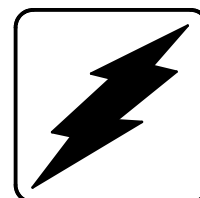


Service Parts

Industrial Generator Sets



Models:

2000ROZD

See Group 701, Literature for
Engine and Accessory Parts Catalogs

KOHLER[®]
POWER SYSTEMS

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

Specification Series 132

TP-5816 10/96a

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Introduction

This manual contains a list of generator and some engine service replacement parts for Kohler industrial generator sets. Refer to the Specification Number Index for models and specifications covered.

This manual includes the following main sections:

- *Table of Contents*: Lists the sections of this catalog.
- *Introduction (and other information sections)*: Contains introductory material followed by sections on specification numbers, part numbers, and hardware.
- *Index*: Indexes generator set specifications and their groups.

- *Group Parts Lists*: Lists part numbers of parts in the groups.
- *Kit List and kit sections*: Lists controller and cooling system kits (by model) and their parts. See Parts Catalog TP-5707 for parts lists of optional accessory kits installed on the generator set.
- *Appendices*: Includes Glossary of Abbreviations, Common Hardware Application Guidelines, Common Hardware Identification, General Torque Specifications, and Common Hardware List.

Number Significance

This catalog uses a variety of numbering systems. A description of these follows:

- *Specification Number*: The generator specification number (spec number) is six digits with a PA-, PB- or PE-prefix (Specification Number Index does not show prefixes). The first three digits designate generator size and engine model (specification series). The remaining digits are in sequence and identify a particular spec in a series. Spec numbers break down into groups.
- *Group Number*: A group consists of parts needed to perform one or more related functions. For example, the 101 group is the generator set Air Intake group.

- *Variation Number*: A group might have several variations. Parts comprising each variation perform the same function, but parts list vary. For example, a 50 Hz generator alternator and 60 Hz generator alternator both perform the same function. However, they are constructed of different parts. Each of these differences necessitates the assignment of a group variation number.
- *Part Number*: The part number identifies an individual assembly, subassembly, component, or accessory kit.

How to Find Part Numbers

FOLLOW THESE STEPS to identify a part:

STEP 1: Turn to the Composite Exploded View in front of the catalog. Notice the boxed groupings identifying a corresponding group number and function. The group function and number applies to all generator set models. For example:

| <u>Function & Group Title/Description</u> | <u>Group Number</u> |
|---|---------------------|
| Air Intake | 101 |
| Fuel System | 103 |
| Cooling System | 104 |
| Engine | 105 |
| etc. | |

Note the Group Number in which you located your part. If the part you need is not illustrated, locate a function related to your part and use that Group Number.

STEP 2: Turn to the Specification Number Index. The index lists generator set specification numbers vertically down the first column (grouped by model) and variation numbers in the group title/number columns. Locate your specification number in the first column and read across the page to the group description/number column for your part. Note the variation number found in that column.

STEP 3: Using the page number in the Table of Contents, turn to the group of parts in which your part belongs (noted in step 1). Variation numbers in the heading correspond to variations used in that group. Read down the column noted in step 2 to locate parts used in the variation. The number in the column represents the quantity of that part number used in the variation. A part is not used in the variation if a part number does not have a quantity listed.

Hardware Grades

When replacing hardware do not substitute inferior grade hardware. All hex. head screws are hardness grade 5, except where noted. Socket head screws are similar to grade 8. All replacement hardware should be at

least equal to original manufacturer's hardware quality. Refer to Common Hardware Application Guidelines and Common Hardware Identification in the back of the manual.

Hardware References

Many common hardware items will appear in parts catalogs as **common hardware entries** or **hardware references**. A *common hardware entry* refers to the size of common hardware to apply in accordance with hardware guidelines. For example, item 2 (nut) in Figure 1 below would appear as "3/8-16 hardware" in the text. It indicates that the nut is 3/8-16 size. See Common Hardware Application Guidelines.

Many common hardware items will appear in parts catalogs as common hardware entries or hardware references. A common hardware entry refers to the size of common hardware to apply in accordance with hardware guidelines. For example, an item may appear as "3/8-16 hardware" in the text. It indicates that the piece is 3/8-16 size. See Common Hardware Application Guidelines.

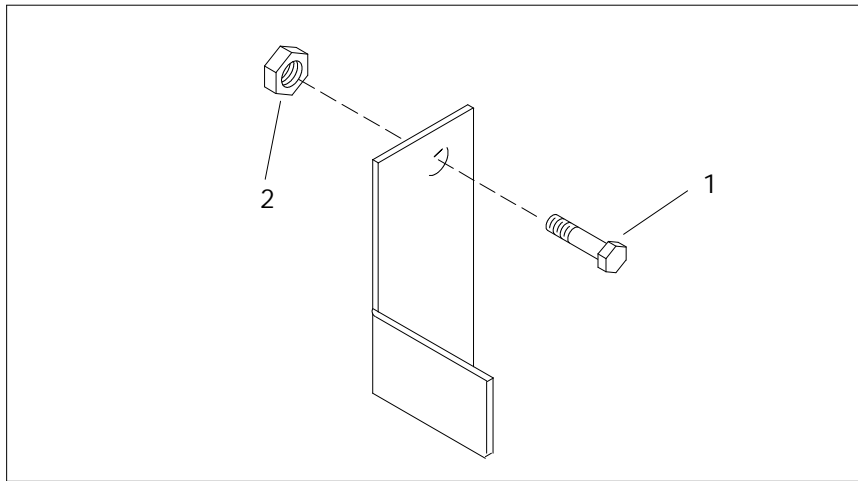
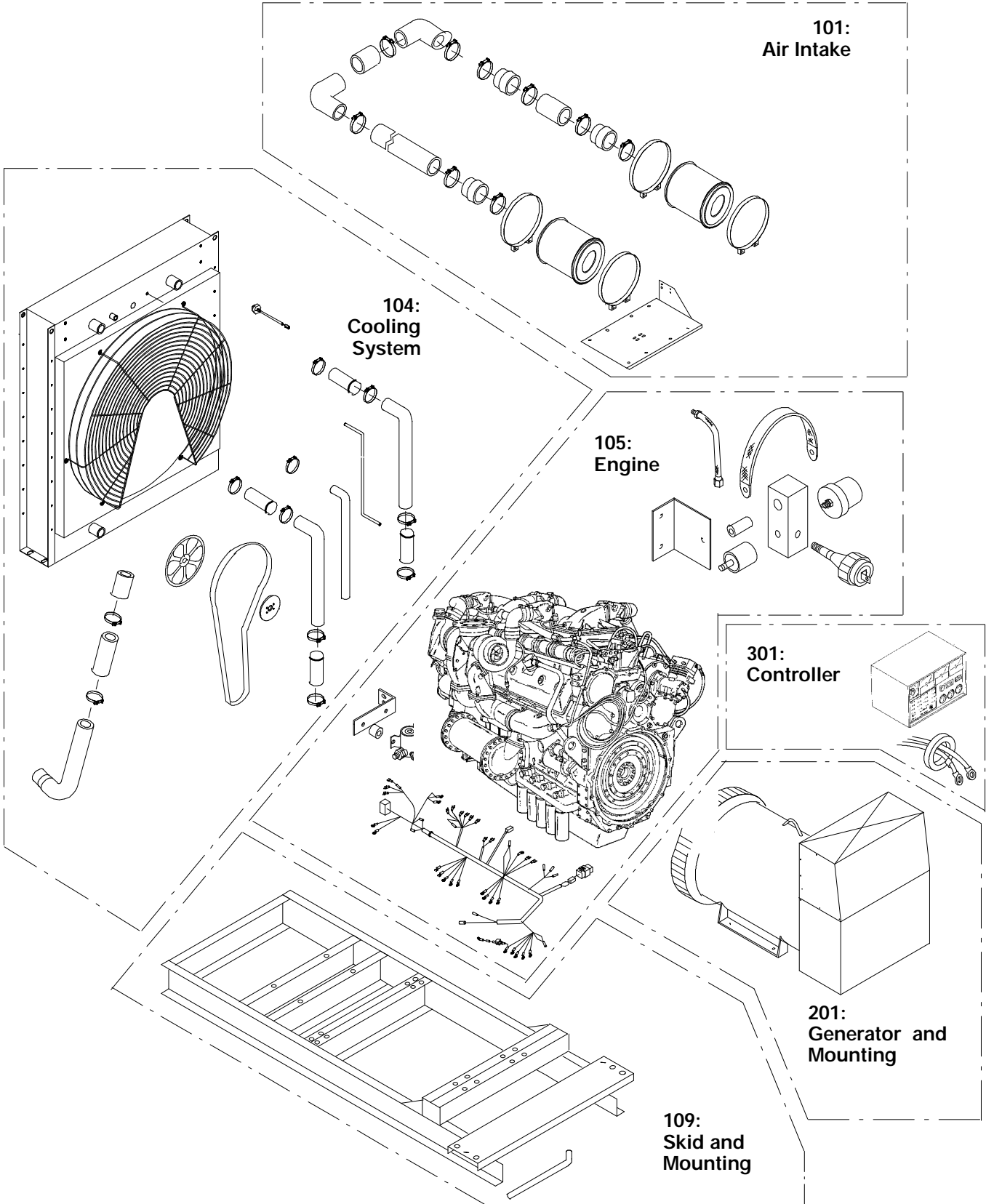


Figure 1. Hardware References

Generator Composite View



Some parts are drawn out of proportion

581601

Specification Number Index

| GROUP TITLE & NUMBER | <i>Air Intake</i> | <i>Cooling System</i> | <i>Engine</i> | <i>Nameplates and Decals</i> | <i>Skid and Plant Mounting</i> | <i>Recommended Spare Parts</i> | <i>Generator and Mounting</i> | <i>Controller and Mounting</i> | <i>Literature</i> | | | | |
|----------------------|-------------------------|-----------------------|---------------|------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------|--|--|--|--|
| GROUP NO. | 101 | 104 | 105 | 107 | 109 | 119 | 201 | 301 | 701 | | | | |
| SPEC NO. | VARIATION NUMBER | | | | | | | | | | | | |

| 2000ROZD | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|---|-----|-----|----|--|--|--|--|
| 132720 | 37 | 34 | 67 | 70 | 51 | - | 326 | 108 | 79 | | | | |
| 132721 | 37 | 34 | 67 | 70 | 51 | - | 327 | 108 | 79 | | | | |
| 132722 | 37 | 34 | 67 | 70 | 51 | - | 328 | 109 | 79 | | | | |
| 132723 | 37 | 34 | 67 | 70 | 51 | - | 329 | 112 | 79 | | | | |
| 132724 | 37 | 34 | 67 | 70 | 51 | - | 330 | 114 | 79 | | | | |
| 132725 | @ | @ | 67 | 70 | @ | - | @ | & | 79 | | | | |
| 132729 | 37 | 34 | 67 | 70 | 51 | - | 330 | 117 | 79 | | | | |

@ Desired air intake, cooling, skid, and generator kit chosen from price list. See Group parts section for parts list.
 & See Controller Kits in kits section for parts list.

Group 101: Air Intake

| Item | Part Number | Description | Quantity | | |
|------|-------------|-----------------------------------|-------------------|--------|--------|
| | | | Variation/Kit No. | | |
| | | | 37 | 347667 | 347810 |
| 1 | X-101-13 | Nut, Lock | 24 | 24 | 24 |
| 2 | X-268-7 | Cap, Pipe | 6 | 6 | 6 |
| 3 | X-522-66 | Tube, Steel | 1 | 1 | |
| 3 | X-522-45 | Tube, Steel | | | 1 |
| 4 | 254344 | Clamp, Hose | 4 | 4 | |
| 5 | 272983 | Clamp | 12 | 12 | |
| 5 | 291666 | Clamping Bracket | | | 8 |
| 5 | 279715 | Clamping Bracket | | | 4 |
| 6 | 274430 | Hose, Hump | 4 | 4 | |
| 6 | 274430 | Hose, Hump | | | 2 |
| 6 | 347807 | Hose, Elbow | | | 2 |
| 7 | 274614 | Bracket, Air Cleaner (Right Side) | 1 | 1 | |
| 7 | 279782 | Bracket, Air Cleaner (Right Side) | | | 1 |
| 8 | 274616 | Bracket, Air Cleaner (Left Side) | 1 | 1 | |
| 8 | 279783 | Bracket, Air Cleaner (Left Side) | | | 1 |
| 9 | 274617 | Bracket, Air Cleaner | 2 | 2 | |
| 9 | 279781 | Bracket, Air Cleaner | | | 2 |
| 10 | 274663 | Tube Assembly | 2 | 2 | 2 |
| 11 | 274664 | Tube Assembly | 4 | 4 | |
| 11 | 274819 | Tube Assembly | | | 2 |
| 11 | 274623 | Tube Assembly | | | 2 |
| 12 | 274821 | Cleaner, Air | 6 | 6 | |
| 12 | A-279713 | Cleaner, Air | | | 3 |
| 12 | A-279714 | Cleaner, Air | | | 2 |
| 12 | A-354106 | Cleaner, Air | | | 2 |
| 13 | 272674 | Cap, Rain | | | 4 |
| 13 | 279722 | Cap, Rain | | | 2 |
| 14 | 280998 | Clamp | 22 | 22 | 12 |
| 14 | 254013 | Clamp | | | 4 |
| 14 | 279743 | Camp | | | 2 |
| 14 | 272960 | Clamp | | | 6 |
| 15 | 291504 | Clamp, Hose | 2 | 2 | 2 |
| 16 | 291559 | Clamp, Hose | 2 | 2 | 2 |
| 17 | 291567 | Hose, 90 Degree Elbow | 2 | 2 | 2 |
| 18 | 291678 | Hose, 90 Degree Elbow | 2 | 2 | 2 |
| 19 | 291679 | Hose, Hump | 4 | 4 | |
| 19 | 279744 | Hose, Hump | | | 2 |
| 19 | 279720 | Hose, Hump | | | 2 |
| 20 | 347476 | Bracket, Air Cleaner | 2 | 2 | 2 |
| 21 | 347477 | Hose, Offset | 2 | 2 | |
| 21 | 347806 | Hose, Elbow | | | 2 |
| 22 | 347591 | Tube Assembly | 1 | 1 | |
| 22 | 347808 | Tube Assembly | | | 1 |
| 23 | 279715 | Bracket, Air Cleaner | | | 4 |
| 24 | 279288 | Bracket | | | 1 |
| 25 | 347722 | Bracket, Air Cleaner (Right) | 1 | 1 | |
| 25 | 347773 | Bracket, Air Cleaner (Right) | | | 1 |
| 26 | 347723 | Bracket, Air Cleaner (Left) | 1 | 1 | |
| 26 | 347774 | Bracket, Air Cleaner (Left) | | | 1 |

Group 104: Cooling System

| Item | Part Number | Description | Quantity | |
|------|-------------|-----------------------------|-------------------|--------|
| | | | Variation/Kit No. | |
| | | | 34 | 347646 |
| 1 | A-347485 | Radiator Assembly | 1 | 1 |
| 2 | X-202-28 | Bushing, Reducer 3/8 X 1/2 | 1 | 1 |
| 3 | X-286-22 | Key, Square | 1 | 1 |
| 4 | X-391-13 | Connector, Elbow | 1 | 1 |
| 5 | X-422-32 | Hose (Vent Line), 16.7 Ft. | 2 | 2 |
| 6 | X-422-34 | Hose (Vent Line), 11.25 Ft. | 1 | 1 |
| 7 | X-426-10 | Clamp, Hose | 6 | 6 |
| 8 | X-468-7 | Tie, Cable | 9 | 9 |
| 9 | X-507-6 | Hose, Radiator .58 Ft. | 4 | 4 |
| 10 | X-582-4 | Connector, Hose | 2 | 2 |
| 11 | X-582-5 | Connector, Hose | 3 | 3 |
| 12 | X-6003-8 | Conduit, Convuluted | 1 | 1 |
| 13 | X-6006-4 | Hose, Radiator .75 Ft. | 4 | 4 |
| 14 | X-6014-86 | Hose, Radiator 1.08 Ft. | 2 | 2 |
| 15 | X-672-19 | Clamp, Insulated | 2 | 2 |
| 16 | 254832 | Sensor, Low Fluid | 1 | 1 |
| 17 | 279748 | Decal, Caution | 2 | 2 |
| 18 | 291537 | Clamp, Hose | 8 | 8 |
| 19 | 291542 | Clamp, Hose | 8 | 8 |
| 20 | 291590 | Clamp, Hose | 2 | 2 |
| 21 | 328021 | Bracket, Tube Mounting | 2 | 2 |
| 22 | 343049 | Clamp, Hose | 4 | 4 |
| 23 | 347422 | Bushing, Pulley | 1 | 1 |
| 24 | 347423 | Pulley | 1 | 1 |
| 25 | 347429 | Belt, Poly V | 1 | 1 |
| 26 | 347432 | Pulley, Idler | 1 | 1 |
| 27 | 347437 | Tube, Upper Radiator | 2 | 2 |
| 28 | 347440 | Tube, Lower Radiator | 1 | 1 |
| 29 | 347441 | Tube, Inner Cooler | 1 | 1 |
| 30 | 347442 | Tube, Inner Cooler | 1 | 1 |
| 31 | 347443 | Bushing, Idler | 1 | 1 |
| 32 | 347474 | Tube, Inlet | 1 | 1 |
| 33 | 347504 | Gasket, Inlet | 1 | 1 |
| 34 | 347505 | Brace, Radiator Tube | 1 | 1 |
| 35 | 347506 | Brace, Radiator Tube | 1 | 1 |
| 36 | 347507 | Shim, Radiator | 1 | 1 |
| 37 | 347585 | Guard, Belt | 1 | 1 |
| 38 | 347586 | Guard, Belt Top | 1 | 1 |
| 39 | 347587 | Guard, Belt R.S. | 1 | 1 |
| 40 | 347588 | Guard, Belt L.S. | 1 | 1 |
| 41 | 347590 | Guard, Belt R.S. | 1 | 1 |
| 42 | 347721 | Brace, Bearing Support | 1 | 1 |
| 43 | 347728 | Brace, Bearing Support | 1 | 1 |
| 44 | 354113 | Sensor, Liquid Level | 1 | 1 |

Group 105: Engine

| Item | Part Number | Description | Quantity |
|------|-------------|--|-----------|
| | | | Variation |
| | | | 67 |
| 1 | A-347395-1 | Engine Assembly, 2000 kW | 1 |
| 2 | A-347395-2 | Engine Assembly, 2000 kW (See TP-5819 for engine parts lists) | 1 |
| 3 | A-347569 | Box Assembly, Interface | 1 |
| 4 | X-202-1 | Bushing, Reducer 3/4 | 4 |
| 5 | X-202-27 | Bushing, Reducer 1/8 X 1/4 | 1 |
| 6 | X-22-12 | Washer, Shakeproof | 13 |
| 7 | X-22-30 | Washer, Shakeproof 5/8 | 4 |
| 8 | X-22-43 | Washer, Lock 5/8 | 8 |
| 9 | X-256-5 | Valve, Drain | 2 |
| 10 | X-274-3 | Elbow, 45 Degree 1/4 | 1 |
| 11 | X-296-15 | Connector, Half Union | 2 |
| 12 | X-447-10 | Elbow, 7/16-20x1/8 | 1 |
| 13 | X-447-18 | Elbow | 3 |
| 14 | X-447-19 | Elbow | 1 |
| 15 | X-651-3 | Hose, Rubber 3/8 X 18" | 1 |
| 16 | X-672-3 | Clamp, Insulating | 4 |
| 17 | X-748-29 | Tube, Shrink | 26 |
| 18 | X-75-1 | Plug, Pipe 1/8 | 2 |
| 19 | X-75-18 | Plug, Pipe 3/4 | 1 |
| 20 | X-75-42 | Plug, Pipe | 2 |
| 21 | X-794-1 | Screw, Drill Hex. | 1 |
| 22 | 223033 | Strap, Ground 3/8 x 5 | 3 |
| 23 | 241481 | Switch, High Engine Temperature | 1 |
| 24 | 259632 | Bumper | 5 |
| 25 | 267548 | Block, Oil Gauge | 1 |
| 26 | 268298 | Sender, Water Temperature | 1 |
| 27 | 272713 | Solenoid, Cranking | 1 |
| 28 | 274327 | Bracket, Relay Mount | 2 |
| 29 | 279602 | Bracket, Sender Mounting | 1 |
| 30 | 280905 | Line, Fuel 3/16x6 1/2 | 1 |
| 31 | 287363 | Strap, Ground | 2 |
| 32 | 328071 | Sender, Oil Pressure | 1 |
| 33 | 328309 | Switch, Low Oil Pressure | 1 |
| 34 | 344358 | Line, Flexible Fuel | 1 |
| 35 | 347494 | Line, Flexible Fuel | 1 |
| 36 | 347495 | Line, Flexible Fuel | 1 |
| 37 | 347496 | Bracket, Mounting | 1 |
| 38 | 347567 | Harness, Wiring (Interface Box To Battery) | 1 |
| 39 | 347571 | Harness, Wiring | 1 |
| 40 | 347580 | Bracket, Box | 1 |
| 41 | 347584 | Bracket, Pressure Mount | 1 |
| 42 | 279260 | Oil Filter | 2 |

Group 107: Nameplate and Decals

| Item | Part Number | Description | Quantity |
|------|-------------|---------------------------|-----------|
| | | | Variation |
| | | | 70 |
| 1 | X-6275-7 | Logo, Kohler | 2 |
| 2 | X-6276-8 | Logo, Kohler | 1 |
| 3 | X-67-5 | Screw, Drive 2 x 3/16 | 4 |
| 4 | 224233 | Decal, 1-800 Number | 1 |
| 5 | 238402 | Decal | 2 |
| 6 | 238451 | Nameplate Serial No. | 4 |
| 7 | 249808 | Decal, Warning | 1 |
| 8 | 249809 | Decal, Warning | 2 |
| 9 | 254454 | Foam, Packing | 2 |
| 10 | 255798 | Tag, Instruction | 1 |
| 11 | 255882 | Decal | 1 |
| 12 | 257438 | Decal, Warning | 2 |
| 15 | 293990 | Decal, Caution | 1 |
| 16 | 327004 | Nameplate | 1 |
| 17 | 343165 | Decal, Caution-Not A Step | 2 |
| 18 | 347166 | Nameplate, CSA | 1 |
| 19 | 347272 | Decal, Power | 2 |
| 20 | 347273 | Decal, System | 2 |
| 21 | 347746 | Decal, Caution | 1 |

Group 109: Skid and Plant Mounting

| Item | Part Number | Description | Quantity | |
|------|-------------|------------------------------|-------------------|--------|
| | | | Variation/Kit No. | |
| | | | 51 | 347645 |
| 1 | SA-472 | Elbow | 2 | 2 |
| 2 | X-202-41 | Bushing, Reducer | 2 | 2 |
| 3 | X-426-8 | Clamp, Hose 1 15/16 X 1 3/16 | 4 | 4 |
| 4 | X-577-18 | Hose, Oil Drain .625" X 25" | 2 | 2 |
| 5 | 241062 | Plug, Drain | 2 | 2 |
| 6 | 272701 | Valve, Oil Drain | 2 | 2 |
| 7 | 276552 | Washer, Nylon | 2 | 2 |
| 8 | 280562 | Decal, Oil Drain | 2 | 2 |
| 9 | 347438 | Skid | 1 | 1 |
| 10 | 347469 | Support, Rear Engine | 2 | 2 |

Group 119: Recommended Spare Parts List

| Item | Part Number | Description | Quantity |
|------|-------------|-------------------------|-----------------------|
| | | | Variation/ Kit No. |
| | | | |
| 1 | 291207 | Fuse, 1.5 Amp | 5 |
| 2 | 243273 | Fuse, 3 Amp | 5 |
| 3 | 283645 | Fuse, 15 Amp | 5 |
| 4 | A-336415 | Main Circuit Board | 1 |
| 5 | 328725 | Voltage Regulator | 1 |
| 6 | A-336432 | Indicator Circuit Board | 1 |
| 7 | 283420 | Bulb | 5 |
| 8 | X-6006-4 | Upper Radiator Hose | 1 |
| 9 | X-507-6 | Lower Radiator Hose | 1 |
| 10 | 347429 | V-Belt | 1 |
| 11 | 274821 | Air Cleaner | 26 |
| 12 | 279260 | Oil Filter | 26 |
| 13 | 291740 | Lamp | 5 |

Group 201: Generator and Mounting

| Item | Part Number | Description | Quantity | | | | |
|------|-------------|--|-------------------|-----|-----|-----|-----|
| | | | Variation/Kit No. | | | | |
| | | | 326 | 327 | 328 | 329 | 330 |
| 1 | X-284-26 | Grommet | 2 | 2 | 2 | 2 | 2 |
| 2 | X-6021-13 | Screw, H.C. | 6 | 6 | 6 | 6 | 6 |
| 3 | X-6217-10 | Screw, Hex Flange | 20 | 20 | 20 | 20 | 20 |
| 4 | X-6232-3 | Decal, Stripes | 1 | | 1 | 1 | 1 |
| 5 | X-6246-1 | Decal, Kohler Power System | 1 | | 1 | 1 | 1 |
| 6 | X-73-5 | Screw, R.H.M. 1/4-20 X 3/8 | 4 | 4 | 4 | 4 | 4 |
| 7 | X-794-2 | Screw, Drill | 6 | 6 | 6 | 6 | 6 |
| 8 | X-801-5 | Washer, Hardened | 6 | 6 | 6 | 6 | 6 |
| 9 | X-801-8 | Washer, Hardened | 4 | 4 | 4 | 4 | 4 |
| 10 | 290743 | Shim | 8 | 8 | 8 | 8 | 8 |
| 11 | 290744 | Shim | 12 | 12 | 12 | 12 | 12 |
| 12 | 290945 | Washer, Hardened | 16 | 1 | 16 | 16 | 16 |
| 13 | 291191 | Shim | 4 | 4 | 4 | 4 | 4 |
| 14 | 328898 | Cover, Top Back | 1 | 1 | 1 | 1 | 1 |
| 15 | 328901 | Cover, Louvered | 1 | 1 | 1 | 1 | 1 |
| 16 | 328904 | Screen | 1 | 1 | 1 | 1 | 1 |
| 17 | 347717 | Box, Control | 1 | 1 | 1 | 1 | 1 |
| 18 | 347718 | Cover, Control Box | 1 | 1 | 1 | 1 | 1 |
| 19 | A-328115 | Alternator Assembly | 1 | | | | |
| 19 | A-347466 | Alternator Assembly | | 1 | | | |
| 19 | A-328126 | Alternator Assembly | | | 1 | | |
| 19 | A-328138 | Alternator Assembly | | | | 1 | |
| 19 | A-347467 | Alternator Assembly | | | | | 1 |
| 20 | 347070 | Alternators include * *Exciter Rectifier Assembly (includes diodes and surge suppressor) | 1 | 1 | 1 | 1 | 1 |
| 21 | 347073 | *Diode, Standard Polarity | 1 | 1 | 1 | 1 | 1 |
| 22 | 279775 | *Diode, Reversing Polarity | 1 | 1 | 1 | 1 | 1 |
| 23 | 279777 | *Surge Suppressor | 1 | 1 | 1 | 1 | 1 |
| 24 | 347160 | *Capacitor | 1 | 1 | 1 | 1 | 1 |
| 25 | 249778 | *Fuse, 5 Amp | 1 | 1 | 1 | 1 | 1 |
| 26 | 279779 | *Fuse Cap | 1 | 1 | 1 | 1 | 1 |
| 27 | 328725 | *DVR2000 Voltage Regulator | 1 | 1 | 1 | 1 | 1 |

Modular Spec Cross Reference Table

| Alternator Kit | Equivalent Variation Number |
|----------------|-----------------------------|
| 347681 | 326 |
| 347682 | 327 |
| 347683 | 328 |
| 347684 | 329 |
| 347685 | 330 |

Group 301: Controller and Mounting

| Item | Part Number | Description | Quantity | | | | |
|------|-------------|--|------------------|-----|-----|-----|-----|
| | | | Variation Number | | | | |
| | | | 108 | 109 | 112 | 114 | 117 |
| 1 | X-22-14 | Washer, Shakeproof 3/8 | 1 | 1 | 1 | 1 | 1 |
| 2 | X-22-16 | Washer, Lock 5/16 | 4 | 4 | 4 | 4 | 4 |
| 3 | X-22-20 | Washer, Shakeproof E.T. | 8 | 8 | 8 | 8 | 8 |
| 4 | X-284-25 | Grommet | 1 | 1 | 1 | 1 | 1 |
| 5 | X-51-11 | Screw, R.H.M. 8-32 X 3/4 | 2 | 2 | 2 | 2 | 2 |
| 6 | X-51-3 | Screw, R.H.M. 8-32 X 1 | 1 | 1 | 1 | 1 | 1 |
| 7 | X-6129-8 | Block, Fuse | 1 | 1 | 1 | 1 | 1 |
| 8 | X-6129-9 | Block, Fuse | 1 | 1 | 1 | 1 | 1 |
| 9 | X-6134-9 | Fuse | 1 | 1 | 1 | 1 | 1 |
| 10 | X-794-2 | Screw, Drill | 6 | 6 | 6 | 6 | 6 |
| 11 | 255080 | Marker, Strip | 1 | 1 | 1 | 1 | 1 |
| 12 | 258453 | Harness, Wiring (Ct) | 1 | 1 | 1 | | |
| 12 | 347563 | Harness, Wiring (Ct) | | | | 1 | 1 |
| 13 | 272684 | Relay | 1 | 1 | 1 | 1 | 1 |
| 14 | 274796 | Panel, Relay | 1 | 1 | 1 | 1 | 1 |
| 15 | 282829 | Mount, Vibro | 4 | 4 | 4 | 4 | 4 |
| 16 | 287684 | Transformer, Potential | 3 | | | | |
| 16 | 287578 | Transformer, Potential | | 3 | | | |
| 16 | 258990 | Transformer, Potential | | | 3 | | |
| 16 | X-6121-50 | Transformer, Potential | | | | 3 | |
| 16 | X-6121-55 | Transformer, Potential | | | | | 3 |
| 17 | 291288 | Pick-Up, Speed | 1 | 1 | 1 | 1 | 1 |
| 18 | 295314 | Block, Terminal | 1 | 1 | 1 | 1 | 1 |
| 19 | 297676 | Transformer, Current | 3 | 3 | | | |
| 19 | 297675 | Transformer, Current | | | 3 | | |
| 19 | 248874 | Transformer, Current | | | | 3 | 3 |
| 20 | 347872 | Harness, Wiring (AC) | 1 | 1 | 1 | | |
| 20 | 347562 | Harness, Wiring (AC) | | | | 1 | 1 |
| 20 | 347564 | Harness, Wiring (AC) | | | | 1 | 1 |
| 21 | A-347509 | Controller Assembly | 1 | 1 | | | |
| 21 | A-347510 | Controller Assembly | | | 1 | | |
| 21 | A-347511 | Controller Assembly Controller Includes * | | | | 1 | 1 |
| 22 | A-336415 | *Circuit Board, Dec-3+ Main | 1 | 1 | 1 | 1 | 1 |
| 23 | A-336432 | *Circuit Board, Dec-3+ Indicator | 1 | 1 | 1 | 1 | 1 |
| 24 | X-22-20 | *Washer, Shakeproof | 1 | 1 | 1 | 1 | 1 |
| 25 | X-22-50 | *Washer, Lock | 2 | 2 | 2 | 2 | 2 |
| 26 | X-22-6 | *Washer, Lock #6 | 4 | 4 | 4 | 4 | 4 |
| 27 | X-22-7 | *Washer, Lock #8 | 3 | 3 | 3 | 3 | 3 |
| 28 | X-284-31 | *Grommet | 1 | 1 | 1 | 1 | 1 |
| 29 | X-301-29 | *Plug, Button | 1 | 1 | | | |
| 30 | X-301-34 | *Plug, Button | 1 | 1 | 1 | 1 | 1 |
| 31 | X-468-3 | *Tie, Cable Nylon | 5 | 5 | 5 | 5 | 5 |
| 32 | X-49-2 | *Screw, R.H.M. 6-32 X 3 | 2 | 2 | 2 | 2 | 2 |
| 33 | X-49-25 | *Screw, R.H.M. 6-32 X 1 | 18 | 18 | 18 | 18 | 18 |
| 34 | X-49-39 | *Screw, Pan Head | 2 | 2 | 2 | 2 | 2 |
| 35 | X-50-3 | *Screw, R.H.M. 10-24 X | 5 | 5 | 5 | 5 | 5 |
| 36 | X-50-70 | *Screw, R.H.M. | 1 | 1 | 1 | 1 | 1 |
| 37 | X-51-53 | *Screw, R.H.M. | 2 | 2 | 2 | 2 | 2 |
| 38 | X-519-1 | *Plug, Cap 1/8 Inch | 2 | 2 | 2 | 2 | 2 |
| 39 | X-6046-2 | *Strap, Ground | 1 | 1 | 1 | 1 | 1 |
| 40 | X-6048-2 | *Jumper, Terminal Block | 1 | 1 | 1 | 1 | 1 |
| 41 | X-6216-1 | *Screw, Hex Crimptite | 10 | 10 | 10 | 10 | 10 |
| 42 | X-6234-6 | *Nut, Hex. | 2 | 2 | 2 | 2 | 2 |
| 43 | X-67-127 | *Screw, Thread Forming | 2 | 2 | 2 | 2 | 2 |
| 44 | X-696-5 | *Sleeve | 1 | 1 | 1 | 1 | 1 |
| 45 | X-712-9 | *Spacer | 4 | 4 | 4 | 4 | 4 |
| 46 | X-71-2 | *Nut, Hex. | 2 | 2 | 2 | 2 | 2 |
| 47 | X-72-4 | *Nut, Hex. | 4 | 4 | 4 | 4 | 4 |
| 48 | 201620-86 | *Tab, Identification | 1 | 1 | 1 | 1 | 1 |
| 49 | 238736 | *Meter, Hour | 1 | 1 | 1 | 1 | 1 |
| 50 | 238898 | *Terminal | 1 | 1 | 1 | 1 | 1 |
| 51 | 241617 | *Connector, 6 Position | 1 | 1 | 1 | 1 | 1 |
| 52 | 246115 | *Block, Terminal | 1 | 1 | 1 | 1 | 1 |
| 53 | 255224 | *Voltmeter | 1 | 1 | 1 | 1 | 1 |
| 54 | 268297 | *Resistor, 24 Volt | 2 | 2 | 2 | 2 | 2 |
| | | Parts list continues | | | | | |

Group 301: Controller and Mounting, continued

| Item | Part Number | Description | Quantity | | | | |
|------|-------------|---------------------------|------------------|-----|-----|-----|-----|
| | | | Variation Number | | | | |
| | | | 108 | 109 | 112 | 114 | 117 |
| 55 | 282816 | *Voltmeter, AC | 1 | 1 | | | |
| 55 | 282817 | *Voltmeter, AC | | | 1 | | |
| 55 | 299898 | *Voltmeter, AC | | | | 1 | 1 |
| 56 | 282818 | *Meter, Frequency | 1 | 1 | 1 | 1 | 1 |
| 57 | 282898 | *Gauge, Water Temperature | 1 | 1 | 1 | 1 | 1 |
| 58 | 283420 | *Bulb | 2 | 2 | 2 | 2 | 2 |
| 59 | 284990 | *Socket, Lamp | 2 | 2 | 2 | 2 | 2 |
| 60 | 287948 | *Spacer, Circuit Board | 9 | 9 | 9 | 9 | 9 |
| 61 | 291207 | *Fuse, 1.5 Amp | 3 | 3 | 3 | 3 | 3 |
| 62 | 291740 | *Lamp | 2 | 2 | 2 | 2 | 2 |
| 63 | 292347 | *Decal | 1 | 1 | 1 | 1 | 1 |
| 64 | 292352 | *Resistor | 1 | 1 | 1 | 1 | 1 |
| 65 | 292373 | *Switch, Selector | 1 | 1 | 1 | 1 | 1 |
| 66 | 292375 | *Box, Controller | 1 | 1 | 1 | 1 | 1 |
| 67 | 292383 | *Nameplate | 1 | 1 | 1 | 1 | 1 |
| 68 | 292818 | *Cover, Controller | 1 | 1 | 1 | 1 | 1 |
| 69 | 292821 | *Holder, Fuse | 1 | 1 | 1 | 1 | 1 |
| 70 | 292823 | *Marker, Strip | 1 | 1 | 1 | 1 | 1 |
| 71 | 292834 | *Bumper | 4 | 4 | 4 | 4 | 4 |
| 72 | 292908 | *Plate, Hinged Back | 1 | 1 | 1 | 1 | 1 |
| 73 | 328072 | *Gauge, Oil Pressure | 1 | 1 | 1 | 1 | 1 |
| 74 | 347428 | *Ammeter, AC | 1 | 1 | | | |
| 74 | 282808 | *Ammeter, AC | | | | 1 | 1 |
| 74 | 273852 | *Ammeter, AC | | | 1 | | |
| 75 | 336428 | *Cable Assembly | 1 | 1 | 1 | 1 | 1 |
| 76 | 292364 | *Switch, Pushbutton | | | 1 | 1 | 1 |
| 77 | 292467 | *Decal, Emergency Stop | | | 1 | 1 | 1 |

Group 701: Literature

| Item | Part Number | Description | Quantity |
|------|-------------|---|-----------|
| | | | Variation |
| | | | 79 |
| 1 | TP-5579 | Operation Manual, Marathon DVR | 1 |
| 2 | TP-5583 | Service Manual, 350-1600 ROZD | 1 |
| 3 | TP-5384 | Service Manual, DDC 149 Series Engine | 1 |
| 4 | TP-5578 | Operation Manual, Marathon Alternator | 1 |
| 5 | TP-5611 | Operation Manual, DDC 71/92/149 Series Engine | 1 |
| 6 | TP-5700 | Installation Manual | 1 |
| 7 | TP-5722 | Wiring Diagram Manual, 350-2000 kW | 1 |
| 8 | TP-5750 | Operation Manual, 20-2000 kW | 1 |
| 9 | TP-5816 | Parts Catalog, 2000ROZD | 1 |
| 10 | TP-5819 | Engine Parts Catalog, DDC 2000 kW | 1 |
| 11 | TP-5707 | Parts Catalog, Accessories | 1 |

Kit List

2000 kW

Controllers, optional (Group 301)

7-Light Microprocessor Controllers (Level 2)

| | |
|---------------------------|--------|
| Standard meterbox | 347725 |
| Standard meterbox, 600V | 347660 |
| Standard meterbox, 380V | 347656 |
| Standard meterbox, 4160V | 347664 |
| Standard meterbox, 3300V | 347691 |
| Oversized meterbox | 347727 |
| Oversized meterbox, 600V | 347662 |
| Oversized meterbox, 380V | 347655 |
| Oversized meterbox, 4160V | 347666 |
| Oversized meterbox, 3300V | 347693 |

16-Light Microprocessor Controllers

| | |
|---------------------------|--------|
| Standard meterbox | 347724 |
| Standard meterbox, 600V | 347659 |
| Standard meterbox, 380V | 347655 |
| Standard meterbox, 4160V | 347663 |
| Standard meterbox, 3300V | 347690 |
| Oversized meterbox | 347726 |
| Oversized meterbox, 600V | 347661 |
| Oversized meterbox, 380V | 347657 |
| Oversized meterbox, 4160V | 347665 |
| Oversized meterbox, 3300V | 347692 |

Engine Gauge Box for Paralleling

| | |
|-------------------|--------|
| Standard meterbox | 347654 |
|-------------------|--------|

Cooling Systems, optional (Group 104)

| | |
|-------------------------------------|--------|
| Cooling, radiator | |
| Cooling, remote radiator set-up | 347831 |
| Duct Flange, radiator | 347609 |
| Heater, block with circulating pump | 347687 |
| Valve, block heater isolation valve | 347881 |

(See Group 104: Cooling System for parts list.)

Miscellaneous

| | |
|------------------------------|--------|
| Generator Paint (Spray Can) | 221323 |
| Generator Paint (Gallon Can) | 221322 |

Optional Accessories

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

7-Light Controller Kits

| 7-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS | | | | | | | |
|---|-------------------------|----------|--------------------------|----------|----------|----------|-----------|
| Qty. | Description | Common | Kit Numbers/Unique Parts | | | | |
| | | | 347656 | 347658 | 347660 | 347662 | 347664 |
| 1 | Controller Assembly* | | A-347532 | A-347525 | A-347526 | A-347534 | A-347527 |
| 1 | Washer, shakeproof 3/8 | X-22-14 | | | | | |
| 4 | Washer, lock 5/16 | X-22-16 | | | | | |
| 8 | Washer, shakeproof | X-22-20 | | | | | |
| 1 | Grommet | X-284-25 | | | | | |
| 2 | Screw, R.H.M 8-32 x 3/4 | X-51-11 | | | | | |
| 1 | Screw, R.H.M 8-32 x 1 | X-51-3 | | | | | |
| 1 | Block, fuse | X-6129-8 | | | | | |
| 1 | Block, fuse | X-6129-9 | | | | | |
| 1 | Fuse | X-6134-9 | | | | | |
| 6 | Screw, drill | X-794-2 | | | | | |
| 1 | Marker, strip | 255080 | | | | | |
| 1 | Harness, wiring (CT) | | 258453 | 258453 | 258453 | 258453 | 347563 |
| 1 | Relay | 272684 | | | | | |
| 1 | Panel, relay | 274796 | | | | | |
| 3 | Transformer, potential | | 276578 | 276578 | 258990 | 258990 | X-6121-55 |
| 4 | Mount, vibro | 282829 | | | | | |
| 1 | Speed Pickup | 291288 | | | | | |
| 1 | Block, terminal | 295314 | | | | | |
| 3 | Transformer, current | | 297676 | 297676 | 297675 | 297675 | 248874 |
| 1 | Harness, wiring (AC) | | 347872 | 347872 | 347872 | 347872 | 347562 |
| 1 | Harness, wiring (AC) | | | | | | 347564 |

| 7-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS | | | | | | | |
|---|-------------------------|----------|--------------------------|-----------|-----------|----------|----------|
| Qty. | Description | Common | Kit Numbers/Unique Parts | | | | |
| | | | 347666 | 347691 | 347693 | 347725 | 347727 |
| 1 | Controller Assembly* | | A-347535 | A-347527 | A-347535 | A-347525 | A-347533 |
| 1 | Washer, shakeproof 3/8 | X-22-14 | | | | | |
| 4 | Washer, lock 5/16 | X-22-16 | | | | | |
| 8 | Washer, shakeproof | X-22-20 | | | | | |
| 1 | Grommet | X-284-25 | | | | | |
| 2 | Screw, R.H.M 8-32 x 3/4 | X-51-11 | | | | | |
| 1 | Screw, R.H.M 8-32 x 1 | X-51-3 | | | | | |
| 1 | Block, fuse | X-6129-8 | | | | | |
| 1 | Block, fuse | X-6129-9 | | | | | |
| 1 | Fuse | X-6134-9 | | | | | |
| 6 | Screw, drill | X-794-2 | | | | | |
| 1 | Marker, strip | 255080 | | | | | |
| 1 | Harness, wiring (CT) | | 347563 | 347563 | 347563 | 258453 | 258453 |
| 1 | Relay | 272684 | | | | | |
| 1 | Panel, relay | 274796 | | | | | |
| 3 | Transformer | | X-6121-55 | X-6121-55 | X-6121-55 | 287684 | 287684 |
| 4 | Mount, vibro | 282829 | | | | | |
| 1 | Speed Pickup | 291288 | | | | | |
| 1 | Block, terminal | 295314 | | | | | |
| 3 | Transformer, current | | 248874 | 248874 | 248874 | 297684 | 297684 |
| 1 | Harness, wiring (AC) | | 347562 | 347562 | 347562 | 347872 | 347872 |
| 1 | Harness, wiring (AC) | | 347564 | 347564 | 347564 | | |

* See Controller Assembly section for parts list.

7-Light Controller Assemblies

| Qty. | Description | Common Parts | Controller Assembly Number/Unique Parts | | | | |
|------|------------------------------|--------------|---|----------|----------|--|--|
| | | | A-347525 | A-347526 | A-347527 | | |
| 1 | Resistor, 24 volt | 268297 | | | | | |
| 1 | Indicator Circuit Board | A-336430 | | | | | |
| 1 | Main Circuit Board | A-336415 | | | | | |
| 1 | Washer, Shakeproof E.T. | X-22-20 | | | | | |
| 2 | Washer, Lock | X-22-50 | | | | | |
| 4 | Washer, Lock #6 | X-22-6 | | | | | |
| 3 | Washer, Lock #8 | X-22-7 | | | | | |
| 2 | Plug, Cap 1/8 inch | X-519-2 | | | | | |
| 1 | Grommet | X-284-31 | | | | | |
| 1 | Plug, Button | X-301-29 | | | | | |
| 1 | Plug, Button | X-301-34 | | | | | |
| 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, Pan Head Machine | X-50-70 | | | | | |
| 2 | Screw, r.h.m. | X-51-53 | | | | | |
| 1 | Strap, Ground | X-6046-2 | | | | | |
| 1 | Jumper | X-6048-2 | | | | | |
| 12 | Screw, Phil Hex Crimptite | X-6216-1 | | | | | |
| 2 | Nut, Hex. | X-6234-6 | | | | | |
| 2 | Screw, Thread Forming | X-67-127 | | | | | |
| 1 | Sleeve | X-696-5 | | | | | |
| 2 | Nut, Hex. | X-71-2 | | | | | |
| 4 | Nut, Hex. 8-32 zinc plated | X-72-4 | | | | | |
| 4 | Spacer | X-712-9 | | | | | |
| 1 | Tab, Ident. | 201620-86 | | | | | |
| 1 | Meter, Hour | 238736 | | | | | |
| 1 | Terminal | 238898 | | | | | |
| 1 | Connector, Plug 6 Position | 241617 | | | | | |
| 1 | Block, Terminal | 246115 | | | | | |
| 1 | Voltmeter | 255224 | | | | | |
| 3 | Bulb | 283420 | | | | | |
| 2 | Lamp, meter scale | 291740 | | | | | |
| 1 | Plate, Hinge | 292908 | | | | | |
| 1 | Voltmeter, AC | | 282816 | 282817 | 354245 | | |
| 1 | Gauge, Oil Pressure | 328072 | | | | | |
| 1 | Gauge, Water Temperature | 282898 | | | | | |
| 1 | Ammeter, AC | | 347834 | 273852 | 273852 | | |
| 3 | Socket, Lamp | 284990 | | | | | |
| 8 | Spacer, Circuit Board | 287948 | | | | | |
| 3 | Fuse, 1.5 Amp | 291207 | | | | | |
| 1 | Decal | 292347 | | | | | |
| 1 | Resistor | 292352 | | | | | |
| 1 | Switch, Selector | 292374 | | | | | |
| 1 | Holder, Fuse | 292821 | | | | | |
| 1 | Marker, Strip | 292823 | | | | | |
| 1 | Bumper | 292834 | | | | | |
| 1 | Harness, Cable | 336428 | | | | | |
| 1 | Meter, Frequency | 282818 | | | | | |
| 1 | Cover, Controller | 292818 | | | | | |
| 1 | Nameplate | 328910 | | | | | |
| 1 | Box, Silkscreened Controller | 292375 | | | | | |

7-Light Controller Assemblies

| Qty. | Description | Common Parts | Controller Assembly Number/Unique Parts | | | | |
|------|------------------------------|--------------|---|----------|----------|----------|--|
| | | | A-347532 | A-347533 | A-347534 | A-347535 | |
| 1 | Resistor, 24 volt | 268297 | | | | | |
| 1 | Indicator Circuit Board | A-336430 | | | | | |
| 1 | Main Circuit Board | A-336415 | | | | | |
| 1 | Washer, Shakeproof E.T. | X-22-20 | | | | | |
| 2 | Washer, Lock | X-22-50 | | | | | |
| 4 | Washer, Lock #6 | X-22-6 | | | | | |
| 3 | Washer, Lock #8 | X-22-7 | | | | | |
| 8 | Washer, Plain | X-25-73 | | | | | |
| 1 | Grommet | X-284-31 | | | | | |
| 1 | Plug, Button | | | X-301-29 | | X-301-29 | |
| 1 | Plug, Button | X-301-34 | | | | | |
| 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, Pan Head Machine | X-50-70 | | | | | |
| 2 | Screw, r.h.m. | X-51-53 | | | | | |
| 1 | Strap, Ground | X-6046-2 | | | | | |
| 1 | Jumper | X-6048-2 | | | | | |
| 12 | Screw, Phil Hex Crimptite | X-6216-1 | | | | | |
| 2 | Nut, Hex. | X-6234-6 | | | | | |
| 2 | Screw, Thread Forming | X-67-127 | | | | | |
| 1 | Sleeve | X-696-5 | | | | | |
| 4 | Spacer | X-712-9 | | | | | |
| 2 | Nut, Hex. | X-71-2 | | | | | |
| 4 | Nut, Hex. 8-32 zinc plated | X-72-4 | | | | | |
| 1 | Tab, Ident. | 201620-86 | | | | | |
| 1 | Meter, Hour | 238736 | | | | | |
| 1 | Terminal | 238898 | | | | | |
| 1 | Connector, Plug 6 Position | 241617 | | | | | |
| 1 | Block, Terminal | 246115 | | | | | |
| 1 | Voltmeter | 255224 | | | | | |
| 3 | Bulb | 283420 | | | | | |
| 2 | Lamp, meter scale | 291740 | | | | | |
| 4 | Bumper | 255443 | | | | | |
| 1 | Plate, Hinge | 273785 | | | | | |
| 1 | Voltmeter, AC | | 282816 | 282816 | 282817 | 354245 | |
| 1 | Gauge, Oil Pressure | 328072 | | | | | |
| 1 | Gauge, Water Temperature | 282898 | | | | | |
| 1 | Ammeter, AC | | 273852 | 347834 | 273852 | 282808 | |
| 3 | Socket, Lamp | 284990 | | | | | |
| 8 | Spacer, Circuit Board | 287948 | | | | | |
| 3 | Fuse, 1.5 Amp | 291207 | | | | | |
| 1 | Decal | 292347 | | | | | |
| 1 | Resistor | 292352 | | | | | |
| 1 | Decal, Emergency Stop | | 292467 | | 292467 | 292467 | |
| 1 | Switch, Selector | 292374 | | | | | |
| 1 | Holder, Fuse | 292821 | | | | | |
| 1 | Marker, Strip | 292823 | | | | | |
| 1 | Bumper | 292834 | | | | | |
| 1 | Harness, Cable | 336428 | | | | | |
| 1 | Meter, Frequency | 282818 | | | | | |
| 1 | Cover, Controller | 273838 | | | | | |
| 1 | Nameplate | 328910 | | | | | |
| 1 | Box, Silkscreened Controller | 273813 | | | | | |
| 1 | Switch, pushbutton | | 292364 | | 292364 | 292364 | |

16-Light Controller Kits

| 16-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS | | | | | | | |
|--|-------------------------|----------|--------------------------|----------|----------|----------|-----------|
| Qty. | Description | Common | Kit Numbers/Unique Parts | | | | |
| | | | 347655 | 347655 | 347659 | 347661 | 347663 |
| 1 | Controller Assembly* | | A-347509 | A-347517 | A-347510 | A-347518 | A-347511 |
| 1 | Washer, shakeproof 3/8 | X-22-14 | | | | | |
| 4 | Washer, lock 5/16 | X-22-16 | | | | | |
| 8 | Washer, shakeproof | X-22-20 | | | | | |
| 1 | Grommet | X-284-25 | | | | | |
| 2 | Screw, R.H.M 8-32 x 3/4 | X-51-11 | | | | | |
| 1 | Screw, R.H.M 8-32 x | X-51-3 | | | | | |
| 1 | Block, fuse1 | X-6129-8 | | | | | |
| 1 | Block, fuse | X-6129-9 | | | | | |
| 1 | Fuse | X-6134-9 | | | | | |
| 6 | Screw, drill | X-794-2 | | | | | |
| 1 | Marker, strip | 255080 | | | | | |
| 1 | Harness, wiring (CT) | | 258453 | 258453 | 258453 | 258453 | 347563 |
| 1 | Relay | 272684 | | | | | |
| 1 | Panel, relay | 274796 | | | | | |
| 3 | Transformer, potential | | 276578 | 276578 | 258990 | 258990 | X-6121-55 |
| 4 | Mount, vibro | 282829 | | | | | |
| 1 | Speed Pickup | 291288 | | | | | |
| 1 | Block, terminal | 295314 | | | | | |
| 3 | Transformer, current | | 297676 | 297676 | 297675 | 297675 | 248874 |
| 1 | Harness, wiring (AC) | | 347872 | 347872 | 347872 | 347872 | 347562 |
| 1 | Harness, wiring (AC) | | | | | | 347564 |

| 16-LIGHT MICROPROCESSOR CONTROLLER KIT PARTS | | | | | | | |
|--|-------------------------|----------|--------------------------|-----------|-----------|----------|----------|
| Qty. | Description | Common | Kit Numbers/Unique Parts | | | | |
| | | | 347665 | 347690 | 347692 | 347724 | 347726 |
| 1 | Controller Assembly* | | A-347519 | A-347511 | A-347519 | A-347509 | A-347517 |
| 1 | Washer, shakeproof 3/8 | X-22-14 | | | | | |
| 4 | Washer, lock 5/16 | X-22-16 | | | | | |
| 8 | Washer, shakeproof | X-22-20 | | | | | |
| 1 | Grommet | X-284-25 | | | | | |
| 2 | Screw, R.H.M 8-32 x 3/4 | X-51-11 | | | | | |
| 1 | Screw, R.H.M 8-32 x 1 | X-51-3 | | | | | |
| 1 | Block, fuse | X-6129-8 | | | | | |
| 1 | Block, fuse | X-6129-9 | | | | | |
| 1 | Fuse | X-6134-9 | | | | | |
| 6 | Screw, drill | X-794-2 | | | | | |
| 1 | Marker, strip | 255080 | | | | | |
| 1 | Harness, wiring (CT) | | 347563 | 347563 | 347563 | 258453 | 258453 |
| 1 | Relay | 272684 | | | | | |
| 1 | Panel, relay | 274796 | | | | | |
| 3 | Transformer, potential | | X-6121-55 | X-6121-55 | X-6121-55 | 287684 | 287684 |
| 4 | Mount, vibro | 282829 | | | | | |
| 1 | Speed Pickup | 291288 | | | | | |
| 1 | Block, terminal | 295314 | | | | | |
| 3 | Transformer, current | | 248874 | 248874 | 248874 | 297676 | 297676 |
| 1 | Harness, wiring (AC) | | 347562 | 347562 | 347562 | 347872 | 347872 |
| 1 | Harness, wiring (AC) | | 347564 | 347564 | 347564 | | |

* See Controller Assembly section for parts list.

16-Light Controller Assemblies

| Qty. | Description | Common Parts | Controller Assembly Number/Unique Parts | | | | |
|------|------------------------------|--------------|---|-----------|-----------|--|--|
| | | | A-347509 | A-3475510 | A-3475511 | | |
| 2 | Resistor, 24 volt | 268297 | | | | | |
| 1 | Indicator Circuit Board | A-336432 | | | | | |
| 1 | Main Circuit Board | A-336415 | | | | | |
| 1 | Washer, Shakeproof E.T. | X-22-20 | | | | | |
| 2 | Washer, Lock | X-22-50 | | | | | |
| 4 | Washer, Lock #6 | X-22-6 | | | | | |
| 3 | Washer, Lock #8 | X-22-7 | | | | | |
| 2 | Plug, Cap 1/8 inch | X-519-1 | | | | | |
| 1 | Grommet | X-284-31 | | | | | |
| 1 | Plug, Button | | X-301-29 | | | | |
| 1 | Plug, Button | X-301-34 | | | | | |
| 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, Pan Head Machine | X-50-70 | | | | | |
| 2 | Screw, r.h.m. | X-51-53 | | | | | |
| 1 | Strap, Ground | X-6046-2 | | | | | |
| 1 | Jumper | X-6048-2 | | | | | |
| 12 | Screw, Phil Hex Crimptite | X-6216-1 | | | | | |
| 2 | Nut, Hex. | X-6234-6 | | | | | |
| 2 | Screw, Thread Forming | X-67-127 | | | | | |
| 1 | Sleeve | X-696-5 | | | | | |
| 2 | Nut, Hex. | X-71-2 | | | | | |
| 4 | Nut, Hex. 8-32 zinc plated | X-72-4 | | | | | |
| 4 | Spacer | X-712-9 | | | | | |
| 1 | Tab, Ident. | 201620-86 | | | | | |
| 1 | Meter, Hour | 238736 | | | | | |
| 1 | Terminal | 238898 | | | | | |
| 1 | Connector, Plug 6 Position | 241617 | | | | | |
| 1 | Block, Terminal | 246115 | | | | | |
| 1 | Voltmeter | 255224 | | | | | |
| 3 | Bulb | 283420 | | | | | |
| 2 | Lamp, meter scale | 291740 | | | | | |
| 1 | Plate, Hinge | 292908 | | | | | |
| 1 | Voltmeter, AC | | 282816 | 282817 | 354245 | | |
| 1 | Gauge, Oil Pressure | 328072 | | | | | |
| 1 | Gauge, Water Temperature | 282898 | | | | | |
| 1 | Ammeter, AC | | 347834 | 273852 | 282808 | | |
| 3 | Socket, Lamp | 284990 | | | | | |
| 8 | Spacer, Circuit Board | 287948 | | | | | |
| 3 | Fuse, 1.5 Amp | 291207 | | | | | |
| 1 | Decal | 292347 | | | | | |
| 1 | Resistor | 292352 | | | | | |
| 1 | Switch, Selector | 292374 | | | | | |
| 1 | Holder, Fuse | 292821 | | | | | |
| 1 | Marker, Strip | 292823 | | | | | |
| 1 | Bumper | 292834 | | | | | |
| 1 | Harness, Cable | 336428 | | | | | |
| 1 | Meter, Frequency | 282818 | | | | | |
| 1 | Cover, Controller | 292818 | | | | | |
| 1 | Nameplate | 292383 | | | | | |
| 1 | Box, Silkscreened Controller | 292375 | | | | | |
| 1 | Decal, Emergency Stop | | | 292467 | 292467 | | |
| 1 | Switch, pushbutton | | | 292364 | 292364 | | |

16-Light Controller Assemblies

| Qty. | Description | Common Parts | Controller Assembly Number/Unique Parts | | | | |
|------|------------------------------|--------------|---|----------|----------|--|--|
| | | | A-347517 | A-347518 | A-347519 | | |
| 2 | Resistor, 24 volt | 268297 | | | | | |
| 1 | Indicator Circuit Board | A-336432 | | | | | |
| 1 | Main Circuit Board | A-336415 | | | | | |
| 1 | Washer, Shakeproof E.T. | X-22-20 | | | | | |
| 2 | Washer, Lock | X-22-50 | | | | | |
| 4 | Washer, Lock #6 | X-22-6 | | | | | |
| 3 | Washer, Lock #8 | X-22-7 | | | | | |
| 8 | Washer, Plain | X-25-73 | | | | | |
| 1 | Grommet | X-284-31 | | | | | |
| 1 | Plug, Button | | X-301-29 | | | | |
| 1 | Plug, Button | X-301-34 | | | | | |
| 2 | Screw, 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, Pan Head Machine | X-50-70 | | | | | |
| 2 | Screw, r.h.m. | X-51-53 | | | | | |
| 1 | Strap, Ground | X-6046-2 | | | | | |
| 1 | Jumper | X-6048-2 | | | | | |
| 12 | Screw, Phil Hex Crimptite | X-6216-1 | | | | | |
| 2 | Nut, Hex. | X-6234-6 | | | | | |
| 2 | Screw, Thread Forming | X-67-127 | | | | | |
| 1 | Sleeve | X-696-5 | | | | | |
| 4 | Spacer | X-712-9 | | | | | |
| 2 | Nut, Hex. | X-71-2 | | | | | |
| 4 | Nut, Hex. 8-32 zinc plated | X-72-4 | | | | | |
| 1 | Tab, Ident. | 201620-86 | | | | | |
| 1 | Meter, Hour | 238736 | | | | | |
| 1 | Terminal | 238898 | | | | | |
| 1 | Connector, Plug 6 Position | 241617 | | | | | |
| 1 | Block, Terminal | 246115 | | | | | |
| 1 | Voltmeter | 255224 | | | | | |
| 3 | Bulb | 283420 | | | | | |
| 2 | Lamp, meter scale | 291740 | | | | | |
| 4 | Bumper | 255443 | | | | | |
| 1 | Plate, Hinge | 273785 | | | | | |
| 1 | Voltmeter, AC | | 282816 | 282817 | 354245 | | |
| 1 | Gauge, Oil Pressure | 328072 | | | | | |
| 1 | Gauge, Water Temperature | 282898 | | | | | |
| 1 | Ammeter, AC | | 347834 | 273852 | 282808 | | |
| 3 | Socket, Lamp | 284990 | | | | | |
| 8 | Spacer, Circuit Board | 287948 | | | | | |
| 3 | Fuse, 1.5 Amp | 291207 | | | | | |
| 1 | Decal | 292347 | | | | | |
| 1 | Resistor | 292352 | | | | | |
| 1 | Decal, Emergency Stop | | | 292467 | 292467 | | |
| 1 | Switch, Selector | 292374 | | | | | |
| 1 | Holder, Fuse | 292821 | | | | | |
| 1 | Marker, Strip | 292823 | | | | | |
| 1 | Bumper | 292834 | | | | | |
| 1 | Harness, Cable | 336428 | | | | | |
| 1 | Meter, Frequency | 282818 | | | | | |
| 1 | Cover, Controller | 273838 | | | | | |
| 1 | Nameplate | 292383 | | | | | |
| 1 | Box, Silkscreened Controller | 273813 | | | | | |
| 1 | Switch, pushbutton | | | 292364 | 292364 | | |

Engine Gauge Box for Paralleling

| ENGINE GAUGE BOX KIT PARTS | | | | | | | |
|----------------------------|-------------------------|----------|--------------------------|--|--|--|--|
| Qty. | Description | Common | Kit Numbers/Unique Parts | | | | |
| | | | 347654 | | | | |
| 1 | Controller Assembly* | | A-354174 | | | | |
| 1 | Washer, shakeproof 3/8 | X-22-14 | | | | | |
| 4 | Washer, lock 5/16 | X-22-16 | | | | | |
| 8 | Washer, shakeproof | X-22-20 | | | | | |
| 1 | Grommet | X-284-25 | | | | | |
| 2 | Screw, R.H.M 8-32 x 3/4 | X-51-11 | | | | | |
| 1 | Screw, R.H.M 8-32 x 1 | X-51-3 | | | | | |
| 1 | Block, fuse | X-6129-8 | | | | | |
| 1 | Block, fuse | X-6129-9 | | | | | |
| 1 | Fuse | X-6134-9 | | | | | |
| 6 | Screw, drill | X-794-2 | | | | | |
| 1 | Marker, strip | 255080 | | | | | |
| 1 | Harness, wiring | 354087 | | | | | |
| 1 | Relay | 272684 | | | | | |
| 1 | Panel, relay | 274796 | | | | | |
| 4 | Mount, vibro | 282829 | | | | | |
| 1 | Sensor, magnetic | 226529 | | | | | |
| 1 | Block, terminal | 295314 | | | | | |
| 1 | Water Level Switch | 336657 | | | | | |

* See Controller Assembly below.

| Qty. | Description | Common Parts | Controller Assembly Number/ Unique Parts | | | | |
|------|------------------------------|--------------|--|--|--|--|--|
| | | | A-354174 | | | | |
| 1 | Strap, Ground | X-6046-2 | | | | | |
| 1 | Switch, Speed | X-6122-1 | | | | | |
| 1 | Meter, Hour | 238736 | | | | | |
| 1 | Voltmeter | 255224 | | | | | |
| 1 | Box, Controller | 263153 | | | | | |
| 1 | Panel | 263154 | | | | | |
| 1 | Resistor, 24 volt | 268297 | | | | | |
| 1 | Harness, Wiring (24-pin) | 273764 | | | | | |
| 1 | Strip, marker | 273781 | | | | | |
| 1 | Harness, Wiring (shielded) | 273984 | | | | | |
| 1 | Gauge, Oil Pressure | 328072 | | | | | |
| 1 | Gauge, Water Temperature | 282898 | | | | | |
| 6 | Strip, Terminal (9-terminal) | 283060 | | | | | |
| 3 | Bulb | 283420 | | | | | |
| 3 | Socket, Lamp | 284990 | | | | | |
| 1 | Switch, pushbutton | 292364 | | | | | |
| 1 | Decal, Emergency Stop | 292467 | | | | | |
| 1 | Cover, Controller | 292818 | | | | | |
| 4 | Bumper | 292834 | | | | | |

Cooling System Kits

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

Block Heater with Circulating Pump **347687**

| | | |
|---|-----------------------------------|----------|
| 1 | Bushing, reducer, 3/4 x 1 1/4 NPT | X-202-18 |
| 1 | Tee, black iron 3/8 | X-203-15 |
| 1 | Nipple, pipe 3/8 | X-204-9 |
| 1 | Cross Pipe | X-207-5 |
| 1 | Elbow, pipe 3/4 | X-215-2 |
| 1 | Elbow, 45°, 1 | X-274-10 |
| 1 | Elbow, 90 deg. | X-391-23 |
| 6 | Clamp, hose, .69-1.25 ID | X-426-12 |
| 2 | Connector, hose | X-582-11 |
| 2 | Connector, hose, 3/4 ID 1 NPT | X-582-15 |
| 1 | Connector, hose, 3/4 ID 3/4 NPT | X-582-8 |
| 3 | Washer, beveled, .44 | X-6011-4 |
| 1 | Socket | X-6124-4 |
| 1 | Hose | X-691-19 |
| 1 | Hose | X-691-25 |
| 1 | Hose | X-691-33 |
| 2 | Screw, drill, 8-18 | X-794-2 |
| 1 | Bushing, reducing, 1/2 x 3/4 | 153659 |
| 1 | Adapter, plate | 274881 |
| 1 | Gasket | 274882 |
| 1 | Harness, block heater | 279956 |
| 1 | Socket assembly | 291273 |
| 1 | Relay | 291309 |
| 1 | Track, mounting | 347278 |
| 1 | Heater, block | 347686 |
| 1 | Thermostat Assembly | 34742 |

Duct Flange, radiator **347609**

| | | |
|----|--------------------------|----------|
| 12 | Rivet, alumin./steel pop | X-781-10 |
| 2 | Frame, air duct | 347611 |
| 1 | Frame, air duct | 347612 |
| 1 | Frame, air duct | 347613 |
| 2 | Bracket, air duct | 347610 |

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

Cooling, Remote Radiator **347831**

| | | |
|---|---------------------------|----------|
| 2 | Hose, radiator | X-507-6 |
| 1 | Clamp, U | X-722-11 |
| 4 | Clamp, exhaust pipe | 286283 |
| 4 | Clamp, hose | 291542 |
| 1 | Gasket, inlet | 347504 |
| 1 | Guard, pulley (front) | 347852 |
| 1 | Guard, pulley (left) | 347853 |
| 1 | Guard, pulley (right) | 347854 |
| 1 | Tube, intercooler | 347985 |
| 1 | Tube, intercooler | 347986 |
| 1 | Tube, inlet | 347987 |
| 1 | Tube, outlet | 347988 |
| 1 | Bracket, inlet tube | 354017 |
| 1 | Bracket, intercooler tube | 354015 |
| 1 | Bracket, intercooler tube | 354016 |
| 2 | Gasket, outlet | 354043 |
| 1 | Bracket, guard | 354086 |
| 1 | Guard, pulley (right) | 354088 |

Valve, Block Heater Isolation **347881**

| | | |
|---|-----------------------|---------|
| 2 | Bushing, reducer, 3/4 | X-202-1 |
| 4 | Nipple, pipe | X-206-9 |
| 2 | Union, pipe | X-206-9 |
| 2 | Valve | 255632 |

Appendix A.

Glossary of Abbreviations

Abbreviations are used throughout this manual. Normally in the text they will appear in complete form with the abbreviation following in parenthesis the first time they are used. After that they will appear in the abbreviated form. The commonly used abbreviations are shown below.

| | | | |
|---------|--|--------------------|--|
| AC | alternating current | etc. | etc etera (and so forth) |
| AISI | American Iron and Steel Institute | ext. | external |
| Amp | ampere | °F | Fahrenheit degree |
| Amps | amperes | fl. oz. | fluid ounce, fluid ounces |
| ANSI | American National Standard Institute | FM | frequency modulation |
| API | American Petroleum Institute | ft. | foot, feet |
| approx. | approximate, approximately | ft. lbs. | foot pound, foot pounds |
| A/R | as required, as requested | ga. | gauge |
| A/S | as supplied, as stated, as suggested | gal./ gals. | gallon, gallons |
| ASA | American Standards Association | gph | gallons per hour |
| ASME | American Society of Mechanical Engineers | gpm | gallons per minute |
| assy. | assembly | gr. | grade |
| ASTM | American Society for Testing Materials | grd. | ground |
| ATDC | after top dead center | HCHT | high cylinder head temperature |
| aux. | auxiliary | HET | high exhaust (or engine) temperature |
| AWG | American Wire Gauge | Hg | mercury (element) |
| AWM | appliance wiring material | H ₂ O | water |
| BBDC | before bottom dead center | HP | horsepower |
| BDC | before dead center | hr, hrs | hour |
| BHP | brake horsepower | Hz | hertz (cycles per second) |
| bmep | brake mean effective pressure | ID | inside diameter |
| Btu | British thermal unit | IEEE | Institute of Electrical and Electronic Engineers |
| °C | Celsius degree | in. | inch(es) |
| cc | cubic centimeter | inc. | incorporated |
| CCA | cold cranking Amps. | in. lbs. | inch pounds |
| CEC | Canadian Electrical Code | int. | internal |
| cfh | cubic feet per hour | int.-ext. | internal-external |
| cfm | cubic feet per minute | ISO | International Standards Organization |
| CID | cubic inch displacement | J | joule, joules |
| cm | centimeter, centimeters | JIS | Japanese Industry Standard |
| cmm | cubic meters per minute | kg | kilogram, kilograms |
| co. | company | kg/cm ² | kilograms per square centimeter |
| cont'd. | continued | kgm | kilogram meter(s) |
| CSA | Canadian Standards Association | kJ | kilojoules (btu cal) |
| CT | current transformer | km | kilometer, kilometers |
| cu. in. | cubic inch, cubic inches | kPa | kiloPascal, kiloPascals |
| cyl. | cylinder | kph | kilometers per hour |
| dB | decibel | kV | kilovolt |
| dBA | decibels (A weighted) | kVA | kilovolt amperes |
| DC | direct current | kW | kilowatt, kilowatts |
| DCR | direct current resistance | kWH | kilowatt hour |
| deg. | degree | L | liter, liters |
| dept. | department | LxWxH | length x width x height |
| dia. | diameter | LED(s) | light emitting diode |
| e.g. | example given | lb., lbs. | pound, pounds |
| EIA | Electronic Industries Association | L/hr. | liter per hour, liters per hour |
| EMI | electromagnetic interference | L/min. | liter(s) per minutes, |
| EPA | Environmental Protection Agency | LOP | low oil pressure |

| | | | |
|---------------------|--|------------|----------------------------------|
| LP | liquefied petroleum | pot. | potentiometer |
| m | meter, meters | ppm | parts per million |
| m ³ | cubic meter, cubic meters | psi | pounds per square inch |
| max. | maximum | pt., pts. | pint, pints |
| MCM | one thousand circular mils. | PVC | polyvinyl chloride |
| megger | megohmmeter | qt., qts. | quart, quarts |
| MHz | megahertz | qty. | quantity |
| mi. | mile, miles | ref. | reference |
| mil | one one-thousandth of an inch | RFI | radio frequency interference |
| min. | minimum | r.h.m. | round-head machine (screw) |
| mJ | millijoule, millijoules | rms | root mean square |
| MJ | mega joule, mega joules | RPM | revolutions per inch |
| mm | millimeter, millimeters | RTV | room temperature vulcanization |
| m ³ /min | cubic meters per minute | SAE | Society of Automotive Engineers |
| MPa | megaPascal | SCR | silicon controlled rectifier |
| mW | milliwatt, milliwatts | sec. | second, seconds |
| MW | megawatt, megawatts | spec. | specs, specification |
| N/A | not available or not applicable | sq. | square |
| NBS | National Bureau of Standards | sq. cm | square centimeters |
| N.C. | normally closed | sq. in. | square inch, square inches |
| NEC | National Electrical Code | tach | tachometer |
| NEMA | National Electrical Manufacturers Association | TDC | top dead center |
| NFPA | National Fire Protection Association | tech. pub. | technical publications |
| Nm | Newton meter, Newton meters | temp. | temperature |
| no., nos | number, numbers | TIF | telephone influence factor |
| NPT | National Standard taper pipe thread per general use | TP, TPs | technical publications |
| N/R | not required | turbo | turbocharger |
| OC | overcrank | UHF | ultrahigh frequency |
| OD | outside diameter | UNC | Unified coarse thread (was NC) |
| OEM | original equipment manufacturer | UNF | Unified fine thread (was NF) |
| OS | overspeed, oversize | UL | Underwriter's Laboratories, Inc. |
| O/S | oversize | U/S | undersize |
| OSHA | Occupational Safety and Health Act | U.S.A. | United States of America |
| OV | overvoltage | V | volt, volts |
| oz. | ounce, ounces | vac | Volts alternating current |
| PF | power factor | vdc | volts direct current |
| PMG | permanent magnet generator | VHF | very high frequency |
| | | W | watt, watts |

Appendix B.

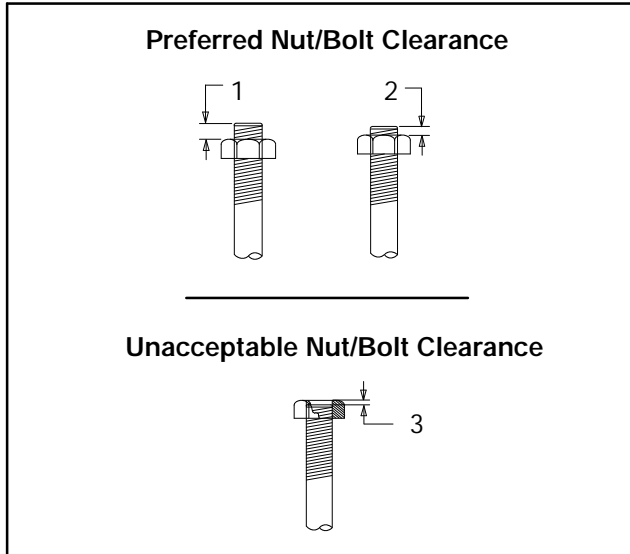
Common Hardware Application Guidelines

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 2 as a guide. As a general rule, a minimum length of one thread beyond the nut and a maximum length of 1/2 the bolt/screw diameter beyond the nut is the preferred method.

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

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



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

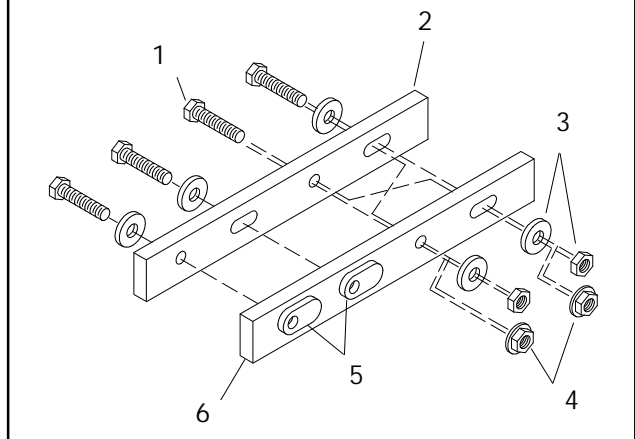
Figure 2. Acceptable Bolt Lengths

Steps for common hardware application:

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

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

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



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

Figure 3. Acceptable Hardware Combinations

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Nuts

Styles



Hex. Head



Lock Nut or
Nylock Nut



Square Nut



Cap Nut or
Acorn Nut



Wing Nut

Grade (Hardness)

American Standard



Grade 2



Grade 5

Metric



5.8



8.8



10.9



12.9

Sample Dimensions

American Standard

Major Thread Diameter In Fractional Inches Or $\frac{1}{4}$ -20 Threads Per Inch
Screw Number Size

Metric

Major Thread Diameter In Millimeters $M8-1.25$ Distance Between Threads In Millimeters

Washers

Styles



Plain
Washer



Split Lock Washer
or Spring Washer



Spring Washer
or Wave Washer



External
Tooth Lock
Washer



Internal Tooth
Lock Washer



Internal-External Tooth
Lock Washer

Grade (Hardness)

There is no marking to identify hardness. Usually hardened washers have a black oxide or black phosphate finish rather than a zinc (silver-colored) finish.

Sample (Hardness)

Plain Washers

Internal Dimension $\frac{9}{32} \times \frac{5}{8} \times \frac{1}{16}$ Thickness
External Dimension

Lock Washers

$\frac{5}{8}$
Internal Dimension

Figure 5. Nuts/Washers

Appendix D.

General Torque Specifications

Use the following specifications for SAE fasteners when no torque values are given elsewhere in this or the service manual for a specified bolt. The values given are based on

new plated threads. Increase values by 20% if nonplated threads are used.

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

Use the following specifications for metric fasteners when no torque values are given elsewhere in this manual for a specified bolt. These values are based on new plated threads. Increase values by 20% if nonplated threads are used.

Screws threaded into aluminum must have two diameters of threads engaged and may require 30% or more reduction in the torque.

| Size (mm) | Torque ft-lb (Nm) | | | Fasteners Assembled Into |
|-----------|-------------------|-----------|-----------|--------------------------|
| | 5.8 | 6.8 | 10.9 | Aluminum |
| 6 x 1.00 | 5 (7) | 6 (9) | 9 (12) | 5 (7) |
| 8 x 1.25 | 14 (19) | 14 (20) | 20 (37) | 14 (19) |
| 8 x 1.00 | 16 (21) | 17 (24) | 23 (31) | 16 (21) |
| 10 x 1.50 | 25 (35) | 27 (37) | 38 (51) | 25 (35) |
| 10 x 1.25 | 29 (39) | 34 (46) | 45 (61) | 29 (39) |
| 12 x 1.75 | 42 (57) | 45 (61) | 65 (89) | |
| 12 x 1.50 | 48 (65) | 55 (75) | 78 (106) | |
| 14 x 2.00 | 64 (86) | 69 (94) | 101 (137) | |
| 14 x 1.50 | 74 (100) | 81 (110) | 116 (157) | |
| 16 x 2.00 | 98 (133) | 104 (141) | 150 (204) | |
| 16 x 1.50 | 104 (141) | 116 (157) | 168 (228) | |
| 18 x 2.50 | 133 (181) | 145 (196) | 208 (283) | |
| 18 x 1.50 | 145 (196) | 156 (212) | 226 (306) | |

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Appendix E.

Common Hardware List

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

HEX BOLTS (GRADE 5)

| <u>Part Number</u> | <u>Dimensions</u> | <u>Part Number</u> | <u>Dimensions</u> |
|--------------------|-------------------|--------------------|-------------------|
| X-465-17 | 1/4-20 x .38 | X-6238-13 | 3/8-16 x 4.50 |
| X-465-6 | 1/4-20 x .50 | X-6238-18 | 3/8-16 x 5.50 |
| X-465-2 | 1/4-20 x .62 | X-6238-25 | 3/8-16 x 6.50 |
| X-465-16 | 1/4-20 x .75 | | |
| X-465-18 | 1/4-20 x .88 | X-6238-14 | 3/8-24 x .75 |
| X-465-7 | 1/4-20 x 1.00 | X-6238-16 | 3/8-24 x 1.25 |
| X-465-8 | 1/4-20 x 1.25 | X-6238-21 | 3/8-24 x 4.00 |
| X-465-9 | 1/4-20 x 1.50 | X-6238-22 | 3/8-24 x 4.50 |
| X-465-10 | 1/4-20 x 1.75 | | |
| X-465-11 | 1/4-20 x 2.00 | X-6024-5 | 7/16-14 x .75 |
| X-465-12 | 1/4-20 x 2.25 | X-6024-2 | 7/16-14 x 1.00 |
| X-465-14 | 1/4-20 x 2.75 | X-6024-8 | 7/16-14 x 1.25 |
| X-465-21 | 1/4-20 x 5.00 | X-6024-3 | 7/16-14 x 1.50 |
| | | X-6024-4 | 7/16-14 x 2.00 |
| X-465-25 | 1/4-28 x .38 | X-6024-11 | 7/16-14 x 2.75 |
| X-465-20 | 1/4-28 x 1.00 | X-6024-12 | 7/16-14 x 6.50 |
| | | | |
| X-125-33 | 5/16-18 x .50 | X-129-15 | 1/2-13 x .75 |
| X-125-23 | 5/16-18 x .62 | X-129-17 | 1/2-13 x 1.00 |
| X-125-3 | 5/16-18 x .75 | X-129-18 | 1/2-13 x 1.25 |
| X-125-31 | 5/16-18 x .88 | X-129-19 | 1/2-13 x 1.50 |
| X-125-5 | 5/16-18 x 1.00 | X-129-20 | 1/2-13 x 1.75 |
| X-125-24 | 5/16-18 x 1.25 | X-129-21 | 1/2-13 x 2.00 |
| X-125-34 | 5/16-18 x 1.50 | X-129-22 | 1/2-13 x 2.25 |
| X-125-25 | 5/16-18 x 1.75 | X-129-23 | 1/2-13 x 2.50 |
| X-125-26 | 5/16-18 x 2.00 | X-129-24 | 1/2-13 x 2.75 |
| | | X-129-25 | 1/2-13 x 3.00 |
| 230578 | 5/16-18 x 2.25 | X-129-27 | 1/2-13 x 3.50 |
| | | X-129-29 | 1/2-13 x 4.00 |
| X-125-29 | 5/16-18 x 2.50 | X-129-30 | 1/2-13 x 4.50 |
| X-125-27 | 5/16-18 x 2.75 | X-463-9 | 1/2-13 x 5.50 |
| X-125-28 | 5/16-18 x 3.00 | X-129-44 | 1/2-13 x 6.00 |
| X-125-22 | 5/16-18 x 4.50 | X-129-51 | 1/2-20 x .75 |
| X-125-32 | 5/16-18 x 5.00 | X-129-45 | 1/2-20 x 1.25 |
| X-125-35 | 5/16-18 x 5.50 | X-129-52 | 1/2-20 x 1.50 |
| X-125-36 | 5/16-18 x 6.00 | | |
| X-125-40 | 5/16-18 x 6.50 | X-6021-3 | 5/8-11 x 1.00 |
| | | X-6021-4 | 5/8-11 x 1.25 |
| X-125-43 | 5/16-24 x 1.75 | X-6021-2 | 5/8-11 x 1.50 |
| X-125-44 | 5/16-24 x 2.50 | X-6021-1 | 5/8-11 x 1.75 |
| X-125-30 | 5/16-24 x .75 | | |
| X-125-39 | 5/16-24 x 2.00 | 273049 | 5/8-11 x 2.00 |
| X-125-38 | 5/16-24 x 2.75 | | |
| | | X-6021-5 | 5/8-11 x 2.25 |
| X-6238-2 | 3/8-16 x .62 | X-6021-6 | 5/8-11 x 2.50 |
| X-6238-10 | 3/8-16 x .75 | X-6021-7 | 5/8-11 x 2.75 |
| X-6238-3 | 3/8-16 x .88 | X-6021-12 | 5/8-11 x 3.75 |
| X-6238-11 | 3/8-16 x 1.00 | X-6021-11 | 5/8-11 x 4.50 |
| X-6238-4 | 3/8-16 x 1.25 | X-6021-10 | 5/8-11 x 6.00 |
| X-6238-5 | 3/8-16 x 1.50 | X-6021-9 | 5/8-18 x 2.50 |
| X-6238-1 | 3/8-16 x 1.75 | | |
| X-6238-6 | 3/8-16 x 2.00 | X-6239-1 | 3/4-10 x 1.00 |
| X-6238-17 | 3/8-16 x 2.25 | X-6239-8 | 3/4-10 x 1.25 |
| X-6238-7 | 3/8-16 x 2.50 | X-6239-2 | 3/4-10 x 1.50 |
| X-6238-8 | 3/8-16 x 2.75 | X-6239-3 | 3/4-10 x 2.00 |
| X-6238-9 | 3/8-16 x 3.00 | X-6239-4 | 3/4-10 x 2.50 |
| X-6238-19 | 3/8-16 x 3.25 | X-6239-5 | 3/4-10 x 3.00 |
| X-6238-12 | 3/8-16 x 3.50 | X-6239-6 | 3/4-10 x 3.50 |
| X-6238-20 | 3/8-16 x 3.75 | | |
| | | X-792-1 | 1-8 x 2.25 |
| | | X-792-5 | 1-8 x 3.00 |
| | | X-792-8 | 1-8 x 5.00 |

NUTS

| <u>Part No.</u> | <u>Dimensions</u> | <u>Type</u> |
|-----------------|-------------------|----------------|
| X-6009-1 | 1-8 | Std. Nut |
| X-6210-3 | 6-32 | Whiz Nut |
| X-6210-4 | 8-32 | Whiz Nut |
| X-6210-5 | 10-24 | Whiz Nut |
| X-6210-1 | 10-32 | Whiz Nut |
| X-6210-2 | 1/4-20 | Spirallock Nut |
| X-6210-6 | 1/4-28 | Spirallock Nut |
| X-6210-7 | 5/16-18 | Spirallock Nut |
| X-6210-8 | 5/16-24 | Spirallock Nut |
| X-6210-9 | 3/8-16 | Spirallock Nut |
| X-6210-10 | 3/8-24 | Spirallock Nut |
| X-6210-11 | 7/16-14 | Spirallock Nut |
| X-6210-12 | 1/2-13 | Spirallock Nut |
| X-6210-15 | 7/16-20 | Spirallock Nut |
| X-6210-14 | | Spirallock Nut |
| X-85-3 | 5/8-11 | Std. Nut |
| X-88-12 | 3/4-10 | Std. Nut |
| X-89-2 | 1/2-20 | Std. Nut |

NOTE

6-32 and 8-32 standard nuts must be used for circuit board mountings and some controller assembly applications and are not classified as common hardware. For this reason they are not on this list.

PLAIN WASHERS

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

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KOHLER CO. Kohler, Wisconsin 53044
Phone 920-565-3381, Web site www.kohlergenerators.com
Fax 920-459-1646 (U.S.A. Sales), Fax 920-459-1614 (International)
For the nearest sales and service outlet in U.S.A. and Canada
Phone 1-800-544-2444

Kohler[®] Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65)264-6422, Fax (65)264-6455