FORWARD

DAEDONG Corporation wishes to thank you for purchasing your new **DAEDONG** Common Rail Direct Injection (CRDI) engine.

This engine is designed based on strict quality standards established by the unit assuring quality of **DAE**-**DONG** genuine components. Its knowledge on the operation of the engine is based on faithful services and reliability for years. This manual makes users familiar with the common rail diesel engine and provides useful information on safety, operation, and maintenance of the engine.

In addition, this engine should be maintained in proper ways according to the Owner's Manual in order to operate the engine with excellent performance, high efficiency, economy, and long-term usage. If the information you seek is not found in this manual, your **DAEDONG** Common Rail Direct Injection (CRDI) engine dealer will be happy to help you. Please feel free to contact **DAEDONG IND. CO.,LTD / DAEDONG-USA, INC.** with your questions/concerns.

< NOTE >

- Make sure to read this manual carefully and keep it handy for future reference.
- When leasing or transferring this tractor, deliver this manual together with the tractor.
- The specifications in this manual are subject to change without notice.

디젤엔진-현대중공업용-KO-00.indd 2

SECTION

SAFETY PRECAUTION	1
PRECAUTION BEFORE OPERATION	2
OPERATION THE ENGINE	3
BREAK-IN AND CHECK	4
MAINTENANCE	5
TROUBLESHOOTING	6
SPECIFICATION	7
INDEX	

TABLE OF CONTENTS

SAFETY PRECAUTIONS	1-1
PRECAUTIONS BEFORE OPERATION	1-2
DESCRIPTION OF ENGINE SYSTEM	2-1
EXTERIOR VIEW	2-2
SERVICING	2-4
OPERATING THE ENGINE	3-1
PRE-START ENGINE CHECKS	3-2
STARTING AND STOPPING THE ENGINE	3-2
STARTING	3-2
STOPPING	3-3
MAINTENANCE	4-1
DAILY CHECKS	4-2
WARMING UP	4-2
SERVICE INTERVALS	4-3
LUBRICANTS	4-4

FUEL	4-5
CHECKING FUEL PIPE REPLACING THE FUEL FILTER BLEEDING FUEL SYSTEM FUEL INJECTION SYSTEM	4-5 4-6 4-6 4-7
	4-8
CHECKING ENGINE OIL LEVEL CHANGING ENGINE OIL REPLACING ENGINE OIL FILTER	4-9 4-10 4-10
RADIATOR (OPTIONAL)	.4-11
RADIATOR (OPTIONAL) CHECKING, ADDING AND CHANGING COOLANT CHANGING COOLANT CLEANING RADIATOR ANTI-FREEZE	.4-11 4-11 4-12 4-14 4-14
RADIATOR (OPTIONAL) CHECKING, ADDING AND CHANGING COOLANT CHANGING COOLANT CLEANING RADIATOR ANTI-FREEZE	.4-11 4-11 4-12 4-14 4-14 4-15
RADIATOR (OPTIONAL) CHECKING, ADDING AND CHANGING COOLANT CHANGING COOLANT CLEANING RADIATOR ANTI-FREEZE AIR CLEANER (OPTIONAL) BATTERY (OPTIONAL)	4-11 4-11 4-12 4-14 4-14 4-15 4-16

TABLE OF CONTENTS

BATTERY STORAGE	4-18
FAN BELT	. 4-18
TENSION AND WEAR OF FAN BELT ADJUSTING TENSION	4-18 4-19
LONG-TERM ENGINE STORAGE	. 4-19
TROUBLESHOOTING	5-1
ENGINE IS HARD TO START	5-2
THE ENGINE MUST BE STOPPED IMMEDIATELY.	5-3
ABNORMAL EXHAUST FUME COLOR	5-4
SUDDEN ENGINE STOP	5-5
ENGINE OVERHEATS	5-6
SPECIFICATIONS	6-1
SPECIFICATIONS	6-2
EXTERNAL DIMENSIONS	6-2
MAJOR SPECIFICATIONS	6-5

INDEX	7-1
	7-2

SAFETY AND VEHICLE DAMAGE WARNING

This manual includes information titled as **WARNING**, **CAUTION**, **IMPORTANT** and **NOTE**. These titles indicate the following:



This indicates that a condition may result in harm, serious injury or death to you or other persons if the warning is not heeded. Follow the advice provided with the warning.



This indicates that a condition may result in damage to your vehicle or its equipment if the caution is not heeded. Follow the advice provided with the caution.



NOTE This indicates that interesting or helpful information is being provided.

QUALITY POLICY

We, a company that exclusively designs, produces, and sells CRDI engines, do our best to secure stability and reliability of products to satisfy customers fully.

Additionally, in order to provide products that satisfy our customers, we strive to understand clearly the requirements of our customers from the design to service stages so we can build a quality management system. We then require that all employees understand and implement the system. Furthermore, we will improve the quality management system continuously to satisfy requirements of ISO9001, 2000/KS A9001, and 2001 and observe national and international laws and regulations in the manufacturing process.

At the same time, we will set and achieve additional mid- and long-term quality goals internally. Our chief of quality assurance unit has responsibility and authority from the CEO for periodically examining the effective operation of the quality management system to take actions for any discrepancy.

ENVIRONMENTAL POLICY

DAEDONG is a company that exclusively designs, produces, and sells agri-machineries and industrial CRDI engines. We have minimized environmental pollutants produced while providing products or services. That means our all managerial activities are operated in an "environment-friendly" system by saving resources and observing internal standards, including requirements of environmental regulations and ISO 14001;1996.

We will achieve environmental goals based on policies that contribute to the protection of the environment by improving related regulations continuously. We publish those policies to the public and interested parties and examine periodically whether the environment management system is understood by all employees and implemented effectively, taking actions to correct any discrepancy.

PRODUCT SAFETY AND MANAGEMENT POLICIES

We design, manufacture, and provide safe products with no defects that give satisfaction to customers, and at the same time, provide the best services. To achieve this goal, all of our employees understand the product safety and management policies fully and try to exceed the level required by national or international regulations or standards.

Our chief of service unit has responsibility and authority from the CEO for periodically examining the effective operation of product safety and management policies and taking actions to correct any discrepancies.

SAFETY AND HEALTH POLICY

We, a company that exclusively designs, manufactures, and sells CRDI engines, inspect in advance any harmful or hazardous 'components during the manufacturing process to prevent any accident related to safety. We will operate the system by implementing a safety and management system to make a workplace with "no disasters" and observing internal standards including the requirements of health regulations and OHSAS18001;1999 to achieve additional safety and health goals internally.

We publish those policies to all employees and interested parties and examine periodically whether all employees understand and implement effectively the safety and health management system, taking actions to correct any discrepancies.

NOTICE ON ENVIRONMENTAL "USAGE AND DISPOSAL"

We, a company that exclusively designs, manufactures, and sells CRDI engines, minimize environmental pollutants generated by our operations, and all managerial activities are operated in environment-friendly ways based on saving resources. All of our employees observe environmental regulations and related standards. To contribute to the protection of the global environment, we measure environmental performance periodically and make the information available to customers and interested parties. We establish and achieve environmental goals internally to secure the transparency of environment management.

In addition, we set guidelines on "usage and disposal' for our customers to protect the environment.

- 1. Customers using this product should read this manual carefully and avoid any overloaded work. Overloaded work may reduce the service life of products, and emissions combusted incompletely due to overloaded work are a major cause of air pollution, which is the environment of the earth where we breathe.
- 2. When you replace the used engine oil with new oil, don't dispose of the used oil in just any place which can cause great soil or water pollution. Please bring the used oil to our local distributor to be disposed lawfully.
- 3. Use the product with proper operation, and if the service life of the product ends, don't leave or dispose it in just any place. Products left out or disposed improperly by customers generate rust or oil, which may pollute soil or water. Therefore, when disposing out-of-service products, never fail to let authorized "collectors for used wasted agri-ma-chineries" collect them to dispose lawfully.

디젤엔진-현대중공업용-영문판-00.indd 12

SAFETY PRECAUTIONS

PRECAUTIONS BEFORE OPERATION1-2

1-2 CRDI ENGINE

PRECAUTION BEFORE OPERATION

The following contents describe the safety cautions, categorized into **DANGER** and **WARNING**. Before the initial operation, read this manual carefully for your safety. The safety precautions described in this chapter are applied overall to CRDI engines. Be sure to observe these regulations as well as the descriptions in the manual text.

The following should never be allowed to operate this machine. An unexpected accident can occur.

- Those under the influence of alcohol
- Pregnant woman who is ready to deliver
- Those under 16
- Inexperienced operator
- Those who are fatigued, sick, or under the influence of medicine; others who are not qualified for any reasons to operate this machine

Do not operate the machine while fatigued. Take a rest if necessary.



Please wear appropriate working clothes.



You may be entangled in moving parts or slip on the machine due to the above-mentioned clothing, which may cause serious injuries.



- 1. Thoroughly read and understand this manual before operating the engine. Contact your **DAEDONG** dealer if you have any questions.
- 2. It is the owner's responsibility to train other operators before they use this engine. All operators should read and understand this manual.

SAFETY PRECATIONS





- 3. Exhaust fumes are poisonous and can cause illness, brain injury, or even death due to lack of oxygen. Therefore, operate the engine where there is good ventilation and there are no people or cattle.
- 4. Don't operate CRDI engines in a place where may be combustible vapors. Responsibility for operating the engine safely in dangerous places must be assumed by the machine managers and workers
- 5. Use diesel fuel only. Never mix gasoline or alcohol with diesel

fuel. Fuel mixtures will damage the engine and may cause an explosion.

6. Confirm that the engine is stopped when repairing the machine, performing maintenance work, or refilling the fuel. Don't open the caps of the radiator or auxiliary tank while operating the engine or just after the engine is stopped. If opened, hot water is ejected, which may cause burning injuries to people around. Open the radiator cap 10 minutes after the engine is stopped.

7. Make sure that all drains and caps are tightly closed and all fluid levels are correct before starting. Always check for leaks and ensure that any loose parts are repaired before operating the engine. Loose parts are the operator's responsibility and may cause damage or injury if ignored. Loose parts are the operator's responsibility and may cause damage or injury if ignored.

4 CRDI ENGINE



9. If you always replace bolts with new ones when assembling, be sure to use bolts of same or corresponding type. Even if you are forced to use bolts of different types, don't use bolts of lower grade than the current ones.



- 10. To prevent injury and equipment damage when servicing the engine; always use the proper tools, know how to use them correctly and keep them in good condition. Wear eye protection.
- Dispose of all fluids and hazardous materials in accordance with local environmental regulations and common sense. Never drain oils, coolants or fuels onto the ground. Do not place fluids, filters or batteries in with

8. When separating or dissembling connecting pipes, joints, or related parts, remove the pressure from the systems for air, engine oils, or coolants. When removing a component in a pressurized system, be careful of the pressure. For example, do not use your hand to check pressure leakage. There may be damages due to oil or fuel with high pressure.

2014-09-12 오전 11:59 34

household wastes. Determine the appropriate disposal method before removing hazardous materials from the engine.



- T91011BA
- 12. When checking the battery, keep flammable items, such as lighter, cigarette, etc., away from the machine.
- Hydrogen gas from batteries may cause an explosion, which may cause injuries or damages.
- 14. Do not allow the battery fluid to contact your skin and clothing. In case of acid contact with eye, skin, or tools, rinse thoroughly with water. Get medical attention immediately if acid contacts your eye or is swallowed. The battery has acid that can burn your skin, eyes, or clothing.





- 15. When disconnecting the cable from battery terminals, start with the negative terminal first. When connecting the cable, start with the positive (+) terminal. Doing so can cause a short circuit which leads to skin burning or fire.
 - Use only a recommended battery.
 - Do not mix the positive and negative battery cables.

16. The cover and other parts removed for inspection and repair should be installed again after the work is done. You can be trapped or entangled into the engine system and get injured.

DESCRIPTION OF ENGINE SYSTEM

EXTERIOR VIEW	2-2
SERVICING	2-4

2

2-2 CRDI ENGINE

EXTERIOR VIEW





Q53W304B

(1) Water Pump(2) Turbocharger(3) Starter(4) Alternator

(5) Common Rail(6) Oil Filter(7) Injector(8) Oil Gauge

(9) HP Pump (10) Oil Cooler (11) Fuel Filler (A) Coolant Out (To Radiator) (B) Coolant In (From Radiator)

4 CYLINDER





(1) Water Pump (2) Turbocharger (3) Starter (4) Alternator

(5) Common Rail (6) Oil Filter (7) Injector (8) Oil Gauge

(9) HP Pump (10) Oil Cooler (11) Fuel Filler (A) Coolant Out (To Radiator)

(B) Coolant In (From Radiator)

4 CRDI ENGINE

SERVICING



(1) Engine Serial Number

Your dealer is interested in your new CRDI engine and has the desire to help you get the most value from it. After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself.

The engine serial number is stamped on the mounting surface of the injection pump. Should your engine require parts or service, please contact your local **DAEDONG** dealer. Your dealer will need the following information in order to assist you.

- 1. Engine make, model number and serial number.
- 2. Names and code numbers of parts to be ordered.
- 3. Make and model number of the machine in which the engine is installed.

OPERATING THE ENGINE

PRE-START ENGINE CHECKS				
STARTING AND STOPPING THE ENGINE	3-2			
STARTINGSTOPPING	3-2 3-3			
CHECK DURING OPERATION	3-3			

3-2 CRDI ENGINE

PRE-START ENGINE CHECKS

Always check the engine and make sure it is ready for safe operation before starting. (See page 4-2 for details)

IMPORTANT

- Before installing the engine, be sure that the equipment is on firm, level ground.
- Do not run the engine on gradients.
- Never use starting fluid or gasoline in the air intake. Engine damage will result, and an explosion may occur.

STARTING AND STOPPING THE ENGINE STARTING

- Insert the key into the starter switch, and turn it to "ON" position. Keep the position until the preheat indicator goes off.
 - (1) Verify that the oil pressure and charge lights are on.
 - ② The engine may be started with out preheat in normal temperature (above 15°C), but with preheat for 15 or 10 seconds in cold temperature (-23°C)(Provided it may be varied according to the installed condition of the engine.).
- 2. Turn the key to the "START" position to engage the starter motor. Release the key immediately as the engine starts.
- 3. Verify that the oil pressure and charge lights are now off. If either light is on, stop the engine immediately and see page 3-4 for troubleshooting instructions.

- 4. Run at a moderate speed until the engine reaches a normal operating temperature before doing work.
- 5. The oil pressure light should remain off during operation. If the light comes on, stop the engine immediately to avoid the possibility of severe engine damage, and check the following:
 - Correct oil level.
 - Verify that the engine contains clean oil of the proper viscosity.
 - · Check for faulty wiring.

To avoid personal injury :

• Keep children or non-essential bystanders away from the engine while it is running.

IMPORTANT

- Do not turn the starter switch to "START" while the engine is running.
- If the engine does not start in 10 seconds, wait 30 seconds and repeat the starting sequence. Never run the starter motor continuously for more than 20 seconds.
- Always warm up the engine before working. Using a cold engine will shorten its life.
- If the temperature may be lower below -15°C (5°F), separate the battery from the machine, and keep it indoors. Then use it when starting the engine.

STOPPING



(1) ECU

- 1. Disengage any load from the engine. Return the speed control lever to the "IDLE" position.
- 2. Turn the starter switch to "OFF" and remove the key. Return the engine stop solenoide to the "START" position for the next start.

CHECK DURING OPERA-TION

While operating the engine, keep checking whether all parts of the engine are operating smoothly and properly.

COOLING SYSTEM

If steam or coolant is escaping from the overflow tube; stop the engine, allow it to cool, and check the following and correct as needed.

- 1. Check for cooling system leaks.
- 2. Check for obstructions that block cooling air.
- 3. Clean any dirt or debris from the radiator core. (Fins & tubes)
- 4. Check and adjust the fan belt tension.
- 5. Ensure that the system is filled to the correct coolant level with the proper mix of anti-freeze and water.
- 6. Check the radiator cap for proper type and condition.

CRDI ENGINE

To avoid personal injury :

• DO NOT remove the radiator cap or the coolant reserve tank cap while the engine is hot. Pressurized steam or coolant will escape and cause serious injury to you and any bystanders. Open the cap at least 10 minutes after the engine is stopped.

OIL PRESSURE LAMP

The oil pressure lamp comes on when the oil pressure drops below a safe level. If the lamp comes on during operation. If the lamp is on while the engine is operated at or above 1,000 rpm, immediately stop the engine and check the following items.

1. Check the engine oil level. (Page 4-9)

ENGINE CHECK LAMP

This lamp comes on when any electric device (sensor or wiring) is defective in the engine. When this lamp is illuminated, contact your local Dealer.

FUEL

The fuel tank should never be allowed to become completely empty. An empty tank will allow air into the fuel system; and the engine will not operate without bleeding the fuel system.

EXHAUST SMOKE

The engine exhaust should be colorless during normal operation within the rated output of the engine. Continuous dark emissions or smoke may indicate improper usage or an engine malfunction.

STOP THE ENGINE IMMEDIATELY:

- 1. If the engine speed suddenly changes.
- 2. If there is an unusual noise.
- 3. If the engine exhausts suddenly darkens.
- 4. If the oil pressure or temperature light come on.

REVERSED ENGINE ROTATION AND REMEDIES

While not common, it is possible for a diesel engine to run backwards. The engine will lose lubrication and be severely damaged if allowed to run in this condition. Shut the engine down immediately.

HOW TO TELL WHEN THE EN-GINE RUNS BACKWARDS

- 1. Oil pressure will drop suddenly. The oil pressure light will come on.
- 2. The sound of the engine will change. Exhaust gases will come out of the air intake.
- 3. A loud knocking sound will be heard.

REMEDIES

- 1. Stop the engine immediately using the engine stop lever.
- 2. Check the air cleaner and rubber parts of the air intake system for damage. Replace as needed.

3



MAINTENANCE

DAILY CHECKS	4-2
WARMING UP	4-2
SERVICE INTERVALS	4-3
LUBRICANTS	4-4
FUEL	4-5
CHECKING FUEL PIPE	4-5
REPLACING THE FUEL FILTER	
BLEEDING FUEL SYSTEM	
FUEL INJECTION SYSTEM	4-7
ENGINE OIL	4-8
CHECKING ENGINE OIL LEVEL	4-9
CHANGING ENGINE OIL	4-10

RADIATOR (OPTIONAL) 4-11	
CHECKING, ADDINGAND CHANGING COOLANT4-11 CHANGING COOLANT4-12 CLEANING RADIATOR4-14 ANTI-FREEZE4-14	
AIR CLEANER (OPTIONAL) 4-15	
BATTERY (OPTIONAL) 4-16	
BATTERY CHECK4-17 BATTERY STORAGE4-18	
FAN BELT4-18	
TENSION AND WEAR OF FAN BELT 4-18 ADJUSTING TENSION4-19	

LONG-TERM ENGINE STORAGE 4-19

DAILY CHECKS

Regular maintenance is an important factor in preventing downtime and accidents. Always make the following checks before operating the engine.

🔰 NOTE

• All service and maintenance should be done on a firm, level surface.

	PAGE	
Parts whi previous op	_	
By walk-	Oil or water leaks	4-11
	Engine oil level and contamina- tion	4-9
	Amount of fuel	4-5
the ma-	Amount of coolant	4-12
chine	Dust in air cleaner	4-15
	Damaged parts and loosened bolts and nuts	_
By start- ing the engine	Color of exhaust fumes	3-4
	Unusual engine noise	3-5

WARMING UP

It is recommended always to warm up the engine before driving in order to maintain the durability of the engine and prevent malfunction of the engine. Before warming up the engine, make sure that each part in the engine is properly lubricated and each hydraulic part is in a perfect condition in order to prevent malfunction in the engine as well as the hydraulic system.

How to warm up engine is as followings;

- Start the engine and run it at a low speed and without load for approx.
 3 to 4 minutes.
- 2. In cold weather, increase the warming up time to 10 minutes.
- 3. If it is very cold, warm up the engine for approx. 15 minutes.
- 4. The engine throttle can be open for 50 % in order to shorten the warming up time.
- 5. The engine is sufficiently warmed up when the temperature gauge on

the instrument panel indicates 1/4 of the normal temperature range, regardless of the warming-up time.

- 6. Do not increase the work load rapidly after starting work.
- 7. Run the engine without load for approx. 2 to 3 minutes before stopping the engine after work.

WARNING

- Warming up the engine excessively increases fuel consumption and affects the durability of the tractor negatively.
- Never warm up the engine and leave the tractor for an extended period of time. It can cause fire and an accident.

SERVICE INTERVALS

NO	NO. CHECK ITEM		RUN HOUR							RUN AGE		SINCE THAN	PAGE	
NO.			50	100	150	200	300	400	600	800	1YR	2YR		IAOL
1	Engine oil	Change				0							Every 200 Hr	4-8
2	Engine oil filter	Replace				0							Every 200 Hr	4-9
3	Engine starting system	Check	0										Every 50 Hr	-
4	Tightening torque	Check	0										Every 50 Hr	-
5	Battery	Check		0									Every 100 Hr	4-16
6	Aircleaner element	Clean		0									Every 100 Hr	4-15
0		Replace											Every 1 Year	4-15
7	Fuel filter	Replace				0							Every 200 Hr	4-7
8	Fan belt	Adjust		0									Every 100 Hr	4-18
٥	Radiator hose and	Check							0				Every 600 Hr	4-12
9	clamp	Change										0	Every 2 Year	4-13
10	C Eval line C	Check				0							Every 200 Hr	4-5
10		Replace										0	Every 2 Year	4-5
11	Intako air lino	Check				0							Every 200 Hr	-
		Replace										0	Every 2 Year	-
12	Engine valve clearance	Adjust								0			Every 800 Hr	-
13	Cooling system	Flush										0	Every 2 Year	-
14	Coolant(Anti-freeze)	Replace										0	Every 2 Year	4-14
15	Fuel airbleeding	Check											Service as required	-
16	Radiator screen	Clean											Daily	-
17	CCRT	Check											Service as required	-

• The ECU, high pressure pump, common rail, nozzle, alternator, starter, compressor, gear pump and hydraulic valve should be checked and repaired only by authorized dealer/distributor. If they are serviced by an unqualified person, the vehicle's safety cannot be guaranteed any longer since changes made may not conform to **DAEDONG** requirements.

4-3

4-4 CRDI ENGINE

LUBRICANTS

To prevent serious equipment damage, use only genuine **KIOTI** fluids, oils and greases, or equivalents.

NO.	SECTION	CAPACITY [U.S.gal. (L)]	LUBRICANTS
1	Fuel	-	Use only ultra low sulfur diesel (ULSD) fuel with a maximum of 15 mg/kg (15ppm) sulfur content
2	Coolant	13.2 (50)	An antifreezing solution(Ethylene glycol) + Pure water (50:50)
3	Engine oil	1.6 (6)	Engine oil : API CJ grade above Oil Viscosity : SAE 10W30, 10W40, 15W40

• Check the oil level regularly. Correct the oil level, if needed, before operating.

• Always check and add oil with the tractor on a flat, level surface.

FUEL

Use only the Ultra-low sulfur diesel. (Inclued sulfur 15PPM).

To avoid accidents:

- Do not mix diesel fuel with gasoline or alcohol. It can explode.
- During refueling, make sure to stop the engine in advance and keep flammables away from the engine.
- If a different type of fuel, such as gasoline, is added into the fuel tank, it can damage the high pressure pump. Never replenish the tank with a different type of fuel.

FUEL LEVEL INSPECTION AND FUELING

- 1. Check if the fuel level is below the lower limit.
- Use ultra-low sulfur diesel fuel only. As other fuel is unknown of its quality or low quality, use only specified fuel. Also, kerosene has low octane number and can harm the engine.

IMPORTANT

- Use a strainer when pouring fuel into the tank. Otherwise, foreign materials or sand may enter the fuel system, causing a problem to the high pressure fuel injection pump and other parts.
- Do not leave the fuel tank empty. If the fuel tank is empty, air may enter the fuel system. Bleeding is necessary before the next engine start.
- Be careful not to spill during refueling. If fuel is spilled, it should be wiped off immediately, or it may cause a fire.

CHECKING FUEL PIPE



(1) Bleeding bolt (2) High-pressure fuel pump (3) Fuel Pipe

Check the fuel pipe every 200 hours.

- 1. If any clamp is loose, apply a small amount of oil to the band bolt and tighten it firmly.
- 2. Rubber fuel pipes can be worn naturally regardless of operation time of the engine. Therefore, replace them every two years.
- 3. If any pipe or clamp is worn prematurely, replace it immediately.

To avoid accidents:

 After stopping the engine, check the fuel pipe and replace it if necessary. A damaged pipe can cause a fire.

IMPORTANT

 If the fuel pipe is disconnected, plug it with clean rag or paper to keep foreign materials out of it. If foreign material enters the pipe, it can lead to malfunction of the injection pump.



REPLACING THE FUEL FILTER

(1) Fuel Filter

- 1. Replace the fuel filter cartridge every 400 hours.
- 2. Apply a thin layer of fuel oil on the gasket. Install and hand-tighten.

IMPORTANT

 Replacing the fuel filter periodically will significantly reduce injection pump and fuel injector wear.

BLEEDING FUEL SYSTEM



(1) Fuel Filter (3) Priming Pump (2) Bleeding Bolt

- 1. Make sure to bleed the fuel system after adding fuel to the completely empty fuel tank, draining water from the fuel filter or replacing the fuel filter.
- 2. To bleed the system, unscrew the bleeding bolt on top of the fuel filter and press the priming pump repeatedly until fuel in the fuel tank is delivered to the fuel filter.
- 3. When fuel flows out from the bleeding bolt, tighten the bleeding bolt.

FUEL INJECTION SYSTEM

• Never crank the engine to run the high pressure pump for bleeding.



(1) Fuel Tank(2) Pre-Filte.(5) Injector(6) Over low(9) High Pressure Pump

(2) Pre-Filter (Only 4 Cylinder)(6) Over low Pipe

(3) Main Filter (7) Common Rail (4) Injection Pipe (8) Fuel Cooler CRDI ENGINE

Fuel in the fuel tank is sucked by the suction pump in the high-pressure pump to be delivered to the highpressure fuel pump through the prefilter (Only for 4-cylinder engine) and main filter.

After fuel is supplied to the injectors by the high-pressure fuel pump, it is injected into the cylinders for combustion. Surplus fuel of fuel supplied to the injectors is returned back to the high-pressure fuel pump through the overflow pipe to flow back to the fuel tank through the fuel cooler.



- High-pressure fluid left in the fuel system can cause a severe injury. Never try to remove or repair the highpressure fuel pump, common rail and fuel pipes around the injectors.
- Have them serviced by welltrained technicians and contact your dealer for service.

ENGINE OIL

For your own safety and maximum service life of the machine, make a thorough daily inspection before starting the engine.

To avoid personal injury:

- Be sure to check and service the tractor on a flat place with the engine stopped.
- Check the surrounding area of the engine to see if there is any loose bolt, part debris, oil or coolant leakage, or damaged or worn part.

CHECKING ENGINE OIL LEVEL



(1) Oil Inlet(2) Oil gauge(A) Oil level is acceptable within this range.

- 1. Park the machine on a flat sur face.
- 2. Check the engine oil before starting the engine or wait 5 minutes or more after the engine has stopped.
- 3. To check the oil level, draw out the oil gauge, wipe it clean, replace it, and draw it out again.

Check to see that the oil level is between the two notches. If the level is too low, add new oil to the prescribed level at the oil inlet.

4. Engine oil capacity

Model	Capacity
3F183T	1.5 U.S.gal. (5.8 L)
4F243T	2.6 U.S.gal. (9.7 L)
3FT-HI4	1.6 U.S.gal. (6.0 L)

5. Use SAE 15W-30CJ oil or equivalent. Use API CJ grade above. (See the lubricants spec of page 4-4)

To avoid personal injury:

• Be sure to stop the engine before checking the oil level.

IMPORTANT

- When using oil of a different brand or viscosity from the previous one, remove all of the old oil. Never mix two different types of oil.
- Do not start the engine if the amount of oil is insufficient.



CHANGING ENGINE OIL

- 1. Change after initial 50 hours of operation.
- 2. To drain the used oil, remove the drain plug at the bottom of the engine and drain the oil completely into the oil pan. All the used oil can be drained out easily when the engine is still warm.
- 3. Fill with the new oil up to the upper notch on the dipstick.
- 4. Then, change engine oil at every 200 hours of operation.

REPLACING ENGINE OIL FILTER





- 1. When changing oil, replace the oil filter as well.
- 2. Remove the oil filter with a filter wrench.
- 3. Apply a thin film of oil to the gasket of the cartridge.
- 4. Screw in the cartridge with a hand. When the gasket touches the sealing surface, tighten the cartridge with a hand firmly. If tightening it using a wrench, it can be over-tightened.



(1) Oil Filter

5. After replacing the oil filter, the engine oil level is lowered. Therefore, run the engine for a while and check the sealing section for oil leakage before checking the oil level. If necessary, add more oil.

NOTE

• Wipe any engine oil spilled on the equipment thoroughly.

RADIATOR (OPTIONAL)

Radiators must be handled and installed properly to avoid coolant leaks. It should be a daily routine to check the engine coolant level. Check it before each use while the engine is cold.

WARNING

To avoid personal injury:

• Do not remove the radiator cap or coolant reserve tank cap while the engine is hot. Escaping steam or coolant will cause serious injury to you or any bystanders. Before opening the cap, wait for at least 10 minutes after stopping the engine.

To avoid personal injury:

 Always stop the engine and allow it to cool before changing the coolant

CHECKING, ADDING AND CHANGING COOLANT



(1) Pressure Cap

- 1. Open the radiator cap and check that the radiator is filled with coolant up to its filler neck.
- 2. If it is equipped with the reservoir tank, check that the coolant level in the reservoir tank is between the "FULL" and "LOW" marks.



(1) Radiator Drain Plug

3. If coolant is insufficient, fill the radiator or reservoir tank with clean water. When it needs to add more coolant, confirm that the drain plugs on the bottom of the radiator and on the side of the crankcase are firmly tightened.



⁽¹⁾ Coolant Reservoir Tank (A) FULL (B) LOW

IMPORTANT

- Do not use muddy water or salty water as coolant.
- When adding more coolant, make sure that the radiator pressure cap is firmly tightened.
- Do not fill the tank with coolant over the "FULL" mark.

IMPORTANT

• When starting the engine after adding coolant, the coolant level is decreased. Stop the engine and add more coolant.

CHANGING COOLANT

- To drain coolant, always remove the drain plugs from the side of the crankcase and the bottom of the radiator as well as the radiator cap.With the cap installed, coolant cannot be drained completely. (To drain coolant from the reservoir tank, disconnect the overflow pipe of the radiator cap)
- 2. Coolant capacity

Model	Capacity
3F183T	0.9 U.S.gal (3.5 L)
4F243T	1.1 U.S.gal (4.2 L)
3FT-HI4	0.8 U.S.gal (3.4 L)

- * The above coolant specification is for the engine only.
- 3. If the radiator cap is loose or there is a gap between the cap and seat, coolant level can be decreased faster.

4. Coolant (Radiator cleaner and anti-freeze)

COOLANT SPEC

An antifreezing solution (Ethylene glycol) + Pure water (50:50)

INSPECTION FOR EXCESSIVE

- 1. Clean the areas between the radiator grill (Screen) or radiator fins and tubes thoroughly.
- 2. If necessary, adjust the fan belt again. (For detailed information, see page 4-18.)
- 3. If the radiator pipe is clogged by slime, clean the pipe with radiator cleaner.

CHECKING RADIATOR HOSE

- 1. Check that the radiator hose is firmly tightened at every 600 hours of operation.
 - If the clamp band is loose or it leaks, tighten it securely.
 - If the radiator hose is swollen, hardened or cracked, replace it with a new one and fix it with the band firmly.
- Replace the hose and clamp every two years. If the hose becomes swollen, hardened or cracked before that, replace it with a new one immediately.

CLEANING RADIATOR CORE

Remove dirt between the radiator fins and tubes with water thoroughly.

PRECAUTION FOR OVERHEATING

Perform the following instructions when the coolant temperature is close to or over the boiling point.¬ Take the appropriate action when the warning buzzer sounds or warning lamp is illuminated.

- 1. Stop the machine in a safe place and leave the engine unloaded.
- 2. Do not stop the engine right away. Instead, run the engine without load for 5 minutes, and then stop the engine.
- 3. If the engine stalls suddenly while it is running without load, get out of the machine and move far from it immediately. Also, never open the hood or any other part.
- 4. Stay away from the machine for at least 10 minutes or until steam does not appear. Also, do not let other people come close to the machine.
- 5. Check if there is any possible dangerous condition, such as a fire. Eliminate the cause of overheating, referring to the description for the malfunction causes and actions.

CLEANING RADIATOR



(1) Radiator Hose

(2) Clamp Band

It is necessary to clean the engine cooling system at every 500 hours of operation. Also, clean it before and after using anti-freeze.

IMPORTANT

 Do not clean the radiator core with a hard object, such as a screwdriver. A hard object can damage the special radiator fins, resulting in malfunction of the radiator.

ANTI-FREEZE

This tractor is filled with 50% of ethylene glycol at factory.

If the anti-freeze has been replaced by tap water later on, the coolant can be frozen, leading to damage to the cylinder and radiator when the ambient temperature is below $0^{\circ}C$.

Therefore, make sure to change water into anti-freeze before winter season comes.

When changing the anti-freeze with one of another type, flush the cooling system several times and contact a professional for the mixture ratio.

Vol. %	Freezing Point		Boiling Point*	
Anti- freeze	°C	°F	°C	°F
40 50	-24 -37	-12 -34	106 108	222 226

 * At 760 mmHg pressure (Atmospheric). A higher boiling point is obtained by using a radiator pressure cap.

AIR CLEANER (OPTIONAL)

- The temperatures shown on the left are industry standards that necessitate a minimum glycol content in the concentrated anti-freeze.
- When the coolant level drops due to evaporation, add water only. In case of leakage, add anti-freeze and water in the specified mixing ratio.
- Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.
- Do not use radiator cleaning agents when anti-freeze has been added to the cooling water. (Anti-freeze contains an anticorrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts)



(1) Filter (3) Evacuator Valve

(2) Cap

If the air cleaner is not in a good condition, the lifetime of the engine can be shortened, excessive soot can be produced, and the engine power can be deteriorated. Therefore, the filter should be inspected frequently. Its replacement interval can be changed according to driving conditions. Replace the filter according to the following procedure:

- 1. Open the hood and check the suction hose and air cleaner housing for damage.
- 2. Unscrew the air cleaner clip and remove the cover.
- 3. Clean the inside of the air cleaner housing by blowing compressed air through it.
- 4. Replace the filter and check the housing for damage.
- 5. Install the cover and fix it with the clip.

NOTE

• When installing the cover, make sure that the dust collection valve is heading down.

BATTERY (OPTIONAL)

- Use only a genuine filter. Use of a non-recommended filter can cause damage to the engine and sensor.
- Make sure that no dust enters the system by installing the cover firmly.
- When removing the filter, be careful not to let foreign material enter the air inlet.



- (1) Red Lead (+) (3) Battery Case
- (2) Ground Lead (-)

Mishandling the battery shortens the service life and adds to maintenance costs. If the battery is insufficiently charged, the headlights may dim and the engine is hard to start. It is important to inspect the battery periodically.

- 1. The battery cable should always be clean and firmly connected. When installing a new or used battery, clean its terminals and the end of the cable.
- 2. Check the battery and cable for damage and corrosion.
- 3. Apply grease to the terminals and cable end in order to prevent corrosion.

2014-09-16 오전 8:36:13

BATTERY CHECK



Check the battery sight glass frequently to keep the battery in the best condition.

CHECK WINDOW	BATTERY CONDITION
Blue	Charge (Normal)
Black	Discharge (Charging)
⊖ White	Change

- The battery gas can explode. Do not expose the battery to flames or sparks. It may cause a fire.
- The battery fluid contains sulfuric acid that can burn you. Do not allow the battery fluid to contact your eyes, skin, or painted surfaces. If you accidentally get it in your eyes or on your skin, flush the site of contact with water and contact your doctor.
- Be sure to wear eye protection while working on the battery. The battery fluid can hurt your eyes.
- Use only the battery with the specified voltage. Otherwise, it may cause a fire.

CHARGE THE BATTERY



(1) Battery (3) Black Lead (-)

(2) Red Lead (+)

- 1. To slow charge the battery, connect the battery positive terminal to the charger positive terminal and the negative to the negative, then recharge in the standard fashion.
- 2. Boost charging is only for emergencies. It will partially charge the battery at a high rate and in a short time. It is applicable when the boost charging battery is used. If boost charging fails, the battery service life will be shortened.

4-18 CRDI ENGINE

3. When the battery is discharged and should be replaced, replace it with a new one with the same specification.

- Keep the battery fully charged. If the battery fluid concentration is too low during the winter season, the battery may be frozen.
- Do not start the engine when the battery is frozen. Try to warm it up first.
- If the battery is not securely installed, the battery case and electrolytes could be damaged by vibration. To prevent the battery acid from contacting the terminals, apply grease around the battery terminals and con-nections.
- Never check the charge status of the battery by placing a metal object across the posts. Use a voltmeter or hydrometer.

BATTERY STORAGE

- 1. When storing the tractor for a long period, remove the battery from tractor, store in a dry place out of direct sunlight.
- 2. The battery self-discharges while it is stored. Recharge it once every three months in hot seasons and once every six months in cold seasons.

FAN BELT TENSION AND WEAR OF FAN BELT

If the fan belt is not properly adjusted, the engine can be overheated or the battery cannot be charged sufficiently.

Check if the fan belt is deflected for $0.28 \sim 0.34$ in. (7 to 9 mm) when pressing it with a finger with force of 10 kgf. Also, check if the belt is cracked or damaged.

ADJUSTING TENSION



(1) Fan Belt (2) Bolt (A) 0.28 ~ 0.34 in. (7~9mm)

Unscrew two alternator mounting bolts, set the proper tension, and tighten the bolts. After adjusting the tension, tighten the bolts and nuts again.

LONG-TERM ENGINE STORAGE

Clean the machine when storing the engine for several months or more.

- Open the drain cocks and remove the radiator cap to drain all of the coolant from the engine and radiator. Leave the drain cocks open. Label the engine with a reminder that there is no coolant in the engine. If the temperature gets lower than 0°C (32°F), coolant gets frozen. In such conditions, be sure to discharge the coolant from the engine.
- 2. Drain the engine oil and replace with clean oil. Run the engine for 5 minutes.
- 3. Repair any leaks. Ensure that all bolts and screws are tight.
- 4. Separate the battery from the machine, check the electrolytes, and recharge the battery. The battery should be kept in a dry place without direct sunlight.

5. Run the engine every 2 to 3 months with no load for 5 minutes. If the engine is not run for a period of more than 5 months, apply engine oil liberally to valve guides and valve stem seals before starting.



TROUBLESHOOTING

ENGINE IS HARD TO START	5-2
THE ENGINE MUST BE STOPPED IMMEDIATELY	5-3
ABNORMAL EXHAUST FUME COLOR	5-4
SUDDEN ENGINE STOP	5-5
ENGINE OVERHEATS	5-6

5

5-2 CRDI ENGINE

ENGINE IS HARD TO START

POSSIBLE CAUSES	ACTIONS
1. Fuel is cloudy or fuel flow is re- stricted	 Check fuel tank and fuel filter. Remove water, dirt, or other debris. Filter out fuel, and replace the filter if contaminated.
2. Air or water in fuel system	 Fuel pump is not working properly due to air in the fuel filter or injection line. Loosen the fuel cap nut and check carefully to obtain proper fuel injection pressure. Loosen the air vent screw from the fuel filter and fuel injection pump and bleed all air from the fuel system.
3. Incorrect valve clearance	 Adjust the valve clearance (with the engine cold). Intake : 0.008 in. (0.2 mm) - Exhaust : 0.008 in. (0.2 mm)
4. Leaks from valve	Polish the valve.
5. Engine system error	Check for DTCs and error codes.Contact your dealer for service.
6. Engine oil is cloudy and engine runs slowly in cold weather	Change to correct oil grade depending on the weather (temperature).
7. Low compression	Defective valve or excessively worn ring, piston, and liner will result in low compression.Replace it with new one.
8. Battery discharged, or engine is not running	 Replace the battery. Remove battery from the tractor and keep it in an indoor environment in cold weather. Install the battery when you use the tractor.

THE ENGINE MUST BE STOPPED IMMEDIATELY

POSSIBLE CAUSES	ACTIONS
1. Insufficient fuel	Drain and replace with proper fuel.Check whether there is air or leakage in the fuel system.
2. Faulty nozzle	Replace new part as required.
3. Moving parts overheating due to poor oil and insufficient oil	 Check the level of engine oil with oil gauge. Check the lubrication system. When replacing engine oil, the element of the oil filter should be replaced. Check if the bearing clearance meets the specification.
4. Engine system error	Check if the engine CHECK lamp is illuminated.Contact your local dealer.

ENGINE LACKS POWER

POSSIBLE CAUSES	ACTIONS
1. Leaks from valve due to low compression	 Defective valve or excessively worn ring, piston, and liner will result in low compression. Replace it with a new one. Polish the valve.
2. Lack of the fuel	Check the feul system.
3. Moving parts overheating	 Check the lubrication system. Check if the oil filter is working properly. Filter screen or element with debris will degrade the lubricant cleaning screen. Replace the element.

POSSIBLE CAUSES	ACTIONS
4. In correct valve adjustment	 Check and adjust valve clearance when the engine is cold. Intake : 0.008 in. (0.2 mm) - Exhaust : 0.008 in. (0.2 mm)
5. Air cleaner contamination	Clean or replace the element every 100hours of operation.
6. Restricted aftertreatment system	 If the corresponding lamp on the instrument cluster is illuminated, perform the aftertreatment system regeneration process. Contact your local dealer.

ABNORMAL EXHAUST FUME COLOR

POSSIBLE CAUSES	ACTIONS
1. Poor fuel governor system	Consult with a dealer for repair.
2. Poor fuel quality	Select good quality fuel. Use the diesel oil only.
3. Poor nozzle	Replace with a new nozzle if necessary.
4. Unstable burn	 Poor spraying, improper injection timing, abnormal injection system, poor valve adjust ment, or compression leakage, poor compression, etc. Check and repair.

SUDDEN ENGINE STOP

POSSIBLE CAUSES	ACTIONS
1. Engine speed suddenly changes	Check the fuel system and injection timing.
2. Unusual sound occurs	Check all moving parts.
3. Exhaust smoke or dark emis- sions appear	Check the fuel injection system. Especially, check the nozzle.
4. Overheating the bearing	Check for lubricating system leaks
5. Oil pressure warning light comes on	 Check the lubrication system. Check if the engine bearing clearance meets the specification. Check the oil pressure relief valve Check the oil pressure switch Check the filter base gasket.

5

5-6 CRDI ENGINE

ENGINE OVERHEATS

POSSIBL	E CAUSES	ACTIONS
1. Low coolant leve	el	Check for and repair leaks. Add coolant.
2. Loose or broker	ı fan belt	Adjust or replace belt as required.
3. Low oil level		Add water or replace coolant to achieve proper mix.
4. Anti-freeze conc	entration too high	Clean dirt and debris from radiator core and radiator guard.
5. Cooling air obst	ructed	Flush and clean system. Replace parts as required.
6. Cooling system	dirty or corroded	Flush and clean system. Replace parts as required.
7. Defective radiate	or cap	Replace defective cap.
8. Faulty thermosta	at	Check and replace thermostat nd replace, if necessary.
9. Defective tem sending unit	perature gauge or	Calibrate using thermometer and replace, if necessary.
10. Engine overloa	d	Reduce load.
11. Leaking head g	gasket	Replace head gasket.
12. Fuel injection t	iming	Check and adjust timing.
13. Unsuitable fue		Replace fuel with the clean fuel of the proper type and grade.
 If the engine does not start or run properly, refer to the following charts to determine the cause and identify corrective actions. If the cause cannot be determined, contact your DAEDONG dealer for assistance 		

2014-09-12 오후 12:00 59

SPECIFICATIONS

SPECIFICATIONS	
EXTERNAL DIMENSIONS	
MAJOR SPECIFICATIONS	

6

6-2 CRDI ENGINE

SPECIFICATIONS EXTERNAL DIMENSIONS [3F183T]



2014-09-16 오전 8:37:37

SPECIFICATIONS 6-



2014-09-16 오전 8:37:40

[3FT-HI4]



mm

MAJOR SPECIFICATIONS

DESCRIPTION		3F183T									
Power (Gross)	HP (kw)	29.8 (22.2)	33.6 (25)	37.3 (27.8)	40 (29.8)	41 (30.6)	44.7 (33.3)	45 (33.6)	50 (37.3)	55 (41)	60 (44.7)
Rated revolution	rpm		2,600								
Maximum bare speed	rpm		2,800								
Minimun bare idling speed	rpm					1,0	000				
Fuel consumption	g/HPh (g/kWh)					168 ((225)				
Туре			Vertical, water cooled, 4-cycle diesel engine								
Number of cylnders			3								
Total displacement	cc (cu)		1,826 (111.4)								
Method of Intake		Turbocharger (T/C)									
Bore and stroke			Φ 87*102.4								
Method of Combustion		Common Rail Direct Injection (CRDI)									
Compression ratio		17.4 : 1									
Injection order		1 - 2 - 3									
Injection pressure	bar	1,800									
Valve clearance	mm	Intake : 0.2, Exhaust : 0.2									
Direction of rotating		Counter-clockwise (View from flywheel side)									

DESCRIPTION	4F243T						
Power (Gross)	HP (kw)	44.7 (33.3)	49.2 (36.7)	54.4 (40.6)	60 (44.7)	66 (49.2)	73 (54.4)
Rated revolution	rpm		2,600				
Maximum bare speed	rpm		2,800				
Minimun bare idling speed	rpm			1,0	00		
Fuel consumption	g/HPh (g/kWh)			168 ((225)		
Туре			Vertical, water cooled, 4-cycle diesel engine				
Number of cylnders			4				
Total displacement	cc (cu)		2,435 (146.8)				
Method of Intake		Turbocharger (T/C)					
Bore and stroke		Φ 87*102.4					
Method of Combustion		Common Rail Direct Injection (CRDI)					
Compression ratio			17.4 : 1				
Injection order		1 - 3 - 4 - 2					
Injection pressure	bar	1,800					
Valve clearance	mm	Intake : 0.2, Exhaust : 0.2					
Direction of rotating		Counter-clockwise (View from flywheel side)					

DESCRIPTION		4F243T-CM3	3FT-HI4
Power (Gross)	HP (kw)	70.5 (52.6)	50.0 (37.5)
Rated revolution	rpm	2,700	2,300
Maximum bare speed	rpm	2,850	2,450
Minimun bare idling speed	rpm	1,500	900
Fuel consumption	g/HPh (g/kWh)	175 (235)	170 (228)
Туре		Vertical, water cooled, 4-cycle diesel engine	Vertical, water cooled, 3-cycle diesel engine
Number of cylnders		4	3
Total displacement	cc (cu)	2,435 (146.8)	
Method of Intake		Turbocharger (T/C)	
Bore and stroke		Ф87×102.4	
Method of Combustion		Common Rail Direct Injection (CRDI)	
Compression ratio		17.4:1	
Injection order		1-3-4-2	1-2-3
Injection pressure	bar	1,800	
Valve clearance	mm	Intake : 0.2, Exhaust : 0.2	
Direction of rotating		Counter-clockwise (View from flywheel side)	





7-2 CRDI ENGINE

Α

ABNORMAL EXHAUST FUME COLOR	5-4
ADJUSTING TENSION	
AIR CLEANER (OPTIONAL)	
ANTI-FREEZE	

BATTERY (OPTIONAL)	4-16
BATTERY CHECK	4–17
BATTERY STORAGE	4-18
BLEEDING FUEL SYSTEM	4-6

С

CHANGING COOLANT	4-12
CHANGING ENGINE OIL	4-10
CHECKING ENGINE OIL LEVEL	4-9
CHECKING FUEL PIPE	4-5
CHECKING, ADDING AND CHANGING COOLANT	4-11
CLEANING RADIATOR	4-14

D

DAILY CHECKS	4-2
DESCRIPTION OF ENGINE SYSTEM	2-1

Е

ENGINE IS HARD TO START......5-2

ENGINE OIL	4-8
ENGINE OVERHEATS	5-6
EXTERIOR VIEW	2-2
EXTERNAL DIMENSIONS	6-2

F

FAN BELT	
FUEL	4-5
FUEL INJECTION SYSTEM	4-7

1

INDEX	
INDEX	
LONG-TERM ENGINE STORAGE	
LUBRICANTS	

Μ

MAINTENANCE	
MAJOR SPECIFICATIONS	

0

Ρ

PRECAUTIONS BEFORE OPERATION1-	2
PRE-START ENGINE CHECKS	2

INDEX 7-3

R

RADIATOR (OPTIONAL)	4-11
REPLACING ENGINE OIL FILTER	4-10
REPLACING THE FUEL FILTER	4-6

S

SAFETY PRECAUTIONS	1-1
SERVICE INTERVALS	4-3
SERVICING	2-4
SPECIFICATIONS	6-1
SPECIFICATIONS	6-2
STARTING	3-2
STARTING AND STOPPING THE ENGINE	3-2
STOPPING	3-3
SUDDEN ENGINE STOP	5-5

т

TENSION AND WEAR OF FAN BELT	
THE ENGINE MUST BE STOPPED IMMEDIATELY	5-3
TROUBLESHOOTING	5-1

W

WARMING UP4-2

