

Service Parts



Generator Sets

Models:

20-30GS

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

See MP-6009 Parts Catalog Industrial Controllers
for controller parts

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Introduction

This manual lists service replacement parts for 20/30GS 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 DDC/MTU Power Generation products reserves the right to change this publication and the products represented without notice and without any obligation or liability whatsoever.

This manual includes the following main sections:

Table of Contents. Lists the sections of the manual.

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

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

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

Kit Sections. List modules and accessories and their parts.

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

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Numbering System Significance

This manual uses the following numbering systems:

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

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

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

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

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Illustrations

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

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How to Find Part Numbers

Use the following steps to locate a service replacement part.

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

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Hardware References

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

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

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

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Specification Number Index

Group Title	Air Intake	Fuel System	Cooling System	Engine	Nameplates and Decals	Oil Pressure Switch	Skid and Plant Mounting	Temperature Switch	Starter	Recommended Spare Parts	Generator and Mounting	Controller and Mounting	Literature
Group No.	101	103	104	105	107	108	109	110	112	119	201	301	701
Spec No.	Variation Number												

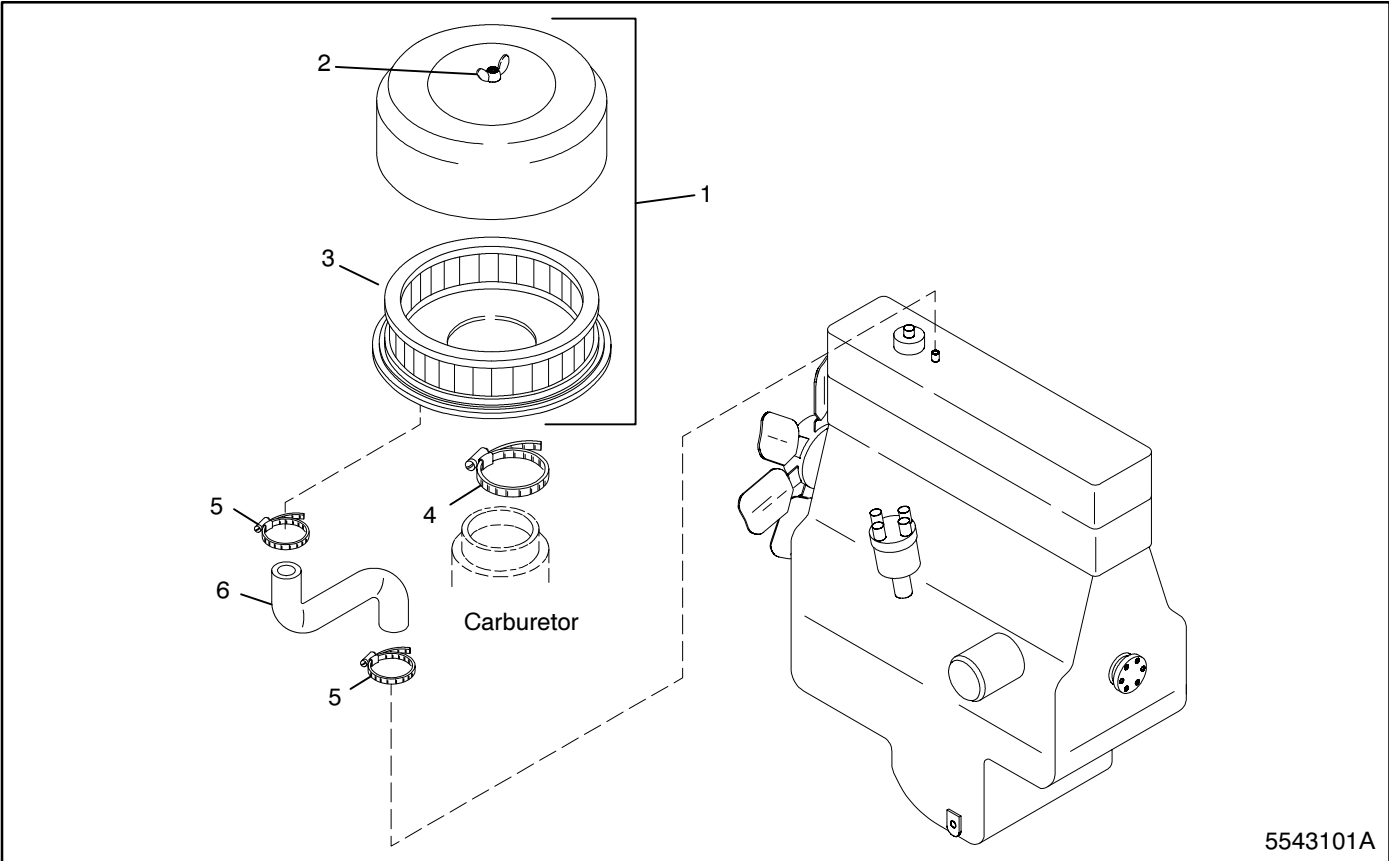
20GS													
193001	5	17	15	24	13	9	9	5	—	1	29	‡	11
193002	5	*	*	24	13	9	9	5	—	3	29	‡	11
193003	5	17	15	24	13	9	9	5	—	1	26	‡	11
193004	5	*	*	24	13	9	9	5	—	3	26	‡	11
193005	5	17	15	24	14	9	9	5	—	1	30	‡	11
193006	5	*	*	24	14	9	9	5	—	3	30	‡	11
193069	6	18	17	25	36	11	10	6	—	5	29	‡	13
193070	6	*	*	25	36	11	10	6	—	6	29	‡	13
193071	6	18	17	25	37	11	10	6	—	5	26	‡	13
193072	6	*	*	25	36	11	10	6	—	6	26	‡	13
193073	6	18	17	25	36	11	10	6	—	5	30	‡	13
193074	6	*	*	25	37	11	10	6	—	6	30	‡	13
193085	8	20	21	29	24	E29	15	E29	—	5	40	‡	19
193086	†	*	*	29	24	E29	†	E29	—	6	†	‡	19
193087	8	20	21	29	24	E29	15	E29	—	5	41	‡	19
193088	†	*	*	29	24	E29	†	E29	—	6	†	‡	19
193089	8	20	21	29	24	E29	15	E29	—	5	42	‡	19
193090	†	*	*	29	24	E29	†	E29	—	6	†	‡	19
GM28726-GA1S	†	*	*	31	GR1	E31	†	E31	—	6	†	‡	19
30GS													
193007	4	15	14	23	15	10	9	5	—	2	26	‡	11
193008	4	*	*	23	15	10	9	5	—	4	26	‡	11
193009	4	15	14	23	15	10	9	5	—	2	27	‡	11
193010	4	*	*	23	15	10	9	5	—	4	27	‡	11
193011	4	15	14	23	15	10	9	5	—	2	28	‡	11
193012	4	*	*	23	15	10	9	5	—	1	28	‡	11
193013	4	16	14	23	15	10	9	5	—	2	26	‡	11
193015	4	16	14	23	15	10	9	5	—	2	27	‡	11
193017	4	16	14	23	66	10	9	5	—	2	28	‡	11
193079	179-3	179-7	11	9	13	179-3	179-3	179-3	—	1	20	‡	7
193080	179-3	179-7	11	9	13	179-3	179-3	179-3	—	1	15	‡	7
193081	179-3	179-7	11	9	13	179-3	179-3	179-3	—	1	21	‡	7
193082	179-3	*	*	9	13	179-3	179-3	179-3	—	2	20	‡	7
193083	179-3	*	*	9	14	179-3	179-3	179-3	—	2	15	‡	7
193084	179-3	*	*	9	14	179-3	179-3	179-3	—	2	21	‡	7

* Determine the kit number from the generator nameplate and see the Kit List for the parts list.

† Desired air, skid, and generator kit chosen from the price list. Determine the kit number from the generator nameplate and see the Group parts sections for the parts list.

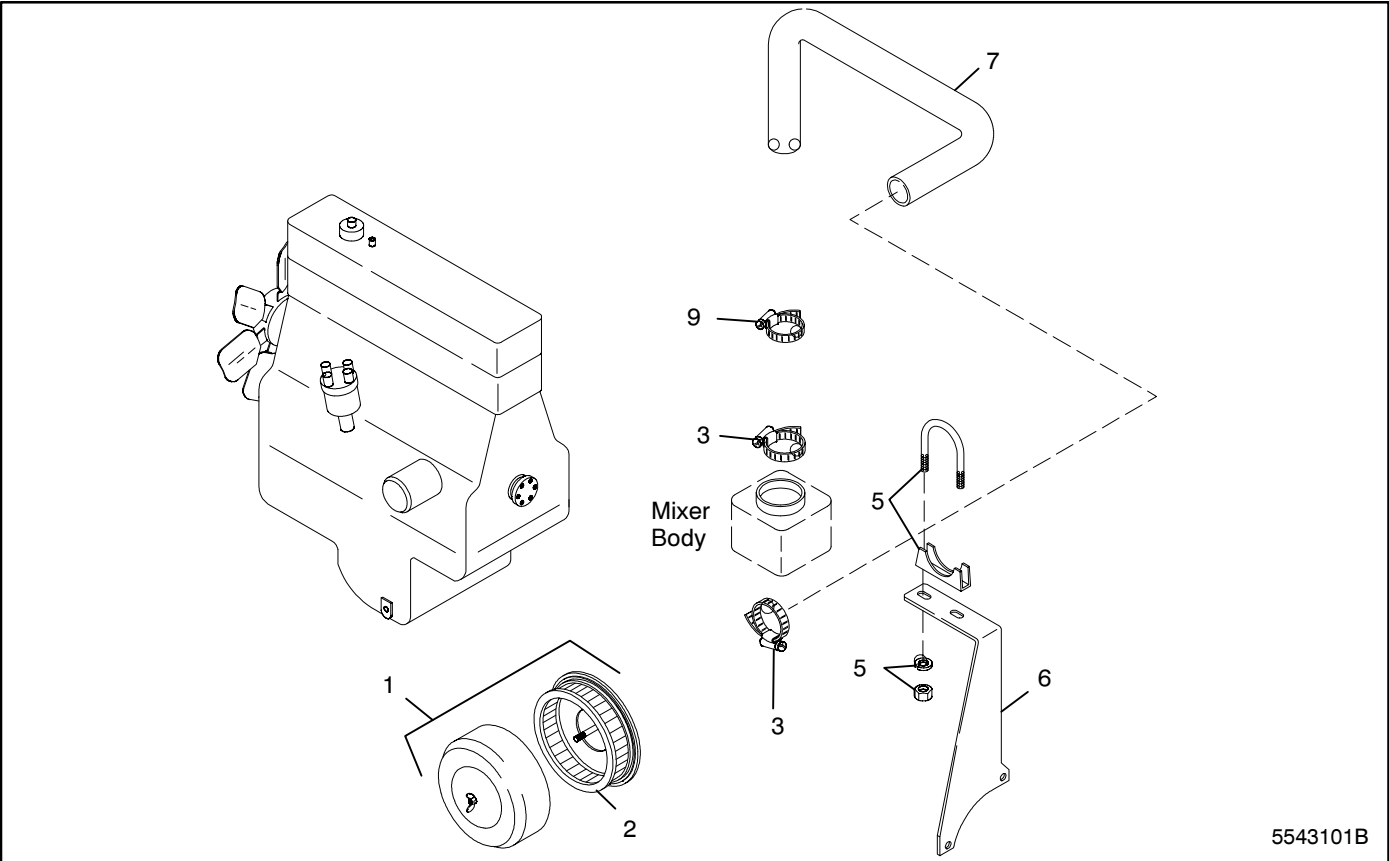
‡ Controller group and controller assembly parts are listed in a separate parts catalog, MP-6009 Parts Catalog Industrial Controllers.

Group 101: Air Intake



Item	Part Number	Description	Quantity				
			Variation /ModuleNo.				
			5	6	8	179-3	326878
1	A-269441	Air Cleaner (includes items 2 and 3)	1				
1	A-326315	Air Cleaner (includes items 2 and 3)		1	1	1	1
2	254457	Nut, wing	1				
3	258423	Element, air cleaner	1	1	1	1	1
4	X-426-10	Clamp				1	
5	X-426-10	Clamp	2	2	2		2
6	256870	Hose, molded	1				
6	326326	Hose		1			
6	326860	Hose			1		1

Group 101: Air Intake, continued



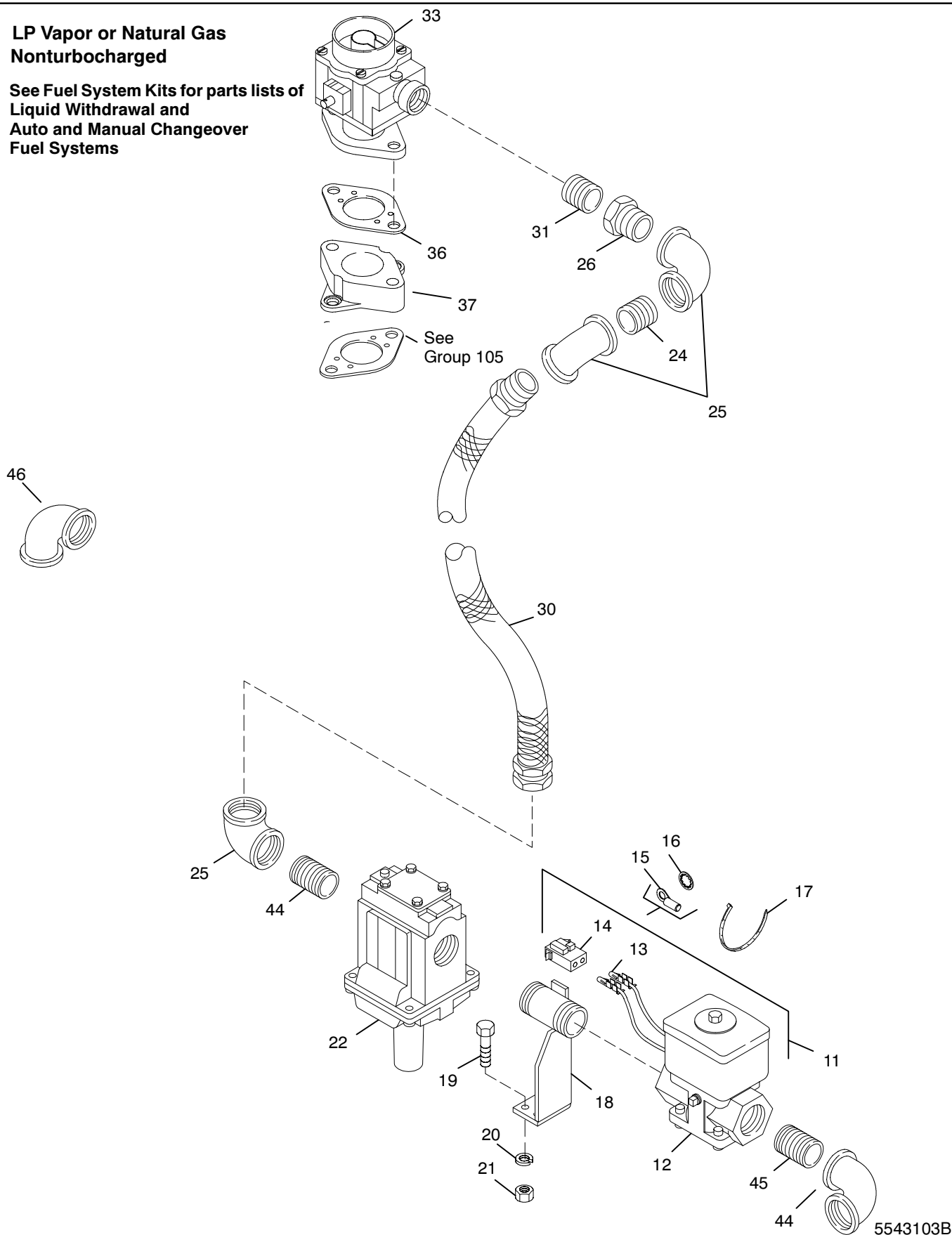
Item	Part Number	Description	Quantity
			Var. No.
1	A-273699	Air Cleaner Assembly	1
2	253107	Element, air cleaner	1
3	X-426-1	Clamp, hose, 2 17/32-3 7/8	1
5	286283	Clamp, U	1
6	326108	Bracket, air cleaner	1
6	X-284-23	Grommet (not shown)	1
6	X-6050-2	Screw, hex head (not shown, fastens bracket to engine)	2
6	X-400-170	Spacer (not shown)	2
7	326107	Hose, air intake	1
9	X-426-2	Clamp, hose	1

Notes

Group 103: Fuel System

LP Vapor or Natural Gas
Nonturbocharged

See Fuel System Kits for parts lists of
Liquid Withdrawal and
Auto and Manual Changeover
Fuel Systems



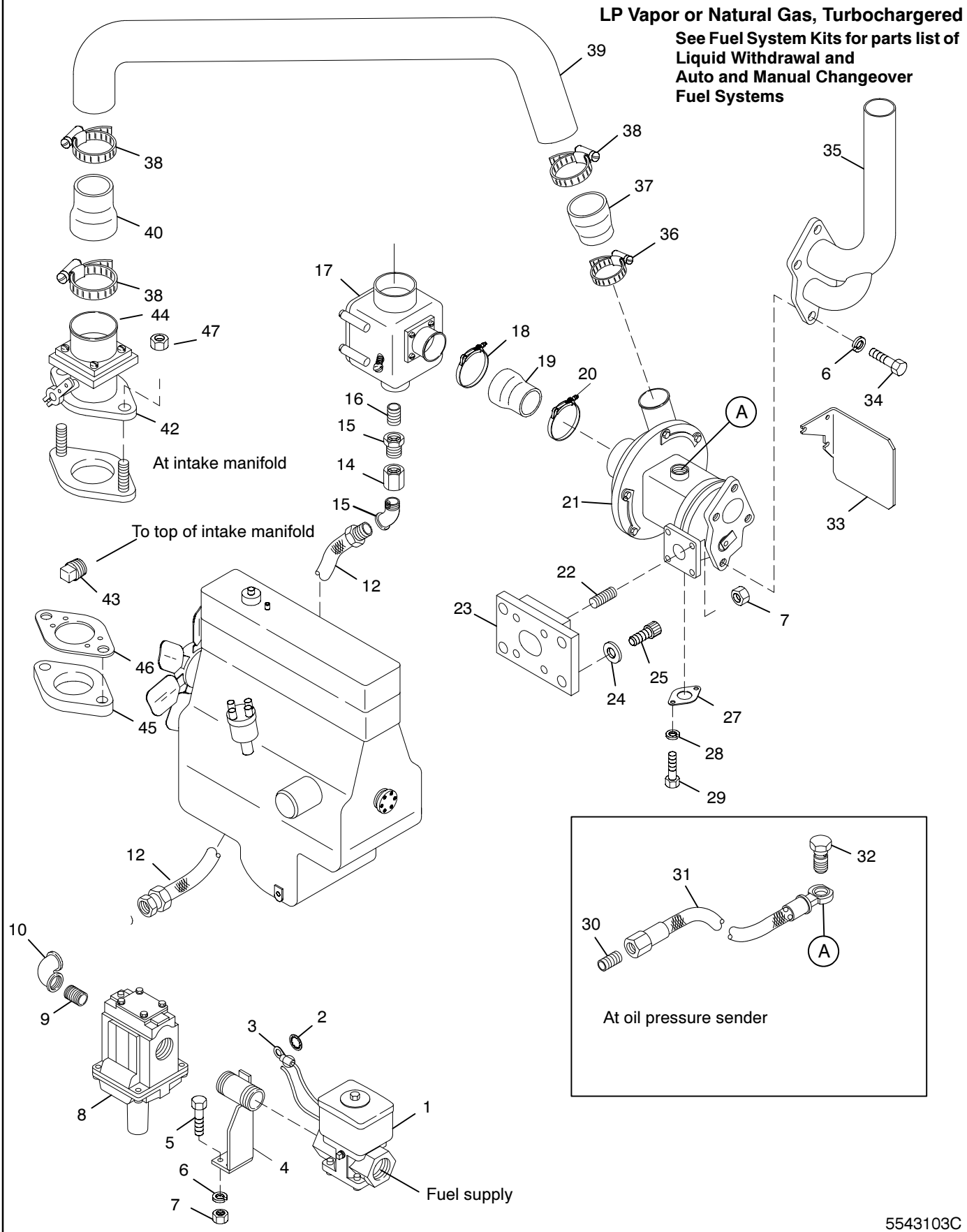
Group 103: Fuel System, continued

Item	Part Number	Description	Quantity				
			Variation No.				
			17	18	20	179-7	326425
11	254859	Valve, gas (includes items 12-14)					1
12	244621	Valve, gas	1				
12	326223	Valve, gas				1	1
13	241618	Terminal					2
14	292371	Connector, jack					1
15	X-283-32	Terminal	1				
16	X-22-15	Washer, lock	1				
18	254456	Bracket, fuel valve	1	1	1	1	1
19	#	Screw, h.c., 5/16-18	2	2	2		
20	#	Washer, lock, 5/16 in.	2	2	2		
21	X-82-2	Nut, hex, 5/16	2	2	2		
22	291259	Regulator, pressure	1	1	1	1	1
24	X-209-2	Nipple, pipe		1	1		1
25	X-215-2	Elbow, pipe	3				
26	X-202-23	Bushing, reducer	1				
26	X-202-41	Bushing, reducer		1	1	1	1
27	X-204-8	Nipple, pipe	1				
27	X-206-9	Nipple, pipe				1	
28	X-215-1	Elbow		1	1		1
28	X-215-5	Elbow				1	
30	276395	Fuel Line, flexible	1			1	
30	326603	Fuel Line, flexible		1	1		1
31	X-204-9	Nipple, pipe	1				
31	X-209-2	Nipple, pipe		1	1		1
31	X-209-3	Nipple, pipe				1	
33	254983	Carburetor	1				
33	A-326319	Carburetor		1	1		1
33	A-326593	Carburetor				1	
36	280007	Gasket, carburetor	1				
37	255595	Spacer	1				
38	X-6050-4	Screw		2	2		2
44	X-215-2	Elbow, pipe, 3/4 in.				1	
45	X-206-9	Nipple, pipe				1	
46	X-225-8	Elbow, 45°, 3/4 in.		1	1	1	1

Common hardware; procure locally.

Group 103: Fuel System, continued

LP Vapor or Natural Gas, Turbocharged
See Fuel System Kits for parts list of
Liquid Withdrawal and
Auto and Manual Changeover
Fuel Systems

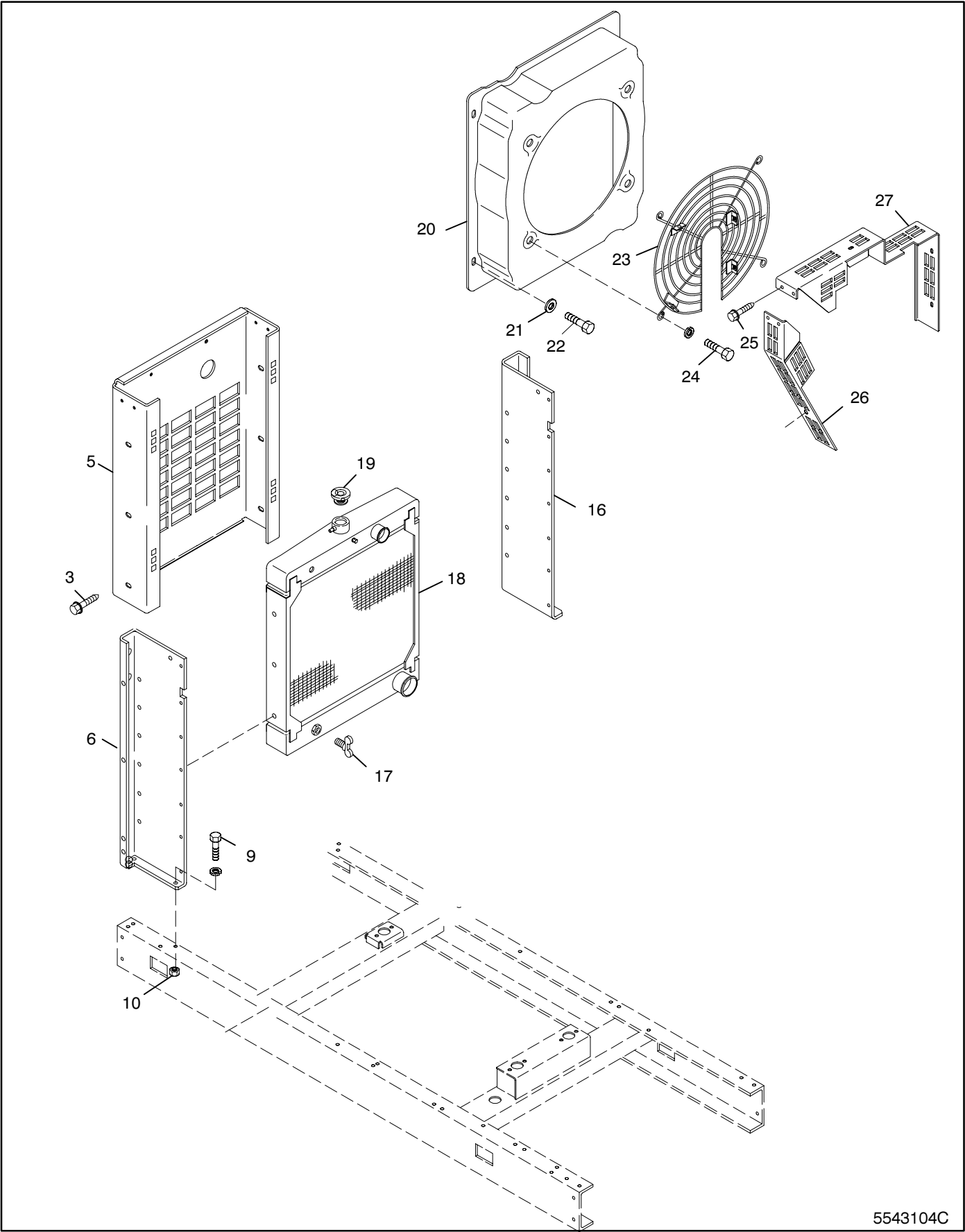


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Group 103: Fuel System, continued

Item	Part Number	Description	Quantity	
			Variation No.	
			15	16
1	244621	Valve, gas	1	1
2	X-22-15	Washer, shakeproof	1	1
3	X-283-32	Terminal	1	1
4	254456	Bracket, fuel valve	1	1
5	X-125-3	Screw, h.c.	2	2
6	X-21-1	Washer, lock	6	6
7	X-82-2	Nut, hex	6	6
8	291259	Regulator, pressure	1	1
9	X-206-4	Nipple, pipe	1	1
10	X-215-2	Elbow, pipe	1	1
12	276395	Fuel Line, flexible	1	1
13	X-274-2	Elbow	1	1
14	X-216-13	Coupling, pipe	1	1
14	276389	Bracket, support (not shown)	1	1
14	X-297-1	Bolt, U (not shown)	1	1
14	X-6051-3	Screw, h.c. (not shown)	2	2
15	X-202-41	Bushing, reducer	1	1
16	X-209-2	Nipple, pipe	1	1
17	A-326112	Body, mixer	1	
17	A-326137	Body, mixer (LP vapor)		1
18	249887	Clamp, hose	1	1
19	258875	Hose, step	1	1
20	249888	Clamp, hose	1	1
21	258490	Turbocharger	1	1
22	X-352-65	Stud	4	4
23	258866	Adapter, turbocharger	1	1
24	X-25-28	Washer, plain	4	4
25	X-6055-3	Screw, socket head	4	4
27	258878	Gasket, turbo oil	1	1
28	X-20-1	Washer, lock	2	2
29	X-6049-2	Screw, h.c.	2	2
30	X-296-5	Connector	1	1
31	258492	Oil Line, feed	1	1
32	255628	Bolt, banjo	1	1
33	276258	Shield, heat	1	1
34	X-6050-3	Screw, h.c.	4	4
35	258876	Pipe, turbo discharge	1	1
36	X-426-8	Clamp, hose	1	1
37	258868	Hose, step	1	1
38	X-426-4	Clamp, hose	3	3
38	258869	Tube, turbo crossover	1	1
40	258874	Hose, step	1	1
42	A-326138	Body, throttle	1	1
43	X-75-2	Plug, pipe	2	2
44	326114	Adapter, throttle body	1	1
45	255595	Spacer	1	1
46	280007	Gasket, carburetor	1	1
46	258558	Tag, instruction (not shown)	1	1

Group 104: Cooling System



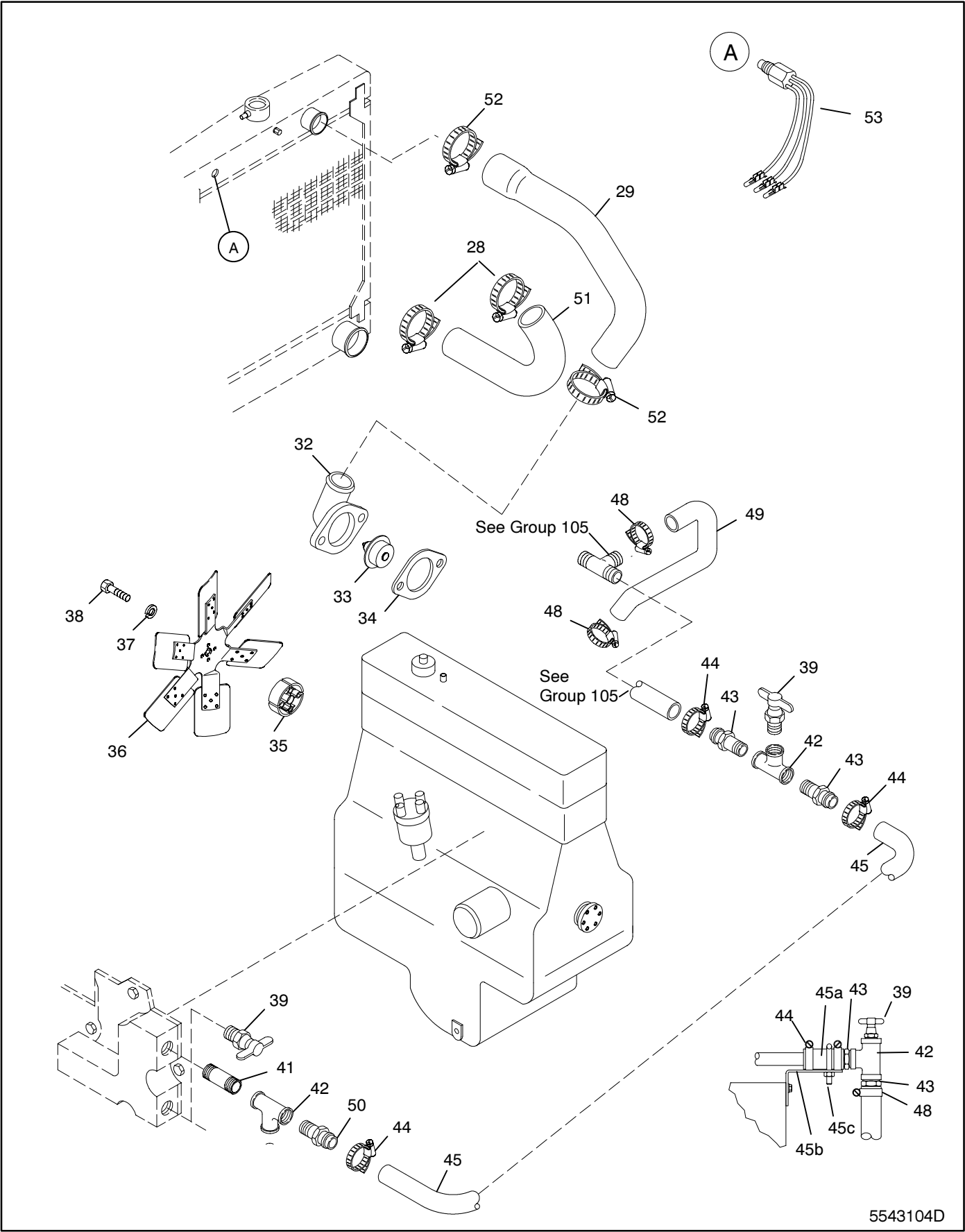
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Group 104: Cooling System, continued

Item	Part Number	Description	Quantity					
			Variation No.					326874
			11	14	15	17	21	
3	X-465-2	Screw, 1/4-20 x 5/8 in.		8	8			
5	276491	Shroud, radiator		1	1			
5	326351	Shroud, radiator				1	1	1
5	360005	Shroud, radiator	1					
6	276493	Support, radiator (left)		1	1			
6	326350	Support, radiator (left)				1	1	1
6	326001	Support, radiator (left)	1					
7	#	Washer, lock, 5/16 in.				16		
8	X-125-23	Screw, h.c.				6		
9	#	Screw, h.c., 5/16-18		6	6			
9	#	Hardware, 3/8-16					8	8
10	#	Nut, hex, 5/16-18		6	6			
10	#	Hardware, 3/8-16					8	8
16	276492	Support, radiator (right)		1	1			
16	326349	Support, radiator (right)				1	1	1
16	326002	Support, radiator (right)	1					
16	273911	Spacer, radiator support (not shown)	1			1	1	1
17	X-256-3	Valve, drain	1	1	1	1	1	1
18	A-326021	Radiator Assembly (includes cap)			1			
18	A-276304	Radiator Assembly (includes cap)		1				
18	A-326023	Radiator Assembly (includes cap)	1			1	1	1
19	224365	Cap, radiator (14 psi)	1	1	1	1	1	1
19	224358	Cap, radiator (7 psi)	1	1	1	1	1	1
20	226334	Shroud, fan		1	1			
20	324039	Shroud, fan	1			1	1	1
21	X-25-73	Washer, plain	4	4	4	4		
21	#	Washer, 1/4 in.					4	4
22	X-465-2	Screw, h.c.	4	4	4	4	4	4
23	226335	Fan Guard, wire						
23	326106	Fan Guard, wire		1	1			
23	326358	Fan Guard, wire				1	1	1
23	326006	Fan Guard, wire	1					
24	X-125-23	Screw, h.c.		4	4			
24	#	Hardware, 5/16 in.				4	4	4
24	X-6365-1	Insert, threaded (not shown)				4	4	4
25	X-6216-1	Screw, hex crimpite	6	5	5	10	10	10
26	326468	Guard, belt (bottom)				1	1	1
26	326470	Bracket, mounting (not shown)				1	1	1
26	326110	Guard, belt (left)		1	1			
26	326467	Guard, belt (left)				1	1	1
26	326007	Guard, belt (left)	1					
26	326109	Guard, belt (right)		1	1			
26	326686	Guard, belt (right)				1		
26	326933	Guard, belt (right)					1	1
26	326008	Guard, belt (right)	1					
26	326469	Bracket, mounting (not shown)				1	1	1

Common hardware; procure locally.

Group 104: Cooling System, continued

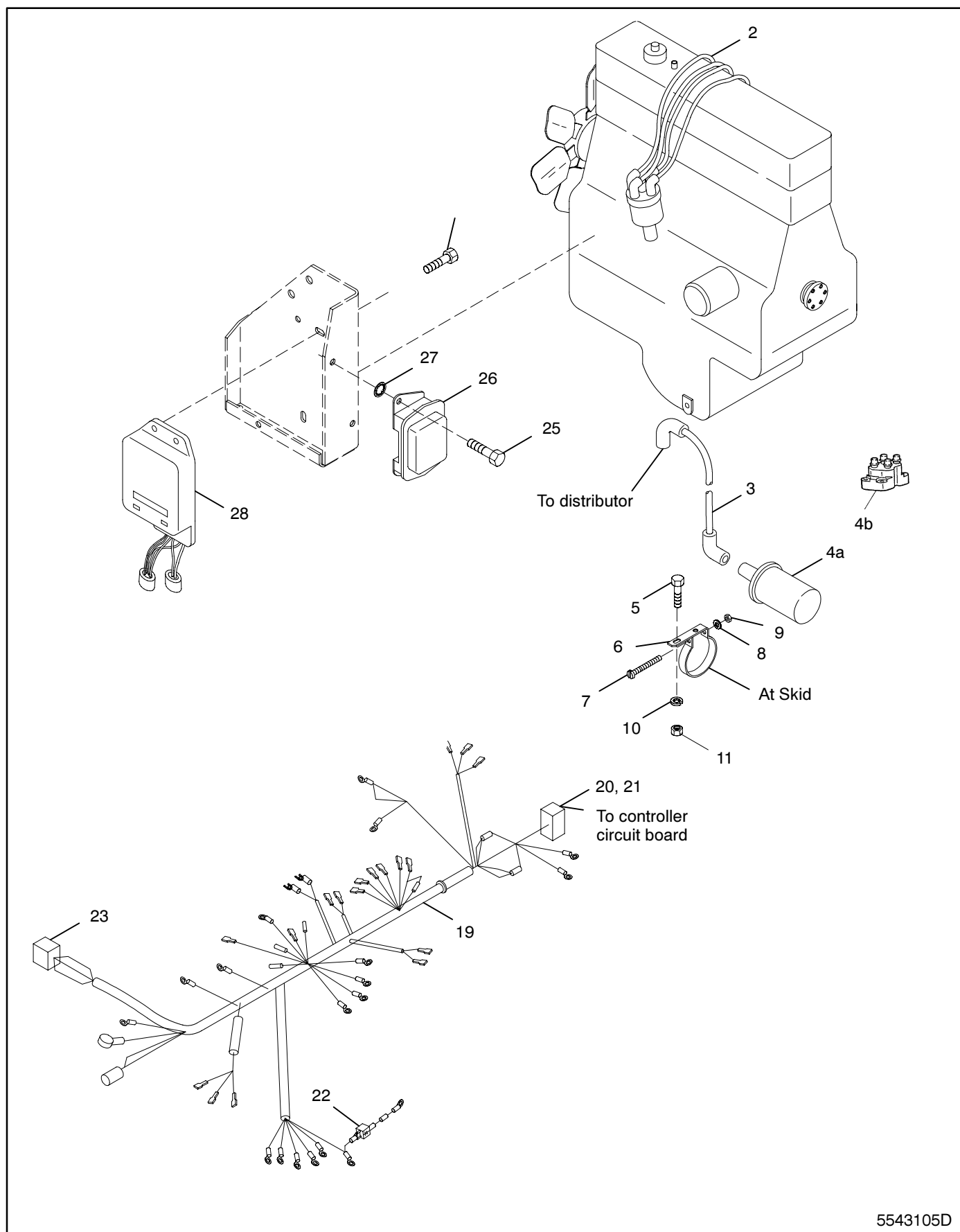


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Group 104: Cooling System, continued

Item	Part Number	Description	Quantity					
			Variation No.					326874
			11	14	15	17	21	
27	326111	Guard, belt (top)		1	1			
27	326577	Guard, belt (top)				1	1	1
27	326009	Guard, belt (top)	1					
27	326449	Bracket, mounting (not shown)				1	1	1
27	326144	Bracket, mounting (not shown)	1					
28	X-426-4	Clamp, hose, 1.31/2.25 in.	2	2	2	2	1	1
28	X-426-6	Clamp, hose, 1.56/2.5 in.					1	1
29	276287	Hose, upper radiator		1	1			
29	326356	Hose, upper radiator				1	1	1
29	326004	Hose, upper radiator	1					
32	326863	Housing, thermostat					1	1
32	326014	Housing, thermostat	1					
33	249930	Thermostat		1	1			
33	276162	Thermostat	1					
34	276160	Gasket, water outlet	1					
35	276102	Spacer, pulley to fan		1	1			
35	326010	Spacer, fan	1					
35	226404	Spacer, fan					1	1
36	276479	Fan, pusher			1			
36	276387	Fan, pusher		1				
36	326347	Fan, pusher				1	1	1
36	326011	Fan, pusher	1					
37	X-801-4	Washer, hardened	4	4	4		4	4
38	X-6050-16	Screw, h.c.					4	4
39	X-256-1	Valve, drain		1	1	1	1	1
41	X-204-6	Connector		1	1			
42	X-203-15	Tee		2	2		1	1
43	X-582-2	Connector, hose (3/8 in. NPT x 5/8 in.)				2	1	1
43	X-582-11	Connector, hose (3/8 in. NPT x 3/4 in.)					1	1
44	X-426-12	Clamp				2	2	2
45a	X-691-39	Hose, .75 ID x 4 in.				1	1	1
45b	326610	Bracket				1	1	1
45c	X-397-6	Clamp, U				1	1	1
48	X-426-3	Clamp, hose				2	2	2
49	326395	Hose, molded bypass				1	1	1
50	X-391-30	Elbow, hose		1	1			
51	276288	Hose, lower radiator		1	1			
51	326357	Hose, lower radiator					1	1
52	X-426-8	Clamp, hose, .81/1.75 in.		2	2			
52	X-426-4	Clamp, hose, 1.31/2.25 in.				1	2	2
52	X-426-6	Clamp, hose, 1.56/2.5 in.	2			1		
53	273404	Switch, coolant level (before serial number 363369)	1	1	1	1	1	1
53	365289	Switch, coolant level (serial numbers 363369 and after)	1	1	1	1	1	1

Group 105: Engine



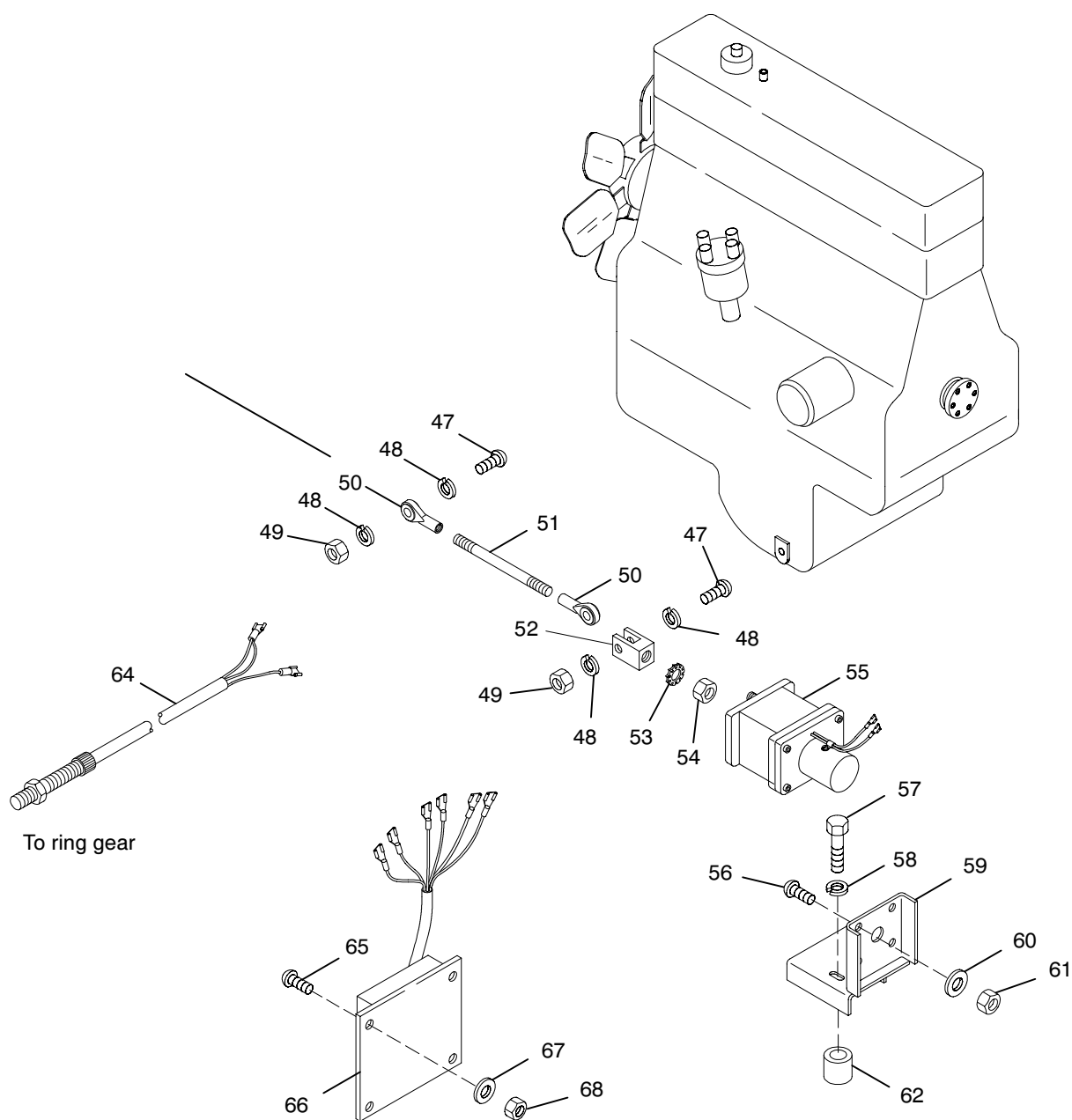
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Group 105: Engine, continued

Item	Part Number	Description	Quantity					
			Variation No.					
			9	23	24	25	29	31
1	326299	Plug, spark		4	4			
2	276120	Harness, wiring, spark plug		1	1			
2	326364	Harness, wiring, spark plug				1	1	1
3	276106	High Tension Lead		1	1			
4	276107	Coil, ignition		1	1			
4	326361	Coil, ignition				1	1	1
4	X-400-208	Spacer (not shown)				4	4	4
4	X-50-42	Screw, r.h.m., 10-24					4	4
5	#	Screw, h.c., 5/16-18		1	1			
6	276108	Strap, ignition coil		1	1			
6	326359	Bracket, ignition coil				1	1	1
7	X-50-57	Screw, r.h.m.		1	1			
8	#	Washer, lock, #10		1	1			
9	#	Nut, hex, 10-24		1	1			
10	#	Washer, lock, 5/16 in.		1	1			
18	233959	Diode, 6 A, 100 V		1	1			
19	276401	Harness, wiring engine		1	1			
19	326399	Harness, wiring engine (before serial number 363369)				1		
19	326613	Harness, wiring engine (serial numbers 363369 and after)				1		
19	326013	Harness, wiring engine (before serial number 363369)	1					
19	326614	Harness, wiring engine (serial numbers 363369 and after)	1					
19	326932	Harness, wiring engine					1	1
20	295145	Connector, 24-position	1	1	1	1		
21	292800	Connector, cable	1	1	1	1		
22	253798	Lead Assembly	1	1	1	1		
23	239408	Connector, 4-position	1	1	1	1		
24	276094	Harness, ignition module wiring	1					
24	326363	Harness, ignition module wiring				1		
24	359302	Harness, ignition module wiring					1	1
24	GM28715	Harness, wiring (module to MAP)					1	1
25	#	Hardware, 1/4-20		2	2			
26	276128	Regulator, alternator		1	1			
27	X-22-12	Washer, shakeproof		2	2			
28	276077	Module, ignition	1	1	1			
28	326362	Module, ignition				1		
28	GM28758	Module kit, ignition (includes items 182, 183, 186, and harness GM28715)					1	
28	See item 182	Module, ignition control and MAP						1
29	X-6084-1	J-Clip		1				
33	X-465-21	Screw, h.c.		3	3			
33	X-50-3	Screw, r.h.m., 10-24					2	

Common hardware; procure locally.

Group 105: Engine, continued



5543105E

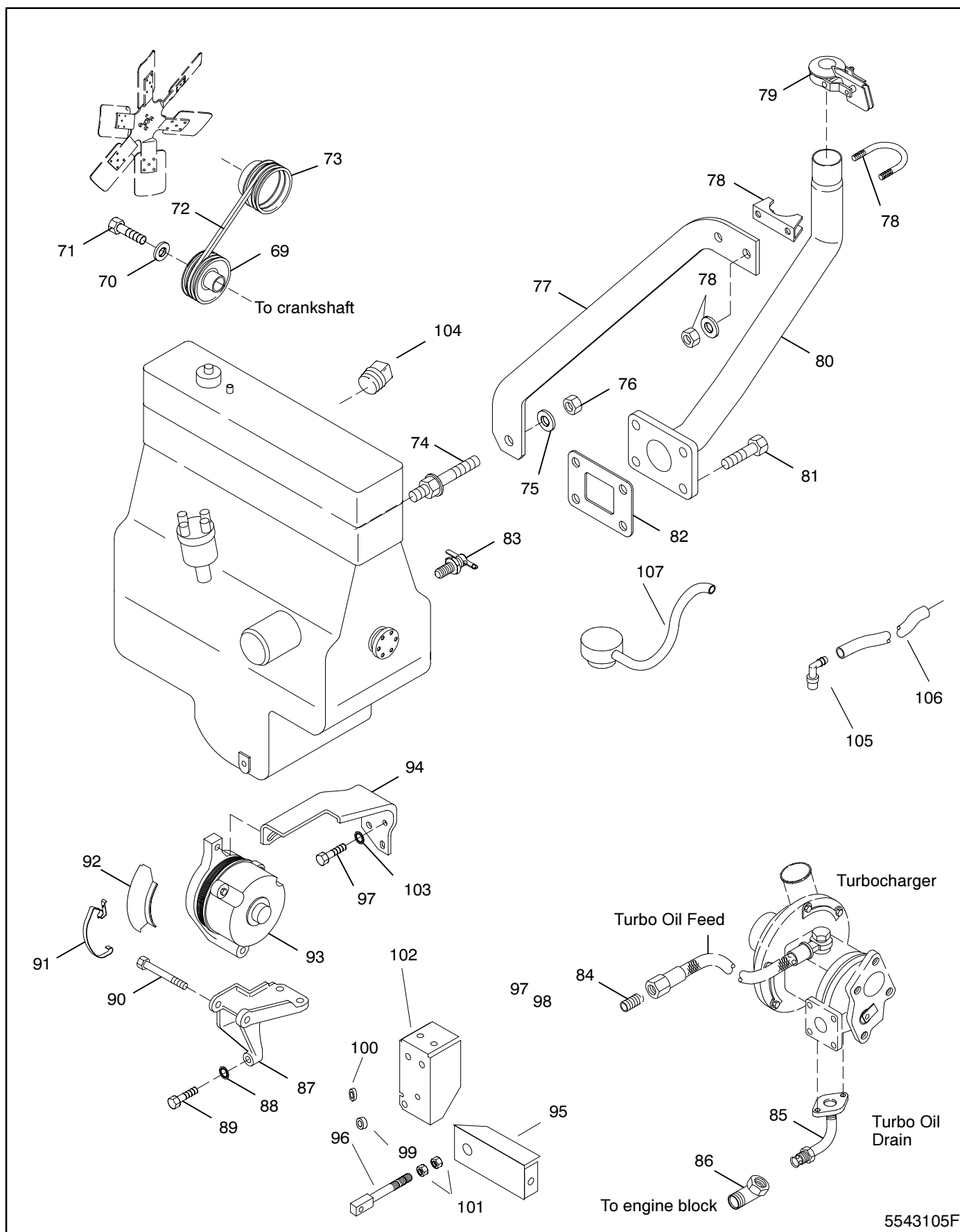
K,L-276000

Group 105: Engine, continued

Item	Part Number	Description	Quantity					
			Variation No.					
			9	23	24	25	29	31
47	X-50-56	Screw, r.h.m.		2	2			
47	X-50-70	Screw, r.h.m.	2			2	2	2
48	X-25-36	Washer, flat		4	4			
48	X-25-115	Washer, flat	4			4	4	4
49	X-101-12	Nut, lock		2	2			
49	X-101-9	Nut, lock	2			2	2	2
50	272456	Link, ball	2	2	2	2	2	2
51	X-532-86	Stud		1	1			
51	X-532-79	Stud				1	1	1
X-352-51	X-532-73	Stud	1					
51	X-70-11	Nut, hex (not shown)	2			2	2	2
52	273751	Yoke	1	1	1	1	1	1
53	X-22-11	Washer, lock	1	2	2	1	1	1
54	X-6053-1	Nut, actuator					1	1
55	249923	Actuator, linear	1		1	1	1	1
55	273748	Actuator, linear		1				
56	#	Hardware, 14-20		4	4			
57	X-6050-2	Screw, h.c.		1	1			
57	X-6050-3	Screw, h.c.				3	3	3
57	X-125-25	Screw, h.c.	1					
58	#	Washer, lock, 5/16 in.		1	1			
59	256432	Bracket, linear actuator		1				
59	254722	Bracket, linear actuator			1			
59	326396	Bracket, linear actuator				1	1	1
59	256470	Bracket, linear actuator	1					
60	#	Washer, flat, 1/4 in.		4	4			
61	#	Nut, hex, 1/4-20		4	4			
62	X-400-100	Spacer		1	1			
62	265693	Spacer, .344 x .625 x 1.062	1					
64	276404	Pickup, magnetic	1	1	1	1	1	1
65	X-51-11	Screw, r.h.m.		4	4	4		
65	X-6216-1	Screw, hex head					4	4
66	A-246045	Governor Assembly	1	1	1	1	1	1
67	#	Washer, flat, #8		4	4	4		
68	#	Nut, hex, 8-32		4	4	4		

Common hardware; procure locally.

Group 105: Engine, continued

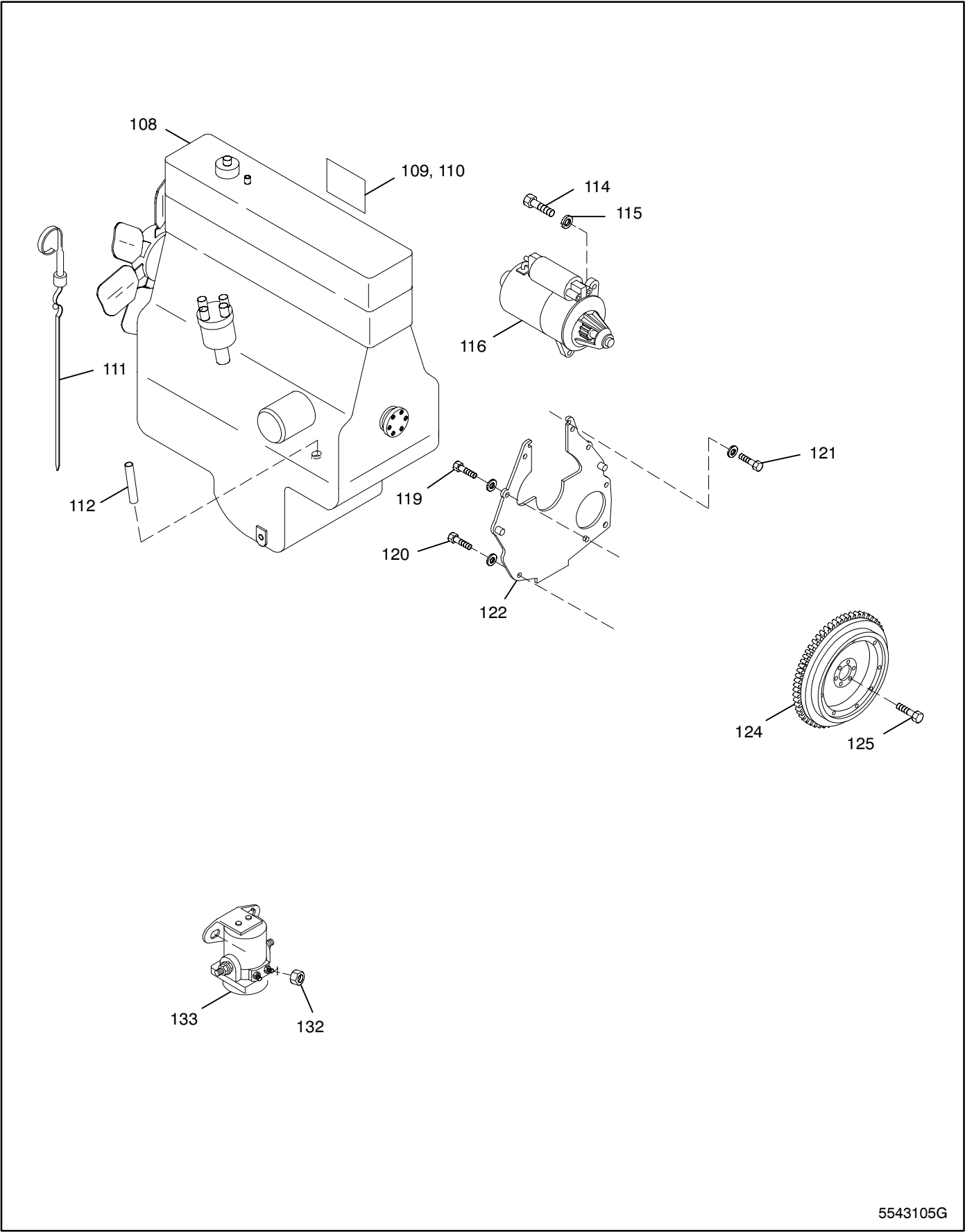


Group 105: Engine, continued

Item	Part Number	Description	Quantity					
			Variation No.					
			23	24	25	29	31	179-9
69	276105	Pulley, crankshaft	1	1				
70	276152	Washer, hardened	1	1				
71	276158	Bolt, h.c.	1	1				
72	276148	Belt, fan drive	1	1				
72	326320	Belt, fan drive			1	1	1	
72	276142	Belt, matched pair						1
73	276118	Pulley, water pump	1	1				
73	326360	Pulley, water pump			1	1	1	
73	276157	Pulley, water pump						1
74	276153	Stud, hex shoulder	1	1	1	1	1	
75	X-801-3	Washer, hardened	1	1		1	1	
76	X-6053-3	Nut, hex	1	1		1	1	
77	276125	Bracket, exhaust support	1	1	1	1	1	
78	X-722-5	Clamp, U	1	1	1	1	1	
79	276126	Cap, vertical exhaust		1	1			
80	276127	Pipe, muffler inlet		1	1	1	1	
80	276165	Pipe, exhaust						1
80	276163	Flange, muffler pipe						1
81	X-6051-3	Screw, h.c.		4		4	4	
82	276124	Gasket		1		1	1	
83	X-256-3	Valve, drain, 1/4 in.			1	1	1	
85	276131	Tube, oil return	1					
86	276130	Elbow, flared	1					
87	276149	Bracket, alternator mounting	1	1				
87	326318	Bracket, alternator mounting			1			
87	276143	Bracket, alternator mounting						1
87	326314	Bracket, alternator mounting				1	1	
87	X-400-91	Spacer (not shown)			1			
87	X-400-207	Spacer (not shown)			1			
88	X-22-1	Washer, shakeproof, 3/8 in.	3	3				
89	X-6051-1	Screw, h.c.	3	3				
89	X-6051-24	Screw, h.c.				2	2	
90	X-6051-9	Screw, h.c.	1	1				
91	276136	Clip, alternator fan shield	1	1				
92	376137	Shield, alternator	1	1				
93	276140	Alternator	1	1				
93	326348	Alternator			1	1	1	
93	276182	Alternator						1
93	276144	Hub, alternator pulley (not shown)						1
94	276272	Arm, alternator adjusting	1	1				
94	276145	Arm, alternator adjusting						1
95	326317	Bracket, rod adjustment			1	1	1	
96	326316	Bracket, rod adjustment			1	1	1	
97	X-6050-4	Screw, h.c.	3	3				
98	X-6051-3	Screw, h.c.				1	1	
99	X-400-91	Spacer				1	1	
100	X-400-207	Spacer				1	1	
101	X-70-10	Nut, hex				2	2	
102	326318	Bracket, mounting				1	1	
103	#	Washer, lock, 5/16 in.	3	3				
104	276212	Plug, freeze	1					
104	X-75-28	Plug, pipe (not shown)	1					
104	X-202-41	Bushing, reducer (not shown)	1					
105	276179	Regulator, crankcase vent						1
105	326367	PVC Valve			1	1	1	
106	276177	Hose, crankcase vent						1
106	276176	Hose, crankcase vent						1
106	326366	Hose, vent			1	1	1	
107	276178	Hose, crankcase vent						1

Common hardware; procure locally.

Group 105: Engine, continued



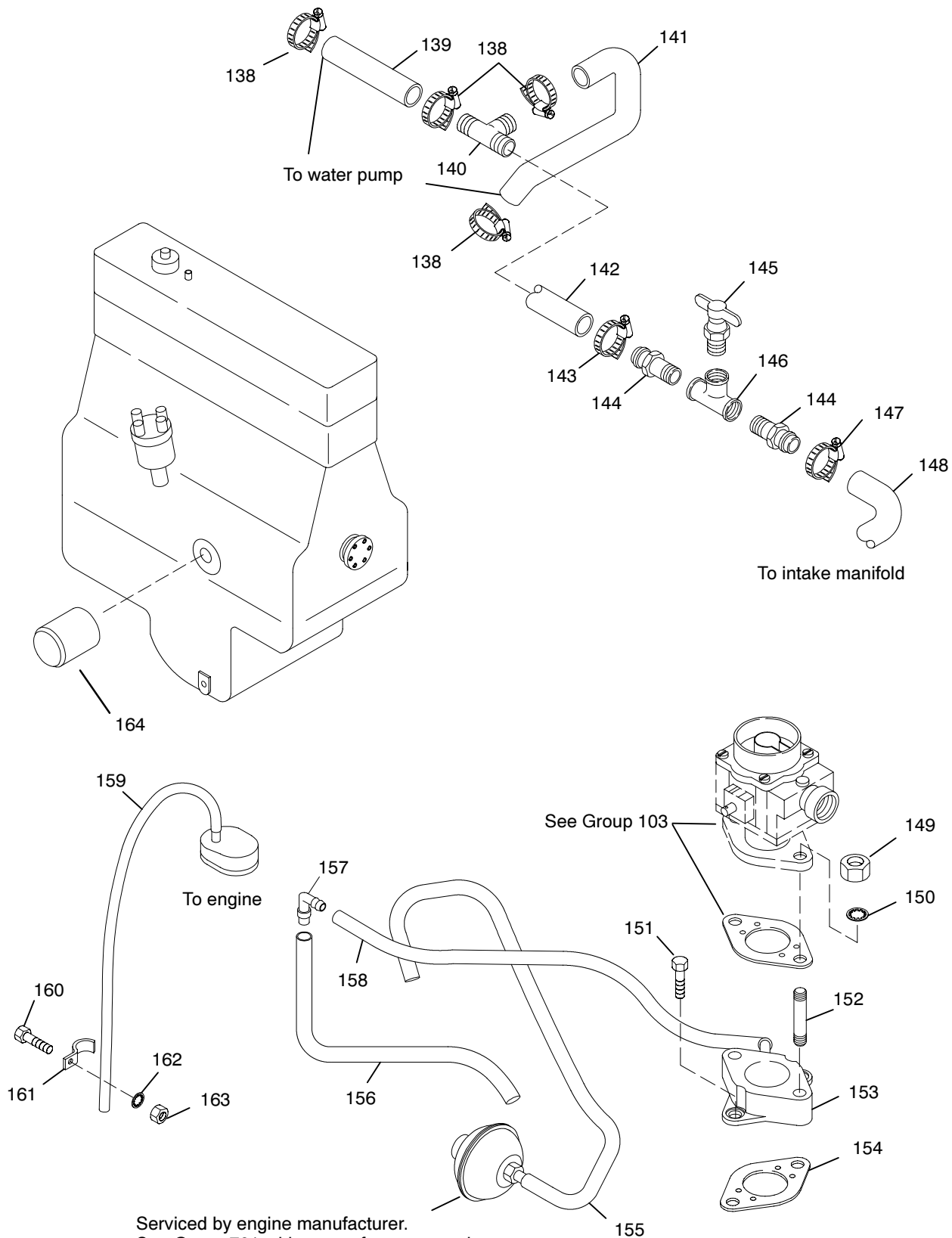
5543105G

Group 105: Engine, continued

Item	Part Number	Description	Quantity					
			Variation No.					
			9	23	24	25	29	31
108	A-276397	Engine Assembly, Ford LSG-423		1	1			
108	A-326352	Engine Assembly, Ford LRG-423				1		
108	A-326275	Engine Assembly, Ford CSG-649	1					
108	A-359289	Engine Assembly, Ford LRG-425					1	
108	B-359289	Engine Assembly, Ford LRG-425						1
109	276129	Nameplate, engine			1			
109	276132	Nameplate, engine		1				
110	246066	Adhesive, neoprene		1	1			
111	276111	Indicator, oil level		1	1			
111	326365	Indicator, oil level				1	1	1
111	276181	Indicator, oil level	1					
112	276110	Tube, oil level indicator		1	1	1	1	1
112	276180	Tube, oil level indicator	1					
114	X-6238-4	Screw, h.c.	3	3	3			
115	X-22-14	Washer, lock			1	1	1	1
116	276112	Starter Assembly		1	1	1	1	1
116	276175	Starter Assembly	1					
116	326101	Cover, starter (not shown)	1					
116	326872	Terminal (not shown)				1	1	1
116	X-6053-2	Nut, hex (not shown)					1	1
119	X-6238-5	Screw, h.c.		2	2		2	2
120	X-6238-6	Screw, h.c.		2	2		2	2
121	X-6265-2	Screw, h.c.		2	2		2	2
122	276390	Adapter Plate		1	1	1	1	1
123	326078	Adapter, generator	1					
124	276103	Flywheel		1	1	1	1	1
124	326095	Flywheel	1					
125	276104	Bolt, locking		6	6		6	6
125	276169	Bolt, locking	6					
126	X-6214-2	Cap, plastic					1	1
132	#	Nut, hex, 10-32		2	2			
133	291891	Solenoid, starter	1	1	1	1	1	1
136	X-22-12	Washer, shakeproof	2				2	2

Common hardware; procure locally.

Group 105: Engine, continued



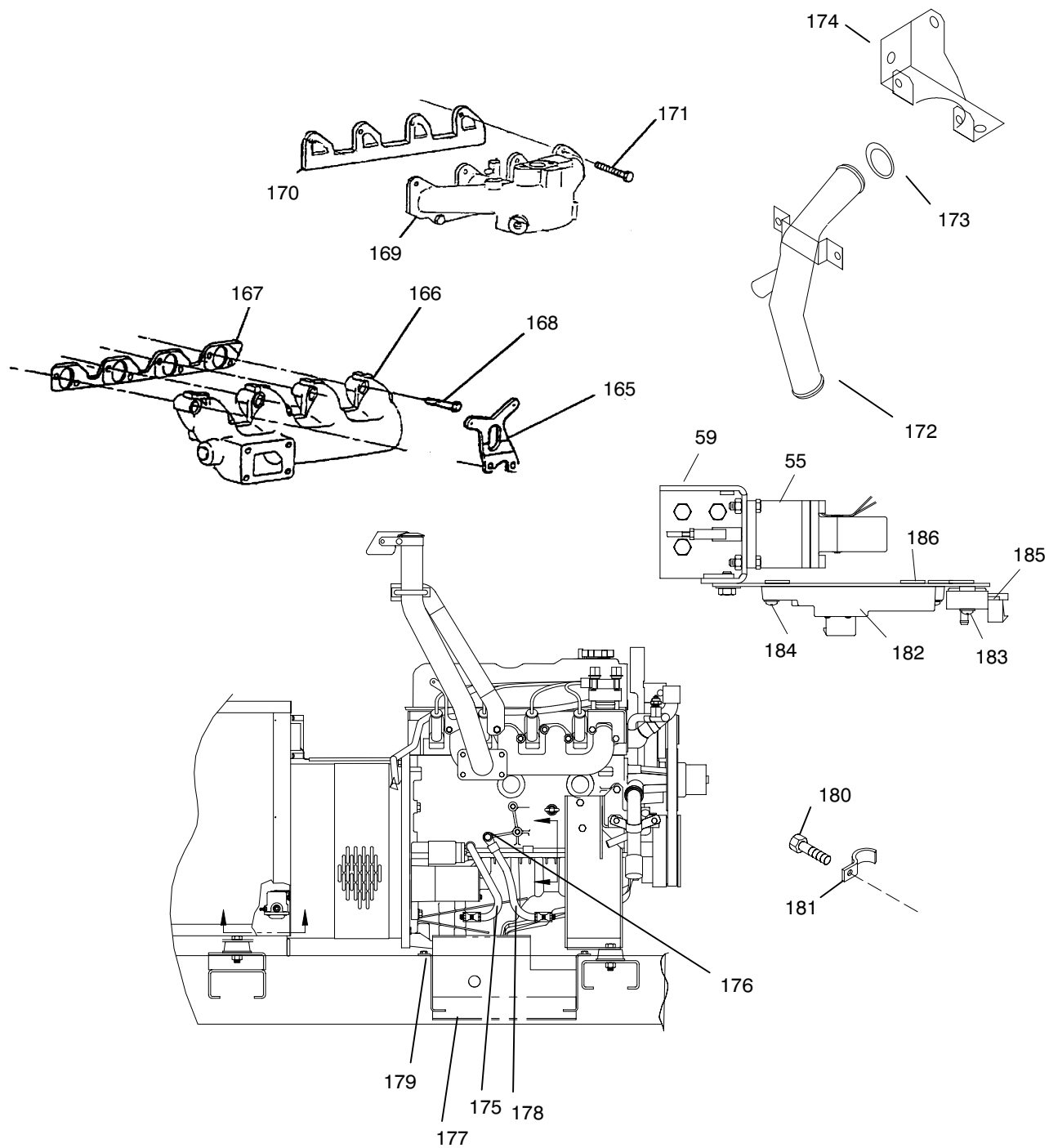
Serviced by engine manufacturer.
See Group 701—Literature for parts catalog
number.

5543105H

Group 105: Engine, continued

Item	Part Number	Description	Quantity					
			Variation No.					
			9	23	24	25	29	31
138	X-426-3	Clamp, hose		4	4			
139	X-577-37	Hose		1	1			
140	276123	Tee		1	1			
140	X-211-8	Elbow, street, 3/8 in. (not shown)		1	1			
141	X-577-38	Hose		1	1			
142	X-651-27	Hose, rubber		1	1			
143	X-426-9	Clamp, hose		4	4			
144	X-582-9	Connector, hose		2	2			
145	X-256-1	Valve, drain		1	1			
146	X-203-15	Tee, black iron		1	1			
147	X-426-9	Clamp, hose		2	2			
148	X-651-13	Hose, rubber		1	1			
149	X-6053-2	Nut, hex		2	2			
149	X-6210-10	Nut, hex	2					
150	X-22-5	Washer, shakeproof		2	2			
150	X-22-10	Washer, shakeproof	2					
151	X-6265-1	Screw		2	2			
151	X-55-29	Screw	2					
152	X-6054-11	Stud		2				
152	X-6054-6	Stud		2	2			
152	X-352-76	Stud	2					
153	276099	Adapter, carburetor			1			
153	276117	Adapter, carburetor		1				
153	276146	Adapter, carburetor	1					
154	276098	Gasket, carburetor to manifold		1	1			
154	276147	Gasket, carburetor to manifold	1					
155	X-386-74	Line, flexible			1			
155	X-386-106	Hose, breather				1		
155	X-391-35	Elbow (not shown)	1					
156	276121	Hose, crankcase vent			1			
157	276122	Regulator, crankcase vent			1			
158	X-651-23	Hose, rubber			1			
159	X-312-24	Hose		1				
164	279449	Oil Filter		1	1			

Group 105: Engine, continued



Group 105: Engine, continued

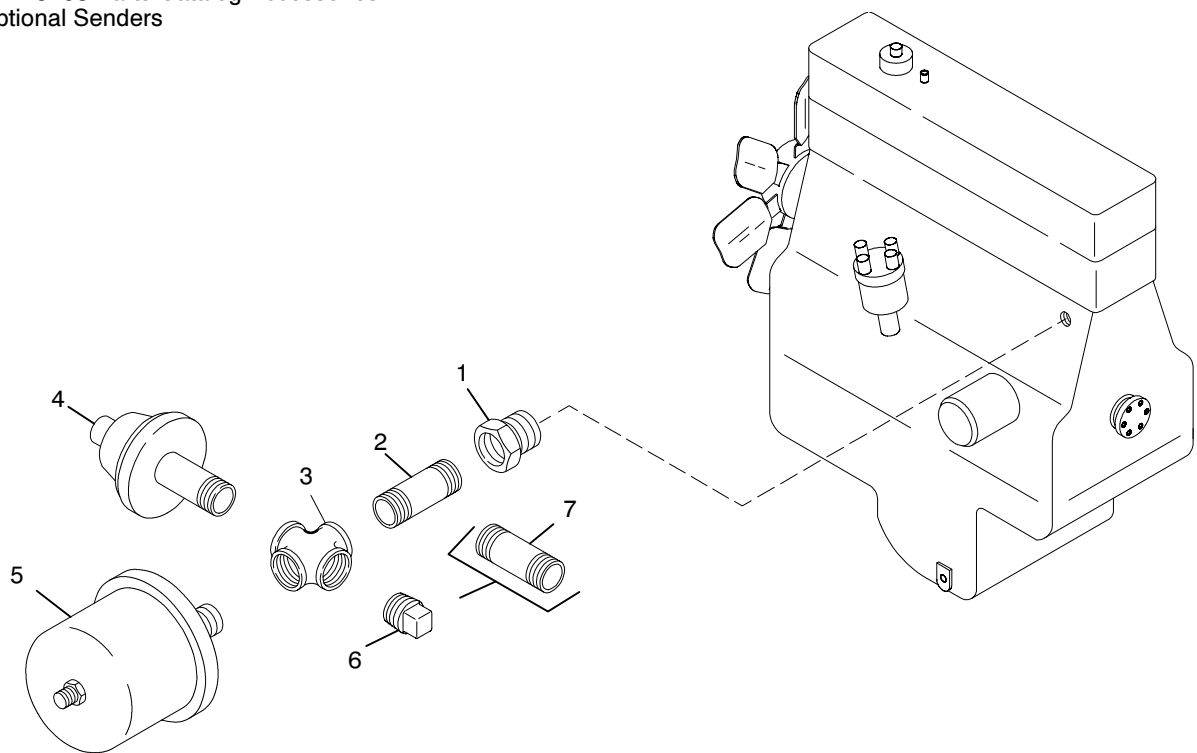
Item	Part Number	Description	Quantity			
			Variation No.			
			25	29	31	179-9
165	326596	Lifting Bracket	1	1	1	
166	326419	Exhaust Manifold	1	1	1	
167	326420	Gasket, exhaust manifold	1	1	1	
168	X-6051-9	Screw, hex head cap		6	6	
169	326416	Intake Manifold	1	1	1	
170	326417	Gasket, intake manifold	1	1	1	
171	X-6050-3	Screw		2	2	
171	X-6050-4	Screw		6	6	
172	326415	Water Tube Assembly	1			
172	326862	Water Tube Assembly		1	1	
173	326414	O-ring	1	1	1	
174	326355	Water Inlet Bracket	1	1	1	
175	X-545-98	Cable, battery negative		1	1	
176	X-6238-10	Screw, h.c.		1	1	
177	X-794-1	Screw, drill hex		2	2	
178	244723	Cable, battery positive		1	1	
178	GM20743	Boot, starter terminal (not shown)		1	1	
178	GM20748	Boot, battery, 90 deg. right (not shown)		1	1	
179	326864	Rack, battery		1	1	
179	256982	Clamp, battery (not shown)		1		
179	324033	Clamp, battery (not shown)			1	
180	X-6051-2	Screw, hex head cap		1	1	
181	X-672-31	Clamp		1	1	
182	GM28714	Module, ignition control			1	
183	GM17771	Manifold, air pressure module			1	
184	X-50-8	Screw, slotted head machine			3	
185	X-50-7	Screw, slotted head machine			2	
186	326858	Bracket, ignition module mtg.			1	

Group 107: Nameplate and Decals

Item	Part Number	Description	Quantity							
			Variation No.							
			13	14	15	16	24	GR1S	36	37
1	X-781-1	Rivet, pop		4		4				
2	Not available	Nameplate, serial number	4	4	4	4			4	4
3	238402	Decal, caution positive terminal only	1	1	1	1	1	1	1	1
4	246055	Tag, warning	1	1	1	1	1	1	1	1
5	254454	Foam, packing	2	2	2	2	2			
6	254455	Tag, hanging	1	1	1	1				
7	257438	Decal, danger (haz. volt./moving rotor)	3	3	3	3	1	3	3	3
8	259365	Decal, backfeed	1		1		1			
9	241067	Decal, instruction	1	1	1	1		1		
10	258815	Decal, warning, hazardous voltage	1	1	1	1	1	1	1	1
11	257437	Decal, warning, lifting sling method	1	1	1	1	1			
12	-	Decal, rating (See Parts Bulletin 97)	2	2	2	2	2	2	2	2
13	X-6301-1	Decal, DDC/MTU logo	2	2	2	2				
13	X-6301-3	Decal, DDC/MTU logo	1	1	1	1	1			
13	GM23477-3	Decal, DDC/MTU logo	1	1	1	1	1	2	2	2
14	X-6302-1	Decal, DDC/MTU torque symbol	1	1	1	1				
15	249809	Decal, warning, hot engine	1	1	1	1	1	2	1	1
16	239776	Decal, caution, lifting support	1			1				
17	257441	Decal, warning, unbalanced weight	1	1	1	1	1	1	2	2
18	255882	Decal, standby service	1			1				
19	274323	Decal, warning	1		1	1				
20	279958	Decal, warning, 600 volt connect.		1		1				1
20	GM13776	Decal, reconnection						1		
21	249808	Decal, rotating parts	1	1		1	1	1	1	1
22	249810	Decal, warning, hot coolant	1				1	1		
23	273780	Decal, warning, explosion						1		
24	GM20577	Decal, exhaust piping						1		
25	GM20811	Decal, fuel type						1		

Group 108: Oil Pressure Switch

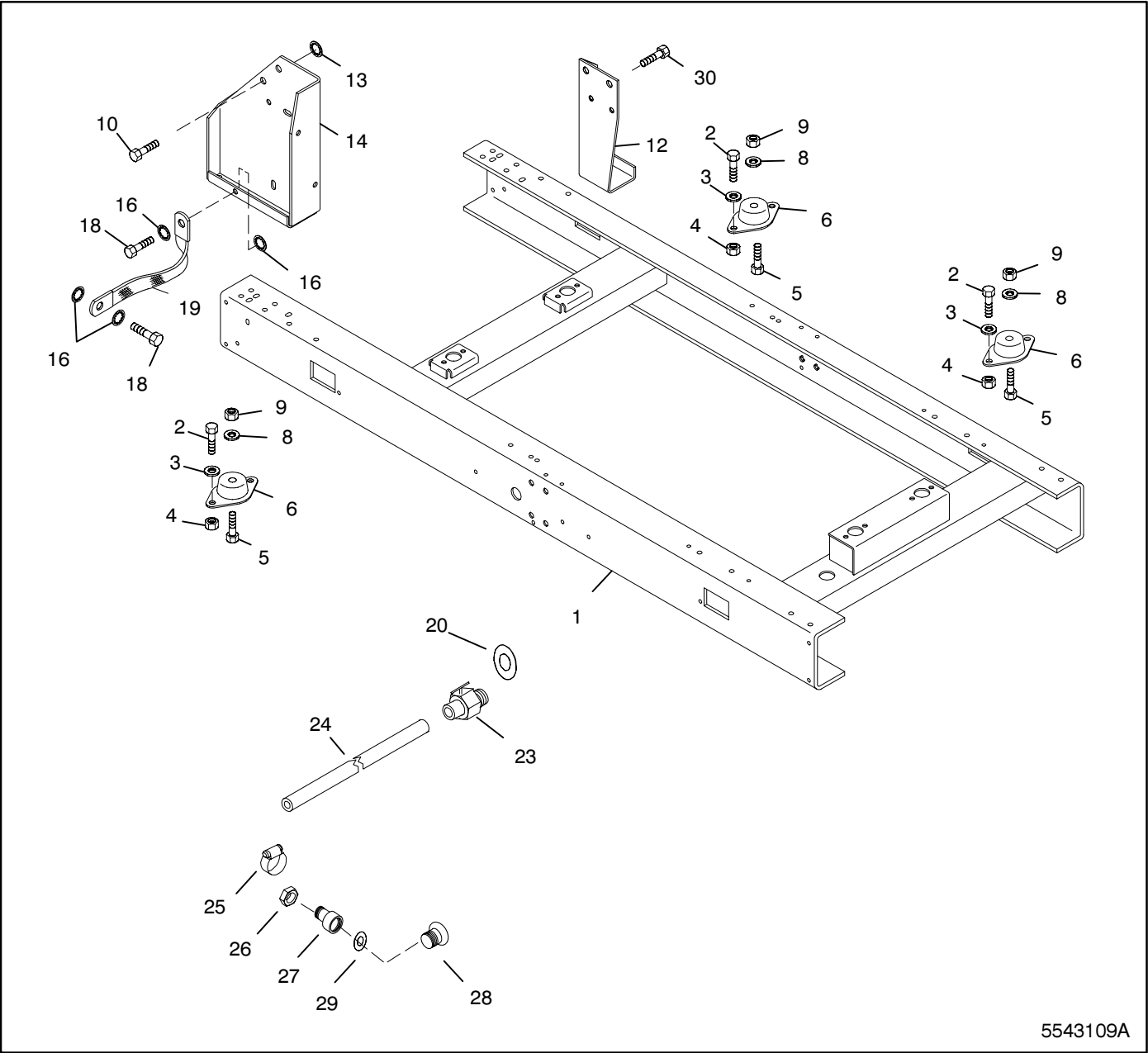
See MP-5708 Parts Catalog Accessories
for Optional Senders



5543108A

Item	Part Number	Description	Quantity					
			Variation No.					
			9	10	11	12	179-3	E29
1	A-106	Bushing, reducer	1	1	1	1	1	1
2	289055	Nipple, pipe	1	1	1		1	1
3	164037	Cross, pipe	1	1	1		1	1
4	328309	Switch, pressure	1	1	1	1	1	1
5	264390	Sender, oil pressure	1	1	1		1	1
6	X-75-1	Plug, pipe	1	1	1		1	1
7	296-5	Connector		1				
7	X-203-16	Tee, pipe, 1/8 x 1/8 x 1/8 in.		1				

Group 109: Skid and Plant Mounting



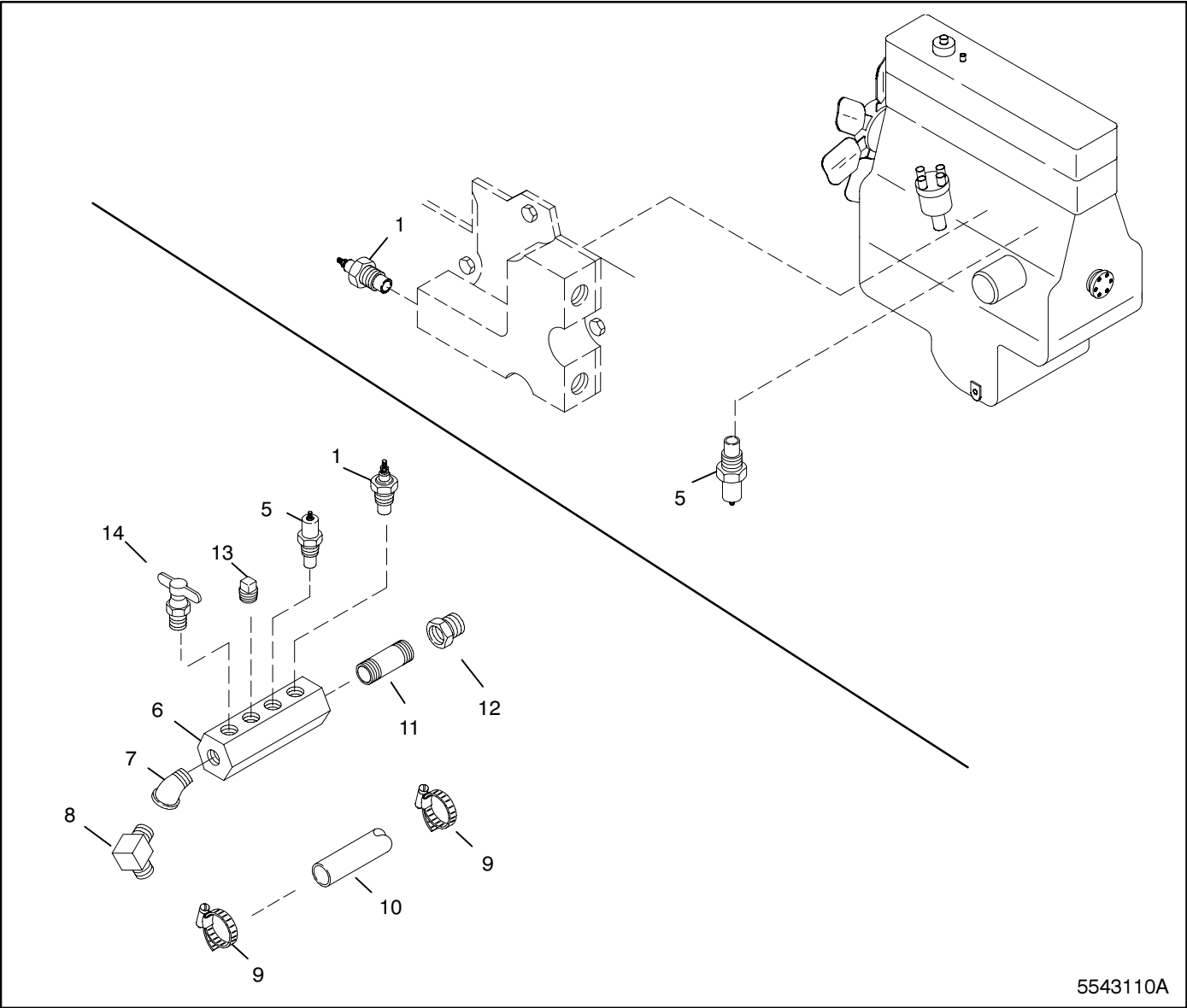
5543109A

Group 109: Skid and Plant Mounting, continued

Item	Part Number	Description	Quantity					
			Variation No.					
			9	10	15	179-2	179-3	333233
1	276301	Skid, engine mounting	1					
1	326313	Skid, engine mounting		1				
1	326866	Skid, engine mounting			1			1
1	326015	Skid, engine mounting				1	1	
2	#	Screw, h.c., 1/2-13	8					
2	#	Screw, 3/8-16		8	8	8	8	8
3	#	Washer, plain, 1/2 in.	8					
3	#	Washer, plain, 3/8 in.		8	8	8	8	8
4	#	Nut, hex, 1/2-13	8					
4	#	Nut, hex, 3/8-16		8	8	8	8	8
5	#	Screw, h.c., 1/2-13	4	4		4		
5	X-129-24	Screw			2			2
5	X-129-23	Screw			2			2
6	276476	Vibromount (engine end)	2	2	2			2
6	324073	Vibromount (engine end)				2	2	
6	324073	Vibromount (generator end)	2			2		
6	324074	Vibromount (generator end)		2	2			2
6	276309	Vibromount (generator end)					2	
8	X-25-140	Washer, plain	4	4	4	4	4	4
9	X-101-23	Nut, hex stop	4	4	4	4	4	4
10	X-6051-3	Screw, h.c.	4					
10	X-6051-24	Screw, h.c.		2				
10	X-6051-2	Screw, h.c.			1			1
10	X-6051-8	Screw, h.c.			1			1
11	X-22-14	Washer			2			2
12	276303	Support, engine (RS)	1					
12	326310	Support, engine (RS)		1	1			1
12	326017	Support, engine (RS)				1	1	
12	X-6024-2	Screw, h.c. (not shown)				4	4	
13	X-22-15	Washer, lock	4					
13	X-22-14	Washer, lock			1			1
13	X-22-16	Washer, lock			1			1
14	276302	Support, engine (LS)	1					
14	326311	Support, engine (LS)		1	1			1
14	326016	Support, engine (LS)				1	1	
14	X-400-209	Spacer (not shown)		2	2			2
16	X-22-16	Washer, lock, 5/16 in.	4	4	4	4	4	4
18	#	Hardware, 5/16-18	4	4	4	4	4	4
19	290418	Strap, ground	1	1	1	1	1	1
23	359300	Valve, oil drain			1			1
24	326921	Hose, molded			1			1
25	X-426-9	Clamp, hose			2			2
26	X-80-1	Nut, hex			1			1
27	254720	Adapter, hose			1			1
28	241062	Plug, drain			1			1
29	276552	Washer, nylon			1			1
30	X-6051-21	Screw			1			1

Common hardware; procure locally.

Group 110: Temperature Switch



5543110A

Item	Part Number	Description	Quantity			
			Variation No.			
			5	6	E29	179-3
1	255240	Sender, water temperature	1	1	1	
1	268298	Sender, water temperature				1
5	255241	Switch, high temperature	1			
5	326105	Switch, high temperature		1	1	
5	241308	Switch, high temperature				1
6	273659	Manifold, temperature switch				1
7	X-211-3	Elbow				1
8	X-391-33	Elbow, hose				1
9	X-426-3	Clamp, hose				1
10	X-312-23	Hose				1
11	X-209-2	Nipple, pipe, 1/2 x 1 3/16				1
12	X-202-41	Bushing, reducer				1
13	X-75-3	Plug, pipe				1
14	X-256-5	Valve, drain				1

Group 119: Recommended Spare Parts

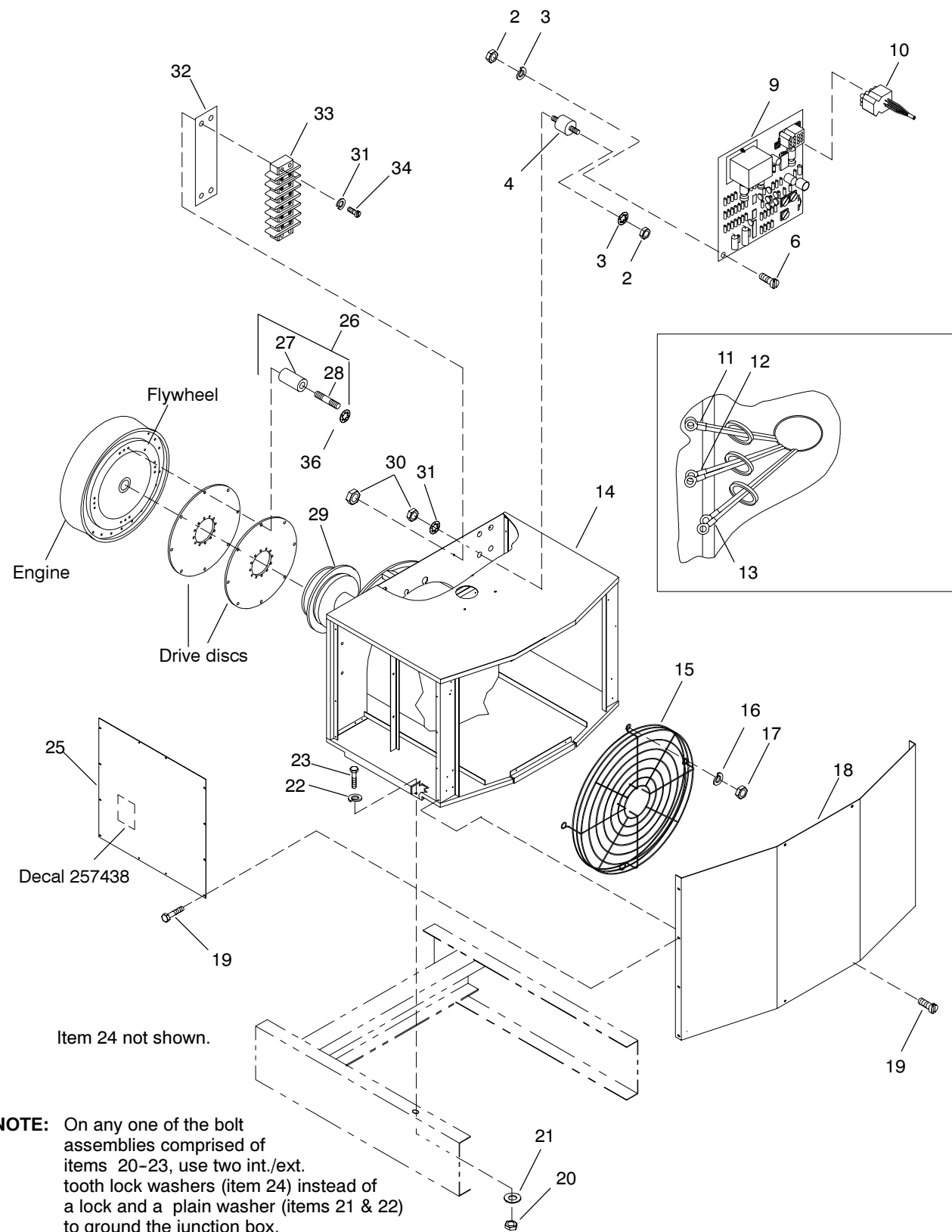
Item	Part Number	Description	Quantity							
			Variation No.							
			1	2	3	4	5	6	179-1	179-2
1	291207	Fuse, 1.5-amp	5	5			5		5	
2	243273	Fuse, 3-amp	5	5			5		5	
3	283645	Fuse, 15-amp	5	5			5		5	
4	See chart below	Main Circuit Board	1	1			1		1	
5	B-360418	Photo Board	1	1	1	1	1	1	1	1
6	B-258545	Split Activator	1	1	1	1	1	1	1	1
7	A-257099	LED Board	1	1	1	1	1	1	1	1
8	C-255670	Voltage Regulator	1	1	1	1	1	1	1	1
9	See chart below	Indicator Board	1	1			1		1	
10	241927	Speed Sensor	1	1			1		1	
11	255126	Bulb	5	5			5		5	
12	276287	Hose, upper radiator	1	1						
12	326356	Hose, upper radiator					1			
12	326004	Hose, upper radiator							1	
12	276288	Hose, lower radiator	1	1						
13	326357	Hose, lower radiator					1			
13	326003	Hose, lower radiator							1	
14	279450	Thermostat and seal	1	1	1	1	1	1		
14	276162	Thermostat							1	1
15	276148	Fan Belt	1	1	1	1				
15	326320	Fan Belt					1	1		
15	276142	Fan Belt (matched pair)							1	1
16	258423	Air Filter	4		4		4	4		
16	253107	Air Filter		4		4				
16	326099	Air Filter							4	4
17	279449	Oil Filter	8	8	8	8	8	8	8	8

Serial Number—Contingent Spare 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

Group 201: Generator and Mounting

20 kW, 30 kW



5543201E

EC, ED-255000

Group 201: Generator and Mounting, continued

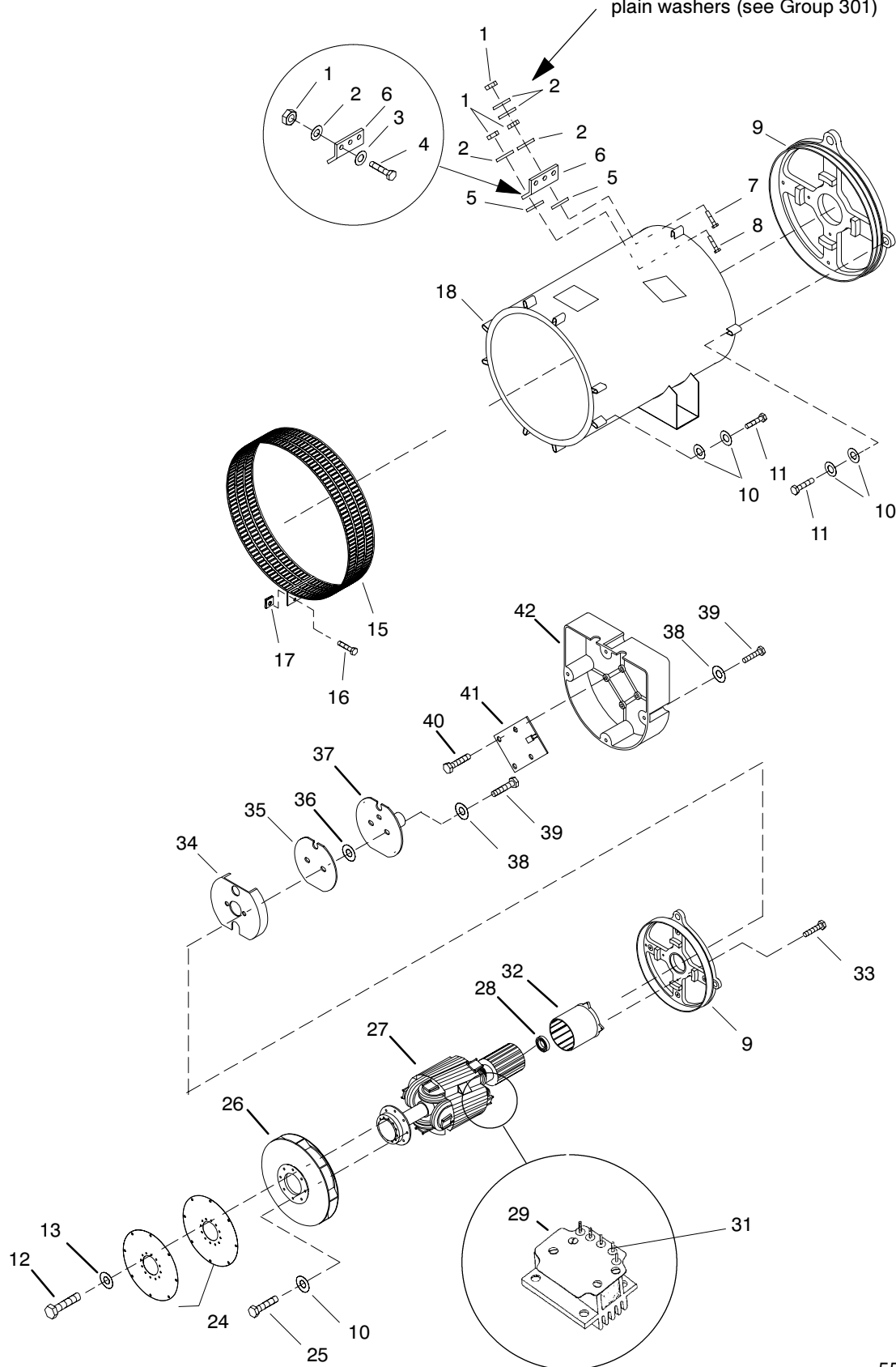
Item	Part Number	Description	Quantity													
			Variation No.													
			15	20	21	26	27	28	29	30	40	41	42	333234	333235	333236
2	X-72-4	Nut, hex				2	2	2	2	2	2	2	2	2	2	2
3	X-22-20	Washer, shakeproof	4			4	4	4	4	4						
4	282829	Vibromount	3													
4	360459	Standoff, circuit board		4	4	4	4	4	4	4	4	4	4	4	4	4
8	X-634-16	Bushing				1	1	1	1	1						
9	C-255670	Circuit Board, voltage regulator	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	255481	Harness, wiring	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	X-750-14	Tag, lead L1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	X-750-15	Tag, lead L2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	X-750-16	Tag, lead L3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	222823	Box, junction	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	274596	Guard, generator			1	1		1		1						
16	X-22-10	Washer, lock			4	4		4		4						
17	X-83-2	Nut, hex, 3/8-16			4	4		4		4						
18	222834	Cover, rear	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	X-6216-1	Screw, hex head	12	12	12	12	12	12	12	12	12	12	12	12	12	12
20	#	Nut, 3/8-16				8	8	8	8	8						
21	#	Washer, steel, 11/32 x 3/4 x 1				3	3	3	3	3						
22	#	Washer, lock, 3/8-16				3	3	3	3	3						
23	#	Screw, h.c., 3/8-16				4	4	4	4	4						
25	273429	Cover, side	2	2	2	2	2	2	2	2	2	2	2	2	2	2
24	X-22-16	Washer, lock, 5/16 in. (see note)	2	2	2	2	2	2	2	2	2	2	2	2	2	2
25	222833	Cover, side	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	257498	Hardware Kit, enging attach. (includes items 27 and 28)				1	1	1	1	1	1	1	1	1	1	1
27	X-400-132	Spacer				6	6	6	6	6	6	6	6	6	6	6
27	X-400-75	Spacer	8	8	8											
28	X-352-63	Stud				6	6	6	6	6	6	6	6	6	6	6
28	X-6238-27	Screw	8	8	8											
	B-257775	Alternator Assembly (includes items 1-42 shown on following pages)														
29	B-276411	Alternator Assembly				1						1			1	
29	A-276412	Alternator Assembly					1									
29	B-276414	Alternator Assembly						1								
29	B-276410	Alternator Assembly							1		1			1		
29	B-276413	Alternator Assembly								1			1			1
29	A-326080	Alternator Assembly	1													
29	A-326374	Alternator Assembly		1												
29	A-326375	Alternator Assembly			1											
30	#	Nut, hex, 8-32				5	5	5	5	5	5	5	5	5	5	5
31	X-22-7	Washer, lock, #8	4	8	8	8	8	8	8	8	8	8	8	8	8	8
32	255080	Marker, strip	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	295314	Block, terminal	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	X-51-11	Screw, r.h.m.	2	2	2	2	2	2	2	2	2	2	2	2	2	2
35	276307	Bracket, junction box				2	2	2	2	2	2	2	2	2	2	2
35	326581	Bracket, junction box	2	2	2											
36	X-801-3	Washer, hardened				6	6	6	6	6	6	6	6	6	6	6

Common hardware; procure locally.

Group 201: Generator and Mounting, continued

20 kW, 30 kW

Controller ground is strap located between plain washers (see Group 301)



5543201

Group 201: Generator and Mounting, continued

Item	Part Number	Description	Quantity													
			Variation No.													
			15	20	21	26	27	28	29	30	40	41	42	333234	333235	333236
1	X-6234-1	Nut, hex	6	6	6	6	6	6	6	6	6	6	6	6	6	6
2	X-25-136	Washer		5	5											
2	X-25-133	Washer	5			5	5				5	5	5	5	5	5
3	X-6086-16	Washer, spring	5	6	6	5	5	5	5	5	5	5	5	5	5	5
4	X-465-23	Screw, h.c.	3			3	3	3	3	3	3	3	3	3	3	3
5	X-22-44	Washer	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6	257986	Terminal, lead	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	X-791-8	Screw, h.c.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	X-791-5	Screw, h.c.				1										
8	X-465-22	Screw, h.c.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	257984	Bracket, end	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	X-25-93	Washer, plain	20	20	20	14	14	14	14	14	14	14	14	14	14	14
11	X-6238-6	Screw, h.c.	6	6	6	6	6	6	6	6	6	6	6	6	6	6
15	326143	Guard, generator fan	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	X-67-125	Screw, self-tapping	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	257442	Clip, speed	2	2	2	2	2	2	2	2	2	2	2	2	2	2
18	276406	Stator Assembly				1						1			1	
18	276407	Stator Assembly					1									
18	276409	Stator Assembly						1								
18	276405	Stator Assembly							1		1			1		
18	276408	Stator Assembly								1			1			1
18	326086	Stator Assembly	1													
18	326372	Stator Assembly		1												
18	326371	Stator Assembly			1											
21	X-6238-6	Screw, h.c.				6	6	6	6	6	6	6	6	6	6	6
22	270956	Screw, h.c.	8	8	8	8	8	8	8	8	8	8	8	8	8	8
23	X-801-3	Washer, hardened	8	8	8	8	8	8	8	8	8	8	8	8	8	8
24	257014	Disc, armature drive				2	2	2	2	2	2	2	2	2	2	2
24	257015	Disc, armature drive	2	2	2	2	2	2	2	2	2	2	2			
25	X-6238-11	Screw, h.c.	4	4	4	4	4	4	4	4	4	4	4	4	4	4
26	257020	Fan, generator	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	A-258817	Rotor Assembly	1			1		1				1			1	
27	A-326271	Rotor Assembly					1								1	
27	A-258981	Rotor Assembly							1	1	1		1	1		1
27	A-326089	Rotor Assembly	1													
27	A-326373	Rotor Assembly		1	1											
28	X-758-2	Bearing	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	B-258545	SCR Assembly	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	X-101-24	Nut	5	5	5											
30	X-101-22	Nut				5	5	5	5	5	5	5	5	5	5	5
31	X-283-7	Terminal	4	4	4	4	4	4	4	4	4	4	4	4	4	4
32	257080	Exciter Assembly	1	1	1	1		1	1	1	1	1	1	1	1	1
32	257081	Exciter Assembly					1									
33	X-125-34	Screw, h.c.	4	4	4	4	4	4	4	4	4	4	4	4	4	4
34	257007	Actuator, magnetic	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35	257850	Insulator	1	1	1	1	1	1	1	1	1	1	1	1	1	1
36	243321	Washer, insulating	2	2	2	2	2	2	2	2	2	2	2	2	2	2
37	B-360418	Circuit Board, split activator	1	1	1	1	1	1	1	1	1	1	1	1	1	1
38	X-22-9	Washer, lock	6	6	6	6	6	6	6	6	6	6	6	6	6	6
39	X-117-5	Screw, h.c.	6	6	6	6	6	6	6	6	6	6	6	6	6	6
40	X-6071-1	Screw, washer head	4	4	4	4	4	4	4	4	4	4	4	4	4	4
41	A-257099	Circuit Board, LED	1	1	1	1	1	1	1	1	1	1	1	1	1	1
42	257258	Cover, circuit board	1	1	1	1	1	1	1	1	1	1	1	1	1	1
43	X-6238-6	Screw, hex cap	4	4	4		4									
43	273736	Screw, hex cap				4		4	4	4	4	4	4	4	4	4

Common hardware; procure locally.

Group 701: Literature

Item	Part Number	Description	Quantity			
			Variation No.			
			11	13	19	21
1	MP-5700	Installation Manual, industrial	1	1	1	1
2	MP-5543	Parts Catalog, 20/30GS	1	1	1	1
2	MP-5172	Parts Catalog, Ford LSG-423 engine	1			
2	TP-5743	Parts Catalog, 18-20 Ford LRG-423 engine		1		
2	MP-5708	Parts Catalog, 20-100GS accessories	1	1	1	1
2	TP-5939	Parts Catalog, Ford LRG-425 engine			1	
2	TP-5186	Parts Catalog, Ford CSG-649 engine				1
3	MP-5184	Service Manual, Ford LSG-423 engine	1			
3	MP-5744	Service Manual, 18-20 LSG-423 engine		1		
3	TP-5940	Service Manual, Ford LRG-425 engine			1	
3	TP-5185	Service Manual, Ford CSG-649 engine				1
3	MP-5353	Service Manual, 20-300DS, 20-100GS	1	1	1	1
4	TP-5208	Operation Manual, Ford LSG-423 engine	1			
4	TP-5742	Operation Manual, 18/20 LRG-423 engine		1		
4	TP-5938	Operation Manual, Ford LRG-425 engine			1	
4	TP-5151	Operation Manual, Ford CSG-649 engine				1
4	MP-5750	Operation Manual, 20-2000 kW	1	1	1	1
5	MP-5719	Wiring Diagrams, 20-100 kW		1	1	1

	20GS	30GS
Controllers, Optional (Group 301)		
Manual	333007	325149
Manual, 600 V	325150	325150
Basic Controllers	See MP-6009 for parts lists	
16-Light Controllers	See MP-6009 for parts lists	
Digital Controllers	See MP-6009 for parts lists	
Cooling System Accessories (Group 104)		
Cooling, city water	326102	326440
	326177	326117
Cooling, radiator 50°C ambient	333036	333017
Cooling, radiator 40°C ambient	N/A	333016
	333019	333020
Cooling, remote radiator	326441	326103
	326178	326178
Duct Flange, radiator	324205	326205
	324203	324203
Heater, block		
110-120 Volt	326447	326232
	326038	326230
190-208/220-240 Volt	326448	326233
	326039	326231

Kit List, continued

	20GS	30GS
Fuel System Accessories (Group 103)		
Bypass, manual valve & gas solenoid	255634	326094 255634
Changeover, automatic (nat. gas/LP gas)	326442 326179	326611
Changeover, manual (LP gas to gasoline)	326443 256993	326068
Fuel Line,flexible gas	PA-255177-SD	PA-255177-SD
Fuel Line, flexible gasoline	276284	276285
Fuel Pump, electric	324405	324405
Gas Solenoid Valve (additional)	326127	326127
Gasoline Fuel System	326444 326050	326093
LP Gas Fuel System	326425 276432	326594 276431
LP Gas Liquid Withdrawal	326445 326180	326612 326181
Natural Gas Fuel System	326425 276432	326594 276430
Strainer, gas	290276	290276
Paint and Miscellaneous Parts		
12 oz. Can Gray Spray Paint	221331	221331
Gallon Can Gray Spray Paint	221322	221332
Touch-up Paint	GM19491	GM19491

Manual Controller Kits

Manual Controller Kit Parts					
Qty.	Description	Common	Kit Number/Unique Parts		
			325149	325150	333007
1	Controller Assembly*		A-325108	A-325107	A-325106
4	Washer, lock, 5/16	X-22-16			
1	Terminal	X-283-8			
1	Conduit, convoluted			X-6003-17	
1	Screw, drill hex	X-794-1			
1	Harness, wiring	255040			
3	Transformer, current		259360	259793	259359
1	Bracket, CT mounting	276417			
1	Water Level Switch	336656			

* See Controller Assembly section for parts list.

Manual Controller Assemblies

Qty.	Description	Common Parts	Manual Controller Assembly Number/Unique Parts		
			A-324106	A-324107	A-324108
1	Potentiometer Assembly	A-255041			
1	Overspeed Circuit Board	A-249812			
1	Main Circuit Board	F-239563			
1	Washer, shakeproof, #10	X-22-13			
4	Washer, lock, #6	X-22-6			
1	Grommet	X-284-31			
1	Plug, button	X-301-34			
2	Terminal	X-431-25			
2	Terminal	X-431-29			
2	Screw, r.h.m., 6-32 x 3/8	X-49-2			
18	Screw, r.h.m., 6-32 x 1/4	X-49-25			
2	Screw, pan head	X-49-39			
4	Screw, r.h.m., 10-24 x 3/4	X-50-3			
1	Screw, r.h.m., 10-24 x 1	X-50-7			
2	Screw, r.h.m., 8-32 x 3/8	X-51-12			
2	Screw, r.h.m.	X-51-53			
1	Strap, ground	X-6046-2			
1	Jumper	X-6048-2			
10	Screw, hex head	X-6216-1			
2	Screw, thread-forming	X-67-127			
1	Sleeve	X-696-5			
1	Tab, identification	201620-86			
1	Fuse, 10-amp	223316			
1	Holder, fuse	238426			
1	Hourmeter	238736			
1	Terminal	238898			
1	Block, terminal	246115			
1	Switch, rocker	249406			
1	Voltmeter	253329			
2	Lamp, meter scale	253332			
2	Lamp	291740			
1	Lamp	269373			
1	Plate, hinge	273376			
1	Harness, controller	274710			
1	Voltmeter, AC		282814	282815	282814
1	Gauge, oil pressure	282897			
1	Gauge, water temperature	282898			
1	Ammeter		285934	285934	295337
2	Socket, lamp	284990			
8	Spacer, circuit board	287948			
3	Fuse, 1.5-amp	291207			
1	Decal	292347			
1	Resistor				
1	Decal	292361			
1	Switch, selector		292373	292374	292373
1	Holder, fuse	292821			
1	Marker, strip	292823			
1	Bumper	292834			
1	Meter, frequency	295069			
1	Transformer, controller	295281			
1	Cover, controller	325003		325072	
1	Decal, selector switch				
1	Box, controller	324140			

Cooling System Kits

Qty.	Description	Part No.
Cooling System, City Water		326177
3	Adapter	X-570-17
1	Adapter, hose	X-570-21
1	Hose, radiator	X-6014-59
1	Screw, HC	X-6051-12
2	Clamp	X-672-10
3	Elbow, 90°, 1 1/2	151771
3	Nipple, pipe, 1 1/2 x 1 3/4	155040
1	Bushing, reducer	160212
2	Bushing, reducer, 1/2	168848
2	Clamp, hose	249888
1	Cap, pressure	258037
1	Tank, expansion	274645
1	Hose, upper radiator	276287
1	Regulator, water	290176
1	Exchanger, heat	326160
1	Guard, belt (top)	326261
1	Guard, belt (left)	326262
1	Guard, belt (right)	326263
1	Guard, belt (cover)	326264
1	Bracket, mounting	326265
1	Bracket, mounting	326266
2	Bracket, mounting	326267
1	Hose, molded	326288
2	Support, surge tank	326289
1	Support, top	326290
2	Bracket, support	326290
Cooling System, City Water		326102
1	Valve, solenoid, 5/8, 12-volt	X-350-7
1	Line, fuel	X-386-36
2	Clamp, hose	X-426-4
2	Clamp, hose	X-426-6
3	Adapter	X-570-17
1	Hose, radiator	X-6014-10
1	Clamp	X-672-10
4	Elbow, 90°	151771
1	Bushing, 2 1/16 x 1 1/4	153016
3	Nipple, pipe, 1 1/2 x 1 3/4	155040
2	Bushing, reducer, 1/2	168848
2	Clamp, hose	249887
1	Hose, radiator	255172
1	Bracket, expansion tank	255325
1	Guard, belt	255326
1	Cap, pressure	258037
2	Decal, water drain	280561
3	Adapter, hose	285685
1	Regulator, water	290176
1	Tank, expansion	291457
1	Hose, upper radiator	326004
2	Bracket, heat exchanger	326124
1	Guard, belt	326125
1	Guard, belt	326126
1	Exchanger, heat	326160
2	Plate, heat exchanger	326166
1	Guard, belt	326215

Qty.	Description	Part No.
Cooling System, City Water		326440
1	Bushing, reducer	X-202-45
2	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, street, 1/2	X-211-1
1	Coupling, pipe, 3/8	X-216-23
3	Valve, drain, 3/8	X-256-1
1	Clamp, hose, 1/2	X-309-14
1	Valve, solenoid, 5/8, 12-volt	X-350-7
1	Line, fuel	X-386-36
2	Clamp, hose	X-426-3
2	Clamp, hose	X-426-4
3	Adapter	X-570-17
1	Hose, radiator	X-6014-59
1	Hose, radiator	X-6014-77
1	Clamp	X-672-10
4	Elbow, 90°	151771
4	Nipple, pipe, 1 1/2 x 1 3/4	155040
2	Bushing, reducer, 1/2	168848
4	Clamp, hose	249888
1	Cap, pressure	258037
1	Tank, expansion	274645
1	Regulator, water	290176
1	Exchanger, heat	326160
2	Bracket, mounting	326287
2	Support, surge tank	326289
1	Support, top surge tank	326290
2	Bracket, support	326291
1	Hose, bypass	326295
1	Bracket, mounting top	326449
1	Bracket, mounting right	326469
1	Bracket, mounting left	326470
1	Guard, belt right	326578
1	Guard, belt left	326579
1	Guard, belt bottom	326580
1	Guard, belt top	326581
1	Guard, belt cover	326582
1	Hose, upper	326583
1	Bracket, support	326610

Cooling System Kits, continued

Qty.	Description	Part No.
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Cooling System, Radiator

333019

1	Radiator Assembly	A-326021
1	Cap, radiator	224358
4	Washer, plain	X-25-73
1	Valve, drain, 3/8	X-256-1
1	Valve, drain, 1/4	X-256-3
2	Clamp, hose, 1.375 x 2.100	X-426-4
2	Clamp, hose, 1 15/16	X-426-8
4	Screw, HC	X-6068-4
5	Screw, crimpite	X-6216-1
4	Washer, hardened	X-801-4
1	Shroud, fan	226334
1	Switch Assembly, level	273404
1	Spacer, pulley to fan	276102
1	Hose, upper radiator	276287
1	Hose, lower radiator	276288
1	Fan, pusher	276479
1	Guard, radiator	276491
1	Support, radiator	276492
1	Support, radiator	276493
1	Guard, wire fan	326106
1	Guard, belt (right)	326109
1	Guard, belt (left)	326110
1	Guard, belt (top)	326111

Cooling System, Radiator

333020

1	Radiator Assembly	A-276304
1	Cap, radiator	224358
4	Washer, plain	X-25-73
1	Valve, drain, 3/8	X-256-1
1	Valve, drain, 1/4	X-256-3
2	Clamp, hose, 1.375 x 2.100	X-426-4
2	Clamp, hose, 1 15/16	X-426-8
4	Screw, HC	X-6068-4
5	Screw, crimpite	X-6216-1
4	Washer, hardened	X-801-4
1	Shroud, fan	226334
1	Switch Assembly, level	273404
1	Spacer, pulley to fan	276102
1	Hose, upper radiator	276287
1	Hose, lower radiator	276288
1	Fan, pusher	276387
1	Guard, radiator	276491
1	Support, radiator	276492
1	Support, radiator	276493
1	Guard, wire fan	326106
1	Guard, belt (right)	326109
1	Guard, belt (left)	326110
1	Guard, belt (top)	326111

Qty.	Description	Part No.
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Cooling System, Radiator 40 Ambient

333016

See Group 104, variation 179-11 for parts listing.

Cooling System, Radiator 50 Ambient

336017

1	Radiator Assembly	A-326018
1	Valve, drain, 1/4	X-256-3
2	Clamp, hose, 1.375 x 2.10	X-426-4
2	Clamp, hose, 1 9/16 x 2 1/2	X-426-6
4	Washer, hardened	X-801-3
1	Sensor, low fluid	365289
4	Spacer, radiator support	273911
1	Fan Shroud	324039
1	Support, radiator left	326001
1	Support, radiator right	326002
1	Hose, lower radiator	326003
1	Hose, upper radiator	326004
1	Guard, wire fan	326006
1	Guard, belt left	326007
1	Guard, belt right	326008
1	Guard, belt top	326009
1	Spacer	326010
1	Fan	326011
1	Bracket, belt guard	326144

Cooling System, Radiator 50 Ambient

333036

See Group 104, variation 17 for parts listing.

Cooling System, Remote Radiator

326103

1	Hose	X-312-16
2	Clamp, hose	X-426-6
1	Hose, radiator	X-6014-45
1	Hose, 2 x 8	X-6014-8
2	Clamp, hose	249888
1	Bracket, expansion tank	255325
1	Guard, belt	255326
1	Hose, lower radiator	326003
1	Guard, belt	326125
1	Guard, belt	326126
1	Guard, belt	326215

Cooling System, Remote Radiator

326178

1	Valve, drain, 3/8	X-256-1
2	Clamp, hose, 1.375 x 2.100	X-426-4
2	Clamp, hose, 1 15/16	X-426-8
1	Hose, upper radiator	276287
1	Hose, lower radiator	276288
1	Bracket, mounting	326265
1	Bracket, mounting	326270
1	Guard, belt (right)	326263
1	Guard, belt (left)	326262
1	Guard, belt (top)	326261
1	Guard, belt (cover)	326264

Cooling System Kits, continued

Qty.	Description	Part No.
Cooling System, Remote Radiator		326441
2	Clamp, hose, 1.375 x 2.10	X-426-2
3	Clamp, hose, 1.375 x 2.10	X-426-4
1	Clamp, hose	X-426-6
1	Hose, upper	326356
1	Hose, lower	326357
1	Hose, bypass	326395
1	Bracket, mounting (top)	326449
1	Bracket, mounting (right)	326469
1	Bracket, mounting (left)	326470
1	Guard, belt (right)	326578
1	Guard, belt (left)	326579
1	Guard, belt (bottom)	326580
1	Guard, belt (top)	326581
1	Guard, belt (cover)	326582

Duct Flange, Radiator		324203
8	Rivet, pop	X-781-11
6	Screw, drill hex	X-794-1
2	Frame, air duct	324199
2	Frame, air duct	324201

Duct Flange, Radiator		324205
8	Rivet, pop	X-781-11
6	Screw, drill hex	X-794-1
2	Frame, air duct	324200
2	Frame, air duct	324201

Qty.	Description	Part No.
Heater, Block		326038
2	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, 1/2 x 1 3/16	X-209-2
1	Hose	X-312-18
1	Hose	X-312-34
6	Clamp, hose	X-426-10
2	Connector, hose	X-582-1
2	Screw, HHC	X-6051-2
1	Clamp, insulated	X-672-20
1	Plug, pipe, 1/2	X-75-28
1	Hose, molded	276206
2	Plug, freeze	276212
1	Tag, hang	279047
1	Bracket, block heater	326219
1	Heater, block	326222
1	Shield, heat	326225

Heater, Block		326039
2	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, 1/2 x 1 3/16	X-209-2
1	Hose	X-312-18
1	Hose	X-312-34
6	Clamp, hose	X-426-10
2	Connector, hose	X-582-1
2	Screw, HHC	X-6051-2
1	Clamp, insulated	X-672-20
1	Plug, pipe, 1/2	X-75-28
1	Hose, molded	276206
2	Plug, freeze	276212
1	Tag, hang	279047
1	Bracket, block heater	326219
1	Heater, block	326224
1	Shield, heat	326225

Cooling System Kits, continued

Qty.	Description	Part No.
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Heater, Block

326230

1	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, 1/2 x 1 3/16	X-209-2
1	Hose	X-312-18
1	Hose	X-312-34
6	Clamp, hose	X-426-10
2	Connector, hose	X-582-1
1	Clamp, insulated	X-672-20
1	Plug, pipe, 1/2	X-75-28
1	Hose, molded	276206
2	Plug, freeze	276212
1	Tag, hang	279047
1	Bracket, block heater	326219
1	Heater, block	326222
1	Shield, heat	326227

Heater, Block

326231

1	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, 1/2 x 1 3/16	X-209-2
1	Hose	X-312-18
1	Hose	X-312-34
6	Clamp, hose	X-426-10
2	Connector, hose	X-582-1
1	Clamp, insulated	X-672-20
1	Plug, pipe, 1/2	X-75-28
1	Hose, molded	276206
2	Plug, freeze	276212
1	Tag, hang	279047
1	Bracket, block heater	326219
1	Heater, block	326224
1	Shield, heat	326227

Heater, Block

326232

2	Bushing, reducer	X-202-41
1	Nipple, pipe, 1/2 x 3	X-209-11
1	Nipple, pipe, 1/2 x 2 1/2	X-209-3
2	Elbow, pipe, 1/2	X-215-1
1	Hose	X-312-17
1	Hose	X-312-51
1	Spacer	X-400-201
4	Clamp, hose	X-426-10
2	Connector, hose	X-582-1
2	Plug, freeze	276215
1	Bracket, support	276351
1	Bracket, block heater mounting	326219
1	Heater, block	326228
1	Shield, heat	326236
1	Plug, freeze	326307

Qty.	Description	Part No.
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Heater, Block

326233

2	Bushing, reducer	X-202-41
1	Nipple, pipe, 1/2 x 3	X-209-11
2	Elbow, pipe, 1/2	X-215-1
1	Hose	X-312-17
1	Hose	X-312-51
1	Spacer	X-400-201
4	Clamp, hose	X-426-10
2	Connector, hose	X-582-1
2	Plug, freeze	276215
1	Bracket, support	276351
1	Bracket, block heater mounting	326219
1	Heater, block	326229
1	Shield, heat	326236
1	Plug, freeze	326307

Heater, Block

326447

1	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, pipe, 1/2 x 1 3/16	X-209-2
1	Elbow, 45°, 1/2	X-225-17
1	Nipple, pipe, 1/4 x 7/8	X-220-5
2	Hose	X-312-34
1	Hose	X-312-45
6	Clamp, hose	X-426-10
1	Connector, hose	X-582-1
1	Connector, hose	X-582-22
1	Plug, freeze	276212
1	Bracket, mounting	326219
1	Heater, block	326222

Heater, Block

326448

1	Tee, pipe, 1/4	A-110
1	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, pipe, 1/2 x 1 3/16	X-209-2
1	Elbow, 45°, 1/2	X-225-17
1	Nipple, pipe, 1/4 x 7/8	X-220-5
2	Hose	X-312-34
1	Hose	X-312-45
6	Clamp, hose	X-426-10
1	Connector, hose	X-582-1
1	Connector, hose	X-582-22
1	Plug, freeze	276212
1	Bracket, mounting	326219
1	Heater, block	326224

Fuel System Kits

Qty.	Description	Kit/Part No.
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Bypass, Manual Valve and Gas Solenoid

Bypass, Manual Valve and Gas Solenoid 255634		
2	Tee, pipe 3/4	A-108
1	Elbow	SA-472
1	Nipple, pipe, 3/4 x 2	X-206-2
1	Nipple, pipe	X-206-4
2	Nipple, pipe	X-206-9
1	Elbow, pipe, 3/4	X-215-2
1	Line, flexible fuel, 3/4 x 12	X-504-2
1	Bracket, fuel valve	254456
1	Valve	255632

Bypass, Manual Valve and Gas Solenoid 326094		
1	Pipe, 3/4 x 4	A-107
2	Tee, pipe, 3/4	A-108
1	Nipple, pipe	X-206-4
3	Nipple, pipe	X-206-9
1	Elbow, pipe, 3/4	X-215-2
1	Bolt, U, 5/16-18 x 1 1/2	X-397-1
1	Line, flex. fuel, 3/4 x 12	X-504-2
1	Bracket, fuel valve	254456
1	Valve	255632

Changeover, Automatic (LP Gas/Natural Gas)

Changeover, Automatic 326179		
2	Tee, pipe, 3/4	A-108
1	Bushing, reducer, 1/8	A-106
1	Bushing, reducer, 3/4	X-202-1
1	Bushing, reducer, 3/8	X-202-23
1	Bushing, reducer	X-202-39
1	Nipple, pipe, 3/8	X-204-9
1	Nipple, pipe	X-206-2
1	Nipple, pipe	X-206-4
5	Nipple, pipe	X-206-9
2	Elbow, pipe, 3/4	X-215-2
1	Coupling, pipe, 3/4	X-216-13
1	Nipple, pipe, 1/8 x 3/4	X-217-6
1	Label, "natural gas"	X-543-3
1	Elbow, street, 1/8 x 1/8	X-555-2
1	Valve, gas	244621
1	Relay	245748
1	Carburetor Assembly	254983
1	Line, flexible fuel	276395
1	Label, "LP gas"	285623
1	Switch, vacuum	287387
2	Regulator, pressure	291259
1	Bracket, fuel	326065
1	Valve, line load	326077
1	Line, flexible fuel	326260
1	Harness, wiring	326267

Qty.	Description	Kit/Part No.
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Changeover, Automatic 326442		
2	Tee, pipe, 3/4	A-108
1	Bushing, reducer, 1/8	A-106
2	Bushing, reducer, 3/4	X-202-1
1	Bushing, reducer	X-202-39
1	Bushing, reducer	X-202-41
1	Nipple, pipe	X-206-4
7	Nipple, pipe	X-206-9
2	Nipple, 1/2 x 1 3/16	X-209-2
2	Elbow, pipe, 1/2	X-215-1
1	Nipple, pipe, 1/8 x 3/4	X-217-6
1	Elbow, 45°, 3/4	X-225-8
1	Label, "natural gas"	X-543-3
2	Valve, gas	244621
1	Relay	245748
1	Carburetor Assembly	A-326319
1	Label, "LP gas"	285623
1	Switch, vacuum	287387
2	Regulator, pressure	291259
1	Bracket, fuel	GM11473
1	Valve, line load	326077
1	Line, flexible fuel	326260
1	Harness, wiring	326267

Changeover, Automatic 326611		
2	Tee, pipe, 3/4	A-108
1	Fitting, elbow, 45 degree	X-225-8
1	Nipple, pipe	X-206-4
2	Bushing, reducer, 3/4	X-202-1
1	Bushing, reducer	X-202-56
1	Bushing, reducer	X-202-41
8	Nipple, pipe	X-206-9
2	Nipple, 1/2 x 2 1/2	X-209-3
3	Elbow, pipe, 1/2	X-215-2
1	Nipple, pipe, 1/8 x 3/4	X-217-6
1	Elbow, 45°, 3/4	X-225-8
4	Terminal	X-283-3
1	Label, "natural gas"	X-543-3
1	Relay	245748
1	Carburetor Assembly	A-326593
1	Line, flexible fuel	276395
1	Label, "LP gas"	285623
1	Switch, vacuum	287387
2	Regulator, pressure	291259
1	Bracket, fuel	326065
1	Valve, line load	326077
2	Solenoid	326223
1	Harness, wiring	326267

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
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Changeover, Manual (LP Gas to Gasoline)

Changeover, Manual (Gas to Gasoline) 256993		
1	Coupling, pipe	X-216-11
2	Washer, lock, shakeproof	X-22-5
1	Connector, 90° elbow	X-391-22
2	Clamp, hose	X-426-15
2	Clamp, hose	X-426-18
1	Elbow, 1/2-20 x 1/4	X-447-6
3	Tie, cable	X-468-1
2	Screw, RHM, 10-32 x 1/2	X-50-1
2	Stud	X-6054-6
1	Hose	X-651-34
1	Harness, wiring	226299
1	Solenoid Assembly, fuel	226304
1	Switch, toggle	241911
1	Bracket, fuel valve	254456
1	Line, flexible fuel	254493
1	Valve Assembly, gas	254859
1	Pump, fuel	255243
1	Spacer	255595
1	Adapter, mixer	256977
1	Mixer, gas	256987
1	Hose	256989
1	Bracket, fuel switch	256990
1	Decal	256991
1	Decal	256992
1	Carburetor	256994
1	Tag, instruction	258558
1	Gasket, carburetor	280007
1	Regulator, pressure	291259

Changeover, Manual (Gas to Gasoline) 326068		
1	Carburetor Assembly	A-291440
1	Nipple, pipe, 3/4 x 10	X-206-16
2	Nipple, pipe	X-206-4
1	Nipple, pipe	X-206-9
2	Elbow, pipe, 3/4	X-215-2
1	Hose, rubber	X-312-36
2	Elbow, pipe, 3/4	X-215-2
1	Elbow, 45°, 3/4	X-225-8
1	Terminal	X-367-1
1	Line, flexible fuel, 1/4 x 40	X-386-56
2	Connector, hose, 1/8	X-391-1
1	Bolt, U, 5/16-18 x 1 1/2	X-397-1
2	Clamp, hose	X-426-10
2	Clamp, hose	X-426-9
2	Clamp, hose	X-426-3
1	Connector, hose	X-582-16
1	Switch, toggle	241911
1	Pump, electric fuel	247076
1	Bracket, fuel valve	254456
1	Adapter, mixer	256977
1	Mixer, gas	256987
1	Hose	256989
1	Bracket, fuel switch	256990
1	Decal	256991
1	Decal	256992
1	Adapter, carburetor	279013
1	Gasket, carburetor	280494
1	Regulator, pressure	291259
1	Solenoid	326223

Qty.	Description	Kit/Part No.
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Changeover, Manual (Gas to Gasoline) 326443		
1	Elbow, pipe, 1/2	X-215-5
1	Nipple, pipe, 1/8 x 3/4	X-217-6
1	Hose, rubber	X-312-36
1	Hose, rubber, .62 ID	X-312-46
1	Stud	X-352-75
2	Connector, hose, 5/8	X-391-2
1	Connector, 90°, elbow	X-391-22
2	Clamp, hose	X-426-15
2	Clamp, hose	X-426-18
4	Clamp, hose	X-426-3
1	Elbow, 1/2-20 x 1/4	X-447-6
2	Screw, RHM, 10-32 x 1/2	X-50-1
2	Nut, hex	X-6053-2
2	Stud	X-6054-11
1	Hose	X-651-34
1	Harness, wiring	226299
1	Solenoid Assembly, fuel	226304
1	Switch, toggle	241911
1	Pump, electric fuel	247076
1	Bracket, fuel valve	254456
1	Valve Assembly, gas	254859
1	Adapter, mixer	256977
1	Mixer, gas	256987
1	Hose	256989
1	Bracket, fuel switch	256990
1	Decal	256991
1	Decal	256992
1	Carburetor	256994
1	Tag, instruction	258558
1	Gasket, carburetor	280007
1	Regulator, pressure	291259
1	Bracket, fuel pump	326589
1	Line, flexible fuel	326592

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
Changeover, Manual (Gas to Gasoline)		326590
1	Elbow, pipe, 1/2	X-215-5
1	Nipple, pipe, 1/8 x 3/4	X-217-6
1	Stud	X-352-75
1	Line, 1/2 x 25 in.	X-386-12
1	Connector, elbow	X-391-21
1	Connector, 90°, elbow	X-391-22
1	Hose	X-422-29
2	Clamp, hose	X-426-15
2	Clamp, hose	X-426-18
4	Clamp, hose	X-426-3
1	Elbow, 1/2-20 x 1/4	X-447-6
2	Screw, RHM, 10-32 x 1/2	X-50-1
2	Nut, hex	X-6053-2
2	Stud	X-6054-6
1	Hose	X-651-34
1	Bushing, reducer, 1/2	168848
1	Harness, wiring	226299
1	Solenoid Assembly, fuel	226304
1	Switch, toggle	241911
1	Pump, electric fuel	247076
1	Bracket, fuel valve	254456
1	Valve Assembly, gas	254859
1	Adapter, mixer	256977
1	Mixer, gas	256987
1	Hose	256989
1	Bracket, fuel switch	256990
1	Decal	256991
1	Decal	256992
1	Carburetor	256994
1	Tag, instruction	258558
1	Gasket, carburetor	280007
1	Regulator, pressure	291259
1	Bracket, fuel pump	326589
1	Line, flex. fuel	326592

Fuel Lines, Flexible Gas

Fuel Line, Flexible Gas		PA-255177-SD
1	Bushing, reducer, 3/4	X-202-1
1	Nipple, pipe, 3/4	X-206-2
1	Elbow, pipe, 1	X-215-15
1	Elbow	151385
1	Line, flexible fuel	276353

Qty.	Description	Kit/Part No.
Fuel Lines, Flexible Gasoline		
Fuel Line, Flexible Gasoline		256842
1	Clamp, hose	X-426-9
2	Tie, cable	X-468-1
1	Line, flexible fuel	256841
Fuel Line, Flexible Gasoline		276285
1	Cap, pipe	X-268-3
1	Connector, 7/16-20 x 1/8	X-296-1
1	Elbow, 7/16-20 x 1/8	X-447-10
1	Elbow, oil line connect	X-447-7
1	Line, flexible fuel	273614

Fuel Pump, Electric

Fuel Pump, Auxiliary		324405
1	Pump, electric fuel	324420

Gas Solenoid Valve

Gas Solenoid Valve		244621
1	Valve, gas	244621
Gas Solenoid Valve		326127
1	Valve, gas	326223

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
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Gasoline Fuel Systems

Gasoline Fuel System 326050

2	Washer, lock, shakeproof	X-22-5
1	Elbow, 1/2-20 x 1/8	X-447-4
2	Nut, hex	X-6053-2
1	Stud	X-6054-6
1	Line, flexible fuel	254493
1	Pump, fuel	255243
1	Gasket, fuel pump	255244
1	Spacer	255595
1	Carburetor	255245
1	Gasket, carburetor	280007

Gasoline Fuel System 326093

1	Carburetor Assembly	A-291440
1	Air Cleaner Assembly	A-269441
1	Terminal	X-367-1
1	Line, flexible fuel, 1/4 x 40	X-386-56
2	Connector, hose, 1/8	X-391-1
2	Clamp, hose	X-426-9
1	Terminal	X-431-38
1	Pump, electric fuel	247076
1	Adapter, carburetor	279013
1	Gasket, carburetor	280494

Gasoline Fuel System 326444

1	Air Cleaner Assembly	A-269441
1	Elbow, pipe, 90°	X-215-19
1	Pipe	X-217-15
1	Connector, half union	X-296-9
1	Hose, rubber	X-312-36
1	Hose, rubber, .62 ID	X-312-47
1	Stud	X-352-75
12	Connector, hose, 5/8	X-391-2
4	Clamp, hose	X-426-3
2	Nut, hex	X-6053-2
2	Stud	X-6054-11
1	Pump, electric fuel	247076
1	Carburetor	256994
1	Gasket, carburetor	280007
1	Bracket, fuel pump	326589
1	Line, flexible fuel	326592

Qty.	Description	Kit/Part No.
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Gasoline Fuel System 326588

1	Air Cleaner Assembly	A-269441
1	Elbow, pipe, 90°	X-215-19
1	Pipe	X-217-15
1	Connector, half union	X-296-9
1	Stud	X-352-75
1	Line, 1/2 x 25 in.	X-386-12
1	Connector, elbow	X-391-13
1	Connector, hose elbow	X-391-21
1	Hose	X-422-29
2	Clamp, hose	X-426-10
2	Clamp, hose	X-426-18
4	Clamp, hose	X-426-3
2	Nut, hex	X-6053-2
2	Stud	X-6054-11
1	Bushing, reducer, 1/2	168848
1	Pump, electric fuel	247076
1	Hose, molded	256870
1	Carburetor	256994
1	Gasket, carburetor	280007
1	Regulator, pressure	291259
1	Bracket, fuel pump	326589
1	Line, flexible fuel	326592

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
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LP Gas Fuel Systems

LP Gas Fuel System		276431
1	Body Assembly, mixer	A-326137
1	Body Assembly, throttle	A-326138
1	Bushing, reducer	X-202-41
1	Nipple, pipe	X-206-4
1	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 3/4	X-215-2
1	Coupling, pipe, 3/4	X-216-13
1	Washer, lock	X-22-15
4	Washer, plain	X-25-28
1	Terminal, 16-14 wire	X-283-32
4	Stud	X-352-65
1	Bolt, U, 5/16-18	X-397-1
3	Clamp, hose, 1.375 x 2.100	X-426-4
1	Clamp, hose, 1 15/16	X-426-8
2	Screw, HC, M6 x 1 x 16	X-6049-2
4	Screw, hex	X-6050-3
2	Screw, hex	X-6051-3
4	Screw, socket head cap	X-6055-3
2	Plug, pipe	X-75-2
1	Valve, gas	244621
1	Clamp, hose	249887
1	Clamp, hose	249888
1	Bracket, fuel valve	254456
1	Spacer	255595
1	Bolt, banjo	255628
4	Plug, spark	258276
1	Turbocharger	258490
1	Line, oil feed	258492
1	Adapter, turbo	258866
1	Hose, step	258868
1	Tube, turbo crossover	258869
1	Hose, step	258874
1	Hose, step	258875
1	Pipe, turbo discharge	258876
1	Gasket, turbo oil outlet	258878
1	Shield, heat	276258
1	Bracket, mixer support	276389
1	Line, flexible fuel	276395
1	Gasket, carburetor	280007
1	Regulator, pressure	291259
1	Adapter	326114

Qty.	Description	Kit/Part No.
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LP Gas Fuel System		276432
1	Tee, pipe, 3/4	A-108
1	Bushing, reducer, 3/8	X-202-23
1	Bushing, reducer	X-202-39
1	Nipple, pipe, 3/8	X-204-9
2	Nipple, pipe	X-206-4
2	Elbow, pipe, 3/4	X-215-2
1	Washer, lock	X-22-15
1	Terminal, 16-14 wire	X-283-32
3	Plug, pipe	X-75-2
1	Valve, gas	244621
1	Bracket, fuel valve	254456
1	Carburetor Assembly	254983
1	Spacer	255595
1	Line, flexible fuel	276395
1	Gasket, carburetor	280007
1	Regulator, pressure	291259

LP Gas Fuel System		326425
1	Carburetor	A-326319
1	Bushing, reducer	X-202-41
2	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 1/2	X-215-1
1	Elbow, 45°, 3/4	X-225-8
1	Valve, gas	254859
1	Bracket, fuel valve	254456
1	Line, flexible fuel	326603
1	Regulator, pressure	291259

LP Gas Fuel System		326594
1	Carburetor	A-326593
1	Bushing, reducer	X-202-41
1	Nipple, pipe, 3/4 x 10 1/4	X-206-16
1	Nipple, pipe	X-206-4
1	Nipple, pipe	X-206-9
2	Nipple, 1/2 x 2 1/2	X-209-3
1	Elbow, pipe, 1/2	X-215-1
1	Elbow, 45°, 3/4	X-225-8
1	Valve, gas	254859
1	Bracket, fuel valve	254456
1	Line, flexible fuel	276395
1	Regulator, pressure	291259
1	Solenoid	326223

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
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LP Gas Liquid Withdrawal Fuel Systems

LP Gas Fuel System		326180
1	Bushing, reducer	X-202-41
2	Nipple, pipe, 3/8 x 1 1/2	X-204-8
1	Cross Pipe, 1/2	X-207-7
1	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 1/4	X-215-5
2	Elbow, pipe	X-215-9
1	Nipple, pipe, 1/4 x 1 1/2	X-220-6
1	Hose, 5/8 ID x 31 1/2	X-312-15
1	Hose	X-312-53
1	Connector, hose elbow	X-391-19
1	Connector, hose, 5/8 x 3/8	X-391-2
4	Clamp, hose, 1/2-1 13/32	X-426-3
2	Clamp, hose, 1.375 x 2.1	X-426-4
1	Elbow	X-447-17
1	Connector, hose	X-582-2
2	Plug, pipe	X-75-2
2	Plug, pipe, 1/2 in.	X-75-28
1	Line, flexible fuel	225160
1	Converter, gas	226576
1	Carburetor Assembly	254983
1	Spacer	255595
1	Bracket, converter	256888
1	Solenoid, fuel	256976
1	Plug, freeze	276212
1	Connector, hose	276222
1	Gasket, carburetor	280007

Qty.	Description	Kit/Part No.
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LP Gas Fuel System 326181

1	Body Assembly, mixer	A-326137
1	Body Assembly, throttle	A-326138
1	Bushing, reducer, 3/8	X-202-23
2	Bushing, reducer	X-202-41
1	Nipple, pipe, 3/8 x 3	X-204-7
1	Cross Pipe, 1/2	X-207-7
2	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 1/4	X-215-5
1	Coupling, pipe, 3/4	X-216-13
2	Washer, lock	X-22-5
1	Nipple, pipe, 1/4 x 1 1/2	X-220-6
4	Washer, plain	X-25-28
1	Elbow	X-274-2
1	Hose, 5/8 ID x 31 1/2	X-312-15
1	Hose	X-312-53
4	Stud	X-352-65
1	Bolt, U, 5/16-18	X-397-1
4	Clamp, hose, 1/2-1 13/32	X-426-3
5	Clamp, hose, 1.375 x 2.100	X-426-4
1	Clamp, hose, 1 15/16	X-426-8
1	Connector, hose	X-582-2
2	Screw, HC, M6 x 1 x 16	X-6049-2
4	Screw, hex cap	X-6050-3
2	Screw, hex cap	X-6051-3
4	Screw, socket head cap	X-6055-3
2	Plug, pipe, 1/2 in.	X-75-28
2	Plug, pipe	X-75-2
1	Converter, gas	226576
1	Clamp, hose	249887
1	Clamp, hose	249888
1	Spacer	255595
1	Bolt, banjo	255628
1	Bracket, converter	256888
1	Solenoid, fuel	256976
4	Plug, spark	258276
1	Turbocharger	258490
1	Line, oil feed	258492
1	Adapter, turbo	258866
1	Hose, step	258868
1	Tube, turbo crossover	258869
1	Hose, step	258874
1	Hose, step	258875
1	Pipe, turbo discharge	258876
1	Gasket, turbo oil outlet	258878
1	Plug, freeze	276212
1	Connector, hose	276222
1	Shield, heat	276258
1	Bracket, mixer support	276389
1	Line, flexible fuel	276395
1	Gasket, carburetor	280007
1	Adapter	326114

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
LP Gas Liquid Withdrawal		256986
1	Bushing, reducer, 1/4 x 1	X-202-12
1	Bushing, reducer, 3/8	X-202-28
1	Tee, pipe, 1/2	X-203-13
1	Nipple, pipe, 3/8 x 1	X-204-9
1	Nipple, 1/2 x 1-3/16	X-209-2
1	Elbow, pipe, 1/4	X-215-5
1	Elbow	X-215-9
2	Washer, lock, shakeproof	X-22-5
1	Nipple, pipe, 1/4 x 1 1/2	X-220-6
1	Hose, 5/8 ID x 31 1/2	X-312-15
1	Hose, rubber, 5/8 x 49	X-312-37
1	Stud	X-352-86
1	Connector, hose	X-380-4
1	Connector, hose elbow	X-391-19
3	Connector, hose, 5/8 x 3/8	X-391-2
4	Clamp, hose, 1/2-1 13/32	X-426-3
1	Elbow, 5/8-18 x 3/8	X-447-9
2	Nut, hex	X-6053-2
2	Stud	X-6054-6
1	Plug, pipe, 1/2	X-75-3
1	Bushing, reducer, 1/2	168848
1	Line, flexible fuel	225160
1	Carburetor Assembly	254983
1	Spacer	255595
1	Solenoid Assembly, fuel	256449
1	Bracket, converter	256888
1	Converter	256903
1	Gasket, carburetor	280007

Qty.	Description	Kit/Part No.
LP Gas Fuel System		326586
1	Carburetor Assembly	A-326319
1	Bushing, reducer	X-202-41
1	Bushing, reducer	X-202-46
2	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 1/4	X-215-5
1	Elbow, pipe, 1/2	X-215-1
1	Nipple, pipe, 1/4 x 1 1/2	X-220-6
1	Elbow, 45°, 1/2	X-225-7
1	Connector, half union	X-296-13
1	Hose, 5/8 ID x 31 1/2	X-312-15
1	Hose	X-312-53
1	Connector, hose elbow	X-391-19
3	Connector, hose, 5/8 x 3/8	X-391-2
4	Clamp, hose, 1/2-1 13/32	X-426-3
2	Plug, pipe, 1/2 in.	X-75-28
1	Line, flexible fuel	225160
1	Converter	256903
1	Bracket, converter	256888
1	Solenoid, fuel	256449
1	Plug, freeze	276212

LP Gas Fuel System		326612
1	Carburetor Assembly	A-326593
1	Elbow	SA-472
1	Bushing, reducer, 3/4	X-202-1
1	Bushing, reducer	X-202-30
1	Bushing, reducer	X-202-41
1	Tee, pipe, 1/2	X-203-13
1	Nipple, pipe, 3/4 x 10	X-206-16
1	Nipple, pipe	X-206-4
1	Nipple, pipe, 3/4 x 3 1/2	X-206-6
1	Pipe	X-209-18
1	Nipple, 1/2 x 2 1/2	X-209-3
2	Elbow, street, 1/4	X-211-6
1	Elbow, pipe, 3/4	X-215-2
1	Nipple, pipe, 1/4 x 4	X-220-2
2	Elbow, 45°, 3/4	X-225-8
1	Hose	X-312-17
1	Hose	X-312-49
1	Connector, hose elbow	X-391-19
2	Connector, hose, 5/8 x 3/8	X-391-2
4	Clamp, hose, 1/2-1 13/32	X-426-10
1	Line, flexible fuel	276395
1	Connector, hose	275581
1	Converter	326067
1	Bracket, converter	326069
1	Solenoid, fuel	326070

Fuel System Kits, continued

Qty.	Description	Kit/Part No.
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Natural Gas Fuel Systems

Natural Gas Fuel System 254996

1	Tee, pipe, 3/4	A-108
1	Bushing, reducer, 3/8	X-202-23
1	Bushing, reducer	X-202-39
1	Nipple, pipe, 3/8	X-204-9
1	Elbow	X-215-9
2	Washer, lock, shakeproof	X-22-5
1	Stud	X-352-86
1	Elbow, oil line	X-447-16
1	Tie, cable	X-468-1
2	Nut, hex	X-6053-2
2	Stud	X-6054-6
1	Line, flexible fuel	225160
1	Bracket, fuel valve	254456
1	Valve Assembly, gas	254859
1	Carburetor Assembly	254983
1	Spacer	255595
1	Tag, instruction	258558
1	Gasket, carburetor	280007
1	Regulator, pressure	291259

Natural Gas Fuel System 276430

1	Elbow, pipe, 3/4	X-215-2
1	Coupling, pipe, 3/4	X-216-13
1	Washer, lock	X-22-15
4	Washer, plain	X-25-28
1	Terminal, 16-14 wire	X-283-32
4	Stud	X-352-65
1	Bolt, U, 5/16-18	X-397-1
3	Clamp, hose, 1.375 x 2.100	X-426-4
1	Clamp, hose, 1 15/16	X-426-8
2	Screw, HC, M6 x 1 x 16	X-6049-2
4	Screw, hex head cap	X-6050-3
2	Screw, hex head cap	X-6051-3
4	Screw, socket head cap	X-6055-3
2	Plug, pipe	X-75-2
1	Valve, gas	244621
1	Clamp, hose	249887
1	Clamp, hose	249888
1	Bracket, fuel valve	254456
1	Spacer	255595
1	Bolt, banjo	255628
1	Turbocharger	258490
1	Line, oil feed	258492
1	Adapter, turbo	258866
1	Hose, step	258868
1	Tube, turbo crossover	258869
1	Hose, step	258874
1	Hose, step	258875
1	Pipe, turbo discharge	258876
1	Gasket, turbo oil outlet	258878
1	Shield, heat	276258
1	Bracket, mixer support	276389
1	Line, flexible fuel	276395
1	Gasket, carburetor	280007
1	Regulator, pressure	291259
1	Adapter	326114

Qty.	Description	Kit/Part No.
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Natural Gas Fuel System 326425

1	Carburetor	A-326319
1	Bushing, reducer	X-202-41
2	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 1/2	X-215-1
1	Elbow, 45°, 3/4	X-225-8
1	Valve, gas	254859
1	Bracket, fuel valve	254456
1	Line, flexible fuel	326603
1	Regulator, pressure	291259

Natural Gas Fuel System 326594

1	Carburetor	A-326593
1	Bushing, reducer	X-202-41
1	Nipple, pipe, 3/4 x 101/4	X-206-16
1	Nipple, pipe	X-206-4
1	Nipple, pipe	X-206-9
2	Nipple, 1/2 x 2 1/2	X-209-3
1	Elbow, pipe, 1/2	X-215-1
1	Elbow, 45°, 3/4	X-225-8
1	Valve, gas	254859
1	Bracket, fuel valve	254456
1	Line, flexible fuel	276395
1	Regulator, pressure	291259
1	Solenoid	326223

Natural Gas or LP Fuel System 326875

1	Carburetor	A-326319
1	Bushing, reducer	X-202-41
2	Nipple, 1/2 x 1 3/16	X-209-2
1	Elbow, pipe, 1/2	X-215-1
1	Elbow, 45°, 3/4	X-225-8
2	Screw, hex head cap	X-6050-4
1	Valve, gas	254859
1	Bracket, fuel valve	254456
1	Line, flexible fuel	326603
1	Regulator, pressure	291259

Strainer, Gas

Strainer, Gas 290276

1	Strainer, gas	292490
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Appendix A Abbreviations

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

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

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

Appendix B Common Hardware Application Guidelines

Use the information below and on the following pages to identify proper fastening techniques when no specific reference for reassembly is made.

Bolt/Screw Length: When bolt/screw length is not given, use Figure 1 as a guide. As a general rule, a minimum length of one thread beyond the nut and a maximum length of 1/2 the bolt/screw diameter beyond the nut is the preferred method.

Washers and Nuts: Use split lock washers as a bolt locking device where specified. Use SAE flat washers with whiz nuts, spirallock nuts, or standard nuts and preloading (torque) of the bolt in all other applications.

See Appendix C, General Torque Specifications, and other torque specifications in the service literature.

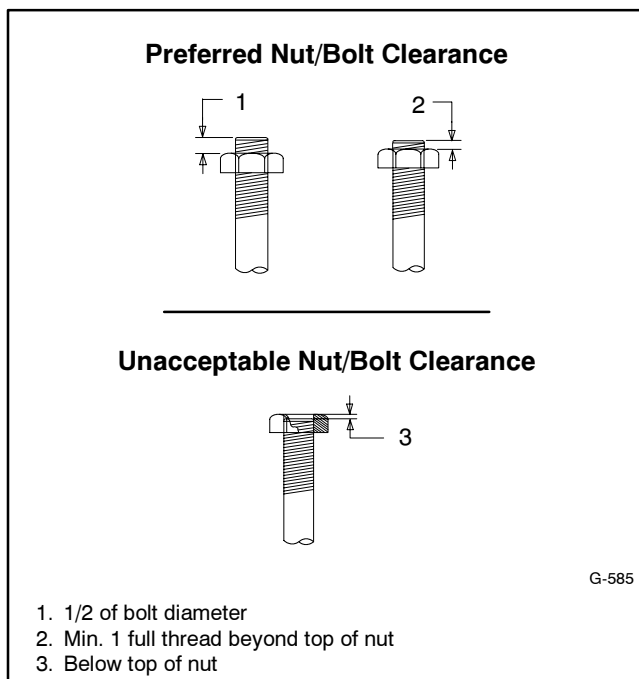


Figure 1 Acceptable Bolt Lengths

Steps for common hardware application:

1. Determine entry hole type: round or slotted.
2. Determine exit hole type: fixed female thread (weld nut), round, or slotted.

For round and slotted exit holes, determine if hardware is greater than 1/2 inch in diameter, or 1/2 inch in diameter or less. Hardware that is *greater than 1/2 inch* in diameter takes a standard nut and SAE washer. Hardware *1/2 inch or less* in diameter can take a properly torqued whiz nut or spirallock nut. See Figure 2.

3. Follow these SAE washer rules after determining exit hole type:
 - a. Always use a washer between hardware and a slot.
 - b. Always use a washer under a nut (see 2 above for exception).
 - c. Use a washer under a bolt when the female thread is fixed (weld nut).
4. Refer to Figure 2, which depicts the preceding hardware configuration possibilities.

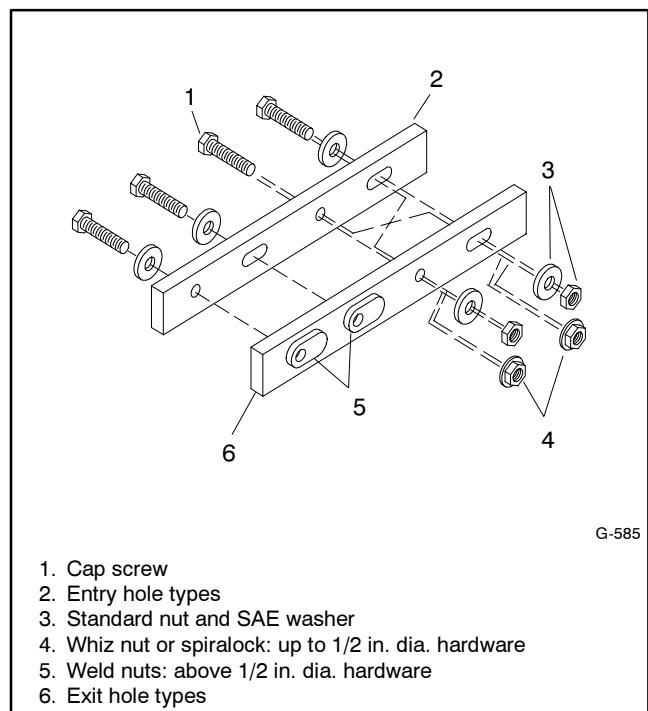


Figure 2 Acceptable Hardware Combinations

Appendix C General Torque Specifications

Use the following torque specifications when service literature instructions give no specific torque values. The charts list values for new plated, zinc phosphate, or

oiled threads. Increase values by 15% for nonplated threads. All torque values are +0%/-10%.

American Standard Fasteners Torque Specifications					
Size	Torque Measurement	Assembled into Cast Iron or Steel			Assembled into Aluminum Grade 2 or 5
		Grade 2	Grade 5	Grade 8	
8-32	Nm (in. lb.)	1.8 (16)	2.3 (20)	—	1.8 (16)
10-24	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	2.9 (26)
10-32	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	2.9 (26)
1/4-20	Nm (in. lb.)	6.8 (60)	10.8 (96)	14.9 (132)	6.8 (60)
1/4-28	Nm (in. lb.)	8.1 (72)	12.2 (108)	16.3 (144)	8.1 (72)
5/16-18	Nm (in. lb.)	13.6 (120)	21.7 (192)	29.8 (264)	13.6 (120)
5/16-24	Nm (in. lb.)	14.9 (132)	23.1 (204)	32.5 (288)	14.9 (132)
3/8-16	Nm (ft. lb.)	24.0 (18)	38.0 (28)	53.0 (39)	24.0 (18)
3/8-24	Nm (ft. lb.)	27.0 (20)	42.0 (31)	60.0 (44)	27.0 (20)
7/16-14	Nm (ft. lb.)	39.0 (29)	60.0 (44)	85.0 (63)	—
7/16-20	Nm (ft. lb.)	43.0 (32)	68.0 (50)	95.0 (70)	—
1/2-13	Nm (ft. lb.)	60.0 (44)	92.0 (68)	130.0 (96)	—
1/2-20	Nm (ft. lb.)	66.0 (49)	103.0 (76)	146.0 (108)	—
9/16-12	Nm (ft. lb.)	81.0 (60)	133.0 (98)	187.0 (138)	—
9/16-18	Nm (ft. lb.)	91.0 (67)	148.0 (109)	209.0 (154)	—
5/8-11	Nm (ft. lb.)	113.0 (83)	183.0 (135)	259.0 (191)	—
5/8-18	Nm (ft. lb.)	128.0 (94)	208.0 (153)	293.0 (216)	—
3/4-10	Nm (ft. lb.)	199.0 (147)	325.0 (240)	458.0 (338)	—
3/4-16	Nm (ft. lb.)	222.0 (164)	363.0 (268)	513.0 (378)	—
1-8	Nm (ft. lb.)	259.0 (191)	721.0 (532)	1109.0 (818)	—
1-12	Nm (ft. lb.)	283.0 (209)	789.0 (582)	1214.0 (895)	—

Metric Fasteners Torque Specifications, Measured in Nm (ft. lb.)				
Size (mm)	Assembled into Cast Iron or Steel			Assembled into Aluminum Grade 5.8 or 8.8
	Grade 5.8	Grade 8.8	Grade 10.9	
M6 x 1.00	5.6 (4)	9.9 (7)	14.0 (10)	5.6 (4)
M8 x 1.25	13.6 (10)	25.0 (18)	35.0 (26)	13.6 (10)
M8 x 1.00	21.0 (16)	25.0 (18)	35.0 (26)	21.0 (16)
M10 x 1.50	27.0 (20)	49.0 (35)	68.0 (50)	27.0 (20)
M10 x 1.25	39.0 (29)	49.0 (35)	68.0 (50)	39.0 (29)
M12 x 1.75	47.0 (35)	83.0 (61)	117.0 (86)	—
M12 x 1.50	65.0 (48)	88.0 (65)	125.0 (92)	—
M14 x 2.00	74.0 (55)	132.0 (97)	185.0 (136)	—
M14 x 1.50	100.0 (74)	140.0 (103)	192.0 (142)	—
M16 x 2.00	115.0 (85)	200.0 (148)	285.0 (210)	—
M16 x 1.50	141.0 (104)	210.0 (155)	295.0 (218)	—
M18 x 2.50	155.0 (114)	275.0 (203)	390.0 (288)	—
M18 x 1.50	196.0 (145)	305.0 (225)	425.0 (315)	—

Appendix D Common Hardware Identification

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

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

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

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

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

Sample Dimensions

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

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

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

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

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

Hex Head Bolts (Full Thread)

M933-04006-60	M4-0.70 x 6
M933-05030-60	M5-0.80 x 30
M933-05035-60	M5-0.80 x 35
M933-05050-60	M5-0.80 x 50
M933-06010-60	M6-1.00 x 10
M933-06012-60	M6-1.00 x 12
M933-06014-60	M6-1.00 x 14
M933-06016-60	M6-1.00 x 16
M933-06020-60	M6-1.00 x 20
M933-06025-60	M6-1.00 x 25
M933-06040-60	M6-1.00 x 40
M933-06050-60	M6-1.00 x 50
M933-07025-60	M7-1.00 x 25
M933-08010-60	M8-1.25 x 10
M933-08012-60	M8-1.25 x 12
M933-08016-60	M8-1.25 x 16
M933-08020-60	M8-1.25 x 20
M933-08025-60	M8-1.25 x 25
M933-08030-60	M8-1.25 x 30
M933-08030-82	M8-1.25 x 30*
M933-10012-60	M10-1.50 x 12
M961-10020-60	M10-1.25 x 20
M933-10020-60	M10-1.50 x 20
M933-10025-60	M10-1.50 x 25
M961-10025-60	M10-1.25 x 25
M933-10025-82	M10-1.50 x 25
M961-10030-60	M10-1.25 x 30
M933-10030-60	M10-1.50 x 30
M933-10030-82	M10-1.50 x 30*
M961-10035-60	M10-1.25 x 35
M933-10035-60	M10-1.50 x 35
M933-10035-82	M10-1.50 x 35
M961-10040-60	M10-1.25 x 40
M933-12016-60	M12-1.75 x 16
M933-12020-60	M12-1.75 x 20
M961-12020-60F	M12-1.50 x 20
M933-12025-60	M12-1.75 x 25
M933-12025-82	M12-1.75 x 25*
M961-12030-60	M12-1.25 x 30
M961-12030-82F	M12-1.50 x 30
M933-12030-60	M12-1.75 x 30
M933-12035-60	M12-1.75 x 35
M961-12040-82	M12-1.25 x 40*
M933-12040-60	M12-1.75 x 40
M933-12040-82	M12-1.75 x 40*

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

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

Pan Head Machine Screws

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

Flat Head Machine Screws

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

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

Metric, continued

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

Washers

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

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



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