



# MARINE

## Standard Repair Times

### MDKAA, MDKAB, and MDKAL

# Table of Contents

<b>Contents</b>	<b>Page</b>
<b>Foreword</b> .....	<b>v</b>
<b>General Information</b> .....	<b>vi</b>
Types of Standard Repair Times .....	vi
Administrative SRTs .....	vi
Troubleshooting SRTs .....	vii
Repair SRTs .....	vii
Standard Repair Combined Times .....	vii
Manual Organization .....	viii
SRT Coding System .....	viii
Step Numbers .....	ix
General .....	ix
How Standard Repair Times are Developed .....	ix
Cummins/Onan SRT Objectives and Philosophy .....	ix
How Times are Developed .....	x
Productive Repair Time .....	x
Time Allowances .....	x
Work Not Included in A SRT .....	xi
Non-Productive Work .....	xi
Service Accessibility Codes .....	xii
“A” Accessibility Rating .....	xii
“B” Accessibility Rating .....	xii
“C” Accessibility Rating .....	xiii
“D” Accessibility Rating .....	xiii
Standard Repair Combined Times (SRCTs) .....	xiii
How To Use This Manual .....	xiv
Company Action .....	xvii
<b>Group 00 – Complete Engine or Generator Set</b> .....	<b>1</b>
Administrative Time .....	2
Troubleshoot .....	2
Genset (Above Deck) .....	9
Genset (Below Deck) .....	9
Engine .....	9
Genset Engine Assembly .....	11

<b>Contents</b>	<b>Page</b>
<b>Group 01 – Cylinder Block</b> .....	<b>13</b>
Camshaft, Valve .....	14
Camshaft, Fuel .....	14
Connecting Rod .....	15
Connecting Rod Bearings .....	16
Crankshaft .....	17
Gear, Crankshaft .....	18
Gear Case Cover .....	18
Piston .....	19
Crankshaft Seal, Front .....	20
Crankshaft Seal, Rear .....	20
<b>Group 02 – Cylinder Head</b> .....	<b>21</b>
Cylinder Head Gasket .....	22
Valve Guides .....	22
Valves .....	24
<b>Group 03 – Rocker Levers</b> .....	<b>25</b>
Valves .....	26
Breather .....	26
<b>Group 04 – Cam Followers/Tappets</b> .....	<b>27</b>
Valve Tappets .....	28
<b>Group 05 – Fuel System</b> .....	<b>29</b>
Fuel Pump, Electrical .....	30
Pump, Injection .....	30
<b>Group 06 – Injectors and Fuel Lines</b> .....	<b>31</b>
Injectors .....	32
<b>Group 07 – Lubricating Oil System</b> .....	<b>33</b>
Oil Pan and Gasket .....	34
Oil Pump .....	34
Oil Pickup Tube and Strainer .....	35
Oil Filter and Fluid .....	35
Oil Pressure Relief Valve .....	36

<b>Contents</b>	<b>Page</b>
<b>Group 08 – Cooling System</b> .....	<b>37</b>
Thermostat .....	38
Heat Exchanger .....	38
Belt Guard .....	39
Raw Water Pump .....	39
Coolant Pump .....	40
Drive Belt, Water Pump .....	40
<b>Group 10 – Intake Air System</b> .....	<b>41</b>
Air Intake Silencer .....	42
Intake Manifold .....	42
<b>Group 11 – Exhaust System</b> .....	<b>43</b>
Exhaust Manifold .....	44
Exhaust Mixer .....	44
<b>Group 13 – Electrical Equipment</b> .....	<b>45</b>
Alternator .....	46
Starter Motor .....	46
Glow Plugs .....	47
<b>Group 16 – Mounting Adaptations</b> .....	<b>49</b>
Flywheel .....	50
Flywheel Housing .....	50
<b>Group 17 – Miscellaneous</b> .....	<b>51</b>
Vibration Isolators .....	52
Sound Shield .....	52
Muffler, Aqualift .....	53
<b>Group 21 – Generator Equipment</b> .....	<b>55</b>
Main Circuit Breaker (AC) .....	56
Oil Pressure Sender .....	56
Field Breaker .....	57
Gauge .....	57
Temperature Sender .....	58
Genset .....	58

<b>Contents</b>	<b>Page</b>
<b>Group 25 – Generator</b> .....	<b>59</b>
Main Rotor .....	60
Main Stator .....	60
Exciter Rotor .....	61
Exciter Stator .....	61
Generator Bearing .....	62
Rotating Diode Assemblies .....	62
 <b>Group 26 – Generator Control Components</b> .....	 <b>63</b>
DC Wire Harness .....	64
AC Control Box .....	64
AC Voltage Regulator .....	65
Start Solenoid .....	65
Bridge Rectifier .....	66
Circuit Breaker (DC) .....	66
Stopt Solenoid .....	67
Start / Stop Switch .....	67
Hourmeter .....	68
Relay .....	68
 <b>Index</b> .....	 <b>69</b>
 <b>SRT Request Form</b>	

## Foreword

The Standard Repair Times (SRTs) in this manual represent the time required to perform service repairs on Onan Engine and Generator Sets. These times are representative of an average mechanic in a typical dealer or distributorship using the prescribed hand tools, equipment, and all available service tools and equipment required to perform quality repairs and do all necessary testing.

The use of this manual will:

- Encourage uniform terminology throughout the Cummins/Onan organization
- Standardize Repair Order job description write-ups
- Provide shop managers with a guide for establishing flat rate quotations
- Serve as a basis for Onan Corporation, Inc. to establish its warranty labor obligations

Reporting of errors, omissions, and recommendations for improving this publication is encouraged. Send your suggestions or comments to:

### **Onan Corporation**

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Attn: Service Department

## General Information

Standard Repair Times (SRTs) are lists of work tasks (procedures) and the time required to perform those tasks. The procedures list the work tasks required to be sure an engine or generator set is ready to return to service at the lowest possible cost to the customer. A Standard Repair Time is equitable when the repair described in the procedure can be performed in a period of time less than or equal to the standard by a journeyman mechanic after he/she has performed that repair on the same model, in the same application at least once. Those SRTs that a particular mechanic performs more frequently will often require less time than the standard. Conversely, those SRTs that a particular mechanic does not frequently perform may require more time than the standard. Several of the procedures may be required to accurately depict all the work actually performed to return a particular engine or generator set to service because the repair of a particular engine or generator set is often unique in light of the complaint, failure model, progressive damage, condition of the parts and customer desires. To allow for differences in the time required to perform a repair because of interference by the application, a Service Accessibility Code Scheme has been created.

## Types of Standard Repair Times

There are three types of SRTs. Most often at least one of each type is necessary to accurately depict the repair. The three types are:

- Administrative
- Troubleshooting
- Repair

## Administrative SRTs

Administrative SRTs are intended to provide time to move the vehicle engine or generator set to and from the work area, fill out the repair order, record SRT used, etc. It is intended that an administrative SRT be used only once for each repair order. There are two administrative SRTs found in this manual in Group 00 – Complete Engine. One administrative SRT is to be used when the repair takes place in a shop operated by the repairing location. The other administrative SRT is to be used when the repair takes place away from the shop operated by the repairing location (road repairs). The time for the road repair administrative SRT is greater to allow for loading and unloading tools, equipment, parts, etc. from the service truck.

## Troubleshooting SRTs

Troubleshooting SRTs are found only in Group 00 – Complete Engine. These SRTs are intended to be used when diagnosing and analyzing engine, generator set or component failures. Troubleshooting SRTs are broken down into logical numbered steps. The time for each step is cumulative with successive steps, including the time for the appropriate preceding step(s). Some troubleshooting SRTs contain time to remove and install components to perform the check(s) listed. Most do not. If a troubleshooting SRT does **NOT** include required component removal and installation, it is intended that the SRT for the removal and installation of that component be in addition to the troubleshooting SRT. Refer to the following example:

Procedure Number	Procedure Description	SRT Hours
00–055	Troubleshoot – Lubricating Oil Consumption Excessive	
	Includes:	
–01	– Check:	0.4
	– Oil consumption report	
	– For external oil leaks	
	– For overfilled oil pan	
	– Oil specifications	
	– For fuel contamination	
	– Oil change interval	
	– For engine oil in torque converter	
–02	– Perform checks in Step 01	1.0
	– Check:	
	– Oil temperature	
	– Air compressor oil consumption	
	– Turbocharger seal	
	– Crankcase blowby	

In the above example, the time required to perform the checks in Step 01 is 0.4 hour. If the problem is not located while performing the checks in Step 01, an additional 0.6 hour is allowed to perform the checks in Step 02 for a total of 1.0 hour. The total troubleshooting time appropriate is the time indicated in the column directly in line with the final step required to locate the problem. The step required to locate the problem may or may not be the last step shown in the troubleshooting SRT. Each step contains information as to which steps are included.

## Repair SRTs

Repair SRTs make up the majority of this manual. These are the SRTs that cover the actual repair work. The time shown on the same line as the SRT code and title is the total time for that SRT.

## Standard Repair Combined Times

Standard Repair Combined Times (SRCTs) provide for the combining of the three types of SRTs under one code so that, if appropriate, the user can identify the work performed with fewer SRT codes.



## Manual Organization

### SRT Coding System

Each SRT has a unique code so that SRT data can be computerized. The numbering system used is common to all the SRT manuals for all Onan engines and generator sets. The portion of the system shown in the manual contains three segments:

“Group Number” XX	“Procedure Number” XXX	“Step Number” XX
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#### Group Numbers

Group numbers (the first two digits in the SRT code) are used to identify major engine components. The following list explains the group numbers used in SRT manuals:

#### Procedure Numbers

The procedure number consists of three digits. The first digit provides guidance as to the category of the repair. The second and third digits, shown as XX in the following list, are sequential numbers or alpha within the category.

Group Number	Contents of Group	Specific Repair Number	Description of Category
00	Complete Engine or Generator Set		
01	Cylinder Block	0XX	Troubleshooting
02	Cylinder Head		ONLY in Group 00
03	Rocker Levers	1XX	Remove and Install
04	Cam Followers/Tappets	2XX	Rebuild
05	Fuel System	3XX	Replace
06	Injectors and Fuel Lines	4XX	Clean and Visually Check or Inspect for Reuse
07	Lubricating Oil System		
08	Cooling System	5XX	Machine/Ream/Dowel/ Sleeve
09	Drive Units		Modify/Cut/Lap
10	Intake Air System		Adjust/Calibrate
11	Exhaust System	6XX	
12	Air (Compressed) System		
13	Electrical Equipment	7XX	Test
14	Engine or Generator Set Testing		
15	Instruments and Controls		
16	Mounting Adaptations		
17	Miscellaneous	9XX	(SRCT in Group 99) General/Miscellaneous
21	Generator Equipment		
22	Hardware		
25	Generator Components		
26	Generator Control Components		
27	Transfer Switches		
99	SRCT		

## Step Numbers

While all SRT codes will contain a Group and Procedure number, only those procedures that are broken down into steps have step numbers. The step numbers are sequential within a SRT.

## General

There is an alphabetic index in the back of the manual. Within a particular group the procedures are arranged in alphabetical order by title, thus are not in code numeric order.

There is also a numerical index in which the procedures are arranged in numeric order and not in alphabetical order.

Within a procedure, the user will note that some lines are indented. This indentation is intended to indicate that the sub-tasks are part of the task under which they are indented.

## How Standard Repair Times are Developed

### Cummins/Onan SRT Objectives and Philosophy

The objective of the Cummins/Onan SRT program is to provide credible and equitable labor time standards and procedures to the worldwide Cummins/Onan service network.

An SRT is credible when the procedure accurately depicts the work that **must** be performed to accomplish a quality engine or generator set repair.

An SRT is equitable when it can be performed in a period of time less than or equal to the standard by a journeyman mechanic after he/she has performed that repair at least once.

To establish credible and equitable SRTs with sufficient flexibility to account for differences in complaints, failures, progressive damage, customer desires, etc., SRTs have been structured using the following considerations:

- What must ALWAYS be done to the engine or generator set to perform the work.
- What MAY have to be done to the engine or generator set parts dependent on their condition.
- What MAY have to be removed to access the engine or generator set.
- How difficult it is for the mechanic to reach the engine or generator set even after interfering application hardware has been removed.

While the most frequent use of SRT information is the Onan Warranty System, it is Onan's intent that the SRTs be applicable to repairs conducted for any customer.

As SRTs are developed, it is assumed:

- That all the required tools, equipment, and supplies are available in sufficient quantity and in operating condition.
- That required Onan Service Manuals are available to the mechanic are being used.
- That the correct parts are available when the mechanic needs them.

## How Times are Developed

SRTs are developed from time studies conducted in the field and Onan Technical Service Personnel. Technical Service Representatives create a comprehensive list of all the work elements or tasks required to perform specific repairs. Field studies are analyzed to find these same work elements or tasks and determine the time required for each. The time for work elements or tasks that are not included in the field time studies is determined by conducting free engine or generator set studies or by estimation using similar elements from existing time studies. A time is determined for each element of the procedure. The time for all elements is then totaled to establish the total productive repair time.

## Productive Repair Time

Productive Repair Time is described as the actual time involved doing productive work, such as: removing, disassembling, cleaning, inspecting, machining, installing and adjusting parts or components. In addition, the following operations are considered to be productive work for inclusion in an SRT:

- Clock on and off the job or repair order, including shift changes.
- Move vehicle, engine or generator set to and from the work area.
- Move tool box to the work area.
- Obtain tools from tool box, wipe and put away after use.
- Refer to service manuals.
- Obtain, unpack and clean replacement parts as necessary.
- Package and mark parts removed as necessary for warranty or local consumer laws.
- Operate engine or generator set to check for proper operation.
- Clean work area at completion of shift or repair.
- Properly dispose of used engine fluids such as oil and coolant.
- Write summary of work performed at completion of repair or work shift.
- Help from another mechanic (time for one man to complete the task times two).

## Time Allowances

After the total productive time is established, an additional allowance of 15 percent is added to cover the following:

- Personal time of 5 percent for:
  - Scheduled rest breaks
  - Personal phone calls
  - Restroom breaks
  - Shift changes
- Supplementary time of 10 percent to cover normal work interruptions:
  - Seized or hard turning fasteners
  - Extra time for extremely dirty equipment
  - Excessive waiting time for replacement parts
  - Brief assistance to other mechanics (less than 5 minutes)
  - Routine maintenance (not repair) of shop equipment
  - Obtain consumable supplies
  - Technical consultation with shop supervision

The following is an example of how the allowances are calculated to establish the SRT for a procedure where the productive time is 208.7 minute (3.48 hr):

Allowance Type	Allowance Percent (%)	Time (Minutes)
Productive Repair Time	100	208.7
Personal	5	10.4
Supplementary	10	20.9
<b>TOTAL</b>	<b>115</b>	<b>240.0</b>

Published Standard Repair Time = 4.0 hours

### Work Not Included in An SRT

For almost every complete repair there will be one SRT that contains most of the work performed. This is sometimes called a base repair. For example, repairing an engine for high oil consumption often requires use of the SRT title Piston and Rings – Remove and Install. This SRT contains most of the time appropriate for the repair, so it is the base repair. There can be work required that is **not** part of this base SRT. This does not mean that the other work is non-productive, rather that other work is **NOT** required EVERY TIME the pistons and rings are removed and installed. More often than not, this other work is covered by another SRT. If the other work is **not** included in the base repair or in another SRT, the work is probably still productive work required for that particular repair.

### Non-Productive Work

Analysis of past SRT time studies reveals the following general types of work that were not considered to be productive:

- Waiting on camshaft gears to heat and cool
- Waiting on another mechanic to finish using special tools or shop equipment
- Hunting for misplaced parts
- Repairing shop equipment
- Sorting through capscrews, to find the correct length, that were all thrown together into one basket during disassembly
- Repairing customer supplied components
- Salvaging parts or tools that have been damaged from improper handling or lack of correct tools
- Clearing off tables, parts carts, parts racks etc. left dirty or loaded with parts from previous repairs on other equipment
- Rework caused by installation of incorrect parts or incorrect installation of correct parts
- Fabrication or modification of special tools or equipment because the correct tools or equipment are not available
- Visiting during non-break time
- Conducting business with tool vendors
- Waiting on other mechanics to provide required help

- Waiting on parts clerk to fill orders for other mechanics
- Unnecessary inspection of new parts
- “Hot Setting” valves and injectors when not required
- Repairs to application hardware
- Rework resulting from failure to follow recommended service practices
- Performing work that is **not** part of the repair order or helping another mechanic

## Service Accessibility Codes

Service repairs are affected by engine or generator set accessibility. The more difficult the accessibility, the longer it will take to complete the tasks given in the SRT procedure. Accessibility for a particular application is determined by reviewing the application and rating the degree of difficulty for performing the 20 most common repairs. Four codes (A, B, C and D) are used to classify the degree of difficulty for the service accessibility of a specific model or type of equipment. An “A” accessibility code indicates the engine or generator set is easily accessible. A “D” code indicates the application does not make the engine or generator set as easily accessible, thus the highest degree of difficulty relative to SRT standards. An “S” code is included for special or specific repairs not covered in the other four classifications. The “R” code indicates the repair is completed with the component, engine or generator set removed from the application.

### “A” Accessibility Rating

1. Engine or generator sets mounted in equipment where 90 percent of the work can be performed while standing on the ground, shop floor, or flat work deck.
2. Engine or generator set can be accessed without removing any doors or panels.
3. Interfering application hardware can all be removed.
4. Clearance is sufficient for hands, wrenches, and drain and fill operations, making visual checks and room to stand and work.

### “B” Accessibility Rating

1. Engine or generator set mounted in equipment where 70 percent of the work can be performed while standing on the ground, shop floor or flat work deck.
2. Access to the engine can be gained by removing access panels or doors.
3. On 80 percent of the operations, interfering application hardware can be removed.
4. On 80 percent of the operations, clearance is sufficient for hands, wrenches, service tools, drain and fill operations, making visual checks and room to stand and work.

## “C” Accessibility Rating

1. Engine or generator set mounted in equipment where 50 percent of the work can be performed while standing on the ground, shop floor or flat work deck.
2. Access to the engine or generator set can be gained by removing the hood, structural members (bolted in) or sheet metal panels.
3. On 60 percent of the operations, interfering application hardware can be removed.
4. On 60 percent of the operations, clearance is sufficient for hands, wrenches, service tools, drain and fill operations, making visual checks and room to stand and work.

## “D” Accessibility Rating

1. Engine or generator set mounted in equipment where 25 percent of the work can be performed while standing on the ground, shop floor or flat work deck.
2. Access to the engine or generator set is limited due to interference from permanently mounted structural members, sheet metal or crossmembers.
3. On 40 percent of the operations, clearance is sufficient for hands, wrenches, service tools, drain and fill operations, making visual checks and limited room to stand and work.

## Standard Repair Combined Times (SRCTs)

SRCTs are the combination of some of the SRTs in the manual within a distinctive code. These SRCTs are based on field input of SRTs that are most frequently used in combination to describe the most common field repairs on this engine.

The use of SRCTs can reduce the amount of time required to determine the labor standard for a specific complete engine or generator set repair. The use of SRCTs will also reduce the number of codes required when completing a warranty claim or customer invoice.

SRCTs are intended to supplement, NOT replace, SRTs. One SRCT code can be used instead of several SRT codes.

It is intended that other appropriate SRTs can be used to supplement an SRCT as long as the work does not overlap. If there is overlapping work, do **not** use an SRCT.

## How To Use This Manual

### 1. Determine the actual work performed:

- Obtain this information from the work description on the repair order.

### 2. Determine the Accessibility Code:

- Determine the application from the repair order.
- Look in the “Accessibility Code Listing” on page to determine the accessibility code for the application involved in the repair. If the application is not shown, assume the accessibility code is “B”.
- Write down the code.

### 3. Determine applicable SRCT:

- Find the Contents Page for Group 99 – Standard Repair Combined Times.
- Compare the titles to the work performed to determine if a SRCT will apply.
- If there is an SRCT that seems to apply, find that SRCT and compare the SRT within the SRCT to the work performed. If you are not sure of the work included in the SRT, read that SRT and compare the procedure listing with the work performed.
- If an SRCT applies to all or part of the work performed, find the column that contains the same accessibility code determined in Step 2 above.
- Move down the column to the line containing the SRCT code and title and pick out the appropriate time.
- If all the work in the SRCT is performed and additional steps were taken, use the SRCT and continue to Step 4 to cover the additional work.
- If there is NOT an appropriate SRCT, move to Step 4.

### 4. Determine the appropriate repair SRT:

- Use the information from the repair order to identify the parts involved.
- Use the contents page at the front of the manual or the alphabetical index in the back of the manual to determine the appropriate SRT group for the parts and/or work involved.
- Find the contents page for that group.
- Read the contents page for procedure titles that seem to correspond to the work performed.
- Find the SRT within the group.
- Read the SRT procedure listing to determine the work included.



- If the work performed and the work included in the SRT are the same, all or in part, determine and record the time.
- Repeat the steps in this paragraph until you have determined a SRT for all the work performed.

#### **5. Determine the appropriate troubleshooting SRT:**

- Read the repair order to determine what troubleshooting work was performed.
- Find the contents page for Group 00.
- Read the contents page for procedure to determine the work included in each step.
- If the work performed and the work included in the troubleshooting SRT are the same, all or in part, determine and record the time of the SRT step. Remember that troubleshooting SRTs are cumulative.

#### **6. Determine the appropriate miscellaneous SRT:**

- Read the repair order to determine if any application hardware was removed and installed in order to access the engine or generator set.
- Find the contents page for Group 17.
- Read the contents page for procedure titles that seem to correspond to the work performed.
- Find the SRT within the group.
- Read the SRT procedure to determine the work included in the SRT.
- If the work performed and the work included in the SRT are the same, all or in part, determine and record the time.
- If the work required to application hardware is not given in the SRT manual, determine the time for ONLY this work from the repair order. Record the time for possible use as “99–999” or “Non-SRT Time”.

#### **7. Determine the appropriate administrative SRT:**

- Both of the administrative SRTs are shown at the beginning of Group 00.
- Determine the appropriate SRT.
- Record the time.



## 8. Determine the total appropriate SRT time:

- Check to be sure that there is no duplication of tasks within the SRT procedures selected. If there is work duplicated by some of those selected, use other information contained in the manual to reduce the time of one of the SRTs accordingly. If the information is not available, make an estimate.
- Total all the times obtained during performance of Steps 2 through 7.

### Standard Repair Times Review Procedure

Onan Corporation makes every effort to be sure the SRTs published in this manual are credible and equitable. It will be necessary to review the published times when one or more of the following changes occur:

- Design changes to special service tools or equipment required to perform the repair
- Changes to the repair procedure

A formal SRT review procedure is available for any Cummins/Onan Authorized Repair Location that believes the SRTs shown in this manual are incorrect.

To be sure prompt attention and an accurate appraisal is given to your request, the following guidelines must be met:

1. Be sure the technician has followed all the procedures and used all the service tools referred to in the appropriate service manuals.
2. Be sure a journeyman technician performed the repair, one who has completed the repair a sufficient number of times to become familiar with the procedure.
3. Be sure all the SRTs, including supplemental SRTs, appropriate for the repair are being used.
4. Include as much detail as possible about the specific repair.

**NOTE:** It is **NOT** the intent of this procedure to provide a forum for appealing or disputing the amount of time or the SRT judged appropriate on a particular warranty claim. Communication of this sort **must** follow the processes shown in the Onan Warranty Administration Manual.

5. Provide photographs of the installation.
6. Provide copies of all repair orders applicable to the SRTs involved, the technicians time cards, and any other information related to the repair that will aid in the review process.
7. Be sure to provide the correct name of the repairing location, a phone number, and point of contact.

## Company Action

Upon receipt of the request for an SRT review, the following action will be taken:

1. The person signing the request will be contacted to acknowledge the receipt of the request.
2. All the information provided will be analyzed and compared with the history files of the specific operation.
3. All information will be analyzed to determine if an error has been made in the procedure, the operations description, or the published repair time.
4. If it is determined the published repair time is incorrect, additional studies/analysis will be performed to establish the correct time. The requester will be notified of the results, and the results will be published in the next SRT update.
5. If it is determined that the time and procedure is correct, recommendations and assistance will be offered as needed.



# Group 00 – Complete Engine or Generator Set

## Contents

	Page
<b>Administrative Time</b> .....	<b>2</b>
Open/Close Repair Order (Shop) .....	2
Open/Close Repair Order (Road) .....	2
<b>Troubleshoot</b> .....	<b>2</b>
Engine Will Not Crank .....	2
Genset Starts But Stops After Switch Releases .....	3
High/Low AC Output .....	3
No AC Output Voltage .....	4
Unstable Voltage with Stable Engine .....	5
High Exhaust Temperature .....	5
Unbalanced Output Voltage .....	5
Engine Oil Leak .....	6
Coolant Loss .....	6
Coolant Temperature Above Normal .....	6
Genset Cranks But Will Not Start .....	7
Genset Unstable (Hunts) .....	7
Excessive Smoke Under Load (Overload Condition) .....	8
Excess White Smoke at Start-Up (Warm) .....	8
Excess White Smoke at Start-Up (Cold) .....	8
Genset (Above Deck) .....	9
Remove And Install .....	9
Genset (Below Deck) .....	9
Remove And Install .....	9
Engine .....	9
Rebuild .....	9
Genset Engine Assembly .....	11
Replace .....	11

<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>00-901 Administrative Time – Open/Close Repair Order (Shop)</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Clock on and off the job</li> <li>– Move equipment to and from work area</li> <li>– Clean work area</li> <li>– Record the following: <ul style="list-style-type: none"> <li>– Genset model number</li> <li>– Genset serial number</li> <li>– Customer name and address</li> <li>– Genset date in service</li> <li>– Hours of operation</li> </ul> </li> <li>– Write repair procedures</li> </ul>	0.4	-	-	-	-	-
<b>00-902 Administrative Time – Open/Close Repair Order (Road)</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Clock on and off the job</li> <li>– Move equipment to and from work area</li> <li>– Clean work area</li> <li>– Record the following: <ul style="list-style-type: none"> <li>– Genset model number</li> <li>– Genset serial number</li> <li>– Customer name and address</li> <li>– Genset date in service</li> <li>– Hours of operation</li> </ul> </li> <li>– Write repair procedures</li> </ul>	0.7	-	-	-	-	-
<b>00-0AA Troubleshoot – Engine Will Not Crank</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>-01 – Check: <ul style="list-style-type: none"> <li>– Battery condition</li> <li>– Battery connections</li> </ul> </li> </ul>	-	-	0.3	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>(continued from previous page)</b>						
<b>00-0AA Troubleshoot – Engine Will Not Crank</b>	-	-	-	-	-	-
-02 – Perform checks in step 01	-	-	0.7	-	-	-
– Check:						
– Manual engine rotation						
– Wiring connections to and from control, relay, switch, and starter						
– Start/Stop switch						
– Starter						
– Stop solenoid adjustment						
<b>00-0AB Troubleshoot – Genset Starts But Stops After Switch Releases</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check:	-	-	0.5	-	-	-
– Voltage regulator plugs fully seated						
– Field sense, quad leads fully seated in connector to control						
– AC output						
– Field voltage						
– Broken or loose wires						
-02 – Perform checks in step 01	-	-	1.0	-	-	-
– Check:						
– Proper field resistance reading, open to ground						
– Proper quadrature resistance reading open to ground and main windings						
– Start disconnect relay functioning						
<b>00-0AD Troubleshoot – High/Low AC Output</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check:	-	-	0.5	-	-	-
– Proper output lead connection						
– Genset output voltage						
– Voltage at line side of genset breaker						
– Voltage at load side of genset breaker						
– Sense leads condition and fully seated in connector to voltage regulator						

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
(continued from previous page)						
<b>00-0AD Troubleshoot – High/Low AC Output</b>	-	-	-	-	-	-
– Voltage regulator plugs fully seated						
-02 – Perform checks in step 01	-	-	1.0	-	-	-
– Check:						
– Field voltage						
– Field, main, and quad winding resistance						
-03 – Perform checks in step 02	-	-	1.5	-	-	-
– Check:						
– Main rotor resistance						
– Exciter rotor resistance						
– Rotating diode assemblies						
<b>00-0AG Troubleshoot – No AC Output Voltage</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check:	-	-	0.5	-	-	-
– Load breaker closed						
– Broken or loose wires						
– Voltage regulator plugs fully seated						
– Field resistance						
-02 – Perform checks in step 01	-	-	1.0	-	-	-
– Check:						
– Exciter genset with external battery source and check for AC output						
-03 – Perform checks in step 02	-	-	1.5	-	-	-
– Check:						
– Main and quad winding resistance						
– Main rotor resistance						
– Exciter rotor resistance						
– Rotating diode assemblies						

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
		R	A	B	C	D
<b>Procedure Number and Description</b> (continued from previous page)						
<b>00-0AH Troubleshoot – Unstable Voltage with Stable Engine</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Check:               <ul style="list-style-type: none"> <li>- Proper output lead connection</li> <li>- Genset output voltage                   <ul style="list-style-type: none"> <li>- Voltage at line side of genset breaker</li> <li>- Voltage at load side of genset breaker</li> </ul> </li> <li>- Sense leads condition and fully seated in connector to voltage regulator</li> <li>- Voltage regulator plugs fully seated</li> </ul> </li> </ul>	-	-	0.7	-	-	-
<b>00-0AN Troubleshoot – High Exhaust Temperature</b> <i>Includes:</i>	-	-	-	-	-	-
-01    - Check: <ul style="list-style-type: none"> <li>- Raw water strainer</li> <li>- Cracked or leaking hoses</li> <li>- Loose hose clamps</li> </ul>	-	-	0.3	-	-	-
-02    - Perform checks in step 01 <ul style="list-style-type: none"> <li>- Raw water pump impeller</li> <li>- Exhaust temperature switch</li> </ul>	-	-	1.0	-	-	-
-03    - Perform checks in step 02 <ul style="list-style-type: none"> <li>- Check:               <ul style="list-style-type: none"> <li>- Heat exchanger</li> </ul> </li> </ul>	-	-	1.2	-	-	-
<b>00-0AZ Troubleshoot – Unbalanced Output Voltage</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Check:               <ul style="list-style-type: none"> <li>- Proper output lead connection</li> <li>- Genset output voltage                   <ul style="list-style-type: none"> <li>- Voltage at line side of genset breaker</li> <li>- Voltage at load side of genset breaker</li> </ul> </li> <li>- Load at genset breaker</li> <li>- Output lead configuration</li> <li>- Voltage regulator plugs fully seated</li> </ul> </li> </ul>	-	-	0.7	-	-	-



Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>(continued from previous page)</b>						
<b>00-0AZ Troubleshoot – Unbalanced Output Voltage</b> – Sense leads condition and fully seated in connector to voltage regulator	-	-	0.7	-	-	-
<b>00-0CM Troubleshoot – Engine Oil Leak</b> <i>Includes:</i>	-	-	-	-	-	-
-01 – Clean contaminated area – Check: – Oil level – Loose hose or drain fittings – Oil filter seal	-	-	0.4	-	-	-
-02 – Perform checks in step 01 – Check: – Leaks while running with dye in oil	-	-	1.0	-	-	-
<b>00-010 Troubleshoot – Coolant Loss</b> <i>Includes:</i>	-	-	-	-	-	-
-01 – Check: – Coolant level – Cracked or leaking hoses – Loose hose clamps – Coolant in oil	-	-	0.5	-	-	-
-02 – Perform checks in step 01 – Check – Pressure test cooling system (cold) – Pressure test cooling system (hot)	-	-	1.0	-	-	-
<b>00-014 Troubleshoot – Coolant Temperature Above Normal</b>	-	-	-	-	-	-
<i>Includes:</i> -01 – Check: – Coolant level – Coolant temperature switch – Coolant level switch (if equipped) – Fault breaker	-	-	0.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>(continued from previous page)</b>						
<b>00-014 Troubleshoot – Coolant Temperature Above Normal</b>	-	-	-	-	-	-
– Pump belt tension						
-02 – Perform checks in step 01 – Check – Pressure cap – Raw water pump impeller – Heat exchanger	-	-	1.0	-	-	-
<b>00-022 Troubleshoot – Genset Cranks But Will Not Start</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check: – Fuel supply – Fuel from fuel pump – Glowplug relay – Glowplugs	-	-	0.5	-	-	-
-02 – Perform checks in step 01 – Check: – Stop solenoid operation – Compression	-	-	1.5	-	-	-
<b>00-041 Troubleshoot – Genset Unstable (Hunts)</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check: – Fuel supply – Clogged filter – Air in fuel – Loose wire connections	-	-	0.7	-	-	-
-02 – Perform checks in step 01 – Check: – Governor linkage binding – Governor adjustments	-	-	1.2	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>(continued from previous page)</b>						
<b>00-046 Troubleshoot – Excessive Smoke Under Load (Overload Condition)</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check: – Fuel supply – Clogged filter	-	-	0.5	-	-	-
-02 – Perform checks in step 01 – Check: – Intake restriction	-	-	0.7	-	-	-
-03 – Perform checks in step 02 – Check: – Fuel flow – Exhaust back pressure	-	-	1.2	-	-	-
<b>00-047 Troubleshoot – Excess White Smoke at Start-Up (Warm)</b>	-	-	-	-	-	-
<i>Includes:</i>						
-01 – Check: – Low engine temperature – Glowplugs – Glowplug relay – Low raw water flow (steam)	-	-	0.7	-	-	-
-02 – Perform checks in step 01 – Check: – Engine compression	-	-	1.5	-	-	-
<b>00-048 Troubleshoot – Excess White Smoke at Start-Up (Cold)</b>	-	-	0.5	-	-	-
<i>Includes:</i>						
– Check – Low engine temperature – Battery voltage – Glowplugs – Glowplug relay						

<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>00-1AB Genset (Above Deck) – Remove And Install</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Output leads</li> <li>- Fuel lines</li> <li>- Exhaust system</li> <li>- Raw water supply</li> <li>- Remove and install</li> <li>- Genset</li> <li>- Test run unit</li> </ul>	-	-	4.0	-	-	-
<p><b>00-1AC Genset (Below Deck) – Remove And Install</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Output leads</li> <li>- Fuel lines</li> <li>- Exhaust system</li> <li>- Raw water supply</li> <li>- Remove and install</li> <li>- Genset</li> <li>- Test run unit</li> </ul>	-	-	13.0	-	-	-
<p><b>00-201 Engine – Rebuild</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Coolant hose</li> <li>- Exhaust hose</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> </ul>	-	-	16.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>00-201 Engine – Rebuild</b></p> <ul style="list-style-type: none"> <li>- Generator control</li> <li>- Generator end</li> <li>- Flywheel</li> <li>- Flywheel housing</li> <li>- Intake manifold</li> <li>- Exhaust Manifold</li> <li>- Coolant pump belt drive</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Fuel injection pump</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> <li>- Lifters</li> <li>- Crankshaft pulley</li> <li>- Gearcase cover and gasket</li> <li>- Oil pan and gasket</li> <li>- Pistons and connecting rods</li> <li>- Rod bearings</li> <li>- Oil pump drive gear</li> <li>- Oil pump and gasket</li> <li>- Rear main seal carrier</li> <li>- Idler gear</li> <li>- Camshaft</li> <li>- Fuel camshaft</li> <li>- Crankshaft</li> <li>- Main bearing carrier and bearings</li> <li>- Oil seals</li> <li>- Clean and visually inspect <ul style="list-style-type: none"> <li>- Crankshaft</li> <li>- Camshafts</li> <li>- Cylinder block</li> </ul> </li> <li>- Hone cylinder (as needed)</li> <li>- Torque cylinder head</li> </ul>	-	-	16.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>00-201 Engine – Rebuild</b> (continued from previous page) – Adjust valve lash – Test run unit	-	-	16.0	-	-	-
<b>00-3AB Genset Engine Assembly – Replace</b> <i>Includes:</i> – Disconnect and connect – Battery cables – Engine wiring harness (as needed) – Fuel lines – Exhaust hose – Coolant hoses – Drain and refill engine fluids – Remove and install – Soundshield (as needed) – Starter – Generator control assembly – Generator assembly – Transfer parts to new engine – Flywheel – Flywheel housing – Intake manifold – Exhaust Manifold – Starter – Switches and senders – Engine mounts – Raw water pump – Fuel filter assembly and lines – Fuel pump – Test run unit	-	-	8.0	-	-	-



# Group 01 – Cylinder Block

## Contents

	<b>Page</b>
<b>Camshaft, Valve</b> .....	<b>14</b>
Replace .....	14
<b>Camshaft, Fuel</b> .....	<b>14</b>
Replace .....	14
<b>Connecting Rod</b> .....	<b>15</b>
Remove And Install .....	15
<b>Connecting Rod Bearings</b> .....	<b>16</b>
Replace .....	16
<b>Crankshaft</b> .....	<b>17</b>
Remove And Install .....	17
<b>Gear, Crankshaft</b> .....	<b>18</b>
Remove And Install .....	18
<b>Gear Case Cover</b> .....	<b>18</b>
Remove And Install .....	18
<b>Piston</b> .....	<b>19</b>
Remove And Install .....	19
<b>Crankshaft Seal, Front</b> .....	<b>20</b>
Replace .....	20
<b>Crankshaft Seal, Rear</b> .....	<b>20</b>
Replace .....	20



<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>01-3AE Camshaft, Valve – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> <li>- Lifters</li> <li>- Crankshaft pulley</li> <li>- Gearcase cover and gasket</li> <li>- Camshaft stopper</li> <li>- Camshaft and gear</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	12.0	-	-	-
<b>01-1AC Camshaft, Fuel – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines (as needed)</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> </ul>	-	-	12.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
		R	A	B	C	D
<b>Procedure Number and Description</b> <b>(continued from previous page)</b>						
<b>01-1AC Camshaft, Fuel – Replace</b> <ul style="list-style-type: none"> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Coolant pump drive belt</li> <li>– Coolant pumps</li> <li>– Coolant hoses</li> <li>– Fuel lines (as needed)</li> <li>– Fuel injection supply and return lines</li> <li>– Injection pump</li> <li>– Crankshaft pulley</li> <li>– Gearcase cover and gasket</li> <li>– Idler gear</li> <li>– Camshaft, fuel stopper</li> <li>– Camshaft assembly</li> <li>– Test run unit</li> </ul>	-	-	12.0	-	-	-
<b>01-1AA Connecting Rod – Remove And Install</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines (as needed)</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Generator assembly</li> <li>– Fuel injection supply and return lines</li> <li>– Valve cover and rocker assembly</li> <li>– Cylinder head and gasket</li> <li>– Oil pan and gasket</li> <li>– Piston and connection rod</li> <li>– Piston rings</li> <li>– Rod bearings</li> </ul>	-	-	10.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>01-1AA Connecting Rod – Remove And Install</b></p> <ul style="list-style-type: none"> <li>- Clean and visually inspect crankshaft</li> <li>- Hone cylinder (as needed)</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	10.0	-	-	-
<p><b>01-3AF Connecting Rod Bearings – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and Connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator assembly</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover and rocker assembly</li> <li>- Cylinder head and gasket</li> <li>- Oil pan and gasket</li> <li>- Pistons and connection rod</li> <li>- Rod bearings</li> <li>- Clean and visually inspect crankshaft</li> <li>- Hone cylinder (as needed)</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	10.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>01-112 Crankshaft – Remove And Install</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Generator assembly</li> <li>- Flywheel</li> <li>- Flywheel housing</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> <li>- Lifters</li> <li>- Crankshaft pulley</li> <li>- Gearcase cover and gasket</li> <li>- Oil pan and gasket</li> <li>- Pistons and connecting rods</li> <li>- Rod bearings</li> <li>- Oil pump drive gear</li> <li>- Oil pump and gasket</li> <li>- Rear main seal carrier</li> <li>- Crankshaft</li> <li>- Main bearing carrier and bearings</li> <li>- Oil seals</li> </ul> </li> <li>- Clean and visually inspect crankshaft</li> <li>- Hone cylinder (as needed)</li> <li>- Torque cylinder head</li> </ul>	-	-	14.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
		R	A	B	C	D
<b>Procedure Number and Description</b> (continued from previous page)						
<b>01-112 Crankshaft – Remove And Install</b> – Adjust valve lash – Test run unit	-	-	14.0	-	-	-
<b>01-114 Gear, Crankshaft – Remove And Install</b> <i>Includes:</i> – Disconnect and connect – Battery cables – Engine wiring harness (as needed) – Fuel lines – Exhaust hose – Coolant hoses – Drain and refill engine fluids – Remove and install – Soundshield (as needed) – Coolant pump drive belt – Coolant pumps – Coolant hoses – Crankshaft pulley – Gearcase cover and gasket – Idler gear – Crankshaft gear – Test run unit	-	-	4.5	-	-	-
<b>01-121 Gear Case Cover – Remove And Install</b> <i>Includes:</i> – Disconnect and connect – Battery cables – Engine wiring harness (as needed) – Fuel lines – Exhaust hose – Coolant hoses – Drain and refill engine fluids – Remove and install – Soundshield (as needed)	-	-	4.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>01-121 Gear Case Cover – Remove And Install</b></p> <ul style="list-style-type: none"> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Crankshaft pulley</li> <li>- Gearcase cover and gasket</li> <li>- Test run unit</li> </ul>	-	-	4.0	-	-	-
<p><b>01-140 Piston – Remove And Install</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator assembly</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover and rocker assembly</li> <li>- Cylinder head and gasket</li> <li>- Lifters</li> <li>- Oil pan and gasket</li> <li>- Pistons and connecting rods</li> <li>- Rod bearings</li> <li>- Clean and visually inspect crankshaft</li> <li>- Hone cylinder (as needed)</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	10.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>01-304 Crankshaft Seal, Front – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Coolant pump drive belt</li> <li>- Crankshaft pulley</li> <li>- Oil seal</li> <li>- Crankshaft collet and o-ring</li> </ul> </li> <li>- Test run unit</li> </ul>	-	-	3.0	-	-	-
<p><b>01-308 Crankshaft Seal, Rear – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Generator assembly</li> <li>- Flywheel</li> <li>- Bearing case cover</li> <li>- Oil seal</li> </ul> </li> <li>- Visually inspect for oil leaks</li> <li>- Test run unit</li> </ul>	-	-	6.0	-	-	-

# Group 02 – Cylinder Head

## Contents

	<b>Page</b>
<b>Cylinder Head Gasket</b> .....	<b>22</b>
Replace .....	22
<b>Valve Guides</b> .....	<b>22</b>
Replace .....	22
<b>Valves</b> .....	<b>24</b>
Replace .....	24



<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>02-3AA Cylinder Head Gasket – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Exhaust manifold</li> <li>- Intake resonator</li> <li>- Intake manifold</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> <li>- Clean carbon off</li> <li>- Cylinder head</li> <li>- Tops of pistons</li> <li>- Around valve ports</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	6.0	-	-	-
<p><b>02-302 Valve Guides – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> </ul>	-	-	8.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>02-302 Valve Guides – Replace</b></p> <ul style="list-style-type: none"> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Exhaust manifold</li> <li>- Intake resonator</li> <li>- Intake manifold</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> </ul> </li> <li>- Remove and install from head <ul style="list-style-type: none"> <li>- Caps</li> <li>- Spring collet, retainer, and spring</li> <li>- Stem seal</li> <li>- Valve</li> <li>- Valve guides</li> </ul> </li> <li>- Clean carbon off <ul style="list-style-type: none"> <li>- Cylinder head</li> <li>- Tops of pistons</li> <li>- Around valve ports</li> </ul> </li> <li>- Lap valves of valve seats</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	8.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>02-3AB Valves – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect <ul style="list-style-type: none"> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> </ul> </li> <li>- Drain and refill engine fluids</li> <li>- Remove and install <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Exhaust manifold</li> <li>- Intake resonator</li> <li>- Intake manifold</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> </ul> </li> <li>- Remove and install from head <ul style="list-style-type: none"> <li>- Caps</li> <li>- Spring collet, retainer, and spring</li> <li>- Stem seal</li> <li>- Valve</li> </ul> </li> <li>- Clean carbon off <ul style="list-style-type: none"> <li>- Cylinder head</li> <li>- Tops of pistons</li> <li>- Around valve ports</li> </ul> </li> <li>- Lap valves of valve seats</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	6.5	-	-	-

# Group 03 – Rocker Levers

## Contents

	<b>Page</b>
<b>Valves</b> .....	<b>26</b>
Adjust .....	26
<b>Breather</b> .....	<b>26</b>
Service .....	26

<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>03-603 Valves – Adjust</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Glowplugs</li> <li>- Valve cover</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	1.7	-	-	-
<b>03-801 Breather – Service</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Breather cover</li> <li>- Breather gasket</li> <li>- Breather element</li> <li>- Test run unit</li> </ul>	-	-	0.7	-	-	-

# Group 04 – Cam Followers/Tappets

## Contents

	<b>Page</b>
<b>Valve Tappets</b> .....	<b>28</b>
Remove And Install .....	28

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>04-118 Valve Tappets – Remove And Install</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Exhaust manifold</li> <li>- Intake resonator</li> <li>- Intake manifold</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Fuel injection supply and return lines</li> <li>- Valve cover rocker assembly and pushrods</li> <li>- Cylinder head and gasket</li> <li>- Tappets</li> <li>- Clean carbon off</li> <li>- Cylinder head</li> <li>- Tops of pistons</li> <li>- Around valve ports</li> <li>- Torque cylinder head</li> <li>- Adjust valve lash</li> <li>- Test run unit</li> </ul>	-	-	6.0	-	-	-

# Group 05 – Fuel System

## Contents

	<b>Page</b>
<b>Fuel Pump, Electrical</b> .....	<b>30</b>
Replace .....	30
<b>Pump, Injection</b> .....	<b>30</b>
Replace .....	30



<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>05-1AC Fuel Pump, Electrical – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Fuel lines (as needed)</li> <li>- Fuel filter assembly</li> <li>- Fuel pump</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-
<b>05-102 Pump, Injection – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Fuel lines (as needed)</li> <li>- Fuel injection supply and return lines</li> <li>- Fuel injection pump</li> <li>- Test run unit</li> </ul>	-	-	2.2	-	-	-

# Group 06 – Injectors and Fuel Lines

## Contents

	<b>Page</b>
<b>Injectors</b> .....	<b>32</b>
Replace .....	32

<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>06-149 Injectors – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install               <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Fuel lines (as needed)</li> <li>- Fuel injection supply and return lines</li> <li>- Glowplugs</li> <li>- Injectors and seals</li> </ul> </li> <li>- Test run unit</li> </ul>	-	-	2.5	-	-	-

# Group 07 – Lubricating Oil System

## Contents

	<b>Page</b>
<b>Oil Pan and Gasket</b> .....	<b>34</b>
Replace .....	34
<b>Oil Pump</b> .....	<b>34</b>
Replace .....	34
<b>Oil Pickup Tube and Strainer</b> .....	<b>35</b>
Replace .....	35
<b>Oil Filter and Fluid</b> .....	<b>35</b>
Replace .....	35
<b>Oil Pressure Relief Valve</b> .....	<b>36</b>
Inspect and Replace .....	36

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>07-109 Oil Pan and Gasket – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Engine mounts</li> <li>- Heat exchanger</li> <li>- Oil pan and gasket</li> <li>- Test run unit</li> </ul>	-	-	3.0	-	-	-
<b>07-113 Oil Pump – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Coolant pump drive belt</li> <li>- Coolant pumps</li> <li>- Coolant hoses</li> <li>- Crankshaft pulley</li> <li>- Gearcase cover and gasket</li> <li>- Oil pump drive gear</li> <li>- Oil pump and gasket</li> <li>- Test run unit</li> </ul>	-	-	4.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>07-114 Oil Pickup Tube and Strainer – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Engine mounts</li> <li>- Heat exchanger</li> <li>- Oil pan and gasket</li> <li>- Oil pickup tube and strainer</li> <li>- Test run unit</li> </ul>	-	-	3.25	-	-	-
<p><b>07-301 Oil Filter and Fluid – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Oil filter</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>07-410 Oil Pressure Relief Valve – Inspect and Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install <ul style="list-style-type: none"> <li>- Oil filter</li> <li>- Valve assembly</li> </ul> </li> <li>- Clean and visually inspect or replace <ul style="list-style-type: none"> <li>- Bore, spring, ball, and seat</li> </ul> </li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-

# Group 08 – Cooling System

## Contents

	<b>Page</b>
<b>Thermostat</b> .....	<b>38</b>
Replace .....	38
<b>Heat Exchanger</b> .....	<b>38</b>
Remove And Install .....	38
<b>Belt Guard</b> .....	<b>39</b>
Replace .....	39
<b>Raw Water Pump</b> .....	<b>39</b>
Replace / Rebuild .....	39
<b>Coolant Pump</b> .....	<b>40</b>
Replace / Rebuild .....	40
<b>Drive Belt, Water Pump</b> .....	<b>40</b>
Adjust / Replace .....	40



Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>08-104 Thermostat – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Coolant hoses</li> <li>– Thermostat cover and gasket</li> <li>– Thermostat</li> <li>– Test run unit</li> </ul>	-	-	1.5	-	-	-
<b>08-119 Heat Exchanger – Remove And Install</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Coolant hoses</li> <li>– Heat exchanger</li> <li>– Test run unit</li> </ul>	-	-	3.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>08-142 Belt Guard – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Belt guard</li> <li>- Test run unit</li> </ul>	-	-	0.3	-	-	-
<p><b>08-207 Raw Water Pump – Replace / Rebuild</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Raw water pump</li> <li>- Clean and visually inspect or replace</li> <li>- Pump housing</li> <li>- Replace</li> <li>- Cover and gasket</li> <li>- Impeller</li> <li>- Seal</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>08-209 Coolant Pump – Replace / Rebuild</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Pump drive belt</li> <li>– Coolant pump</li> <li>– Impeller</li> <li>– Seal assembly</li> <li>– Shaft assembly</li> <li>– Pulley flange</li> <li>– Pump gasket</li> <li>– Inspect pump housing</li> <li>– Adjust belt tension</li> <li>– Test run unit</li> </ul>	-	-	2.5	-	-	-
<p><b>08-302 Drive Belt, Water Pump – Adjust / Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Pump drive belt</li> <li>– Adjust belt tension</li> <li>– Test run unit</li> </ul>	-	-	1.0	-	-	-

# Group 10 – Intake Air System

## Contents

	<b>Page</b>
<b>Air Intake Silencer</b> .....	<b>42</b>
Remove and Install .....	42
<b>Intake Manifold</b> .....	<b>42</b>
Replace .....	42

<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>10-1AA Air Intake Silencer – Remove and Install</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Intake silencer</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-
<b>10-129 Intake Manifold – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Intake silencer</li> <li>- Intake manifold</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-

# Group 11 – Exhaust System

## Contents

	Page
<b>Exhaust Manifold</b> .....	<b>44</b>
Remove and Install .....	44
<b>Exhaust Mixer</b> .....	<b>44</b>
Remove and Install .....	44

<b>Standard Repair Times</b>	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>11-105 Exhaust Manifold – Remove and Install</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Coolant hoses</li> <li>- Pump drive belt</li> <li>- DC charge alternator</li> <li>- Exhaust manifold and gasket</li> <li>- Exhaust mixer and gasket</li> <li>- Test run unit</li> </ul>	-	-	1.5	-	-	-
<b>11-110 Exhaust Mixer – Remove and Install</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Coolant hoses</li> <li>- Pump drive belt</li> <li>- DC charge alternator</li> <li>- Exhaust mixer and gasket</li> <li>- Exhaust temperature switch</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-

# Group 13 – Electrical Equipment

## Contents

	<b>Page</b>
<b>Alternator</b> .....	<b>46</b>
Replace .....	46
<b>Starter Motor</b> .....	<b>46</b>
Replace .....	46
<b>Glow Plugs</b> .....	<b>47</b>
Replace .....	47



Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>13-101 Alternator – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Pump drive belt</li> <li>– DC charge alternator</li> <li>– Test run unit</li> </ul>	-	-	1.7	-	-	-
<b>13-104 Starter Motor – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Starter</li> <li>– Test run unit</li> </ul>	-	-	1.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>13-114</b> <b>Glow Plugs – Replace</b>            (continued from previous page)  <i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install               <ul style="list-style-type: none"> <li>- Soundshield (as needed)</li> <li>- Glow plugs</li> </ul> </li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-



# Group 16 – Mounting Adaptations

## Contents

	<b>Page</b>
<b>Flywheel</b> .....	<b>50</b>
Replace .....	50
<b>Flywheel Housing</b> .....	<b>50</b>
Replace .....	50

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<b>16-103 Flywheel – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Starter</li> <li>- Generator control assembly</li> <li>- Generator assembly</li> <li>- Flywheel</li> <li>- Test run unit</li> </ul>	-	-	5.0	-	-	-
<b>16-108 Flywheel Housing – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Starter</li> <li>- Generator control assembly</li> <li>- Generator assembly</li> <li>- Flywheel</li> <li>- Flywheel housing</li> <li>- Test run unit</li> </ul>	-	-	6.0	-	-	-

# Group 17 – Miscellaneous

## Contents

	<b>Page</b>
<b>Vibration Isolators</b> .....	<b>52</b>
Replace .....	52
<b>Sound Shield</b> .....	<b>52</b>
Replace .....	52
<b>Muffler, Aqualift</b> .....	<b>53</b>
Replace .....	53

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>17-1AB Vibration Isolators – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Drip tray</li> <li>- Vibration isolators</li> <li>- Test run unit</li> </ul>	-	-	2.0	-	-	-
<p><b>17-1AC Sound Shield – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Sound shield</li> <li>- Test run unit</li> </ul>	-	-	1.7	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>17-131 Muffler, Aqualift – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install               <ul style="list-style-type: none"> <li>- Muffler</li> </ul> </li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-





# Group 21 – Generator Equipment

## Contents

	<b>Page</b>
<b>Main Circuit Breaker (AC)</b> .....	<b>56</b>
Replace .....	56
<b>Oil Pressure Sender</b> .....	<b>56</b>
Replace .....	56
<b>Field Breaker</b> .....	<b>57</b>
Replace .....	57
<b>Gauge</b> .....	<b>57</b>
Replace .....	57
<b>Temperature Sender</b> .....	<b>58</b>
Replace .....	58
<b>Genset</b> .....	<b>58</b>
Test with Load Bank .....	58

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
		R	A	B	C	D
<b>21-102 Main Circuit Breaker (AC) – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Circuit breaker</li> <li>– Test run unit</li> </ul>	-	-	0.7	-	-	-
<b>21-105 Oil Pressure Sender – Replace</b> <i>Includes:</i> <ul style="list-style-type: none"> <li>– Disconnect and connect</li> <li>– Battery cables</li> <li>– Engine wiring harness (as needed)</li> <li>– Fuel lines</li> <li>– Exhaust hose</li> <li>– Coolant hoses</li> <li>– Drain and refill engine fluids</li> <li>– Remove and install</li> <li>– Soundshield (as needed)</li> <li>– Sender</li> <li>– Test run unit</li> </ul>	-	-	0.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>21-303 Field Breaker – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Field breaker</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-
<p><b>21-313 Gauge – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Gauge</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>21-315 Temperature Sender – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Sender</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-
<p><b>21-701 Genset – Test with Load Bank</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Engine wiring harness (as needed)</li> <li>- Load bank</li> </ul>	-	-	1.0	-	-	-

# Group 25 – Generator

## Contents

	<b>Page</b>
<b>Main Rotor</b> .....	<b>60</b>
Replace .....	60
<b>Main Stator</b> .....	<b>60</b>
Replace .....	60
<b>Exciter Rotor</b> .....	<b>61</b>
Replace .....	61
<b>Exciter Stator</b> .....	<b>61</b>
Replace .....	61
<b>Generator Bearing</b> .....	<b>62</b>
Replace .....	62
<b>Rotating Diode Assemblies</b> .....	<b>62</b>
Replace .....	62

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>25-1AA Main Rotor – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator mounts</li> <li>- End bell / bearing carrier</li> <li>- Main stator</li> <li>- Main rotor assembly</li> <li>- Test run unit</li> </ul>	-	-	5.0	-	-	-
<p><b>25-1AB Main Stator – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator mounts</li> <li>- End bell / bearing carrier</li> <li>- Main stator</li> <li>- Test run unit</li> </ul>	-	-	5.0	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>25-1AE Exciter Rotor – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator mounts</li> <li>- End bell / bearing carrier</li> <li>- Main stator</li> <li>- Main rotor assembly</li> <li>- Test run unit</li> </ul>	-	-	5.0	-	-	-
<p><b>25-1AF Exciter Stator – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator mounts</li> <li>- End bell / bearing carrier</li> <li>- Exciter stator</li> <li>- Test run unit</li> </ul>	-	-	3.0	-	-	-



Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>25-3AC Generator Bearing – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator mounts</li> <li>- End bell / bearing carrier</li> <li>- Generator bearing</li> <li>- Test run unit</li> </ul>	-	-	4.0	-	-	-
<p><b>25-3AD Rotating Diode Assemblies – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Generator mounts</li> <li>- End bell / bearing carrier</li> <li>- Rotating diode assemblies</li> <li>- Test run unit</li> </ul>	-	-	4.0	-	-	-

# Group 26 – Generator Control Components

## Contents

	Page
<b>DC Wire Harness</b> .....	<b>64</b>
Replace .....	64
<b>AC Control Box</b> .....	<b>64</b>
Replace .....	64
<b>AC Voltage Regulator</b> .....	<b>65</b>
Replace .....	65
<b>Start Solenoid</b> .....	<b>65</b>
Replace .....	65
<b>Bridge Rectifier</b> .....	<b>66</b>
Replace .....	66
<b>Circuit Breaker (DC)</b> .....	<b>66</b>
Replace .....	66
<b>Stop Solenoid</b> .....	<b>67</b>
Replace .....	67
<b>Start / Stop Switch</b> .....	<b>67</b>
Replace .....	67
<b>Hourmeter</b> .....	<b>68</b>
Replace .....	68
<b>Relay</b> .....	<b>68</b>
Replace .....	68

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>26-1AB DC Wire Harness – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Electrical wiring</li> <li>- Test run unit</li> </ul>	-	-	1.7	-	-	-
<p><b>26-1AC AC Control Box – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Control box cover</li> <li>- Control box</li> <li>- Ground strap</li> <li>- Transfer control parts to new box</li> <li>- Test run unit</li> </ul>	-	-	1.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>26-3AA AC Voltage Regulator – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Voltage regulator</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-
<p><b>26-3AC Start Solenoid – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Starter</li> <li>- Start solenoid</li> <li>- Test run unit</li> </ul>	-	-	1.2	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>26-3AD Bridge Rectifier – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Bridge rectifier</li> <li>- Test run unit</li> </ul>	-	-	1.0	-	-	-
<p><b>26-3AE Circuit Breaker (DC) – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Control box cover</li> <li>- Circuit breaker</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>26-3AF Stopt Solenoid – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Stop solenoid</li> <li>- Test run unit</li> </ul>	-	-	0.7	-	-	-
<p><b>26-3AJ Start / Stop Switch – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Control box cover</li> <li>- Start / Stop switch</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-

Standard Repair Times	Removed From Chassis	In-Chassis Service Accessibility Codes				
Procedure Number and Description	R	A	B	C	D	<u>Special</u> S
<p><b>(continued from previous page)</b></p> <p><b>26-3AK Hourmeter – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Control box cover</li> <li>- Hourmeter</li> <li>- Test run unit</li> </ul>	-	-	0.5	-	-	-
<p><b>26-3AL Relay – Replace</b></p> <p><i>Includes:</i></p> <ul style="list-style-type: none"> <li>- Disconnect and connect</li> <li>- Battery cables</li> <li>- Engine wiring harness (as needed)</li> <li>- Fuel lines</li> <li>- Exhaust hose</li> <li>- Coolant hoses</li> <li>- Drain and refill engine fluids</li> <li>- Remove and install</li> <li>- Soundshield (as needed)</li> <li>- Control box cover</li> <li>- Relay</li> <li>- Test run unit</li> </ul>	-	-	0.3	-	-	-

## Index

### A

AC Control Box, Replace, 64  
AC Voltage Regulator, Replace, 65  
Administrative Time  
  Open/Close Repair Order (Road), 2  
  Open/Close Repair Order (Shop), 2  
Alternator, Replace, 46

### B

Belt Guard, Replace, 39  
Breather, Service, 26

### C

Camshaft, Fuel, Replace, 14  
Camshaft, Valve, Replace, 14  
Circuit Breaker (DC), Replace, 66  
Connecting Rod, Remove And Install, 15  
Connecting Rod Bearings, Replace, 16  
Coolant Pump, Replace / Rebuild, 40  
Crankshaft, Remove And Install, 17  
Crankshaft Seal, Front, Replace, 20  
Crankshaft Seal, Rear, Replace, 20  
Cylinder Head Gasket, Replace, 22

### D

DC Wire Harness, Replace, 64  
Drive Belt, Water Pump, Adjust / Replace, 40

### E

Engine, Rebuild, 9  
Exciter Rotor, Replace, 61  
Exciter Stator, Replace, 61  
Exhaust Manifold, Replace, 44  
Exhaust Mixer, Remove and Install, 44

### F

Flywheel, Replace, 50

Flywheel Housing, Replace, 50  
Fuel Pump, Electrical, Replace, 30

### G

Gauge, Replace, 57  
Gear Case Cover, Remove And Install, 18  
Gear, Crankshaft, Remove And Install, 18  
Generator Bearing, Replace, 62  
Genset, Test with Load Bank, 58  
Genset (Above Deck), Remove and Install, 9  
Genset (Below Deck), Remove and Install, 9  
Genset Engine Assembly, Replace, 11  
Glow Plugs, Replace, 47

### H

Heat Exchanger, Remove and Install, 38  
Hourmeter, Replace, 68

### I

Injectors, Replace, 32  
Intake Manifold, Replace, 42

### M

Main Circuit Breaker, Replace, 56  
Main Rotor, Replace, 60  
Main Stator, Replace, 60  
Muffler, Aqualift, Replace, 53

### O

Oil Filter and Fluid, Replace, 35  
Oil Pan and Gasket, Replace, 34  
Oil Pickup Tube and Strainer, Replace, 35  
Oil Pressure Relief Valve, Inspect and Replace,  
  36  
Oil Pressure Sender, Replace, 56  
Oil Pump, Replace, 34



## **P**

Piston, Remove and Install, 19  
Pump, Injection, Replace, 30

## **R**

Raw Water Pump, Replace / Rebuild, 39  
Relay, Replace, 68  
Rotating Diode Assemblies, Replace, 62

## **S**

Sound Shield, Replace, 52  
Start / Stop Switch, Replace, 67  
Start Solenoid, Replace, 65 , 66  
Starter Motor, Replace, 46  
Stop Solenoid, Replace, 67

## **T**

Temperature Sender, Replace, 57 , 58  
Thermostat, Replace, 38

## Troubleshoot

Coolant Loss, 6  
Coolant Temperature Above Normal, 6  
Engine Oil Leak, 6  
Engine Will Not Crank, 2  
Excess White Smoke at Start-Up (Cold), 8  
Excess White Smoke at Start-Up (Warm), 8  
Excessive Smoke Under Load (Overload Condition), 8  
Genset Cranks But Will Not Start, 7  
Genset Starts But Stops After Switch Releases, 3  
Genset Unstable (Hunts), 7  
High Exhaust Temperature, 5  
High/Low AC Output, 3  
No AC Output Voltage, 4  
Unbalanced Output Voltage, 5  
Unstable Voltage with Stable Engine, 5

## **V**

Valve Guides, Replace, 22  
Valve Tappets, Remove and Install, 28  
Valves  
Adjust, 26  
Replace, 24  
Vibration Isolators, Replace, 52

# Request for SRT Review

<b>Distributor/Dealer Data</b>		
<b>Distributor/Dealer</b>	<b>Phone No.</b>	
<b>Address</b>		
<b>City</b>	<b>State</b>	<b>Zip Code</b>
<b>Country</b>		

My experience has indicated the following repair procedures require more time:

<b>Procedure Data</b>			
<b>SRT Number</b>	<b>Procedure Discription</b>	<b>Published time Hrs.</b>	<b>Suggested time Hrs.</b>
<b>Total Hours</b>			

<b>Generator Set Model</b>
<b>Transfer Switch Model</b>
<b>Repair Date</b>
<b>Technician Name</b>

Describe how repair was performed:

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Signature \_\_\_\_\_ Title \_\_\_\_\_

Mail to: Onan Corporation  
 Service Department  
 1400 73rd Avenue NE  
 Minneapolis, MN 55432



# Onan

Cummins Power Generation  
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Minneapolis, MN 55432  
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