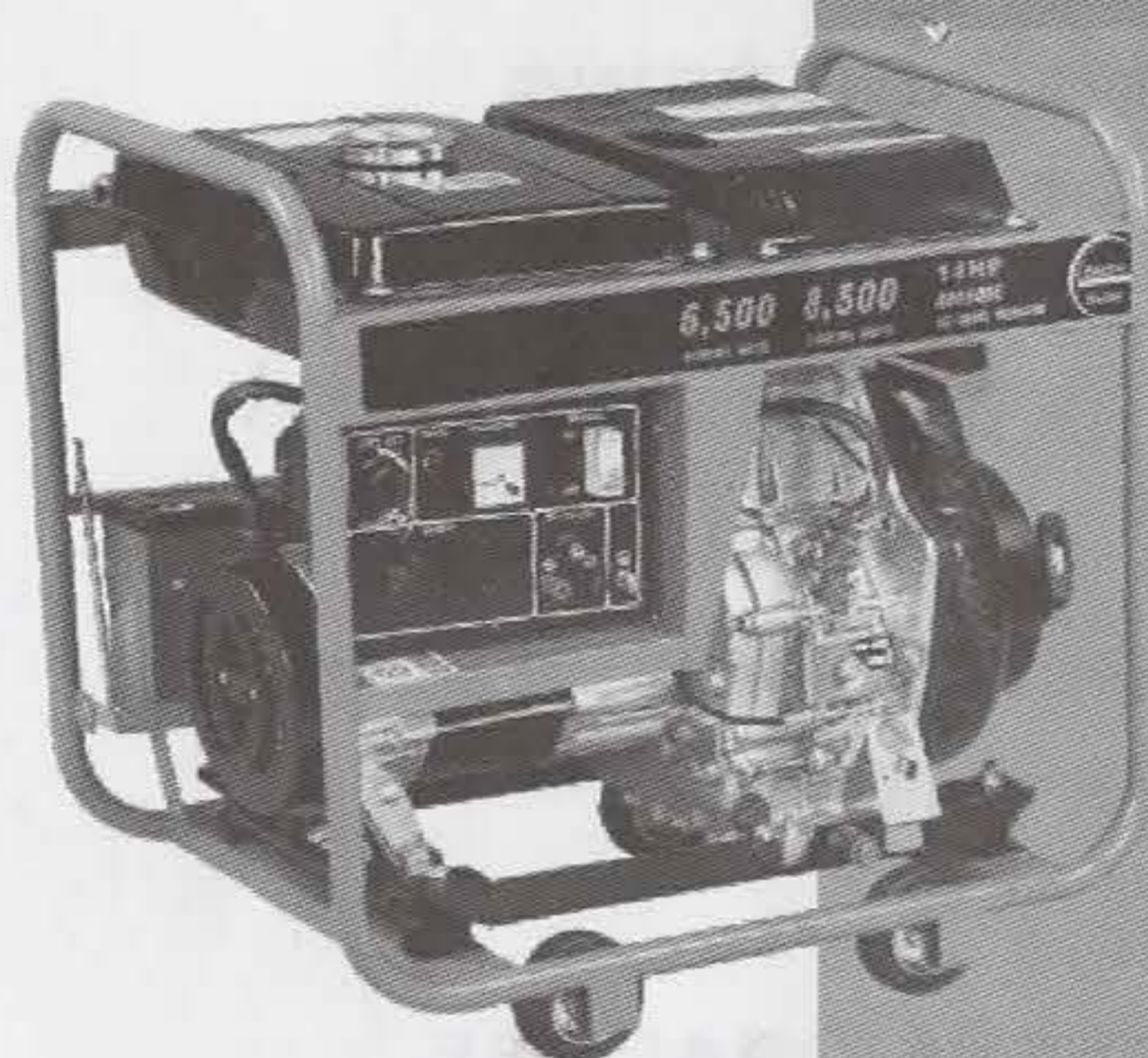


# INSTRUCTION MANUAL



***AD8500E***

***AD6500E***

***AD5500/E***

***AD4500/E***

***AD3500/E***

***AD2500/E***



## DIESEL GENERATOR INSTRUCTION MANUAL



### **READ ALL INSTRUCTIONS AND WARNINGS BEFORE USING THIS PRODUCT.**

This manual provides important information on proper operation & maintenance. Every effort has been made to ensure the accuracy of this manual. These instructions are not meant to cover every possible condition and situation that may occur. We reserve the right to change this product at any time without prior notice.

**IF THERE IS ANY QUESTION ABOUT A CONDITION BEING SAFE OR UNSAFE, DO NOT OPERATE THIS PRODUCT!**

**DO NOT RETURN THIS PRODUCT TO THE RETAILER-CONTACT CUSTOMER SERVICE.**

If you experience a problem, have questions or need parts for this product, visit our website at <http://www.sparkmotor.com>; <http://www forcemer.com>  
Please contact your dealer.

**FOR CONSUMER USE ONLY NOT FOR PROFESSIONAL USE.**

**KEEP THIS MANUAL, SALES RECEIPT & APPLICABLE WARRANTY FOR FUTURE REFERENCE.**



# AD8500S/AD6500S/AD5500S/AD4500S



## FEATURES

Diesel generator	Ad8500	Ad8500	AD6500	AD4500	AD3500	AD2500
Rated output(KVA)	7.5	6.5	5.0	3.5	2.8	1.8
Max. output(KVA)	8.5	7.8	6.5	4.5	3.5	2.0
Rated voltage(V)	220/380、230/400					
Rated frequency(Hz)	50					
DC output(V/A)	12/8.3					
Rated power factor(COS )	0.8					
Phase	Three phase or Single phase					
Engine Model	D192F	D190F	D186FA	D186F	D178F	D170F
Engine Type	Air cooled, single cylinder, four stroke diesel engine					
Displacement(cc)	499	477	418	406	296	211
Bore×Stroke(mm)	92X75	90X75	86X72	86X70	78X62	70X55
Cooling system	Air cooled					
Starting system	Recoil Or Recoil+ Electric					
Lube Oil Capacity(L)	1.65			1.1		0.8
Fuel tank capacity(L)	15					
Packing Dimension(cm)	74×50×66	74×50×66	74×50×66	74×50×66	70×50×58	65×49×55
Net weight(kg)	120	120	108	97	68	55

**Add Diesel Fuel ONLY (DO NOT ADD GASOLINE). DO NOT OVER FILL.  
DO NOT MODIFY THE GENERATOR. MODIFICATION WILL VOID ANY WARRANTIES.**



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# RECOGNIZE SAFETY SYMBOLS, WORDS AND LABELS

## What You Need to Know About Safety Instructions

Warning and Important Safety Instructions appearing in this manual are not meant to cover all possible conditions and situations that may occur. Common sense, caution and care must be exercised when operating or cleaning tools and equipment.

Always contact your dealer, distributor, service agent or manufacturer about problems or conditions you do not understand.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.



USE THIS GENERATOR ONLY OUTDOORS IN NON-CONFINED AREAS. DO NOT SECURE THE GENERATOR WITH A CHAIN OR ROPE, AS THIS WILL MAKE IT DIFFICULT TO MOVE IN AN EMERGENCY.



# IMPORTANT SAFETY INSTRUCTIONS

## STOP!

Before using this generator and if you have any questions regarding the hazard and safety notices listed in this manual and/or on this generator, please contact your dealer.

### ▲ WARNING

**Chemicals:** According to the State of California, the exhaust from this generator contains chemicals known to cause cancer, birth defects, or other reproductive harm.

### ▲ DANGER

**Carbon Monoxide Gas:** When In Operation, The Exhaust From This Generator Contains Poisonous Carbon Monoxide Gas. Carbon Monoxide Gas Is Both Odorless And Colorless And May Be Present Even If You Do Not See Or Smell Gas. Breathing This Poison Gas Can Lead To Headaches, Dizziness, Drowsiness, Loss Of Consciousness And Eventually Death.

- Use This Generator Only Outdoors In Non-confined Areas. Do Not Secure The Generator With A Chain Or Rope, As This Will Make It Difficult To Move In An Emergency.
- Keep At Least Several Feet Of Clearance On All Sides To Allow Proper Ventilation For This Generator.

### ▲ WARNING

**Flammable Fuel:** This generator may emit highly flammable and explosive fuel vapors, which can cause severe burns or even death. A nearby open flame can lead to an explosion even if not directly in contact with fuel.

- Do not operate this generator near open flame.
- Do not smoke near this generator.
- Always operate this generator on a firm, level surface. Diesel Fuel is highly flammable and explosive. Handling fuel can result in serious injury or burns.
- Always shut down this generator before refueling. Refuel in a well-ventilated area. Keep heat, sparks and flame away while refueling and away from the location where diesel fuel is stored. Never refuel indoors where diesel fuel fumes may reach flames and/or sparks.
- Allow this generator to cool for at least 2 minutes before removing the fuel tank cap. Loosen the cap slowly to relieve pressure in the fuel tank. Avoid spilling fuel.
- Do not fill the fuel tank above the upper limit line. Diesel fuel may expand during operation. Do not fill to the top of the tank.
- Always check for spilled diesel fuel and immediately wipe it up before starting this generator.
- Empty the fuel tank before storing or transporting this generator.
- Always handle fuel outdoors.
- Before transporting, turn the fuel valve to the "OFF" position.

### ▲ WARNING

**Powerful Voltage:** This generator produces powerful voltage, which can result in electrocution.

- ALWAYS ground this generator before using it. (See "Ground the Generator" section in this manual).
- Only electrical devices should be plugged into this generator, either directly or with an extension cord. NEVER connect a building electrical system to this generator without a qualified electrician. Doing so voids your warranty. Such connections must isolate generator power from utility power and comply with local electrical laws and codes. Failure to comply can create a back feed into utility lines creating an electrocution hazard, which may result in serious injury or death to utility workers. Such a back feed may cause this generator to explode, burn and create fires when utility power is restored.
- Use a ground fault circuit interrupter (GFCI) in highly conductive areas such as metal decking or steel work. GFCIs are available in-line with some extension cords.
- Do not use this generator in wet conditions (rain, snow, active sprinkler system, wet hands, etc.). Always keep this generator dry and operate it with dry hands.
- Do not touch bare wires or outlets (receptacles).
- Do not allow children or non-qualified persons to operate this generator.



**⚠ DANGER**

**High Temperatures:** This generator produces heat when in operation. Temperatures near the exhaust can exceed 150 Degrees Fahrenheit (65 Degrees Celsius).

- Do not touch hot surfaces. Observe all warning placards on this generator denoting hot surfaces.
- Allow this generator to cool for several minutes after use before touching the engine, muffler or other areas that are hot during operation and before storing indoors.
- Hot exhaust may ignite some materials. Keep flammable materials away from this generator.
- Keep at least several feet of clearance on all sides of this generator during operation. Do not enclose this generator in any structure.

**⚠ CAUTION**

**Usage:** Misuse of this generator can damage it or shorten its life.

- Use this generator only for its intended purpose.
- Operate this generator only on a dry, level surface. Do not secure the generator with a chain or rope, which would prevent it from being moved in an emergency.
- Allow this generator to run for several minutes before connecting any electrical devices.
- Promptly turn off any malfunctioning devices and disconnect them.
- Do not operate an excessive number of electrical devices in excess of the wattage capacity of this generator.
- Do not turn on electrical devices until after they are connected to this generator.
- Turn off all connected electrical devices before stopping this generator.

**⚠ CAUTION**

**Usage:** Prolonged exposure to high noise levels can be hazardous to hearing. Always wear ANSI-approved hearing protection when operating or working around the generator when it is running.

**⚠ CAUTION**

**Usage:** This generator is not intended to power sensitive electronic equipment such as TVs, DVD players, stereos, desktop computers or laptop computers without the use of an appropriate line conditioner and/or surge protector (both not included). Sensitive electronic equipment should be operated on approved inverter type generators or pure sine wave generators.

**⚠ WARNING**

**Usage:** Avoid the use of extension cords if possible. If you choose to use them, be sure they are sized adequately to handle the flow of electricity. An undersized cord can overheat, short out and cause a fire.

**⚠ CAUTION**

**Usage:** Do not use fuel stabilizers with this generator, doing so could cause damage to the generator, or decrease the fuel and operating efficiency of the generator. You may choose to add a fuel conditioner to oxygenate the fuel and to help it run more efficiently.

**⚠ WARNING**

**USE THIS GENERATOR ONLY OUTDOORS IN NON-CONFINED AREAS. DO NOT SECURE THE GENERATOR WITH A CHAIN OR ROPE, AS THIS WILL MAKE IT DIFFICULT TO MOVE IN AN EMERGENCY.**



## **WARNING**

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

## **DANGER**

EXHAUST CONTAINS POISONOUS CARBON MONOXIDE GAS THAT CAN BUILD UP TO DANGEROUS LEVELS IN CLOSED AREAS. BREATHING CARBON MONOXIDE CAN CAUSE UNCONSCIOUSNESS OR DEATH. Never run the generator in a closed or even partly closed area where people may be present.

## **WARNING**

GASOLINE IS HIGHLY FLAMMABLE AND EXPLOSIVE. YOU COULD BE BURNED OR SERIOUSLY INJURED IF THE GASOLINE IS IGNITED. Before refueling, stop the engine and keep heat, sparks and flame away. Handle fuel only outdoors. Do not fill the fuel tank above the upper limit line. Wipe up spills immediately.

## **WARNING**

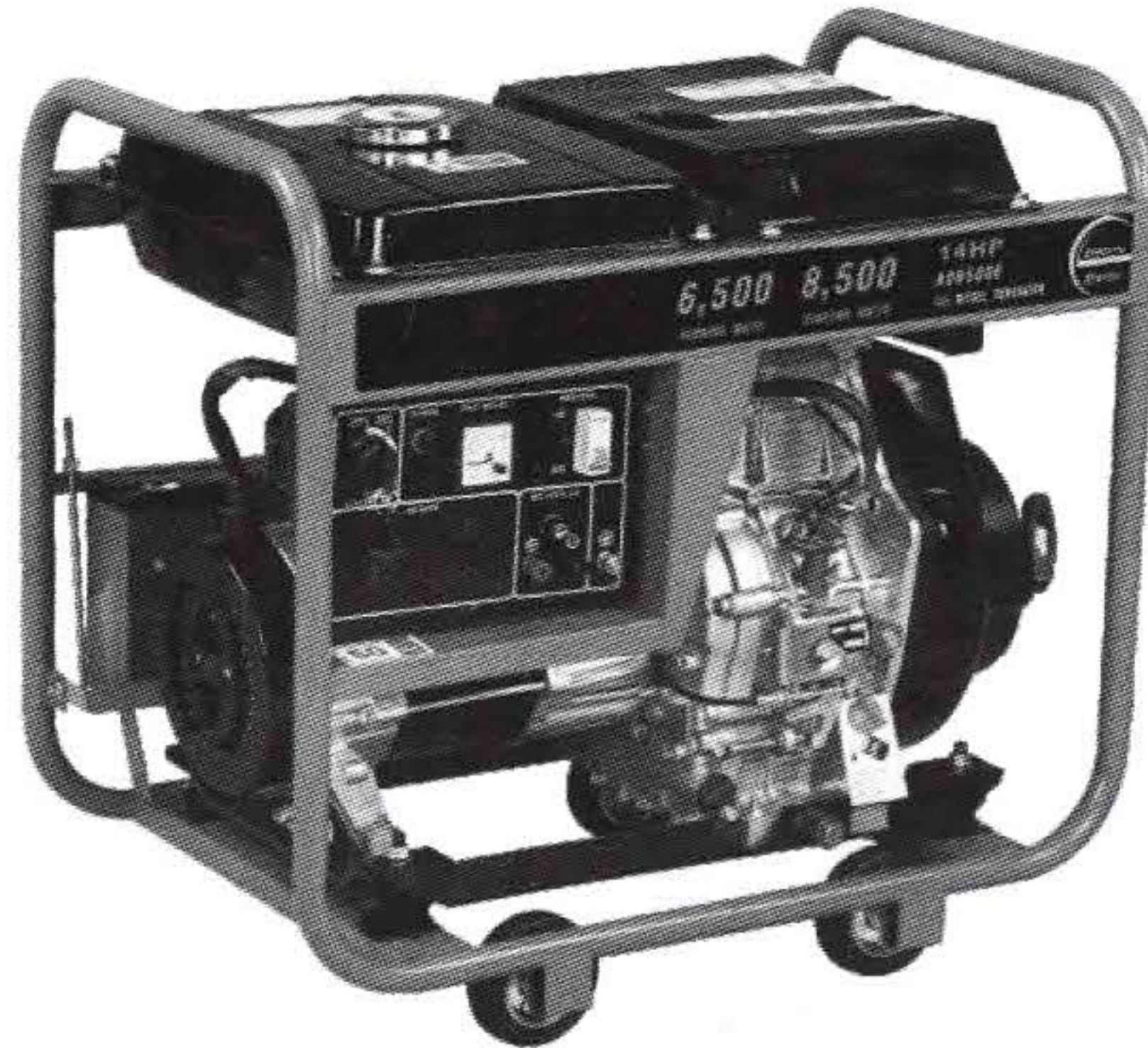
IMPROPER CONNECTIONS TO A BUILDING CAN ALLOW ELECTRICAL CURRENT TO BACKFEED INTO UTILITY LINES, CREATING AN ELECTROCUTION HAZARD. Connections to a building must isolate generator power from utility power and comply with all applicable laws and electrical codes.



In addition to the previously described safety information, familiarize yourself with all safety and hazard placards on this generator.

**▲ DANGER POISONOUS GAS**  
 Generator exhaust contains toxic carbon monoxide gas. Breathing exhaust can cause loss of consciousness and shortness of breath, NEVER operate generator in poorly ventilated areas.

**▲ WARNING! RISK OF ELECTRIC SHOCK**  
 This generator produces high voltage. Always ground properly before use. Do not connect to any building electrical system. Never use in rainy or wet conditions. Never touch bare wires or receptacles. Never allow children or non-qualified person to operate.



**▲ CAUTION! HOT EXHAUST**  
**DO NOT TOUCH**

**▲ CAUTION!**  
**HIGH TEMPERATURE**  
**DO NOT TOUCH**

**▲ WARNING**  
 Risk of electric shock. Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

**▲ DANGER**

Using a generator indoors CAN KILL YOU IN MINUTES. Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.

<p><b>NEVER</b> use inside a home or garage, <b>EVEN IF</b> doors and windows are open.</p>	<p>Only use <b>OUTSIDE</b> and far away from windows, doors, and vents.</p>

**Avoid other generator hazards. READ MANUAL BEFORE USE.**



# PACKAGE CONTENTS

The following items are supplied with this Model AD8500S/AD6500S/AD5500/AD4500 Portable Generator. Verify that all items are included.

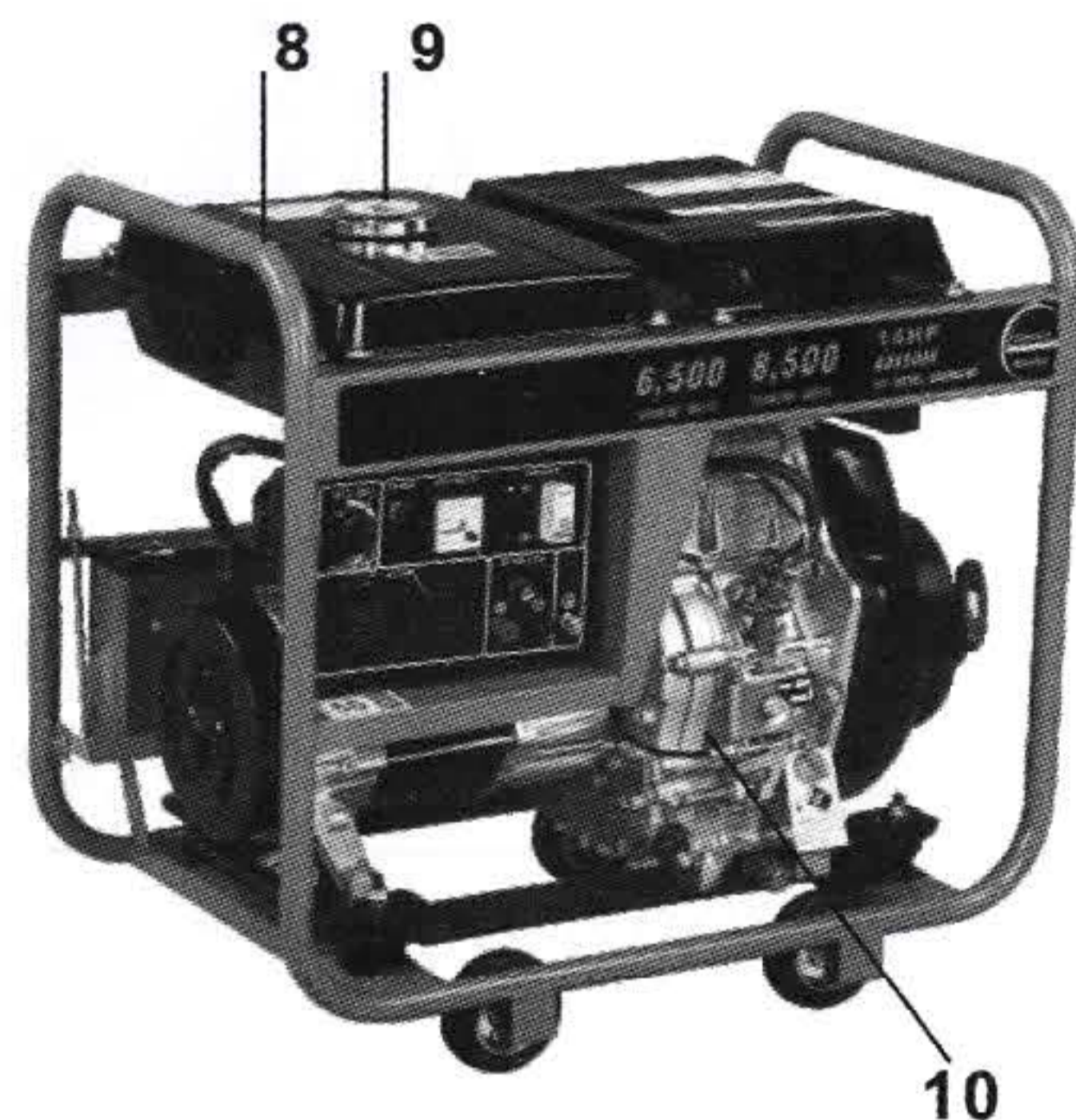
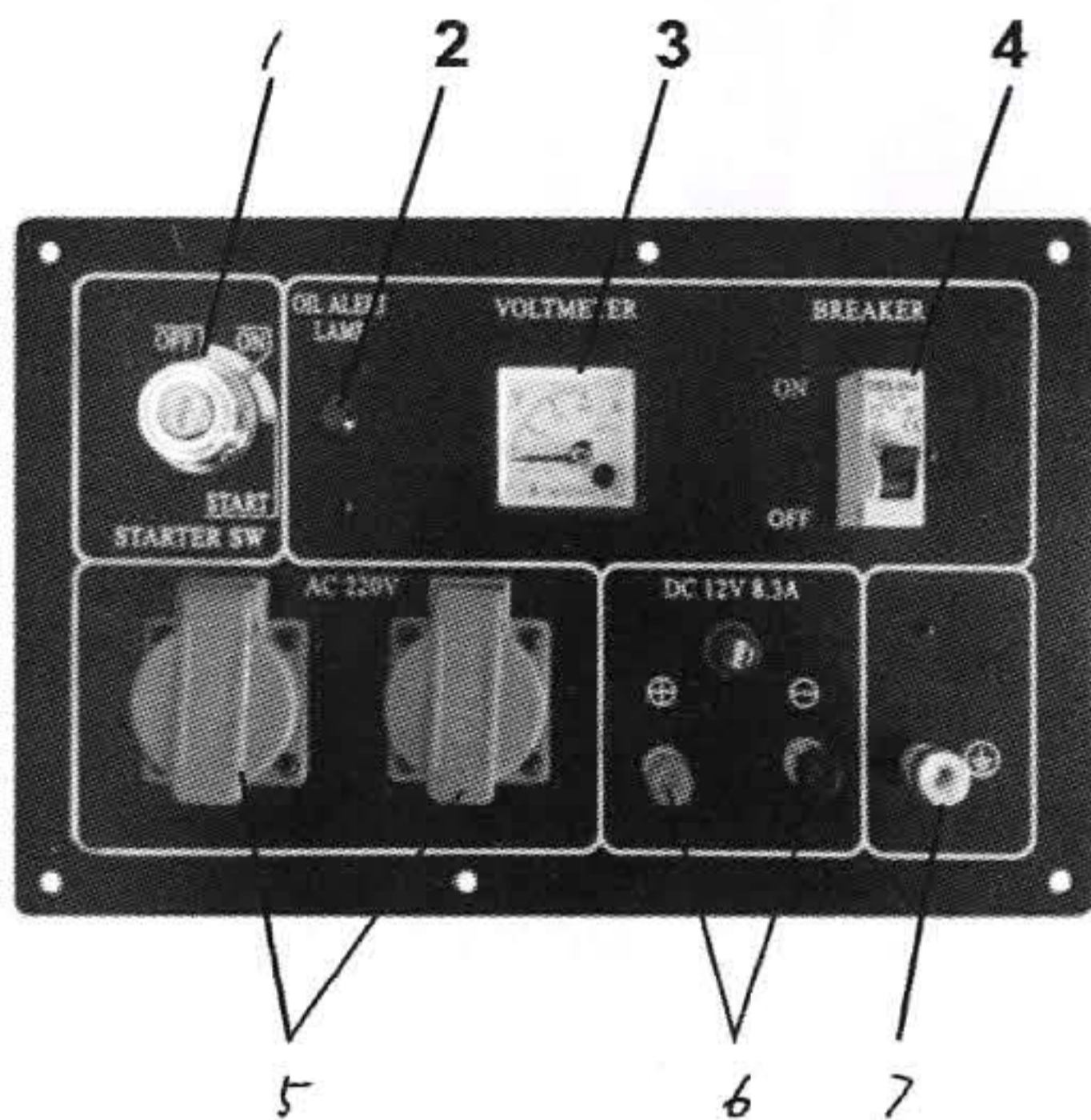
## STOP!

If there are missing items, Please contact your dealer. DO NOT RETURN THIS GENERATOR TO THE RETAILER.

### ▲WARNING

USE THIS GENERATOR ONLY OUTDOORS IN NON-CONFINED AREAS. DO NOT SECURE THE GENERATOR WITH A CHAIN OR ROPE, AS THIS WILL MAKE IT DIFFICULT TO MOVE IN AN EMERGENCY.

## GENERATOR COMPONENTS



- 1) Electric Start Switch
- 2) Low Oil Alert
- 3) Volt Meter
- 4) Breaker

- 5) AC outlet
- 6) DC Terminal
- 7) Ground
- 8) Fuel Gauge

- 9) Fuel Cap
- 10) diesel engine



## PREPARING THE GENERATOR FOR USE

### STOP!

The following section describes the required steps for preparing this generator for use. Failure to correctly perform these steps can damage this generator and/or shorten its life. If still unsure about how to perform any of these steps after reading this section,

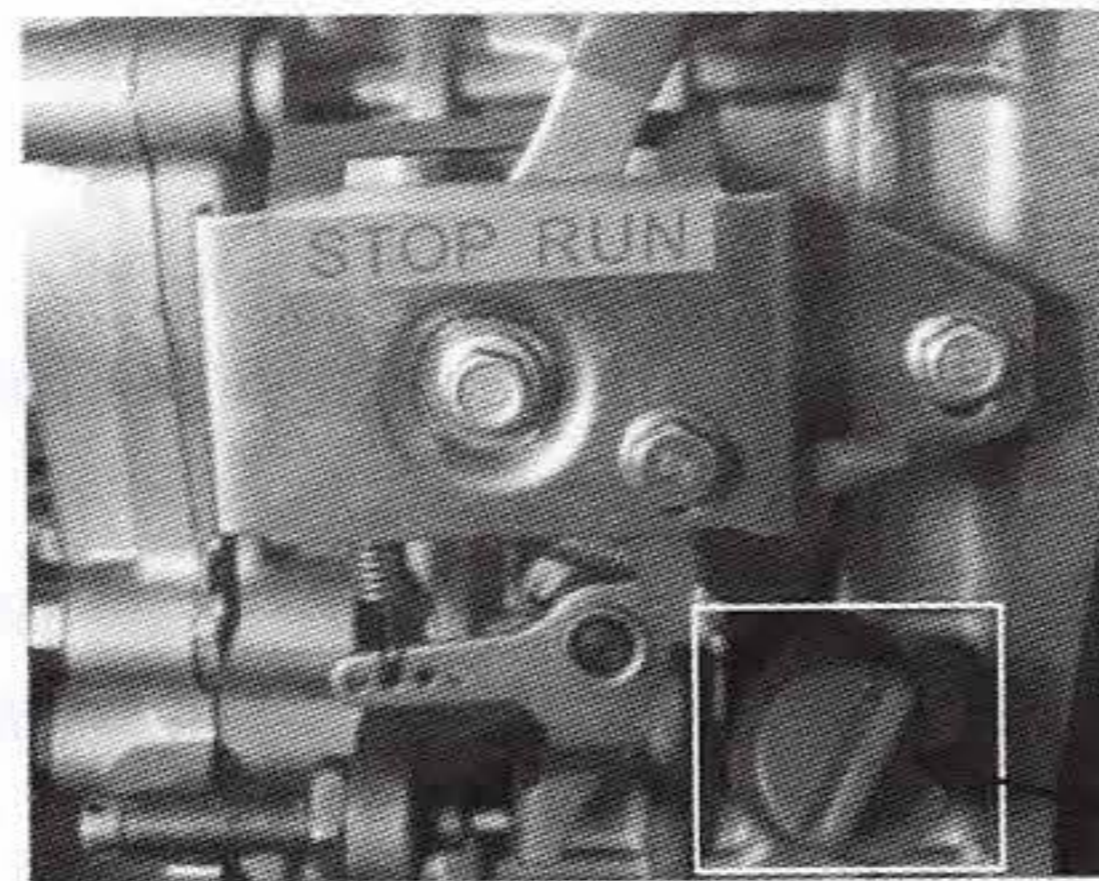
If this generator is being used for the first time, the following few steps are required to prepare it for operation:

### Step 1 - Add Oil, Then Add Diesel Fuel

This generator requires engine oil to function. Engine oil is a major factor affecting engine performance and service life. When new from the package, this generator contains no oil in the engine crankcase. The correct quantity of oil is equal to the oil capacity of the engine crankcase and is for this Portable Generator. Add the correct quantity of oil before operating this generator for the first time.

To add oil:

1. Confirm that this generator is on a level surface.
2. Open the Oil dipstick illustrated in Figure 1
3. Using a funnel, add high detergent motor oil to fill the engine crankcase to the correct quantity as stated above. SAE 15W-40 Diesel Grade Oil is recommended. When the engine crankcase is full, the oil level should reach the lower lip of the oil fill opening.
4. Replace the oil filler/dipstick cap and close the oil access panel.



Oil dipstick

Figure 1

### ▲WARNING

Diesel Fuel and fumes are highly flammable and explosive. Handling fuel can result in serious injury or burns.

- Do not fill the fuel tank near a heat, sparks or an open flame. Keep fuel away from appliance pilot lights, barbecues, electric appliances, power tools, etc. Do not overfill the fuel tank. Always check for fuel spills and immediately wipe them up. Spilled fuel is a fire hazard.

To add diesel fuel, use only FRESH, DIESEL FUEL:

1. Confirm that this generator is on a level surface.
2. Unscrew fuel tank cap and set aside. (NOTE: The fuel tank cap may be tight and difficult to unscrew.)
3. Slowly add fresh, diesel fuel to the fuel tank. Be careful not to fill the fuel tank above the upper limit line. The fuel tank capacity for this generator is 4 gallon (15 L). NOTE: Because diesel fuel can expand, do not fill the fuel tank to the very top.
4. Securely tighten the fuel tank cap and immediately wipe up any spilled fuel with a dry cloth.



**▲WARNING**

Failure to properly ground this generator can result in electrocution.

## Step 2 - Ground the Generator

Ground this generator by tightening the grounding nut against a grounding wire (Figure 3), found on the front of the battery. A No. 8 stranded copper wire is generally an acceptable grounding wire. The other end of this grounding wire should be connected to a copper or brass-grounding rod that is driven into the earth. Grounding codes can vary by location. Contact a local electrician for information on grounding regulations for your area.

## Step 3 – Install Battery

The battery case is located behind the metal plate under the electrical panel. Install the battery by using the two cables (one red and the other black) that were included in the packaging, or are attached to the generator.

Disconnect all electrical loads from this generator before changing the battery.

1. Attach the end of the red cable to the positive/red terminal on the battery.
2. Attach the end of the black cable to the negative/black terminal on the battery.
3. Bolt the battery to the battery plate.

## STARTING THE GENERATOR

### **STOP!**

Before starting this generator, confirm that all the steps in the section titled, "Preparing the Generator for Use," of this manual have been correctly completed. If unsure about how to perform any of these steps, Please contact the dealer. If the generator has been used before, always check the oil level and diesel fuel level. Always check that the battery is secure and the generator has been grounded. To start this generator:

1. Confirm that there are no electrical devices connected to this generator.
2. Confirm that this generator is properly grounded. (See "Ground the Generator")
3. Move Circuit breaker to ON position. (Figure 5)
4. Set the engine Run switch to the "Run" position (Figure 5A).
5. Insert Key and turn it to the start position. (Figure 5B).
6. If the engine fails to start, repeat step 6. NOTE: After repeated attempts, consult the

Troubleshooting Guide before attempting again. (You may need to open top panel and push down on Decompression Lever.)

If problems persist, Please contact the dealer, 8. Allow this generator to run for several minutes before connecting any electrical devices.

**Fuel Cock** The fuel cock is located between the fuel tank and carburetor.

When the fuel cock is in

the ON position, fuel is allowed to flow from the fuel tank to the carburetor.

Be sure to return the fuel

cock to the OFF position after stopping the engine.

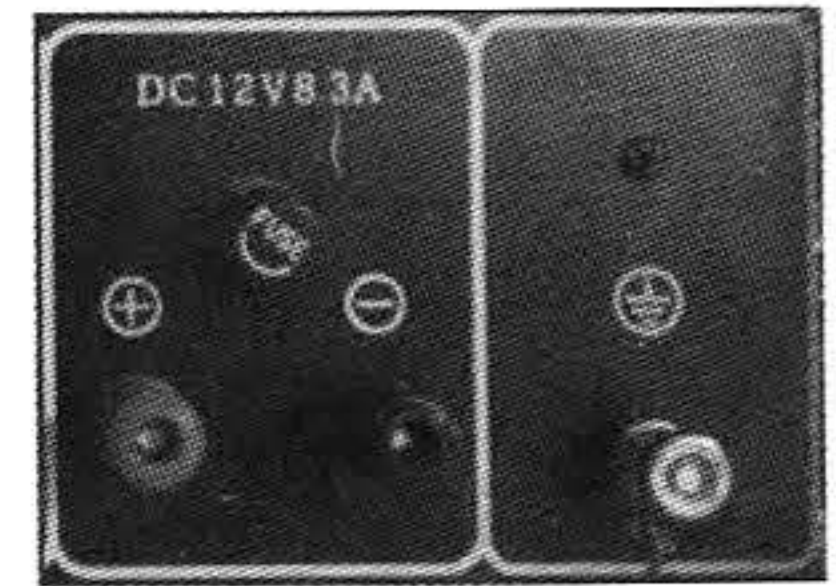


Figure 3



Figure 4

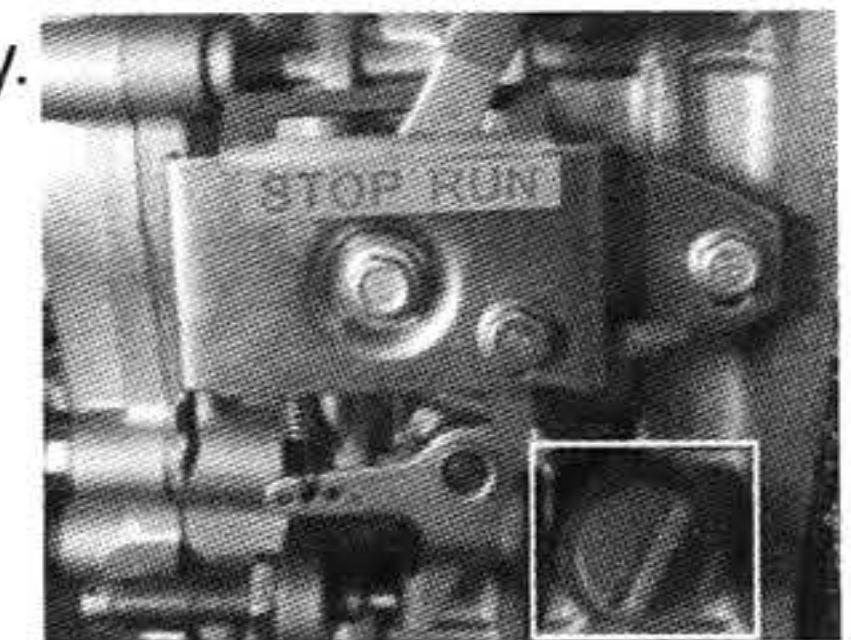


Figure 5

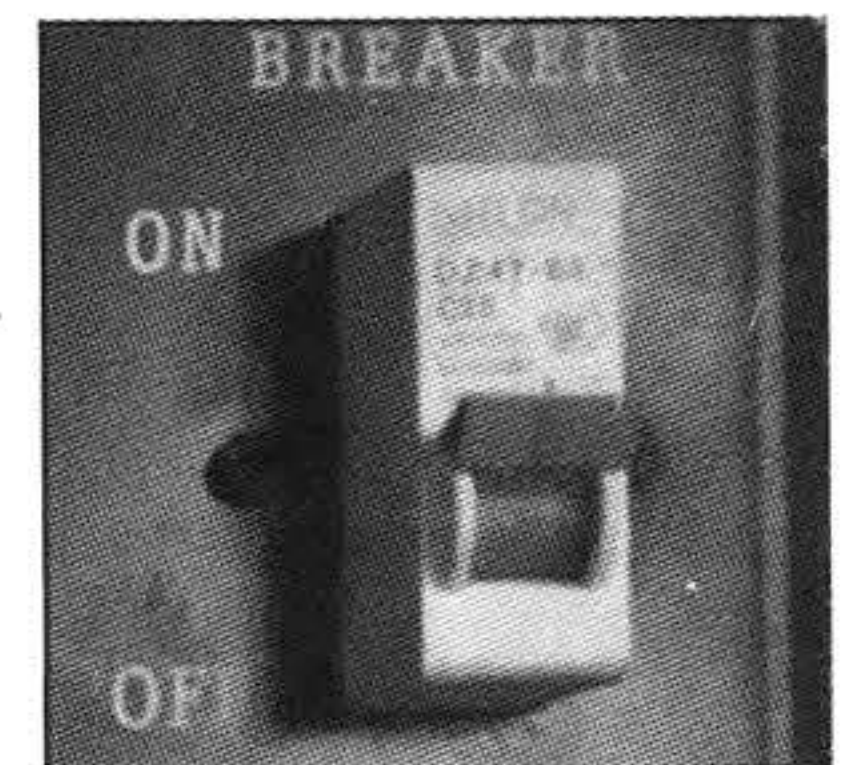


Figure 5A



Figure 5B



# USING THE GENERATOR

## ▲ CAUTION

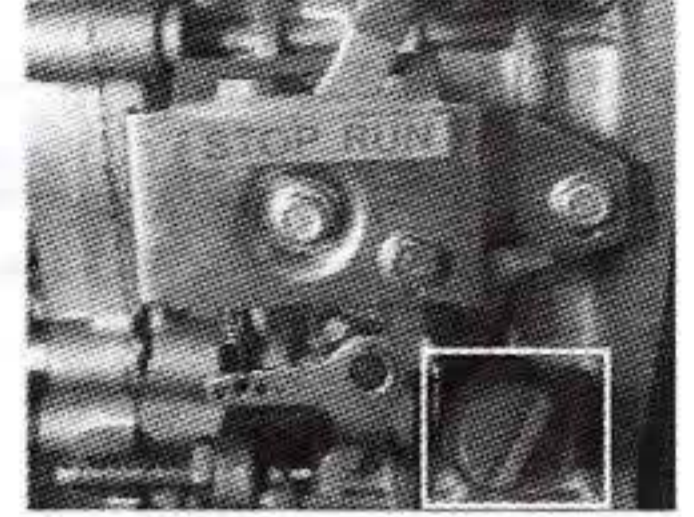
Connect only electrical devices that are in good working order. Faulty devices or power cords present the risk of electrical shock. Immediately turn off and disconnect any device that commences to operate abnormally, sluggish or abruptly stops. Determine if the problem was the device or the rated load capacity of this generator has been exceeded.

## ▲ WARNING

- USE THIS GENERATOR ONLY OUTDOORS IN NON-CONFINED AREAS. DO NOT SECURE THE GENERATOR WITH A CHAIN OR ROPE, AS THIS WILL MAKE IT DIFFICULT TO MOVE IN AN EMERGENCY.
- Keep at least several feet of clearance on all sides to allow proper ventilation for this generator.

After the engine has been running for several minutes, electrical devices may be connected to this generator.

**WARNING:** Altering the fuel controller will VOID the warranty. Do not alter the fuel controller. (Figure A).



(Fig A)

### AC Usage

Electrical devices running on AC current may be connected according to their wattage requirements. The rated (running) wattage corresponds to the maximum wattage a generator can output on a continuous basis. The surge wattage corresponds to the maximum amount of power a generator can output for a short time. Many electrical devices, such as a refrigerator, require short bursts of extra power for starting and stopping fan motors, etc., in addition to their listed rated wattage. Motorized devices typically require more than their rated wattage for startup. The surge wattage ability of a generator allows for this extra power requirement.

The total running wattage requirement of the electrical devices connected to a generator should not exceed the rated wattage of the generator itself. To calculate the total wattage requirement of the electrical devices to be connected, look up the rated (running) wattage of each device and add these numbers together to find the total wattage that all of the devices together will draw from the generator. If the total wattage of the selected devices exceeds the rated wattage of the generator, DO NOT connect all of the devices. Select a combination of the electrical devices that will have a total wattage less than or equal to the rated wattage for the generator.

## ▲ CAUTION

This generator can run at its surge wattage capacity for only a short time. Connect electrical devices requiring a rated (running) wattage equal to or less than the rated wattage of this generator. Never connect devices requiring a rated wattage equal to the surge wattage of a generator.

Electrical Device	Rated (Running) Watts	Additional Surge Watts
air compressor (1-1/2 HP)	2500	2500
airless sprayer (1/3 HP)	600	1200
coffee maker	1500	0
computer w/17 inch monitor	800	0
deep freezer	500	500
electric drill (1/2 HP)	1000	1000
furnace fan blower (1/2 HP)	800	1300
hot plate	2500	0
microwave oven (1000 watt)	1000	0
quartz halogen work light	1000	0
refrigerator/freezer (18 Cu. Ft.)	800	1600
saw -circular (7 1/4 inch)	1500	1500
stereo receiver	450	0
electric stove-single element	1500	0
sump pump	800	1200
television (27 inch color)	500	0
well water pump (1/3 HP)	1000	2000
window air conditioner (10000 BTU)	1200	1800
window fan	300	600

A device's rated (running) wattage should be listed somewhere on the device itself and/or in its manual. If the wattage specification for a device is not available, the wattage can be calculated by multiplying the Voltage requirement by the Amperage drawn.

Or, the wattage required by a device can be estimated by using the following chart. The chart provides only estimates and it is better to know the exact wattage of each electrical device to be powered by this generator.

$$\text{Watts} = \text{Volts} \times \text{Amperes}$$

Connect electrical devices to this generator according to the following procedure:  
Allow the engine to run for several minutes after it has been started.

Confirm that the electrical device is switched off prior to plugging it into this generator.



NOTE: Plug appliances into the correct outlet.

**▲ CAUTION**

Do not exceed the rated power of electrical equipment. More than will damage the generator and the warranty is invalid.

NOTE: While this generator is running, power is available from either the standard 220 Volt outlet or the 12 Volt DC outlet. Both 220 Volts and 12 Volts can be simultaneously drawn from this generator.

Turn on the connected electrical devices beginning with the device with the highest rated wattage requirement and then each additional device with the next lower rated wattage requirement.

**▲ CAUTION**

Do not connect 60Hz or 3-phase loads to this generator.

DC Usage

**▲ CAUTION**

The DC terminal is only for recharging 12 Volt automotive-type batteries. Do not connect any other device to this outlet.

**▲ CAUTION**

Use this generator only for recharging 12 Volt batteries. NEVER attempt to jumpstart a car with this generator.

**▲ DANGER**

Failing to use the correct procedure can cause a battery to explode, seriously injuring anyone nearby. Keep heat, sparks, flame and smoking materials away from the battery.

To connect 12 Volt batteries to the DC outlet:

1. Connect one charging wire to the positive terminal of the battery and the other charging wire to the negative terminal of the battery.
2. Connect the free end of the positive wire to the positive side of the outlet on this generator.
3. Carefully connect the free end of the negative wire to the negative side of the outlet on this generator.
4. Start this generator.
5. When disconnecting, always disconnect the wires from this generator first to

**▲ DANGER**

Storage batteries emit highly explosive hydrogen gas when charged.

Batteries also contain acid, which can cause severe chemical burns.

- Do not allow open flames or cigarettes nearby for several minutes after charging a battery.
- Always wear protective goggles and rubber gloves when charging a battery.
- If battery acid gets on the skin, flush with water.
- If battery acid gets in the eyes, flush with water and immediately call a physician.
- If battery acid is swallowed, drink large quantities of milk and immediately call a physician.

**▲ DANGER**

Do not secure the generator with a chain or rope, which would prevent it from being moved in an emergency.



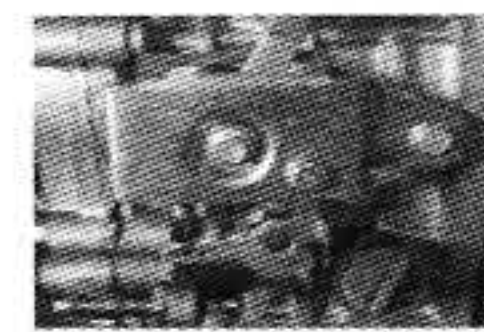
# STOPPING THE GENERATOR

To stop this generator:

1. Turn off all connected electrical devices and then unplug them.
2. Switch the circuit breaker to the "OFF" position. (Figure 6)
3. Allow this generator to run for several more minutes with no electrical devices connected to help stabilize the temperature of this generator.
4. Set the engine Run lever to the "Stop" position. (Figure 7)
5. Turn the Starter switch to Off Position. (Figure 8).



(Figure 6)



(Figure7)



(Figure8)

## ▲WARNING

Allow this generator to cool down before touching areas that become hot during operation.

## ▲CAUTION

Allowing diesel fuel to sit in this generator's fuel tank for extended time without use can increase the difficulty in starting this generator in the future. Never store this generator for extended time with fuel in the fuel tank.

## MAINTENANCE/CARE

Proper routine maintenance of this generator is essential for safe, economical, and trouble-free operation. It will help prolong the life of this generator as well as help reduce air pollution. Perform maintenance checks and procedures according to the schedule in Figure 7.

## ▲CAUTION

Never perform maintenance procedures while this generator is running. Allow this generator to cool before commencing any maintenance procedures. Keep heat, sparks and flame away.

## ▲WARNING

Improper maintenance and/or failure to correct any problems prior to operating this generator can cause a malfunction which could cause death or serious injury. Always follow the inspection and maintenance recommendations and schedules in this manual.

## Recommended Maintenance Schedule

		Each Use	Every Month or Each 20 Hrs	Every 3 Months or Each 50 Hrs	Every 6 Months or Each 100 Hrs	Every Year or Each 300 Hrs
Engine Oil	Check Level	X				
	Replace		X (First Use)		X	
Air Filter	Check	X				
	Clean			X		
Fuel Filter	Replace					X
Oil Filter	Replace					X
Fuel Tank	Verify Gas Level	X				
	Clean					X

Figure 7 -Recommended maintenance schedule

### Cleaning the Generator

Always use this generator in a cool dry place. If the generator becomes dirty, the exterior can be cleaned with a damp cloth.

Never clean this generator with a bucket of water and/or a hose as water can get inside and cause a short circuit or corrosion. Never use gasoline to clean parts of this generator.

### Replacing Oil Filter

Replace oil filter every year or 300 hours.



## Checking the Oil Level

It is important to check the oil level in the engine crankcase before each use to ensure that there is a sufficient quantity.

To check the oil level:

1. Verify that this generator is shut down and on a level surface.
2. Unscrew the oil filler/dipstick cap from the engine.
3. With a dry cloth, wipe the oil off of the dipstick that is located on the inside of the cap.
4. Insert the dipstick as if replacing the cap and then remove again. There should be oil on the dipstick. If there is no oil on the dipstick, or oil is visible only at the very end of the dipstick, add oil until the engine crankcase is filled.
5. Confirm that the oil filler/dipstick cap is properly in place when finished verifying the oil level.

## Changing/Adding Oil

The oil level in this generator should be checked before each use. (See Figure 8.) When the oil level is low, add oil until the level is sufficient to operate this generator.

The oil capacity for this Model Portable Generator engine is 1.65litre

To drain the oil from this generator:

The oil should be changed after the first 20 hours of operation. The oil should then be changed every 6months, or for every 100 hours of use time, or when it has become contaminated with water and/or dirt.

1. Place a tray underneath this generator to catch oil as it drains.
2. Unscrew the oil drain plug located on the crankcase underneath the oil filler/dipstick cap.
3. Allow all the oil to drain from this generator.
4. Replace the oil drain plug and tighten.

**NOTE:** Never dispose of used motor oil in the trash, down a drain or on the ground. Put oil in a sealed container and contact your local recycling center or auto garage to arrange oil disposal.

To add oil to the engine crankcase:

1. Confirm that this generator is on a level surface.
2. Unscrew the oil filler/dipstick cap from the engine as illustrated in Figure 8 below.
3. Using a funnel, add high detergent motor oil to fill the engine crankcase to the correct quantity. SAE15W-40 Diesel Grade oil is recommended for general use. When the engine crankcase is full, the oil level should reach the lower lip of the oil filling opening.

Oil Capacity (litre)	1.65 (litre)
Oil Type Recommended	SAE 15W-40 Diesel Grade Oil

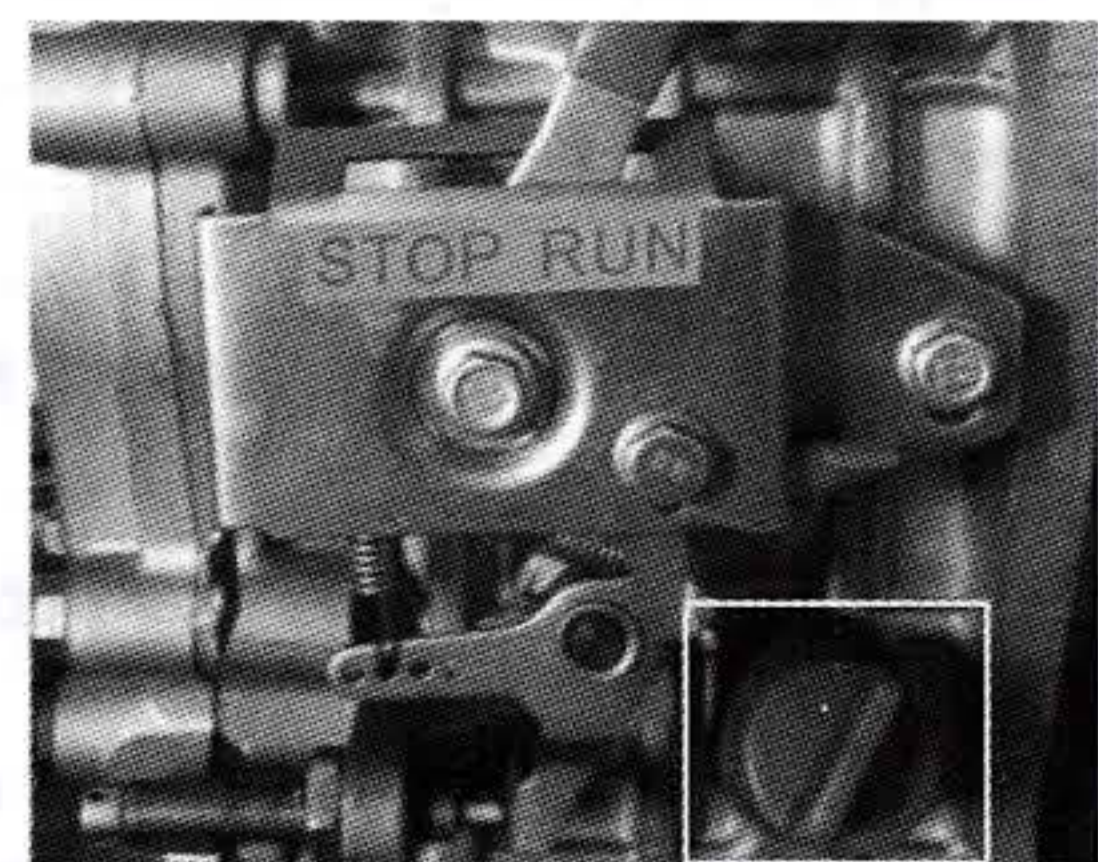
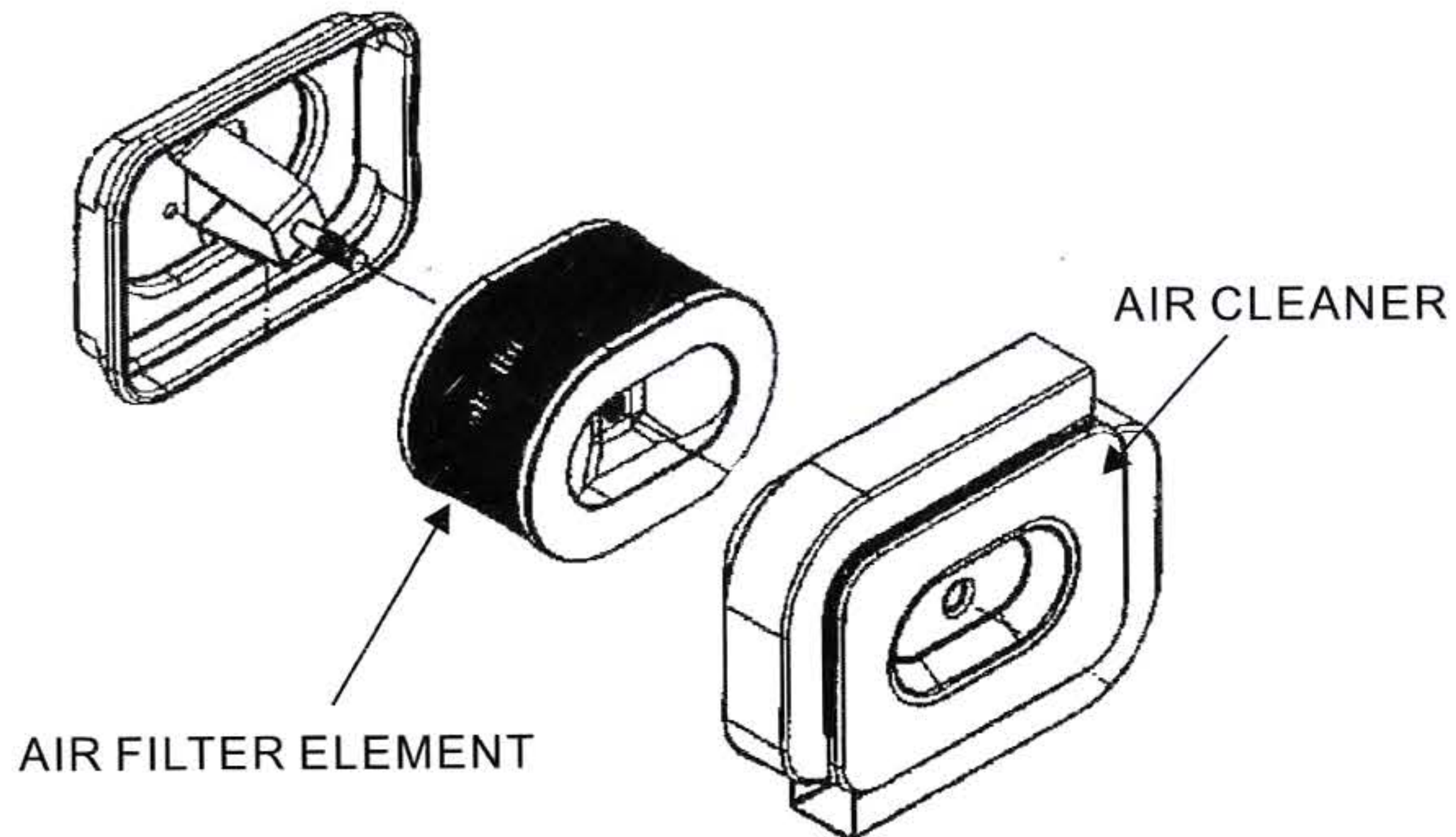


Figure 8



## Air Filter Maintenance ( Fuel Filter Maintenance)

Routine maintenance of the air filter helps maintain proper airflow to the carburetor. Occasionally verify that the air filter is free of excessive dirt. The air filter will require more frequent cleaning when operating this generator in extremely dusty areas. Remove the foam filter element from the generator and wash it in warm water and household dish detergent. Thoroughly rinse and dry. Wring out the filter and reinstall in the generator.



### Emptying the Fuel Tank

To store this generator for extended time, drain the diesel fuel from the fuel tank. To drain fuel from this generator:

1. Remove the inline fuel filter.
2. Place a funnel underneath the fuel valve to catch fuel as it drains into a bucket.
3. Replace the inline fuel filter.
4. Store the drained fuel in a suitable place.

### STORAGE/TRANSPORT PROCEDURES

#### ▲CAUTION

Never place any type of storage cover on this generator while it is still hot.

When transporting or storing this generator for extended time:

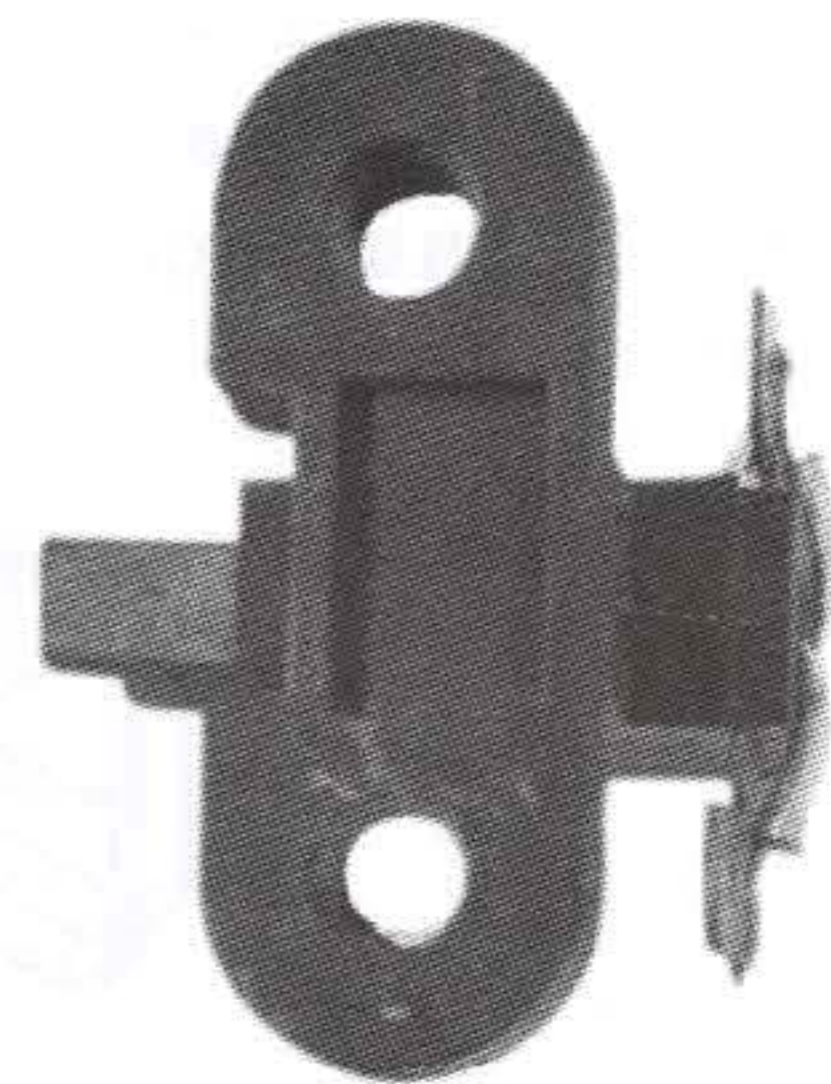
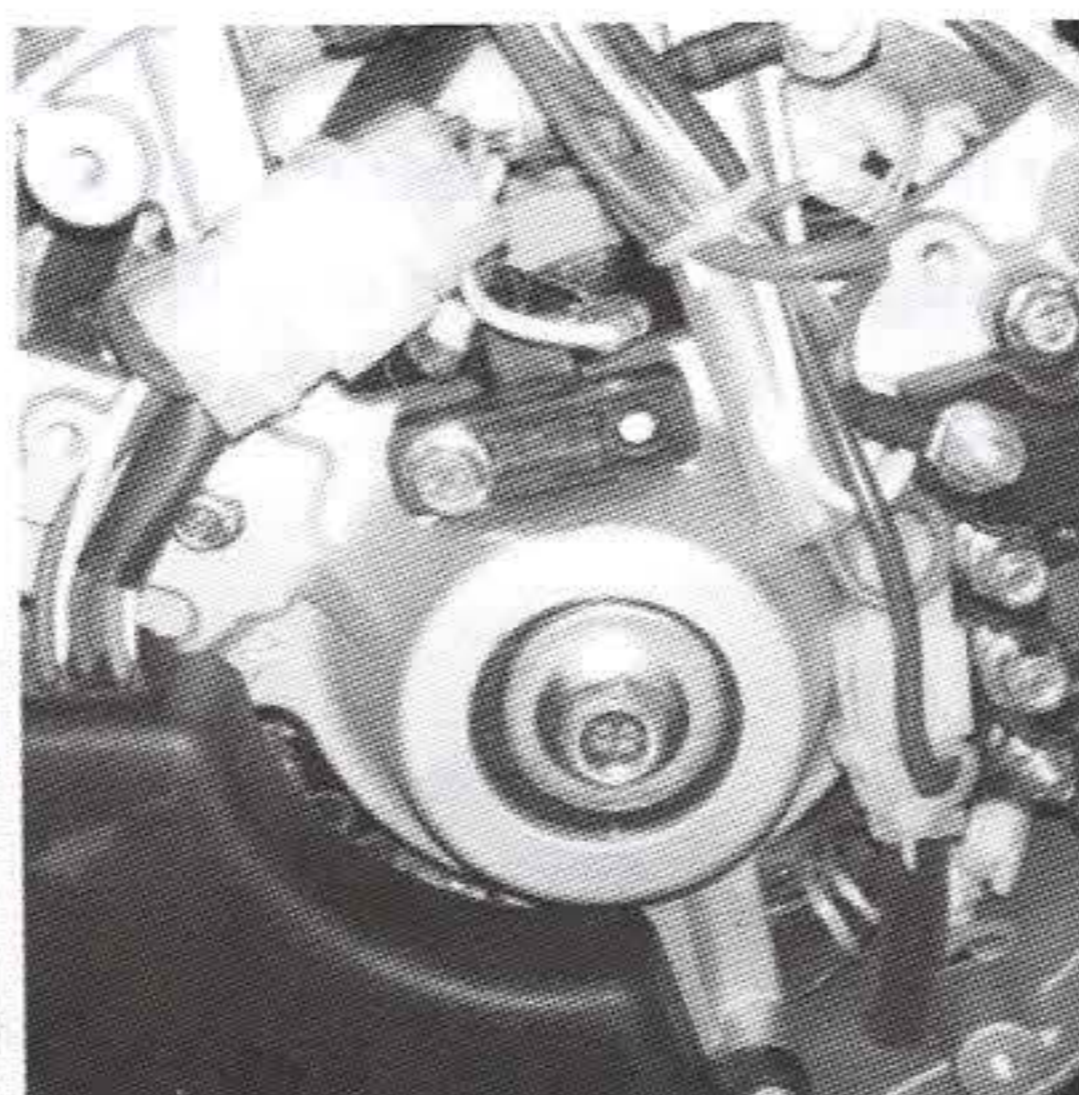
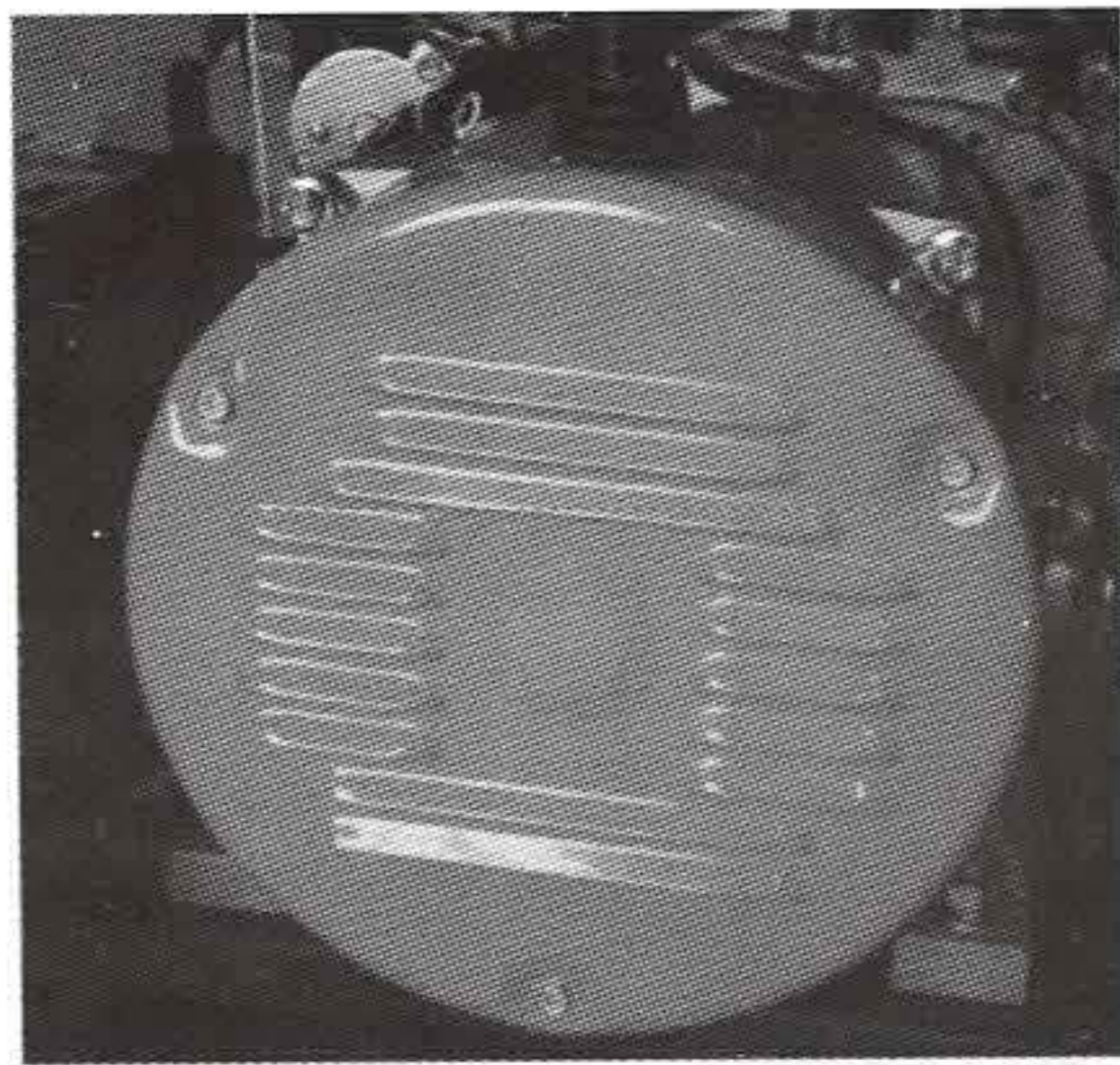
- Allow generator to fully cool before moving it. A hot engine and exhaust system can burn you and ignite some materials.
- Empty the fuel tank. (See “Emptying the Fuel Tank” in the “Maintenance/Care” section.)
- Turn the fuel valve to the “off” position.
- Do not obstruct any ventilation openings.
- Do not drop or strike this generator while moving it.
- Store this generator in a cool dry area, free of excessive dust.

Storage Time	Recommended Storage Procedure (which will help prevent difficult starts)
Less than 1 month	No storage procedure required.
1 to 2 months	Fill with fresh diesel fuel
2 months to 1 year	Empty the fuel tank. (See Emptying the Fuel Tank in the Maintenance/Care section.)
1 year or more	Empty the fuel tank. (See Emptying the Fuel Tank in the Maintenance/Care section.)



# Replacing The Carbon Brushes

## Replacing The Carbon Brushes



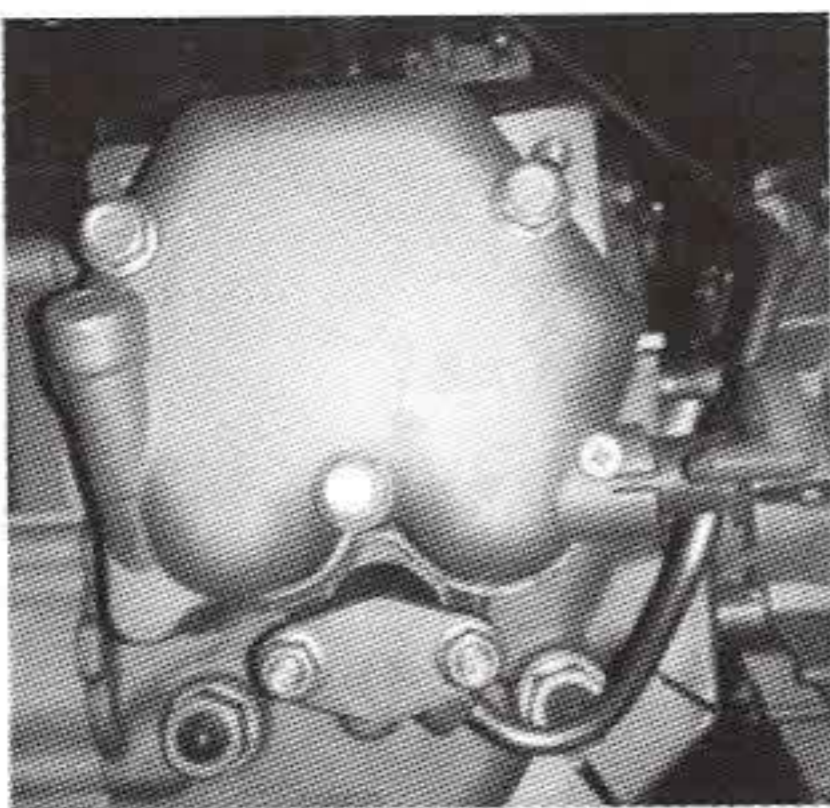
1. Rear Housing

2. Brush Assembly Is Visible

3. Replace Carbon Brushes

### TROUBLESHOOTING

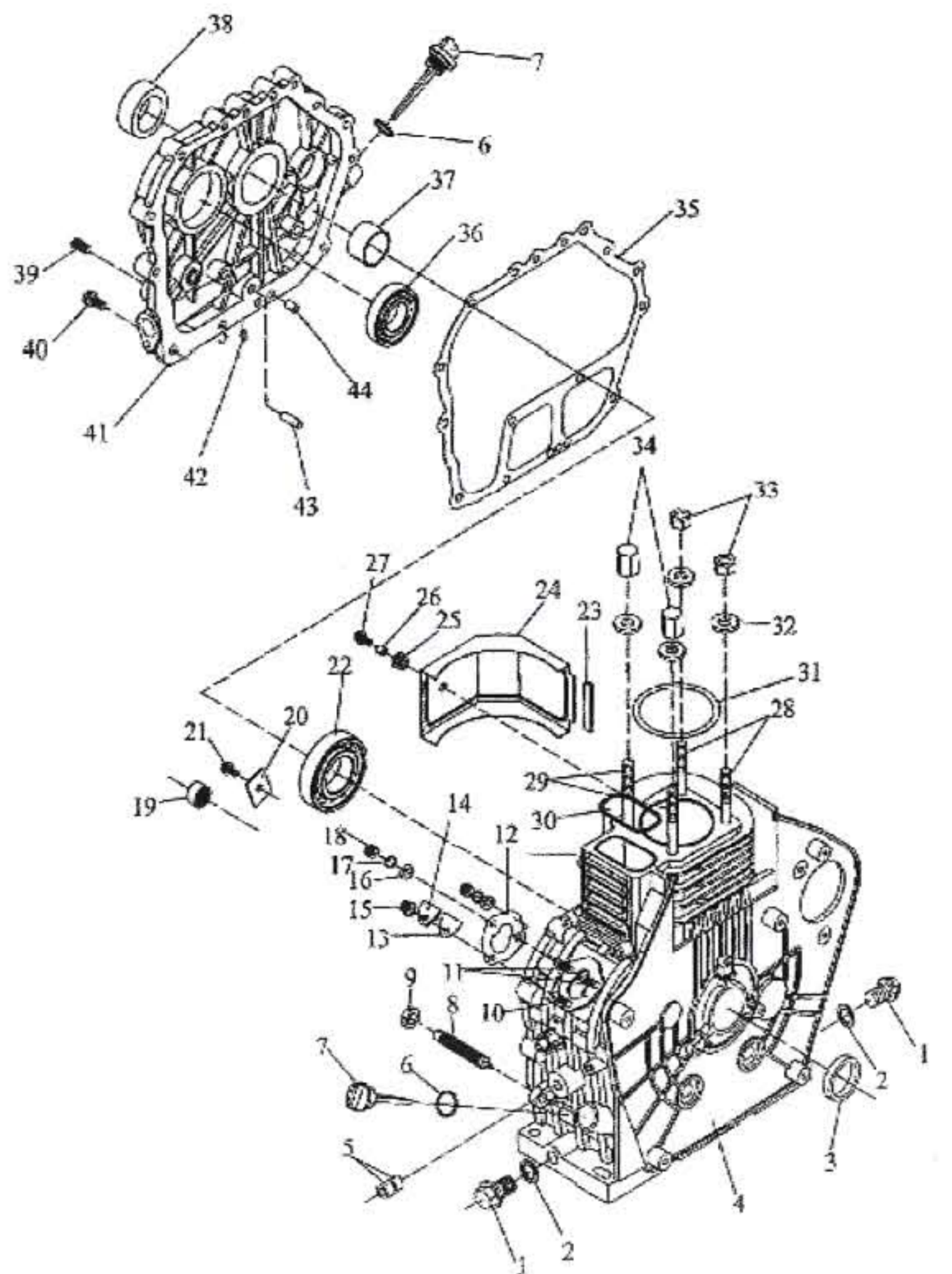
IMPORTANT: If trouble persists, Please contact your dealer.

Symptom	Cause	Solution
 (Figure 10)	Engine will not start.	Engine switch is set to "off."
		Set engine switch to "on."
		Engine is out of diesel fuel.
		Add diesel fuel.
		Oil is low.
		Add or replace oil.
	Generator is not on level surface.	Move generator to a level surface to prevent triggering the low oil shutdown.
	Spring loaded Decompression Lever has closed the exhaust valve.	Open top panel. (Figure 10) Push down on Decompression Lever, reinstall top panel. Start engine.
	Engine is filled with contaminated and/or old diesel fuel.	Drain fuel from the engine and add new diesel fuel.
Engine runs but there is no electrical output.	Circuit breaker is off.	Flip circuit breaker to "on."
	Reset button is "off."	Push reset button to "on."
	Bad connecting wires/cables.	Try a different extension cord.
	Bad electrical device connected to generator.	Disconnect device, try connecting another device.
	Loose wiring and/or connection behind control panel or at end of generator.	Tighten the nuts that secure the wiring. See Figure B (page 27). Visually inspect to make sure they are in contact with the two copper bands on the rotor. Replace as necessary.
Generator runs but does not support all connected electrical devices.	Carbon brushes or AVR are worn or broken.	Reduce draw on generator to within this generator's rated wattage by reducing number of connected electrical devices.
	Generator is overloaded.	
	Short in one of the connected devices.	Disconnect any faulty or short-circuited electrical loads.
	Air filter is dirty.	Clean or replace air filter.

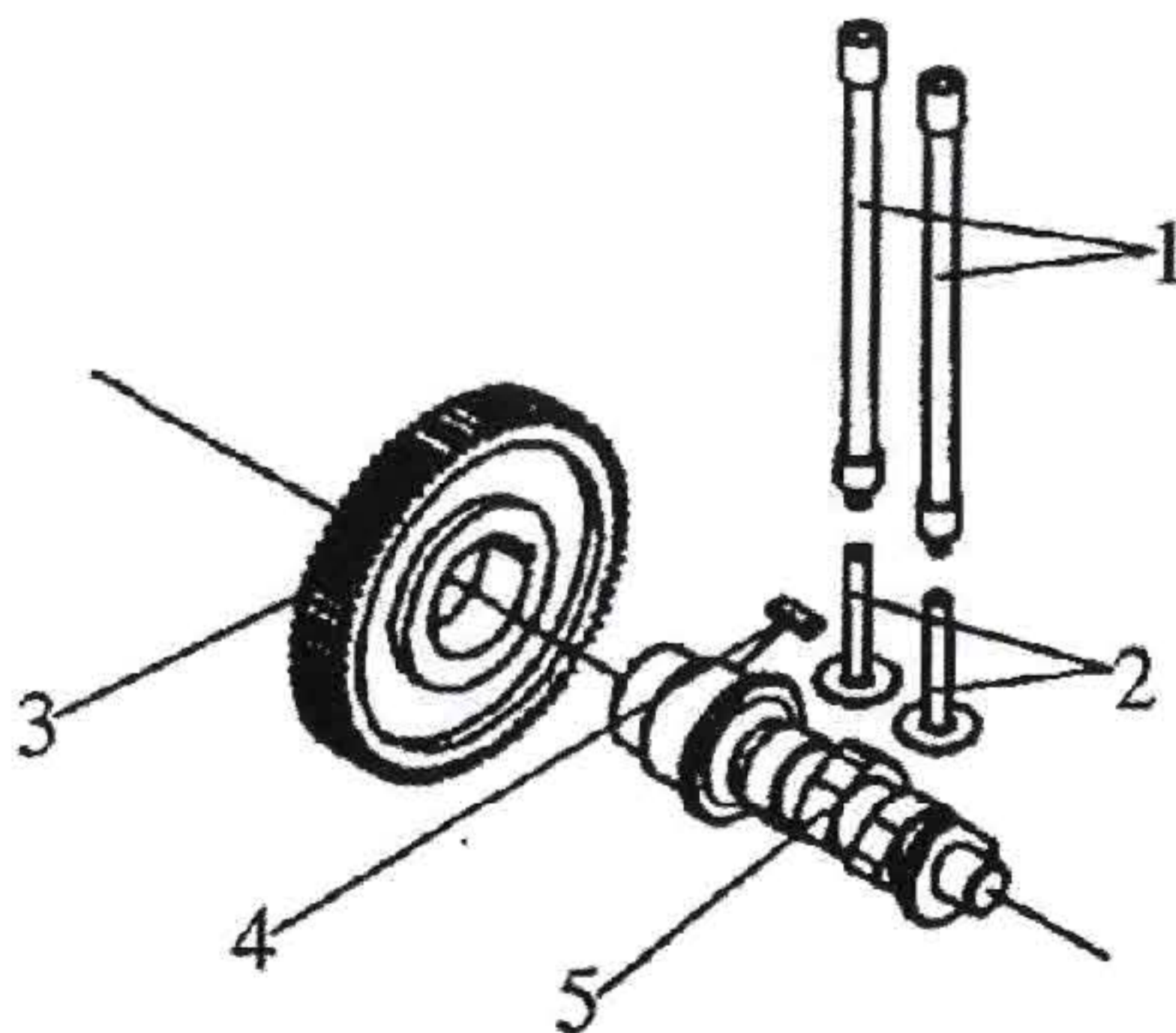


# AD8500S DIESEL GENERATOR PARTS DIAGRAM

## Cylinder Block Assembly(D186F-01000)



Ref No.	Parts No.	Description	Qty.
1	D168F-01018	Drain Plug	
1-1	D186FGET-01018-01	Conneting boit of drain	2
2	D168F-01100	Washer Unit of Drain Plug	1
3	GB/T9877.1-1988	Oil Seal SG35x50x8(rear)	2
4	D186F-01001	Cylinder B1ock	1
	D186FA-01001	Cylinder Block	1
5	GB/T290-1989	Needle Bearing 7941/8	1
6	GB/T1235-1976	O-Ring 22.5x2.4	2
7	D178F-01002	Oil Dipstick	2
8	D168F-11200	Fuel Controller Assem.	2
9	GB/T6173-2000	Nut M10x1.25	1
10	D168F-01012	Forcing Stud Of Fuel Injection Pump(Short)	1
11	D168F-01011	Forcing Stud Of Fuel Injection Pump(Long)	2
12	D168F-10014	Fuel Injection Pump Washer	2-3
13	D168F-10016	Joint Washer	1
14	D168F-10015	Seal Plate	1
15	GB/T6177.1-2000	Nut M6	1
16	GB/T97.1-1985	Gasket 6	2
17	GB/T93-1987	Gasket 6	2
18	GB/T6170-2000	Nut M6	2
19	GB/T290-1989	Needle Bearjng HK1512	1
20	D168F-01009	Thrust Plate	1
21	GB/T5789-1986	BoltM8x12	1
22	GB/T276-1994	Ball Bearing 6308/P5	1
23	D178F-01203	Cushion brocking	1
24	D186F-01211	Governor	1
25	D178F-01201	Vibration isolation cushion block	1
26	D178F-01202	Sheath	1
27	GB/T5789-1986	Bolt M6x18	2
28	D186F-01003	Cylinder Head Stud Bolt(Short)	2
29	D186F-01006	Cylinder Head Stud Bolt(Long)	1
30	D186F-01008	Sheet Gasket	1
31	D186F-01013	Cylinder Head Shim	4
32	D186F-01005	Cylinder Head Nut Gasket	2
33	D186F-01004	Cylinder Head Nut(Thin)	2
34	D186F-01007	Cylinder Head Nut(Thick)	1
35	D186F-01015	Crankcase Cover Washer	1
36	GB/T276-1994	Ball Bearing 6207/P5	1
37	D186F-01014	Main Bearing	1
38	GB/T9877.1-1988	Oil Seal SG35x50x8(front)	1
39	D168F-01017	Hexagonal Internal Screw Plug	16
39-1	D178FG-01300	Oil indicator	1
40	GB/T5789-1986	Bolt M8x33.5	1
41	D186F-01016	Crankcase Cover	3
	D186FS-01016	Crankcase Cover	1
42	D168F-01021	Plunger	2
43	D178F-09003	Oil Conduit	
44	GB/T1119.1-2000	Pin8x12	1
	D186FS-01000		
1	D186FS-01022	Block	



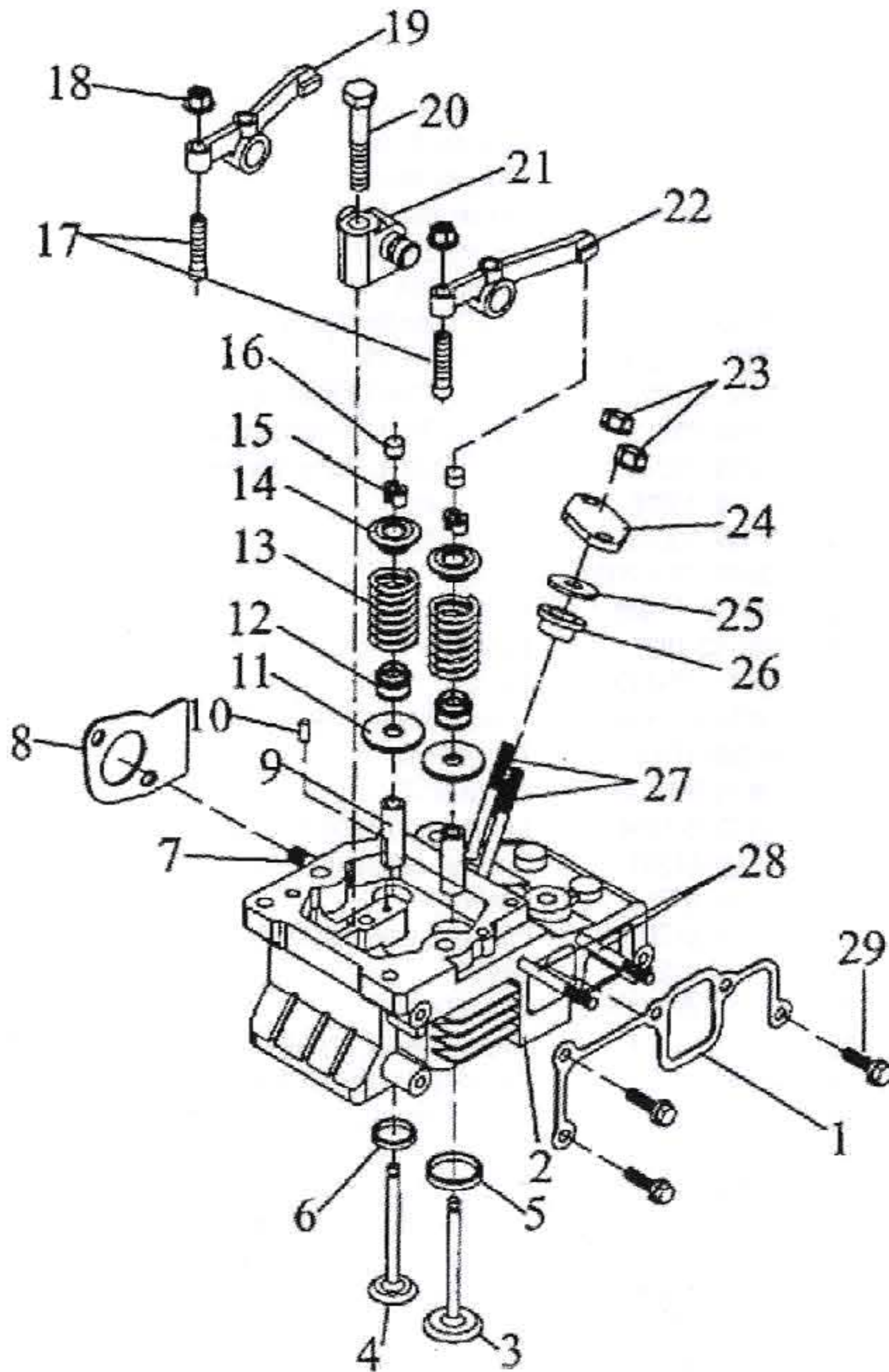
## Cylinder Block Assembly(D186F-06000)

Ref No.	Parts No.	Description	Qty.
1	D186F-06100	Valve Push Rod Assem.	2
2	D186F-06003	Valve Tappet	2
3	D186F-06002	Camshaft Timing Gear	1
4	GB/T1096-1979	Key5x14	1
5	D186F-06001	Camshaft	1
	D186FA-06001	Camshaft	1
5-1	D186FS-06001	Camshaft	1
	D186FS-0600		
1	GB/T1096-1779	key8x40	1

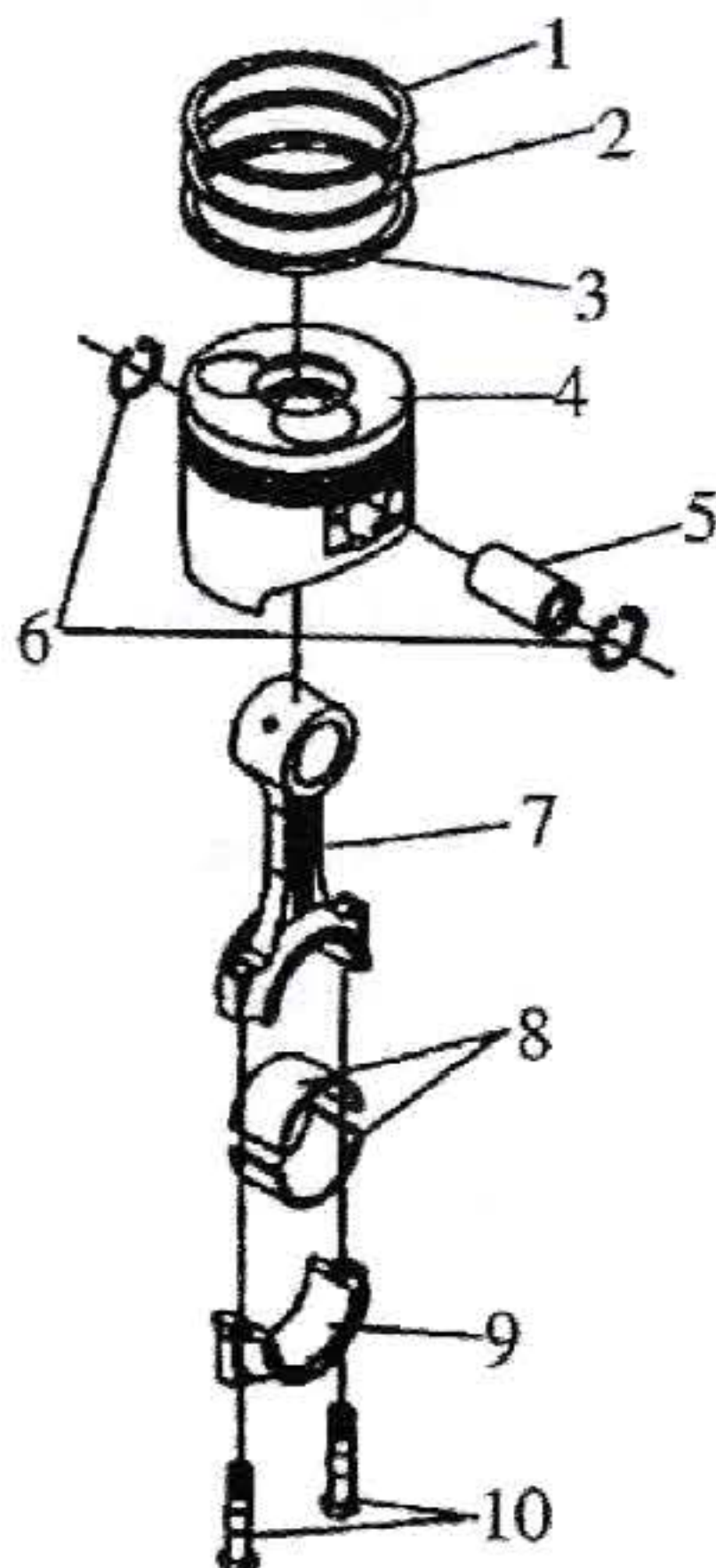


# AD8500S DIESEL GENERATOR PARTS DIAGRAM

## Cylinder Head Assem.(D186F-02000)



Ref No.	Parts No.	Description	Qty.
1	D186F-02014	Intake Pipe Washer	1
2	D186F-02202	Cylinder Head	1
2-1	D186FA-02202	Cylinder Head	1
3	D186F-02004	Intake Valve	1
4	D186F-02003	Exhaust Valve	1
5	D186F-02203	Inlet Valve Seat	1
6	D186F-02204	Exhaust Valve Seat	1
7	GB/T889-1988	Stud AM8x20	2
8	D186F-02015	Muffler Shim	1
9	D186F-02201	Valve Conduit	2
10	GB/T119.1-2000	Pin4x8	1
11	D186F-02007	Valve Spring Gasket	2
12	D186F-02019	Valve Conduit Oil Seal	2
13	D186F-02005	Valve Spring	2
14	D186F-02002	Valve Spring Seat	2
15	D186F-02001	Valve Retaining Clip	4
16	D186F-02016	Valve Adjusting Cushion	2
17	D186F-02008	Valve Clearance Adjusting Screw	2
18	D186F-02019	Valve Clearance adjustment locking nut	2
19	D186F-02012	Exhaust Valve Rocker Arm	1
19-1	D186FA-02012	Exhaust Valve Rocker Arm	1
20	D186F-02017	Set Bolt of Rocker Arm Seat	1
20-1	D186FA-02017	Set Bolt of Rocker Arm Seat	1
21	D186F-02006	Rocker Arm Seat Assem.	1
21-1	D186FA-02006	Rocker Arm Seat Assem.	1
22	D186F-02013	Intake Valve Rocker Arm	1
22-1	D186FA-02013	Intake Valve Rocker Arm	1
23	GB/T6177.1-2000	NutM6	2
24	D186F-02009	Fuel Injection Valve Retainer	1
25	D186F-02018	Heat Insulator Gasket	1
26	D186F-02011	Heat Insulator	1
26-1	D170FA-02011	Heat Insulator	1
27	GB/T900-1988	Stud AM6x50	2
27-1	GB/T900-1988	Stud AM6x50	2
28	GB/T900-1988	Stud AM6x75	2
29	GB/T5789-1986	Stud M6x25	3
D186FGET-02000			
1	D186FGET-02105	Rubber plug	1
D186FA-02000			
1	GB/T119.1-2000	Pin4x8	2
2	GB/T894.1-1986	Retainer Ring	2



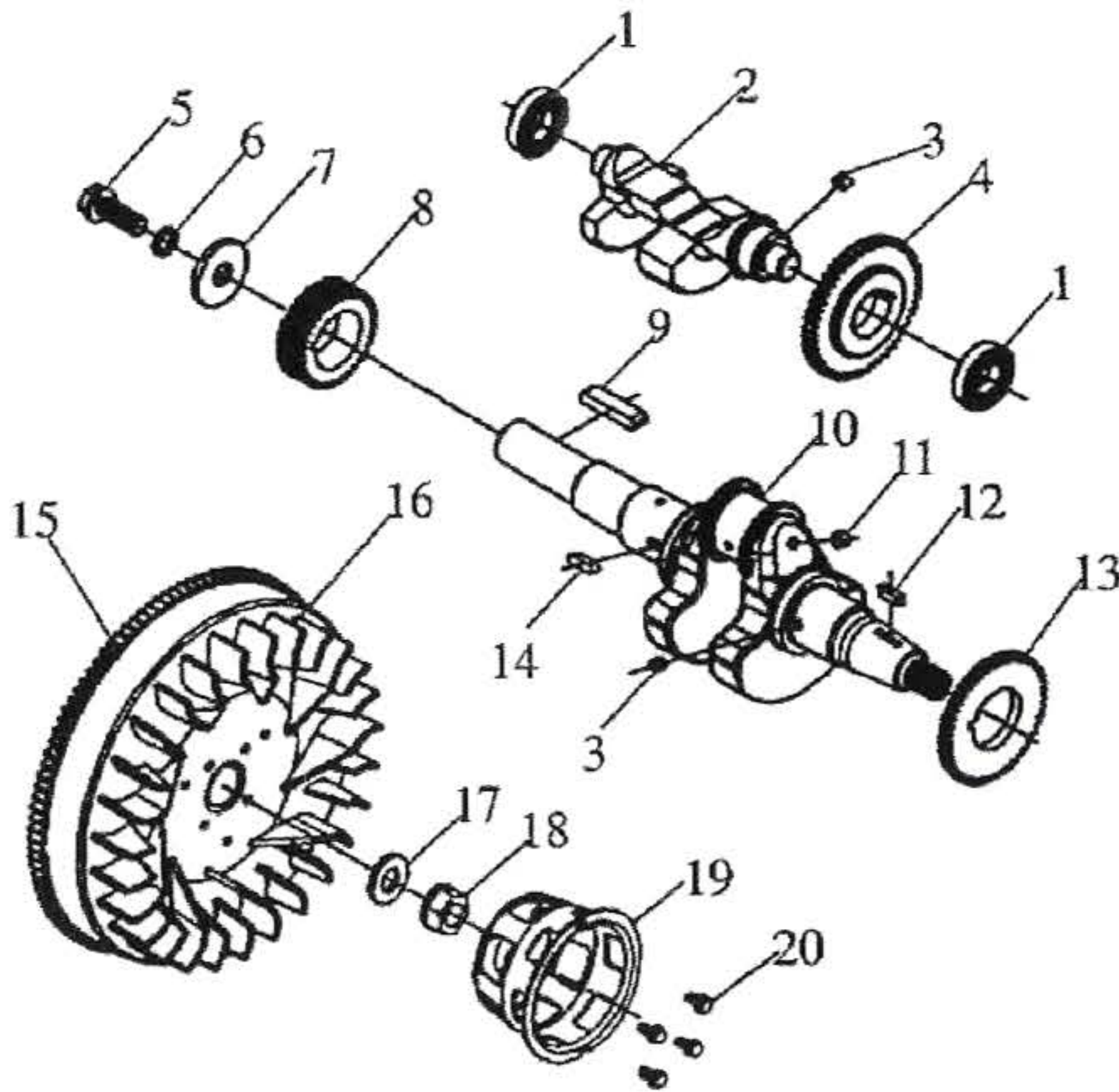
## Piston & Connecting Rod Assem.(D186F04000)

Ref No.	Parts No.	Description	Qty.
1	D186F-04001	First Air Ring	1
2	D186F-04002	Second Air Ring	1
3	D186F-04100	Oil Ring Assem.	1
4	D186F-04003	Piston	1
	D186FS-04003	Piston	1
4-1	D186FA-04003	Piston	1
5	D186F-04004	Piston Pin	1
6	GB/T893.1-1986	Retainer Ring 23	2
7	D186F-04007	Connecting Rod Block	1
8	D186F-04005	Connecting Rod Shaft Bushing	2
9	D186F-04006	Connecting Rod Cover	1
10	D186F-04008	Connecting Rod Bolt	2



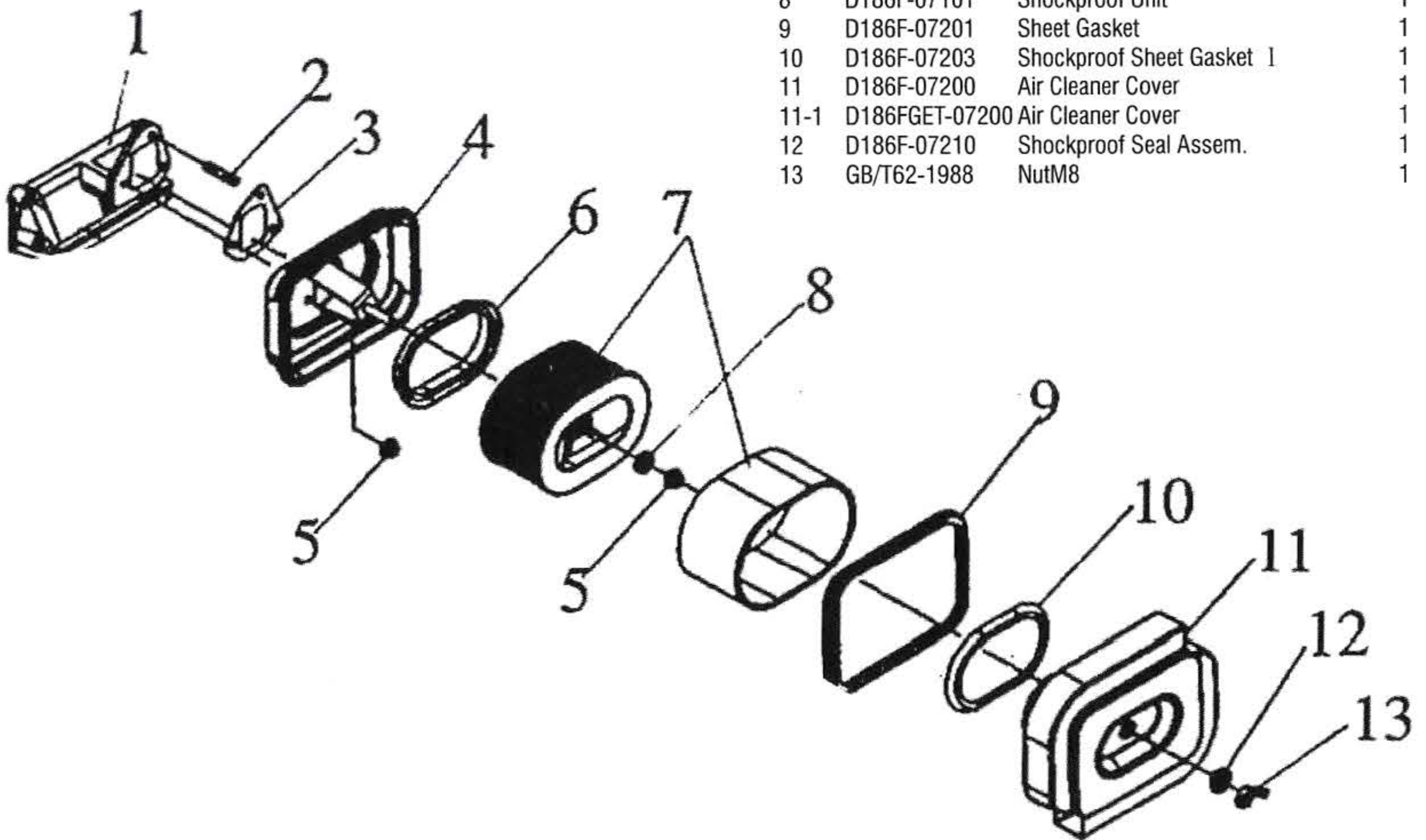
# AD8500S DIESEL GENERATOR PARTS DIAGRAM

## Crankshaft & Flywheel Assem.(D186F-05000)



Ref No.	Parts No.	Description	Qty.
1	GB/T276-1994	Ball Bearing 6203/P5	2
2	D186F-05301	Balance Shaft	1
3	D186F-05006	Key	2
4	D186F-05004b	Timing Gear of Balance Shaft	1
5	D186F-05007	Output End Set Bolt	1
6	GB/T93-1987	Gasket10	1
7	D178F-05008	Output End Gasket	1
8	D186F-05203	Crankshaft timing Gear	1
9	GB/T1096-1979	Key6x50	1
10	D186F-05201	Crankshaft	1
	D186FA-05201	Crankshaft	1
	D186FG-05201	Crankshaft	1
	D186FW-05201	Crankshaft	1
	D186FP-05201	Crankshaft	1
	D186FS-05201	Crankshaft	1
11	D168F-05202	SteelBall 1/4	1
12	GB/T1096-1979	Key5x12	1
13	D186F-05004	Drive Gear of Balance Shaft	1
14	GB/T1096-1979	Key5x14	1
15	D186F-05102	Flywheel teeth	1
	D186FS-05102	Flywheel teeth	1
16	D186F-05101	Flywheel	1
	D186FS-05101	Flywheel	1
17	D186F-05003	Flywheel Nut Gasket	1
18	D186F-05002	Flywheel Nut	1
19	D186F-05001	Starting Ratchet Reel	1
20	GB/T5789-1986	Bolt M6x12	4

## Air Intake System(D186F-07000)

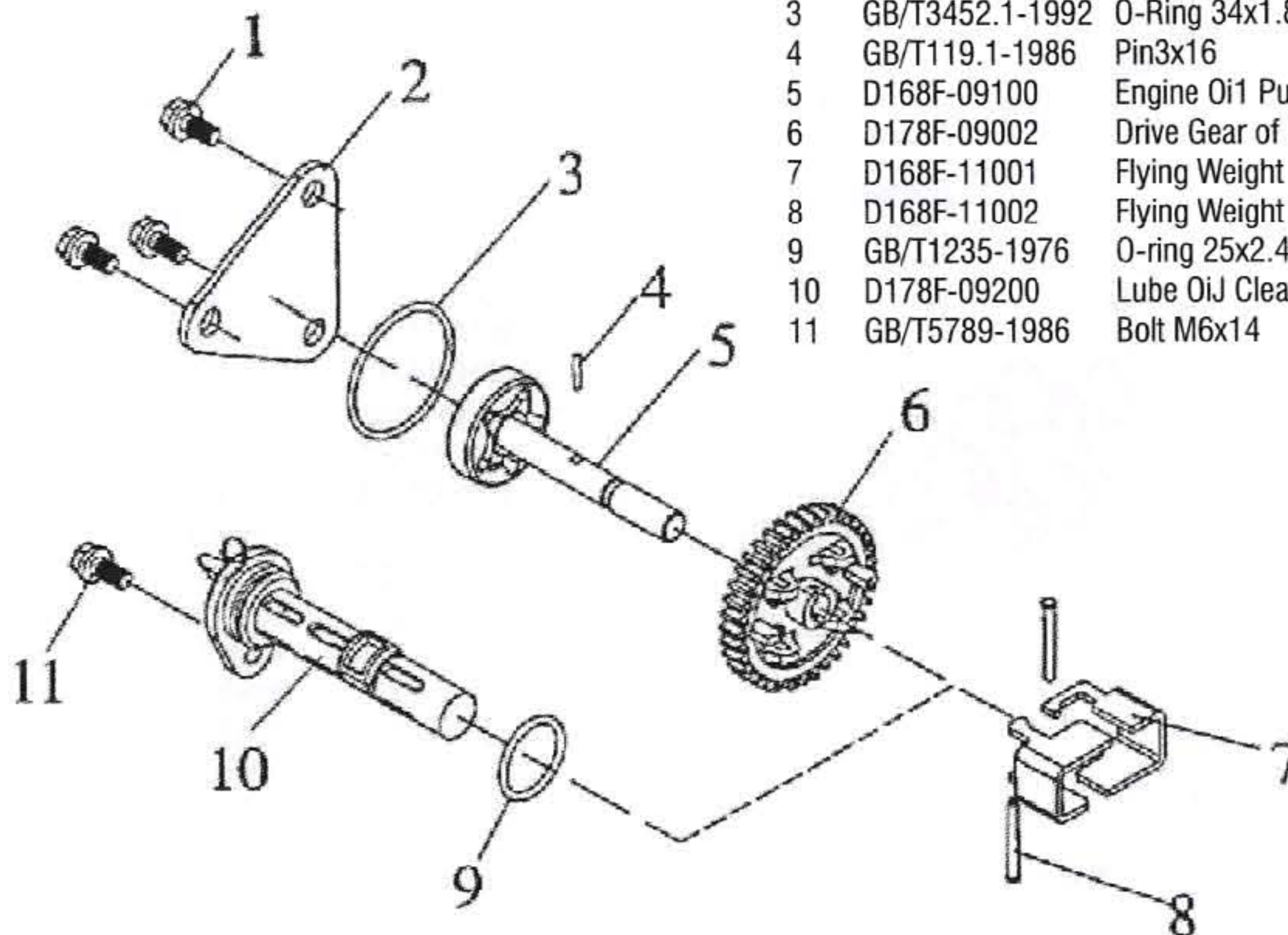


Ref No.	Parts No.	Description	Qty.
1	D186F-07401	Inlet pipe	1
2	D168F-07402	Tightening Bott Of Air Cleaner	1
3	D186F-07001	Air Cleaning washer	1
4	D186F-07300	Air Cleaning Bottom Case Assm.	1
5	GB/T6177.1-2000	NutM6	4
6	D186F-07303	Shockproof Sheet Gasket II	1
7	D186F-07100	Air Cleaner Element Assem.	1
8	D186F-07101	Shockproof Unit	1
9	D186F-07201	Sheet Gasket	1
10	D186F-07203	Shockproof Sheet Gasket I	1
11	D186F-07200	Air Cleaner Cover	1
11-1	D186FGET-07200	Air Cleaner Cover	1
12	D186F-07210	Shockproof Seal Assem.	1
13	GB/T62-1988	NutM8	1



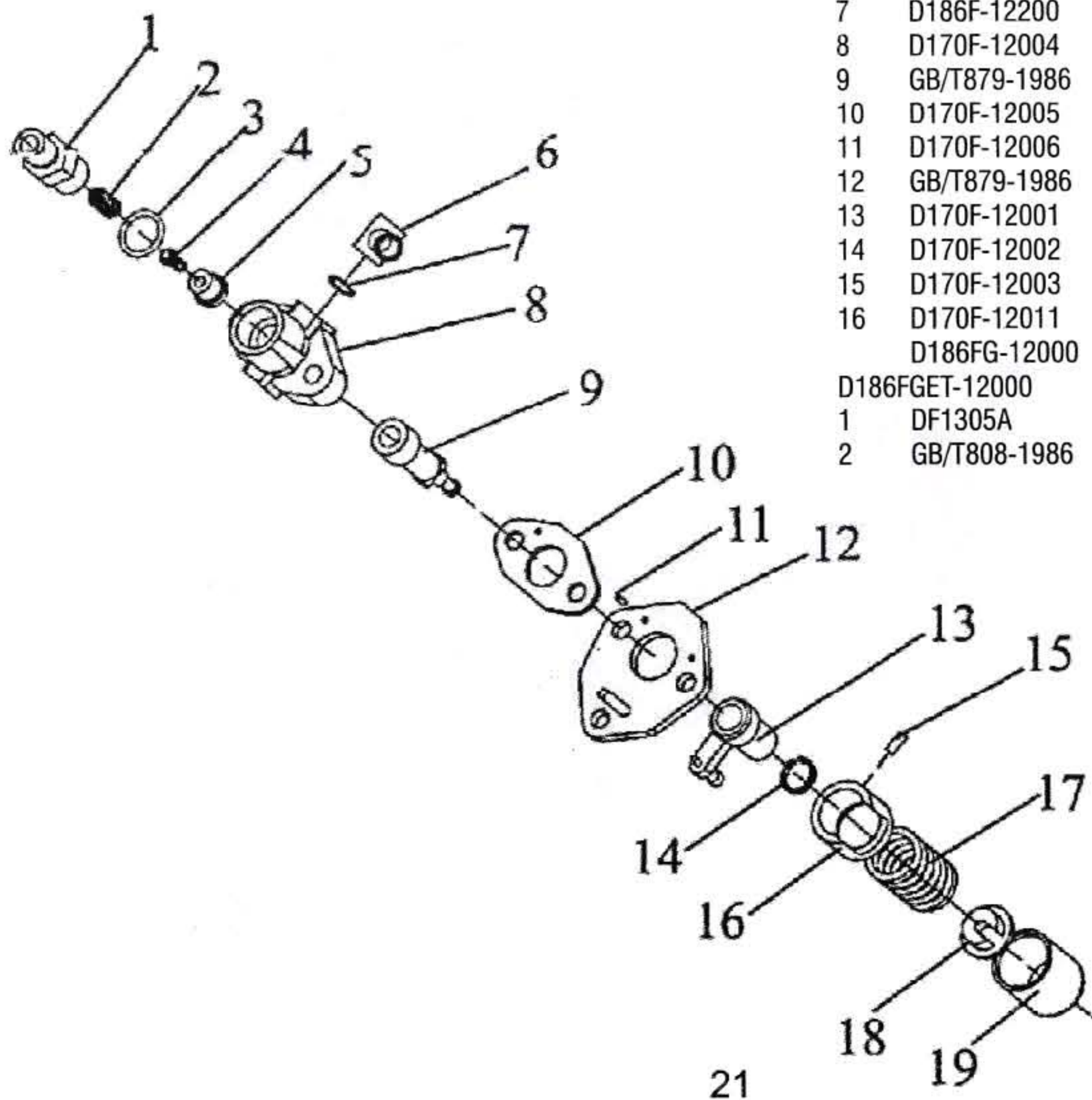
# AD8500S DIESEL GENERATOR PARTS DIAGRAM

## Lubricating System (D186F-09000)



Ref No.	Parts No.	Description	Qty.
1	GB/T5789-1986	Bolt M6x12	3
2	D168F-09003	Lube Oil Pump Cover	1
3	GB/T3452.1-1992	O-Ring 34x1.8	1
4	GB/T119.1-1986	Pin 3x16	1
5	D168F-09100	Engine Oil Pump Unit	1
6	D178F-09002	Drive Gear of Lube Oil Pump	1
7	D168F-11001	Flying Weight	2
8	D168F-11002	Flying Weight Pin	2
9	GB/T1235-1976	O-ring 25x2.4	1
10	D178F-09200	Lube Oil Cleaner Assem.	1
11	GB/T5789-1986	Bolt M6x14	1

## Fuel Injection Pump Assem (D186F-12000)

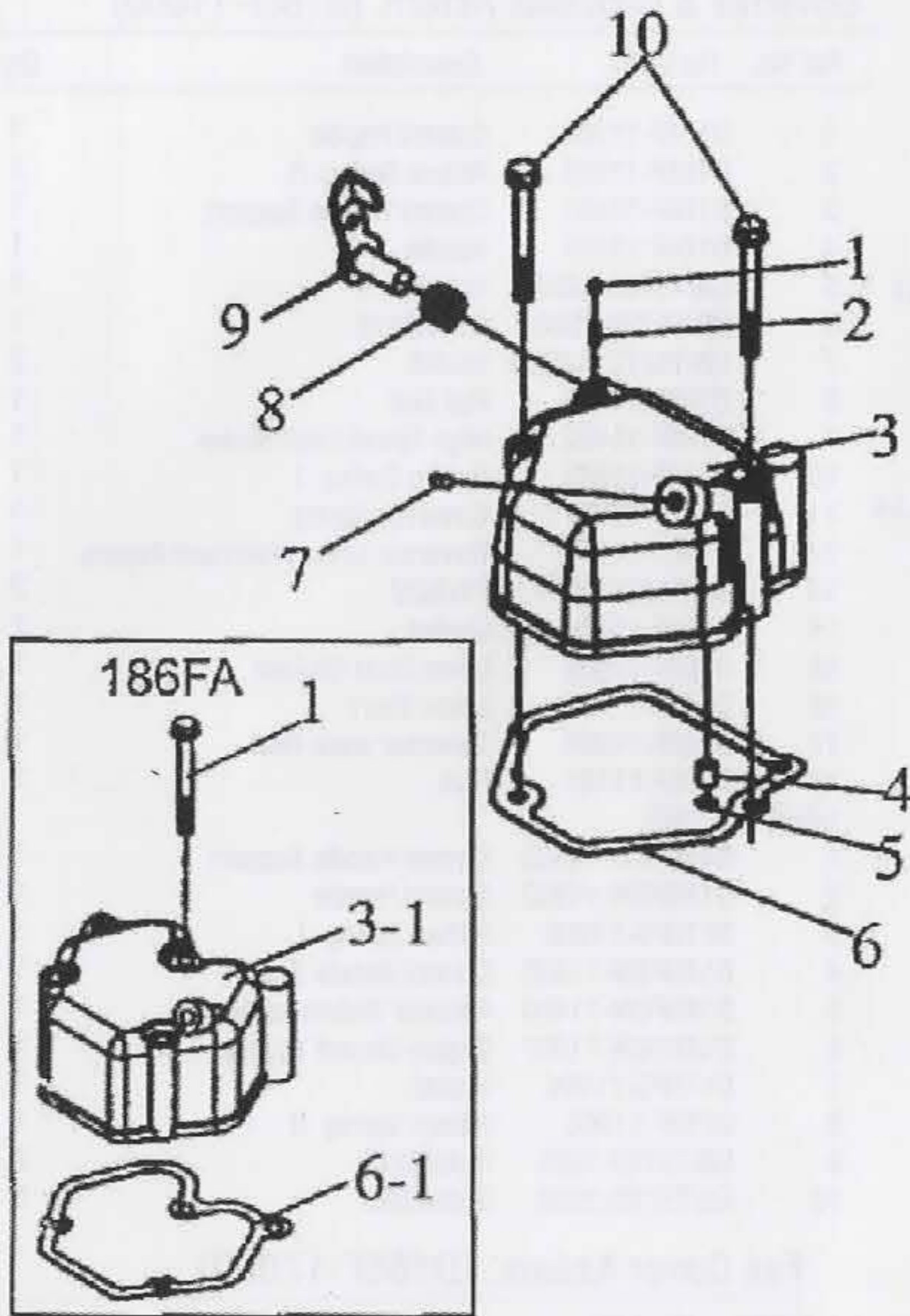


Ref No.	Parts No.	Description	Qty.
1	D170F-12001	Fuel Delivery Valve Forcing Holder	1
2	D170F-12002	Dumping Block	1
3	D170F-12003	Fuel Delivery Valve Spring	1
4	D170F-12011	High-pressure Sheet Gasket	2
5	D170F-12100	Fuel Delivery Assembly	1
6	D170F-12400a	Intake Oil Pipe	1
6-1	D178FGET-12400	Outtake Oil Pipe	1
7	D186F-12200	FIP Block plunger Assembly	1
8	D170F-12004	Volt-adjusting Washer	As Required
9	GB/T879-1986	Pin 2x6	2
10	D170F-12005	FIP Connecting Plate	1
11	D170F-12006	Fuel Limiting Sheath	1
12	GB/T879-1986	Pin 3x8	1
13	D170F-12001	Spring Supporting Block	1
14	D170F-12002	Plunger Spring	1
15	D170F-12003	Spring Holder	1
16	D170F-12011	Tappet	1
	D186FG-12000	Fuel Injection Pump Assem	1
	D186FGET-12000		
1	DF1305A	Stator Magnetic Valve	1
2	GB/T808-1986	Nut M10x1	1



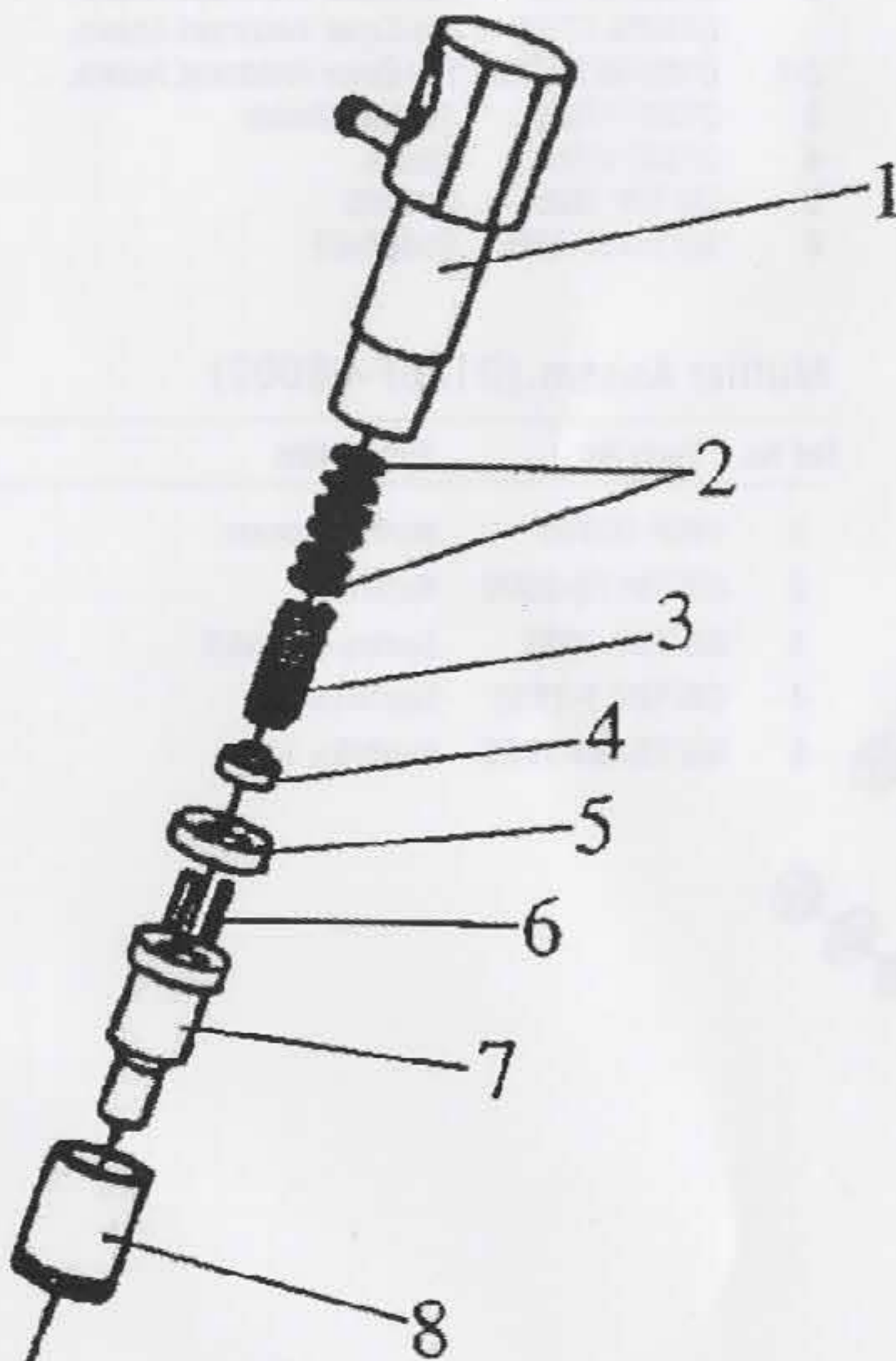
# AD8500S DIESEL GENERATOR PARTS DIAGRAM

## Cylinder Head Cover Assem.(D186F-03000)



Ref No.	Parts No.	Description	Qty.
1	GB/T119-1986	Pin3x16	1
2	D186F-03001	Cylinder Head Cover	1
2-1	D186FA-03001	Cylinder Head Cover	1
3	D168F-03007	Breather Seat	1
4	GB/T1235-1976	O-Ring 12x1.9	1
5	D186F-03003	Cylinder Head Cover Washer	1
5-1	D186FA-03003	Cylinder Head Cover Washer	1
6	D168F-01021	Plunger	1
7	D168F-03004	Decompression Spring	1
8	D168F-03100	Decompression Shaft Assem.	1
9	GB/T5789-1986	BoltM6x70	2
<b>D186FG-03000</b>			
1	D178FG-03012	Bolt m6x55	2
2	D168FG-03100	Decompression Wire Sheath	1
3	D186FG-03011	Decompression Shaft Assem.	1
4	D178FG-03009	Decompression Wire	1
5	D178FG-03008	Outer Decompression Handle	1
6	GB/T5789-1986	Decompression Handle Support	3
7	D178FG-03013	BoltM6x14	1
8	GB/T6170-2000	Outer Decompression Handle Sheath	1
<b>D186FA-03000</b>			
1	GB/T5789-1986	NutM6	3
2	D168F03005	Filler Screw Plug	1

## Fuel Injection Valve Assem(186F-13000)

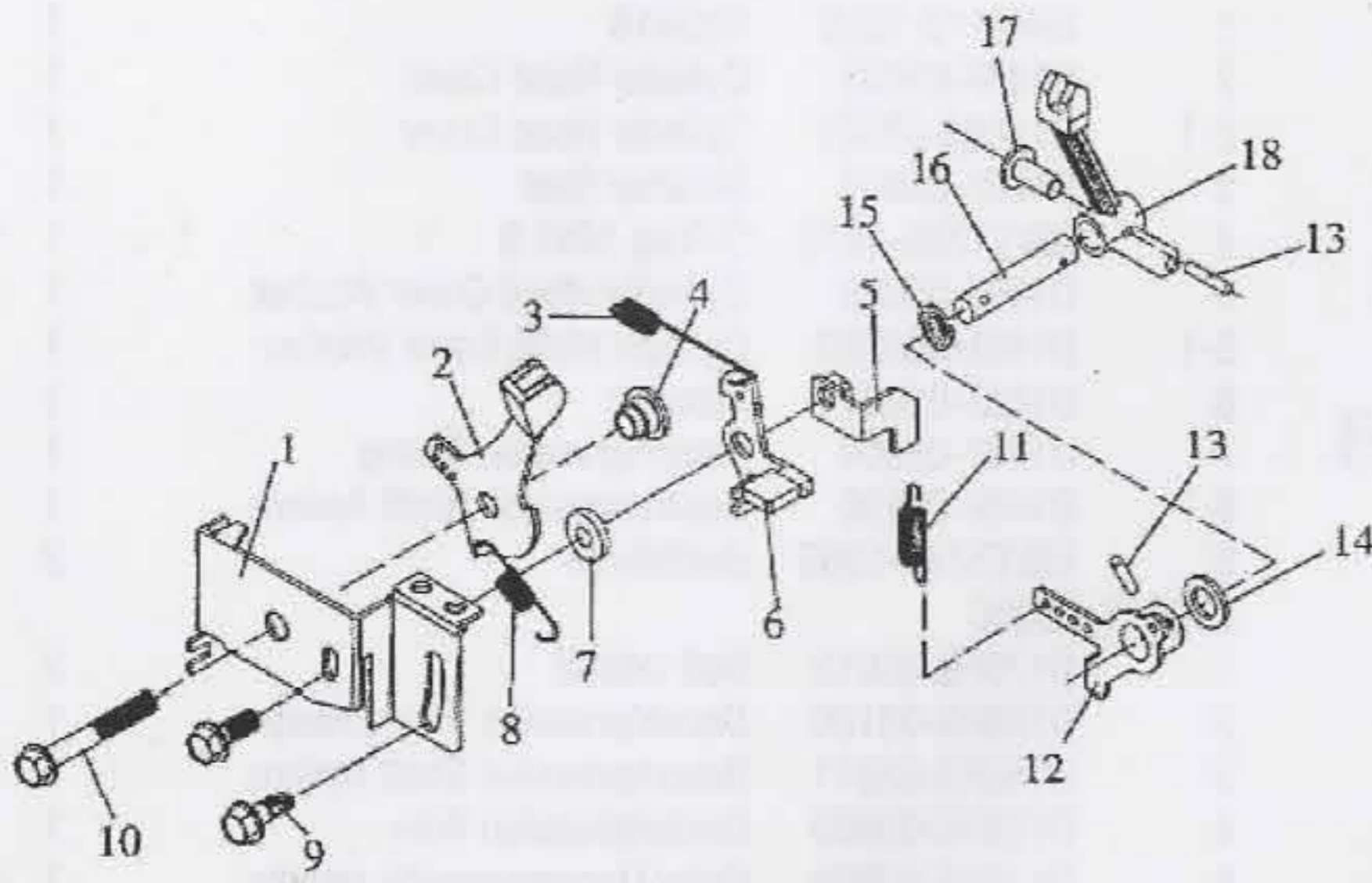


Ref No.	Parts No.	Description	Qty.
1	D170F-13200a	FuelInjection Valve Block	1
2	GB/T879-1986	Pin3x5	1
3	D170F-13007	Volt-adjustment Washer As Required	
4	D170F-13006	Volt-adjustment Spring	1
5	D170F-13005	Mandril	1
6	D170F-13003	Intermediate Block	1
7	D170F-13004	Locating Pin	2
8	D186F-13100	Fuel Injection Nozzle	1
9	D170F-13002	Nozzle Forcing Nut	1
	D186FA-13000	Fuel Injection Valve Assem	1



# AD8500S DIESEL GENERATOR PARTS DIAGRAM

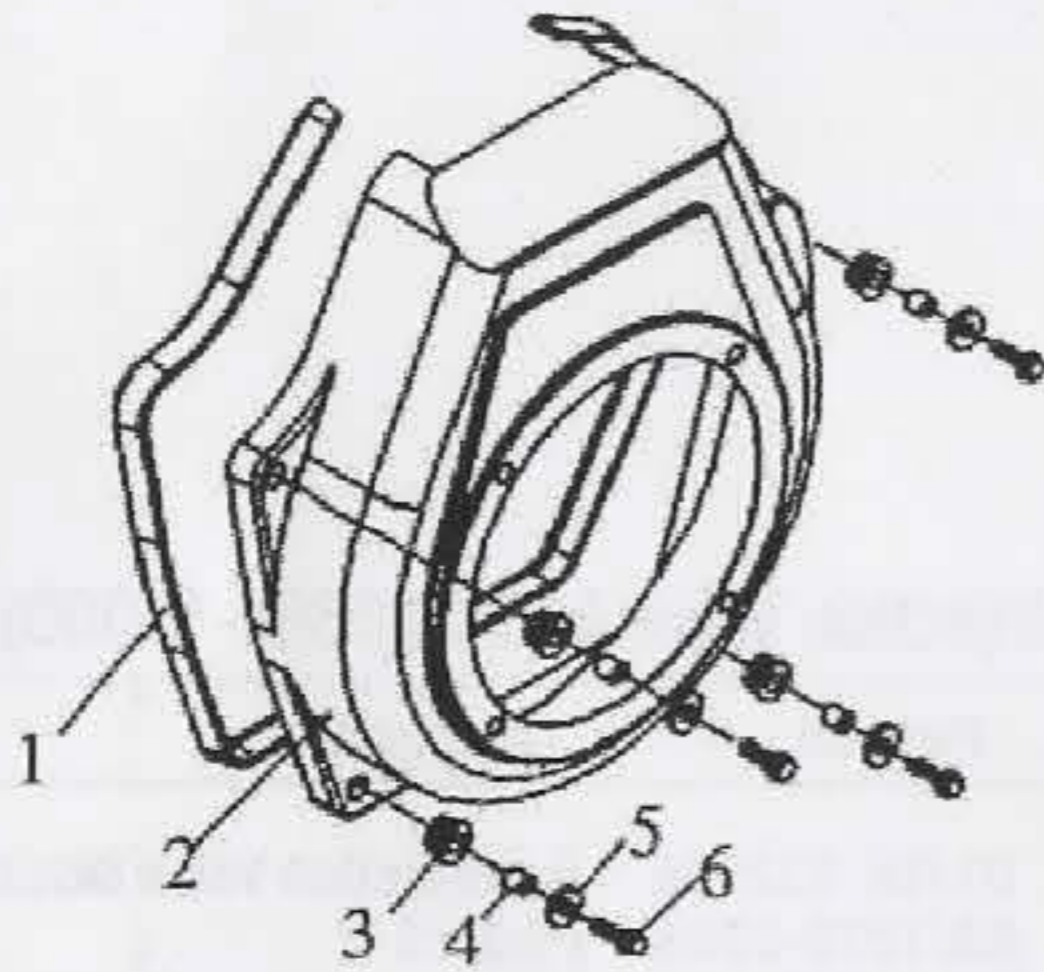
## Governor & Controller Assem. (D186F-11000)



Ref No.	Parts No.	Description	Qty.
1	D168F-11300	Control Handle	1
2	D168F-11006	Return Spring II	1
3	D168F-11401	Control Handle Support	1
4	D168F-11301	Handle	1
5	GB/T5789-1986	BoltM6x14	1
6	GB/T5789-1986	BoltM6x18	1
7	GB/T6172.1-2000	NutM6	2
8	D168F-11403	Pull Bolt	1
9	D168F-11402	High Speed Limit Screw	1
10	D168F-11005	Return Spring I	1
11	D186F-11007	Governor Spring	1
12	D186F-11110	Governor Lever Weldment Assem.	1
13	GB/T117-2000	Pin3x22	2
14	D168F-11003	Gasket	2
15	D168F-11008	Lever Shah Oil Seal	1
16	D168F-11102	Lever Shart	1
17	D186F-11004	Governor push Reel	1
18	D186F-11101	Fork	1

### 186FGW-11000

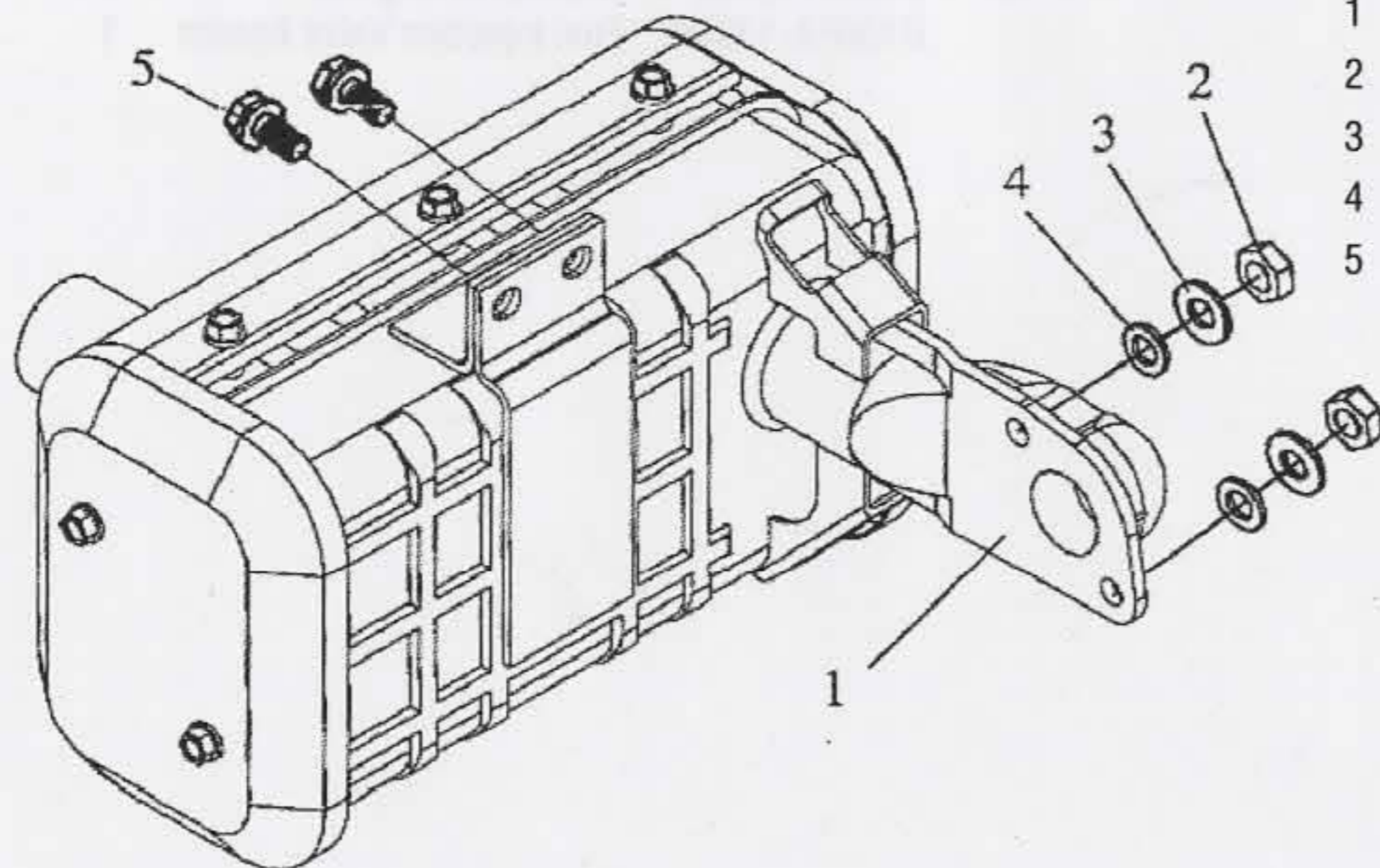
1	D186FGW-13005	Control Handle Support	1
2	D186FGW-11302	Control Handle	1
3	D178FG-11005	Return Sprng I	1
4	D186FGW-11303	Control Hahdle Shaft	1
5	D186FGW-11400	Retainer Weldment Assem.	1
6	D186FGW-11007	Engine-Shutoff Handle	1
7	D178FG-11006	Sheath	1
8	D168F-11006	Return Sprmg II	1
9	GB/T5783-1986	BoltM6x16	2
10	GB/T5782-2000	BoltM6x25	1



## Fan Cover Assem. (D186F-17000)

Ref No.	Parts No.	Description	Qty.
1	D186F-17003	Cushion	1
2	D186F-17100	Fan Cover Weldment Assem.	1
	D186FS-17100	Fan Cover Weldment Assem.	1
2-1	D186FGET-17100	Fan Cover Weldment Assem.	1
3	D168F-17002	Cushion Sheath	4
4	D168F-17001	Sheath	4
5	GB/T96-1985	Gasket6	4
6	GB/T5789-1986	BoltM6x22	4

## Muffler Assem. (D186F-08000)

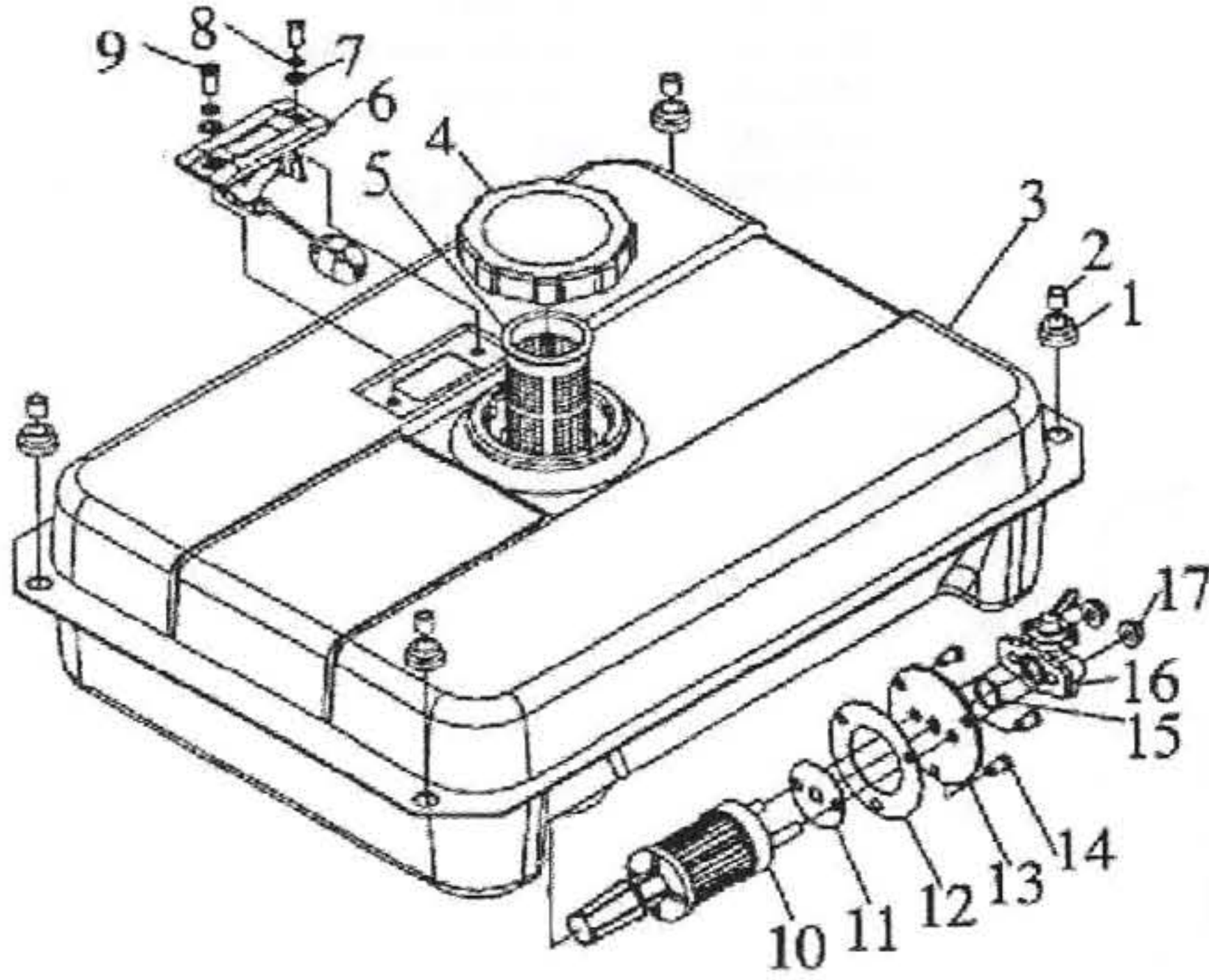


Ref No.	Parts No.	Description	Qty.
1	186F-08000	Muffler Assem.	1
2	GB/T6170-2000	NutM8	2
3	GB/T93-1987	Spring Gasket 8	2
4	GB/T97.1-1985	Gasket 8	2
5	GB/T5789-1986	8oltM8 x 14	2



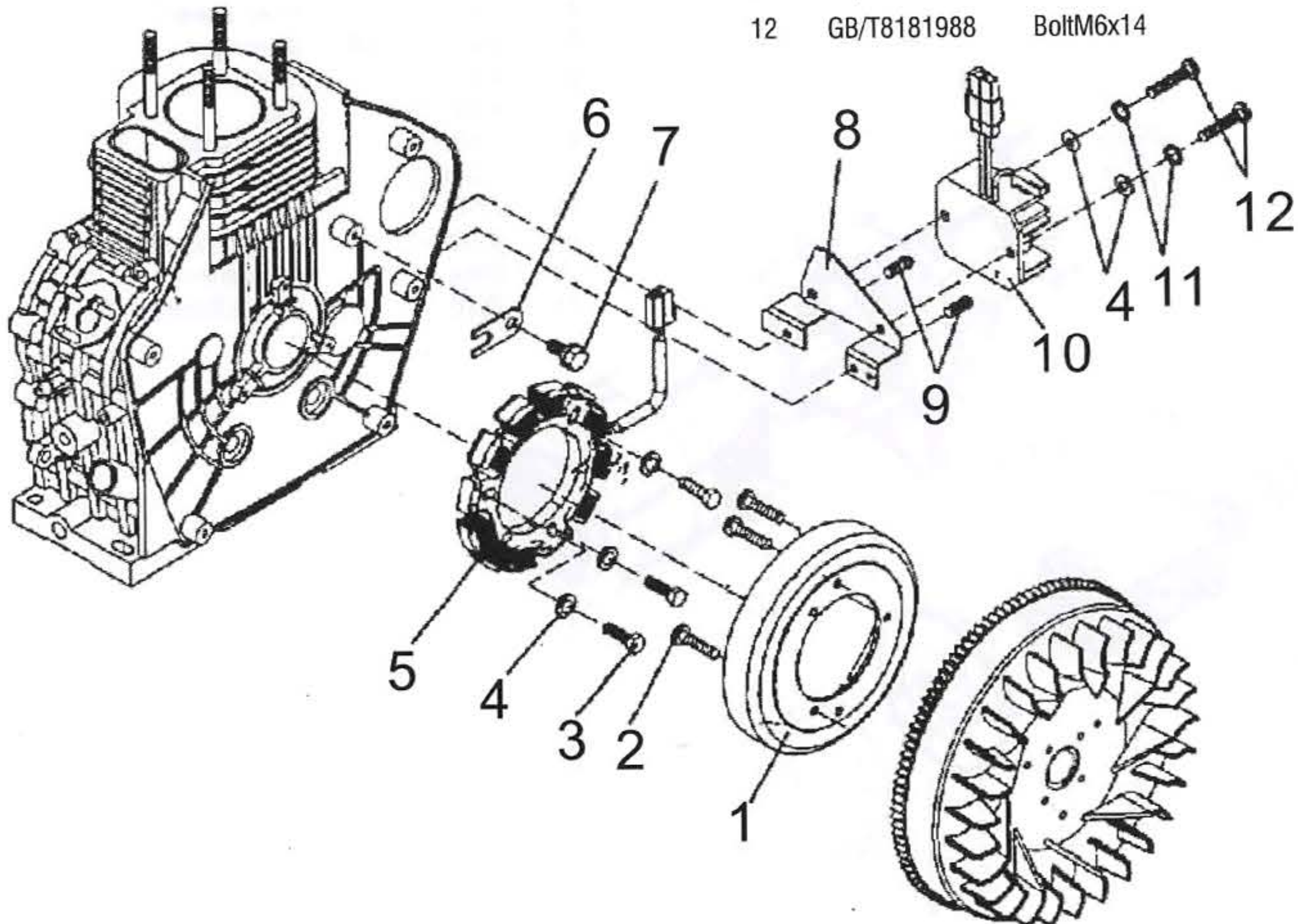
# AD8500S DIESEL GENERATOR PARTS DIAGRAM

## Fuel System (AD8500E-30000)



Ref No.	Parts No.	Description	Qty.
1	5000E-30004	Cushion	4
2	5000E-30005	Sheath	4
3	5000E-31000	Fuel Tank Weldment Assem.	1
4	KR180N-10100	Fuel Tank Cap	1
5	D168F-10004	Fuel Filler Screen	1
6	5000E-32000	Fuel Indicator Assem.	1
7	GB/T93-1987	Spring Gasket5	2
8	GB/T97.1-1985	Gasket5	2
9	GB/T819.1-2000	Plus ScrewM5x12	2
10	D168F-10300	Element Assem.	1
11	D168F-10007	Fuel Cleaner Washer	1
12	5000E-31007	Joint Washer	1
13	5000E-31006	Sealing Plate	1
14	GB/T819.1-2000	Plus ScrewM5x8	3
15	GB/T3452.1-1992	O-Ring 13.2x1.8	1
16	D168F-10400	Throttle Switch Assem.	2
17	GB/T6187-1986	NutM6	2

## Flywheel Alternator Assem.



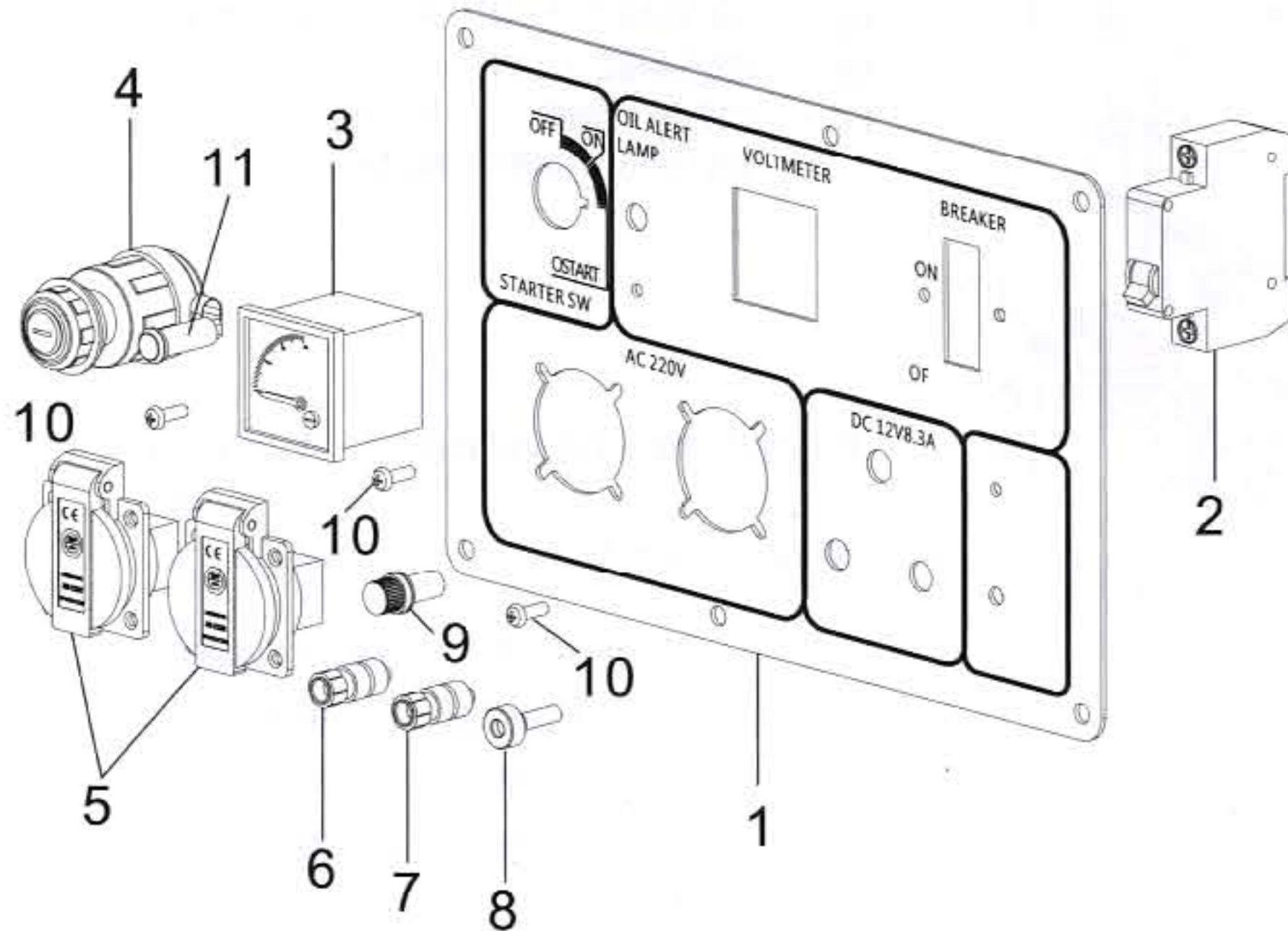
Ref No.	Parts No.	Description	Qty.
1	D168F-16100	Rotator Assem.	1
2	GB/T819.1-2000	ScrewM6x14	3
3	GB/T5782-2000	BoltM6x20	3
4	GB/T97.1-1985	Gasket6	5
5	D168F-16200	Stator Assem.	1
6	D168F.16001	Retainer	1
7	GB/T5789-1986	ScrewM6x12	1
8	D168F.16301	Supprot 1 of Governor	1
9	GB/T5789-1986	ScrewM6x14	2
10	D168F.16400	Volt Regulator Assem.	1
11	GB/T93-1987	Gasket6	2
12	GB/T8181988	BoltM6x14	2



# AD8500S DIESEL GENERATOR PARTS DIAGRAM

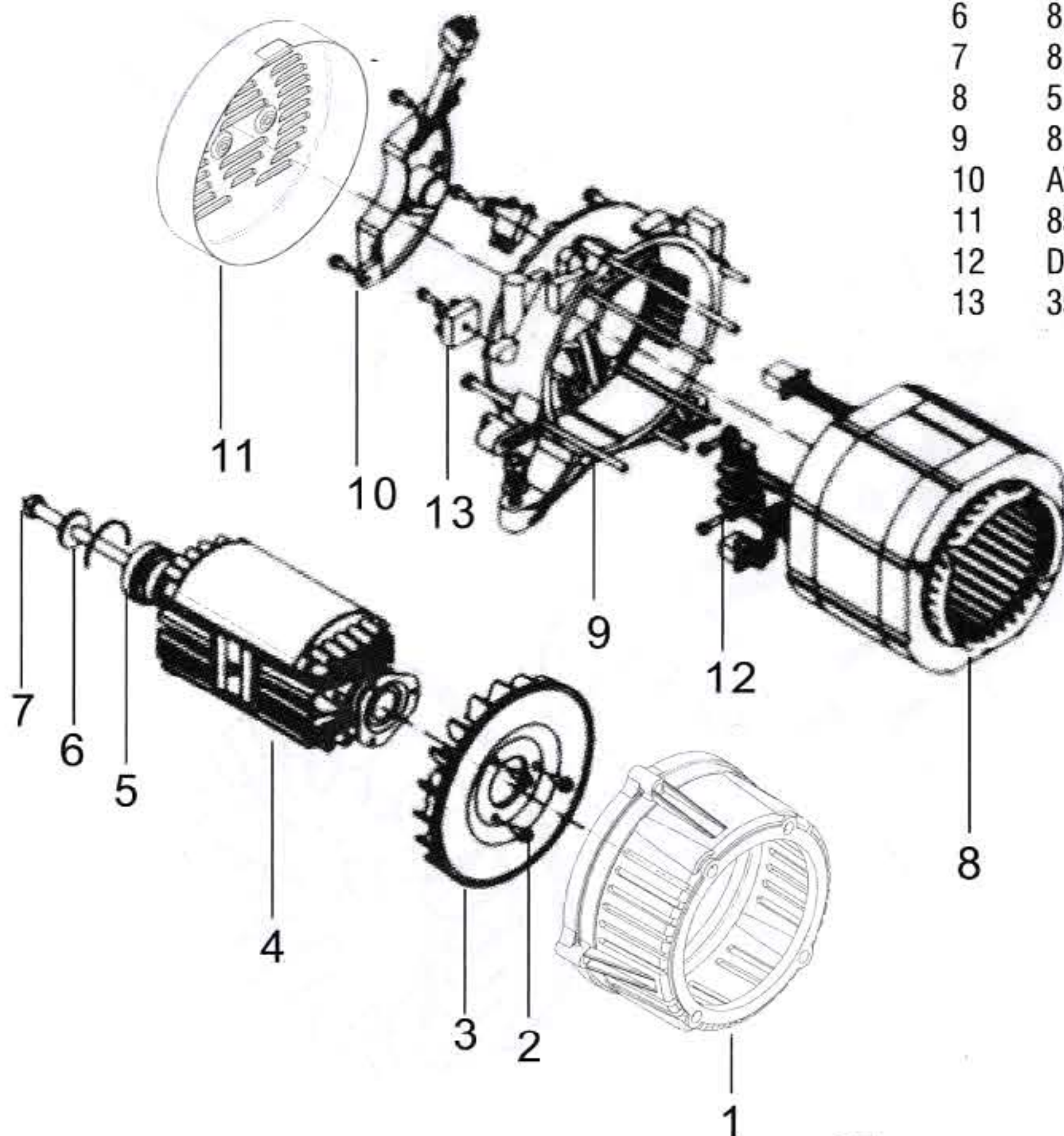
## FIG R. CONTROL PANEL

Ref No.	Parts No.	Description	Qty.
1	AD8500S	control panel	1
2	AD8500S	AC Circuit breaker	1
3	AD8500S	Voltmeter	1
4	AD8500S	Engine switch	1
5	AD8500S	European socket	1
6	AD8500S	DC output +	1
7	AD8500S	DC output -	1
8	AD8500S	Negative wire terminal	1
9	AD8500S	fuse holder	1
10	AD8500S	Bolt	3
11	AD8500S	oil warning light	1

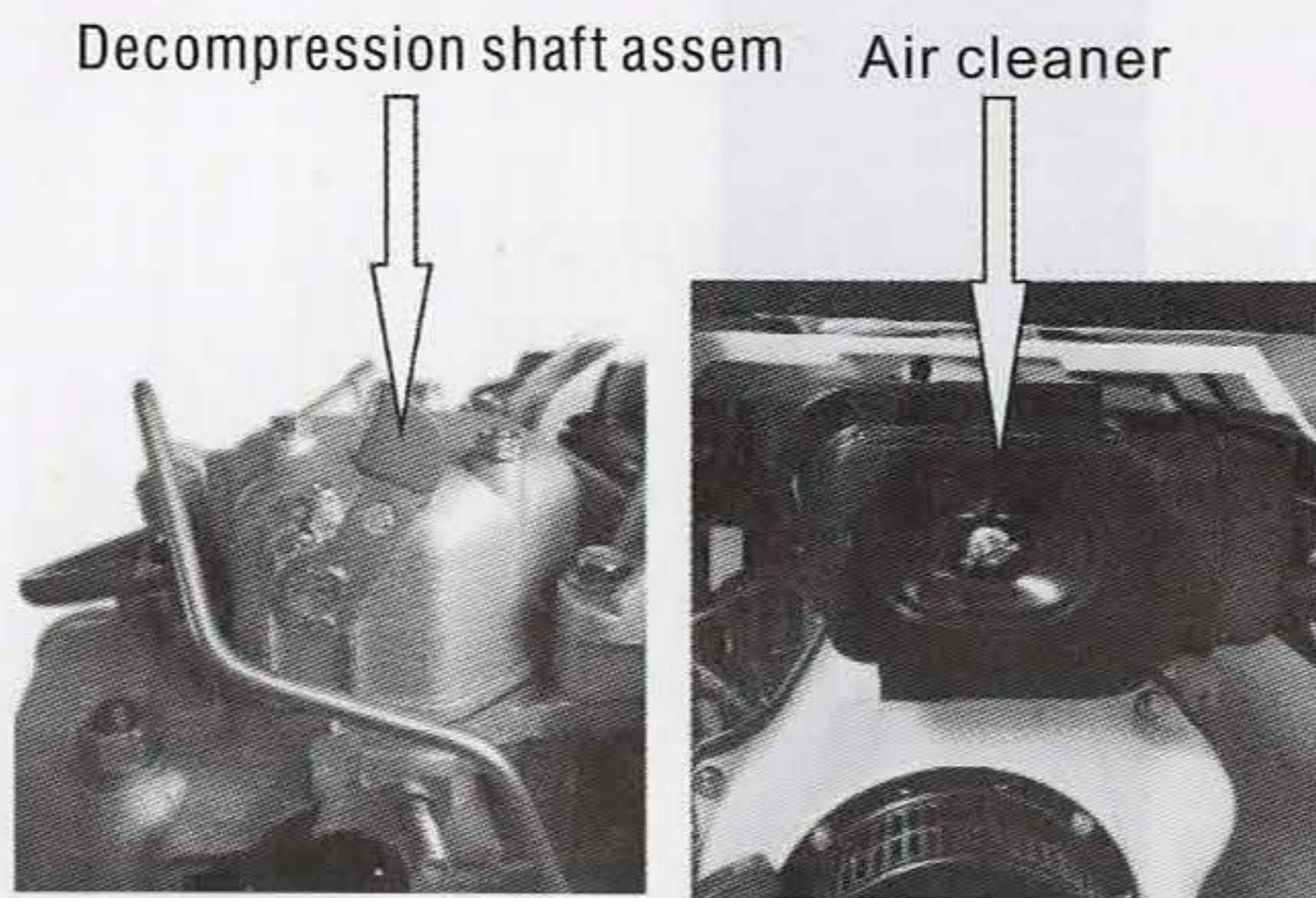


## FIG P. GENERATOR

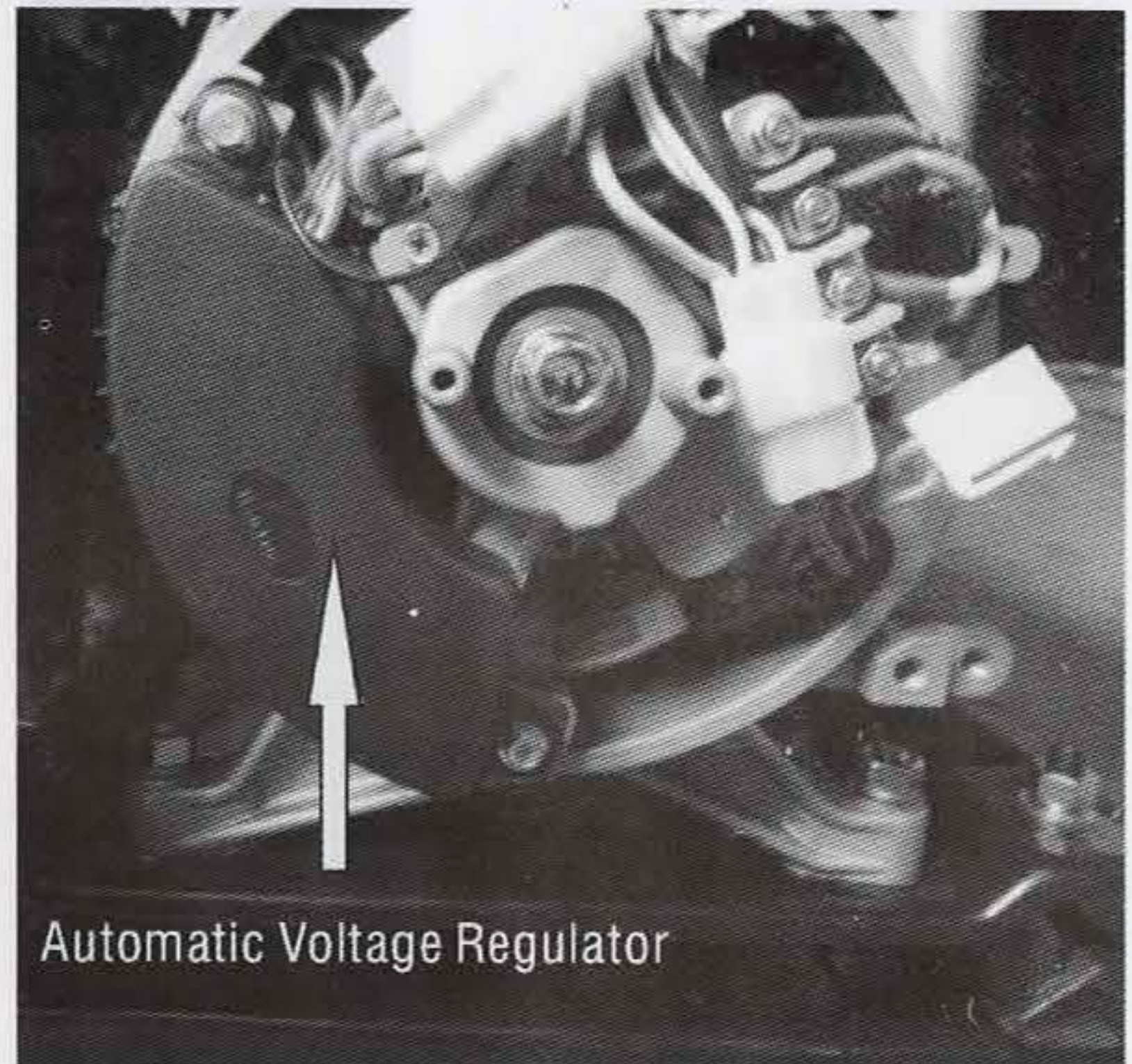
Ref No.	Parts No.	Description	Qty.
1	8.0341.01	Front Cover	1
2	GB/5786-1986	bolt	3
3	8.4351.01	fan blade	1
4	5.6741.01	Front Cover	1
5	GB/T276-1994	bearing	1
6	8.214.009	Shim	1
7	8.202.009	bolt	1
8	5.6801.01	stator assy	1
9	8.0342.01	rear cover	1
10	AVR	AVR	1
11	8500D-02100	Motor draught hood	1
12	D104	carbon brush	1
13	3510	Bridge Rectifiers	1



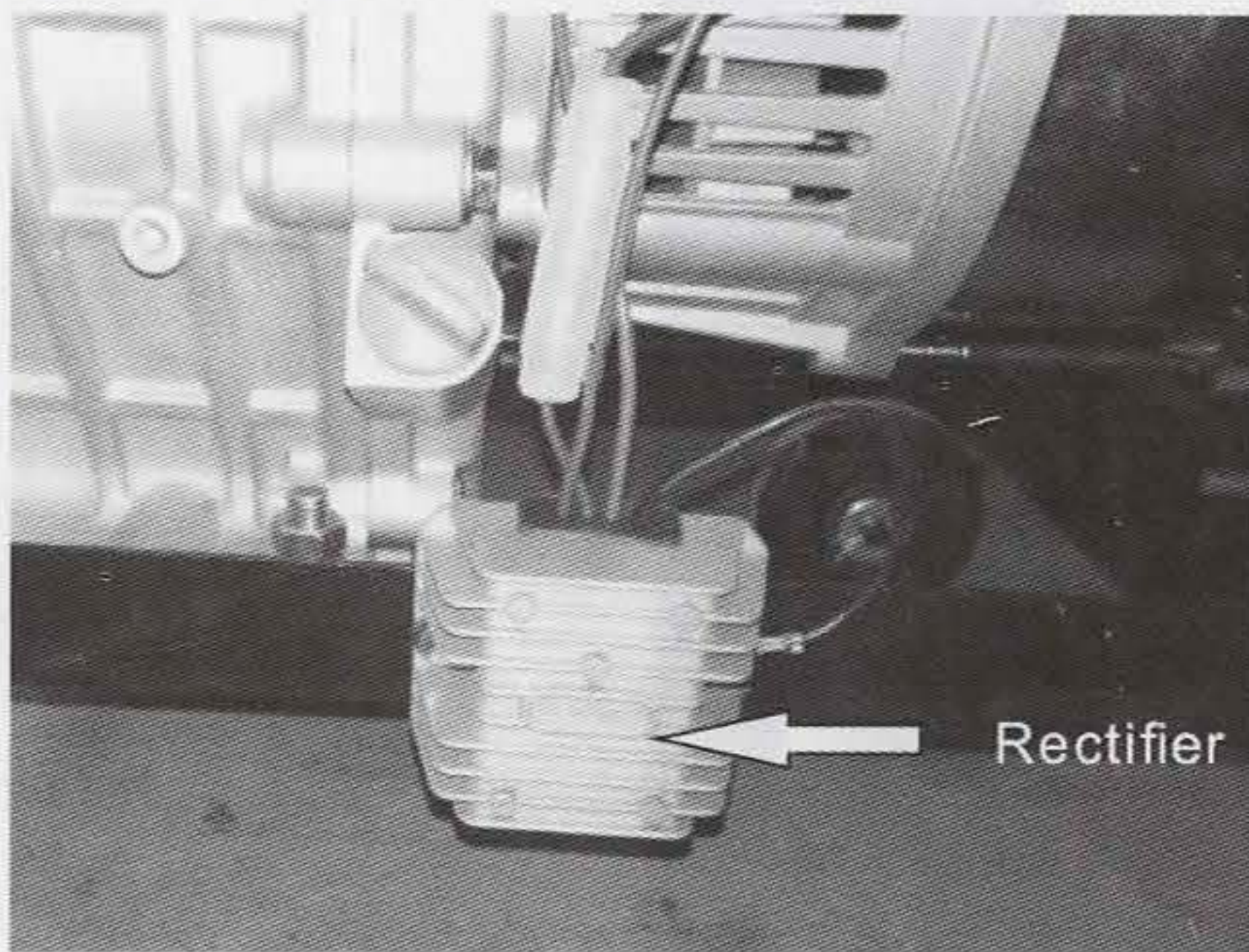




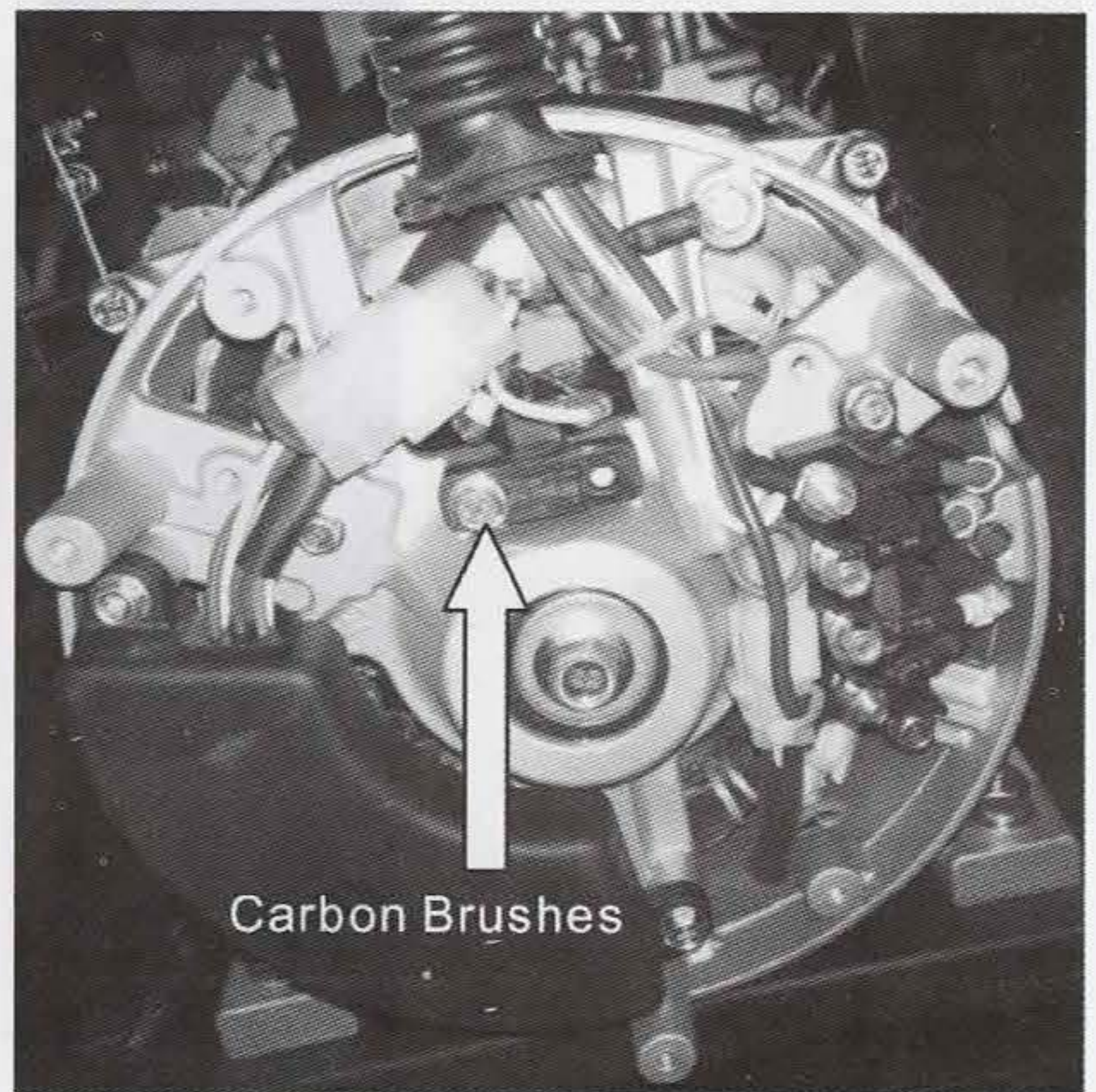
**Figure A** Remove side panel, then remove air filter. Locate the Red Decompression Lever (Photo above shows it in the UP position). Press the lever down this will hold the exhaust valve open. Replace the air filter assembly. Start the engine. You will notice that the spring loaded lever will automatically return to the UP position. (Also referred to as the decompression shaft assembly on the parts diagram.)



**Figure B**-Review the location of the AVR (Automatic Voltage Regulator. This item may eventually need to be replaced when they wear out.



**Figure C**-Review the location of the rear access panel that has been removed. You can see the location of the starter and the regulator/rectifier for the 12V starting battery. The starter motor is located above the regulator/rectifier.



**Figure D**-Review the location of the Carbon Brushes. This item may eventually need to be replaced when they wear out.





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