

Service Parts



Generator Sets

Models:

650-1000DSEB

650-1000DSEC

See Group 701: Literature, inside this manual for
part numbers of engine and accessory parts catalogs

See MP-6009 Parts Catalog Industrial Controllers
for controller parts



Table of Contents

Introduction	3
Numbering System Significance	3
Illustrations	3
How to Find Part Numbers	3
Hardware References	4
Specification Number Index	5
Group 101: Air Intake	6
Group 104: Cooling System	8
Group 105: Engine	12
Routine Engine Service Parts	13
Group 107: Nameplate and Decals	13
Group 109: Skid and Plant Mounting	14
Group 201: Generator and Mounting	19
Alternator Part Number and Mount Type	19
Control and Harness	24
Group 701: Literature	28
Kit List	29
Cooling System Kits	30
Appendix A Abbreviations	33
Appendix B Common Hardware Application Guidelines	35
Appendix C General Torque Specifications	36
Appendix D Common Hardware Identification	37
Appendix E Common Hardware List	38
Index	41

Introduction

This manual lists service replacement parts for 650-1000DSEB/C generator sets.

Information in this publication represents data available at the time of print. The manufacturer of DDC/MTU Power Generation products reserves the right to change this publication and the products represented without notice and without any obligation or liability whatsoever.

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.

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.

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.

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.

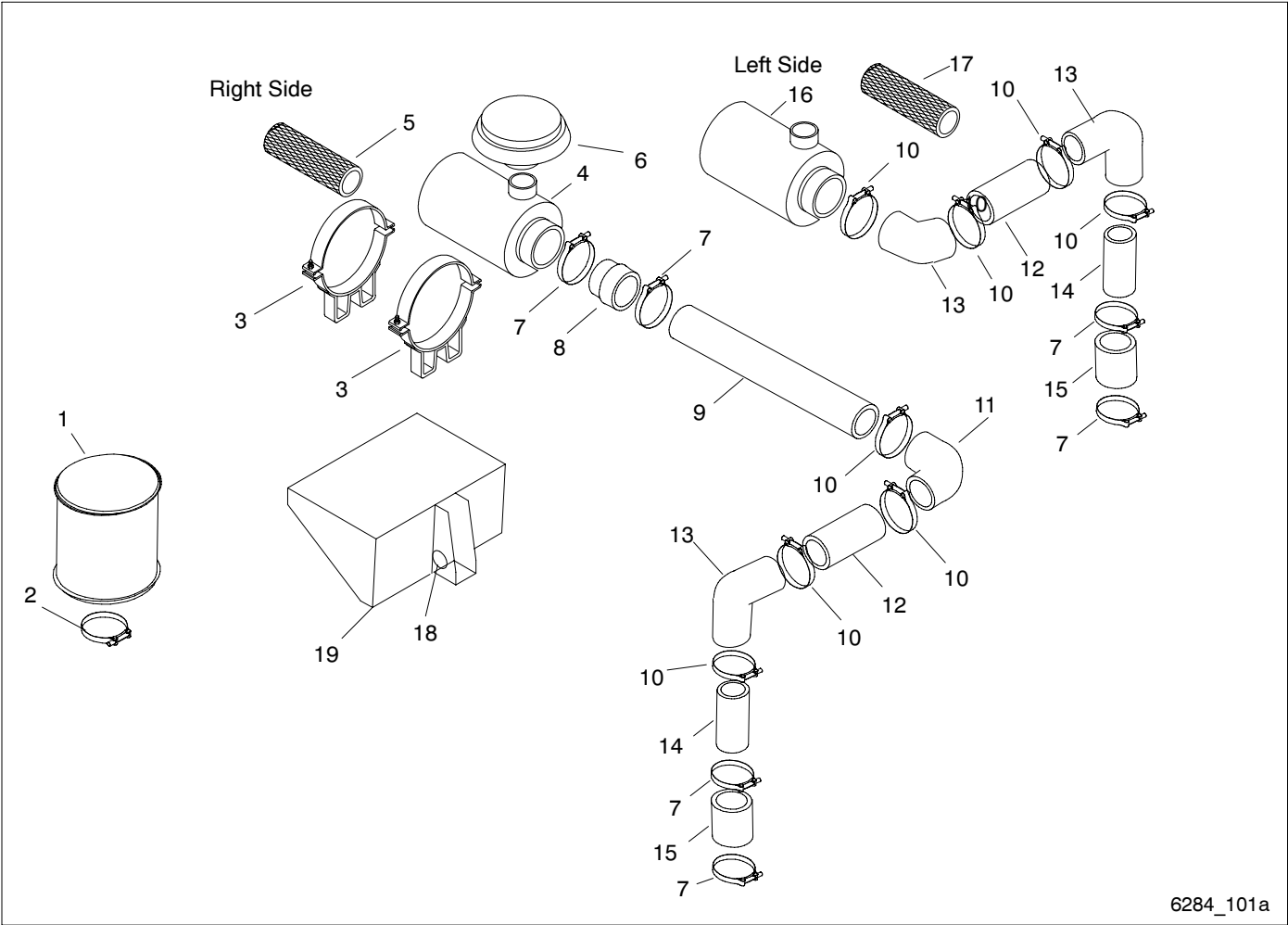
Specification Number Index

Group Title	Air Intake	Cooling System	Engine	Nameplates and Decals	Skid and Plant Mounting	Generator and Mounting	Controller and Mounting	Literature
Group No.	101	104	105	107	109	201	301	701
Spec No.	Variation Number							
Model								
650DSEB								
GM30408-GA1S	*	*	1	GR1	*	*	†	207
GM30408-GA2S	*	*	2	GR1	*	*	†	207
GM30408-GA11S	*	*	11	GR1	*	*	†	207
GM30408-GA12S	*	*	12	GR1	*	*	†	207
650DSEC								
GM47454-GA1S	*	*	19	GR1	*	*	†	225
GM47454-GA6S	*	*	20	GR1	*	*	†	225
750DSEB								
GM30408-GA3S	*	*	3	GR1	*	*	†	209
GM30408-GA4S	*	*	4	GR1	*	*	†	209
GM30408-GA13S	*	*	13	GR1	*	*	†	209
GM30408-GA14S	*	*	14	GR1	*	*	†	209
750DSEC								
GM47454-GA2S	*	*	21	GR1	*	*	†	227
GM47454-GA7S	*	*	22	GR1	*	*	†	227
800DSEB								
GM30408-GA9S	*	*	9	GR1	*	*	†	219
GM30408-GA10S	*	*	10	GR1	*	*	†	219
900DSEB								
GM30408-GA5S	*	*	5	GR1	*	*	†	211
GM30408-GA6S	*	*	6	GR1	*	*	†	211
GM30408-GA15S	*	*	15	GR1	*	*	†	211
GM30408-GA16S	*	*	16	GR1	*	*	†	211
900DSEC								
GM47454-GA4S	*	*	23	GR1	*	*	†	229
GM47454-GA9S	*	*	24	GR1	*	*	†	229
1000DSEB								
GM30408-GA7S	*	*	7	GR1	*	*	†	213
GM30408-GA8S	*	*	8	GR1	*	*	†	213
GM30408-GA17S	*	*	17	GR1	*	*	†	213
GM30408-GA18S	*	*	18	GR1	*	*	†	213
1000DSEC								
GM47454-GA5S	*	*	23	GR1	*	*	†	231
GM47454-GA10S	*	*	24	GR1	*	*	†	231

* Configured group. Refer to the generator set nameplate for the module number. Turn to the respective group on the following pages for parts breakdowns.

† Configured group. Refer to the generator set nameplate for the module number. See MP-6009 P/C Controllers for controller parts lists.

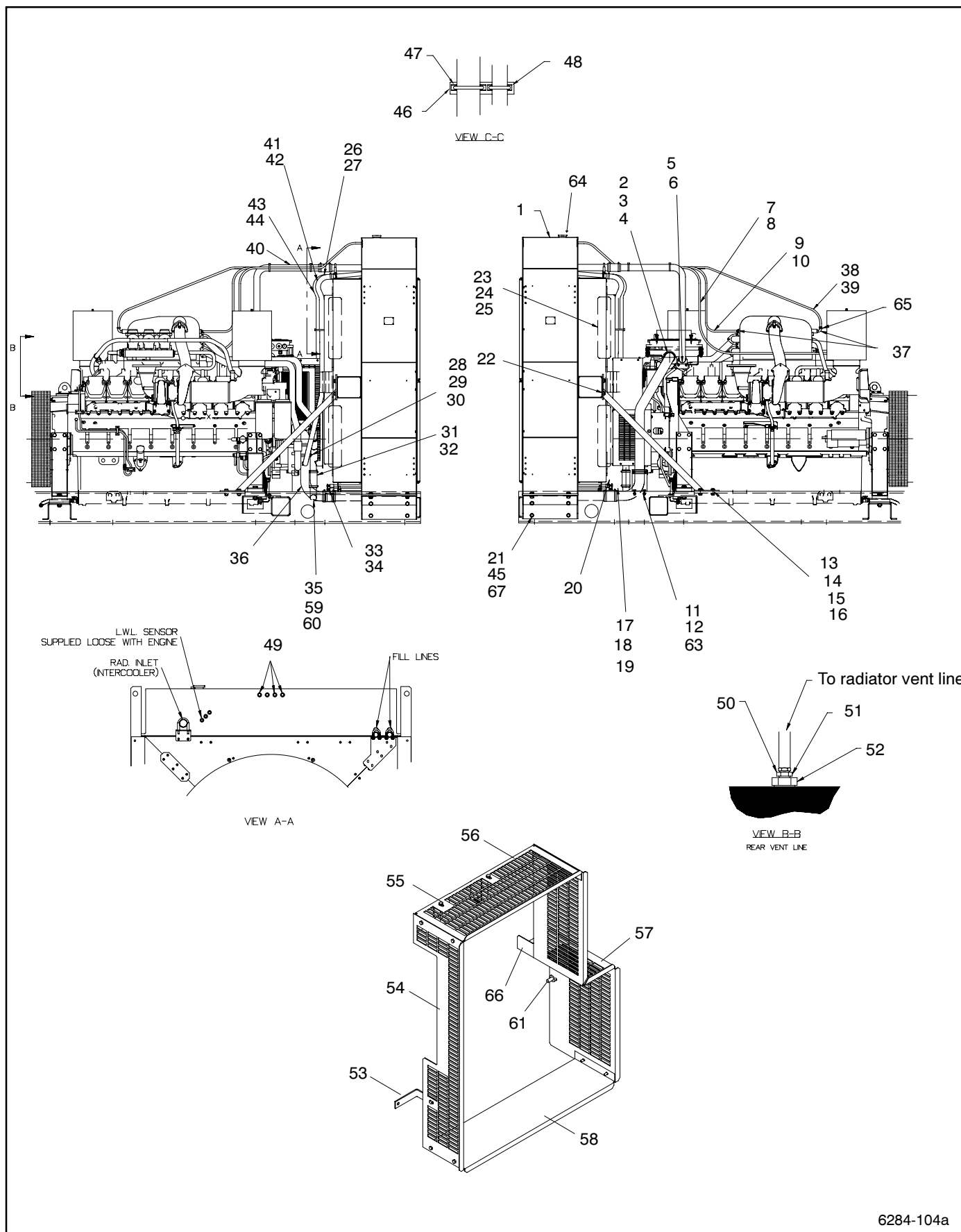
Group 101: Air Intake



Group 101: Air Intake

Item	Part Number	Description	Quantity Module				
			GM24329-MA2	GM31567-MA1	GM48846-MA1	GM48846-MA1	GM31567-MA2
1	GM28399	Air cleaner assembly	2				
2	GM30578	Clamp, hose	2				
3	279715	Mount, air cleaner, 18.00 in. ID		4	4	4	4
4	A-279714	Air cleaner assembly (DDC), right side		1	1	1	1
5	279738	Element, air cleaner, primary		1	1	1	1
6	279722	Cap, rain		2	2	2	2
7	279743	Clamp, hose, 8.38/8.69 in.		6	6	6	6
8	GM23518	Hose, hump, 8.00 in. ID		1	1	1	1
9	X-522-112	Tube, steel		1	1		
9	X-522-113	Tube, steel				1	1
10	279717	Clamp, hose, 8.63/8.94 in.		8	8	8	8
11	347957	Hose, 45 deg. elbow, 8.00 in. ID		1	1	1	1
12	X-522-115	Tube, steel		2	2	2	2
13	GM23519	Hose, 90 deg. elbow, 8.00 ID		3	3	3	3
14	X-522-114	Tube, steel		2			2
14	X-522-100	Tube, steel			2	2	
15	GM28302	Hose, straight air, 8.00 in. ID		2	2	2	2
16	A-279714	Air cleaner assembly, left side		1	1	1	1
17	279738	Element, air cleaner		1	1	1	1
18	X-634-23	Bushing, 1.968 x 2.50 in. NPT		1	1	1	1
19	GM31563	Bracket, heavy duty air cleaner		1			1
19	GM48847	Bracket, heavy duty air cleaner			1	1	
19	GM38631	Plate, spacer (not shown)		2	2	2	2

Group 104: Cooling System

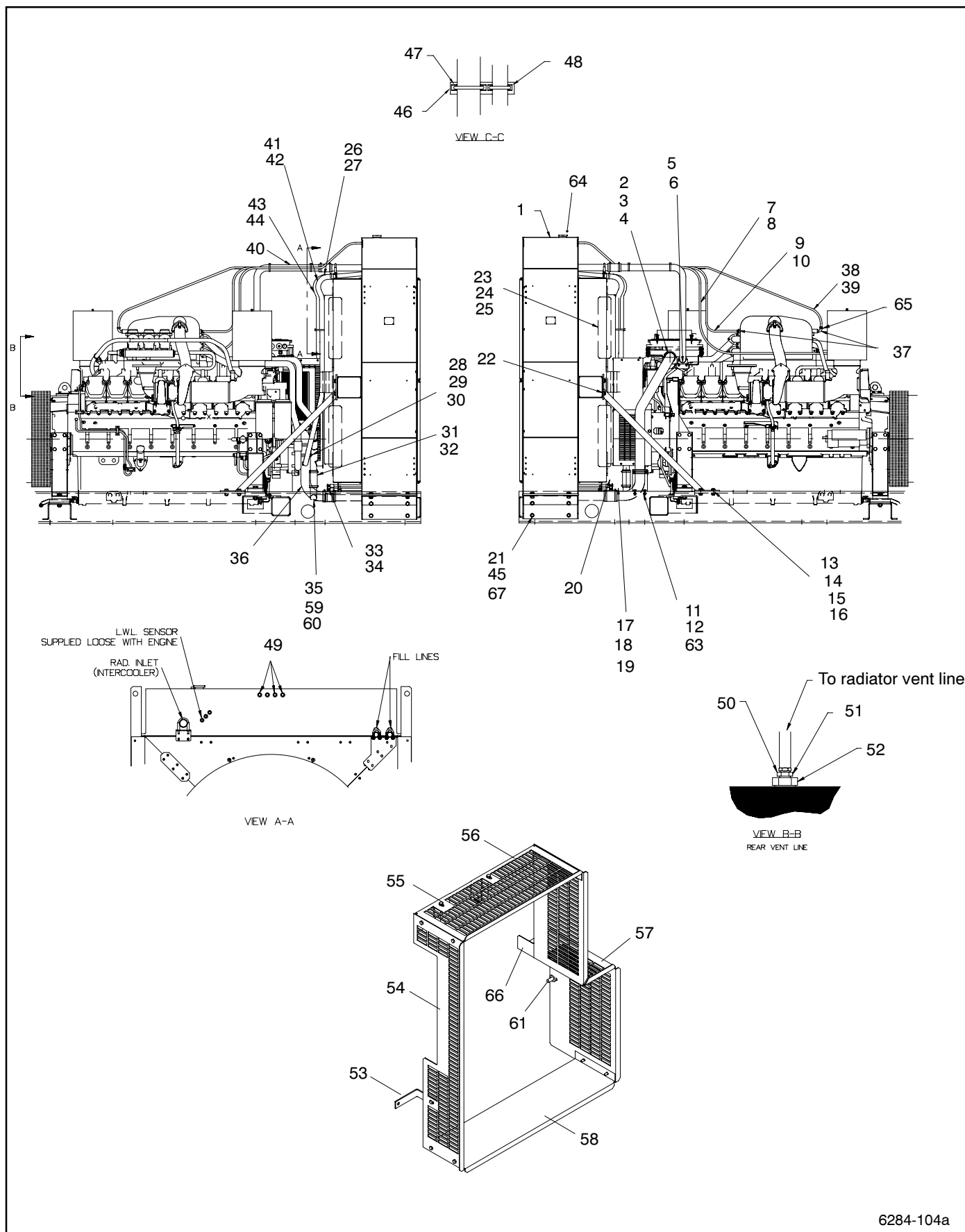


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Group 104: Cooling System

Item	Part Number	Description	Quantity								
			Module								
			GM30703-MA1	GM30703-MA2	GM30954-MA1	GM30954-MA2	GM31763-MA1	GM31763-MA2	GM31745-MA1	GM31745-MA2	GM31745-MA3
1	GM30483	Radiator assembly	1						1		
1	GM30485	Radiator assembly			1						
1	GM30484	Radiator assembly				1					
1	GM30486	Radiator assembly					1				
1	GM48107	Radiator assembly						1			
1	GM40277	Radiator assembly		1							
1	GM49008	Radiator assembly								1	
1	GM40738	Radiator assembly									1
2	GM30405	Hose, reducer	1	1	1	1	1	1	1	1	1
3	274824	Clamp, hose, 3.68/4 in.	1	1	1	1	1	1	1	1	1
4	291542	Clamp, hose, 3.25/3.56 in.	1	1	1	1	1	1	1	1	1
5	X-281-31	Hose, radiator, straight, 2 in. ID	1	1	1	1	1	1	1	1	1
6	249887	Clamp, hose, 2.25/2.56 in.	2	2	2	2	2	2	2	2	2
7	X-6359-16	Hose, rubber	1	1			1	1			
7	X-6359-14	Hose, rubber			1	1			1	1	1
8	X-426-9	Clamp, hose, .25/.70 in.	2	2	2	2	2	2	2	2	2
9	X-6359-7	Hose, rubber, straight, .25 in. ID	1	1	1	1	1	1	1	1	1
10	X-426-9	Clamp, hose, .25/.70 in.	2	2	2	2	2	2	2	2	2
11	GM32036	Bracket, coolant tube	1	1					1	1	1
11	GM30400	Bracket, water tube			1	1					
11	GM32037	Bracket, coolant tube					1	1			
12	286283	Clamp, muffler, 3.12 in.	1	1	1	1	1	1	1	1	1
13	GM30351	Support, radiator, right hand	1		1	1			1	1	
13	GM31743	Support, radiator, right hand		1							
13	GM40872	Support, radiator, right hand									1
14	GM30352	Support, radiator, left hand	1		1	1			1	1	
14	GM31744	Support, radiator, left hand		1							
14	GM40873	Support, radiator, left hand									1
15	X-801-9	Washer, hardened, .688 ID x 1.373 in. OD	4	4	4	4			4	4	4
16	X-6011-3	Washer, beveled, .68 ID x 1.5 in. OD	4	4	4	4			4	4	4
17	GM31741	Tube, lower radiator, jacket water	1	1					1	1	1
17	GM30403	Tube, lower radiator			1	1					
17	GM31758	Tube, lower radiator					1	1			
18	X-507-7	Hose, radiator, straight, 3 in. ID	1	1	1	1	1	1	1	1	1
19	291542	Clamp, hose, 3.25/3.56 in.	2	2	2	2	2	2	2	2	2
20	X-256-1	Valve, drain, 3/8 in. NPT	2	2	2	2	2	2	2	2	2
21	GM30330	Support, radiator	1		1	1					
21	GM33878	Support, radiator, right hand							1	1	
21	GM31740	Support, radiator		1							
21	GM40871	Support, radiator									1
22	X-801-9	Washer, hardened, .688 ID x 1.373 in. OD	4	4	4	4			4	4	4
23	299892	Fan, pusher	1		1	1			1		
23	GM29834	Fan, pusher			1						
23	GM31749	Fan, pusher					1	1			
23	GM47608	Fan, pusher		1							1
23	GM47607	Fan, pusher								1	
24	X-129-57	Bolt, hex cap	6	6	6	6	6	6	6	6	6
25	290945	Washer, hardened, .531 ID x 1.06 in. OD	6	6	6	6	6	6	6	6	6
26	X-281-31	Hose, radiator, straight, 2 in. ID	1	1	1	1	1	1	1	1	1
27	249887	Clamp, hose, 2.25/2.56 in.	2	2	2	2	2	2	2	2	2
28	GM30405	Hose, reducer	1	1	1	1	1	1	1	1	1
29	274824	Clamp, hose, 3.68/4 in.	1	1	1	1	1	1	1	1	1
30	291542	Clamp, hose, 3.25/3.56 in.	1	1	1	1	1	1	1	1	1
31	X-6014-116	Hose, radiator wire insert	1	1					1	1	1
31	X-6014-114	Hose, radiator wire insert			1	1					
31	X-6014-8	Hose, radiator wire insert					1	1			
32	249887	Clamp, hose, 2.25/2.56 in.	2	2	2	2	2	2	2	2	2
33	X-6014-53	Hose, radiator, straight, 3 in. ID	1	1	1	1	1	1	1	1	1
34	291542	Clamp, hose, 3.25/3.56 in.	2	2	2	2	2	2	2	2	2
35	GM30402	Tube, lower radiator	1	1	1	1	1	1	1	1	1
36	GM31761	Tube, lower radiator	1	1					1	1	1
36	GM30401	Tube, lower radiator			1	1					
36	GM31762	Tube, lower radiator					1	1			
37	X-6370-7	Connector, hose	2	2	2	2	2	2	2	2	2
38	X-6359-3	Hose, rubber, straight, .25 in. ID	1	1	1	1	1	1	1	1	1
39	X-426-9	Clamp, hose, .25/.70 in.	2	2	2	2	2	2	2	2	2

Group 104: Cooling System, continued

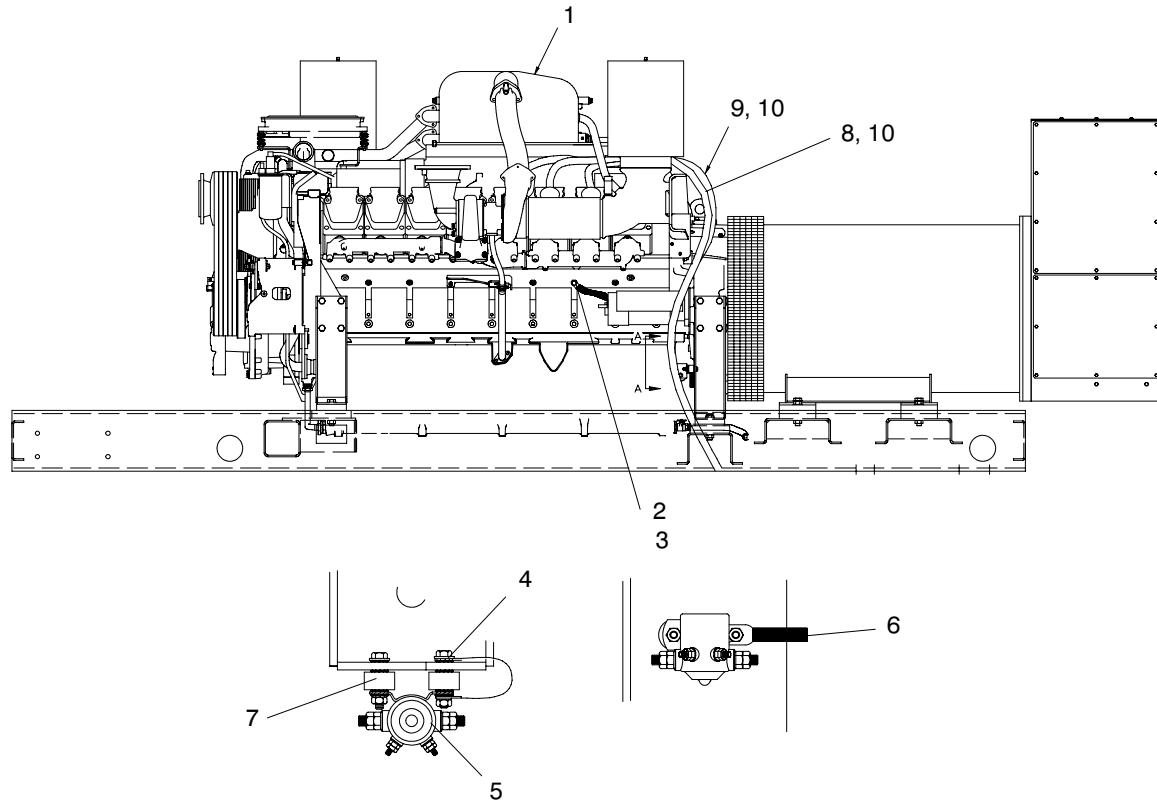


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Group 104: Cooling System, continued

Item	Part Number	Description	Quantity								
			Module								
			GM30703-MA1	GM30703-MA2	GM30954-MA1	GM30954-MA2	GM31763-MA1	GM31763-MA2	GM31745-MA1	GM31745-MA2	GM31745-MA3
40	GM30875	Tube, upper radiator (intercooler)	1	1					1	1	1
40	GM30404	Tube, upper radiator			1	1					
40	GM31757	Tube, upper radiator					1	1			
41	X-272-25	Hose, radiator, straight, 1.25 in. ID	1	1	1	1			1	1	1
41	X-272-27	Hose, radiator, straight, 1.25 in. ID					1	1			
42	X-426-8	Clamp, hose, .81/1.75 in.	2	2	2	2	2	2	2	2	2
43	X-272-29	Hose, radiator, straight, 1.25 in. ID	1	1	1	1			1	1	1
43	X-272-25	Hose, radiator, straight, 1.25 in. ID					1	1			
44	X-426-8	Clamp, hose, .81/1.75 in.	2	2	2	2	2	2	2	2	2
45	GM30330	Support, radiator	1		1	1					
45	GM33879	Support, radiator, left hand							1	1	
45	GM31740	Support, radiator		1							
45	GM40871	Support, radiator									1
46	GM32750	Support, tube	1	1	1	1	1	1	1	1	1
47	286283	Clamp, muffler, 3.12 in.	1	1	1	1	1	1	1	1	1
48	X-722-5	Clamp, muffler, 2.12 in.	1	1	1	1	1	1	1	1	1
49	X-582-25	Connector, hose + vibra seal	3	3	3	3	3	3	3	3	3
50	X-582-38	Connector, hose	1	1	1	1	1	1	1	1	1
51	X-202-60	Bushing, reducing, 3/4 in. to 3/8 in.	1	1	1	1	1	1	1	1	1
52	GM32319	Adapter bushing	1	1	1	1	1	1	1	1	1
53	GM31122	Bracket, mounting belt guard	1	1	1	1	1	1	1	1	1
54	GM31117	Guard, belt, right side	1			1			1	1	
54	GM42170	Guard, belt, right side			1						
54	GM32040	Guard, belt, right side		1			1	1			1
55	GM31121	Bracket, belt guard	2	2	2	2	2	2	2	2	2
56	GM31119	Guard, belt, top	1	1	1	1	1	1	1	1	1
57	GM31118	Guard, belt, left side	1			1			1	1	
57	GM42171	Guard, belt, left side			1						
57	GM32041	Guard, belt, left side		1			1	1			1
58	GM31120	Guard, belt, bottom	1	1		1	1	1	1	1	1
58	GM42172	Guard, belt, bottom			1						
59	X-6014-114	Hose, radiator wire insert	1	1	1	1	1	1	1	1	1
60	249887	Clamp, hose, 2.25/2.56 in.	2	2	2	2	2	2	2	2	2
61	X-400-198	Spacer, .437 ID x .875 OD x .25 in.	1	1	1	1	1	1	1	1	1
63	X-6011-4	Washer, beveled, .44 ID x 1.25 in. OD	2	2			2	2	2	2	2
64	GM23500	Cap, radiator	1	1	1	1	1	1	1	1	1
65	GM19032-2	Elbow, swivel nut	1	1	1	1	1	1	1	1	1
66	GM38292	Plate, closing	1	1	1	1	1	1	1	1	1
67	X-801-9	Washer, hardened, .688 ID x 1.373 in. OD	8	8	8	8			8	8	8

Group 105: Engine



Item	Part Number	Description	Quantity																	
			Variation Number																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	GM29887	Engine, 650 kW, 24 V, 60 Hz, w/CCB*	1																	
1	GM29888	Engine, 650 kW, 24 V, 50 Hz, w/CCB*		1																
1	GM29889	Engine, 750 kW, 24 V, 60 Hz, w/CCB*			1															
1	GM29890	Engine, 750 kW, 24 V, 60 Hz, w/CCB*				1														
1	GM37402	Engine, 800 kW, 24 V, 60 Hz, w/CCB*									1									
1	GM29891	Engine, 900 kW, 24 V, 60 Hz, w/CCB*					1													
1	GM29892	Engine, 900 kW, 24 V, 60 Hz, w/CCB*						1												
1	GM29893	Engine, 1000 kW, 24 V, 60 Hz, w/CCB*							1											
1	GM29894	Engine, 1000 kW, 24 V, 60 Hz, w/CCB*								1										
1	GM39707	Engine, 650 kW, 24 V, 60 Hz											1							
1	GM39708	Engine, 650 kW, 24 V, 50 Hz												1						
1	GM39709	Engine, 750 kW, 24 V, 60 Hz													1					
1	GM39710	Engine, 750 kW, 24 V, 50 Hz														1				
1	GM39715	Engine, 800 kW, 24 V, 60 Hz										1								
1	GM39711	Engine, 900 kW, 24 V, 60 Hz															1			
1	GM39712	Engine, 900 kW, 24 V, 50 Hz																1		
1	GM39713	Engine, 1000 kW, 24 V, 60 Hz																	1	
1	GM39714	Engine, 1000 kW, 24 V, 50 Hz																	1	
2	GM10772	Strap, ground, 14 in.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	X-22-26	Washer, lock, .521 ID x 1.24 in. OD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	X-22-12	Washer, lock, .262 ID x .743 in. OD	8	8	8	8					8	8					8	8	8	
5	272713	Solenoid	1	1	1	1					1	1					1	1	1	
6	223033	Strap, ground	1	1	1	1					1	1					1	1	1	
7	259632	Bumper	2	2	2	2					2	2					2	2	2	
8	X-6014-5	Hose, left side breather, 1 in. ID x 80 in.										1	1	1	1	1	1	1	1	
8	X-6014-95	Hose, left side breather, 1 in. ID x 73 in.										1	1	1	1	1	1	1	1	
8	X-6014-96	Hose, left side breather, 1 in. ID x 85 in.										1	1	1	1	1	1	1	1	
8	X-6014-119	Hose, left side breather, 1 in. ID x 93 in.										1					1	1	1	
9	X-6014-120	Hose, right side breather, 1 in. ID x 97 in.										1	1	1	1	1	1	1	1	
9	X-6014-121	Hose, right side breather, 1 in. ID x 103 in.										1					1	1	1	
9	X-6014-122	Hose, right side breather, 1 in. ID x 110 in.										1					1	1	1	
9	X-6014-93	Hose, right side breather, 1 in. ID x 90 in.											1	1	1	1				
10	X-426-8	Clamp, hose, .81/1.75 in.										7	5	5	5	5	7	7	7	

* CCB means closed crankcase breather option.

Group 105: Engine

Item	Part Number	Description	Quantity							
			Variation Number							
			19	20	21	22	23	24	25	26
1	GM47144	Engine, 650 kW, 24 V, 60 Hz, w/CCB*	1		1					
1	GM47143	Engine, 750 kW, 24 V, 60 Hz, w/CCB*					1			
1	GM47142	Engine, 900 kW, 24 V, 60 Hz, w/CCB*							1	
1	GM47141	Engine, 1000 kW, 24 V, 60 Hz, w/CCB*								
1	GM47153	Engine, 650 kW, 24 V, 60 Hz		1						
1	GM47152	Engine, 750 kW, 24 V, 60 Hz				1				
1	GM47151	Engine, 900 kW, 24 V, 60 Hz						1		
1	GM47150	Engine, 1000 kW, 24 V, 60 Hz								1
2	GM10772	Strap, ground, 14 in.	1	1	1	1	1	1	1	1
3	X-22-26	Washer, lock, .521 ID x 1.24 in. OD	1	1	1	1	1	1	1	1
4	X-22-12	Washer, lock, .262 ID x .743 in. OD					8	8	8	8
5	272713	Solenoid					1	1	1	1
6	223033	Strap, ground					1	1	1	1
7	259632	Bumper					2	2	2	2
8	X-6014-5	Hose, left side breather, 1 in. ID x 80 in.		1		1		1		1
8	X-6014-95	Hose, left side breather, 1 in. ID x 73 in.		1		1		1		1
8	X-6014-96	Hose, left side breather, 1 in. ID x 85 in.		1		1		1		1
8	X-6014-119	Hose, left side breather, 1 in. ID x 93 in.						1		1
9	X-6014-120	Hose, right side breather, 1 in. ID x 97 in.		1		1		1		1
9	X-6014-121	Hose, right side breather, 1 in. ID x 103 in.						1		1
9	X-6014-122	Hose, right side breather, 1 in. ID x 110 in.						1		1
9	X-6014-93	Hose, right side breather, 1 in. ID x 90 in.		1		1				
10	X-426-8	Clamp, hose, .81/1.75 in.		5		5		7		7

* CCB means closed crankcase breather option.

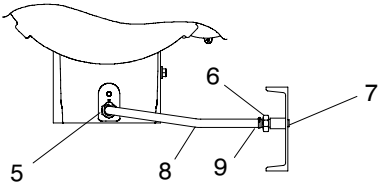
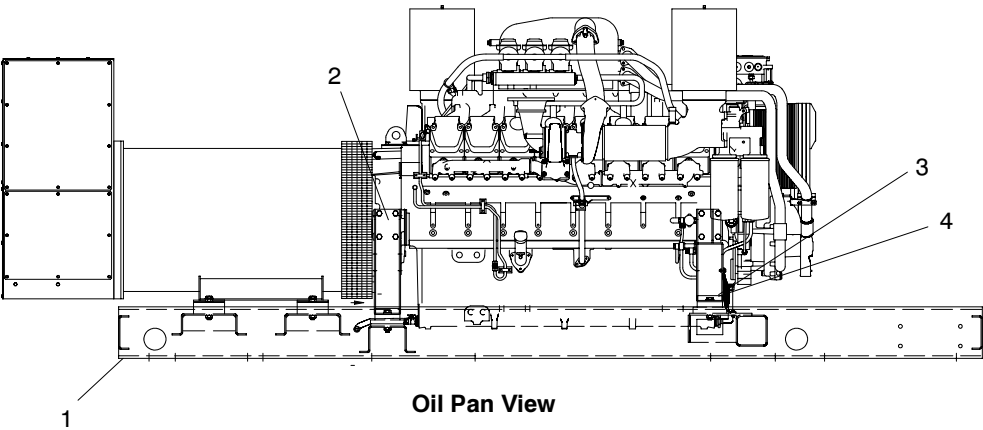
Routine Engine Service Parts

Item	Part Number	Description	Quantity (per engine)
1	GM30210	Filter, fuel	1
2	365528	Filter, oil	2
3	GM35176	Belt, alternator	1
4	GM35177	Thermostat	3
5	GM35178	O-ring, thermostat	3
6	GM35810	Fan belt kit	1

Group 107: Nameplate and Decals

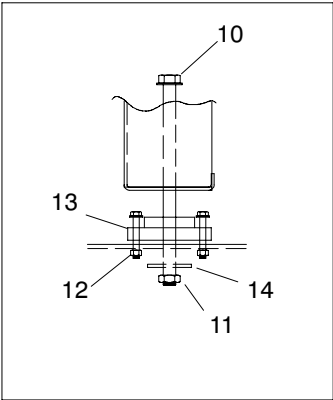
Item	Part Number	Description	Quantity
			Variation Number GR1S
1	238402	Decal, caution positive term. only	1
2	249809	Decal, caution hot engine	2
3	249808	Decal, warning rotating parts	1
4	249810	Decal, warning hot coolant	1
5	255882	Decal, caution stdby svc connect	1
6	257438	Decal, danger moving rotor	1
7	294520	Decal, danger	1
8	347166	Decal, electrical equipment	1
9	GM13227	Decal, warning fan force	1
10	GM13228	Decal, warning lifting support	1
11	364116	Decal, caution welding disconnect	1
12	324069	Nameplate, model/ratings, DDC/MTU logo	1
13	GM23477-6	Decal, DDC/MTU logo	1
14	GM15300	Decal, exhaust piping	1
15	GM19296	Decal, fuel type	1

Group 109: Skid and Plant Mounting

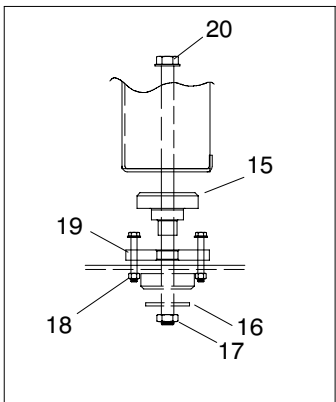


Detailed Mounting Views

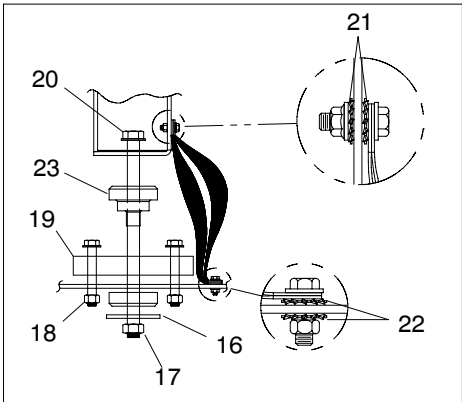
Solid mounting



Isolation mounting



Generator end



Radiator end

Group 109: Skid and Plant Mounting

Item	Part Number	Description	Quantity															
			Module															
			GM29802-MA1	GM29802-MA2	GM29802-MA3	GM29802-MA4	GM29802-MA5	GM29802-MA6	GM29802-MA7	GM29802-MA8	GM29798-MA1	GM29798-MA2	GM29798-MA3	GM29798-MA4	GM29798-MA5	GM29798-MA6	GM29798-MA7	GM29798-MA8
1	GM29793	Skid	1								1							
1	GM29794	Skid		1								1						
1	GM29795	Skid			1								1					
1	GM29830	Skid				1								1				
1	GM29831	Skid					1								1			
1	GM31856	Skid						1								1		
1	GM31858	Skid							1								1	
1	GM31857	Skid								1								1
2	GM30600	Foot, engine mounting	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	GM30477	Foot, engine mounting, right side	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	GM29796	Foot, engine mounting, left side	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	GM30602	Valve, oil drain	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	X-582-1	Connector, hose + vibra seal	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	X-75-3	Plug, pipe, 1/2 in. NPT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	X-577-35	Hose, rubber, straight, .62 in. ID	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	X-426-3	Clamp, hose, .56/1.06 in.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	M931-24120-60	Screw, hex cap	4	4	4	4	4	4	4	4								
11	M934-24-80	Nut, hex	4	4	4	4	4	4	4	4								
12	M934-20-80	Nut, hex	8	8	8	8	8	8	8	8								
13	361668	Plate, spacer mounting	4	4	4	4	4	4	4	4								
14	M125A-24-80	Washer, plain	4	4	4	4	4	4	4	4								
15	361919	Vibromount									2					2		
15	361054	Vibromount										2	2	2	2		2	2
16	X-25-152	Washer, plain, 1.06 ID x 5.25 in									4	4	4	4	4	4	4	4
17	M982-24-60	Nut, hex elastic stop									4	4	4	4	4	4	4	4
18	M934-20-80	Nut, hex									8	8	8	8	8	8	8	8
19	361039	Plate, generator mounting									4	4	4	4	4	4	4	4
20	M931-24160-60	Screw, hex cap									4	4	4	4	4	4	4	4
21	X-22-15	Washer, lock, .456 ID x 1.058 in. OD									2	2	2	2	2	2	2	2
22	X-22-16	Washer, lock, .326 ID x .883 in. OD									2	2	2	2	2	2	2	2
23	361054	Vibromount									2		2			2		2
23	361919	Vibromount										2		2	2		2	

Non-Tier 2

Component of item 1, Alternator

Alternator Mounting Bracket

Skid

Solid Mount

Isolation Mount

Mounting Detail

Alternator Parts

Inner Panel Side View

6284_201a

Group 201: Generator and Mounting

Item	Part Number	Description	Qty.
1	See chart p. 19	Alternator assembly	1
2	M931-20140-60	Screw, hex cap, 3/4-pt. mtg., isolation*	2/4
2	M931-24160-60	Screw, hex cap, 4-pt. mtg., isolation, 7M alternator	4
3	361734	Vibromount, 3-pt. mtg.	2
3	361734	Vibromount, 4-pt. mtg.	4
3	361919	Vibromount, 4-pt. mtg. (5M4044 only, 7M)	4
4	361733	Plate, generator mounting*	2/4
4	361039	Plate, generator mounting (5M4044 only, 7M)	4
5	M982-20-80	Nut, hex elastic stop, 3-pt. mtg.	2
5	M982-20-60	Nut, hex elastic stop, 4-pt. mtg.	4
5	M982-24-60	Nut, hex elastic stop, 4-pt. mtg., 7M	4
5	X-400-239	Spacer, 4-pt. mtg., 5M4044 alt.	4
6	X-25-155	Washer, plain	8
6	X-25-152	Washer, plain, 7M	8
7	M931-20120-60	Screw, hex cap, 3-pt. mtg.	2
7	M931-20120-60	Screw, hex cap, 4-pt. mtg., 5M alt.	4
7	M931-24120-60	Screw, hex cap, 4-pt. mtg., 7M alt.	4
8	X-400-241	Spacer, 4-pt. mtg., 5M alternator	4
9	290743	Shim, 4-pt. mtg.	4
9	365410	Shim, 3-pt. mtg.	4
10	290744	Shim, 4-pt. mtg.	4
10	365411	Shim, 3-pt. mtg.	4
11	291191	Shim, 4-pt. mtg.	4
11	365412	Shim, 3-pt. mtg.	4
12	M934-20-80	Nut, hex elastic stop, 3/4-pt. mtg.*	2/4
12	M934-24-80	Nut, hex elastic stop, 7M alternator	4
13	361061	Plate, generator mounting, 5M044, 7M	2
13	GM30445	Plate, generator mounting	4
14	M934-20-80	Nut, hex elastic stop†	4/8
15	See chart p. 19	Screw, hex cap	6
16	X-801-5	Washer, hardened, .656 ID x 1.06	6
17	M931-12050-82	Screw, hex cap (5M)	16
17	M933-12040-82	Screw, hex cap (7M)	16
18	M125A-12-80	Washer, plain	16
19	328903	Screen, 5M alternator	1
19	328904	Screen, 7M alternator	1
22	X-83-7	Nut, hex, zinc, 3/8-16	2
23	X-6086-6	Washer, spring, .39 ID x .81 in. OD	2
24	X-25-118	Washer, plain, .406 ID x 1 in. OD	4
25	X-22-14	Washer, lock, .391 ID x .975 in.	4
26	361271	Bus, ground	1
27	365476	Bracket, inner panel	1
28	X-6217-10	Screw, hex flange machine	25
29	229353	Mount, controller	4

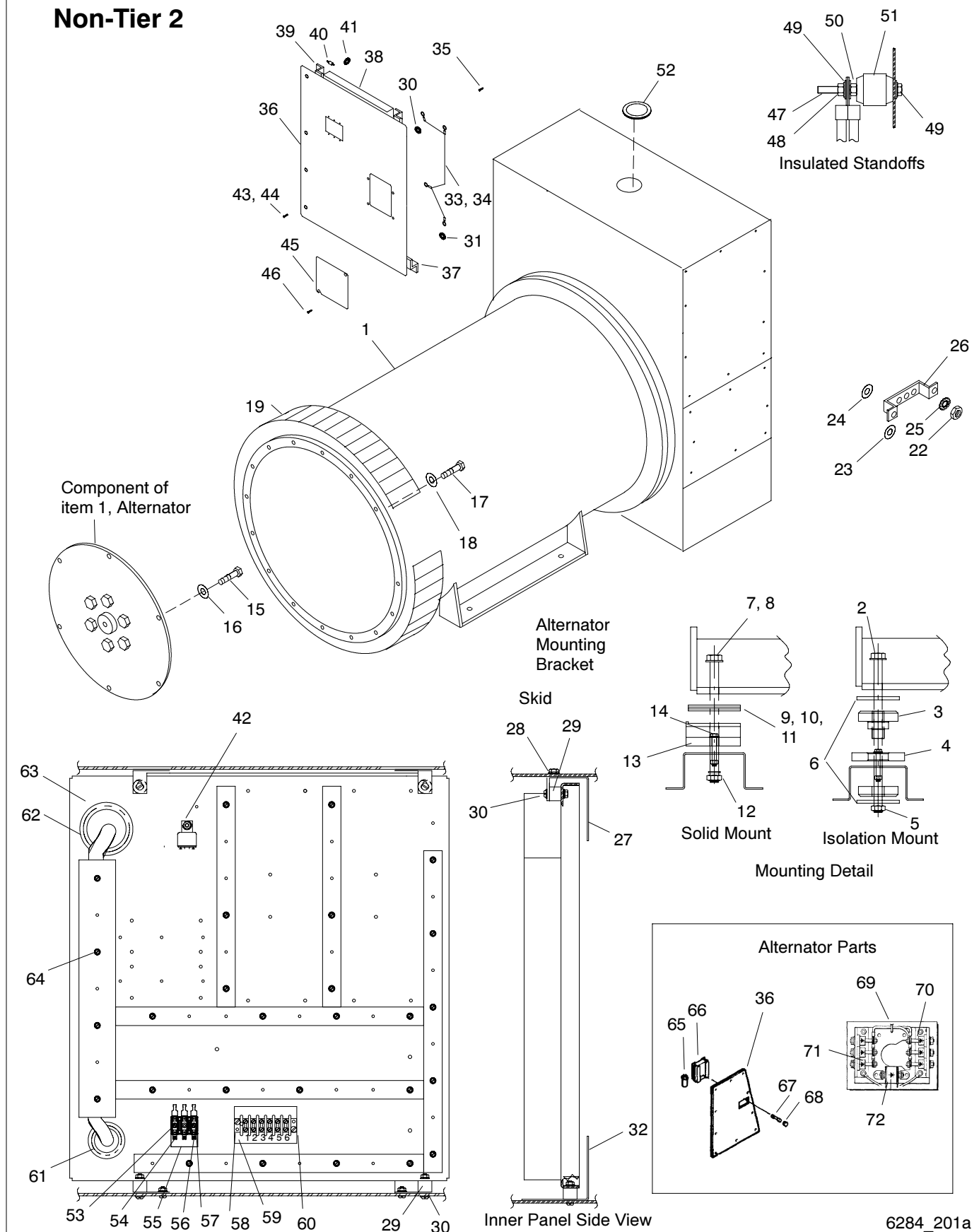
* 3-point mounting uses qty. 2; 4-point mounting uses qty. 4

† 3-point mounting uses qty. 4; 4-point mounting uses qty. 8

Item	Part Number	Description	Qty.
30	X-22-12	Washer, lock, .262 ID x .743 in.	8
31	X-22-13	Washer, lock, .20 ID x .595 in. OD	1
32	361478	Retainer, inner panel	2
33	GM21264	Harness, inner panel ground	1
34	361567	Base, tie wrap (not shown)	2
35	X-67-151	Screw (DVR mounting bracket)	6
36	GM31958	Door, junction box	1
37	GM13561	Bracket, door panel mounting, bottom	1
38	GM13563	Panel, inner door	1
39	GM13562	Bracket, door panel mounting, top	2
40	282829	Vibromount	6
41	X-22-18	Washer, lock, .172 ID x .595 in. OD	12
42	272684	Relay	1
43	X-6217-10	Screw, hex flange machine	25
44	295009	Retainer	2
45	GM17571	Cover, access	1
46	X-50-2	Screw, slotted pan head machine	4
47	X-6274-7	Rod, threaded	3
48	X-6086-6	Washer, spring, .39 ID x .81 in. OD	6
49	X-25-118	Washer, plain, .406 ID x 1 in. OD	9
50	X-83-7	Nut, hex, 3/8-16, zinc	6
51	X-6128-29	Insulator, standoff, 3/8-16 x 2 in.	3
52	X-634-23	Bushing, 1.968 x 2.50 in. NPT	2
53	X-49-26	Screw, cross recess PHM	2
54	292821	Fuse holder	1
55	GM28584	Strip, marker	1
56	292937	Fuse, 20 A	1
57	239298	Fuse, 5 A	1
58	X-49-6	Screw, pan head 6-32 x 1/2	4
59	299090	Marker, strip	1
60	295314	Block, terminal	1
61	X-634-16	Bushing, 1.312 x 1.50 in. NPT	1
62	X-634-23	Bushing, 1.968 x 2.50 in. NPT	1
63	361186	Panel, junction box, inner	1
64	X-67-43	Screw, thread-cutting	27
65	347160	Capacitor	1
66	328725	Voltage regulator, DVR2000	1
67	279778	Fuse, 5 A	1
68	279779	Cap, fuse	1
69	347071	Exciter rectifier assembly	1
69	347070	Exciter rectifier assembly, 7M alt.	1
70	279772	Diode, standard polarity	1
70	279773	Diode, standard polarity, 7M alt.	1
71	279774	Diode, reversing polarity	1
71	279775	Diode, reversing polarity, 7M alt.	1
72	279776	Surge suppressor	1
72	279777	Surge suppressor, 7M alt.	1

Group 201: Generator and Mounting, continued

Non-Tier 2



Group 201: Generator and Mounting, continued

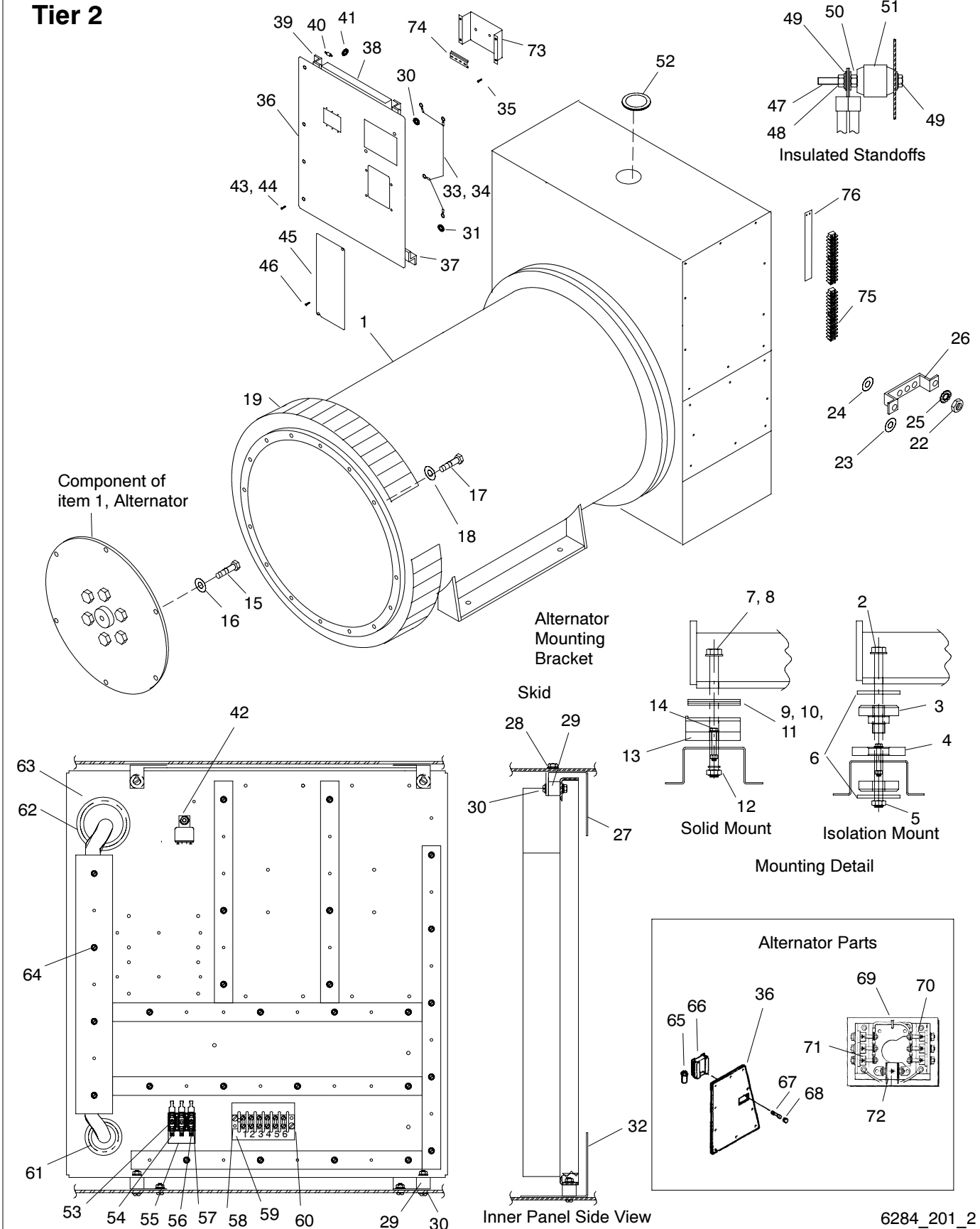
Alternator Part Number and Mount Type

Use this table to identify the module number's mount type, item 1, and item 15.

Module Number	Alternator Description	Mount Type	Item1, Alternator	Item15, Hex Cap Screw
GM29691-MA1	5M4030, 10-Lead	Isolation, 3-point mounting	GM11976	M933-16030-82
GM29691-MA2	5M4030, 10-Lead	Solid, 3-point mounting	GM11976	M933-16030-82
GM29691-MA3	5M4032, 10-Lead	Isolation, 3-point mounting	A-361756	M933-16030-82
GM29691-MA4	5M4032, 10-Lead	Solid, 3-point mounting	A-361756	M933-16030-82
GM29691-MA5	5M4034, 10-Lead	Isolation, 3-point mounting	A-361757	M933-16030-82
GM29691-MA6	5M4034, 10-Lead	Solid, 3-point mounting	A-361757	M933-16030-82
GM29691-MA7	5M4036, 10-Lead	Isolation, 3-point mounting	A-361758	M933-16030-82
GM29691-MA8	5M4036, 10-Lead	Solid, 3-point mounting	A-361758	M933-16030-82
GM29691-MA9	5M4038, 10-Lead	Isolation, 3-point mounting	A-361762	M933-16030-82
GM29691-MA10	5M4038, 10-Lead	Solid, 3-point mounting	A-361762	M933-16030-82
GM29691-MA11	5M4164, 4-Lead	Isolation, 3-point mounting	GM12022	M933-16030-82
GM29691-MA12	5M4164, 4-Lead	Solid, 3-point mounting	GM12022	M933-16030-82
GM29691-MA13	5M4166, 4-Lead	Isolation, 3-point mounting	A-361759	M933-16030-82
GM29691-MA14	5M4166, 4-Lead	Solid, 3-point mounting	A-361759	M933-16030-82
GM29691-MA15	5M4272, 4-Lead	Isolation, 3-point mounting	GM12023	M933-16030-82
GM29691-MA16	5M4272, 4-Lead	Solid, 3-point mounting	GM12023	M933-16030-82
GM29691-MA17	5M4276, 4-Lead	Isolation, 3-point mounting	A-361760	M933-16030-82
GM29691-MA18	5M4276, 4-Lead	Solid, 3-point mounting	A-361760	M933-16030-82
GM29691-MA19	5M4278, 4-Lead	Isolation, 3-point mounting	A-361761	M933-16030-82
GM29691-MA20	5M4278, 4-Lead	Solid, 3-point mounting	A-361761	M933-16030-82
GM29675-MA1	5M4036, 10-Lead	Isolation, 4-point mounting	A-361758	M933-16030-82
GM29675-MA2	5M4036, 10-Lead	Solid, 4-point mounting	A-361758	M933-16030-82
GM29675-MA3	5M4038, 4-Lead	Isolation, 4-point mounting	A-361762	M933-16030-82
GM29675-MA4	5M4038, 4-Lead	Solid, 4-point mounting	A-361762	M933-16030-82
GM29675-MA5	5M4044, 4-bus	Isolation, 4-point mounting	A-361765	M933-16030-82
GM29675-MA6	5M4044, 4-bus	Solid, 4-point mounting	A-361765	M933-16030-82
GM29675-MA7	7M4046, 4-bus	Isolation, 4-point mounting	GM37563	M933-16030-82
GM29675-MA8	7M4046, 4-bus	Solid, 4-point mounting	GM37563	M933-16030-82
GM29675-MA9	5M4168, 4-Lead	Isolation, 4-point mounting	A-361763	M933-16030-82
GM29675-MA10	5M4168, 4-Lead	Solid, 4-point mounting	A-361763	M933-16030-82
GM29675-MA11	5M4280, 4-Lead	Isolation, 4-point mounting	A-361764	M933-16030-82
GM29675-MA12	5M4280, 4-Lead	Solid, 4-point mounting	A-361764	M933-16030-82
GM29675-MA13	7M4170, 4-bus	Isolation, 4-point mounting	GM37564	M933-16045-82
GM29675-MA14	7M4170, 4-bus	Solid, 4-point mounting	GM37564	M933-16045-82
GM29675-MA15	7M4282, 4-bus	Isolation, 4-point mounting	GM37565	M933-16045-82
GM29675-MA16	7M4282, 4-bus	Solid, 4-point mounting	GM37565	M933-16045-82
GM29675-MA17	7M4284, 4-bus	Isolation, 4-point mounting	GM37566	M933-16045-82
GM29675-MA18	7M4284, 4-bus	Solid, 4-point mounting	GM37566	M933-16045-82
GM29675-MA19	5M4034, 10-Lead	Isolation, 4-point mounting	A-361757	M933-16030-82
GM29675-MA20	5M4034, 10-Lead	Solid, 4-point mounting	A-361757	M933-16030-82
GM29675-MA21	5M4166, 4-Lead	Isolation, 4-point mounting	A-361759	M933-16030-82
GM29675-MA22	5M4166, 4-Lead	Solid, 4-point mounting	A-361759	M933-16030-82
GM29675-MA23	5M4278, 4-Lead	Isolation, 4-point mounting	A-361761	M933-16030-82
GM29675-MA24	5M4278, 4-Lead	Solid, 4-point mounting	A-361761	M933-16030-82

Group 201: Generator and Mounting, continued

Tier 2



Group 201: Generator and Mounting, continued

Item	Part Number	Description	Qty.
1	See chart p. 23	Alternator assembly	1
2	M931-20140-60	Screw, hex cap, 3/4-pt. mtg., isolation*	2/4
2	M931-24160-60	Screw, hex cap, 4-pt. mtg., isolation, 7M alternator	4
3	361734	Vibromount, 3-pt. mtg.	2
3	361734	Vibromount, 4-pt. mtg.	4
3	361919	Vibromount, 4-pt. mtg. (5M4044 only, 7M)	4
4	361733	Plate, generator mounting*	2/4
4	361039	Plate, generator mounting (5M4044 only, 7M)	4
5	M982-20-80	Nut, hex elastic stop, 3-pt. mtg.	2
5	M982-20-60	Nut, hex elastic stop, 4-pt. mtg.	4
5	M982-24-60	Nut, hex elastic stop, 4-pt. mtg., 7M	4
5	X-400-239	Spacer, 4-pt. mtg., 5M4044 alt.	4
6	X-25-155	Washer, plain	8
6	X-25-152	Washer, plain, 7M	8
7	M931-20120-60	Screw, hex cap, 3-pt. mtg.	2
7	M931-20120-60	Screw, hex cap, 4-pt. mtg., 5M alt.	4
7	M931-24120-60	Screw, hex cap, 4-pt. mtg., 7M alt.	4
8	X-400-241	Spacer, 4-pt. mtg., 5M alternator	4
9	290743	Shim, 4-pt. mtg.	4
9	365410	Shim, 3-pt. mtg.	4
10	290744	Shim, 4-pt. mtg.	4
10	365411	Shim, 3-pt. mtg.	4
11	291191	Shim, 4-pt. mtg.	4
11	365412	Shim, 3-pt. mtg.	4
12	M934-20-80	Nut, hex elastic stop, 3/4-pt. mtg.*	2/4
12	M934-24-80	Nut, hex elastic stop, 7M alternator	4
13	361061	Plate, generator mounting, 5M044, 7M	2
13	GM30445	Plate, generator mounting	4
14	M934-20-80	Nut, hex elastic stop†	4/8
15	See chart p. 19	Screw, hex cap	6
16	X-801-5	Washer, hardened, .656 ID x 1.06	6
17	M931-12050-82	Screw, hex cap (5M)	16
17	M933-12040-82	Screw, hex cap (7M)	16
18	M125A-12-80	Washer, plain	16
19	328903	Screen, 5M alternator	1
19	328904	Screen, 7M alternator	1
22	X-83-7	Nut, hex, zinc, 3/8-16	2
23	X-6086-6	Washer, spring, .39 ID x .81 in. OD	2
24	X-25-118	Washer, plain, .406 ID x 1 in. OD	4
25	X-22-14	Washer, lock, .391 ID x .975 in.	4
26	361271	Bus, ground	1
27	365476	Bracket, inner panel	1
28	X-6217-10	Screw, hex flange machine	25
29	229353	Mount, controller	4
30	X-22-12	Washer, lock, .262 ID x .743 in.	8
31	X-22-13	Washer, lock, .20 ID x .595 in. OD	1

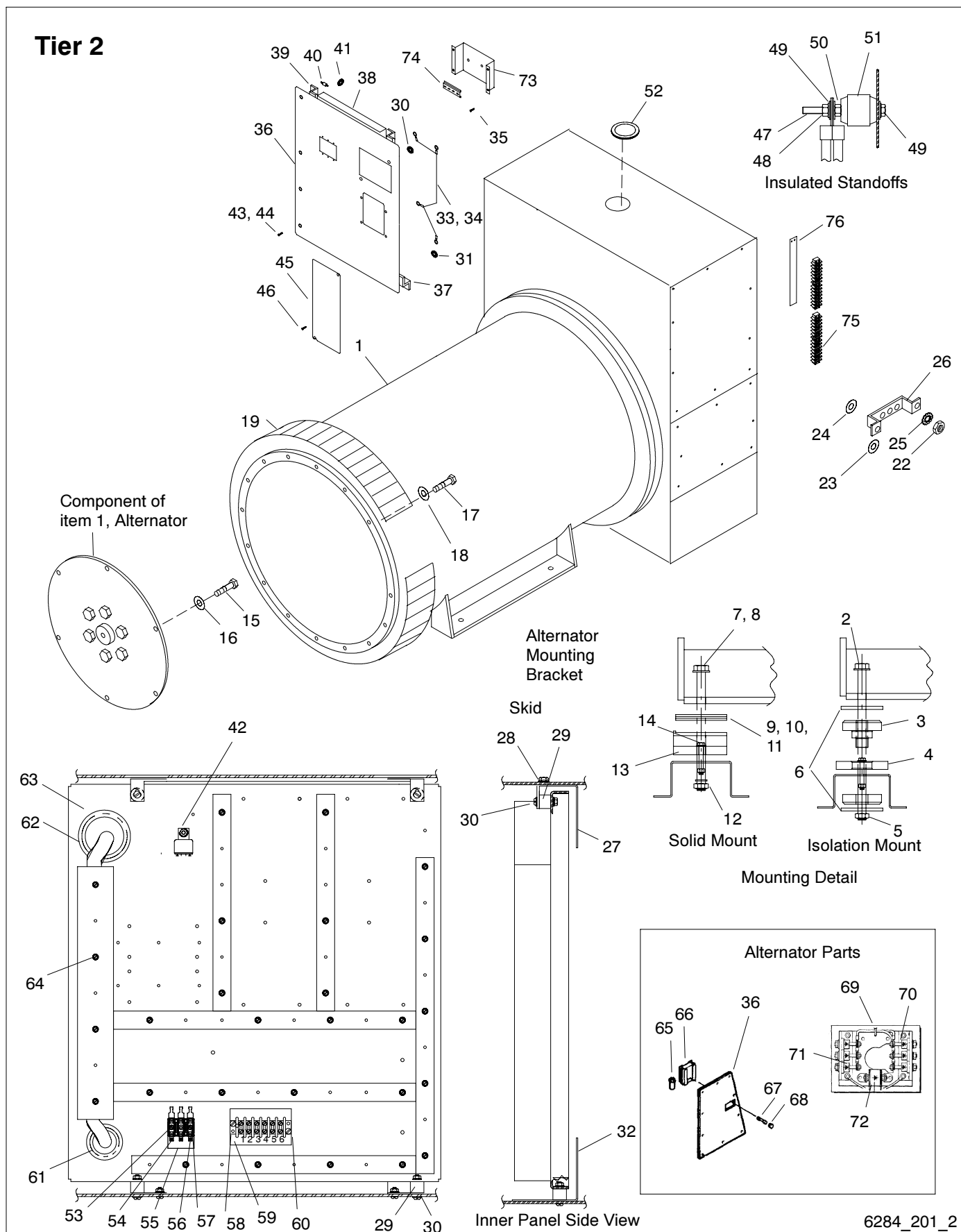
* 3-point mounting uses qty. 2; 4-point mounting uses qty. 4

† 3-point mounting uses qty. 4; 4-point mounting uses qty. 8

Item	Part Number	Description	Qty.
32	361478	Retainer, inner panel	2
33	GM21264	Harness, inner panel ground	1
34	361567	Base, tie wrap (not shown)	2
35	X-67-151	Screw (DVR mounting bracket)	6
36	GM13564	Door, junction box	1
37	GM13561	Bracket, door panel mounting, bottom	1
38	GM13563	Panel, inner door	1
39	GM13562	Bracket, door panel mounting, top	2
40	282829	Vibromount	6
41	X-22-18	Washer, lock, .172 ID x .595 in. OD	12
42	272684	Relay	1
43	X-6217-10	Screw, hex flange machine	25
44	295009	Retainer	2
45	GM13565	Cover, access	1
46	X-50-2	Screw, slotted pan head machine	6
47	X-6274-7	Rod, threaded	3
48	X-6086-6	Washer, spring, .39 ID x .81 in. OD	6
49	X-25-118	Washer, plain, .406 ID x 1 in. OD	9
50	X-83-7	Nut, hex, 3/8-16, zinc	6
51	X-6128-29	Insulator, standoff, 3/8-16 x 2 in.	3
52	X-634-23	Bushing, 1.968 x 2.50 in. NPT	2
53	X-49-26	Screw, cross recess PHM	2
54	292821	Fuse holder	1
55	GM40888	Strip, marker	1
56	283645	Fuse, 15 A	1
57	283645	Fuse, 15 A	1
58	X-49-6	Screw, pan head 6-32 x 1/2	4
59	299090	Marker, strip	1
60	295314	Block, terminal	1
61	X-634-16	Bushing, 1.312 x 1.50 in. NPT	1
62	X-634-23	Bushing, 1.968 x 2.50 in. NPT	1
63	361186	Panel, junction box, inner	1
64	X-67-43	Screw, thread-cutting	27
65	347160	Capacitor	1
66	328725	Voltage regulator, DVR2000	1
67	279778	Fuse, 5 A	1
68	279779	Cap, fuse	1
69	347071	Exciter rectifier assembly	1
69	347070	Exciter rectifier assembly, 7M alt.	1
70	279772	Diode, standard polarity	1
70	279773	Diode, standard polarity, 7M alt.	1
71	279774	Diode, reversing polarity	1
71	279775	Diode, reversing polarity, 7M alt.	1
72	279776	Surge suppressor	1
72	279777	Surge suppressor, 7M alt.	1
73	GM48782	Bracket, mounting	1
74	GM48806	Rail, DIN	1
75	328913	Strip, terminal (23 term.)	2
76	GM11657	Marker, strip	1

Group 201: Generator and Mounting, continued

Tier 2



6284_201_2

Group 201: Generator and Mounting, continued

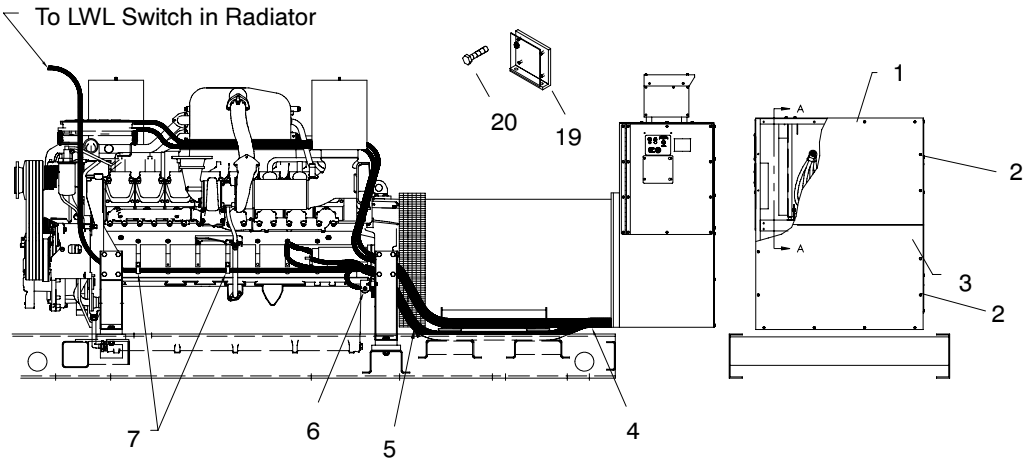
Alternator Part Number and Mount Type

Use this table to identify the module number's mount type, item 1, and item 15.

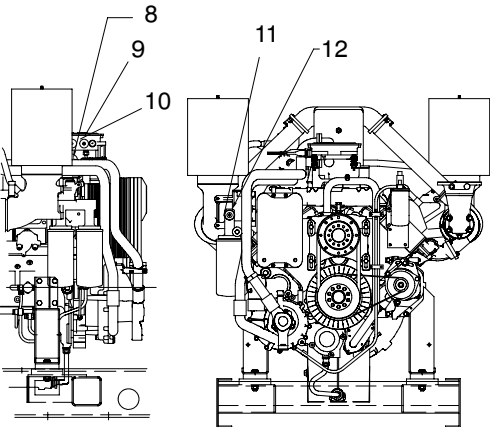
Module Number	Alternator Description	Mount Type	Item1, Alternator	Item15, Hex Cap Screw
GM48809-MA1	5M4030, 10-Lead	Isolation, 3-point mounting	GM11976	M933-16030-82
GM48809-MA2	5M4030, 10-Lead	Solid, 3-point mounting	GM11976	M933-16030-82
GM48809-MA3	5M4032, 10-Lead	Isolation, 3-point mounting	A-361756	M933-16030-82
GM48809-MA4	5M4032, 10-Lead	Solid, 3-point mounting	A-361756	M933-16030-82
GM48809-MA5	5M4034, 10-Lead	Isolation, 3-point mounting	A-361757	M933-16030-82
GM48809-MA6	5M4034, 10-Lead	Solid, 3-point mounting	A-361757	M933-16030-82
GM48809-MA7	5M4036, 10-Lead	Isolation, 3-point mounting	A-361758	M933-16030-82
GM48809-MA8	5M4036, 10-Lead	Solid, 3-point mounting	A-361758	M933-16030-82
GM48809-MA9	5M4038, 10-Lead	Isolation, 3-point mounting	A-361762	M933-16030-82
GM48809-MA10	5M4038, 10-Lead	Solid, 3-point mounting	A-361762	M933-16030-82
GM48809-MA11	5M4164, 4-Lead	Isolation, 3-point mounting	GM12022	M933-16030-82
GM48809-MA12	5M4164, 4-Lead	Solid, 3-point mounting	GM12022	M933-16030-82
GM48809-MA13	5M4166, 4-Lead	Isolation, 3-point mounting	A-361759	M933-16030-82
GM48809-MA14	5M4166, 4-Lead	Solid, 3-point mounting	A-361759	M933-16030-82
GM48809-MA15	5M4272, 4-Lead	Isolation, 3-point mounting	GM12023	M933-16030-82
GM48809-MA16	5M4272, 4-Lead	Solid, 3-point mounting	GM12023	M933-16030-82
GM48809-MA17	5M4276, 4-Lead	Isolation, 3-point mounting	A-361760	M933-16030-82
GM48809-MA18	5M4276, 4-Lead	Solid, 3-point mounting	A-361760	M933-16030-82
GM48809-MA19	5M4278, 4-Lead	Isolation, 3-point mounting	A-361761	M933-16030-82
GM48809-MA20	5M4278, 4-Lead	Solid, 3-point mounting	A-361761	M933-16030-82
GM48807-MA1	5M4036, 10-Lead	Isolation, 4-point mounting	A-361758	M933-16030-82
GM48807-MA2	5M4036, 10-Lead	Solid, 4-point mounting	A-361758	M933-16030-82
GM48807-MA3	5M4038, 4-Lead	Isolation, 4-point mounting	A-361762	M933-16030-82
GM48807-MA4	5M4038, 4-Lead	Solid, 4-point mounting	A-361762	M933-16030-82
GM48807-MA5	5M4044, 4-bus	Isolation, 4-point mounting	A-361765	M933-16030-82
GM48807-MA6	5M4044, 4-bus	Solid, 4-point mounting	A-361765	M933-16030-82
GM48807-MA7	7M4046, 4-bus	Isolation, 4-point mounting	GM37563	M933-16030-82
GM48807-MA8	7M4046, 4-bus	Solid, 4-point mounting	GM37563	M933-16030-82
GM48807-MA9	5M4168, 4-Lead	Isolation, 4-point mounting	A-361763	M933-16030-82
GM48807-MA10	5M4168, 4-Lead	Solid, 4-point mounting	A-361763	M933-16030-82
GM48807-MA11	5M4280, 4-Lead	Isolation, 4-point mounting	A-361764	M933-16030-82
GM48807-MA12	5M4280, 4-Lead	Solid, 4-point mounting	A-361764	M933-16030-82
GM48807-MA13	7M4170, 4-bus	Isolation, 4-point mounting	GM37564	M933-16045-82
GM48807-MA14	7M4170, 4-bus	Solid, 4-point mounting	GM37564	M933-16045-82
GM48807-MA15	7M4282, 4-bus	Isolation, 4-point mounting	GM37565	M933-16045-82
GM48807-MA16	7M4282, 4-bus	Solid, 4-point mounting	GM37565	M933-16045-82
GM48807-MA17	7M4284, 4-bus	Isolation, 4-point mounting	GM37566	M933-16045-82
GM48807-MA18	7M4284, 4-bus	Solid, 4-point mounting	GM37566	M933-16045-82

Control and Harness

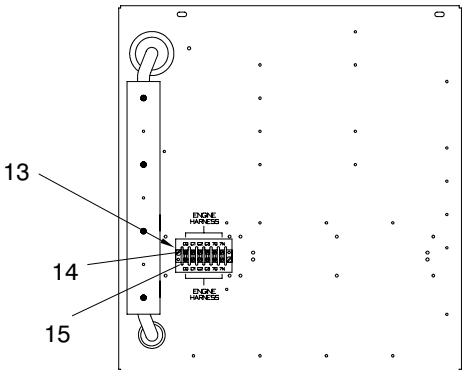
Non-Tier 2



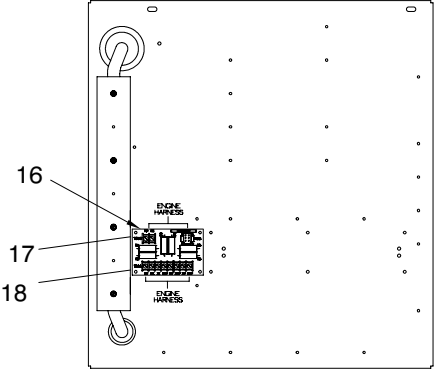
Items 21-30 are not shown.



Inner panels



VIEW A-A



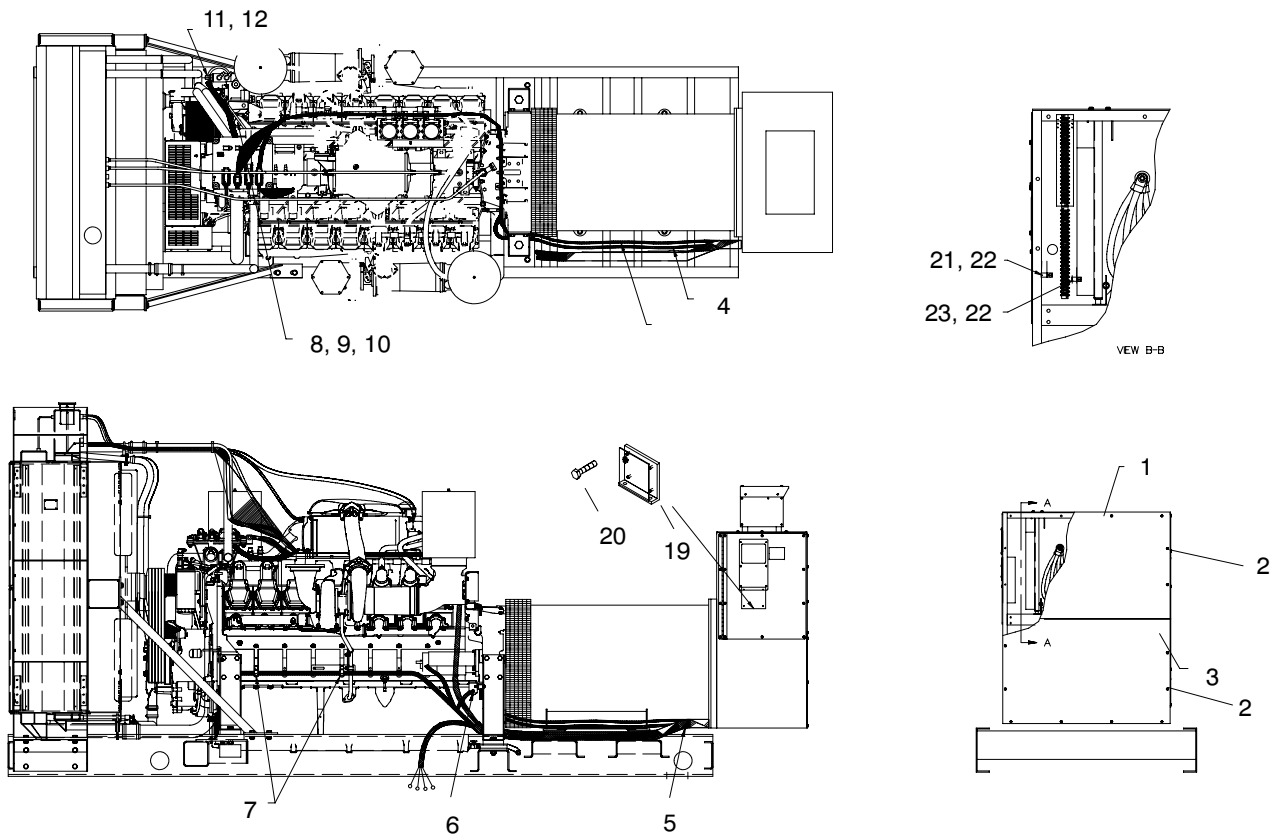
Digital 550, 600 volt maximum

Control and Harness

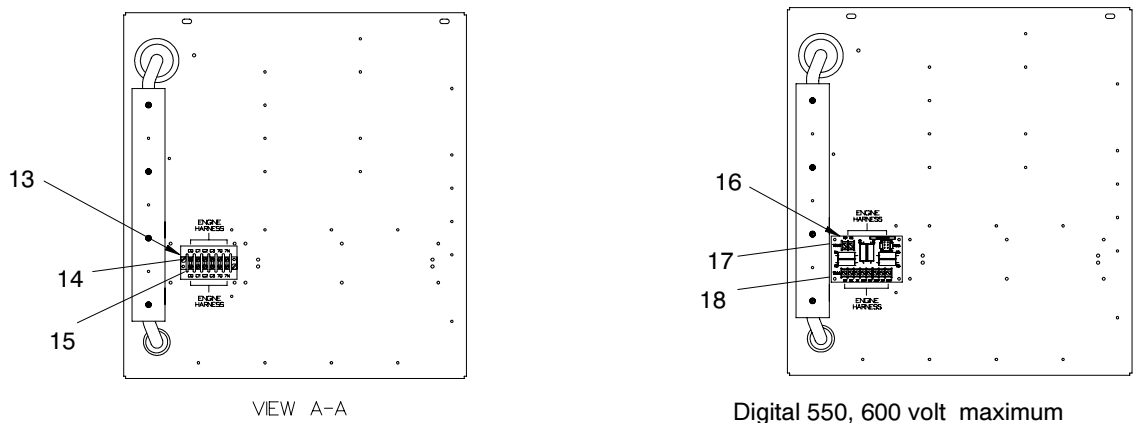
Item	Part Number	Description	Quantity					
			Module					
			GM30870-MA1	GM30870-MA2	GM30870-MA3	GM31025-MA1	GM31025-MA2	GM31025-MA3
1	361184	Panel, junction box top	1	1	1	1	1	1
2	X-6217-10	Screw, hex flange machine	24	24	24	24	24	24
3	361826	Panel, junction box bottom	1	1	1	1	1	1
3	328901	Panel, junction box bottom		1			1	
4	GM30897	Harness, engine power (includes item 21)	1	1	1	1	1	1
5	GM30896	Harness, engine (includes items 22-30)	1	1				
5	GM32761	Harness, engine (includes items 22-30)			1			
5	GM32760	Harness, engine (includes items 22-30)						1
5	GM30907	Harness, engine (includes items 22-30)						
6	238915	Boot	2	2	2	2	2	2
7	X-672-6	Clamp, insulation, 1.38 in.	2	2	2	2	2	2
8	GM10166	Sender, temperature				1	1	1
9	364364	Adapter, bushing				1	1	1
10	X-6427-7	Washer, copper				1	1	1
11	365624	Sender, oil pressure				1	1	1
12	GM31040	Adapter, bushing				1	1	1
13	295314	Block, terminal				1	1	1
14	255080	Marker, strip				1	1	1
15	X-49-6	Screw, cross recess pan head				1	1	1
16	GM13980	PCB assembly, CT burden resistor	1	1	1			
17	X-70-12	Nut, hex machine screw, 8-32	4	4	4			
18	X-712-9	Spacer, .25 OD, .5 in.	4	4	4			
19	GM11718	PCB assembly, Marathon excitation interface	1	1	1			
20	M965A-06012-20	Screw, pan head machine	4	4	4			
21	GM28568	Connector, 5 pin	1	1	1	1	1	1
22	233959	Diode, 6 A	3	3	3	3	3	3
23	GM28623	Clamp, cable (P6 and P3)	3	3	2	2	2	2
24	GM28574	Connector, 4-pin (P6)	1	1	1	1	1	1
25	GM11496	Connector, 3-pin (P2)	1	1	1	1	1	1
26	292800	Connector, cable (P1)	1	1	1	1	1	1
27	295145	Connector, 24-pin (P1)	1	1	1	1	1	1
28	337131	Connector, plug, 6-pin (P3)	1	1	1			
29	GM28873	Connector, 4-pin (P3)	1	1	1	1	1	1
30	GM28375	Connector, 55-pin (P4)	1	1	1	1	1	1

Control and Harness, continued

Tier 2



Inner panels



6021_301

Control and Harness, continued

Item	Part Number	Description	Quantity					
			Module					
			GM48039-MA1	GM48039-MA2	GM48039-MA3	GM48038-MA1	GM48038-MA2	GM48038-MA3
1	361184	Panel, junction box top	1	1	1	1	1	1
2	X-6217-10	Screw, hex flange machine	22	24	22	22	24	22
3	361826	Panel, junction box bottom	1		1	1		1
3	328901	Panel, junction box bottom		1			1	
4	GM40893	Harness, S2000 Tier II ECM 46 Pin	1	1		1	1	
4	GM40892	Harness, S2000 Tier II ECM 46 Pin			1			1
5	GM40416	Harness, engine 900-1000 kW S2000 Tier 2	1	1				
5	GM40422	Harness, engine 650-750 kW S2000 Tier 2			1			
5	GM40424	Harness, engine 900-1000 kW S2000 Tier 2				1	1	
5	GM40423	Harness, engine 650-750 kW S2000 Tier 2						1
6	238915	Boot	2	2		2	2	
7	X-672-6	Clamp, insulation, 1.38 in.	2	2	2	2	2	2
8	GM41022	Sender, temperature				1	1	1
9	364364	Adapter, bushing				1	1	1
10	X-6427-7	Washer, copper				1	1	1
11	GM41023	Sender, oil pressure				1	1	1
12	GM31040	Adapter, bushing				1	1	1
13	295314	Block, terminal				1	1	1
14	255080	Marker, strip				1	1	1
15	X-49-6	Screw, cross recess pan head				1	1	1
16	GM13980	PCB assembly, CT burden resistor	1	1	1			
17	X-70-12	Nut, hex machine screw, 8-32	4	4	4			
18	X-712-9	Spacer, .25 OD, .5 in.	4	4	4			
19	GM11718	PCB assembly, Marathon excitation interface	1	1	1	1	1	1
20	M965A-06012-20	Screw, pan head machine	4	4	4	4	4	4
21	X-414-13	Clamp, uninsulated	1	1	1	1	1	1
22	X-73-1	Screw, slotted round head machine	2	2	2	2	2	2
23	X-414-12	Clamp, uninsulated	1	1	1	1	1	1
24	GM40895	Harness, PWR 900-1000 Tier II	1	1		1	1	
25	GM40894	Harness, PWR 650-750 Tier II						1

Group 701: Literature

Item	Part Number	Description	Quantity								
			Variation Number								
			207	209	211	213	219	225	227	229	231
1	MP-5374	Warranty 1-Year Limited Industrial	1	1	1	1	1	1	1	1	1
2	MP-6356	S/M Controllers, 20-2800 kW	1	1	1	1	1	1	1	1	1
3	MP-5700	I/M Industrial	1	1	1	1	1	1	1	1	1
4	MP-6161	O/M Microprocessor Plus w/Comm, Basic	1	1	1	1	1	1	1	1	1
5	MP-6009	P/C Controllers	1	1	1	1	1	1	1	1	1
6	MP-6117	P/C Accessories, 230-2000 kW diesel	1	1	1	1	1	1	1	1	1
7	MP-6140	O/M Controller Setup & Application, Digital 550	1	1	1	1	1	1	1	1	1
8	MP-6200	O/M Digital 550, version 2.10	1	1	1	1	1	1	1	1	1
9	MP-6216	W/D 650-2000DSEB, 2500/2800DSE	1	1	1	1	1	1	1	1	1
10	MP-6284	P/C 650-1000DSEB	1	1	1	1	1	1	1	1	1
11	TP-5578	O/I/S/M Marathon Alt. Magna DVR	1	1	1	1	1	1	1	1	1
12	TP-6199	O/I/S/M Marathon DVR2000E	1	1	1	1	1	1	1	1	1
13	TP-6375	O/M DDC 12V/16V2000 Series	1	1	1	1	1	1	1	1	1
14	TP-6298	S/M 12V/16V2000 DDC	1	1	1	1	1	1	1	1	1
15	TP-6301	P/C DDC/MTU 12V2000, 650-750 kW	1	1							
15	TP-6302	P/C DDC/MTU 16V2000, 900-1000 kW			1	1	1				
15	TP-6468	P/C DDC/MTU 12V2000 Tier 2, 650-750 kW						1	1		
15	TP-6469	P/C DDC/MTU 16V2000 Tier 2, 900-1000 kW								1	1
16	MP-6373	S/M Pilot-Excited PM Alternator, 350-2800kW	1	1	1	1	1	1	1	1	1

Kit List

This section lists the part numbers of modules/kits not listed in the Group Parts Lists. Refer to the generator set nameplate or the list below to identify the module/kit number installed on your generator set. See the sections following this page for the parts list of the module/kit.

	650 kW	750 kW	800 kW	900 kW	1000 kW
Controllers					
See Parts Catalog MP-6009 for parts lists.					
Cooling Systems					
Unit-Mounted Radiator (see Group 104 for parts lists)					
Remote Radiator Setup	GM31867-MA1	GM31867-MA1	GM31867-MA1	GM31867-MA1	GM31867-MA1
Block Heater (with isolation valves)					
480 V, 3 phase	GM29883-KA6	GM29883-KA6	GM29883-KA1	GM29883-KA1	GM29883-KA1
240 V, 1 phase	GM29883-KA7	GM29883-KA7	GM29883-KA2	GM29883-KA2	GM29883-KA2
480 V, 1 phase	GM29883-KA8	GM29883-KA8	GM29883-KA3	GM29883-KA3	GM29883-KA3
240 V, 3 phase	GM29883-KA9	GM29883-KA9	GM29883-KA4	GM29883-KA4	GM29883-KA4
380 V, 3 phase	GM29883-KA10	GM29883-KA10	GM29883-KA5	GM29883-KA5	GM29883-KA5
208 V, 1 phase	GM29883-KA12	GM29883-KA12	GM29883-KA11	GM29883-KA11	GM29883-KA11

Optional Kits

See Parts Catalog MP-6117 for parts lists.

Paint and Miscellaneous Parts

Paint, Gray

All models use 221331 Spray Can, 221332 Gallon

Cooling System Kits

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

Remote Radiator Setup

GM31867-MA1

2	Clamp, hose, 2.25/2.56 in.	249887
2	Clamp, hose, 3.68/4 in.	274824
2	Hose, reducer	GM30405
2	Bracket, belt guard	GM31121
1	Bracket, mounting belt guard	GM31122
1	Guard, belt, right side	GM32298
1	Guard, belt, left side	GM32299
1	Guard, belt, top	GM32300
1	Guard, belt, bottom	GM32301
1	Cover, front	GM32302
1	Adapter bushing	GM32319
1	Bushing, reducing, 3/4 in. to 3/8 in.	X-202-60
1	Spacer, .437 ID x .875 OD x .25 in.	X-400-198
1	Connector, hose	X-582-38
2	Hose, radiator, straight, 2 in. ID	X-6014-8
2	Connector, hose	X-6370-7

Block Heater Kits

Kits: GM29883-KA1-GM29883-KA5

Qty.	Description	Common Parts	Unique Parts				
			GM29883-KA1	GM29883-KA2	GM29883-KA3	GM29883-KA4	GM29883-KA5
1	Heater, block		361240	361246	361247	361248	361249
1	Element, block heater service		GM29665	GM29666	GM29667	GM29668	GM29669
1	Hose, coolant 44 in.		X-6367-1	X-6367-1	X-6367-1	X-6367-1	X-6367-1
1	Tag, hang	279047					
1	Tag, instruction	299896					
4	Vibromount, controller	328645					
1	Tee, pipe, 3/4 x 3/4 x 3/4 NPT	A-108					
2	Valve, shutoff, 3/4-14 NPT	GM19666					
1	Connector, swivel 37°, flared	GM29562					
1	Bracket, block heater	GM30921					
1	Bracket, block heater	GM30922					
1	Bushing, reducing, 3/4 x 1 in. NPT	X-202-1					
1	Tee, pipe, 1 x 1 x 1 NPT	X-203-2					
2	Pipe, 3/4 NPT x 2.00 in.	X-206-2					
1	Pipe, 3/4 NPT x 1.38 in.	X-206-9					
1	Pipe, 1 NPT x 1.50 in.	X-218-24					
8	Washer, lock, .326 ID x .883 in. OD	X-22-16					
2	Elbow, street, 45° x 3/4 in. NPT	X-274-15					
4	Stud, 5/16-18 x 1.5 in.	X-352-65					
4	Clamp, hose, .69/1.25 in.	X-426-12					
2	Connector, hose	X-582-15					
2	Connector, hose	X-582-8					
2	Washer, beveled, .44 ID x 1.25 in. OD	X-6011-4					
1	Hose, coolant	X-6367-14					
1	Plug, pipe, 1 in. NPT	X-75-13					

Cooling System Kits

Block Heater Kits, continued

Kits: GM29883-KA6-GM29883-KA10

Qty.	Description	Common Parts	Unique Parts				
			GM29883-KA6	GM29883-KA7	GM29883-KA8	GM29883-KA9	GM29883-KA10
1	Heater, block		361240	361246	361247	361248	361249
1	Element, block heater service		GM29665	GM29666	GM29667	GM29668	GM29669
1	Hose, coolant		X-6367-14	X-6367-14	X-6367-14	X-6367-14	X-6367-14
1	Tag, hang	279047					
1	Tag, instruction	299896					
4	Vibromount, controller	328645					
1	Tee, pipe, 3/4 x 3/4 x 3/4 NPT	A-108					
2	Valve, shutoff, 3/4-14 NPT	GM19666					
1	Connector, swivel 37° flared	GM29562					
1	Bracket, block heater	GM30921					
1	Bracket, block heater	GM30922					
1	Bushing, reducing, 3/4 x 1 in. NPT	X-202-1					
1	Tee, pipe, 1 x 1 x 1 NPT	X-203-2					
2	Pipe, 3/4 NPT x 2.00 in.	X-206-2					
1	Pipe, 3/4 NPT x 1.38 in.	X-206-9					
1	Pipe, 1 NPT x 1.50 in.	X-218-24					
8	Washer, lock, .326 ID x .883 in. OD	X-22-16					
2	Elbow, street, 45° x 3/4 in. NPT	X-274-15					
4	Stud, 5/16-18 x 1.5 in.	X-352-65					
4	Clamp, hose, .69/1.25 in.	X-426-12					
2	Connector, hose	X-582-15					
2	Connector, hose	X-582-8					
2	Washer, beveled, .44 ID x 1.25 in. OD	X-6011-4					
1	Hose, coolant	X-6367-14					
1	Plug, pipe, 1 in. NPT	X-75-13					

Cooling System Kits

Block Heater Kits, continued

Kits: GM29883-KA11 and GM29883-KA12

Qty.	Description	Common Parts	Unique Parts	
			GM29883-KA11	GM29883-KA12
1	Heater, block		GM42088	GM42088
1	Element, block heater service		GM42089	GM42089
1	Hose, coolant		X-6367-11	X-6367-14
1	Tag, hang	279047		
1	Tag, instruction	299896		
4	Vibromount, controller	328645		
1	Tee, pipe, 3/4 x 3/4 x 3/4 NPT	A-108		
2	Valve, shutoff, 3/4-14 NPT	GM19666		
1	Connector, swivel 37° flared	GM29562		
1	Bracket, block heater	GM30921		
1	Bracket, block heater	GM30922		
1	Bushing, reducing, 3/4 x 1 in. NPT	X-202-1		
1	Tee, pipe, 1 x 1 x 1 NPT	X-203-2		
2	Pipe, 3/4 NPT x 2.00 in.	X-206-2		
1	Pipe, 3/4 NPT x 1.38 in.	X-206-9		
1	Pipe, 1 NPT x 1.50 in.	X-218-24		
8	Washer, lock, .326 ID x .883 in. OD	X-22-16		
2	Elbow, street, 45° x 3/4 in. NPT	X-274-15		
4	Stud, 5/16-18 x 1.5 in.	X-352-65		
4	Clamp, hose, .69/1.25 in.	X-426-12		
2	Connector, hose	X-582-15		
2	Connector, hose	X-582-8		
2	Washer, beveled, .44 ID x 1.25 in. OD	X-6011-4		
1	Hose, coolant	X-6367-14		
1	Plug, pipe, 1 in. NPT	X-75-13		

Appendix A Abbreviations

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

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

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

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.

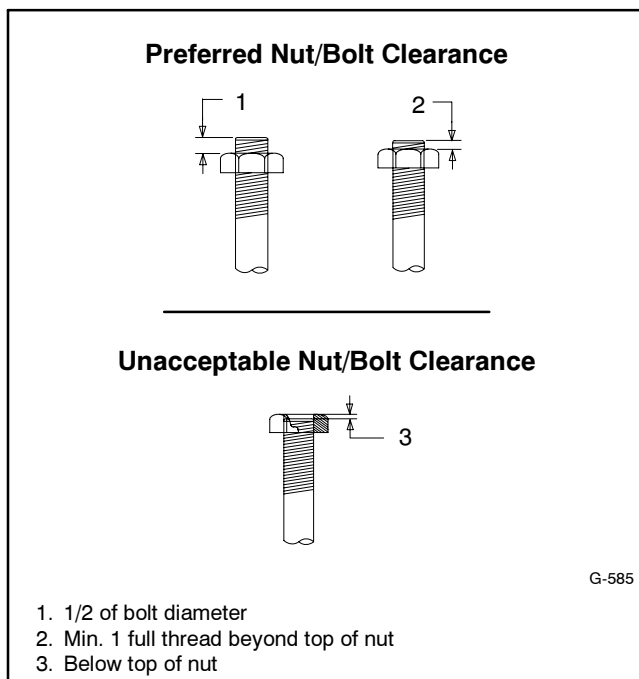


Figure 1 Acceptable Bolt Lengths

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.

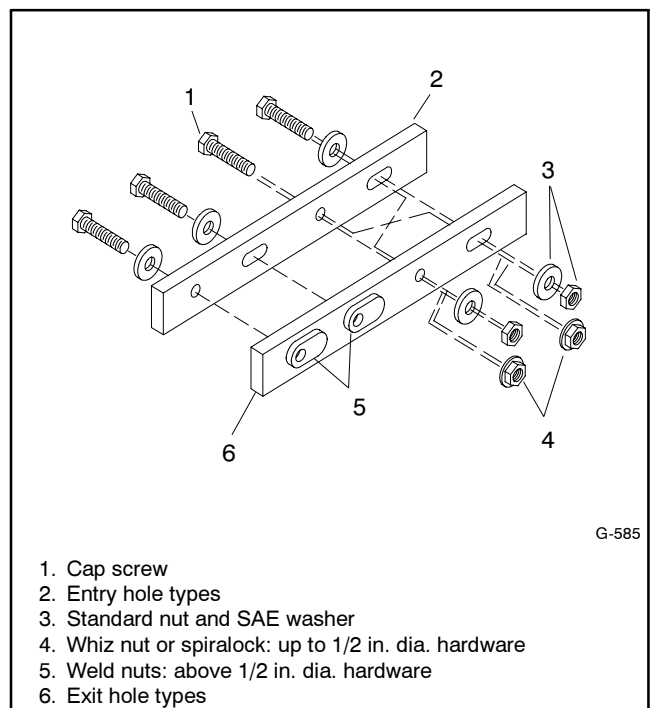


Figure 2 Acceptable Hardware Combinations

Appendix C General Torque Specifications

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)	—	See Note 3
10-24	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	
10-32	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	
1/4-20	Nm (in. lb.)	6.8 (60)	10.8 (96)	14.9 (132)	
1/4-28	Nm (in. lb.)	8.1 (72)	12.2 (108)	16.3 (144)	
5/16-18	Nm (in. lb.)	13.6 (120)	21.7 (192)	29.8 (264)	
5/16-24	Nm (in. lb.)	14.9 (132)	23.1 (204)	32.5 (288)	
3/8-16	Nm (ft. lb.)	24.0 (18)	38.0 (28)	53.0 (39)	
3/8-24	Nm (ft. lb.)	27.0 (20)	42.0 (31)	60.0 (44)	
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	6.2 (4.6)	9.5 (7)	13.6 (10)	See Note 3
M8 x 1.25	15.0 (11)	23.0 (17)	33.0 (24)	
M8 x 1.00	16.0 (11)	24.0 (18)	34.0 (25)	
M10 x 1.50	30.0 (22)	45.0 (34)	65.0 (48)	
M10 x 1.25	31.0 (23)	47.0 (35)	68.0 (50)	
M12 x 1.75	53.0 (39)	80.0 (59)	115.0 (85)	
M12 x 1.50	56.0 (41)	85.0 (63)	122.0 (90)	
M14 x 2.00	83.0 (61)	126.0 (93)	180.0 (133)	
M14 x 1.50	87.0 (64)	133.0 (98)	190.0 (140)	
M16 x 2.00	127.0 (94)	194.0 (143)	278.0 (205)	
M16 x 1.50	132.0 (97)	201.0 (148)	287.0 (212)	
M18 x 2.50	179.0 (132)	273.0 (201)	390.0 (288)	
M18 x 1.50	189.0 (140)	289.0 (213)	413.0 (305)	

Notes:

1. The torque values above are general guidelines. Always use the torque values specified in the service manuals and/or assembly drawings when they differ from the above torque values.
2. The torque values above are based on new plated threads. Increase torque values by 15% if non-plated threads are used.
3. Hardware threaded into aluminum must have either two diameters of thread engagement or a 30% or more reduction in the torque to prevent stripped threads.
4. Torque values are calculated as equivalent stress loading on American hardware with an approximate preload of 90% of the yield strength and a friction coefficient of 0.125.

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)

1/4-20 x 1
 — Length In Inches (Screws and Bolts)
 — Threads Per Inch
 — Major Thread Diameter In Fractional Inches Or Screw Number Size

Metric (Screws, Bolts, Studs, and Nuts)

M8-1.25 x 20
 — Length In Millimeters (Screws and Bolts)
 — Distance Between Threads In Millimeters
 — Major Thread Diameter In Millimeters

Plain Washers

9/32 x 5/8 x 1/16
 — Thickness
 — External Dimension
 — Internal Dimension

Lock Washers

5/8
 — Internal Dimension

Appendix E Common Hardware List

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

American Standard

[illegible]

Metric

Hex head bolts are hardness grade 8.8 unless noted.

Part No. Dimensions Hex Head Bolts (Partial Thread)

M931-05055-60	M5-0.80 x 55
M931-06040-60	M6-1.00 x 40
M931-06055-60	M6-1.00 x 55
M931-06060-60	M6-1.00 x 60
M931-06060-SS	M6-1.00 x 60
M931-06070-60	M6-1.00 x 70
M931-06070-SS	M6-1.00 x 70
M931-06075-60	M6-1.00 x 75
M931-06090-60	M6-1.00 x 90
M931-06145-60	M6-1.00 x 145
M931-06150-60	M6-1.00 x 150
M931-08035-60	M8-1.25 x 35
M931-08040-60	M8-1.25 x 40
M931-08045-60	M8-1.25 x 45
M931-08050-60	M8-1.25 x 50
M931-08055-60	M8-1.25 x 55
M931-08055-82	M8-1.25 x 55*
M931-08060-60	M8-1.25 x 60
M931-08070-60	M8-1.25 x 70
M931-08070-82	M8-1.25 x 70*
M931-08075-60	M8-1.25 x 75
M931-08080-60	M8-1.25 x 80
M931-08090-60	M8-1.25 x 90
M931-08095-60	M8-1.25 x 95
M931-08100-60	M8-1.25 x 100
M931-08110-60	M8-1.25 x 110
M931-08120-60	M8-1.25 x 120
M931-08130-60	M8-1.25 x 130
M931-08140-60	M8-1.25 x 140
M931-08150-60	M8-1.25 x 150
M931-08200-60	M8-1.25 x 200
M931-10040-82	M10-1.25 x 40*
M931-10040-60	M10-1.50 x 40
M931-10045-60	M10-1.50 x 45
M931-10050-60	M10-1.50 x 50
M931-10050-82	M10-1.25 x 50*
M931-10055-60	M10-1.50 x 55
M931-10060-60	M10-1.50 x 60
M931-10065-60	M10-1.50 x 65
M931-10070-60	M10-1.50 x 70
M931-10080-60	M10-1.50 x 80
M931-10080-82	M10-1.25 x 80*
M931-10090-60	M10-1.50 x 90
M931-10090-82	M10-1.50 x 90*
M931-10100-60	M10-1.50 x 100
M931-10110-60	M10-1.50 x 110
M931-10120-60	M10-1.50 x 120
M931-10130-60	M10-1.50 x 130
M931-10140-60	M10-1.50 x 140
M931-10180-60	M10-1.50 x 180
M931-10235-60	M10-1.50 x 235
M931-10260-60	M10-1.50 x 260
M960-10330-60	M10-1.25 x 330
M931-12045-60	M12-1.75 x 45
M960-12050-60	M12-1.25 x 50
M960-12050-82	M12-1.25 x 50*
M931-12050-60	M12-1.75 x 50
M931-12050-82	M12-1.75 x 50*
M931-12055-60	M12-1.75 x 55
M931-12060-60	M12-1.75 x 60
M931-12060-82	M12-1.75 x 60*
M931-12065-60	M12-1.75 x 65
M931-12075-60	M12-1.75 x 75
M931-12080-60	M12-1.75 x 80
M931-12090-60	M12-1.75 x 90
M931-12100-60	M12-1.75 x 100
M931-12110-60	M12-1.75 x 110

Part No. Dimensions Hex Head Bolts (Partial Thread), continued

M960-16090-60	M16-1.50 x 90
M931-16090-60	M16-2.00 x 90
M931-16100-60	M16-2.00 x 100
M931-16100-82	M16-2.00 x 100*
M931-16120-60	M16-2.00 x 120
M931-16150-60	M16-2.00 x 150
M931-20065-60	M20-2.50 x 65
M931-20090-60	M20-2.50 x 90
M931-20100-60	M20-2.50 x 100
M931-20120-60	M20-2.50 x 120
M931-20140-60	M20-2.50 x 140
M931-20160-60	M20-2.50 x 160
M931-22090-60	M22-2.50 x 90
M931-22120-60	M22-2.50 x 120
M931-22160-60	M22-2.50 x 160
M931-24090-60	M24-3.00 x 90
M931-24120-60	M24-3.00 x 120
M931-24160-60	M24-3.00 x 160
M931-24200-60	M24-3.00 x 200

Hex Head Bolts (Full Thread)

M933-04006-60	M4-0.70 x 6
M933-05030-60	M5-0.80 x 30
M933-05035-60	M5-0.80 x 35
M933-05050-60	M5-0.80 x 50
M933-06010-60	M6-1.00 x 10
M933-06012-60	M6-1.00 x 12
M933-06014-60	M6-1.00 x 14
M933-06016-60	M6-1.00 x 16
M933-06020-60	M6-1.00 x 20
M933-06025-60	M6-1.00 x 25
M933-06030-60	M6-1.00 x 30
M933-06040-60	M6-1.00 x 40
M933-06050-60	M6-1.00 x 50
M933-07025-60	M7-1.00 x 25
M933-08010-60	M8-1.25 x 10
M933-08012-60	M8-1.25 x 12
M933-08016-60	M8-1.25 x 16
M933-08020-60	M8-1.25 x 20
M933-08025-60	M8-1.25 x 25
M933-08030-60	M8-1.25 x 30
M933-08030-82	M8-1.25 x 30*
M933-10012-60	M10-1.50 x 12
M961-10020-60	M10-1.25 x 20
M933-10020-60	M10-1.50 x 20
M933-10025-60	M10-1.50 x 25
M961-10025-60	M10-1.25 x 25
M933-10025-82	M10-1.50 x 25*
M961-10030-60	M10-1.25 x 30
M933-10030-60	M10-1.50 x 30
M933-10030-82	M10-1.50 x 30*
M961-10035-60	M10-1.25 x 35
M933-10035-60	M10-1.50 x 35
M933-10035-82	M10-1.50 x 35*
M961-10040-60	M10-1.25 x 40

Part No. Dimensions Hex Head Bolts (Full Thread), continued

M933-12016-60	M12-1.75 x 16
M933-12020-60	M12-1.75 x 20
M961-12020-60F	M12-1.50 x 20
M933-12025-60	M12-1.75 x 25
M933-12025-82	M12-1.75 x 25*
M961-12030-60	M12-1.25 x 30
M933-12030-82	M12-1.75 x 30*
M961-12030-82F	M12-1.50 x 30*
M933-12030-60	M12-1.75 x 30
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*
M961-14025-60	M14-1.50 x 25
M933-14025-60	M14-2.00 x 25
M961-14050-82	M14-1.50 x 50*
M961-16025-60	M16-1.50 x 25
M933-16025-60	M16-2.00 x 25
M961-16030-82	M16-1.50 x 30*
M933-16030-82	M16-2.00 x 30*
M933-16035-60	M16-2.00 x 35
M961-16040-60	M16-1.50 x 40
M933-16040-60	M16-2.00 x 40
M961-16045-82	M16-1.50 x 45*
M933-16045-82	M16-2.00 x 45*
M933-16050-60	M16-2.00 x 50
M933-16050-82	M16-2.00 x 50*
M933-16060-60	M16-2.00 x 60
M933-16070-60	M16-2.00 x 70
M933-18035-60	M18-2.50 x 35
M933-18050-60	M18-2.50 x 50
M933-18060-60	M18-2.50 x 60
M933-20050-60	M20-2.50 x 50
M933-20055-60	M20-2.50 x 55
M933-24060-60	M24-3.00 x 60
M933-24065-60	M24-3.00 x 65
M933-24070-60	M24-3.00 x 70

Pan Head Machine Screws

M7985A-03010-20	M3-0.50 x 10
M7985A-03012-20	M3-0.50 x 12
M7985A-04010-20	M4-0.70 x 10
M7985A-04016-20	M4-0.70 x 16
M7985A-04020-20	M4-0.70 x 20
M7985A-04050-20	M4-0.70 x 50
M7985A-04100-20	M4-0.70 x 100
M7985A-05010-20	M5-0.80 x 10
M7985A-05012-20	M5-0.80 x 12
M7985A-05016-20	M5-0.80 x 16
M7985A-05020-20	M5-0.80 x 20
M7985A-05025-20	M5-0.80 x 25
M7985A-05030-20	M5-0.80 x 30
M7985A-05080-20	M5-0.80 x 80
M7985A-05100-20	M5-0.80 x 100
M7985A-06100-20	M6-1.00 x 100

Flat Head Machine Screws

M965A-04012-SS	M4-0.70 x 12
M965A-05012-SS	M5-0.80 x 12
M965A-05016-20	M5-0.80 x 16
M965A-06012-20	M6-1.00 x 12

* 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
M934-04-B	M4-0.70	Brass
M934-05-50	M5-0.80	Standard
M934-06-60	M6-1.00	Standard
M934-06-64	M6-1.00	Std. (green)
M6923-06-80	M6-1.00	Spiralock
M982-06-80	M6-1.00	Elastic Stop
M934-08-60	M8-1.25	Standard
M6923-08-80	M8-1.25	Spiralock
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	Spiralock
M6923-10-62	M10-1.50	Spiralock†
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	Spiralock
M982-12-80	M12-1.75	Elastic Stop
M982-14-60	M14-2.00	Elastic Stop
M6923-16-80	M16-2.00	Spiralock
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.

Index

Listed below are part numbers and page numbers of modules listed in this manual. Italicized numbers refer to the page numbers on which modules appear.

GM24329-MA2, 7	GM29691-MA7, 19	GM48039-MA3, 27
GM29675-MA1, 19	GM29691-MA8, 19	GM48807-MA1, 23
GM29675-MA10, 19	GM29691-MA9, 19	GM48807-MA10, 23
GM29675-MA11, 19	GM29798-MA1, 15	GM48807-MA11, 23
GM29675-MA12, 19	GM29798-MA2, 15	GM48807-MA12, 23
GM29675-MA13, 19	GM29798-MA3, 15	GM48807-MA13, 23
GM29675-MA14, 19	GM29798-MA4, 15	GM48807-MA14, 23
GM29675-MA15, 19	GM29798-MA5, 15	GM48807-MA15, 23
GM29675-MA16, 19	GM29798-MA6, 15	GM48807-MA16, 23
GM29675-MA17, 19	GM29798-MA7, 15	GM48807-MA17, 23
GM29675-MA18, 19	GM29798-MA8, 15	GM48807-MA18, 23
GM29675-MA19, 19	GM29802-MA1, 15	GM48807-MA2, 23
GM29675-MA2, 19	GM29802-MA2, 15	GM48807-MA3, 23
GM29675-MA20, 19	GM29802-MA3, 15	GM48807-MA4, 23
GM29675-MA21, 19	GM29802-MA4, 15	GM48807-MA5, 23
GM29675-MA22, 19	GM29802-MA5, 15	GM48807-MA6, 23
GM29675-MA23, 19	GM29802-MA6, 15	GM48807-MA7, 23
GM29675-MA24, 19	GM29802-MA7, 15	GM48807-MA8, 23
GM29675-MA3, 19	GM29802-MA8, 15	GM48807-MA9, 23
GM29675-MA4, 19	GM30703-MA1, 9, 11	GM48809-MA1, 23
GM29675-MA5, 19	GM30703-MA2, 9, 11	GM48809-MA10, 23
GM29675-MA6, 19	GM30870-MA1, 25	GM48809-MA11, 23
GM29675-MA7, 19	GM30870-MA2, 25	GM48809-MA12, 23
GM29675-MA8, 19	GM30870-MA3, 25	GM48809-MA13, 23
GM29675-MA9, 19	GM30954-MA1, 9, 11	GM48809-MA14, 23
GM29691-MA1, 19	GM30954-MA2, 9, 11	GM48809-MA15, 23
GM29691-MA10, 19	GM31025-MA1, 25	GM48809-MA16, 23
GM29691-MA11, 19	GM31025-MA2, 25	GM48809-MA17, 23
GM29691-MA12, 19	GM31025-MA3, 25	GM48809-MA18, 23
GM29691-MA13, 19	GM31567-MA1, 7	GM48809-MA19, 23
GM29691-MA14, 19	GM31567-MA2, 7	GM48809-MA2, 23
GM29691-MA15, 19	GM31745-MA1, 9, 11	GM48809-MA20, 23
GM29691-MA16, 19	GM31745-MA2, 9, 11	GM48809-MA3, 23
GM29691-MA17, 19	GM31745-MA3, 9, 11	GM48809-MA4, 23
GM29691-MA18, 19	GM31763-MA1, 9, 11	GM48809-MA5, 23
GM29691-MA19, 19	GM31763-MA2, 9, 11	GM48809-MA6, 23
GM29691-MA2, 19	GM48038-MA1, 27	GM48809-MA7, 23
GM29691-MA20, 19	GM48038-MA2, 27	GM48809-MA8, 23
GM29691-MA4, 19	GM48038-MA3, 27	GM48809-MA9, 23
GM29691-MA5, 19	GM48039-MA1, 27	GM48846-MA1, 7
GM29691-MA6, 19	GM48039-MA2, 27	

Notes



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