80	M8-1.25	Spirallock
M982-08-80	M8-1.25	Elastic Stop
M934-10-60	M10-1.50	Standard
M934-10-60F	M10-1.25	Standard
M6923-10-80	M10-1.50	Spirallock
M6923-10-62	M10-1.50	Spirallock†
M982-10-80	M10-1.50	Elastic Stop
M934-12-60	M12-1.75	Standard
M934-12-60F	M12-1.25	Standard
M6923-12-80	M12-1.75	Spirallock
M982-12-80	M12-1.75	Elastic Stop
M982-14-60	M14-2.00	Elastic Stop
M6923-16-80	M16-2.00	Spirallock
M982-16-80	M16-2.00	Elastic Stop
M934-18-80	M18-2.5	Standard
M982-18-60	M18-2.50	Elastic Stop
M934-20-80	M20-2.50	Standard
M982-20-80	M20-2.50	Elastic Stop
M934-22-60	M22-2.50	Standard
M934-24-80	M24-3.00	Standard
M982-24-60	M24-3.00	Elastic Stop
M934-30-80	M30-3.50	Standard

Washers

Part No.	ID	OD	Thick.	Bolt/ Screw
M125A-03-80	3.2	7.0	0.5	M3
M125A-04-80	4.3	9.0	0.8	M4
M125A-05-80	5.3	10.0	1.0	M5
M125A-06-80	6.4	12.0	1.6	M6
M125A-08-80	8.4	16.0	1.6	M8
M125A-10-80	10.5	20.0	2.0	M10
M125A-12-80	13.0	24.0	2.5	M12
M125A-14-80	15.0	28.0	2.5	M14
M125A-16-80	17.0	30.0	3.0	M16
M125A-18-80	19.0	34.0	3.0	M18
M125A-20-80	21.0	37.0	3.0	M20
M125A-24-80	25.0	44.0	4.0	M24

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

TP-5998 9/02f

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