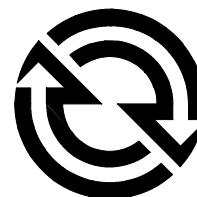


Service Parts

SPECTRUM®

DETROIT DIESEL



Generator Sets

Models:

350-400DS

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



Table of Contents

SUBJECT	PAGE	SUBJECT	PAGE
Introduction	1	Group 301: Controller and Mounting	24
Number Significance	1	Generator Paint	30
Exploded View Drawings	1	Group 701: Literature	30
How to Find Part Numbers	2	Kit List	32
Hardware Grades	2	6- and 7-Light Controller Kits	33
Hardware References	2	6- and 7-Light Controller Assemblies	34
Specification Number Index	3	16-Light Controller Kits	36
Group 101: Air Intake	6	16-Light Controller Assemblies	37
Group 104: Cooling System	8	Meterbox for Switchgear Kits	39
Group 105: Engine	12	Cooling System Kits	40
Group 107: Nameplates and Decals	15	Appendix A. Abbreviations	A-1
Group 108: Oil Pressure Switches	16	Appendix B. Common Hardware Application Guidelines	A-3
Group 109: Skid and Plant Mounting	18	Appendix C. General Torque Specifications ...	A-4
Group 110: Water Temperature Switches	20	Appendix D. Common Hardware Identification .	A-5
Group 112: Starter	21	Appendix E. Common Hardware List	A-6
Group 201: Generator and Mounting	22		

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. The manufacturer of Spectrum® 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.

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											
350DS												
191020	17	20	37	20	9	24	11	8	79	35	38	
191021	17	*	37	20	9	24	11	8	79	*	38	
191022	17	*	37	20	9	24	11	8	80	*	38	
191023	17	*	37	20	9	24	11	8	81	*	38	
191024	17	*	37	20	9	24	11	8	82	*	38	
191141	19	24	41	20	11	32	13	10	79	35	38	
191142	19	*	41	20	11	32	13	10	79	*	38	
191143	19	*	41	20	11	30	13	10	80	*	38	
191144	19	*	41	20	11	32	13	10	81	*	38	
191145	19	*	41	20	11	32	13	10	82	*	38	
191153	19	24	41	20	11	32	13	10	250	50	47	
191154	19	*	41	20	11	32	13	10	250	*	47	
191155	19	*	41	20	11	30	13	10	251	*	47	
191156	19	*	41	20	11	32	13	10	252	*	47	
191157	19	*	41	20	11	32	13	10	253	*	47	
191277	32	55	62	65	E62	46	E62	E62	279	84	47	
191278	32	55	62	65	E62	46	E62	E62	280	84	47	
191279	32	55	62	65	E62	47	E62	E62	281	84	47	
191280	32	55	62	65	E62	46	E62	E62	282	85	47	
191281	32	55	62	65	E62	46	E62	E62	283	86	47	
191282	32	55	62	65	E62	47	E62	E62	284	85	47	
191283	32	55	62	65	E62	47	E62	E62	285	86	47	
191284	*	*	62	65	E62	*	E62	E62	*	*	47	

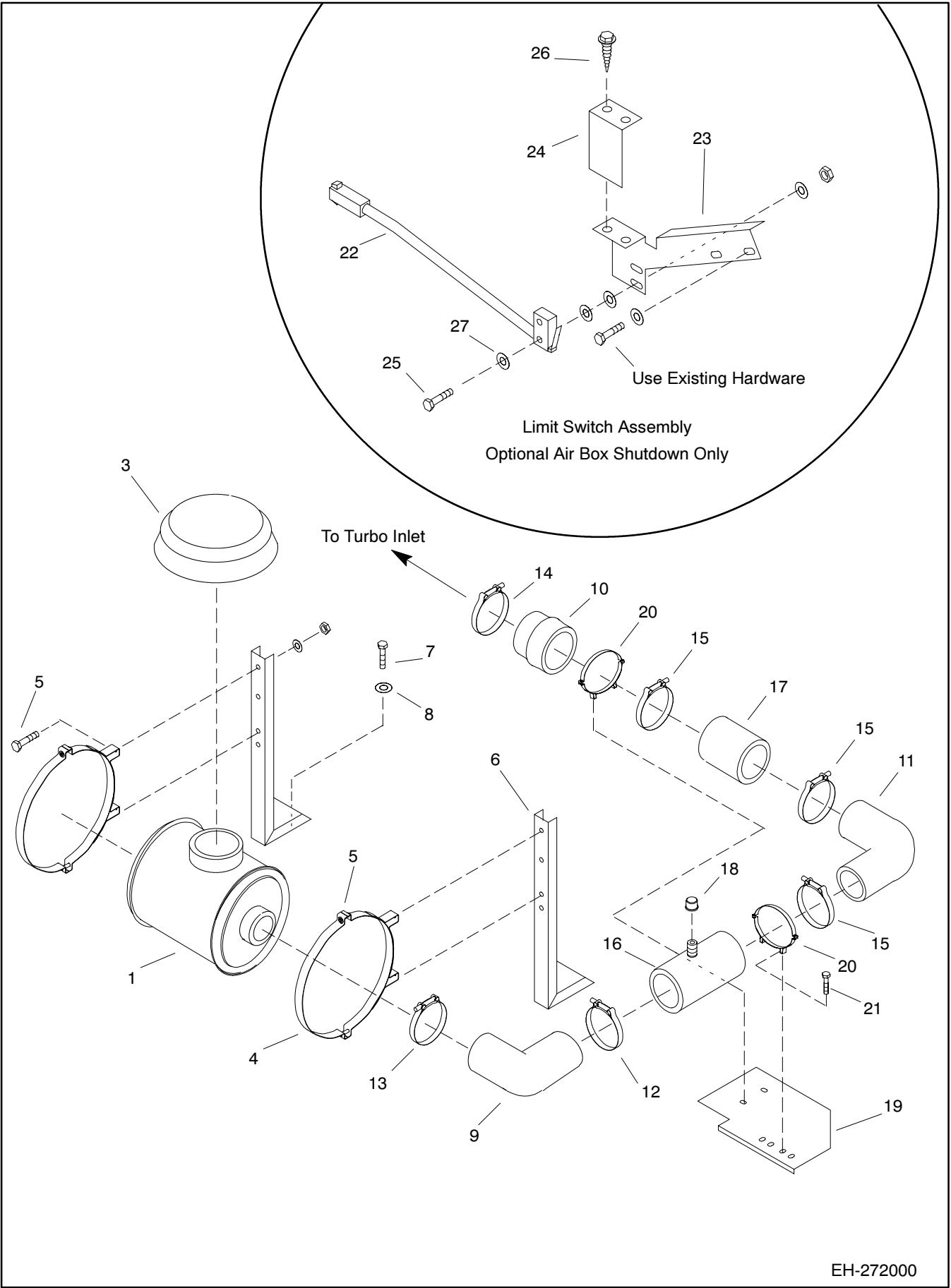
* See Cooling System Kits or Controller Kits in kits section for parts list.

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											
400DS												
191025	10	18	35	31	9	21	10	8	79	35	56	
191026	10	18	35	31	5	21	10	6	83	35	56	
191027	10	*	35	31	9	21	10	8	79	*	56	
191028	10	*	35	31	9	24	10	8	83	*	56	
191029	10	*	35	31	9	21	10	8	80	*	56	
191030	10	*	35	31	9	21	10	8	81	*	56	
191031	10	*	35	31	9	21	10	8	84	*	56	
191146	20	25	42	31	11	32	9	10	79	35	56	
191147	20	25	42	31	11	32	9	10	83	35	56	
191148	20	*	42	31	11	32	9	10	79	*	56	
191149	20	*	42	31	11	32	9	10	83	*	56	
191150	20	*	42	31	11	30	9	10	80	*	56	
191151	20	*	42	31	11	32	9	10	81	*	56	
191152	20	*	42	31	11	30	9	10	84	*	56	
191158	20	25	42	31	11	32	9	10	250	50	63	
191159	20	25	42	31	11	32	9	10	254	50	63	
191160	20	*	42	31	11	32	9	10	250	*	63	
191161	20	*	42	31	11	32	9	10	254	*	63	
191162	20	*	42	31	11	30	9	10	251	*	63	
191163	20	*	42	31	11	32	9	10	252	*	63	
191164	20	*	42	31	11	30	9	10	255	*	63	
191285	33	54	63	65	E63	46	E63	E63	279	84	63	
191286	33	54	63	65	E63	46	E63	E63	280	84	63	
191287	33	54	63	65	E63	47	E63	E63	281	93	63	
191288	33	54	63	65	E63	47	E63	E63	286	95	63	
191289	33	54	63	65	E63	46	E63	E63	283	94	63	
191290	33	54	63	65	E63	47	E63	E63	287	93	63	
191291	33	54	63	65	E63	47	E63	E63	284	95	63	
191292	33	54	63	65	E63	47	E63	E63	285	94	63	
191293	*	*	63	65	E63	*	E63	E63	*	*	63	

@ See Cooling System Kits or Controller Kits in kits section for parts list.

Group 101: Air Intake



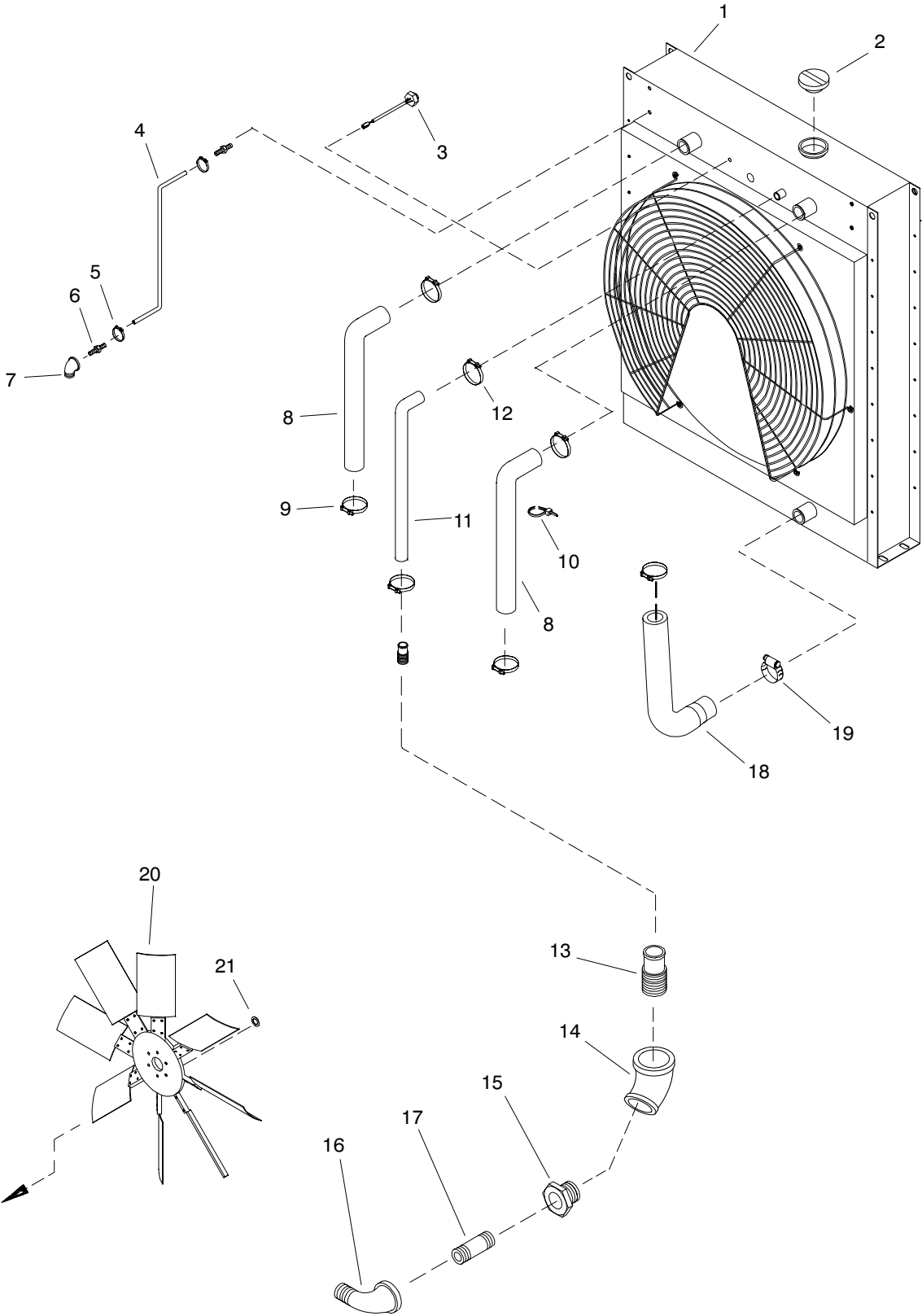
Group 101: Air Intake

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
Note: All air cleaners in this group do not apply if an optional heavy-duty air cleaner is installed. See accessory parts catalog MP-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"	
		10, 20, 33	272983
	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



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

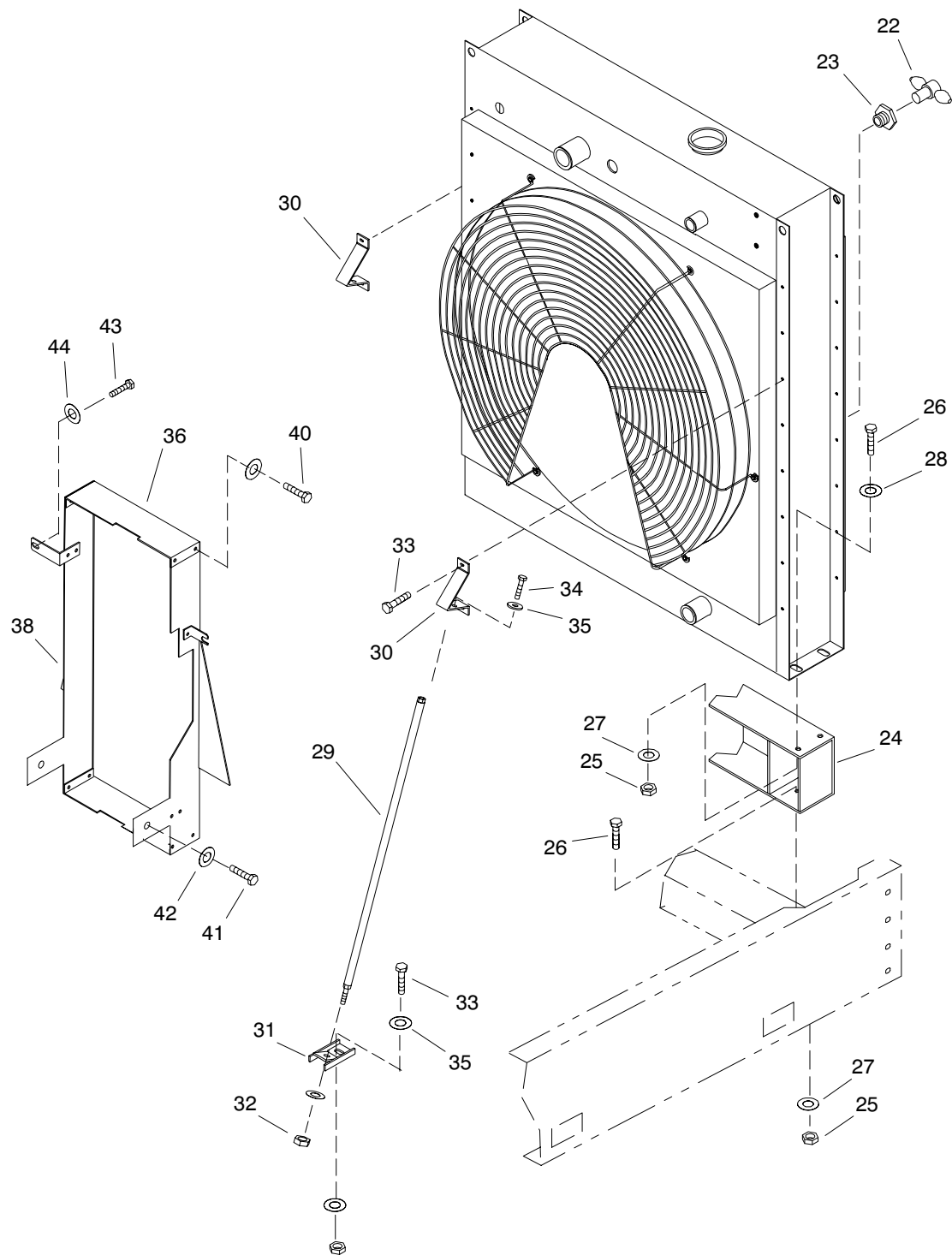
Item	Qty.	Description Variation	Part No.
12	2	Clamp, hose, 1 3/4 18	X-426-8
	2	Clamp, hose, 1.50-1.81 ID 20, 24, 25, 54, 55	279669
13	1	Adapter, hose, 1.25 ID x 1 NPT 18, 20, 24, 25, 54, 55	272930
14	1	Elbow, 45°, 1NPT 18, 20, 24, 25, 54, 55	X-225-9
15	1	Bushing, reducer, 3/4 F x 1 M 18, 25, 20, 24, 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 55	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



EH-272000

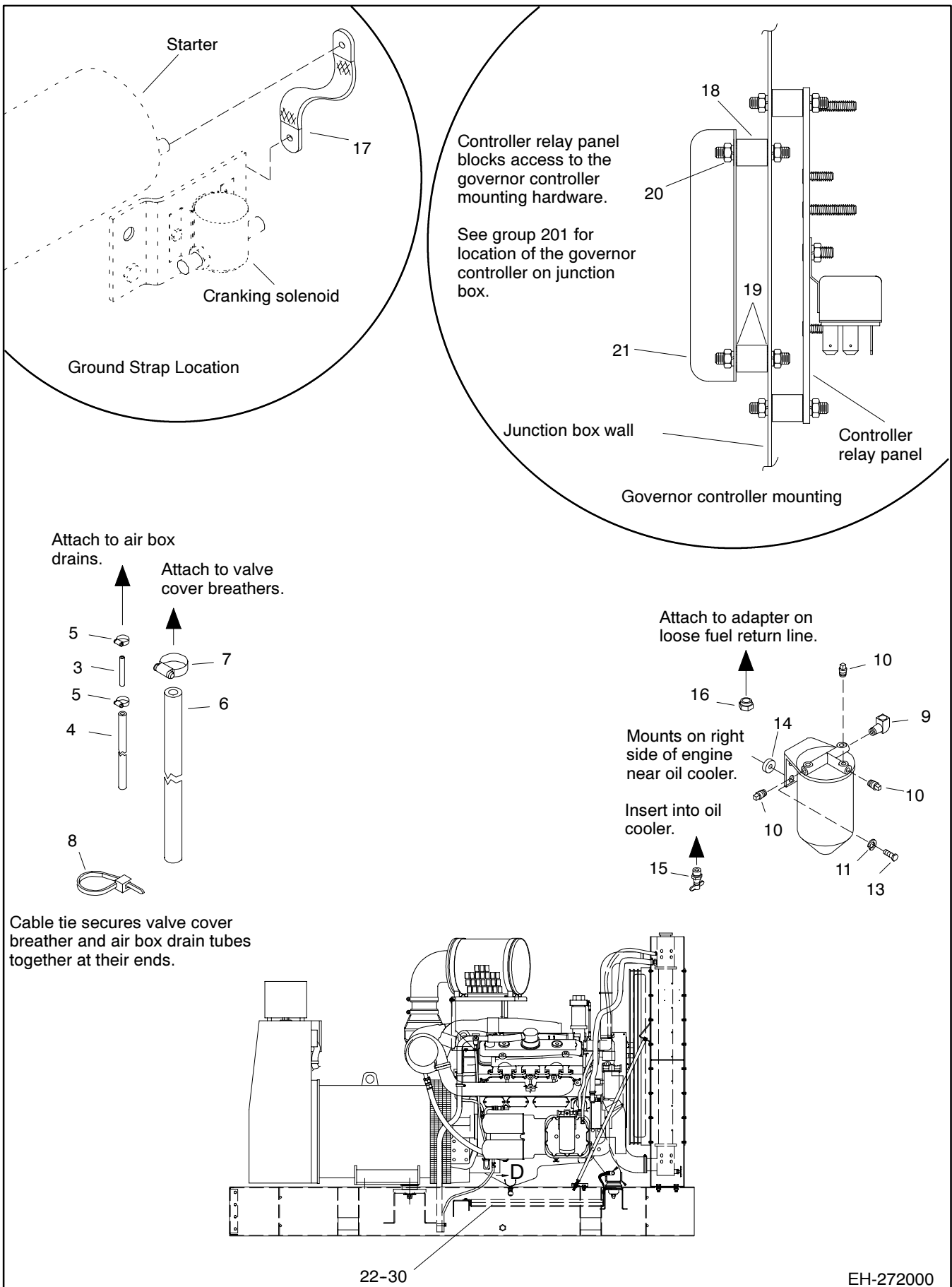
Group 104: Cooling System, Continued

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



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

Description			
Item	Qty.	Variation	Part No.

NOTE: Nameplates and Decals not illustrated.

1	1	Decal, positive terminal 20, 31, 65	238402
2	1	Decal, warning (hot engine) 20, 31, 65	249809
3	1	Decal, 350 kW Spectrum® 20	X-6299-16
4	1	Decal, 400 kW Spectrum® 31	X-6299-17
5	1	Decal, Torque symbol, 3.14 dia. 20, 31, 65	X-6302-1
6	1	Decal, Spectrum® 20, 31, 65	X-6301-4
	1	Decal, Spectrum 65	X-6301-3

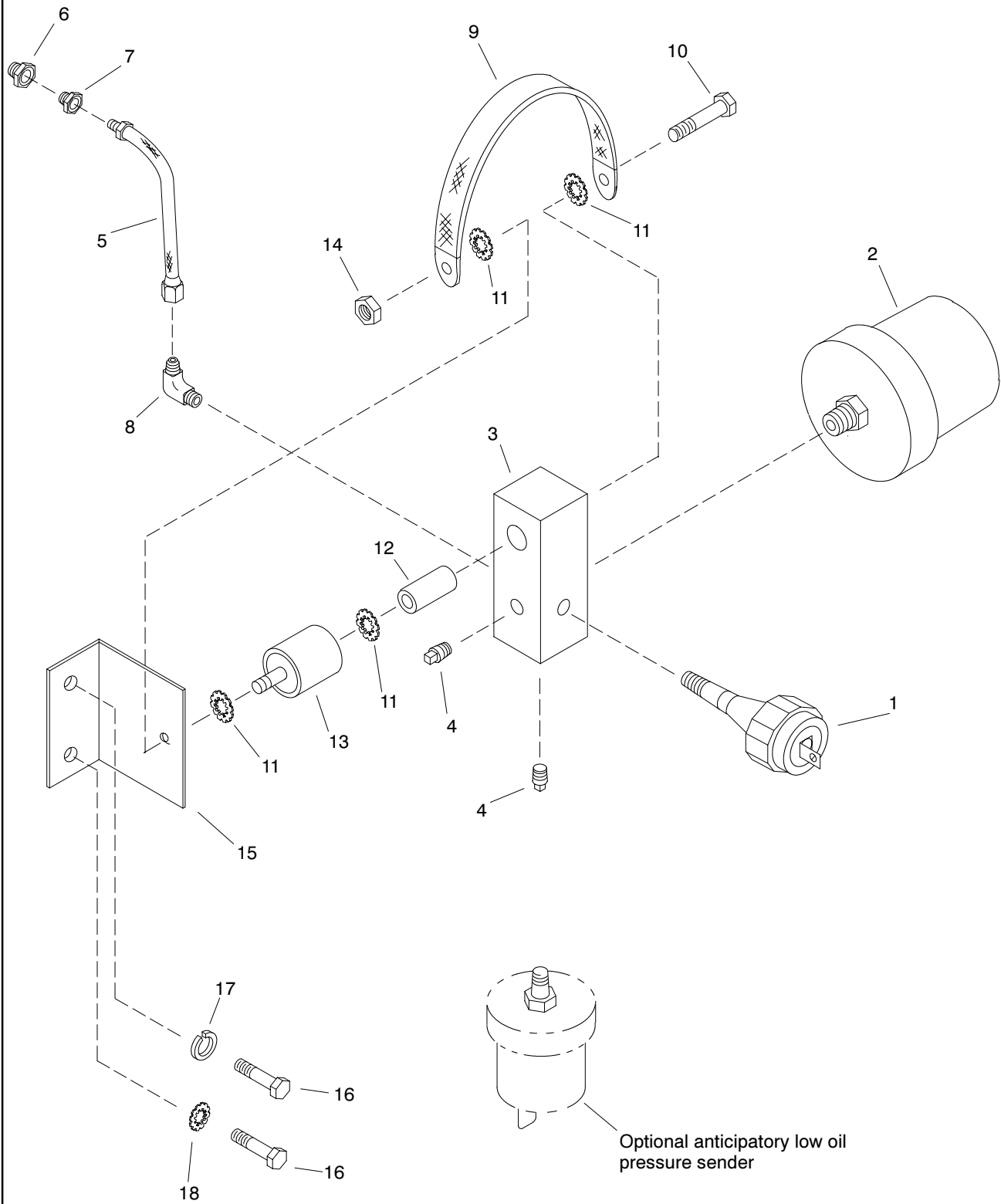
Description			
Item	Qty.	Variation	Part No.

7	1	Decal, Torque symbol, 5.25 dia. 20, 31, 65	X-6302-2
8	2	Decal, danger: haz. volt./moving parts 20, 31, 65	257438
9	1	Decal, warning: haz. volt./backfeed 20, 31	258815
10	1	Decal, warning 20, 31, 65	274323
15	1	Decal, standby connection 20, 31, 65	255882
16	1	Decal, warning hot coolant 20, 31, 65	249810
17	1	Decal, caution lifting support 20, 31	293990

Group 108: Oil Pressure Switches

NOTE:

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



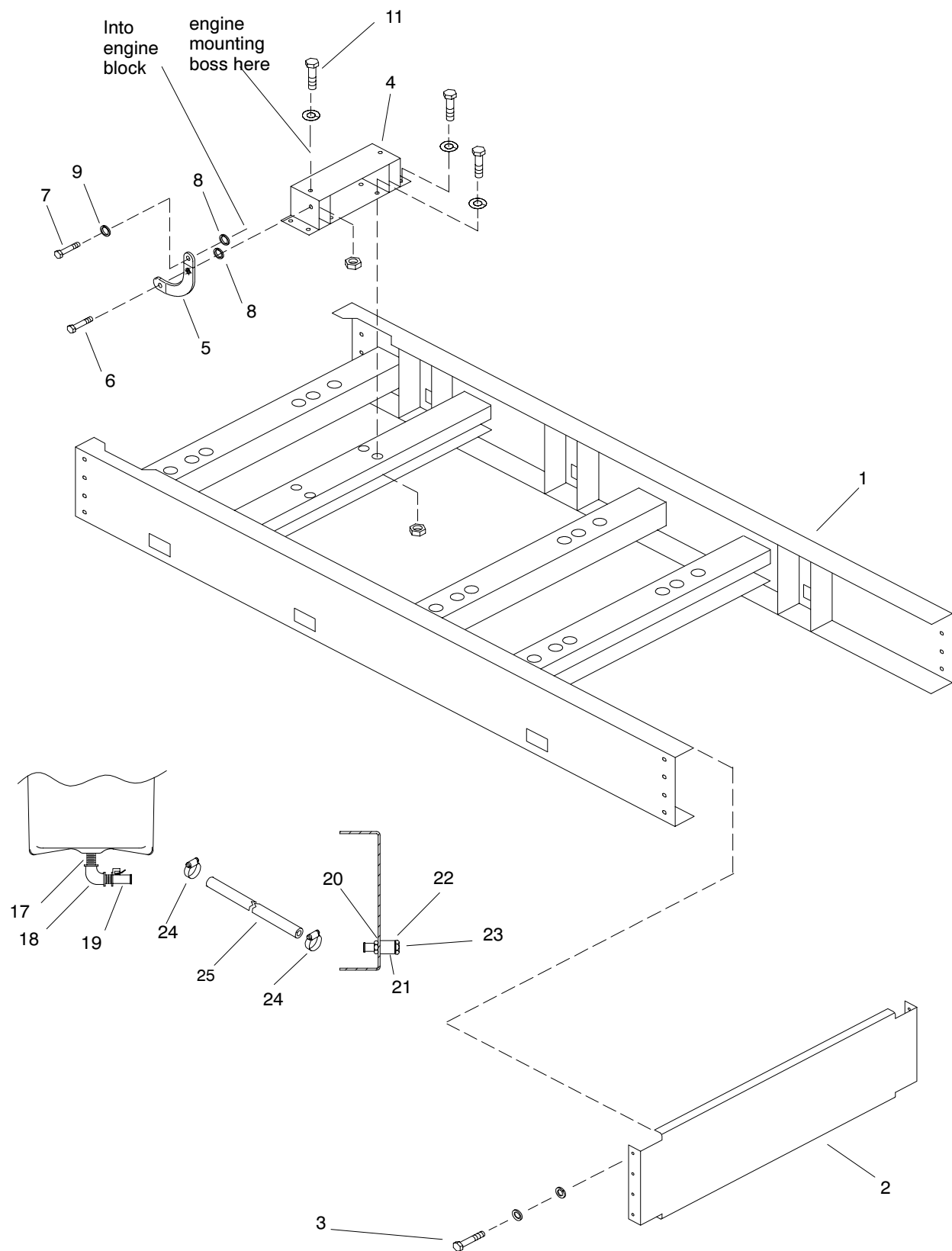
AM-272000

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, 12E62, 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



EH-272000

Group 109: Skid and Plant Mounting

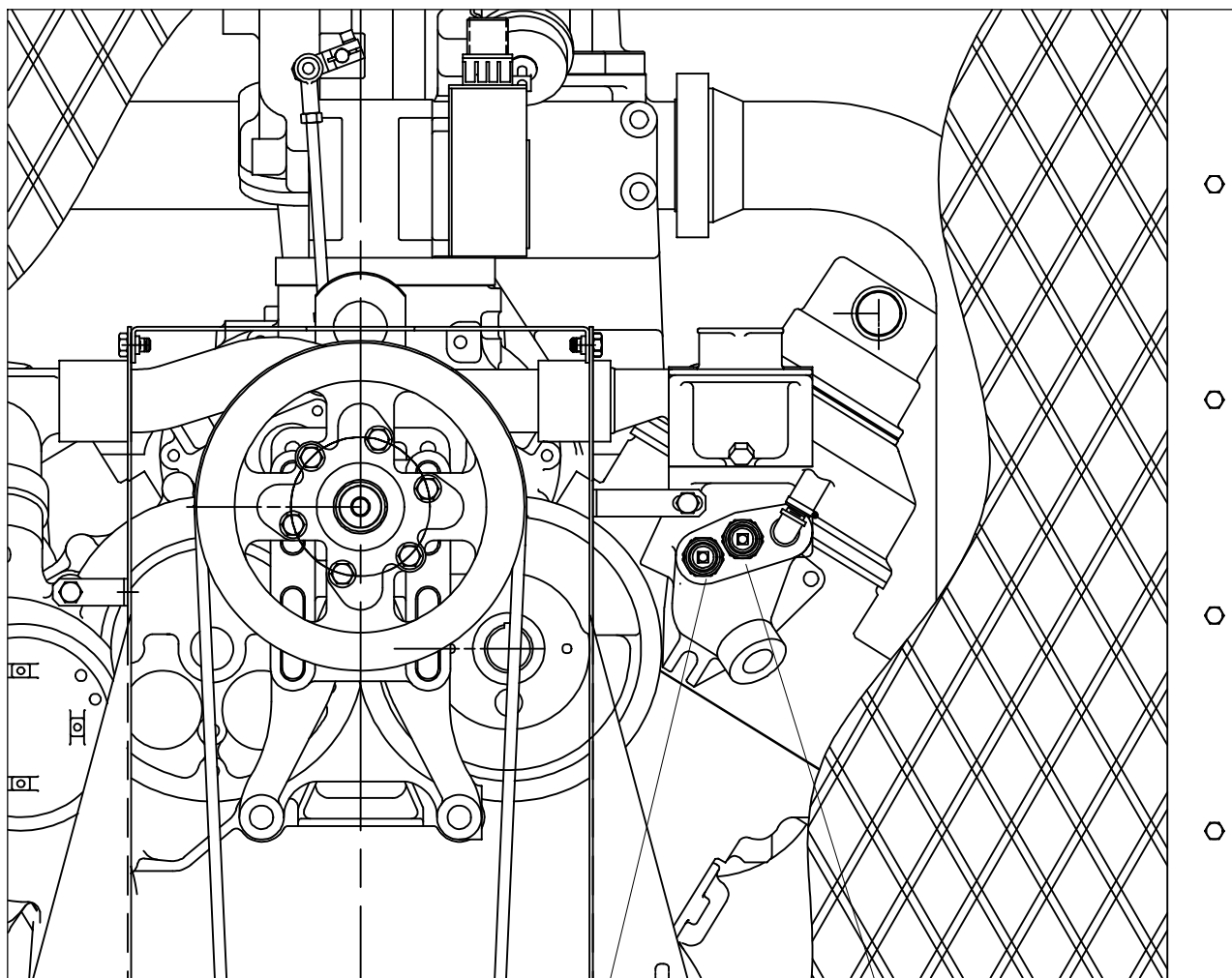
Item	Qty.	Description Variation	Part No.
1	1	Skid	
		24	299848
		30	299944
		32	299943
		46	354640
		47	354641
2	1	Crossmember	
		24, 30, 32, 46, 47	274441
3		Hardware, 3/8	
		24, 30, 32, 46, 47	#
4	1	Support, front engine	
		24	279794
	1	Support, front engine	
		30, 32, 46, 47	299936
5	1	Strap, ground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

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

Common Hardware; Procure Locally

Group 110: Water Temperature Switches

Front view through radiator



1

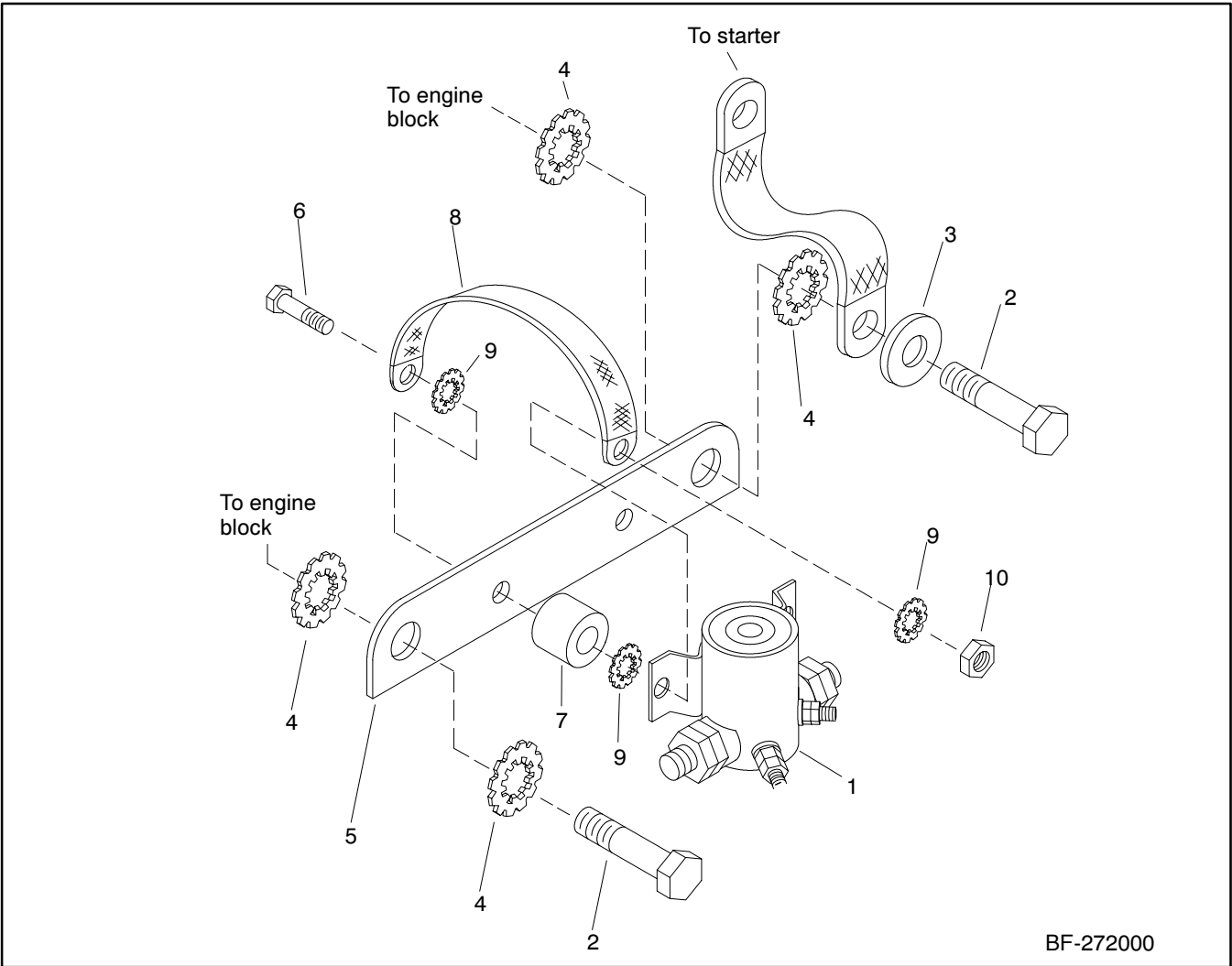
2

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

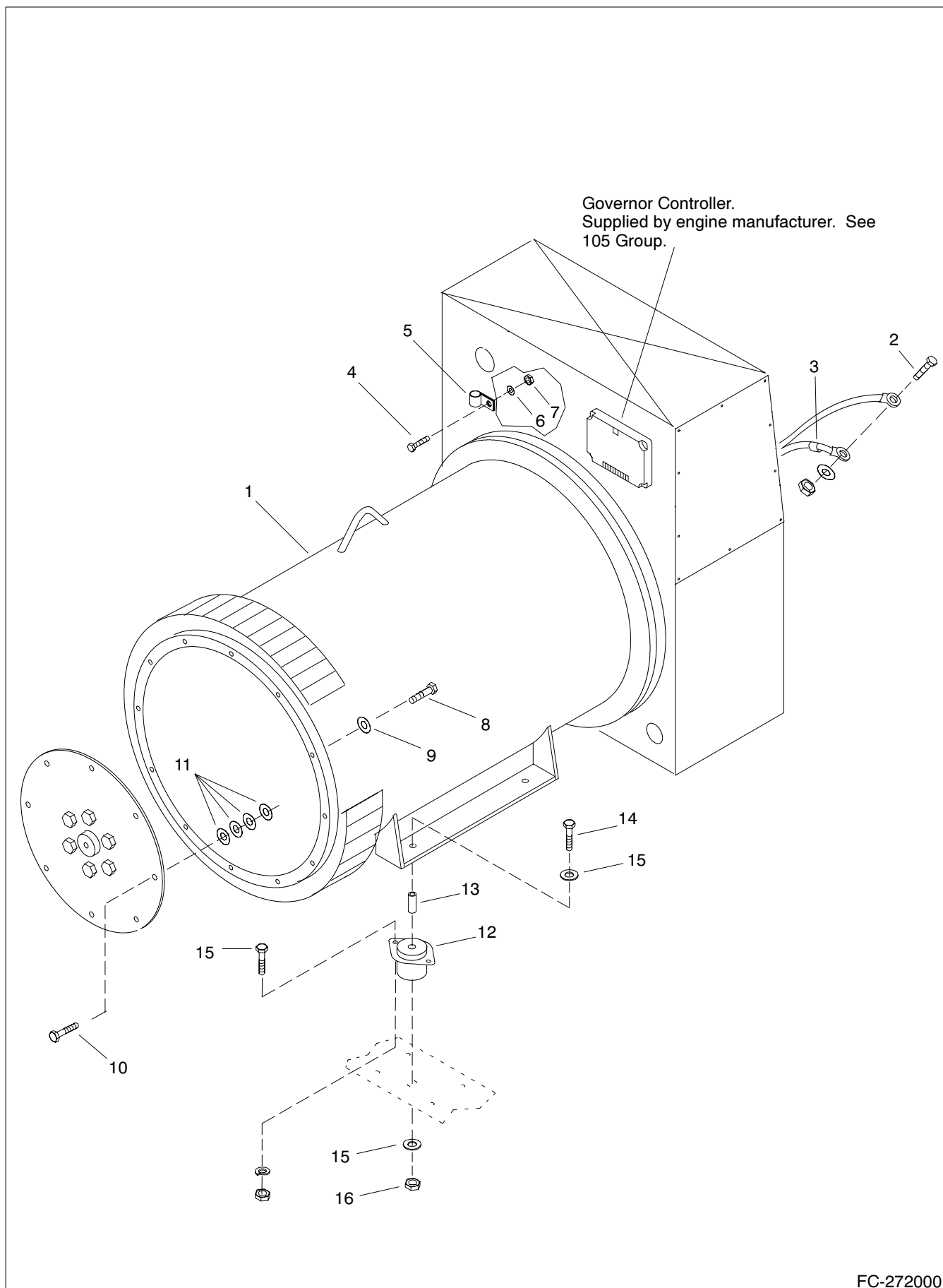


Item	Qty.	Description Variation	Part No.
1	1	Solenoid, cranking 6, 8, 10, E62, E63	272713
2	2	Screw, 3/8-16 x 1 6	X-6238-11
3	1	Washer, plain, 13/32 x 13/16 6	X-25-37
4	4	Washer, int./ext. tooth lock, 3/8 6, 8, 10, E62, E63	X-22-14
5	2	Bracket, C-relay 6, 8, 10, E62, E63	272762
6	2	Screw, 1/4-20 x 1/2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



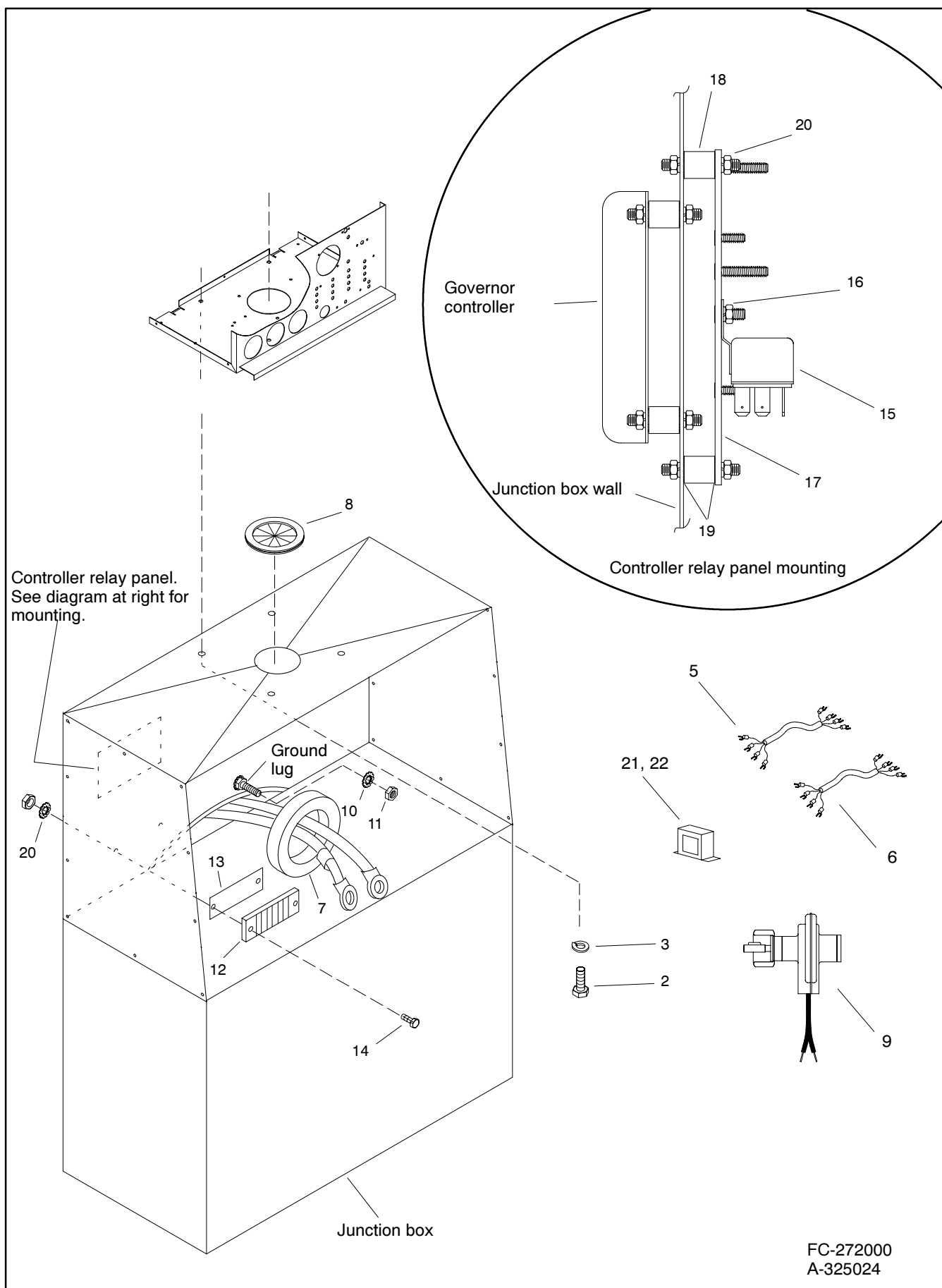
Group 201: Generator and Mounting

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
		250, 279	A-328098
		251, 281	A-328101
		252, 283	A-328127
		253, 282	A-328116
		254, 280	A-328099
		255, 286	A-328117
		284	A-328662
		285	A-328663
		287	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 279-287	#
7	1	Nut, 10-24 all except 279-287	#
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	2	Mount, vibro all except 279-287 279-287	279864 354634
13	2	Spacer, 0.656 ID x 1 all except 279-287	X-400-182
14	2	5/8-11 bolt all except 279-287 279-287	# X-6239-10

Item	Qty.	Description Variation	Part No.
15		Hardware, 5/8-11 all except 279-287 279-287	# X-25-151
16	2	Nut, elastic stop, 5/8-11 all except 279-287 279-287	X-101-15 X-101-26
17	1	Cover, top back 250, 252, 253, 254, 279, 280, 282, 283	328896
	1	Cover, top back 251, 255, 281, 284-287	328897
18	1	Cover, louvered 250, 252, 253, 254, 279, 280, 282, 283	328899
	1	Cover, louvered 251, 255, 281, 284-287	328900
19	1	Screen 250, 252, 253, 254, 279, 280, 282, 283	328902
	1	Screen 251, 255, 281, 284-287	328903
20	13	Screw, hex. 250-255, 279-287	X-6217-10
21	2	Washer, plain 270-278	X-25-150
22	1	Voltage regulator, DVR2000 all	328725
23	1	Exciter rectifier assembly all	347071
24	1	Diode, standard polarity all	279772
25	1	Diode, reversing polarity all	279774
26	1	Surge suppressor all	279776
27	1	Capacitor all	347160
28	1	Fuse, 5 amp all	279778
29	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-519-1
		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) 35, 50, 84, 93 85, 86, 94, 95	258455 274964
7	3	Transformer, current 35, 50, 84 85, 94 86 93 95	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

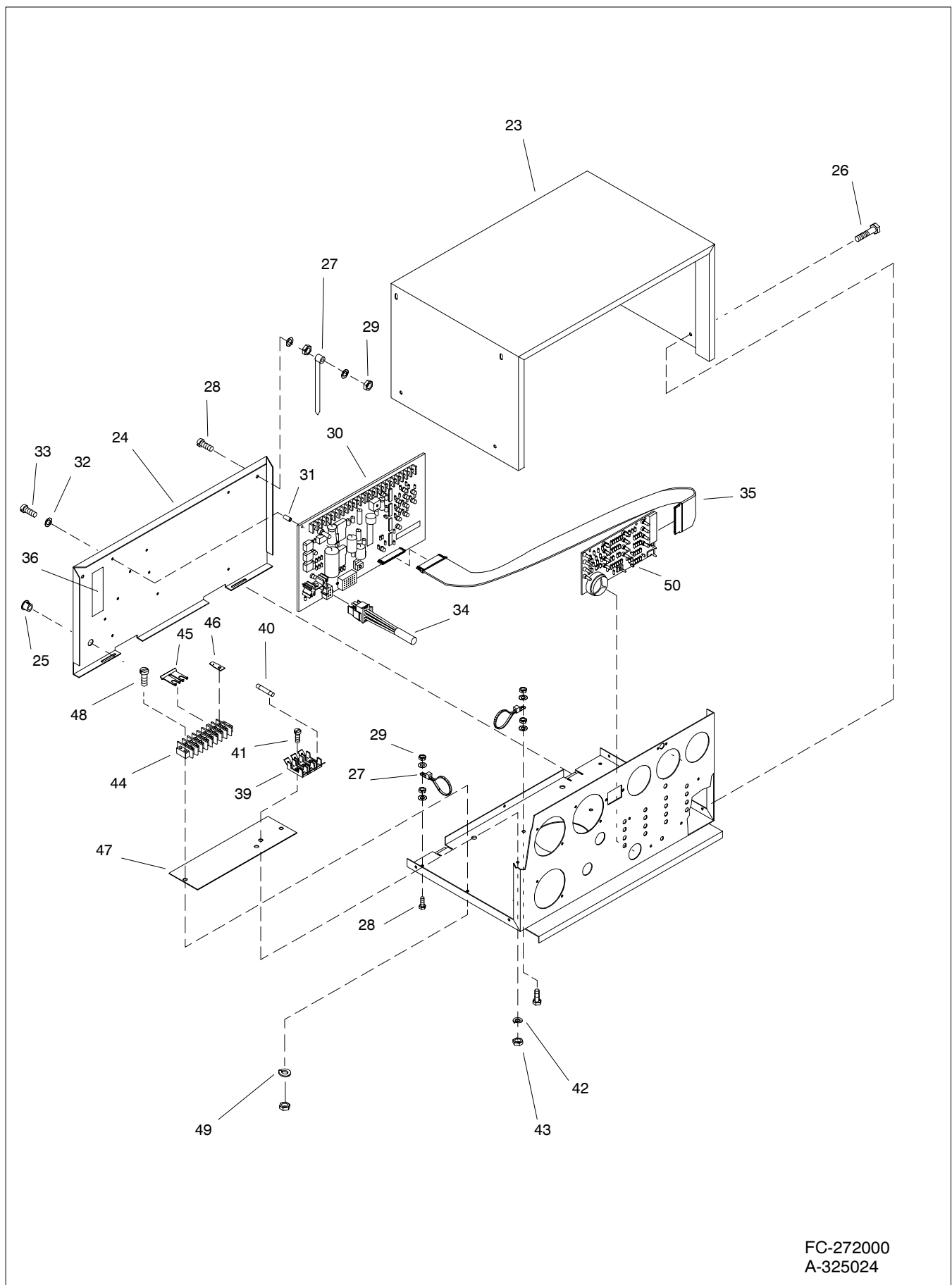
Item	Qty.	Description Variation	Part No.
14	2	Screw, 8-32 x 3/4 all	X-51-11
15	2	Relay all	272684
16	1	Hardware, 8-32 all	
17	1	Panel, relay all	274796
18	4	Mount, vibro all	282829
19	8	Washer, ext. tooth lock, 8 all	X-22-20
20	4	Hardware, 8-32 all	#
21	3	Transformer 85, 95 86, 94	276578 258990
22	6	Screw, drill 85, 86, 94, 95	X-794-2

Serial Number-Contingent Controllers

Variations	Controller Assembly Part Number	
	Before Serial Number 363369	Serial Numbers 363369 and after
35	A-325024	A-325024
50	A-325024	A-325728
84, 85	-	A-325728
86	-	A-325729
93, 95	-	A-325730
94	-	A-325731

Common Hardware; Procure Locally

Group 301: Controller and Mounting, Continued



FC-272000
A-325024

Group 301: Controller and Mounting, Continued

Item	Qty.	Description Variation	Part No.
23	1	Cover, controller all	325002
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

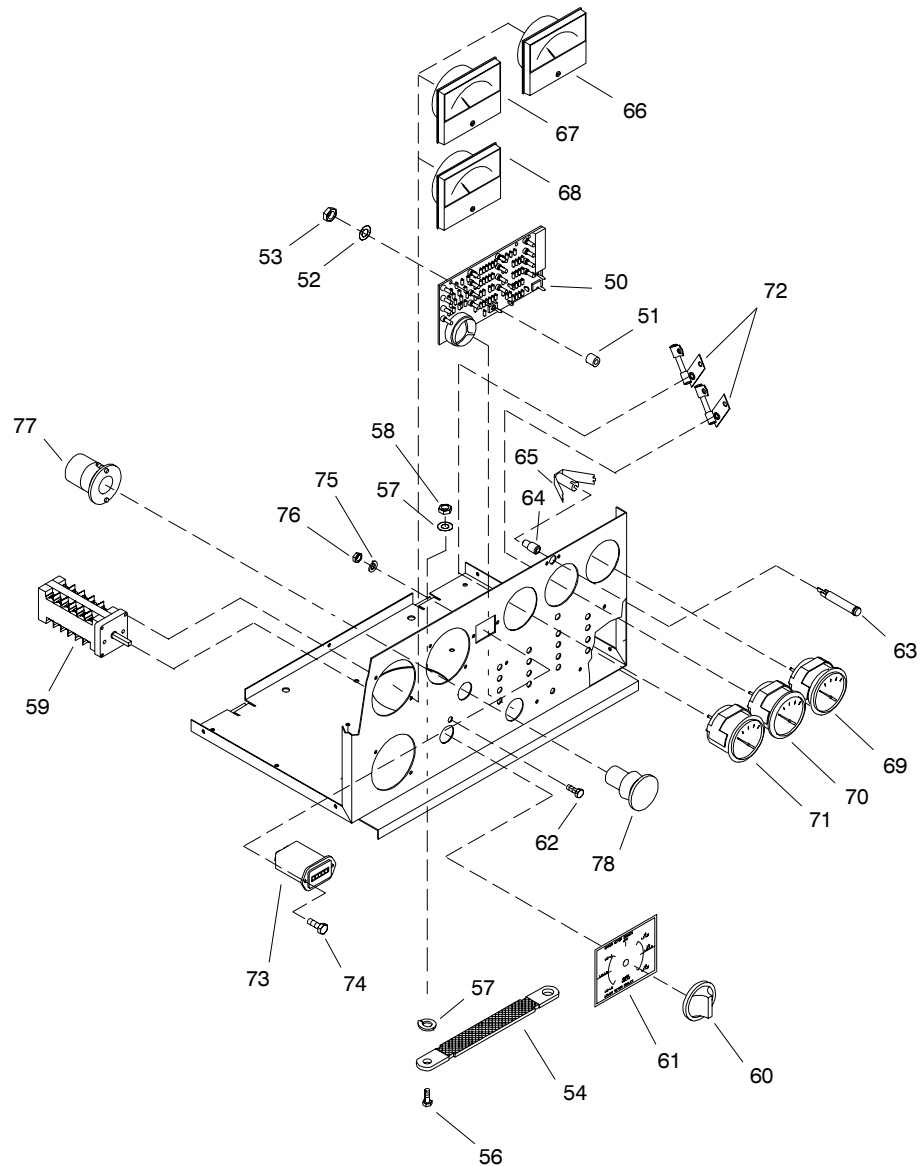
Item	Qty.	Description Variation	Part No.
39	1	Holder, fuse all	292821
40	3	Fuse, 1.5 amp all	291207
41	2	Screw, 6-32 x 3/8 all	X-49-2
42	2	Washer, int. tooth lock, 6 all	X-22-6
43		6-32 hardware all	#
44	1	Block, terminal (8-terminal) all	246115
45	1	Jumper, two-terminal all	X-6048-2
46	1	Terminal, push-on,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

FC-272000
A-325024

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-22-20
		Washer, cut tooth washer, 8 all	X-22-7
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-50-70
57	2	Washer, int./ext. tooth lock, 10 all	X-22-50
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	253332
64	2	Bulb (lamp), no. 313 all	283420
65	2	Socket, lamp all	284990
66	1	Ammeter, AC 35, 50, 84, 85, 94 86 93, 95	282957 282956 282958
67	1	Voltmeter, AC 35, 50, 84, 85, 93, 95 86, 94	282814 282815
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

Common Hardware; Procure Locally

Item	Qty.	Description Variation	Part No.
72	2	Resistor, 24 Volt all	268297
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	12	Lens, red all	253241
82	1	Lens, green all	253242
83	3	Lens, yellow all	255931
84	1	Box, controller all	292375
85	1	Grommet all	X-284-31
86	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	MP-5700
2	1	Operation Manual, DDC 71, 92, 149 all	TP-5611
	1	Operation Manual, Generator Set all	MP-5750
	1	Operation/Installation, MagnaMax Alternator all	TP-5578
	1	Operation Manual, Digital Controller 47, 63	MP-5829
3	1	Operation Manual, Digital Voltage Regulator 38	TP-5579
	1	Operation Manual, PM100 Voltage Regulator 38	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	MP-5583
5	1	Parts Catalog, Generator Set all	MP-5584
	1	Parts Catalog, DDC 350 kW Engine 38, 47	TP-5638
	1	Parts Catalog, DDC 400 kW Engine 63	TP-5639
	1	Parts Catalog, Accessories all	MP-5707
6	1	Wiring Diagram Manual Digital Controller 47, 63	MP-5851
	1	Wiring Diagram Manual 350-2000 kW 47, 63	MP-5722

Generator Paint

1	Gallon Can, Spectrum Gray	221332
1	Spray Can, Spectrum Gray	221331

Notes

Kit List

	350DS	400DS
CONTROLLER KITS		
6-and 7-Light		
Standard Meterbox	325246	325246
	325477 *	325477 *
Standard Meterbox, 380 V	325250	325250
	325485 *	325485 *
Standard Meterbox, 600 V	325254	325254
	325481 *	325481 *
Oversize meterbox	325248	325248
	325479 *	325479 *
Oversize meterbox, 380 V	325252	325252
	325487 *	325487 *
Oversize meterbox, 600 V	325256	325256
	325483 *	325483 *
16-Light		
Standard Meterbox	325237	325237
	325476 *	325476 *
Standard Meterbox, 380 V	325247	325247
	325484 *	325484 *
Standard Meterbox, 600 V	325239	325239
	325480 *	325480 *
Oversize meterbox	325241	325241
	325478 *	325478 *
Oversize meterbox, 380 V	325245	325245
	325486 *	325486 *
Oversize meterbox, 600 V	325243	325243
	325482 *	325482 *
Engine Gauge Box for Paralleling	325273	325273
	N/A	N/A
Engine Gauge Box for Paralleling, 600V	325219	325219
COOLING SYSTEM KITS		
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 MP-5707 for parts listings of optional kits.

* Kit applies to generator set specifications 191165 and above.

** Obsolete Kit

6- and 7-Light Controller Kits

6- AND 7-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS								
Qty.	Description	Common	Kit Numbers/Unique Parts					
			325246 325477	325248 328479	325250 325485	325252 325487	325254 325481	325256 325483
1 1 1 1 1	Controller assembly* Controller assembly* Grommet Marker, strip Harness, wiring	X-284-25 255080 258453	A-325056 A-325797**	A-325126 A-325832**	A-325056 A-325797**	A-325125 A-325832**	A-325057 A-325798**	A-325126 A-325833**
2 1 1 4 3	Relay Panel, relay Harness, wiring Mount, vibro Transformer	272684 274796 282829	 258455 N/A	 258455 N/A	 274964 276578	 274964 276578	 274964 248875	 274964 N/A
1 3 1	Speed pickup Transformer, current Block, terminal	291288 295314	 291547	 291547	 248877	 248877	 258990	 258990

* See Controller Assembly section for parts list.

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

N/A Not Applicable

6-Light Controller Assemblies

Qty.	Description	Common Parts	6-Light Controller Assembly Number/Unique Parts				
			A-325056	A-325057	A-325125	A-325126	
1	6-light circuit board	B-292381					
1	Main circuit board	G-292806					
1	Washer, shakeproof	X-22-20					
2	Washer, lock	X-22-50					
4	Washer, lock #6	X-22-6					
3	Washer, lock #8	X-22-7					
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					
10	Screw, hex	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					
6	Lens, red	253241					
1	Voltmeter	255224					
2	Lamp, meter scale	253332					
2	Bulb	283430					
1	Plate, hinge		292908	292908	273785	273785	
1	Voltmeter, AC		282814	282815	282814	282815	
1	Gauge, oil pressure	282897					
1	Gauge, water temperature	282898					
1	Ammeter		282957	282956	282957	282956	
2	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	292361					
1	Switch, selector	292374					
1	Holder, fuse	292821					
1	Marker, strip	292823					
1	Bumper	292834					
1	Harness, cable	292836					
1	Meter, frequency	295069					
1	Cover, controller		325003	325003	325007	325007	
1	Decal, selector switch	325072					
1	Box, silkscreened controller		325075	325075	325076	325076	
2	Resistor, 24 volt	268297					
1	Switch, pushbutton	292364					
1	Decal, emergency stop	292467					

N/A Not Applicable

7-Light Controller Assemblies

Qty.	Description	Common Parts	7-Light Controller Assembly Number/Unique Parts				
			A-325797	A-325798	A-325832	A-325833	
1	Indicator circuit board	A-336430					
1	Main circuit board	A-336415					
1	Washer, shakeproof	X-22-20					
2	Washer, lock	X-22-50					
4	Washer, lock #6	X-22-6					
3	Washer, lock #8	X-22-7					
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					
10	Screw, hex	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					
7	Lens, red	253241					
1	Voltmeter	255224					
2	Lamp, meter scale	253332					
2	Bulb	283430					
1	Plate, hinge		292908	292908	273785	273785	
1	Voltmeter, AC		282814	282815	282814	282815	
1	Gauge, oil pressure	282897					
1	Gauge, water temperature	282898					
1	Ammeter		282957	282956	282957	282956	
2	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	Switch, selector	292374					
1	Holder, fuse	292821					
1	Marker, strip	292823					
1	Bumper	292834					
1	Harness, cable	336428					
1	Meter, frequency	295069					
1	Cover, controller		325003	325003	325007	325007	
1	Decal, selector switch	325072					
1	Box, silkscreened controller		325945	325945	325943	325943	
2	Resistor, 24 volt	268297					
1	Switch, pushbutton	292364					
1	Decal, emergency stop	292467					

N/A Not Applicable

16-Light Controller Kits

16-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS								
Qty.	Description	Common	Kit Number/Unique Parts					
			325237 325476	325239 325480	325241 325478	325243 325482	325245 325486	325247 325484
1	Controller assembly*	X-284-25 255080 258453	A-325024	A-325025	A-325093	A-325094	A-325093	A-325024
1	Controller assembly*		A-325728**	A-325729**	A-325762**	A-325763**	A-325762**	A-325728**
1	Grommet							
1	Marker, strip							
1	Harness, wiring							
2	Relay	272684						
1	Panel, relay	274796						
1	Harness, wirng		258455	274964	258455	274964	274964	274964
4	Mount, vibro	259919						
3	Transformer		N/A	258990	N/A	258990	276578	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-325024	A-325025	A-325093	A-325094		
1	16-light circuit board	B-292357						
1	Main circuit board	G-292806						
1	Washer, shakeproof	X-22-20						
2	Washer, lock	X-22-50						
4	Washer, lock #6	X-22-6						
3	Washer, lock #8	X-22-7						
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						
5	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						
10	Screw, Phillips hex vrimptite	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						
12	Lens, red	253241						
1	Voltmeter	253329						
2	Lamp, meter scale	253332						
2	Lamp	255126						
1	Plate, hinge		292908	292908	273785	273785		
1	Voltmeter, AC		282814	282815	282814	282815		
1	Gauge, oil pressure	282897						
1	Gauge, water temperature	282898						
1	Ammeter		282957	282956	282957	282956		
2	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	292361						
1	Switch, selector	292374						
1	Holder, fuse	292821						
1	Marker, strip	292823						
1	Bumper	292834						
1	Harness, cable	292836						
1	Meter, frequency	295069						
1	Cover, controller		325003	325003	325007	325007		
1	Decal, selector switch	325072						
1	Box, silkscreened controller		325073	325073	325075	325075		
1	Lens, green	253242						
3	Lens, yellow	255931						
1	Switch, pushbutton	292364						
1	Decal, emergency stop	292467						
2	Resistor, 24 volt	268297						

N/A Not Applicable

16-Light Controller Assemblies

Qty.	Description	Common Parts	16-Light Controller Assembly Number/Unique Parts					
			A-325728	A-325729	A-325762	A-325763		
1	16-light circuit board	A-336432						
1	Main circuit board	A-336415						
1	Washer, shakeproof	X-22-20						
2	Washer, lock	X-22-50						
4	Washer, lock #6	X-22-6						
3	Washer, lock #8	X-22-7						
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						
5	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						
10	Screw, Phillips hex crimp	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						
12	Lens, red	253241						
1	Voltmeter	253329						
2	Lamp, meter scale	253332						
2	Lamp	255126						
1	Plate, hinge		292908	292908	273785	273785		
1	Voltmeter, AC		282814	282815	282814	282815		
1	Gauge, oil pressure	282897						
1	Gauge, water temperature	282898						
1	Ammeter		282957	282956	282957	282956		
2	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	292361						
1	Switch, selector	292374						
1	Holder, fuse	292821						
1	Marker, strip	292823						
1	Bumper	292834						
1	Harness, cable	336428						
1	Meter, frequency	295069						
1	Cover, controller		325003	325003	325007	325007		
1	Decal, selector switch	325072						
1	Box, silkscreened controller		325073	325073	325075	325075		
1	Lens, green	253242						
3	Lens, yellow	255931						
1	Switch, pushbutton	292364						
1	Decal, emergency stop	292467						
2	Resistor, 24 volt	268297						

N/A Not Applicable

Meterbox for Switchgear Kits

METERBOX FOR PARALLELING							
Qty.	Description	Common	Kit Number/Unique Parts				
			325219	325273	325426		
1	Controller Assembly*		A-325346	A-325345	A-325345		
1	Switch Assembly, limit	263438					
2	Relay	272684					
1	Grommet		N/A	X-284-25	X-284-25		
1	Marker, Strip		N/A	255080	255080		
1	Panel, Relay		N/A	274796	274796		
4	Mount, Vibro		N/A	282829	282829		
1	Block, terminal (6-terminal)		N/A	295314	295314		
1	Sensor, low coolant		N/A	N/A	273521		

* See Controller Assembly section for parts list.

N/A Not Applicable

Qty.	Description	Common Parts	Controller Assembly Number/Unique Parts		
			A-325345	A-325346	
1	Potentiometer assembly		N/A	A-255041	
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			
1	Gauge, water temperature	282898			
6	Strip, terminal (9-terminal)	283060			
3	Bulb	283420			
3	Socket, lamp	284990			
1	Decal		N/A	292361	
1	Switch, pushbutton	292364			
1	Decal, emergency stop	292467			
1	Cover, controller	292818			
4	Bumper	292834			

Cooling System Kits

Qty.	Description	Part No.
Block Heater 279926		
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
Block Heater 279927		
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
Block Heater 279963		
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.
Block Heater 279964		
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
Block Heater 354487		
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.
Block Heater 354488			Radiator Cooling 279484		
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
Duct Flange, Radiator (housed) 272722			1	Guard, belt LS	274276
2	Screw, lock, 10-24 x 1/2	X-6216-1	1	Guard, belt RS	274277
8	Rivet, alumin./steel pop, 3/16 x 1/4	X-781-10	1	Guard, belt top	274278
2	Frame, air duct (top/bottom)	272721	1	Bracket, radiator support	274301
2	Frame, air duct (sides)	272847	4	Clamp, hose, 2.81-3.12 ID	275527
Duct Flange, Radiator (unhoused) 279831			1	Fan	279477
8	Rivet, alumin./steel pop, 3/16 x 1/4	X-781-10	1	Hose, lower radiator, 3.50 ID	279599
2	Frame, air duct	272626	2	Clamp, hose, 1.50-1.81 ID	279669
2	Frame, air duct	272627	6	Washer, hardened, 17/32 x 1 1/16	290945
Duct Flange, Radiator (housed) 279834			2	Clamp, hose, 3.75-4.06 ID	291537
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			
Duct Flange, Radiator (unhoused) 279838					
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.
------	-------------	----------

Radiator Cooling

279597

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.
------	-------------	----------

Radiator Cooling

279825

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.
Radiator Cooling		279826
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.
Radiator Cooling		299956
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.
------	-------------	----------

Radiator Cooling

299959

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.
------	-------------	----------

City Water Cooling

274794

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.
City Water Cooling		279997
1	Elbow, street, 1 1/2 NPT	A-27
1	Elbow, 90°, 3/4 NPT	SA-472
1	Tee, pipe, 3	X-203-4
2	Nipple, pipe, 3/8 x 3	X-204-7
1	Nipple, pipe, 3/4 x 2	X-206-2
1	Elbow, 2 NPT	X-211-4
1	Elbow, pipe, 2 1/2	X-215-12
2	Elbow, street, 3/8 NPT	X-215-9
1	Nipple, pipe, 1 x 3	X-218-22
1	Elbow, 45°, 1 NPT	X-225-9
1	Nipple, pipe, 1 x 2 1/2	X-229-1
2	Valve, drain, 3/8 NPTF	X-256-1
1	Valve, solenoid	X-350-9
1	Line, fuel, 5/16 ID x 76"	X-386-96
2	Connector, hose, 3/8 ID 1/4 NPT	X-391-16
2	Bolt, U, 3/8-16	X-397-9
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, 2 1/2 x 1/2	X-501-8
1	Hose, radiator	X-507-10
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	Hose, radiator	X-6014-54
1	Hose, radiator, 3.00 x 25.00"	X-6014-57
1	Hose, radiator, 1.25 x 46.00"	X-6014-61
2	Nipple, combination, 3 NPT 3 ID	X-6268-4
1	Hose, rubber, 0.375 x 34" L	X-651-15
1	Hose 0.375 ID x 28 L	X-651-28
1	Hose, rubber, 3/8 x 1	X-651-3
1	Hose, rubber, 0.375 ID x 36 L	X-651-33
1	Clamp, 0.50 ID	X-672-10
5	Clamp, insulated, 0.44 ID	X-672-7
12	Screw, drill hex., 1/4-14	X-794-1
1	Elbow, 1 NPT	151385
1	Nipple, pipe, 1 1/2 NPTF x 2 1/2	151803
2	Bushing, reducer, 1 1/2 F x 2 M	160212
1	Adapter, hose, 1 1/4 ID 1 NPT	272930
1	Sensor, low fluid	254832
1	Regulator, water	274743
2	Bracket, tank	274745
1	Tank, surge	274746
1	Support, heat exchanger	274773
1	Exchanger, heat	274777
2	Bracket, support	274892
4	Clamp, hose, 2.43-2.75 ID	279604
1	Guard, belt top	279653
1	Guard, belt LS	279654
1	Guard, belt RS	279655
1	Guard, belt front	279656
1	Bracket, mounting	279668
2	Clamp, hose, 1.50-1.81 ID	279669
1	Adapter, hose	279805
4	Clamp, hose, 3.25-3.56 ID	291542
1	Tee, pipe	299832

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

Cooling System Kits, Continued

Qty.	Description	Part No.
City Water Cooling 299954		
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.
Remote Radiator Set Up 274795		
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
Remote Radiator Set Up 279998		
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
Remote Radiator Set Up 299953		
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
Remote Radiator Set Up 299955		
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		
BC	battery charger, battery charging	e.g.	for example (<i>exempli gratia</i>)	IMS	improved motor starting
BCA	battery charging alternator	EG	electronic governor	in.	inch
BCI	Battery Council International	EGSA	Electrical Generating Systems Association	in. H ₂ O	inches of water
BDC	before dead center			in. Hg	inches of mercury
BHP	brake horsepower	EIA	Electronic Industries Association	in. lbs.	inch pounds
blk.	black (paint color), block (engine)	EI/EO	end inlet/end outlet	Inc.	incorporated
blk. htr.	block heater	EMI	electromagnetic interference	ind.	industrial
BMEP	brake mean effective pressure	emiss.	emission	int.	internal
bps	bits per second	eng.	engine	int./ext.	internal/external
br.	brass	EPA	Environmental Protection Agency	I/O	input/output
BTDC	before top dead center	EPS	emergency power system	IP	iron pipe
Btu	British thermal unit	ER	emergency relay	ISO	International Organization for Standardization
Btu/min.	British thermal units per minute	ES	engineering special, engineered special	J	joule
C	Celsius, centigrade			JIS	Japanese Industry Standard
cal.	calorie	ESD	electrostatic discharge	k	kilo (1000)
CARB	California Air Resources Board	est.	estimated	K	kelvin
CB	circuit breaker	E-Stop	emergency stop	kA	kiloampere
cc	cubic centimeter	etc.	et cetera (and so forth)	KB	kilobyte (2 ¹⁰ bytes)
CCA	cold cranking amps	exh.	exhaust	kg	kilogram
ccw.	counterclockwise	ext.	external	kg/cm ²	kilograms per square centimeter
CEC	Canadian Electrical Code	F	Fahrenheit, female	kgm	kilogram-meter
cfh	cubic feet per hour	fglass.	fiberglass	kg/m ³	kilograms per cubic meter
cfm	cubic feet per minute	FHM	flat head machine (screw)	kHz	kilohertz
CG	center of gravity	fl. oz.	fluid ounce		
CID	cubic inch displacement	flex.	flexible		
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>Système international d'unités</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 ³	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 _{wa}	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 ⁶ when used with SI units), male	pF	picofarad	TDOE	time delay off to emergency
m ³	cubic meter	PF	power factor	TDON	time delay off to normal
m ³ /min.	cubic meters per minute	ph.	phase	temp.	temperature
mA	milliampere	PHC	Phillips head crimp (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 ²⁰ 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

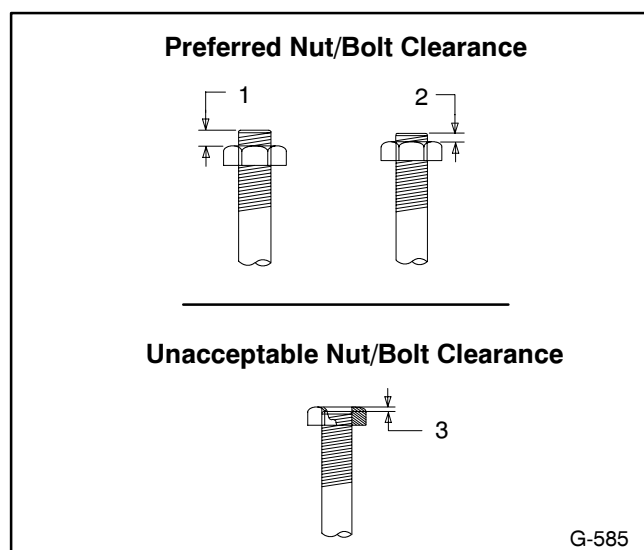
Appendix B. Common Hardware Application Guidelines

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

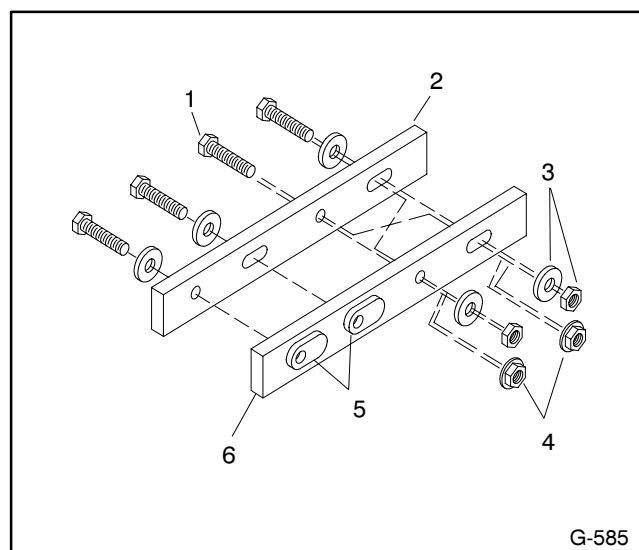
Figure 1. Acceptable Bolt Lengths

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)

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

Part No. Dimensions Hex Head Bolts (Grade 5)

X-465-17	1/4-20 x .38
X-465-6	1/4-20 x .50
X-465-2	1/4-20 x .62
X-465-16	1/4-20 x .75
X-465-18	1/4-20 x .88
X-465-7	1/4-20 x 1.00
X-465-8	1/4-20 x 1.25
X-465-9	1/4-20 x 1.50
X-465-10	1/4-20 x 1.75
X-465-11	1/4-20 x 2.00
X-465-12	1/4-20 x 2.25
X-465-14	1/4-20 x 2.75
X-465-21	1/4-20 x 5.00
X-465-25	1/4-28 x .38
X-465-20	1/4-28 x 1.00
X-125-33	5/16-18 x .50
X-125-23	5/16-18 x .62
X-125-3	5/16-18 x .75
X-125-31	5/16-18 x .88
X-125-5	5/16-18 x 1.00
X-125-24	5/16-18 x 1.25
X-125-34	5/16-18 x 1.50
X-125-25	5/16-18 x 1.75
X-125-26	5/16-18 x 2.00
230578	5/16-18 x 2.25
X-125-29	5/16-18 x 2.50
X-125-27	5/16-18 x 2.75
X-125-28	5/16-18 x 3.00
X-125-22	5/16-18 x 4.50
X-125-32	5/16-18 x 5.00
X-125-35	5/16-18 x 5.50
X-125-36	5/16-18 x 6.00
X-125-40	5/16-18 x 6.50
X-125-43	5/16-24 x 1.75
X-125-44	5/16-24 x 2.50
X-125-30	5/16-24 x .75
X-125-39	5/16-24 x 2.00
X-125-38	5/16-24 x 2.75
X-6238-2	3/8-16 x .62
X-6238-10	3/8-16 x .75
X-6238-3	3/8-16 x .88
X-6238-11	3/8-16 x 1.00
X-6238-4	3/8-16 x 1.25
X-6238-5	3/8-16 x 1.50
X-6238-1	3/8-16 x 1.75
X-6238-6	3/8-16 x 2.00
X-6238-17	3/8-16 x 2.25
X-6238-7	3/8-16 x 2.50
X-6238-8	3/8-16 x 2.75
X-6238-9	3/8-16 x 3.00
X-6238-19	3/8-16 x 3.25
X-6238-12	3/8-16 x 3.50
X-6238-20	3/8-16 x 3.75
X-6238-13	3/8-16 x 4.50
X-6238-18	3/8-16 x 5.50
X-6238-25	3/8-16 x 6.50

Part No. Dimensions Hex Head Bolts, cont.

X-6238-14	3/8-24 x .75
X-6238-16	3/8-24 x 1.25
X-6238-21	3/8-24 x 4.00
X-6238-22	3/8-24 x 4.50
X-6024-5	7/16-14 x .75
X-6024-2	7/16-14 x 1.00
X-6024-8	7/16-14 x 1.25
X-6024-3	7/16-14 x 1.50
X-6024-4	7/16-14 x 2.00
X-6024-11	7/16-14 x 2.75
X-6024-12	7/16-14 x 6.50
X-129-15	1/2-13 x .75
X-129-17	1/2-13 x 1.00
X-129-18	1/2-13 x 1.25
X-129-19	1/2-13 x 1.50
X-129-20	1/2-13 x 1.75
X-129-21	1/2-13 x 2.00
X-129-22	1/2-13 x 2.25
X-129-23	1/2-13 x 2.50
X-129-24	1/2-13 x 2.75
X-129-25	1/2-13 x 3.00
X-129-27	1/2-13 x 3.50
X-129-29	1/2-13 x 4.00
X-129-30	1/2-13 x 4.50
X-463-9	1/2-13 x 5.50
X-129-44	1/2-13 x 6.00
X-129-51	1/2-20 x .75
X-129-45	1/2-20 x 1.25
X-129-52	1/2-20 x 1.50
X-6021-3	5/8-11 x 1.00
X-6021-4	5/8-11 x 1.25
X-6021-2	5/8-11 x 1.50
X-6021-1	5/8-11 x 1.75
273049	5/8-11 x 2.00
X-6021-5	5/8-11 x 2.25
X-6021-6	5/8-11 x 2.50
X-6021-7	5/8-11 x 2.75
X-6021-12	5/8-11 x 3.75
X-6021-11	5/8-11 x 4.50
X-6021-10	5/8-11 x 6.00
X-6021-9	5/8-18 x 2.50
X-6239-1	3/4-10 x 1.00
X-6239-8	3/4-10 x 1.25
X-6239-2	3/4-10 x 1.50
X-6239-3	3/4-10 x 2.00
X-6239-4	3/4-10 x 2.50
X-6239-5	3/4-10 x 3.00
X-6239-6	3/4-10 x 3.50
X-792-1	1-8 x 2.25
X-792-5	1-8 x 3.00
X-792-8	1-8 x 5.00

Part No. Dimensions Type

Hex Nuts

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

Washers

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

Metric

Hex head bolts are hardness grade 8.8 unless noted.

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

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

SPECTRUM[®]

DETROIT DIESEL



SPECTRUM, N7650 County Trunk LS, Sheboygan, Wisconsin 53083 U.S.A.
Phone 920-459-1877
Fax 920-459-1825 (U.S.A. Sales), Fax 920-459-1614 (International)

MP-5584 11/99d

© 1995, 1997, 1999. All rights reserved.