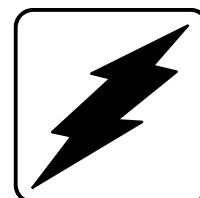


# Service Parts

## Industrial Generator Sets



Models:

**350-400ROZD**

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

**KOHLER**<sup>®</sup>  
POWER SYSTEMS

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

Specification Series 132

TP-5584 11/99c

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# Introduction

This manual lists service replacement parts for 350–400 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.

Information in this publication represents data available at the time of print. Kohler Co. 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.

**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.

xin:004:002

## Numbering System Significance

This manual uses the following numbering systems:

**Specification Number.** A six-digit number with a PA-prefix. The Specification Number Index does not show the prefix. Spec 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 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.

xin:004:003

## 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.

xin:004:004

## 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. **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.
3. **Identify the group** most likely to include the service part number.
4. **Find the group variation number** at the intersection of the spec number row and the group column. Note the variation number.
5. **Page forward to locate the group** identified in step 3 or find the appropriate page in the Table of Contents.
6. **Find the part on the illustration** and note the item number of the part or **find the part description in the parts list**.
7. Select **the part number that corresponds to your group variation**.

## 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.

xin:004:006

## SPECIFICATION NUMBER INDEX

GROUP TITLE & NUMBER	Air Intake	Cooling System	Engine	Nameplates and Decals	Oil Pressure Switches	Skid and Plant Mounting	Water Temperature Switches	Starter	Generator and Mounting	Controller and Mounting	Literature	
GROUP NO.	101	104	105	107	108	109	110	112	201	301	701	
SPEC NO.	VARIATION NUMBER											
350ROZD												
132479	32	55	62	64	E62	46	E62	E62	270	81	43	
132480	32	55	62	64	E62	46	E62	E62	271	81	43	
132481	32	55	62	64	E62	47	E62	E62	272	81	43	
132482	32	55	62	64	E62	46	E62	E62	273	82	43	
132483	32	55	62	64	E62	46	E62	E62	274	83	43	
132484	32	55	62	64	E62	47	E62	E62	275	82	43	
132485	32	55	62	64	E62	47	E62	E62	276	83	43	
132486	*	*	62	64	E62	*	E62	E62	*	*	43	
132519	19	24	41	12	11	32	13	10	178	57	43	
132520	19	*	41	12	11	32	13	10	178	*	43	
132521	19	*	41	12	11	30	13	10	179	*	43	
132522	19	*	41	12	11	32	13	10	180	*	43	
132523	19	*	41	12	11	32	13	10	181	*	43	
132814	17	20	37	12	9	24	11	8	79	26	30	
132815	17	*	37	12	9	24	11	8	79	*	30	
132816	17	*	37	12	9	21	11	8	80	*	30	
132817	17	*	37	12	9	24	11	8	81	*	30	
132818	17	*	37	12	9	24	11	8	82	*	30	
132819	19	24	41	12	11	32	13	10	79	26	30	
132820	19	*	41	12	11	32	13	10	79	*	30	
132821	19	*	41	12	11	30	13	10	80	*	30	
132822	19	*	41	12	11	32	13	10	81	*	30	
132823	19	*	41	12	11	32	13	10	82	*	30	

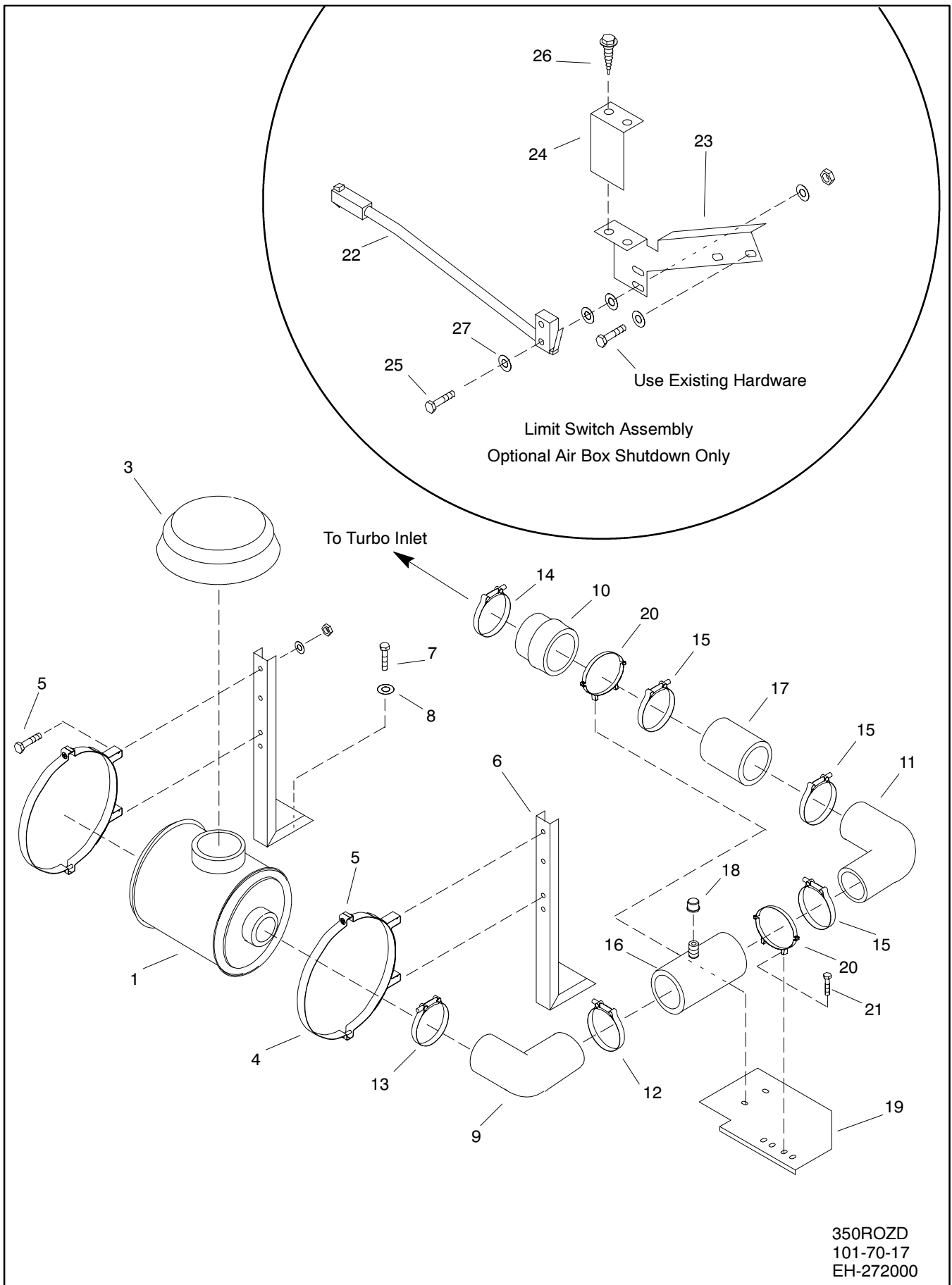
\* See Cooling System Kits or Controller Kits in the kits section for parts list.

# SPECIFICATION NUMBER INDEX

GROUP TITLE & NUMBER	<i>Air Intake</i>	<i>Cooling System</i>	<i>Engine</i>	<i>Nameplates and Decals</i>	<i>Oil Pressure Switches</i>	<i>Skid and Plant Mounting</i>	<i>Water Temperature Switches</i>	<i>Starter</i>	<i>Generator and Mounting</i>	<i>Controller and Mounting</i>	<i>Literature</i>
GROUP NO.	101	104	105	107	108	109	110	112	201	301	701
SPEC NO.	VARIATION NUMBER										
<b>400ROZD</b>											
132361	10	18	35	12	5	24	10	6	83	26	19
132487	33	54	63	64	E63	46	E63	E63	270	81	68
132488	33	54	63	64	E63	46	E63	E63	271	81	68
132489	33	54	63	64	E63	47	E63	E63	272	87	68
132490	33	54	63	64	E63	47	E63	E63	277	89	68
132491	33	54	63	64	E63	46	E63	E63	274	88	68
132492	33	54	63	64	E63	47	E63	E63	278	87	68
132493	33	54	63	64	E63	47	E63	E63	275	89	68
132494	33	54	63	64	E63	47	E63	E63	276	88	68
132495	*	*	63	64	E63	*	E63	E63	*	*	68
132524	20	25	42	46	11	32	9	10	178	57	68
132525	20	@	42	46	11	32	9	10	178	*	68
132526	20	25	42	46	12	32	9	10	182	57	68
132527	20	*	42	46	11	32	9	10	182	*	68
132528	20	*	42	46	11	30	9	10	179	*	68
132529	20	*	42	46	11	32	9	10	180	*	68
132530	20	*	42	46	11	30	9	10	183	*	68
132862	10	18	35	12	9	24	10	8	76	26	51
132863	10	*	35	12	9	24	10	8	79	*	51
132864	10	*	35	12	9	24	10	8	83	*	51
132865	10	*	35	12	9	21	10	8	80	*	51
132866	10	*	35	12	9	24	10	8	81	*	51
132867	10	*	35	12	9	21	10	8	84	*	51
132868	20	25	42	12	11	32	9	10	79	26	51
132869	20	*	42	12	11	32	9	10	79	*	51
132870	20	*	42	12	11	32	9	10	83	*	51
132871	20	*	42	12	11	30	9	10	80	*	51
132872	20	*	42	12	11	30	9	10	84	*	51
132873	20	*	42	12	11	32	9	10	81	*	51
132874	20	25	42	12	12	32	9	10	83	26	51

\* See Cooling System Kits or Controller Kits in the kits section for parts list.

# Group 101: Air Intake



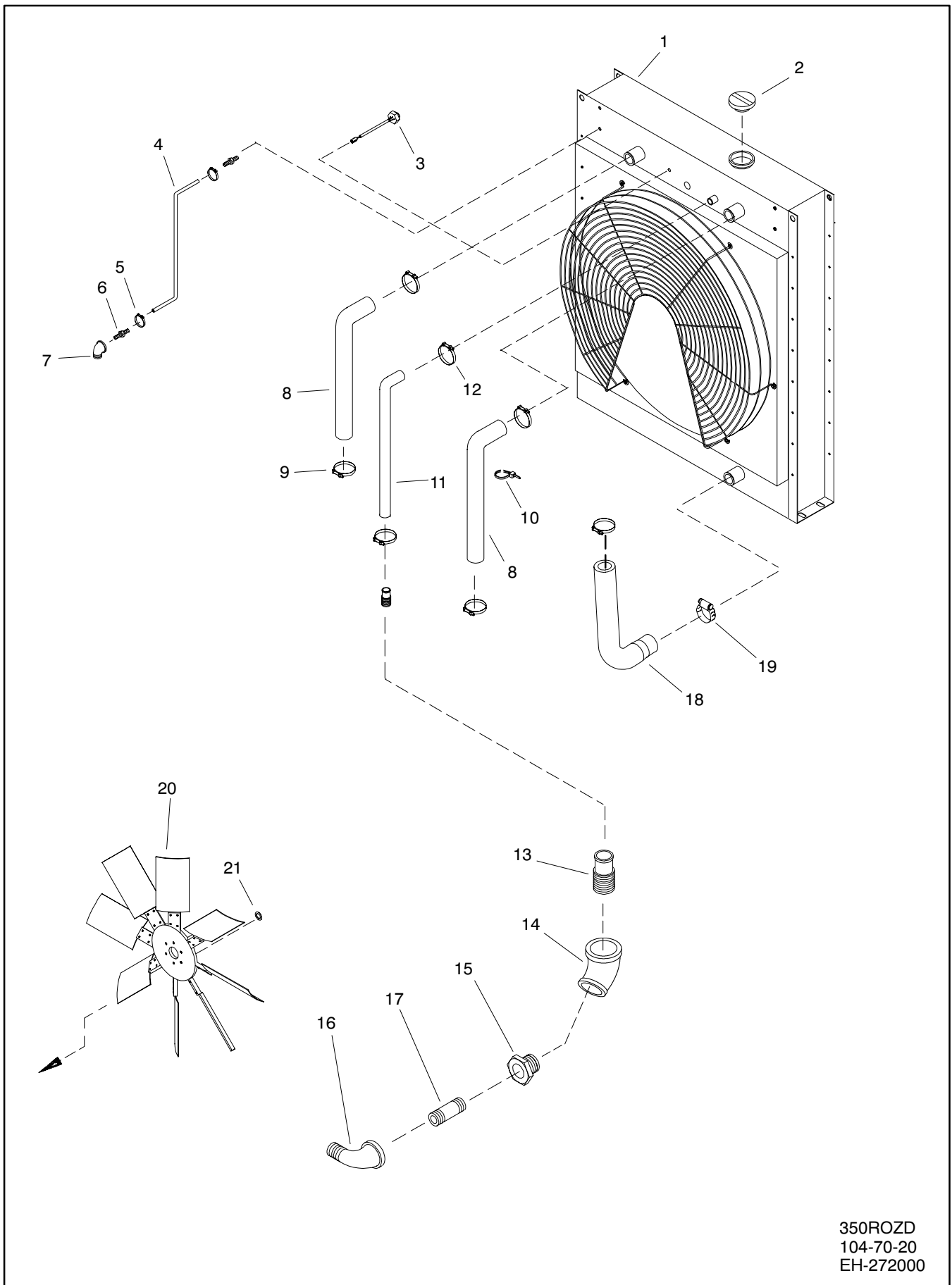
# Group 101: Air Intake

Item	Qty.	Description Variation	Part No.
1	2	Cleaner, air 10, 20, 33	272981
	1	Cleaner, air 17, 19	A-272632
	1	Air cleaner, industrial 32	274821
<b>Note:</b>			
All air cleaners in this group do not apply if an optional heavy-duty air cleaner is installed. See accessory parts catalog TP-5707 for optional air cleaner part numbers.			
2	1	Element (Not avail. separately. Replace with item 1.) 10, 20, 33	
	1	Element (not shown) 17, 19	274680
3	1	Cap, rain 17, 19	272675
4	4	Clamp, hose (band w/mtg.), 13-39/64"	
	2	Mount, air cleaner 17, 19	291666
	2	Mount, air cleaner 32	272983
5	8	Screw, 3/8-16 x 1 10, 20, 33	X-6238-11
	8	Nut, nylon lock, 1/4-20 10, 20, 33	X-101-13
		Hardware, 3/8-16 17, 19	#
	6	Hardware, 7/16-14 32	#
6	1	Plate, mounting (horizontal) 10, 20, 33	274223
		Plate, air cleaner 32	354048
	1	Bracket, mtg. (mtg. plate front) 10, 20, 33	274225
	2	Bracket, air cleaner (L-shaped) 10, 20, 33	274224
	2	Screw, 3/8-16 x 1 1/4 10, 20, 33	X-6238-4
	1	Screw, 3/8-16 x 4 1/2 10, 20, 33	X-6238-13
	4	Nut, nylon lock, 1/4-20 10, 20, 33	X-101-13
	2	Washer, plain, 7/16 x 1 x 5/64 10, 20, 33	X-25-1
	2	Bracket, air cleaner (L-shaped) 17, 19, 32	274595
	1	Spacer, .406 ID x .75 OD x 1.05 in. 20	X-400-200
	1	Spacer, .406 ID X .625 OD x .297 in. 20	X-400-75
7	4	Screw, ref., 7/16-14 x 1 10, 17, 19, 20, 32, 33	X-6024-2
8		Hardware, 7/16-14 10, 17, 19, 20, 32, 33	#
9	2	Hose, elbow 90° 10, 20, 33	272663
	1	Hose, elbow 90° 17, 19	272663
	1	Hose, elbow 32	291678

Item	Qty.	Description Variation	Part No.
10	1	Hose, hump, 5.50 ID x 4.90-5.50 L 17, 19	274221
	1	Hose, hump 32	291560
11	2	Elbow, reducing 10, 20, 33	274218
	1	Elbow, 90° 17, 19	272627
	1	Hose, elbow 32	291678
12	1	Clamp, hose, 7.69-8.00 ID 17, 19	279482
	1	Clamp, hose 32	280998
13	2	Clamp, hose, 7.69-8.00 ID 10, 20, 33	279482
	1	Clamp, hose (band), 6 7/8 17, 19, 32	272960
	1	Clamp, hose 32	280998
14	1	Clamp, hose (band), 6 17, 19, 32	291504
15	4	Clamp, hose (band), 6 7/8 10, 20, 33	272960
	2	Clamp, hose (band), 5 1/2 10, 20, 33	254344
	3	Clamp, hose (band), 6 1/2 17, 19	254013
	2	Clamp, hose 32	280998
	1	Clamp, hose 32	291559
16	2	Tube assembly, 6 OD x 5.7 L 10, 20, 33	274623
	2	Cap, pipe, 1/8 NPT 10, 20, 33	X-268-7
	1	Tube assembly, 6 OD x 5.7 L 17, 19	274623
	1	Tube assembly 32	274664
17	1	Tubing, steel 17, 19	X-522-60
	1	Tube, steel 32	X-522-66
18	1	Cap, pipe, 1/8 NPT 17, 19, 32	X-268-7
19	1	Deflector, heat 17, 19, 32	274588
20	2	Mount, air cleaner, 6 1/2 17, 19	258279
	2	Mount, air cleaner 32	354953
21		Hardware, 3/8-16 17, 19	#
22	1	Switch assembly 10, 17, 19, 20	272790
23	1	Bracket, mounting 10, 20	274884
	1	Bracket, mounting 17, 19	279740
24	1	Guard, limit switch 17, 19	279562
25	2	Screw, 6-32 x 7/8 10, 17, 19, 20	X-49-3
26	2	Screw, drill, 8-18 x 0.44/0.56 L 17, 19	X-794-2
27		Hardware, 6-32 10, 17, 19, 20	#

# Common Hardware; Procure Locally

# Group 104: Cooling System



350ROZD  
104-70-20  
EH-272000

# Group 104: Cooling System, Continued

Item	Qty.	Description Variation	Part No.
1	1	Radiator assembly 18, 25, 54	A-274274
	1	Radiator assembly 20, 24, 55	A-279796
2	1	Cap, radiator 18, 25, 54	224357
	1	Cap, radiator 20, 24, 55	224364
3	1	Switch assembly, level all	See table below
4	2	Hose, rubber, 3/8 ID x 28" 18	X-651-15
	1	Hose, 0.375 ID x 36 L 20, 24, 25, 54, 55	X-651-33
5	4	Clamp, hose, 1" 18	X-426-10
	2	Clamp, hose, 5/8" 20, 24, 25, 54, 55	X-426-9
6	3	Fitting, hose, 3/8 x 1/4 NPT 18	X-652-1
	2	Fitting, hose, 3/8 x 1/4 NPT 20, 24, 25, 54, 55	X-652-1
7	2	Elbow conn., 90°, 3/8 x 1/4 NPT 18	X-391-16
	1	Bushing, reducer, 3/4 F x 1/4 M 18	X-202-39
8	2	Hose, upper radiator, 2 1/2 ID x 28 18, 25	X-542-2
	2	Hose, upper radiator, 2 1/4 ID x 26" 20, 24	X-613-7
	2	Hose, upper radiator 55	354611
	2	Hose, upper radiator 54	354612
9	4	Clamp, hose, 2 13/16 18, 25, 54	275527
	4	Clamp, hose, 2 7/16 min. dia. 20	279604
	4	Clamp, hose 24, 55	328800
10	4	Tie, cable, 14" 18, 20, 24, 25, 54, 55	X-468-4
11	1	Hose, (rad. bypass), 1 1/4 ID x 54 18, 25, 54	X-6014-30
	1	Hose, 1.25 ID x 50 L 20, 24, 55	X-6014-72

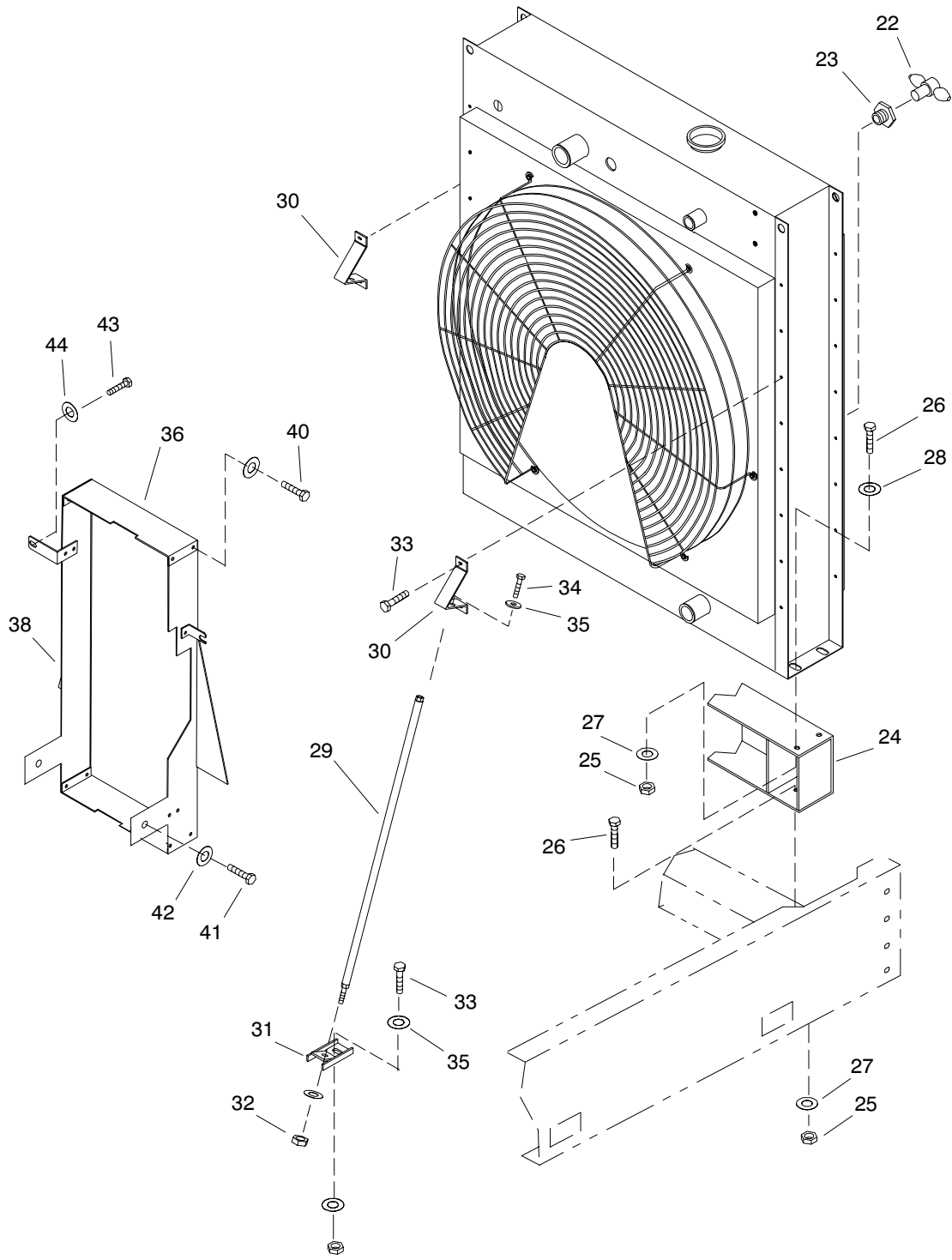
Item	Qty.	Description Variation	Part No.
12	2	Clamp, hose, 1 3/4 18	X-426-8
	2	Clamp, hose, 1.50-1.81 ID 20, 24, 25, 54, 55	279669
13	1	Adapter, hose, 1.25 ID x 1 NPT 18, 20, 24, 25, 54, 55	272930
14	1	Elbow, 45°, 1NPT 18, 20, 24, 25, 54, 55	X-225-9
15	1	Bushing, reducer, 3/4 F x 1 M 18, 25, 20, 24, 55	X-202-1
16	1	Elbow, 90°, 1NPT 18, 25, 54	151385
	1	Elbow, 45°, 1 NPT 20, 24, 55	SA-472
17	1	Nipple, pipe 18, 25, 54	X-218-24
	1	Nipple, pipe, 3/4 NPTF x 2 L 20, 24, 55	X-206-2
18	1	Hose, lower radiator 18, 25, 54, 55	274270
	1	Hose, lower radiator 20, 24	272670
19	2	Clamp, hose, 4 18, 25, 54	291537
	2	Clamp, hose, 3 3/4 20, 24, 55	X-426-1
20	1	Fan, pusher 18, 20, 24, 25	299962
	1	Fan 54,55	279793
21	6	Washer, hardened, 17/32 x 1 1/16 x 1/16 18, 20, 24, 25, 54, 55	290945

### Serial Number-Contingent Cooling System Parts

Part Description	Part Number	
	Before Serial Number 363369	Serial Numbers 363369 and after
Coolant Level Sensor	273469	254832
Bushing, Reducer 3/8 x 1/2 NPT	Not Used	X-202-28

# Common Hardware; Procure Locally

# Group 104: Cooling System, Continued



350ROZD  
104-70-20  
EH-272000

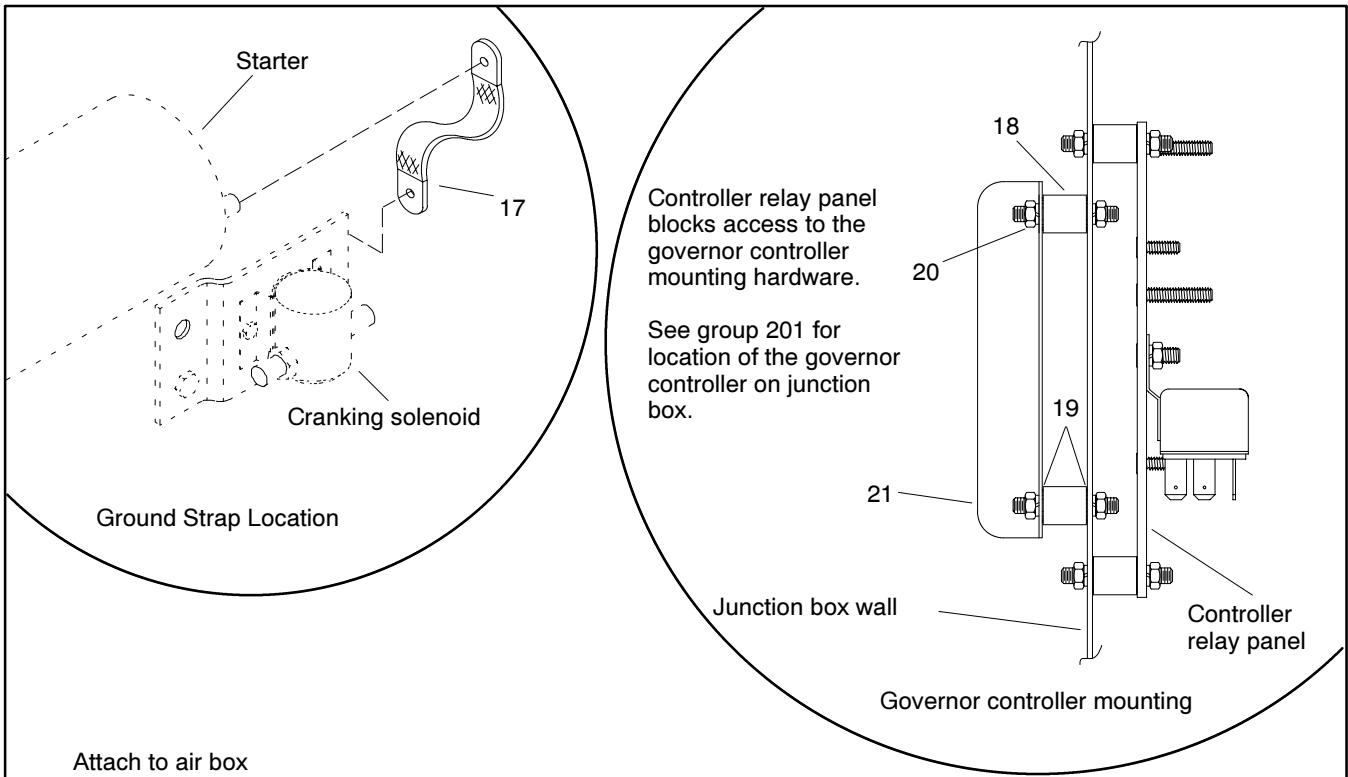
## Group 104: Cooling System, Continued

Item	Qty.	Description Variation	Part No.
22	1	Valve, drain, 3/8 NPT 18, 20, 24, 25, 54, 55	X-256-1
23	1	Bushing, reducer, 3/8 F x 1/2 M 18, 20, 24, 25, 54, 55	X-202-28
24	2	Support, radiator, 18, 20	272789
25	8	Nut, 5/8-11 20	X-85-3
	4	54, 55	#
26	8	Screw, 5/8-11 x 1 1/2 20	X-6021-2
	4	Bolt, 5/8-11 54, 55	#
27	8	Washer, split lock, 5/8 20	X-24-1
28		Hardware, 5/8-11 18	#
	4	Washer, hardened 20, 24, 25, 54, 55	X-801-9
29	2	Brace, radiator 18, 20, 54, 55	274307
30	2	Bracket, upper LH brace support 18, 20, 24, 25, 54, 55	299880
31	2	Bracket, lower radiator 18, 20, 24, 25, 54, 55	299881
32	6	Nut, 1/2-13 20	X-89-8
	4	Hardware, 1/2-13 54, 55	#
33	4	Hardware, 1/4-20 18, 54, 55	#
	4	Screw, 1/4-20 x 1 20	X-465-7

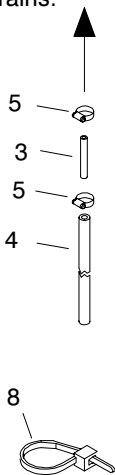
Item	Qty.	Description Variation	Part No.
34	4	Hardware, 1/2-13 18	#
	4	Screw, 1/2-13 x 1 20, 54, 55	X-129-17
35	6	Washer, split lock, 1/2 20, 54, 55	#
36	1	Guard, belt (top) 18	274278
		20	279650
		24, 55	299950
		25, 54	299948
37	1	Guard, belt (RH) 18, 25, 54	274277
	1	Guard, belt (RH) 20, 24, 55	279652
38	1	Guard, belt (LH) 18, 25, 54	274276
	1	Guard, belt (LH) 20, 24, 55	279651
39	2	Nut, 5/16-18 20	X-82-2
40		Hardware, 1/4-20 18,20, 55	#
41	2	Screw, 7/16-14 x 1 12,18	X-6024-2
	2	Screw, 7/16-14 x 1.25 54, 55	X-6024-8
42		Hardware, 7/16-14 18, 55	#
43		Hardware, 3/8 18	#
	1	Screw, 3/8-16 x 5 1/2 20, 55	X-6238-18
44		Hardware, 3/8 20, 55	#

# Common Hardware; Procure Locally

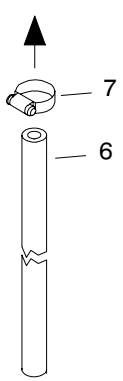
# Group 105: Engine



Attach to air box drains.

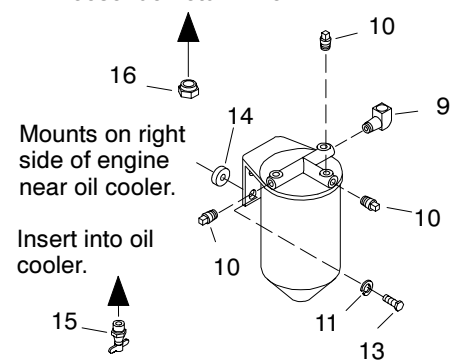


Attach to valve cover breathers.



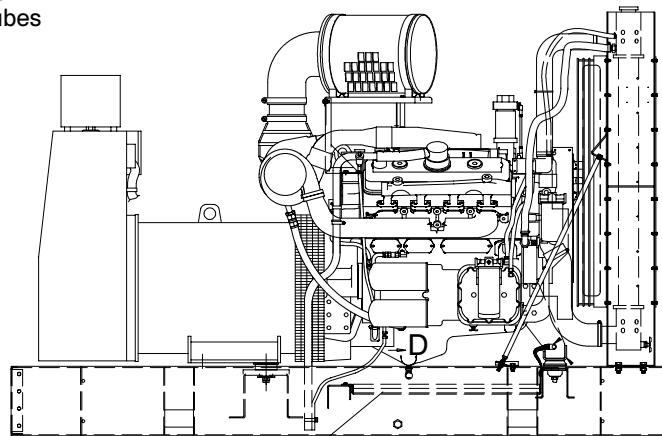
Cable tie secures valve cover breather and air box drain tubes together at their ends.

Attach to adapter on loose fuel return line.



Mounts on right side of engine near oil cooler.

Insert into oil cooler.



350ROZD  
105-70-37  
EH-272000

# Group 105: Engine

Item	Qty.	Description Variation	Part No.
1	1	Engine assembly (8V-92TA) 35 37 41, 62 42, 63	A-272615 A-279821 A-347096 B-347097
2	1	Harness, engine wiring (not shown) all	See table below
3	2	Line, fuel, 3/8 OD x 2 L 35, 37, 41, 42, 62, 63	X-432-12
4	2	Hose, 3/8 x 30" 35, 63	X-651-5
	2	Hose, 0.375 ID x 28 L 37, 62	X-651-28
5	4	Clamp, hose, 5/8 35, 37, 41, 42, 62, 63	X-426-9
6	1	Hose, 1.25 ID x 35 L 35, 62, 63	X-6260-5
	2	Hose, 1.25 ID x 32 L 37	X-6260-7
7	2	Clamp, hose, 1 3/4 35, 37, 41, 42, 62, 63	X-426-8
8	2	Tie, cable 35, 37, 41, 42, 62, 63	X-468-4
9	1	Fitting, fuel, 3/8-18 UNS-2B F x 3/8 NPTF M 35, 42, 63	279676
10	3	Plug, pipe, 3/8 NPT 35, 37, 62, 63	X-75-10
11		Hardware, 3/8 35, 42	#
		Hardware, 5/16 37, 41, 62, 63	#
12	1	Bracket, fuel filter 37, 42, 62	274227
13	2	Screw, ref., 3/8-16 x 1 1/4 35, 42	X-6238-4
	2	Screw, ref., 5/16-18 x 6 37, 41, 62	X-125-36
14	1	Spacer, 11/32 x 3/4 x 3/8 37, 41, 62	X-400-41
15	1	Valve, drain, 1/4 NPT 35, 37, 41, 42, 62, 63	X-256-3
16	1	Cap, pipe 35, 37, 41, 42 62, 63	X-268-3 X-268-9
	1	Fitting, fuel 62, 63	X-514-4

Item	Qty.	Description Variation	Part No.
17	1	Strap, ground 35, 37, 41, 42, 62, 63	287363
18	4	Mount, vibro 35, 37, 41, 42, 62, 63	282829
19	8	Washer, shakeproof, 8 35, 37, 41, 42, 62	X-22-20
20		Hardware, 8-32 35, 37, 41, 42, 62, 63	#
21	1	Controller, governor 41, 42, 62, 63	347841
22	3	Nut, elastic stop 62, 63	X-101-4
23	1	Lead, battery cable, 28 in. 62, 63	X-545-24
24	1	Lead, battery cable, 20 in. 62, 63	X-545-60
25	1	Lead, battery cable, 16 in. 62, 63	X-545-71
26	1	Channel, U 62, 63	X-6047-1
27	3	Bolt, 5/16-24 x 13 in. 62, 63	288446
28	1	Clamp, battery 62, 63	354157
29	1	Insulator, insulation pad 62, 63	354162
30	1	Rack, battery 62, 63	354184

**Serial Number Contingent Wiring Harnesses**

Variation Number	Wiring Harness Part Number	
	Before Serial Number 363369	Serial Numbers 363369 and after
35, 42	279506	347224
37, 41	274436	347223
62	-	347343
63	-	347344

# Common Hardware; Procure Locally

# Notes

## Group 107: Nameplates and Decals

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

**NOTE:** Nameplates and Decals not illustrated.

1	1	Decal, positive terminal 12, 46, 64	238402
2	1	Decal, warning (hot engine) 12, 46, 64	249809
3	4	Screw, drive, 2 x 3/16 12, 46, 64	X-67-5
4	2	Logo, Kohler 12, 46, 64	X-6275-7
5	1	Decal, 1-800 Number 12, 46, 64	224234
6	2	Decal, danger: haz. volt./moving parts 12, 46, 64	257438
7	1	Decal, warning: haz. volt./backfeed 12	258815
8	1	Decal, warning 12, 46, 64	274323
9	1	Decal, stripes 12, 46, 64	X-6232-2

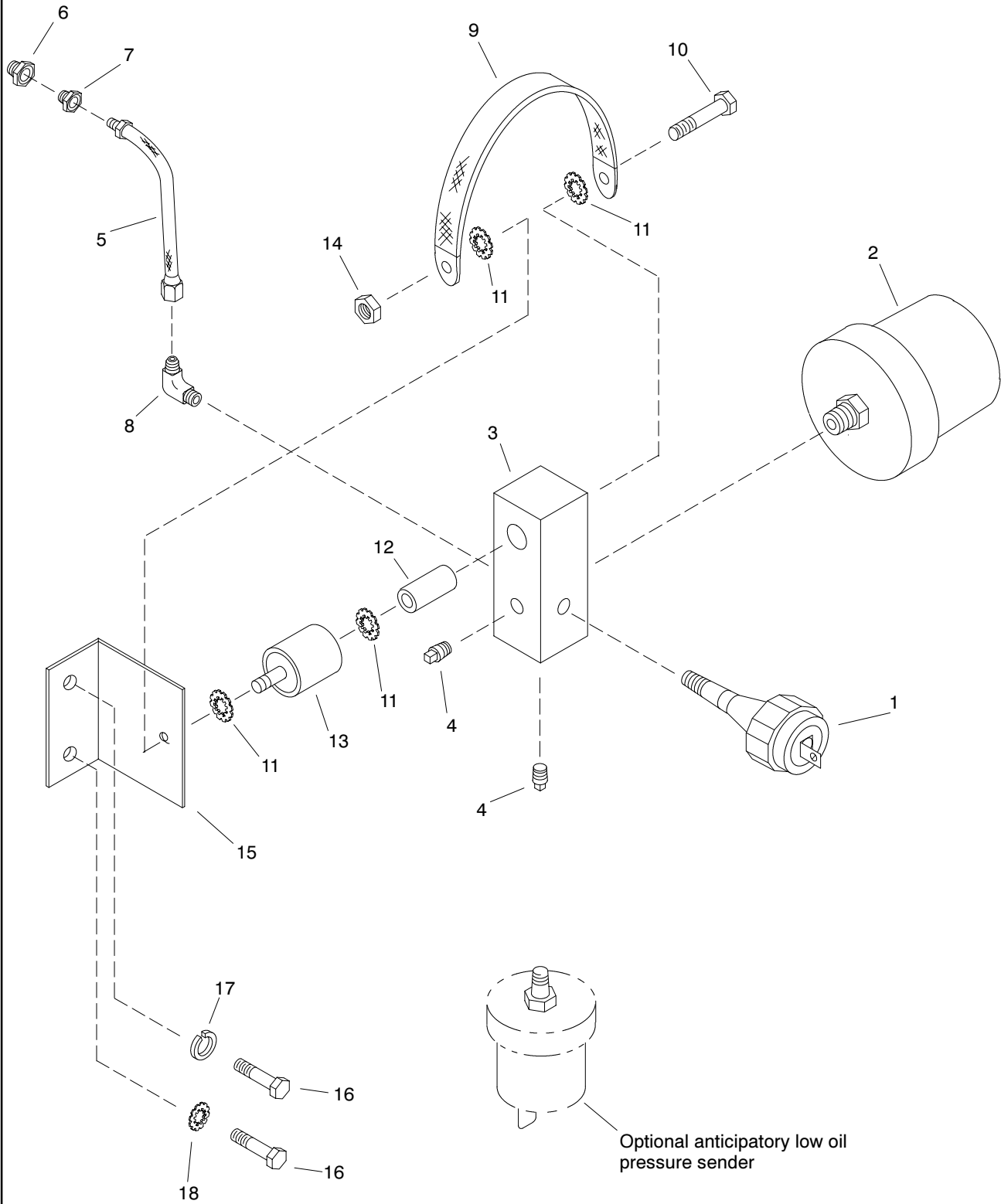
Item	Qty.	Description Variation	Part No.
------	------	--------------------------	----------

10	1	Logo, Kohler 12, 46, 64	X-6276-8
11	1	Decal 12 46	X-6347-1 X-6347-2
12	1	Decal, Kohler Power Systems 12, 46, 64	X-6246-1
13	2	Decal, Power 12, 46, 64	347272
14	2	Decal, System 12, 46, 64	347273
15	1	Decal, standby connection 12, 46, 64	255882
16	1	Decal, warning hot coolant 12, 46, 64	249810
17	1	Decal, caution lifting support 12, 46, 64	293990
18	1	Decal, electrical equipment 64	347166

# Group 108: Oil Pressure Switches

## NOTE:

This drawing is of a typical arrangement of group 108 parts.  
Arrangements may vary between models.



Optional anticipatory low oil pressure sender

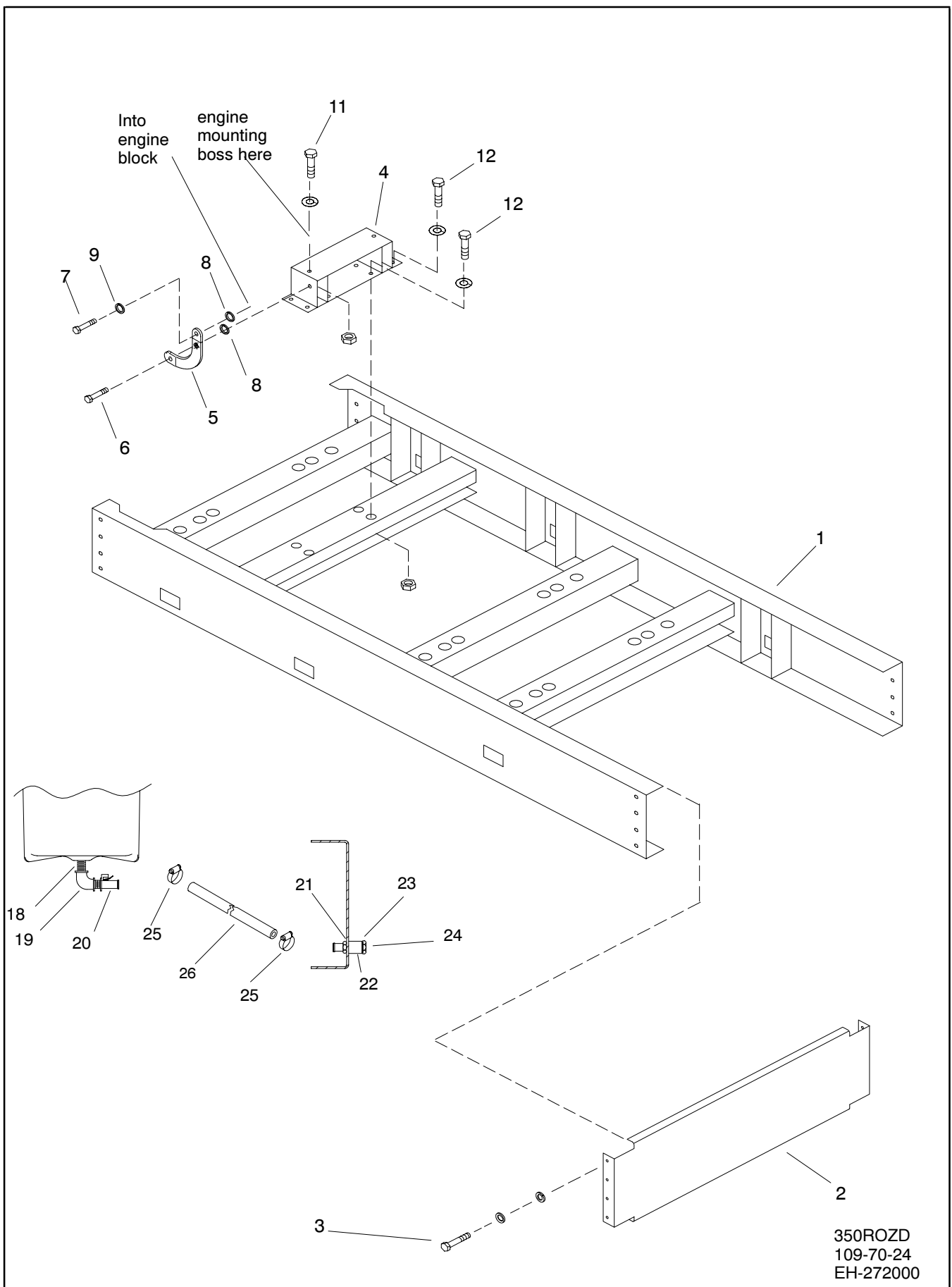
350-1600ROZD  
108-70-5  
AM-272000

## Group 108: Oil Pressure Switches

Item	Qty.	Description Variation	Part No.
1	1	Switch, oil pressure 5, 9, 11, 12, E62, E63	328309
2	1	Sender, oil pressure 5, 9, 11, 12 E62, E63	264390 343473
3	1	Block, oil gauge 5, 9, 11, 12, E62, E63	267548
4	2	Plug, pipe (brass), 1/8 5, 12	X-75-4
	2	Plug, pipe 1/8 9, 11, E62, E63	X-75-1
	1	Adaptor, restricted pipe (not shown) 11	267429
5	1	Line, flex. fuel, 7/16 F x 1/8 NPTF M x 14 L 5, 9, 11, 12, E62, E63	265462
6	1	Bushing, reducer, 1/2 F x 3/4 M 5, 9, 12	153659
7	1	Bushing, reducer, 5, 9, 12 11, E62, E63	X-202-29 X-202-56
8	1	Elbow, 90°, 7/16-20 x 1/8 NPT 5, 9, 11, 12, E62, E63	X-447-10

Item	Qty.	Description Variation	Part No.
9	1	Strap, ground, 3/8 x 5 5, 9, 11, 12, E62, E63	223033
10	1	Screw, 1/4-20 x 1 1/4 5, 9, 11, 12, E62, E63	X-465-8
11	4	Washer, in./ext. tooth lock, 1/4 5, 9, 11, 12, E62, E63	X-22-12
12	1	Spacer, 9/32 x 1/2 x 3/4 5, 12	X-400-174
13	1	Bumper 5, 9, 11, 12, E62, E63	259632
14	1	Nut, 1/4-20 5, 9, 11, 12, E62, E63	#
15	1	Bracket, sender 5, 9, 11, 12, E62, E63	274299
16	2	Screw, 3/8-16 x 1 5, 9, 11, 12, E62, E63	X-6238-11
17	1	Washer, split lock, 3/8 5, 9, 11, 12, E62, E63	#
18	1	Washer, in./ext. tooth lock, 3/8 5, 9, 11, 12, E62, E63	X-22-14

# Group 109: Skid and Plant Mounting



# Group 109: Skid and Plant Mounting

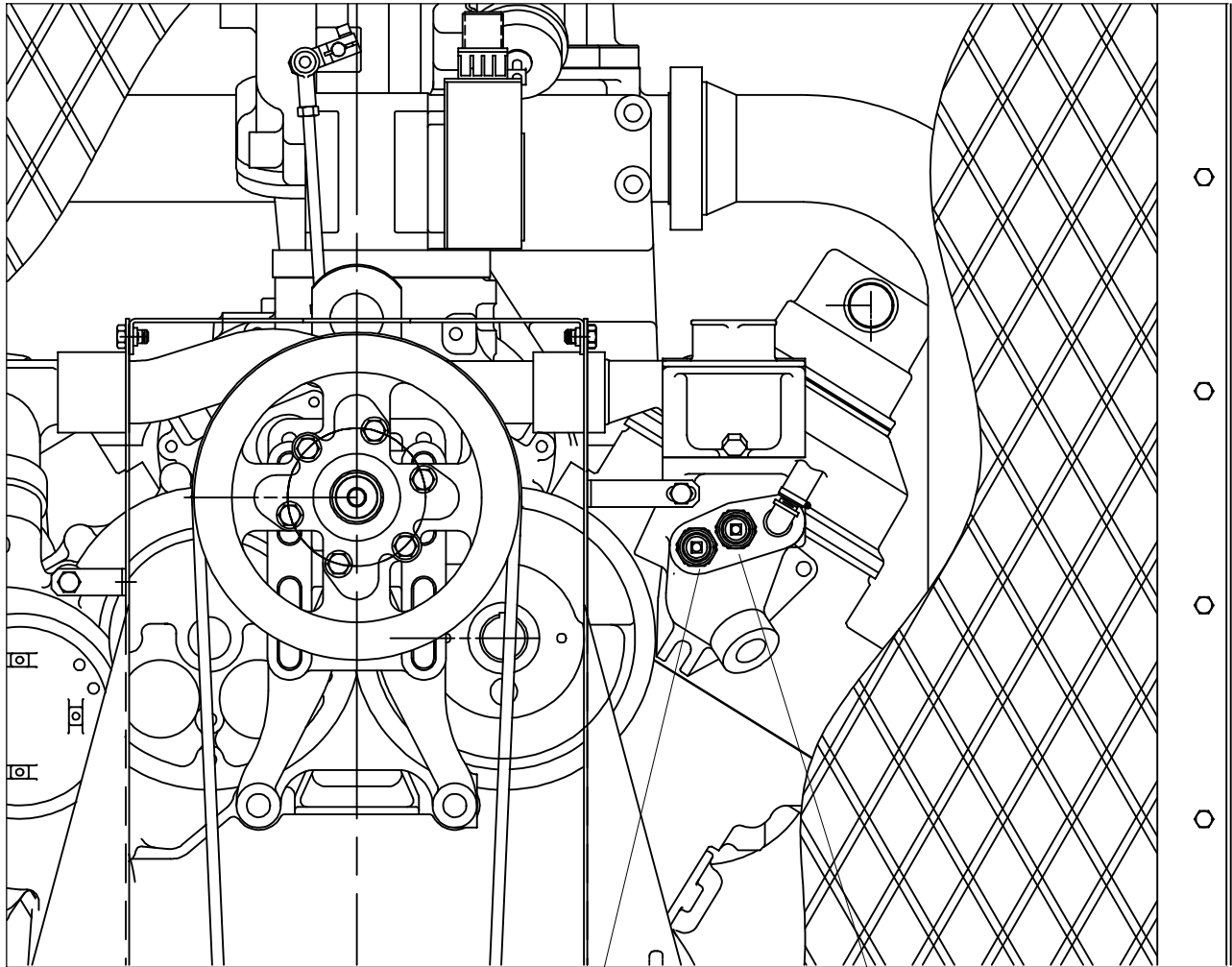
Item	Qty.	Description Variation	Part No.
1	1	Skid 21, 24 30 32 46 47	299848 299944 299943 354640 354641
2	1	Crossmember 21, 24, 30, 32, 46, 47	274441
3		Hardware, 3/8 21,24, 30, 32, 46, 47	#
4	1	Support, front engine 21, 24	279794
	1	Support, front engine 30, 32, 46, 47	299936
5	1	Strap, ground 21, 24	287363
	1	Strap, ground 30, 32, 46, 47	290418
6	1	Screw, ref., 7/16-14 x 3/4 21, 24, 30, 32	X-6024-5
7		Hardware, 5/16 21, 24, 30, 32, 46, 47	#
8	4	Washer, int. tooth lock, 5/16 21, 24, 30, 32, 46, 47	X-22-16
9	1	Washer, int./ext. tooth lock, 7/16 21, 24, 30, 32, 46, 47	X-22-15
10	2	Hardware, 5/8-11 21, 24, 30, 32, 46, 47	#
11	5	Hardware, 5/8-11 21 46, 47	# X-6024-8

Item	Qty.	Description Variation	Part No.
12		Hardware, 3/8-16 21	#
13	2	Mount, vibro (not shown) 30, 32, 46, 47	299937
14	2	Damper, vibratiom (not shown) 30, 32, 46, 47	286020
15	2	Spacer (not shown) 30, 32, 46, 47	X-400-166
16	4	Washer, plain (not shown) 30, 32, 46, 47	X-25-30
17	2	Nut, hex. (not shown) 30, 32, 46, 47	X-101-23
18	1	Nipple, pipe 46, 47	X-209-5
19	1	Fitting, elbow 46, 47	X-215-1
20	1	Valve, oil drain 46, 47	272701
21	1	Nut, hex 46, 47	X-80-1
22	1	Adapter, hose 46, 47	273729
23	1	Washer, nylon 46, 47	276552
24	1	Plug, drain 46, 47	241062
25	2	Clamp, hose 46, 47	X-426-3
26	1	Hose, rubber 46, 47	X-577-8

# Common Hardware; Procure Locally

# Group 110: Water Temperature Switches

Front view through radiator



1

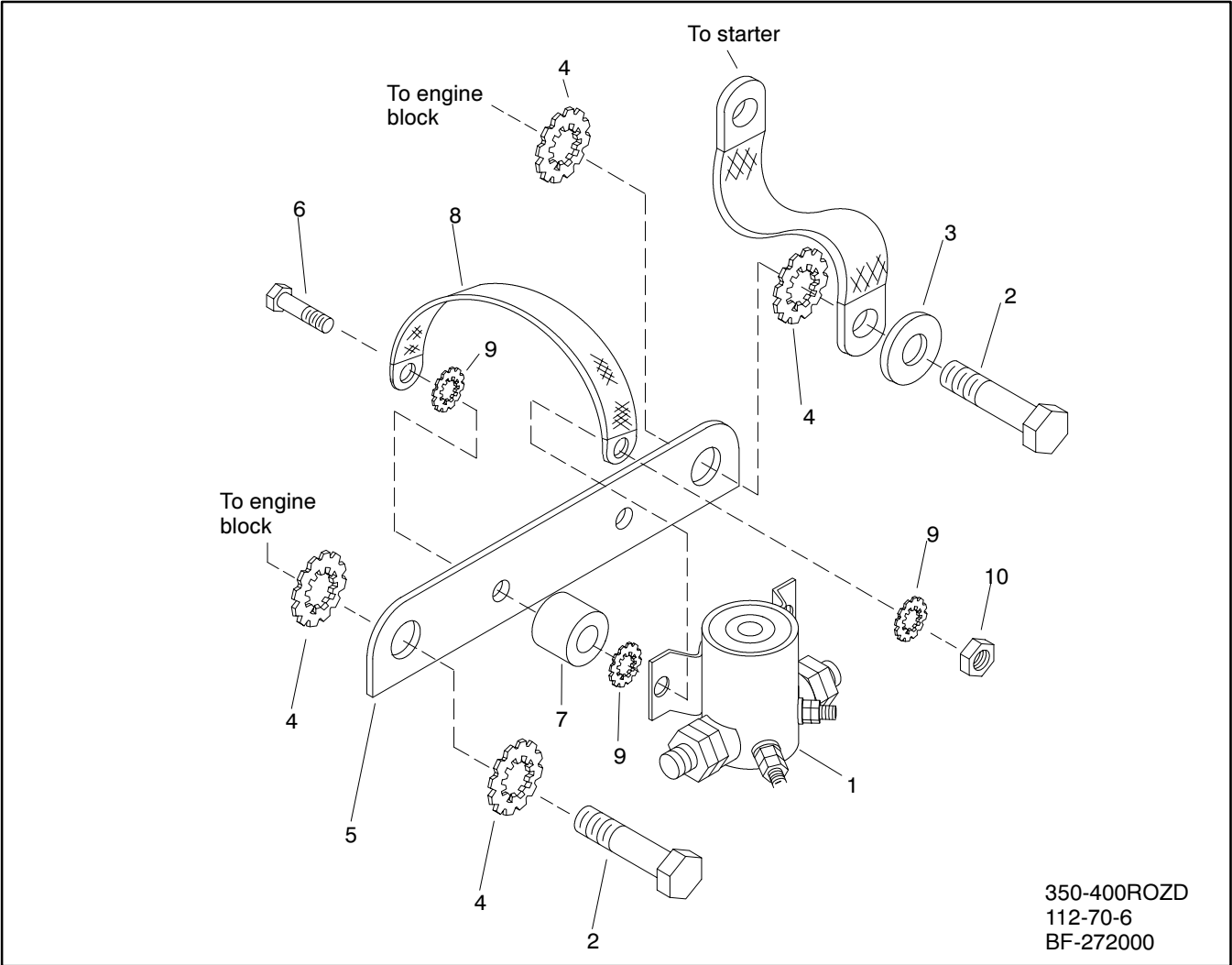
2

350ROZD  
110-70-9  
EH-272000

Item	Qty.	Description Variation	Part No.
1	1	Sender, water temperature 9-13, E62, E63	268298
2	1	Switch, water temperature shutdown 9-13, E62, E63	241481

Item	Qty.	Description Variation	Part No.
3	1	Bushing, reducer, 1/2 F x 3/4 M (Item 3, not shown, used with item 2.) 10, 12	153659

# Group 112: Starter



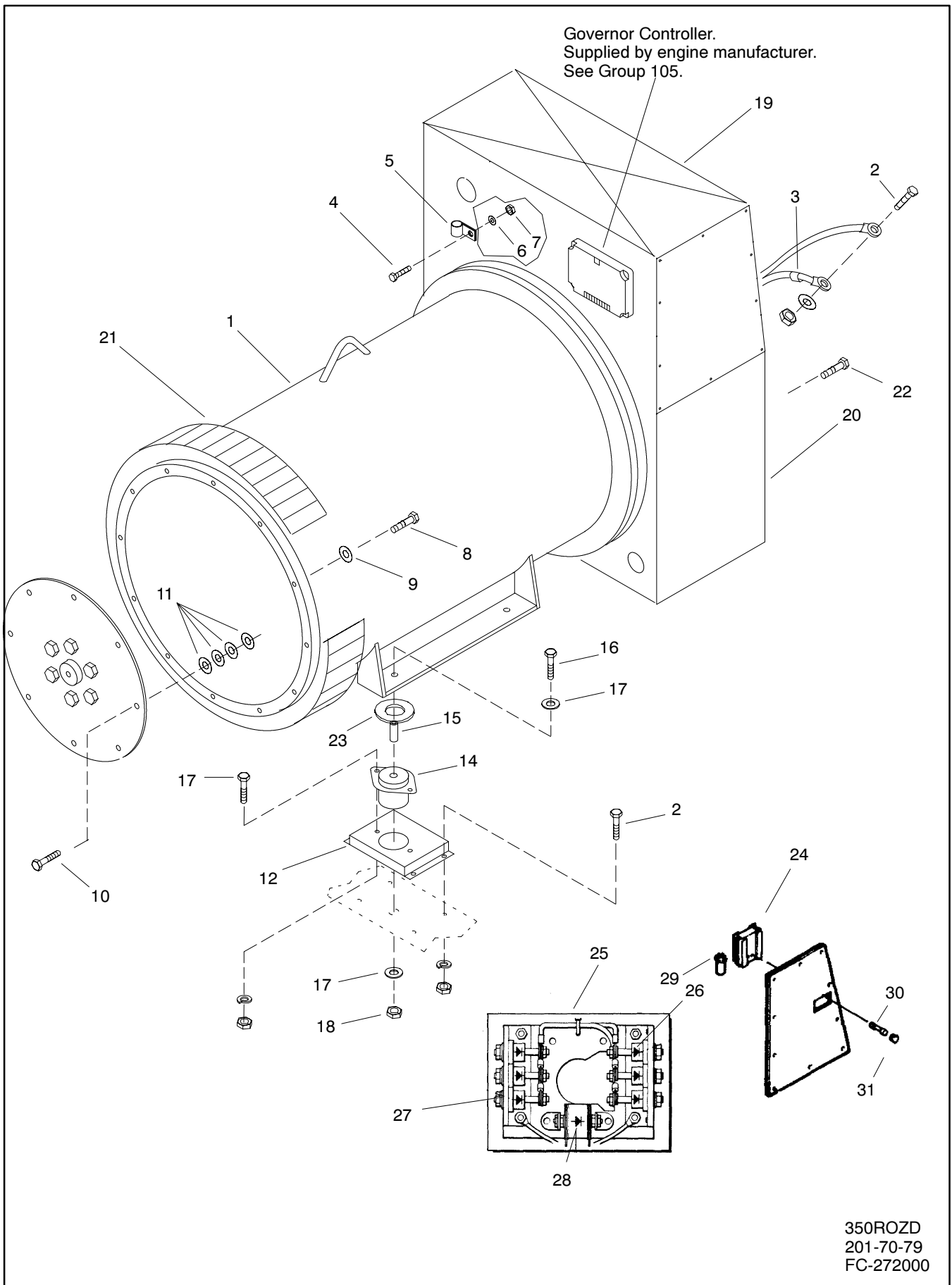
350-400ROZD  
112-70-6  
BF-272000

Item	Qty.	Description Variation	Part No.
1	1	Solenoid, cranking 6, 8, 10, E62, E63	272713
2	2	Screw, 3/8-16 x 1 6	X-6238-11
3	1	Washer, plain, 13/32 x 13/16 6	X-25-37
4	4	Washer, int./ext. tooth lock, 3/8 6, 8, 10, E62, E63	X-22-14
5	2	Bracket, C-relay 6, 8, 10, E62, E63	272762
6	2	Screw, 1/4-20 x 1/2 6	X-465-6

Item	Qty.	Description Variation	Part No.
7	2	Bumper 6, 8, 10, E62, E63	259632
8	1	Strap, ground, 5" 6, 8, 10, E62, E63	223033
9	5	Washer, int./ext. tooth lock, 1/4 6, 8, 10, E62, E63	X-22-12
10	2	Nut, 1/4-20 6, 8, 10	#
11	1	Lead assembly (not shown) 6, 8, 10	255359

# Common Hardware; Procure Locally

# Group 201: Generator and Mounting



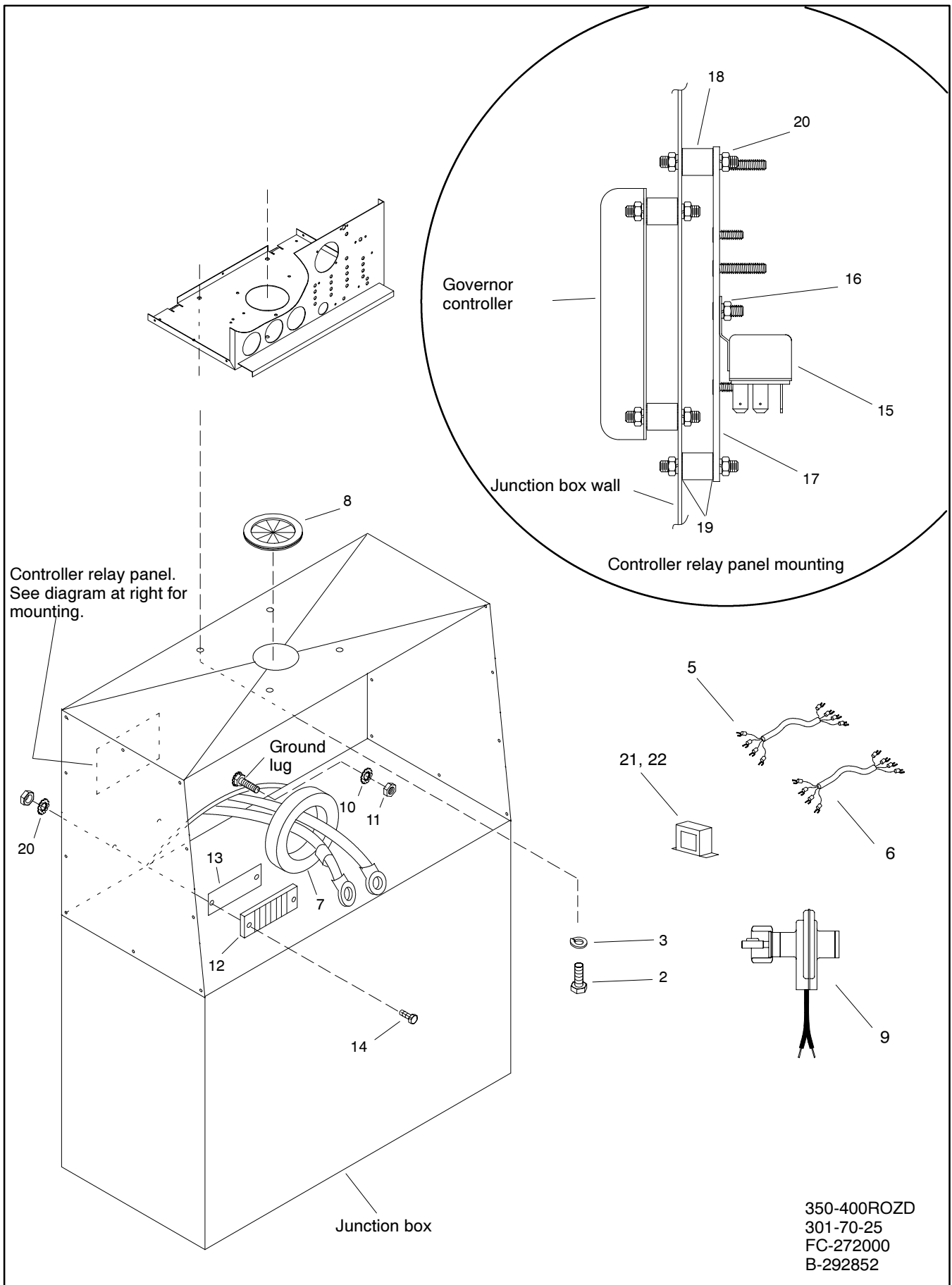
# Group 201: Generator and Mounting

Item	Qty.	Description Variation	Part No.
1	1	Generator assembly	
		79 .....	B-279479
		80 .....	B-279906
		81 .....	B-279584
		82 .....	B-279585
		83 .....	B-279480
		84 .....	B-279904
		178, 270 .....	A-328098
		179, 272 .....	A-328101
		180, 274 .....	A-328127
		181, 273 .....	A-328116
		182, 271 .....	A-328099
		183, 277 .....	A-328117
		275 .....	A-328662
		276 .....	A-328663
		278 .....	A-354635
2		Hardware, 3/8-16 all	#
3	1	Marker, L1 lead all	X-750-14
	1	Marker, L2 lead all	X-750-15
	1	Marker, L3 lead all	X-750-16
4	1	Screw, 10-24 x 1/2 all	X-50-15
5	1	Clamp, insulated, 7/8 all	X-672-13
6	1	Washer, split lock, 10 all except 270-278	#
7	1	Nut, 10-24 all except 270-278	#
8	12	Screw, ref., 7/16-14 x 2 all	X-6024-3
9	12	Washer, hardened, 15/32 x 59/64 x 3/64 all	X-801-6
10	8	Screw, 1/2-13 x 1 /14 all	X-129-54
11	8	Washer, hardened, 17/32 x 1 1/16 all	290945
12	1	Support, generator RH (early) 79, 81-83	279578
	1	Support, generator LH (early) 79, 81-83	279579
	2	Support, generator (early) 80, 84	279580
	2	Plate, generator mounting 270-278	354717
13	16	Washer, plain, 7/16 x 1 x 0.078 81-84	X-25-1

Item	Qty.	Description Variation	Part No.
14	2	Mount, vibro all except 270-278 270-278	279864 354634
15	2	Spacer, 0.656 ID x 1 all except 270-278	X-400-182
16	2	5/8-11 bolt all except 270-278 270-278	# X-6239-10
17		Hardware, 5/8-11 all except 270-278 270-278	# X-25-151
18	2	Nut, elastic stop, 5/8-11 all except 270-278 270-278	X-101-15 X-101-26
19	1	Cover, top back 178-180, 181, 182, 270, 271, 273, 274	328896
	1	Cover, top back 179, 183, 272, 275-278	328897
20	1	Cover, louvered 178-180, 181, 182, 270, 271, 273, 274	328899
	1	Cover, louvered 179, 183, 272, 275-278	328900
21	1	Screen 178-180, 181, 182, 270, 271, 273, 274	328902
	1	Screen 179, 183, 272, 275-278	328903
22	13	Screw, hex. 178-183, 270-278	X-6217-10
23	2	Washer, plain 270-278	X-25-150
24	1	Voltage regulator, DVR2000 all	328725
25	1	Exciter rectifier assembly all	347071
26	1	Diode, standard polarity all	279772
27	1	Diode, reversing polarity all	279774
28	1	Surge suppressor all	279776
29	1	Capacitor all	347160
30	1	Fuse, 5 amp all	279778
31	1	Fuse cap all	279779

# Common Hardware; Procure Locally

# Group 301: Controller and Mounting



# Group 301: Controller and Mounting, Continued

Item	Qty.	Description Variation	Part No.
1	1	Controller assembly all	See table below
2	4	Screw, ref., 5/16-18 x 3 1/2 all	X-125-23
3	4	Washer, int./ext. tooth lock, 5/16 all	X-22-16
4	2	Cap, plastic all	X-6214-3
		Item 4 covers exposed stud of bumper inside controller box.	
5	1	Harness, CT wiring (C0, C1, C2, C3) all	258453
6	1	Harness, AC wiring (V0, V1, V2, V3) all, 81, 87 82, 83, 88, 89	258455 274964
7	3	Transformer, current all, 81 82, 88 83 87 89	291547 248877 248875 291548 291546
8	1	Grommet, 2 1/8 x 2 1/2 x 1/8 all	X-284-25
9	1	Pickup, speed (on flywheel housing) all	291288
10	1	Washer, int./ext. tooth lock, 3/8 all	X-22-14
11		Hardware, 3/8-16 all	#
12	1	Block, terminal (6-terminal) all	295314
13	1	Marker, terminal strip all	255080

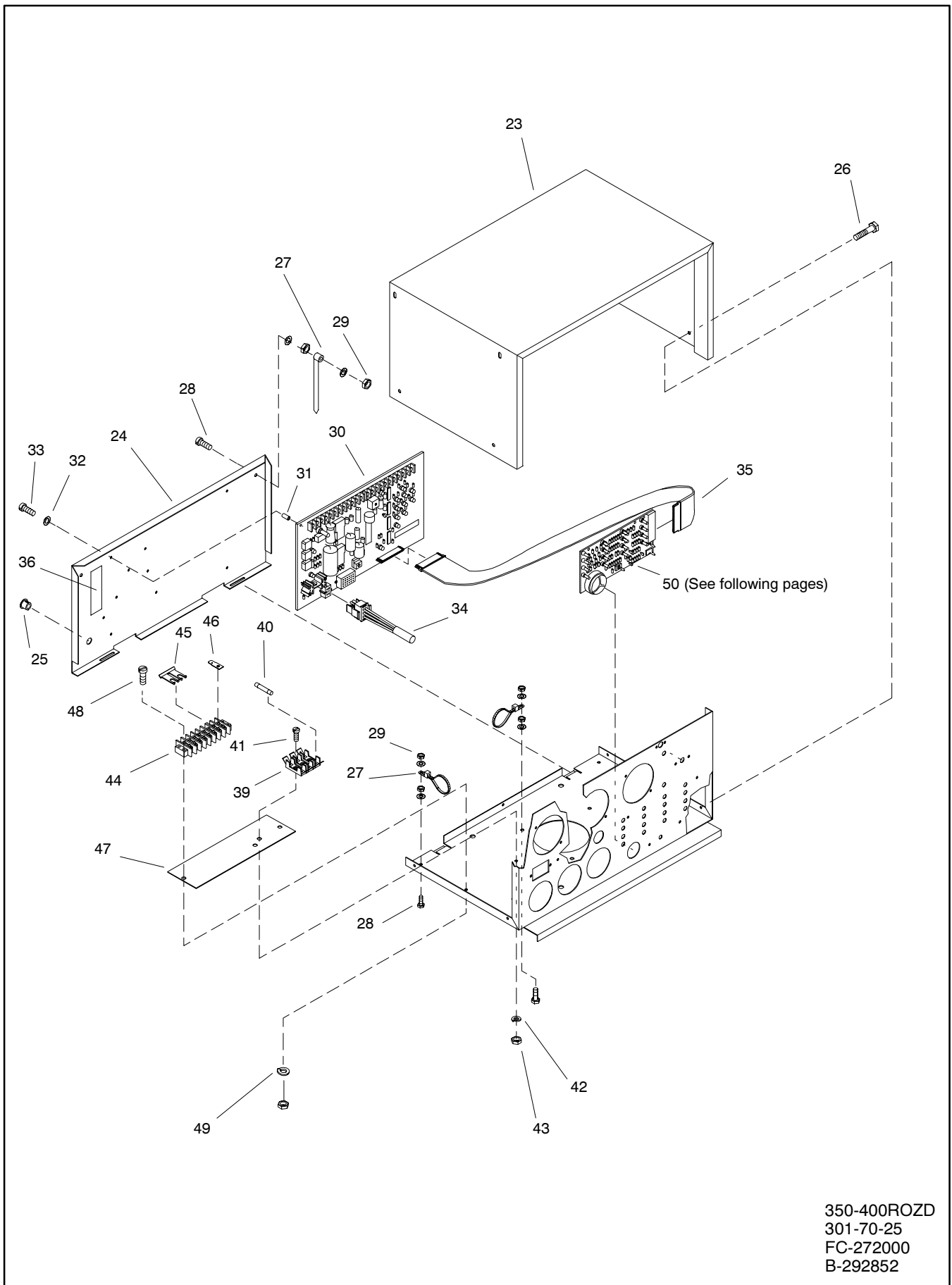
Item	Qty.	Description Variation	Part No.
14	2	Screw, 8-32 x 3/4 all	X-51-11
15	2	Relay all	272684
16	1	Nut, 10-32 all	#
17	1	Panel, relay all	274796
18	4	Mount, vibro all	282829
19	8	Washer, ext. tooth lock, 8 all	X-22-20
20	4	Hardware, 8-32 all	#
21	3	Transformer 82, 89 83, 88	276578 258990
22	6	Screw, drill 82, 83, 88, 89	X-794-2

### Serial Number-Contingent Controllers

Variation	Controller Assembly Part Number	
	Before Serial Number 363369	Serial Numbers 363369 and after
26	B-292852	B-292852
57	B-292852	A-328933
81, 82	-	A-328933
83	-	A-328934
87, 89	-	A-328935
88	-	A-328936

# Common Hardware; Procure Locally

# Group 301: Controller and Mounting, Continued



350-400ROZD  
301-70-25  
FC-272000  
B-292852

# Group 301: Controller and Mounting, Continued

Item	Qty.	Description Variation	Part No.
23	1	Cover, controller all	292818
24	1	Plate, hinge all	292908
25	1	Plug, plastic button, 7/16 all	X-301-34
26	10	Screw, 10-24 x 1/2 all	X-6216-1
27	4	Tie, cable all	X-468-3
28	4	Screw, 10-24 x 3/4 all	X-50-3
29		Hardware, 10-24 all	#
30	1	Main circuit board all	See table below
31	9	Spacer, circuit board all	287948
32		Hardware, 6-32 all	#
33	18	Screw, 6-32 x 1/4 all	X-49-25
34	1	Connector, plug all	241617
35	1	Controller ribbon cable all	See table below
36	1	Decal, fuse rating all	292347
37	2	Fuse, 3 amp (on item 30) all	243273
38	1	Fuse, 15 amp (on item 30) all	283645

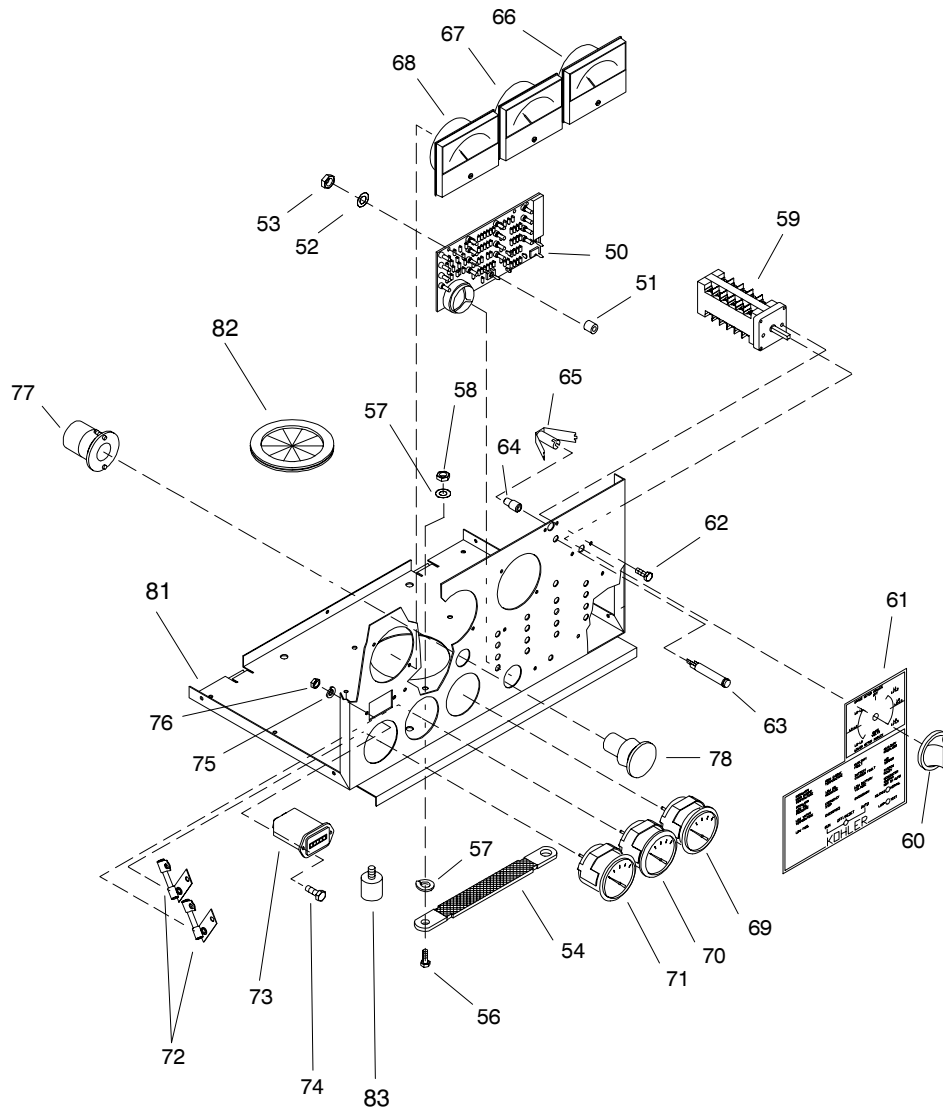
Item	Qty.	Description Variation	Part No.
39	1	Holder, fuse all	292821
40	3	Fuse, 1.5 amp all	291207
41	2	Screw, 6-32 x 3/8 all	X-49-2
42	2	Washer, int. tooth lock, 6 all	X-22-6
43		6-32 hardware all	#
44	1	Block, terminal (8-terminal) all	246115
45	1	Jumper, two-terminal all	X-6048-2
46	1	Terminal, push-on, 1/4 all	238898
47	1	Marker, terminal strip all	292823
48	2	Screw, 8-32 x 5/8 all	X-51-53
49		Hardware, 8-32 all	#

### Serial Number-Contingent Controller Parts

Part Description	Part Number	
	Before Serial Number 363369	Serial Numbers 363369 and after
Main Circuit Board	G-292806	A-336415
Indicator Board	B-292357	A-336432
Controller Ribbon Cable	292836	336428

# Common Hardware; Procure Locally

# Group 301: Controller and Mounting, Continued



Note 1: Item 54, ground strap, attaches to ground lug assembly in junction box.

Note 2: Resistors (item 72) mount on back of water temp. gauge and oil press. gauge (items 70 & 71).

350-400ROZD  
 301-70-17  
 DD-272000  
 B-292852

# Group 301: Controller and Mounting, Continued

Item	Qty.	Description Variation	Part No.
50	1	Indicator Board all	See table below
51	4	Spacer, nylon, 8 hole x 1/2 all	X-712-9
52	3	Washer, split lock, 8 all	X-18-2
53		Hex nut, 8-32 all	#
54	1	Strap, ground all	X-6046-2
55	1	Sleeving (not shown) all	X-696-5
56	1	Screw, 10-24 x 1 all	X-50-7
57	2	Washer, int./ext. tooth lock, 10 all	X-22-13
58		Nut, 10-24 all	X-6234-6
59	1	Switch, selector all	292374
60	1	Knob, (for item 59) all	Not available separately
61	1	Nameplate all	354356
62	2	Screw, thread forming all	X-67-127
63	2	Lamp all	291740
64	2	Bulb (lamp), no. 313 all	283420
65	2	Socket, lamp all	284990
66	1	Ammeter, AC 26, 57, 81, 82, 88 83 87, 89	282810 282809 282811
67	1	Voltmeter, AC 26, 57, 81, 82, 87, 89 83, 88	282816 282817
68	1	Meter, frequency all	295069
69	1	Voltmeter, DC all	255224
70	1	Gauge, water temperature all	282898
71	1	Gauge, oil pressure all	282897
72	2	Resistor, 24 Volt all	268297

# Common Hardware; Procure Locally

Item	Qty.	Description Variation	Part No.
73	1	Hourmeter all	238736
74	2	Screw, 6-32 x 1/2 all	X-49-39
75	2	Washer, int. tooth lock, 6 all	X-22-6
76		Hardware, 6-32 all	#
77	1	Switch, emergency stop all	292364
78	1	Pushbutton (for item 77) all	Not available separately
79	4	Terminal, spade, 6 all (Item 79 connects item 77 to main circuit board at TB1 and TB1A once jumper is removed.)	X-285-9
80	1	Decal, emerg. stop (not shown) all	292467
81	1	Box, controller all	292375
82	1	Grommet all	X-284-31
83	1	Bumper, rubber all	292834

### Serial Number-Contingent Controller Parts

Part Description	Part Number	
	Before Serial Number 363369	Serial Numbers 363369 and after
Main Circuit Board	G-292806	A-336415
Indicator Board	B-292357	A-336432
Controller Ribbon Cable	292836	336428

## Group 701: Literature

Item	Qty.	Description Variation	Part No.
1	1	Installation Manual all	TP-5700
2	1	Operation Manual, DDC 71, 92, 149 all	TP-5611
	1	Operation Manual, Generator Set all	TP-5750
	1	Operation/Installation, MagnaMax Alternator all	TP-5578
	1	Operation Manual, Decision-Maker 340 Controller 43, 68	TP-5829
3	1	Operation Manual, Digital Voltage Regulator 43, 68	TP-5579
	1	Operation Manual, PM100 Voltage Regulator 30, 51	TP-5278

Item	Qty.	Description Variation	Part No.
4	1	Service Manual, DDC 92 Series Engine all	TP-5382
	1	Service Manual, Generator Set all	TP-5583
5	1	Parts Catalog, Generator Set all	TP-5584
	1	Parts Catalog, DDC 350 kW Engine 30, 43	TP-5638
	1	Parts Catalog, DDC 400 kW Engine 51, 68	TP-5639
	1	Parts Catalog, Accessories all	TP-5707
6	1	Wiring Diagram Manual Decision-Maker 340 Controller 43, 68	TP-5851
	1	Wiring Diagram Manual 350-2000 kW 43, 68	TP-5722

## Generator Paint

1	Gallon Can, Kohler Cream Beige	221338
1	Spray Can, Kohler Cream Beige	221337

# Notes

# Kit List

	350ROZD	400ROZD
<b>CONTROLLER KITS</b>		
<b>6-and 7-Light</b>		
Standard meterbox	328204 *	328204 *
	293895	293895
Standard meterbox, 380 V	328212 *	328212 *
	293943	293943
Standard meterbox, 600 V	328208 *	328208 *
	293920	293920
Oversized meterbox	328206 *	328206 *
	293896	293896
Oversized meterbox, 380 V	328214 *	328214 *
	293951	293951
Oversized meterbox, 600 V	328210 *	328210 *
	293929	293929
<b>16-Light</b>		
Standard meterbox*	328203 *	328203 *
	293910	293910
Standard meterbox, 380 V	328211 *	328211 *
	293938	293938
Standard meterbox, 600 V	328207 *	328207 *
	293915	293915
Oversized meterbox	328205 *	328205 *
	293894	293894
Oversized meterbox, 380 V	328213 *	328213 *
	293947	293947
Oversize meterbox, 600 V	328209 *	328209 *
	293909	293909
Meterbox for switchgear	328153 *	328153 *
	273940	273940
Meterbox for switchgear, 600V	328087 *	328087 *
	273939	273939
<b>COOLING SYSTEM KITS</b>		
Block Heater, 110-240 Volt	279963	279926
Block Heater, 380-480 Volt	279964	279927
Block Heater, 380-480 Volt	354487	354488
Duct flange, radiator 40 ambient (unhoused)	272838	272838
Duct flange, radiator 40 ambient (housed)	272722	N/A
Duct flange, radiator 50 ambient (unhoused)	279831	279831
Duct flange, radiator 50 ambient (housed)	279834	N/A
Radiator, 40 ambient	299957	299958
	279826 **	279597 **
Radiator, 50 ambient	299956	299959
	279825 **	279484 **
City water cooling	299952	299954
	279997 **	274794 **
Remote radiator setup	299953	299955
	279998 **	274795 **

## OPTIONAL KITS

See Parts Catalog TP-5707 for parts lists of optional kits.

\* Kit applies to generator set specifications 132519-132523.

\*\* Obsolete Kit

## 6- and 7-Light Controller Kits

6- and 7-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS								
Qty.	Description	Common	Kit Numbers/Unique Parts					
			293895 328204	293896 328206	293920 328208	293929 328210	293943 328212	293951 328214
1	Controller assembly*	X-284-25 255080 258453	A-292457	A-273801	A-274921	A-274929	A-292457	A-273801
1	Controller assembly*		A-347008**	A-347040**	A-347007**	A-347041**	A-347006**	A-347040**
1	Grommet							
1	Marker, strip							
1	Harness, wiring							
2	Relay	272684						
1	Panel, relay	274796						
1	Harness, wiring		258455	258455	274964	274964	274964	274964
4	Mount, vibro	282829						
3	Transformer		N/A	N/A	258990	258990	276578	276578
1	Speed pickup	291288						
3	Transformer, current		291547	291547	248875	248875	248877	248877
1	Block, terminal	295314						

\* See Controller Assembly section for parts list.

\*\* Effective with generator set serial number greater than or equal to 363369.

N/A Not Applicable

## 6- and 7-Light Controller Assemblies

Qty.	Description	Common parts	Controller Assembly Number/Unique parts			
			A-273801	A-274921	A-274929	A-292457
2	Resistor, 24 volt		N/A	268297	268297	268297
1	6-light circuit board	B-292381				
1	Main circuit board	G-292806				
1	Washer, shakeproof E.T.	X-22-20				
2	Washer, lock	X-22-50				
4	Washer, lock #6	X-22-6				
3	Washer, lock #8	X-22-7				
8	Washer, plain	X-25-73				
1	Grommet	X-284-31				
1	Plug, button	X-301-29				
1	Plug, button	X-301-34				
2	Screw, RHM 6-32 x 3/8	X-49-2				
18	Screw, RHM 6-32 x 1/4	X-49-25				
2	Screw, pan head	X-49-39				
4	Screw, RHM 10-24 x 3/4	X-50-3				
1	Screw, pan head machine	X-50-70				
2	Screw, RHM	X-51-53				
1	Strap, ground	X-6046-2				
1	Jumper	X-6048-2				
12	Screw, phil hex crimplite	X-6216-1				
2	Nut, hex.	X-6234-6				
2	Screw, thread forming	X-67-127				
1	Sleeve	X-696-5				
4	Spacer	X-712-9				
1	Tab, ident.	201620-86				
1	Meter, hour	238736				
1	Terminal	238898				
1	Connector, plug 6 position	241617				
1	Block, terminal	246115				
1	Voltmeter	255224				
3	Bulb	283420				
2	Lamp, meter scale	291740				
4	Bumper	255443				
1	Plate, hinge		273785	292908	273785	292908
1	Voltmeter, AC		282816	282817	282817	282816
1	Gauge, oil pressure	282897				
1	Gauge, water temperature	282898				
1	Ammeter, AC		282810	282809	282809	282810
3	Socket, lamp	284990				
9	Spacer, circuit board	287948				
3	Fuse, 1.5 Amp	291207				
1	Decal	292347				
1	Resistor		N/A	292352	292352	292352
1	Decal, emergency stop	292467				
1	Switch, selector	292374				
1	Holder, fuse	292821				
1	Marker, strip	292823				
1	Bumper	292834				
1	Harness, cable	292836				
1	Meter, frequency	282818				
1	Cover, controller		273838	292818	273838	292818
1	Nameplate	292385				
1	Box, silkscreened controller		273813	292375	273813	292375
1	Switch, pushbutton	292364				

N/A Not Applicable

## 6- and 7-Light Controller Assemblies, Continued

Qty.	Description	Common parts	Controller Assembly Number/Unique parts			
			A-347006	A-347007	A-347040	A-347041
2	Resistor, 24 volt		268297	268297	N/A	268297
1	Indicator circuit board	A-336430				
1	Main circuit board	A-336415				
1	Washer, shakeproof E.T.	X-22-20				
2	Washer, lock	X-22-50				
4	Washer, lock #6	X-22-6				
3	Washer, lock #8	X-22-7				
8	Washer, plain	X-25-73				
1	Grommet	X-284-31				
1	Plug, button	X-301-29				
1	Plug, button	X-301-34				
2	Screw, RHM 6-32 x 3/8	X-49-2				
18	Screw, RHM 6-32 x 1/4	X-49-25				
2	Screw, pan head	X-49-39				
4	Screw, RHM 10-24 x 3/4	X-50-3				
1	Screw, pan head machine	X-50-70				
2	Screw, RHM	X-51-53				
1	Strap, ground	X-6046-2				
1	Jumper	X-6048-2				
12	Screw, phillips hex crimplite	X-6216-1				
2	Nut, hex	X-6234-6				
2	Screw, thread forming	X-67-127				
1	Sleeve	X-696-5				
4	Spacer	X-712-9				
1	Tab, ident.	201620-86				
1	Meter, hour	238736				
1	Terminal	238898				
1	Connector, plug 6 position	241617				
1	Block, terminal	246115				
1	Harness assembly		N/A	N/A	269297	N/A
1	Voltmeter	255224				
3	Bulb	283420				
2	Lamp, meter scale	291740				
4	Bumper	255443				
1	Plate, hinge		292908	292908	273785	273785
1	Voltmeter, AC		282816	282817	282816	282817
1	Gauge, oil pressure	282897				
1	Gauge, water temperature	282898				
1	Ammeter, AC		282810	282809	282810	282809
3	Socket, lamp	284990				
9	Spacer, circuit board	287948				
3	Fuse, 1.5 amp	291207				
1	Decal	292347				
1	Resistor		N/A	292352	N/A	292352
1	Decal, emergency stop	292467				
1	Switch, selector	292374				
1	Holder, fuse	292821				
1	Marker, strip	292823				
1	Bumper	292834				
1	Harness, cable	336428				
1	Meter, frequency	282818				
1	Cover, controller		292818	292818	273838	273838
1	Nameplate	328910				
1	Box, silkscreened controller		292375	292375	273813	273813
1	Switch, pushbutton	292364				

N/A Not Applicable

# 16-Light Controller Kits

16-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS								
Qty.	Description	Common	Kit Number/Unique Parts					
			293894 328205	293909 328209	293910 328203	293915 328207	293938 328211	293947 328213
1	Controller assembly*		A-273829	A-274667	A-292852	A-274916	B-292852	A-273829
1	Controller assembly*		A-328968*	A-328969*	A-328933*	A-328934*	A-328933*	A-328968*
1	Grommet	X-284-25						
1	Marker, strip	255080						
1	Harness, wiring	258453						
2	Relay	272684						
1	Panel, relay	274796						
1	Harness, wiring	282829	258455	274964	258455	274964	274964	274964
4	Mount, vibro							
3	Transformer		N/A	258990	N/A	258990	258990	276578
1	Speed pickup	291288						
3	Transformer, current		291547	248875	291547	248875	248877	248877
1	Block, terminal	295314						

\* See Controller Assembly section for parts list.

\*\* Effective with generator set serial number greater than or equal to 363369.

N/A Not Applicable

# 16-Light Controller Assemblies

Qty.	Description	Common Parts	16-Light Controller Assembly Number/Unique Parts			
			A-273829	A-274667	A-274916	B-292852
2	Resistor, 24 volt	268297				
1	16-light circuit board	B-292356				
1	Main circuit board	G-292806				
1	Washer, shakeproof E.T.	X-22-20				
2	Washer, lock	X-22-50				
4	Washer, lock #6	X-22-6				
3	Washer, lock #8	X-22-7				
8	Washer, plain	X-25-73				
1	Grommet	X-284-31				
1	Plug, button	X-301-29				
1	Plug, button	X-301-34				
2	Screw, RHM 6-32 x 3/8	X-49-2				
18	Screw, RHM 6-32 x 1/4	X-49-25				
2	Screw, pan head	X-49-39				
4	Screw, RHM 10-24 x 3/4	X-50-3				
1	Screw, pan head machine	X-50-70				
2	Screw, RHM	X-51-53				
1	Strap, ground	X-6046-2				
1	Jumper	X-6048-2				
12	Screw, Phillips hex crimp tite	X-6216-1				
2	Nut, hex.	X-6234-6				
2	Screw, thread forming	X-67-127				
1	Sleeve	X-696-5				
4	Spacer	X-712-9				
1	Tab, ident.	201620-86				
1	Meter, hour	238736				
1	Terminal	238898				
1	Connector, plug 6 position	241617				
1	Block, terminal	246115				
1	Voltmeter	255224				
3	Bulb	283420				
2	Lamp, meter scale	291740				
4	Bumper	255443				
1	Plate, hinge		273785	273785	292908	292908
1	Voltmeter, AC		282816	282817	282817	282816
1	Gauge, oil pressure	282897				
1	Gauge, water temperature	282898				
1	Ammeter, AC		282810	282809	282809	282810
3	Socket, lamp	284990				
9	Spacer, circuit board	287948				
3	Fuse, 1.5 amp	291207				
1	Decal	292347				
1	Resistor		N/A	292352	292352	N/A
1	Decal, emergency stop	292467				
1	Switch, selector	292374				
1	Holder, fuse	292821				
1	Marker, strip	292823				
1	Bumper	292834				
1	Harness, cable	292836				
1	Meter, frequency	282818				
1	Cover, controller		273838	273838	292818	292818
1	Nameplate	292385				
1	Box, silkscreened controller		273813	273813	292375	292375
1	Switch, pushbutton	292364				

N/A Not Applicable

# 16-Light Controller Assemblies, Continued

Qty.	Description	Common Parts	16-Light Controller Assembly Number/Unique Parts			
			A-328933	A-328934	A-328968	A-328969
2	Resistor, 24 volt	268297				
1	16-light circuit board	A-336432				
1	Main circuit board	A-336415				
1	Washer, shakeproof E.T.	X-22-20				
2	Washer, lock	X-22-50				
4	Washer, lock #6	X-22-6				
3	Washer, lock #8	X-22-7				
8	Washer, plain	X-25-73				
1	Grommet	X-284-31				
1	Plug, button	X-301-29				
1	Plug, button	X-301-34				
2	Screw, RHM 6-32 x 3/8	X-49-2				
18	Screw, RHM 6-32 x 1/4	X-49-25				
2	Screw, pan head	X-49-39				
4	Screw, RHM 10-24 x 3/4	X-50-3				
1	Screw, pan head machine	X-50-70				
2	Screw, RHM	X-51-53				
1	Strap, ground	X-6046-2				
1	Jumper	X-6048-2				
12	Screw, Phillips hex crimp-tite	X-6216-1				
2	Nut, hex.	X-6234-6				
2	Screw, thread forming	X-67-127				
1	Sleeve	X-696-5				
4	Spacer	X-712-9				
1	Tab, ident.	201620-86				
1	Meter, hour	238736				
1	Terminal	238898				
1	Connector, plug 6 position	241617				
1	Block, terminal	246115				
1	Voltmeter	255224				
3	Bulb	283420				
2	Lamp, meter scale	291740				
4	Bumper	255443				
1	Plate, hinge		292908	292908	273785	273785
1	Voltmeter, AC		282816	282817	282816	282817
1	Gauge, oil pressure	282897				
1	Gauge, water temperature	282898				
1	Ammeter, AC		282810	282809	282810	282809
3	Socket, lamp	284990				
8	Spacer, circuit board	287948				
3	Fuse, 1.5 amp	291207				
1	Decal	292347				
1	Resistor		N/A	292352	N/A	292352
1	Decal, emergency stop	292467				
1	Switch, selector	292374				
1	Holder, fuse	292821				
1	Marker, strip	292823				
1	Bumper	292834				
1	Harness, cable	336428				
1	Meter, frequency	282818				
1	Cover, controller		292818	292818	273838	273838
1	Nameplate	292383				
1	Box, silkscreened controller		292375	292375	273813	273813
1	Switch, pushbutton	292364				

# Meterbox for Switchgear Kits

METERBOX FOR PARALLELING							
Qty.	Description	Common	Kit Number/Unique Parts				
			273939	273940	328087	328153	
1	Controller assembly*		A-273762	A-276281	A-328082	A-276281	
1	Switch assembly, limit	263438					
2	Relay	272684					
1	Grommet		N/A	X-284-25	X-284-25	X-284-25	
1	Marker, strip		N/A	255080	255080	255080	
1	Panel, relay		N/A	274796	274796	274796	
4	Mount, vibro		N/A	282829	282829	282829	
1	Block, terminal (6-terminal)		N/A	295314	295314	295314	

\* See Controller Assembly section below for parts list.

Qty.	Description	Common Parts	Controller Assembly Number/Unique Parts		
			A-273762	A-276281	A-328082
1	Potentiometer assembly		A-255041	N/A	N/A
1	Strap, ground	X-6046-2			
1	Switch, speed	X-6122-1			
1	Meter, hour	238736			
1	Voltmeter	255224			
1	Box, controller	263153			
1	Panel	263154			
1	Resistor, 24 volt	268297			
1	Harness, wiring (24-pin)	273764			
1	Strip, marker	273781			
1	Harness, wiring (4-lead)	273983			
1	Harness, wiring (shielded)	273984			
1	Gauge, oil pressure		282897	282897	328072
1	Gauge, water temperature	282898			
6	Strip, terminal (9-terminal)	283060			
3	Bulb	283420			
3	Socket, lamp	284990			
1	Decal		292361	N/A	N/A
1	Switch, pushbutton	292364			
1	Decal, emergency stop	292467			
1	Cover, controller	292818			
4	Bumper	292834			

N/A Not Applicable

# Cooling System Kits

Qty.	Description	Part No.
<b>Block Heater 279926</b>		
4	Nut, elastic stop, 1/4-20	X-101-8
1	Washer, shakeproof, 1/4	X-22-12
4	Clamp, hose, .69-1.25 ID	X-426-12
5	Tie, cable	X-468-1
2	Connector, hose, 3/4 ID, 3/4 NPT	X-582-8
1	Hose, .75 x 55 L	X-691-21
1	Hose, .75 x 39	X-691-26
1	Strap, ground, 3/8x5	223033
4	Bumper, 1/4-20	259632
1	Bracket, block heater	274431
1	Tag, caution block heater damage	279047
1	Connector, hose, 3.50 OD	279799
1	Thermostat, block heater	279813
1	Heater, block	279814
1	Box, block heater control	279873
2	Clamp, hose, 3.75-4.06 ID	291537
<b>Block Heater 279927</b>		
4	Nut, elastic stop, 1/4-20	X-101-8
1	Washer, shakeproof, 1/4	X-22-12
4	Clamp, hose, .69-1.25 ID	X-426-12
5	Tie, cable	X-468-1
2	Connector, hose, 3/4 ID, 3/4 NPT	X-582-8
1	Hose, .75 x 55 L	X-691-21
1	Hose, .75 x 39	X-691-26
1	Strap, ground, 3/8 x 5	223033
4	Bumper, 1/4-20	259632
1	Bracket, block heater	274431
1	Tag, caution block heater damage	279047
1	Connector, hose, 3.50 OD	279799
1	Thermostat, block heater	279813
1	Heater, block	279815
1	Box, block heater control	279874
2	Clamp, hose, 3.75-4.06 ID	291537
<b>Block Heater 279963</b>		
4	Nut, elastic stop, 1/4-20	X-101-8
10	Washer, shakeproof, 1/4	X-22-12
2	Clamp, hose, 2.81-3.75 ID	X-426-1
4	Clamp, hose, .69-1.25 ID	X-426-12
5	Tie, cable	X-468-1
2	Connector, hose, 3/4 ID, 3/4 NPT	X-582-8
1	Hose, .75 x 55 L	X-691-21
1	Hose, .75 x 39	X-691-26
1	Bushing, reducing, 1/2 x 3/4	153659
1	Strap, ground, 3/8 x 5	223033
4	Bumper, 1/4-20	259632
1	Bracket, block heater	274431
1	Tag, caution block heater damage	279047
1	Connector, hose, 3.00 OD	279798
1	Thermostat, block heater	279813
1	Heater, block	279814
1	Box, block heater control	279873

Qty.	Description	Part No.
<b>Block Heater 279964</b>		
4	Nut, elastic stop, 1/4-20	X-101-8
10	Washer, shakeproof, 1/4	X-22-12
1	Fitting, elbow	SA-472
4	Clamp, hose, .69-1.25 ID	X-426-12
2	Connector, hose, 3/4 ID, 3/4 NPT	X-582-8
1	Hose, .75 x 55 L	X-691-21
1	Hose, .75 x 39	X-691-26
1	Bushing, reducing, 1/2 x 3/4	153659
1	Strap, ground, 3/8 x 5	223033
4	Bumper, 1/4-20	259632
1	Bracket, block heater	274431
1	Tag, caution block heater damage	279047
1	Connector, hose, 3.00 OD	279798
1	Thermostat, block heater	279813
1	Heater, block	279815
1	Box, block heater control	279874
<b>Block Heater 354487</b>		
4	Nut, elastic stop, 1/4-20	X-101-8
10	Washer, shakeproof, 1/4	X-22-12
2	Clamp, hose, 2.81-3.75 ID	X-426-1
4	Clamp, hose, .69-1.25 ID	X-426-12
5	Tie, cable	X-468-1
2	Connector, hose, 3/4 ID, 3/4 NPT	X-582-8
1	Hose, .75 x 55 L	X-691-21
1	Hose, .75 x 39	X-691-26
1	Fitting, elbow	SA-472
1	Strap, ground, 3/8 x 5	223033
4	Bumper, 1/4-20	259632
1	Bracket, block heater	274431
1	Tag, caution block heater damage	279047
1	Thermostat, block heater	279813
1	Heater, block	279816
1	Box, block heater control	354316
1	Cover, block heater control	354317
1	Gasket, control box	354318
1	Decal, warning	354326
1	Label, wiring diagram	354328

# Cooling System Kits, Continued

Qty.	Description	Part No.	Qty.	Description	Part No.
<b>Block Heater</b>			<b>Radiator Cooling</b>		
		<b>354488</b>			<b>279484</b>
4	Nut, elastic stop, 1/4-20	X-101-8	1	Radiator assembly	A-279596
10	Washer, shakeproof, 1/4	X-22-12	2	Bushing, reducer, 1/4 F x 1/2 M	X-202-12
2	Clamp, hose, 2.81-3.75 ID	X-426-1	1	Bushing, reducer, 3/8 x 1/2 NPT	X-202-28
4	Clamp, hose, .69-1.25 ID	X-426-12	1	Bushing, reducer, 1/4 x 3/4 NPT	X-202-39
5	Tie, cable	X-468-1	1	Nipple, pipe, 1 x 1 1/2	X-218-24
2	Connector, hose, 3/4 ID, 3/4 NPT	X-582-8	1	Elbow, 45°, 1 NPT	X-225-9
1	Hose, .75 x 55 L	X-691-21	1	Valve, drain, 3/8 NPTF	X-256-1
1	Hose, .75 x 39	X-691-26	1	Line, flex fuel, 1/4 x 1/2 30.00" L	X-386-75
1	Fitting, elbow	SA-472	1	Line, flex fuel, 1/4 x 1/2 36.00" L	X-386-81
1	Bushing, reducing, 1/2 x 3/4	153659	2	Connector, hose elbow, 1/4 ID 1/4 NPT	X-391-20
1	Strap, ground, 3/8 x 5	223033	4	Clamp, hose, 0.25-0.62 ID	X-426-9
4	Bumper, 1/4-20	259632	4	Tie, cable	X-468-4
1	Bracket, block heater	274431	1	Hose, radiator, 1.25 x 54.00"	X-6014-30
1	Tag, caution block heater damage	279047	2	Hose, radiator, 2.50 x 32.00"	X-6014-65
1	Thermostat, block heater	279813	2	Fitting, hose, 1/4 ID 1/4 NPT 1.52 L	X-652-3
1	Heater, block	279816	2	Clamp, insulated, 0.44 ID	X-672-7
1	Box, block heater control	354316	1	Bracket, radiator	299883
1	Cover, block heater control	354317	2	Bracket, radiator	299884
1	Gasket, control box	354318	1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Decal, warning	354326	1	Switch assembly, level	273469
1	Label, wiring diagram	354328	2	Brace, radiator, 1/2-13 2.50 L	299885
<b>Duct Flange, Radiator (housed)</b>			1	Guard, belt LS	274276
		<b>272722</b>	1	Guard, belt RS	274277
2	Screw, lock, 10-24 x 1/2	X-6216-1	1	Guard, belt top	274278
8	Rivet, alumin./steel pop, 3/16 x 1/4	X-781-10	1	Bracket, radiator support	274301
2	Frame, air duct (top/bottom)	272721	4	Clamp, hose, 2.81-3.12 ID	275527
2	Frame, air duct (sides)	272847	1	Fan	279477
<b>Duct Flange, Radiator (unhoused)</b>			1	Hose, lower radiator, 3.50 ID	279599
		<b>279831</b>	2	Clamp, hose, 1.50-1.81 ID	279669
8	Rivet, alumin./steel pop, 3/16 x 1/4	X-781-10	6	Washer, hardened, 17/32 x 1 1/16	290945
2	Frame, air duct	272626	2	Clamp, hose, 3.75-4.06 ID	291537
2	Frame, air duct	272627			
<b>Duct Flange, Radiator (housed)</b>					
		<b>279834</b>			
2	Screw, lock, 10-24 x 1/2	X-6216-1			
2	Frame, air duct	279824			
1	Frame, air duct	279861			
1	Frame, air duct	279862			
<b>Duct Flange, Radiator (unhoused)</b>					
		<b>279838</b>			
8	Rivet, alumin./steel pop, 3/16 x 1/4	X-781-10			
2	Frame, air duct (bottom/top)	272736			
2	Frame, air duct (sides)	272737			

# Cooling System Kits, Continued

Qty.	Description	Part No.
<b>Radiator Cooling</b>		
		<b>279597</b>
1	Radiator assembly	A-274274
2	Bushing, reducer, 1/4 F x 1/2 M	X-202-12
1	Bushing, reducer, 3/8 x 1/2 NPT	X-202-28
1	Bushing, reducer, 1/4 x 3/4 NPT	X-202-39
1	Nipple, pipe, 1 x 1 1/2	X-218-24
1	Elbow, 45°, 1 NPT	X-225-9
1	Valve, drain, 3/8 NPTF	X-256-1
1	Connector, hose, 3/8 ID 1/4 NPT	X-391-16
4	Clamp, hose, 0.50-1.00 ID	X-426-10
1	Tie, cable	X-468-4
2	Hose, 2.50 x 28"	X-542-2
1	Hose, radiator, 1.25 x 54.00"	X-6014-30
2	Hose, rubber, 0.375 x 34" L	X-651-15
3	Fitting, hose, 3/8 ID 1/4 NPT 1.65 L	X-652-1
2	Bracket, radiator support	299880
2	Brace, radiator	274307
2	Support, radiator	272789
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Switch assembly, level	273469
1	Hose, radiator, 3.50 ID	274270
1	Guard, belt LS	274276
1	Guard, belt RS	274277
1	Guard, belt top	274278
2	Bracket, radiator support	299881
1	Fan	299962
4	Clamp, hose, 2.81-3.12 ID	275527
2	Clamp, hose, 1.50-1.81 ID	279669
6	Washer, hardened, 17/32 x 1 1/16	290945
2	Clamp, hose, 3.75-4.06 ID	291537

Qty.	Description	Part No.
<b>Radiator Cooling</b>		
		<b>279825</b>
1	Radiator assembly	A-279827
1	Elbow, 90°, 3/4 NPT	SA-472
1	Bushing, reducer, 3/4 F x 1 M	X-202-1
1	Bushing, reducer, 1/4 F x 1/2 M	X-202-12
1	Bushing, reducer, 3/8 x 1/2 NPT	X-202-28
1	Elbow, 45°, 1 NPT	X-225-9
1	Valve, drain, 3/8 NPTF	X-256-1
2	Clamp, hose, 0.25-0.62 ID	X-426-9
4	Tie, cable	X-468-4
2	Hose, radiator, 2.25 x 35 L	X-6014-23
1	Hose, radiator, 1.25 x 54.00	X-6014-30
1	Hose, rubber, 0.375 x 42 L	X-651-6
2	Fitting, hose, 3/8 ID 1/4 NPT 1.65 L	X-652-1
2	Clamp, insulated, 0.44 ID	X-672-7
2	Bracket, radiator	299883
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Switch assembly, level	273469
2	Brace, radiator, 1/2-13 2.50 L	299885
2	Bracket, radiator support	299884
1	Tag, instruction	279275
1	Fan	279477
4	Clamp, hose, 2.43-2.75 ID	279604
1	Guard, belt top	279650
1	Guard, belt LS	279651
1	Guard, belt RS	279652
2	Clamp, hose	279669
2	Hose, lower rad., 3 ID	279829
6	Washer, hardened, 17/32 x 1 1/16	290945
2	Clamp, hose, 3.75-4.06 ID	291537
2	Clamp, hose, 3.25-3.56 ID	291542

# Cooling System Kits, Continued

Qty.	Description	Part No.
<b>Radiator Cooling</b>		
		<b>279826</b>
1	Radiator assembly	A-279796
1	Elbow, 90°, 3/4 NPT	SA-472
1	Bushing, reducer, 3/4 F x 1 M	X-202-1
1	Bushing, reducer, 1/4 F x 1/2 M	X-202-12
1	Bushing, reducer, 3/8 x 1/2 NPT	X-202-28
1	Tee, pipe, 1 NPT	X-203-2
1	Nipple, pipe, 3/4 x 2	X-206-2
1	Elbow, 45°, 1 NPT	X-225-9
1	Valve, drain, 3/8 NPTF	X-256-1
2	Clamp, hose, 2 17/32	X-426-1
2	Clamp, hose, 0.25-0.62 ID	X-426-9
2	Tie, cable	X-468-4
1	Tie, cable	X-468-5
1	Hose, radiator	X-6014-72
2	Hose, 2.25 x 28" L	X-613-7
1	Hose, rubber, 0.375 ID x 36" L	X-651-33
2	Fitting, hose, 3/8 ID 1/4 NPT 1.65 L	X-652-1
1	Bracket, radiator	272636
1	Hose, lower radiator	272670
2	Bracket, radiator	299880
2	Brace, radiator	294307
2	Support, radiator	299881
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Switch assembly, level	273469
1	Tag, instruction	279275
4	Clamp, hose, 2.43-2.75 ID	279604
1	Guard, belt top	279650
1	Guard, belt LS	279651
1	Guard, belt RS	279652
2	Clamp, hose, 1.50-1.81 ID	279669
2	Fan, pusher	299962
6	Washer, hardened, 17/32 x 1 1/16	290945

Qty.	Description	Part No.
<b>Radiator Cooling</b>		
		<b>299956</b>
1	Radiator assembly	A-279827
1	Elbow, 90°, 3/4 NPT	SA-472
1	Bushing, reducer, 3/4 F x 1 M	X-202-1
1	Bushing, reducer, 3/8 x 1/2 NPT	X-202-28
1	Elbow, 45°, 1 NPT	X-225-9
1	Valve, drain, 3/8 NPTF	X-256-1
2	Clamp, hose, 0.25-0.62 ID	X-426-9
4	Tie, cable	X-468-4
2	Hose, radiator, 2.25 x 35 L	X-6014-23
1	Hose, radiator, 1.25 x 54.00	X-6014-30
1	Hose, rubber, 0.375 x 42 L	X-651-6
2	Fitting, hose, 3/8 ID 1/4 NPT 1.65 L	X-652-1
2	Clamp, insulated, 0.44 ID	X-672-7
2	Bracket, radiator	299883
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Sensor, fluid level	347270
2	Brace, radiator, 1/2-13 2.50 L	299885
2	Bracket, radiator support	299884
1	Tag, instruction	279275
1	Fan	279477
4	Clamp, hose	328800
1	Guard, belt top	279950
1	Guard, belt LS	279651
1	Guard, belt RS	279652
2	Clamp, hose	279669
2	Hose, lower rad., 3 ID	279829
6	Washer, hardened, 17/32 x 1 1/16	290945
2	Clamp, hose, 3.75-4.06 ID	291537
2	Clamp, hose, 3.25-3.56 ID	291542

**Radiator Cooling** **299957**  
 See Group 104, variation 24 for parts list

**Radiator Cooling** **299958**  
 See Group 104, variation 25 for parts list

# Cooling System Kits, Continued

Qty.	Description	Part No.
<b>Radiator Cooling</b>		
		<b>299959</b>
1	Radiator assembly	A-279596
2	Bushing, reducer, 1/4 F x 1/2 M	X-202-12
1	Bushing, reducer, 3/8 x 1/2 NPT	X-202-28
1	Nipple, pipe, 1 x 1 1/2	X-218-24
1	Elbow, 45°, 1 NPT	X-225-9
1	Valve, drain, 3/8 NPTF	X-256-1
2	Connector, hose elbow, 1/4 ID 1/4 NPT	X-391-20
4	Clamp, hose, 0.25-0.62 ID	X-426-9
4	Tie, cable	X-468-4
1	Hose, radiator, 1.25 x 54.00"	X-6014-30
2	Hose, radiator, 2.50 x 32.00"	X-6014-65
2	Fitting, hose,	X-652-1
2	Clamp, insulated, 0.44 ID	X-672-7
1	Bracket, radiator	299883
2	Bracket, radiator	299884
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Sensor, low fluid	254832
2	Brace, radiator, 1/2-13 2.50 L	299885
1	Guard, belt LS	274276
1	Guard, belt RS	274277
1	Guard, belt top	274278
1	Bracket, radiator support	274301
4	Clamp, hose, 2.81-3.12 ID	275527
1	Fan	279477
1	Hose, lower radiator, 3.50 ID	279599
2	Clamp, hose, 1.50-1.81 ID	279669
6	Washer, hardened, 17/32 x 1 1/16	290945
2	Clamp, hose, 3.75-4.06 ID	291537

Qty.	Description	Part No.
<b>City Water Cooling</b>		
		<b>274794</b>
1	Elbow, street, 1 1/2	A-27
2	Tee, pipe, 3	X-203-4
2	Nipple, pipe, 3/8 x 3	X-204-7
1	Elbow, 2	X-211-4
1	Elbow, pipe, 3	X-215-7
2	Elbow, 3/8	X-215-9
1	Nipple, pipe, 1 x 3	X-218-22
1	Nipple, pipe, 1 x 1 1/2	X-218-24
1	Elbow, 45°, 1 NPT	X-225-9
1	Nipple, pipe, 1 x 2 1/2	X-229-1
6	Washer, plain, 0.438 ID, 1.000 OD	X-25-1
2	Valve, drain, 3/8 NPTF	X-256-1
1	Valve, solenoid, 1 1/2 NPT	X-350-9
1	Line, fuel, 0.312 x 0.562 76.00" L	X-386-96
4	Connector, hose, 3/8 ID 1/4 NPT	X-391-16
2	Bolt, U, 3/8-16	X-397-9
8	Clamp, hose, 0.50-1.00 ID	X-426-10
4	Clamp, hose, 0.25-0.62 ID	X-426-9
1	Pipe, 3 x 3 NPTF 3.00 L	X-533-1
1	Pipe, 3 NPTF 14.50 L	X-533-16
2	Adapter, hose, 2.50 x 2	X-570-1
2	Connector, hose, 3/8 NPT x 3/8	X-582-9
1	Hose, radiator, 3.50 x 10.00"	X-6014-43
1	Hose, radiator, 2.50 x 23.00"	X-6014-44
1	Hose, radiator, 3.00 x 25.00"	X-6014-57
1	Hose, radiator, 1.25 x 46.00"	X-6014-61
1	Hose, 2.50 x 10.00"	X-6014-64
1	Nipple, combination, 3 NPT 3 ID	X-6268-4
1	Hose, rubber, 0.375 x 34 L	X-651-15
1	Hose, 0.375 x 28" L	X-651-28
1	Hose, 0.375 x 18" L	X-651-3
1	Hose, 0.375 x 30" L	X-651-5
1	Clamp, 0.50 ID	X-672-10
5	Clamp, insulated, 0.44 ID	X-672-7
11	Screw, drill hex., 1/4-14	X-794-1
1	Nipple, pipe, 1 1/2 x 2.50	151803
2	Bushing, reducer, 1 1/2 NPT 2 NPT	160212
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Switch assembly, level	273469
1	Regulator, water	274743
2	Bracket, tank	274745
1	Tank, surge	274746
1	Support, heat exchanger	274773
1	Exchanger, heat	274777
1	Guard, belt top	274790
1	Guard, belt RS	274791
1	Guard, belt LS	274792
1	Guard, belt front	274793
2	Bracket, support	274892
4	Clamp, hose, 2.81-3.12 ID	275527
1	Bracket, mounting	279668
2	Clamp, hose, 1.50-1.81 ID	279669
1	Adapter, hose, 3.00 NPTF	279806
4	Clamp, hose, 3.25-3.56 ID	291542
1	Tee, pipe (adapter)	299832

# Cooling System Kits, Continued

Qty.	Description	Part No.		Qty.	Description	Part No.
<b>City Water Cooling</b>				<b>City Water Cooling</b>		
		<b>279997</b>				<b>299952</b>
1	Elbow, street, 1 1/2 NPT	A-27		1	Elbow, street, 1 1/2 NPT	A-27
1	Elbow, 90°, 3/4 NPT	SA-472		1	Elbow, 90°, 3/4 NPT	SA-472
1	Tee, pipe, 3	X-203-4		1	Tee, pipe, 3	X-203-4
2	Nipple, pipe, 3/8 x 3	X-204-7		2	Nipple, pipe, 3/8 x 3	X-204-7
1	Nipple, pipe, 3/4 x 2	X-206-2		1	Nipple, pipe, 3/4 x 2	X-206-2
1	Elbow, 2 NPT	X-211-4		1	Elbow, 2 NPT	X-211-4
1	Elbow, pipe, 2 1/2	X-215-12		1	Elbow, pipe, 2 1/2	X-215-12
2	Elbow, street, 3/8 NPT	X-215-9		2	Elbow, street, 3/8 NPT	X-215-9
1	Nipple, pipe, 1 x 3	X-218-22		1	Nipple, pipe, 1 x 3	X-218-22
1	Elbow, 45°, 1 NPT	X-225-9		1	Elbow, 45°, 1 NPT	X-225-9
1	Nipple, pipe, 1 x 2 1/2	X-229-1		1	Nipple, pipe, 1 x 2 1/2	X-229-1
2	Valve, drain, 3/8 NPTF	X-256-1		2	Valve, drain, 3/8 NPTF	X-256-1
1	Valve, solenoid	X-350-9		1	Valve, solenoid	X-350-9
1	Line, fuel, 5/16 ID x 76"	X-386-96		1	Line, fuel, 5/16 ID x 76"	X-386-96
2	Connector, hose, 3/8 ID 1/4 NPT	X-391-16		2	Connector, hose, 3/8 ID 1/4 NPT	X-391-16
2	Bolt, U, 3/8-16	X-397-9		2	Bolt, U, 3/8-16	X-397-9
4	Clamp, hose, 0.50-1.00 ID	X-426-10		4	Clamp, hose, 0.50-1.00 ID	X-426-10
1	Pipe, iron, 3 NPTF x 9.50 L	X-491-7		1	Pipe, iron, 3 NPTF x 9.50 L	X-491-7
1	Pipe, 2 1/2 x 1/2	X-501-8		1	Pipe, 2 1/2 x 1/2	X-501-8
1	Hose, radiator	X-507-10		1	Hose, radiator	X-507-10
2	Adapter, hose, 2 1/4 ID x 2 NPT	X-570-9		2	Adapter, hose, 2 1/4 ID x 2 NPT	X-570-9
2	Connector, hose, 3/8 NPT x 3/8	X-582-9		2	Connector, hose, 3/8 NPT x 3/8	X-582-9
2	Hose, radiator	X-6014-54		2	Hose, radiator	X-6014-54
1	Hose, radiator, 3.00 x 25.00"	X-6014-57		1	Hose, radiator, 3.00 x 25.00"	X-6014-57
1	Hose, radiator, 1.25 x 46.00"	X-6014-61		1	Hose, radiator, 1.25 x 46.00"	X-6014-61
2	Nipple, combination, 3 NPT 3 ID	X-6268-4		2	Nipple, combination, 3 NPT 3 ID	X-6268-4
1	Hose, rubber, 0.375 x 34" L	X-651-15		1	Hose, rubber, 0.375 x 34" L	X-651-15
1	Hose 0.375 ID x 28 L	X-651-28		1	Hose 0.375 ID x 28 L	X-651-28
1	Hose, rubber, 3/8 x 1	X-651-3		1	Hose, rubber, 3/8 x 1	X-651-3
1	Hose, rubber, 0.375 ID x 36 L	X-651-33		1	Hose, rubber, 0.375 ID x 36 L	X-651-33
1	Clamp, 0.50 ID	X-672-10		1	Clamp, 0.50 ID	X-672-10
5	Clamp, insulated, 0.44 ID	X-672-7		5	Clamp, insulated, 0.44 ID	X-672-7
12	Screw, drill hex., 1/4-14	X-794-1		12	Screw, drill hex., 1/4-14	X-794-1
1	Elbow, 1 NPT	151385		1	Elbow, 1 NPT	151385
1	Nipple, pipe, 1 1/2 NPTF x 2 1/2	151803		1	Nipple, pipe, 1 1/2 NPTF x 2 1/2	151803
2	Bushing, reducer, 1 1/2 F x 2 M	160212		2	Bushing, reducer, 1 1/2 F x 2 M	160212
1	Adapter, hose, 1 1/4 ID 1 NPT	272930		1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Sensor, low fluid	254832		1	Regulator, water	274743
1	Regulator, water	274743		1	Sensor, low fluid	254832
2	Bracket, tank	274745		2	Bracket, tank	274745
1	Tank, surge	274746		1	Tank, surge	274746
1	Support, heat exchanger	274773		1	Support, heat exchanger	274773
1	Exchanger, heat	274777		1	Exchanger, heat	274777
2	Bracket, support	274892		2	Bracket, support	274892
4	Clamp, hose, 2.43-2.75 ID	279604		4	Clamp, hose, 2.43-2.75 ID	328800
1	Guard, belt top	279653		1	Guard, belt top	279653
1	Guard, belt LS	279654		1	Guard, belt LS	279654
1	Guard, belt RS	279655		1	Guard, belt RS	279655
1	Guard, belt front	279656		1	Guard, belt front	299949
1	Bracket, mounting	279668		1	Bracket, mounting	279668
2	Clamp, hose, 1.50-1.81 ID	279669		2	Clamp, hose, 1.50-1.81 ID	279669
1	Adapter, hose	279805		1	Adapter, hose	279805
4	Clamp, hose, 3.25-3.56 ID	291542		4	Clamp, hose, 3.25-3.56 ID	291542
1	Tee, pipe	299832		1	Pipe, tee	299832

# Cooling System Kits, Continued

Qty.	Description	Part No.
<b>City Water Cooling</b>		
		<b>299954</b>
1	Elbow, street, 1 1/2	A-27
2	Tee, pipe, 3	X-203-4
2	Nipple, pipe, 3/8 x 3	X-204-7
1	Elbow, 2	X-211-4
1	Elbow, pipe, 3	X-215-7
2	Elbow, 3/8	X-215-9
1	Nipple, pipe, 1 x 3	X-218-22
1	Nipple, pipe, 1 x 1 1/2	X-218-24
1	Elbow, 45°, 1 NPT	X-225-9
1	Nipple, pipe, 1 x 2 1/2	X-229-1
6	Washer, plain, 0.438 ID, 1.000 OD	X-25-1
2	Valve, drain, 3/8 NPTF	X-256-1
1	Valve, solenoid, 1 1/2 NPT	X-350-9
1	Line, fuel, 0.312 x 0.562 76.00" L	X-386-96
4	Connector, hose, 3/8 ID 1/4 NPT	X-391-16
2	Bolt, U, 3/8-16	X-397-9
8	Clamp, hose, 0.50-1.00 ID	X-426-10
4	Clamp, hose, 0.25-0.62 ID	X-426-9
1	Pipe, t.o.e., 3 x 3 NPTF 3.00 L	X-533-1
1	Pipe, 3 NPTF 14.50 L	X-533-16
2	Adapter, hose, 2.50 x 2	X-570-1
2	Connector, hose, 3/8 NPT x 3/8	X-582-9
1	Hose, radiator, 3.50 x 10.00"	X-6014-43
1	Hose, radiator, 2.50 x 23.00"	X-6014-44
1	Hose, radiator, 3.00 x 25.00"	X-6014-57
1	Hose, radiator, 1.25 x 46.00"	X-6014-61
1	Hose, 2.50 x 10.00"	X-6014-64
1	Nipple, combination, 3 NPT 3 ID	X-6268-4
1	Hose, rubber, 0.375 x 34 L	X-651-15
1	Hose, 0.375 x 28" L	X-651-28
1	Hose, 0.375 x 18" L	X-651-3
1	Hose, 0.375 x 30" L	X-651-5
1	Clamp, 0.50 ID	X-672-10
5	Clamp, insulated, 0.44 ID	X-672-7
11	Screw, drill hex., 1/4-14	X-794-1
1	Nipple, pipe, 1 1/2 x 2.50	151803
2	Bushing, reducer, 1 1/2 NPT 2 NPT	160212
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Switch assembly, level	273469
1	Regulator, water	274743
2	Bracket, tank	274745
1	Tank, surge	274746
1	Support, heat exchanger	274773
1	Exchanger, heat	274777
1	Guard, belt top	299960
1	Guard, belt RS	274791
1	Guard, belt LS	274792
1	Guard, belt front	299947
2	Bracket, support	274892
4	Clamp, hose, 2.81-3.12 ID	275527
1	Bracket, mounting	279668
2	Clamp, hose, 1.50-1.81 ID	279669
1	Adapter, hose, 3.00 NPTF	279806
4	Clamp, hose, 3.25-3.56 ID	291542
1	Tee, pipe (adapter)	299832

Qty.	Description	Part No.
<b>Remote Radiator Set Up</b>		
		<b>274795</b>
1	Valve, drain, 1/4	X-256-3
1	Nipple, pipe, 1 x 1 1/2	X-218-24
1	Elbow, 45°, 1 NPT	X-225-9
2	Hose, 2.50 x 28"	X-542-2
1	Hose, radiator, 1.25 x 54.00"	X-6014-30
12	Screw, drill hex., 1/4-14	X-794-1
1	Hose, radiator, 3.50 ID	274270
1	Guard, belt top	274790
1	Guard, belt RS	274791
1	Guard, belt LS	274792
1	Guard, belt front	274793
4	Clamp, hose, 2.81-3.12 ID	275527
2	Clamp, hose, 3.75-4.06 ID	291537
<b>Remote Radiator Set Up</b>		
		<b>279998</b>
2	Valve, drain, 1/4	X-256-3
2	Clamp, hose, 2 17/32	X-426-1
2	Hose, 2.25 x 28" L	X-613-7
12	Screw, drill hex., 1/4-14	X-794-1
1	Hose, lower radiator	272670
4	Clamp, hose	279604
1	Guard, belt top	279653
1	Guard, belt LS	279654
1	Guard, belt RS	279655
1	Guard, belt front	279656
<b>Remote Radiator Set Up</b>		
		<b>299953</b>
2	Valve, drain, 1/4	X-256-3
2	Clamp, hose, 2 17/32	X-426-1
2	Hose, 2.25 x 28" L	X-613-7
12	Screw, drill hex., 1/4-14	X-794-1
1	Hose, lower radiator	272670
4	Clamp, hose	328800
1	Guard, belt top	299949
1	Guard, belt LS	279654
1	Guard, belt RS	279655
1	Guard, belt front	299951
<b>Remote Radiator Set Up</b>		
		<b>299955</b>
1	Valve, drain, 1/4	X-256-3
2	Hose, 2.50 x 28"	X-542-2
12	Screw, drill hex., 1/4-14	X-794-1
1	Hose, radiator, 3.50 ID	274270
1	Guard, belt top	299960
1	Guard, belt RS	274791
1	Guard, belt LS	274792
1	Guard, belt front	299947
4	Clamp, hose, 2.81-3.12 ID	275527
2	Clamp, hose, 3.75-4.06 ID	291537

# Appendix A. Abbreviations

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

A, amp	ampere	cm	centimeter	freq.	frequency
ABDC	after bottom dead center	cmm	cubic meters per minute	FS	full scale
AC	alternating current	CMOS	complementary metal oxide substrate (semiconductor)	ft.	foot, feet
A/D	analog to digital			ft. lbs.	foot pounds (torque)
ADC	analog to digital converter	cogen.	cogeneration	ft./min.	feet per minute
adj.	adjust, adjustment	COM	communications (port)	g	gram
ADV	advertising dimensional drawing	conn.	connection	ga.	gauge (meters, wire size)
AHWT	anticipatory high water temperature	cont.	continued	gal.	gallon
		CPVC	chlorinated polyvinyl chloride	gen.	generator
AISI	American Iron and Steel Institute	crit.	critical	genset	generator set
ALOP	anticipatory low oil pressure	CRT	cathode ray tube	GFI	ground fault interrupter
alt.	alternator	CSA	Canadian Standards Association	gnd.	ground
Al	aluminum	CT	current transformer	gov.	governor
ANSI	American National Standards Institute (formerly American Standards Association, ASA)	Cu	copper	gph	gallons per hour
		cu. in.	cubic inch	gpm	gallons per minute
AO	anticipatory only	cw.	clockwise	gr.	grade, gross
API	American Petroleum Institute	CWC	city water-cooled	gr. wt.	gross weight
approx.	approximate, approximately	cyl.	cylinder	H x W x D	height by width by depth
AR	as required, as requested	D/A	digital to analog	HC	hex cap
AS	as supplied, as stated, as suggested	DAC	digital to analog converter	HCHT	high cylinder head temperature
		dB	decibel	HD	heavy duty
ASE	American Society of Engineers	dba	decibel (A weighted)	HET	high exhaust temperature
ASME	American Society of Mechanical Engineers	DC	direct current	hex	hexagon
		DCR	direct current resistance	Hg	mercury (element)
assy.	assembly	deg., °	degree	HH	hex head
ASTM	American Society for Testing Materials	dept.	department	HHC	hex head cap
		dia.	diameter	HP	horsepower
ATDC	after top dead center	DI/EO	dual inlet/end outlet	hr.	hour
ATS	automatic transfer switch	DIN	Deutsches Institut fur Normung e. V. (also Deutsche Industrie Normenausschuss)	HS	heat shrink
auto.	automatic			hsg.	housing
aux.	auxiliary	DIP	dual inline package	HVAC	heating, ventilation, and air conditioning
A/V	audio/visual	DPDT	double-pole, double-throw	HWT	high water temperature
avg.	average	DPST	double-pole, single-throw	Hz	hertz (cycles per second)
AVR	automatic voltage regulator	DS	disconnect switch	IC	integrated circuit
AWG	American Wire Gauge	DVR	digital voltage regulator	ID	inside diameter, identification
AWM	appliance wiring material	E, emer.	emergency (power source)	IEC	International Electrotechnical Commission
bat.	battery	EDI	electronic data interchange	IEEE	Institute of Electrical and Electronics Engineers
BBDC	before bottom dead center	EFR	emergency frequency relay	IMS	improved motor starting
BC	battery charger, battery charging	e.g.	for example ( <i>exempli gratia</i> )	in.	inch
BCA	battery charging alternator	EG	electronic governor	in. H <sub>2</sub> O	inches of water
BCI	Battery Council International	EGSA	Electrical Generating Systems Association	in. Hg	inches of mercury
BDC	before dead center	EIA	Electronic Industries Association	in. lbs.	inch pounds
BHP	brake horsepower	EI/EO	end inlet/end outlet	Inc.	incorporated
blk.	black (paint color), block (engine)	EMI	electromagnetic interference	ind.	industrial
blk. htr.	block heater	emiss.	emission	int.	internal
BMEP	brake mean effective pressure	eng.	engine	int./ext.	internal/external
bps	bits per second	EPA	Environmental Protection Agency	I/O	input/output
br.	brass	EPS	emergency power system	IP	iron pipe
BTDC	before top dead center	ER	emergency relay	ISO	International Organization for Standardization
Btu	British thermal unit	ES	engineering special, engineered special	J	joule
Btu/min.	British thermal units per minute	ESD	electrostatic discharge	JIS	Japanese Industry Standard
C	Celsius, centigrade	est.	estimated	k	kilo (1000)
cal.	calorie	E-Stop	emergency stop	K	kelvin
CARB	California Air Resources Board	etc.	et cetera (and so forth)	kA	kiloampere
CB	circuit breaker	exh.	exhaust	KB	kilobyte (2 <sup>10</sup> bytes)
cc	cubic centimeter	ext.	external	kg	kilogram
CCA	cold cranking amps	F	Fahrenheit, female	kg/cm <sup>2</sup>	kilograms per square centimeter
ccw.	counterclockwise	fglass.	fiberglass	kgm	kilogram-meter
CEC	Canadian Electrical Code	FHM	flat head machine (screw)	kg/m <sup>3</sup>	kilograms per cubic meter
cfh	cubic feet per hour	fl. oz.	fluid ounce	KHz	kilohertz
cfm	cubic feet per minute	flex.	flexible		
CG	center of gravity				
CID	cubic inch displacement				
CL	centerline				

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

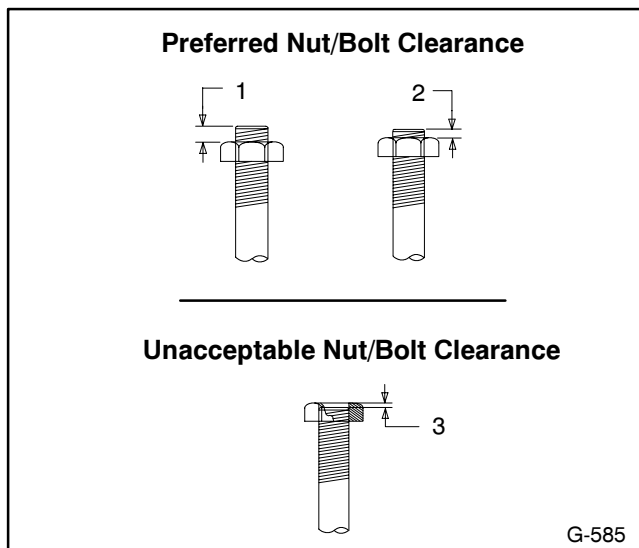
# Appendix B. Common Hardware Application Guidelines

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 General Torque Specifications and other torque specifications in the service literature.



1. 1/2 of Bolt Diameter
2. Min. 1 Full Thread Beyond Top of Nut
3. Below Top of Nut

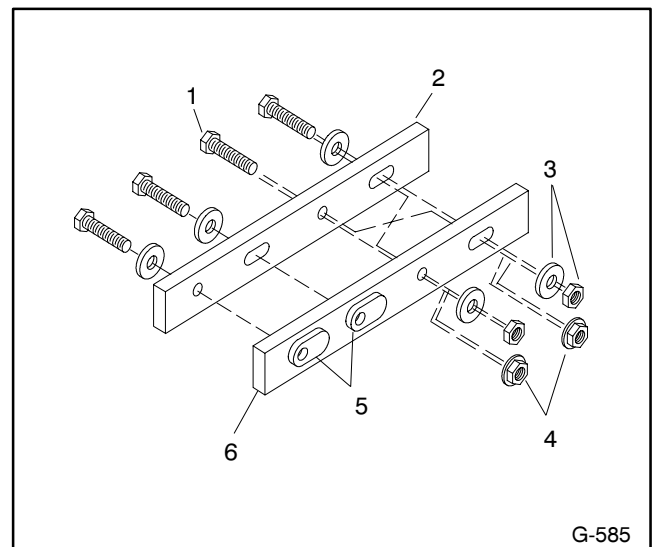
**Figure 1. Acceptable Bolt Lengths**

## 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 the diagram below.

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 the diagram below, which depicts the preceding hardware configuration possibilities.



1. Cap screw
2. Entry hole types
3. Standard nut and SAE washer
4. Whiz nut or spirallock: up to 1/2" dia. hardware
5. Weld nuts: above 1/2" dia. hardware
6. Exit hole types

**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	in. lbs. (Nm)	16 (1.8)	20 (2.3)	—	16 (1.8)
10-24	in. lbs. (Nm)	26 (2.9)	32 (3.6)	—	26 (2.9)
10-32	in. lbs. (Nm)	26 (2.9)	32 (3.6)	—	26 (2.9)
1/4-20	in. lbs. (Nm)	60 (6.8)	96 (10.8)	132 (14.9)	60 (6.8)
1/4-28	in. lbs. (Nm)	72 (8.1)	108 (12.2)	144 (16.3)	72 (8.1)
5/16-18	in. lbs. (Nm)	120 (13.6)	192 (21.7)	264 (29.8)	120 (13.6)
5/16-24	in. lbs. (Nm)	132 (14.9)	204 (23.1)	288 (32.5)	132 (14.9)
3/8-16	ft. lbs. (Nm)	18 (24)	28 (38)	39 (53)	18 (24)
3/8-24	ft. lbs. (Nm)	20 (27)	31 (42)	44 (60)	20 (27)
7/16-14	ft. lbs. (Nm)	29 (39)	44 (60)	63 (85)	—
7/16-20	ft. lbs. (Nm)	32 (43)	50 (68)	70 (95)	—
1/2-13	ft. lbs. (Nm)	44 (60)	68 (92)	96 (130)	—
1/2-20	ft. lbs. (Nm)	49 (66)	76 (103)	108 (146)	—
9/16-12	ft. lbs. (Nm)	60 (81)	98 (133)	138 (187)	—
9/16-18	ft. lbs. (Nm)	67 (91)	109 (148)	154 (209)	—
5/8-11	ft. lbs. (Nm)	83 (113)	135 (183)	191 (259)	—
5/8-18	ft. lbs. (Nm)	94 (128)	153 (208)	216 (293)	—
3/4-10	ft. lbs. (Nm)	147 (199)	240 (325)	338 (458)	—
3/4-16	ft. lbs. (Nm)	164 (222)	268 (363)	378 (513)	—
1-8	ft. lbs. (Nm)	191 (259)	532 (721)	818 (1109)	—
1-12	ft. lbs. (Nm)	209 (283)	582 (789)	895 (1214)	—






## Metric Fasteners Torque Specifications, Measured in ft. lbs. (Nm)

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	4 (5.6)	7 (9.9)	10 (14)	4 (5.6)
M8 x 1.25	10 (13.6)	18 (25)	26 (35)	10 (13.6)
M8 x 1.00	16 (21)	18 (25)	26 (35)	16 (21)
M10 x 1.50	20 (27)	35 (49)	50 (68)	20 (27)
M10 x 1.25	29 (39)	35 (49)	50 (68)	29 (39)
M12 x 1.75	35 (47)	61 (83)	86 (117)	—
M12 x 1.50	48 (65)	65 (88)	92 (125)	—
M14 x 2.00	55 (74)	97 (132)	136 (185)	—
M14 x 1.50	74 (100)	103 (140)	142 (192)	—
M16 x 2.00	85 (115)	148 (200)	210 (285)	—
M16 x 1.50	104 (141)	155 (210)	218 (295)	—
M18 x 2.50	114 (155)	203 (275)	288 (390)	—
M18 x 1.50	145 (196)	225 (305)	315 (425)	—

# Appendix D. Common Hardware Identification

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

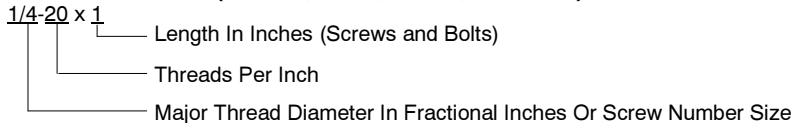
Nuts	
Nut Styles	
Hex Head	
Lock or Elastic	
Square	
Cap or Acorn	
Wing	
Washers	
Washer Styles	
Plain	
Split Lock or Spring	
Spring or Wave	
External Tooth Lock	
Internal Tooth Lock	
Internal-External Tooth Lock	

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

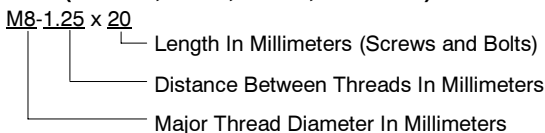
Allen™ head screw is a trademark of Holo-Krome Co.  
Phillips® screw is a registered trademark of Phillips Screw Company.

## Sample Dimensions

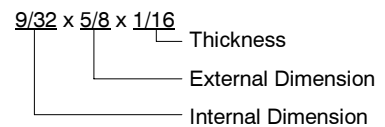
### American Standard (Screws, Bolts, Studs, and Nuts)



### Metric (Screws, Bolts, Studs, and Nuts)



### Plain Washers



### Lock Washers



# Appendix E. Common Hardware List

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

## American Standard

Part No.	Dimensions	Part No.	Dimensions	Part No.	Dimensions	Type		
<b>Hex Head Bolts (Grade 5)</b>								
X-465-17	1/4-20 x .38	X-6238-14	3/8-24 x .75	X-6009-1	1-8	Standard		
X-465-6	1/4-20 x .50	X-6238-16	3/8-24 x 1.25	X-6210-3	6-32	Whiz		
X-465-2	1/4-20 x .62	X-6238-21	3/8-24 x 4.00	X-6210-4	8-32	Whiz		
X-465-16	1/4-20 x .75	X-6238-22	3/8-24 x 4.50	X-6210-5	10-24	Whiz		
X-465-18	1/4-20 x .88	X-6024-5	7/16-14 x .75	X-6210-1	10-32	Whiz		
X-465-7	1/4-20 x 1.00	X-6024-2	7/16-14 x 1.00	X-6210-2	1/4-20	Spiralock		
X-465-8	1/4-20 x 1.25	X-6024-8	7/16-14 x 1.25	X-6210-6	1/4-28	Spiralock		
X-465-9	1/4-20 x 1.50	X-6024-3	7/16-14 x 1.50	X-6210-7	5/16-18	Spiralock		
X-465-10	1/4-20 x 1.75	X-6024-4	7/16-14 x 2.00	X-6210-8	5/16-24	Spiralock		
X-465-11	1/4-20 x 2.00	X-6024-11	7/16-14 x 2.75	X-6210-9	3/8-16	Spiralock		
X-465-12	1/4-20 x 2.25	X-6024-12	7/16-14 x 6.50	X-6210-10	3/8-24	Spiralock		
X-465-14	1/4-20 x 2.75	X-129-15	1/2-13 x .75	X-6210-11	7/16-14	Spiralock		
X-465-21	1/4-20 x 5.00	X-129-17	1/2-13 x 1.00	X-6210-12	1/2-13	Spiralock		
X-465-25	1/4-28 x .38	X-129-18	1/2-13 x 1.25	X-6210-15	7/16-20	Spiralock		
X-465-20	1/4-28 x 1.00	X-129-19	1/2-13 x 1.50	X-6210-14		Spiralock		
X-125-33	5/16-18 x .50	X-129-20	1/2-13 x 1.75	X-85-3	5/8-11	Standard		
X-125-23	5/16-18 x .62	X-129-21	1/2-13 x 2.00	X-88-12	3/4-10	Standard		
X-125-3	5/16-18 x .75	X-129-22	1/2-13 x 2.25	X-89-2	1/2-20	Standard		
X-125-31	5/16-18 x .88	X-129-23	1/2-13 x 2.50	<b>Washers</b>				
X-125-5	5/16-18 x 1.00	X-129-24	1/2-13 x 2.75	<b>Part No.</b>	<b>ID</b>	<b>OD</b>		
X-125-24	5/16-18 x 1.25	X-129-25	1/2-13 x 3.00			<b>Thick.</b>		
X-125-34	5/16-18 x 1.50	X-129-27	1/2-13 x 3.50			<b>Bolt/</b>		
X-125-25	5/16-18 x 1.75	X-129-29	1/2-13 x 4.00			<b>Screw</b>		
X-125-26	5/16-18 x 2.00	X-129-30	1/2-13 x 4.50	X-25-46	.125	.250	.022	#4
230578	5/16-18 x 2.25	X-463-9	1/2-13 x 5.50	X-25-9	.156	.375	.049	#6
X-125-29	5/16-18 x 2.50	X-129-44	1/2-13 x 6.00	X-25-48	.188	.438	.049	#8
X-125-27	5/16-18 x 2.75	X-129-51	1/2-20 x .75	X-25-36	.219	.500	.049	#10
X-125-28	5/16-18 x 3.00	X-129-45	1/2-20 x 1.25	X-25-40	.281	.625	.065	1/4
X-125-22	5/16-18 x 4.50	X-129-52	1/2-20 x 1.50	X-25-85	.344	.687	.065	5/16
X-125-32	5/16-18 x 5.00	X-6021-3	5/8-11 x 1.00	X-25-37	.406	.812	.065	3/8
X-125-35	5/16-18 x 5.50	X-6021-4	5/8-11 x 1.25	X-25-34	.469	.922	.065	7/16
X-125-36	5/16-18 x 6.00	X-6021-2	5/8-11 x 1.50	X-25-26	.531	1.062	.095	1/2
X-125-40	5/16-18 x 6.50	X-6021-1	5/8-11 x 1.75	X-25-15	.656	1.312	.095	5/8
X-125-43	5/16-24 x 1.75	273049	5/8-11 x 2.00	X-25-29	.812	1.469	.134	3/4
X-125-44	5/16-24 x 2.50	X-6021-5	5/8-11 x 2.25	X-25-127	1.062	2.000	.134	1
X-125-30	5/16-24 x .75	X-6021-6	5/8-11 x 2.50					
X-125-39	5/16-24 x 2.00	X-6021-7	5/8-11 x 2.75					
X-125-38	5/16-24 x 2.75	X-6021-12	5/8-11 x 3.75					
X-6238-2	3/8-16 x .62	X-6021-11	5/8-11 x 4.50					
X-6238-10	3/8-16 x .75	X-6021-10	5/8-11 x 6.00					
X-6238-3	3/8-16 x .88	X-6021-9	5/8-18 x 2.50					
X-6238-11	3/8-16 x 1.00	X-6239-1	3/4-10 x 1.00					
X-6238-4	3/8-16 x 1.25	X-6239-8	3/4-10 x 1.25					
X-6238-5	3/8-16 x 1.50	X-6239-2	3/4-10 x 1.50					
X-6238-1	3/8-16 x 1.75	X-6239-3	3/4-10 x 2.00					
X-6238-6	3/8-16 x 2.00	X-6239-4	3/4-10 x 2.50					
X-6238-17	3/8-16 x 2.25	X-6239-5	3/4-10 x 3.00					
X-6238-7	3/8-16 x 2.50	X-6239-6	3/4-10 x 3.50					
X-6238-8	3/8-16 x 2.75	X-792-1	1-8 x 2.25					
X-6238-9	3/8-16 x 3.00	X-792-5	1-8 x 3.00					
X-6238-19	3/8-16 x 3.25	X-792-8	1-8 x 5.00					
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							

## Metric

Hex head bolts are hardness grade 8.8 unless noted.

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

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



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