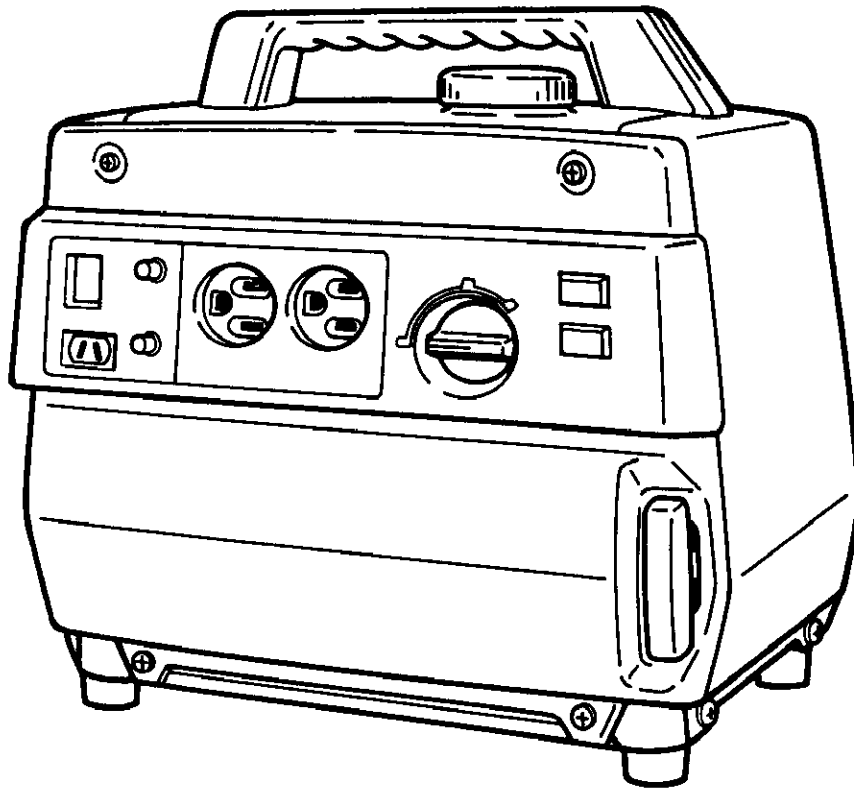


# OPERATOR'S MANUAL



EG-650  
**GENERATOR**

**WARNING**  **DANGER**

READ RULES FOR SAFE OPERATION AND  
INSTRUCTIONS CAREFULLY.

**ECHO**®

# FOREWORD

## **WARNING ▲ DANGER**

**Please read before using your Echo generator**

## **WARNING ▲ DANGER**

**Electrocution or property damage can occur: do not connect this generator to any building's electrical system unless an isolation switch has been installed by a licensed electrician. Refer to the operator's manual.**

The popularity of generators being used as secondary or emergency power sources in commercial, industrial or residential structures has led many states to enact strict codes. Such as, if a generator is hooked to a main power supply system it is to be connected by an isolation switch (double throw switch).

Potential hazard exists when a portable electric generator is connected to the main electrical supply system without the installation of a double throw switch at the power supply point. It is at this point that the electrical generator could feed back into the distribution system of the utility company causing possible electrocution of workers who are repairing the electricity line.

Laws in many states require that:

- Any owner, renter or lessee who connects an electrical generator to the electrical system of an industrial, commercial or residential structure is to notify the public utility or utility district. Violation of any of the above provisions will be punishable by fine or imprisonment.

The following danger decal can be found on the fuel tank portion of the generator. You must contact a licensed electrician before permanently or temporarily hooking your ECHO generator to your utility electrical supply system as either an emergency or temporary source of power.

# INTRODUCTION

Thank you for purchasing an ECHO Generator. This manual covers operation and maintenance of model EG-650.

All information in this publication is based on the latest product information available at the time of approval for printing. ECHO, INCORPORATED reserves the right to make changes at any time without notice and without incurring any obligations.

This manual should be considered a permanent part of the generator and should remain with a

unit when it is sold. Please pay special attention to statements preceded with warning or cautions. They indicate a possibility of personal injury or equipment damage if instructions are not followed.

## **IMPORTANT**

Before starting engine for the first time, add oil as unit is shipped dry.

### FILL OUT AND KEEP FOR YOUR OWN RECORD

Model \_\_\_\_\_ Serial No. \_\_\_\_\_ Purchase Date \_\_\_\_\_

Bill of Sale No. \_\_\_\_\_ Payment Record (Check No., etc.) \_\_\_\_\_

Dealer \_\_\_\_\_

Street or RFD \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**Any part claimed to be defective must be returned by delivering it to an authorized ECHO dealer or distributor. Consult your yellow pages under one or more of the following headings: Lawn equipment, mowers, saws, outdoor power equipment, or phone ECHO Incorporated (708)540-8400 for direction to the nearest dealer.**

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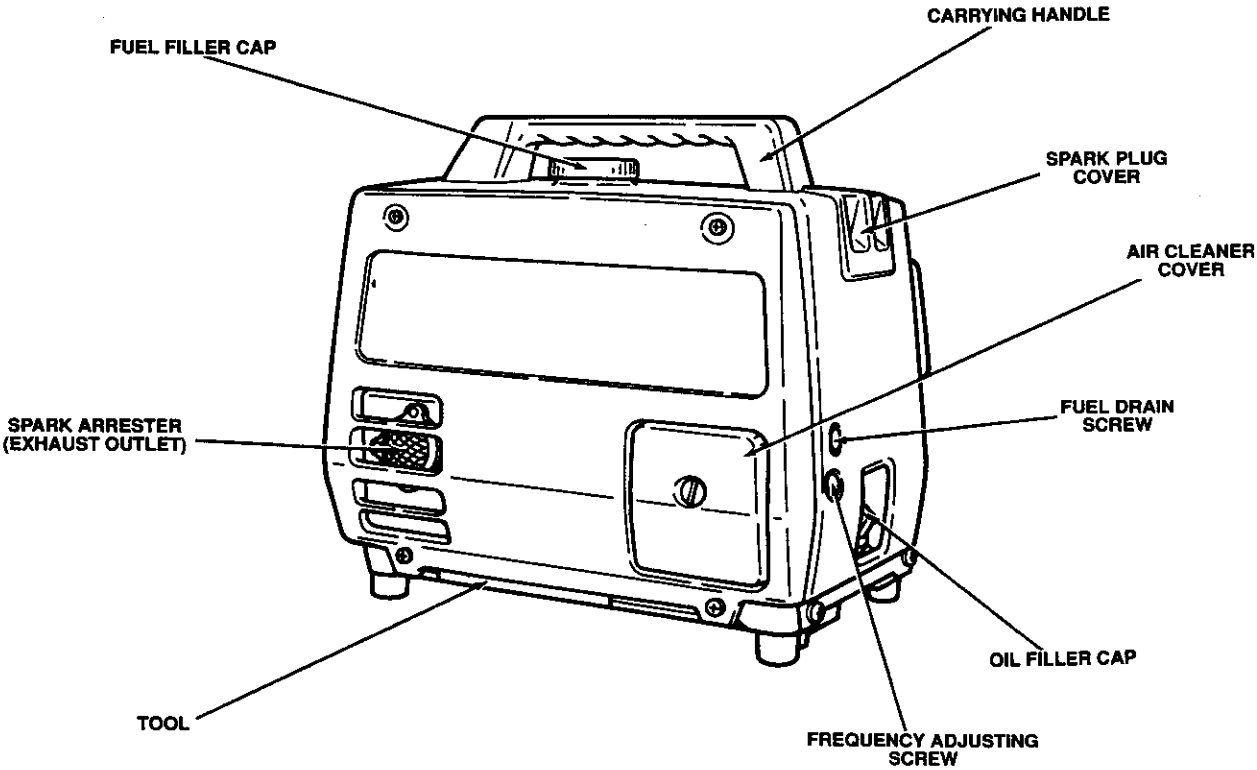
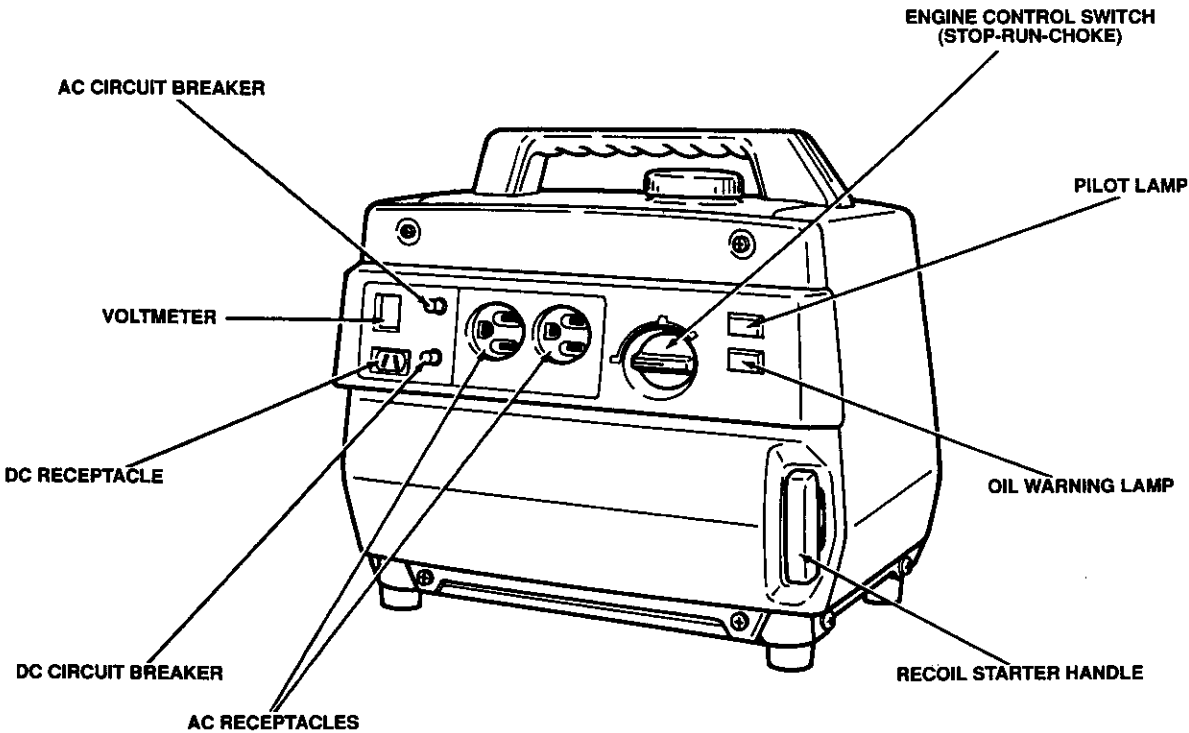
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Specifications, descriptions and illustrative material in this literature are as accurate as known at the time of publication, but are subject to change without notice. Illustrations may include optional equipment and accessories, and may not include all standard equipment.

# SPECIFICATIONS

DESCRIPTION	EG-650
Displacement      cc/cu in	78/4.76
Frequency          Hz	60
Rated Output Watts AC Continuous Duty	550
Output Max. Watts AC	650
Engine Speed      RPM	3600
Voltage            V	120
Output DC	12 Volts 8.3 Amps
Starting System	Recoil
Fuel Tank Capacity: Liters	2.0
US Gal.	0.53
Continuous Operation Hours Per Tank	4.0
Ignition	Transistorized
Automatic Voltage Regulator	Yes
AC Circuit Breaker	Yes
DC Breaker	Yes
Carburetor	Float
AC Receptacle      Unit/Volt (Amp)	2/125V 15A
DC Receptacle	1
Spark Plug	NGK BMR4A or CHAMPION RCJ8
Oil Crankcase      Liters	0.35
Capacity            Ounces	12.3
Low Oil Level Shutdown System	Yes
Spark Plug Wrench with Driver	1
Dimension          L	370 (14.5)
W      mm	275 (10.8)
H      (inches)	345 (13.6)
Weight              kg	18.5
(lbs.)	(40.7)

# DESCRIPTION



# SAFETY PRECAUTIONS

## LEARN GENERATOR SAFETY

Improper use or maintenance by the operator can result in injury. Follow these safety suggestions.

Carefully read this manual. Learn how to operate your generator correctly. Also pay attention to point of use safety messages in this manual.

### **WARNING ▲ DANGER**

**Unauthorized modifications to the generator may impair the function and/or safety and affect machine life. Use only approved accessories on the generator.**

DO NOT let anyone operate the generator without proper instruction.

PROTECT PEOPLE AND PETS.

KEEP PEOPLE AND PETS OUT OF THE AREA where you are using the generator.

DO NOT let children operate the generator, or handle electrical power cords.

OPERATION OF A GENERATOR should be restricted to mature, properly instructed individuals.

HANDLE FUEL SAFELY-AVOID FIRES.

DO NOT USE ANY OTHER FUEL than that recommended in your Operator's Manual. Handle gasoline with care: it is highly flammable. Use an approved gasoline container.

FILL THE FUEL TANK OUTDOORS.

DO NOT OVERFILL FUEL TANK. Fill fuel tank only to middle rib indicator in fuel filter insert.

DO NOT SMOKE while you fill fuel tank or service fuel system.

DO NOT REMOVE GAS CAP OR ADD GASOLINE to tank if engine is hot or running.

CLEAN UP spilled gasoline.

MOVE AWAY from refueling area before attempting to start generator engine.

KEEP ENGINE CLEAN. Remove grass, leaves, excess oil and dirt before you start engine.

LET ENGINE COOL before you store generator in building.

DO NOT store generator where fuel fumes could reach an open flame or spark.

DRAIN GASOLINE before transporting generator.

REFUEL IN A SAFE PLACE. Move the generator at least 10 feet from its operating location. Open the fuel cap slowly to release any pressure which may have formed in the fuel tank. Return the generator to its original location before restarting the engine.

## OPERATE ENGINE SAFELY

DO NOT RUN ENGINE in an enclosed or poorly ventilated area (inside a room, garage, barn, etc.). Exhaust gas contains carbon monoxide, an odorless and deadly poison.

ENGINE IS EQUIPPED WITH A SPARK ARRESTING MUFFLER as regular equipment to meet regulations in states requiring one when operating internal combustion engine-equipped machinery on device.

DO NOT TOUCH A HOT ENGINE OR MUFFLER.

OBEY ALL FIRE SAFETY REGULATIONS. Fire prevention regulations of the U.S. Forestry jurisdiction require approved spark arrester screen to be installed on gasoline powered products used on U.S. Forestry forests, brush and grasslands. Your unit is equipped with such a spark arrester screen installed on the muffler. Keep this screen properly maintained at all times. An improperly maintained screen can cause engine power loss and improper functioning of the exhaust system.

#### NOTE

Compliance with local, state and federal laws is the user's responsibility. Replacement spark arrester screen kits are available for your generator from your ECHO dealer. If you have any questions concerning spark arrester screens or their use, please contact your ECHO servicing dealer.

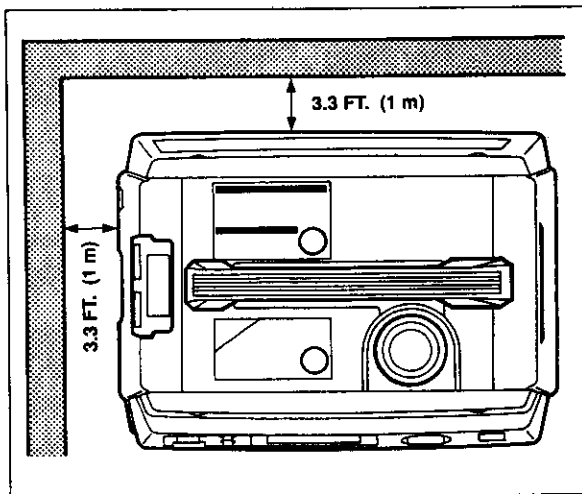
## OPERATE GENERATOR SAFELY

DO NOT ATTEMPT TO CARRY GENERATOR when engine is running.

DO NOT OPERATE GENERATOR ON AN INCLINE. It should be placed on a firm, dry, level surface for proper engine operation and lubrication. Keep the area free of any flammable material such as leaves, brush or fuels.

### WARNING ▲ DANGER

- Avoid accidental fires and engine overheating.
- Do not aim engine exhaust at materials that could catch fire.
- Face cooling air intake and muffler side of engine 3.3 FT. (1 m) away from buildings, obstructions and other burnable objects.



### WARNING ▲ DANGER

- Do not operate generator in area of flammable materials.
- Do not enclose unit, as it relies on free air circulation to cool the engine and generator. Enclosing the unit can create a fire hazard resulting from entrapped gas fumes and overheating which can result in damage to the engine and other components.
- These generators are not intended for installation in RVs (recreational vehicles), boats or similar locations.

## RESPECT ELECTRICITY

DO NOT TOUCH ELECTRICAL EQUIPMENT while standing on metal floors, damp concrete or other well-grounded surfaces.

DO NOT HANDLE ELECTRICAL EQUIPMENT while wearing damp clothing (particularly wet shoes) or while skin surfaces are damp.

BE EXTRA CAUTIOUS WHEN WORKING with generator during wet weather. Generators are not waterproofed. Using a generator in a wet place or during stormy weather could result in short circuits, electric shock or electrocution.

DO NOT pour water directly over the generator, nor wash it with water.

DO NOT operate equipment when mentally or physically stressed.

DO NOT WORK on ungrounded electrical equipment.

DO NOT CONNECT GENERATOR DIRECTLY to household electrical circuits.

DO NOT USE ungrounded extension cords.



NEVER ALTER CORD or plug of any appliance to be used with generator.

## **WARNING ▲ DANGER**

**These units produce 120V which may cause fatal electrical shock if above precautions are not followed.**

USE ONLY POWER CORDS that are suitable for use outdoors and are so marked. Always examine power cords for signs of fraying, damage or cracks in the insulation before using them.

DO NOT HANDLE POWER CORDS that have damaged insulation or are wet.

DO NOT PLUG IN EXTENSION CORDS OR HOOK UP appliances until generator has been properly started, has reached full engine speed and is generating electricity.

DO NOT, under any circumstances, connect your generator to any circuit or receptacle receiving electrical power (home, office, etc.) from any other sources as this is likely to result in a fire and damage to all electrical systems.

DO NOT, under any circumstances, use the generator for purpose that exceeds its rated capacity.

**GROUND THE GENERATOR.** The manufacturer has provided a grounding lug for the proper grounding of the generator. Manufacturer does not supply the required grounding conductor or grounding electrode because it would be impossible to cover every exception and meet all local code requirements. See your local code requirements for the proper grounding governing the use of your generator.

**IF CONSIDERING CONNECTING GENERATOR** to existing wiring systems (house, barn, pumps, for example), **CONTACT A LICENSED ELECTRICIAN** to ensure proper, safe connection and compliance with local electrical, fire safety and building codes.

## **INSPECT GENERATOR CAREFULLY**

INSPECT THE GENERATOR CAREFULLY before you operate it.

GUARDS AND SHIELDS must be in place.

KEEP NUTS, BOLTS, AND SCREWS TIGHT. Loose parts may result in personal injury or damage to the unit.

DO NOT operate the generator without an air filter. Rapid engine wear will result. DO NOT operate the generator if the oil level is low.

VENTILATING OPENINGS such as the generator cover, air filter and muffler exhaust outlet must be cleaned periodically and kept free of debris to ensure proper operation and adequate cooling of the generator.

## **SERVICE GENERATOR SAFELY**

KEEP generator clean.

BEFORE you service or remove parts, let the engine cool.

DO NOT work on generator while it is being operated.

DO NOT adjust generator when engine is running, unless the procedure is approved. STOP THE ENGINE.

WAIT until generator is stopped before you service it.

USE ONLY identical replacement parts when servicing unit.

DO NOT ALTER EXHAUST SYSTEM. Use only ECHO approved exhaust mufflers.

DO NOT ALTER ENGINE SETTINGS. The engine speed is controlled by a preset governor to deliver rated electrical frequency (60 Hz). Consult your ECHO servicing dealer if in doubt.

## STORE GENERATOR SAFELY

Before you leave the generator unattended:

1. Stop engine by moving the Engine Control Switch to the STOP position.
2. Disconnect spark plug wire.
3. Do not store generator where fuel fumes could reach an open flame or spark.

WHEN NOT IN USE, STORE GENERATOR in a cool, dry place and AWAY FROM POSSIBLE SOURCES of ignition such as gas water heaters, furnaces, clothes dryers etc.

WHEN TRANSPORTING your generator, make sure it is in an upright position and that gasoline is not leaking. Secure it from sliding.

## HAVE A FIRE EXTINGUISHER NEARBY

Have a multipurpose dry chemical fire extinguisher filled and handy. Know how to use it.

COMPLY WITH ALL FIRE PREVENTION REGULATIONS. We recommend you keep a fire extinguisher and long-handle shovel close by whenever using a generator in areas where dry grass, leaves or other flammable materials are present.

## PERSONAL PRECAUTIONS WHEN CHARGING BATTERIES

Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.

Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.

If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.

NEVER smoke or allow a spark or flame in vicinity of battery or engine.

## RISK OF EXPLOSIVE GASES

Working in the vicinity of a lead-acid battery is dangerous. Batteries generate explosive gases during normal battery operation. For this reason, it is of utmost importance that each time before using your generator to charge a battery, you read and follow the instruction exactly in this manual, those published by battery manufacturer and manufacturer of any equipment you intend to use in the vicinity of battery. Review cautionary marking on these products and engine.

Be extra cautious to reduce risk of dropping metal tool onto battery, it might spark or short-circuit battery or other electrical part that may cause explosion.

Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.

### WARNING DANGER

- Use generator for charging a lead-acid battery only. Do not use battery charger for charging dry cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- Never charge a frozen battery.

## USING GENERATOR AS BOOSTER

### IMPORTANT

Do not use generator to boost or jump start a vehicle as serious damage can result to generator and vehicle electrical system.

## PREPARING TO CHARGE

If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.

Be sure area around battery is well ventilated while battery is being charged. Gas can be forcefully blown away by using a piece of cardboard or other nonmetallic material as a fan.

Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.

Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow manufacturer's recharging instructions. Never add acid to the battery.

Study all battery manufacturer's specific precautions, such as removing or not removing cell caps while charging and recommended rates of charge.

## CHARGING BATTERY INSTALLED IN VEHICLE

Position battery charging supply cord to reduce risk of damage by hood, door, or moving engine parts.

Stay clear of fan blades, belts, pulleys and other parts that can cause injury to persons.

Never charge marine (boat) batteries on board. Charging marine batteries requires special equipment.

Never attach battery charging supply cord to grounded battery terminal, always connect to frame or engine block.

Never attach grounding battery charging supply cord to carburetor, fuel lines or sheet metal body parts.

Connect the positive battery terminal to the positive generator supply cable. Do not reverse the charging cables or serious damage to the generator and/or battery may occur.

### **WARNING** **DANGER**

- To prevent the possibility of creating a spark near the battery, connect charging supply cables first to the battery, then plug them into the generator and disconnect cables at the generator first.
- Unplug battery charging supply cord from generator before removing clamps from battery.

## CHARGING BATTERY REMOVED FROM VEHICLE

Attach at least a 24-in. (610mm) long 6-gauge (AWG) insulated cable to NEGATIVE battery post.

Position yourself and free end of cable as far away from battery as possible, then connect NEGATIVE (BLACK) clamp of battery charging supply cord to free end of cable.

Connect the positive battery terminal to the positive generator supply cable. Do not reverse the charging cables or serious damage to the generator and/or battery may occur.

Remove battery charging supply cord from generator before removing clamps from battery.

### **WARNING** **DANGER**

To prevent the possibility of creating a spark near the battery, connect charging supply cables first to the battery, then plug them into the generator and disconnect cables at the generator first.

# FUELS AND LUBRICANTS

## ENGINE OIL

### IMPORTANT

Before starting engine for first time, add oil, as unit is shipped dry.

Engine oil is a major factor affecting engine performance and service life. Nondetergent or vegetable oils are not recommended. Be sure to check the engine oil on a level surface with the engine stopped.

### IMPORTANT

Use premium quality engine oils meeting minimum performance requirements of API Service Classification SE or SF.

Quality engine oils are blended, so additives are neither required nor recommended.

LUBRICATION CHART			
SEASON	TEMPERATURES	OIL	
		SAE	API
Summer	Above 30°C Above 86°F	SAE 30	SE
	20° to 29°C 68° to 85°F	SAE 30	
Spring	10° to 19°C 44° to 67°F	SAE 20 or 10W-30	SF
Winter	Below 10°C Below 44°F	SAE 10 or 10W-30	

### NOTE

Engine oil should be changed after the first 20 hours of operation considered the breaking in period for your unit. Engine oil should be changed after every 50 hours of operation following the break in period. Always change the crankcase oil when the engine is warm for complete drainage.

Check the crankcase oil level frequently. Make sure the oil crankcase is full before starting the generator. Always check the crankcase oil level each time the fuel tank is refilled.

### NOTE

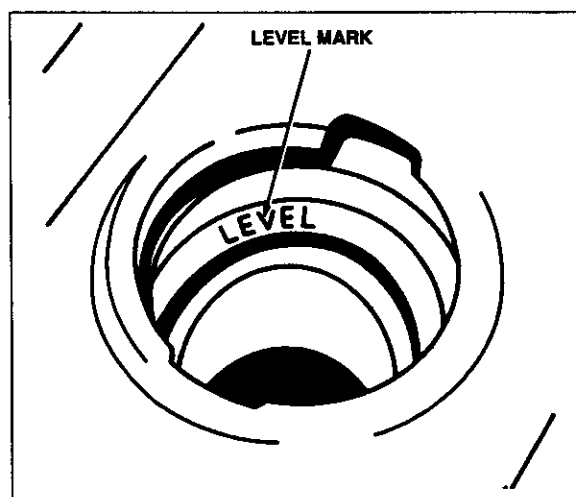
To insure proper piston ring to cylinder wall seating, for the first 10 hours of engine operation, operate generator with at least 30% of rated capacity electrical load.

### IMPORTANT

Operating a generator with a low oil level will cause serious engine damage.

## FUEL

Handle fuel carefully. If the engine is hot or running, do not fill the fuel tank. Do not smoke while you fill the fuel tank or service the fuel system. Fill fuel tank only to the full level mark in the fuel filler neck.



### IMPORTANT

DO NOT use gasoline-alcohol mixtures, such as gasohol or ethanol-blend gasoline. DO NOT mix oil with gasoline.

1. Use unleaded or regular automotive gasoline. Do not use gasoline that has been stored for a long period of time (30 days maximum). Use gasoline with 87 to 92 octane rating.

- Remove fuel cap and fill only to the full level mark in the fuel filler neck.

**NOTE**  
Fuel tank capacity 2.0 liters (0.53 gal. U.S.).

**IMPORTANT**

Fuel additives or special starting fluids should not be used because seals and other rubber composition parts may be damaged. Use of starting fluids can cause backfire through carburetor and will wash lubrication from cylinder walls.

**SERVICING/SET UP OF NEW UNIT OR CHANGING ENGINE OIL**

**IMPORTANT**

Before starting engine for first time, add oil as unit is shipped dry.

**NOTE**  
Change engine oil after first 20 hours of operation and every 50 hours thereafter.

- Set generator on level surface.
- Run engine a few minutes to warm oil.
- Stop engine.
- Remove oil dipstick. Drain oil into container. Don't pollute; dispose of waste oil properly.
- Add oil. (See Lubricants section for correct oil.)

**ENGINE OIL CAPACITY**

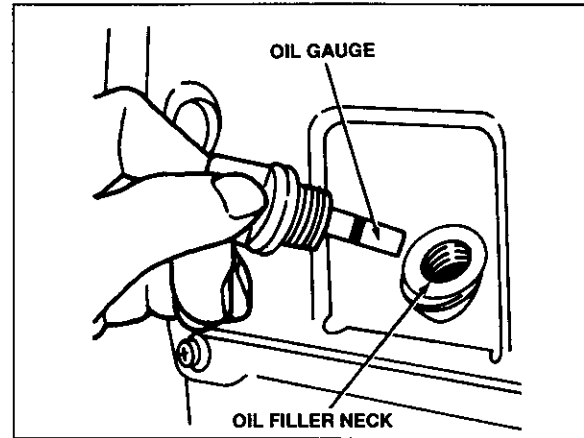
Model	U.S. fl. oz.	liters
EG-650	12.3	0.35

- Install dipstick and thread into place. Do not screw in.
- Remove dipstick to check oil level.

- Add oil if necessary.
- Check O-ring placement and condition on dipstick before installing.

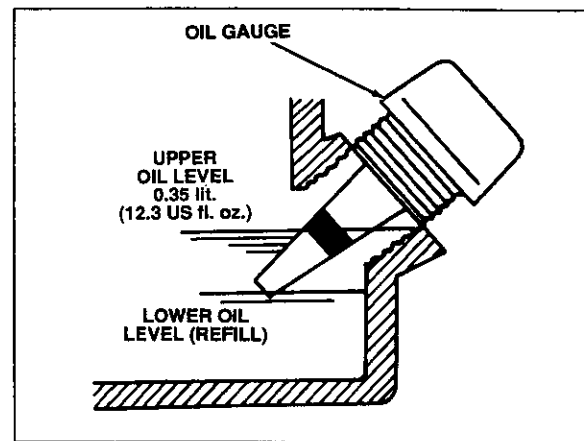
**NOTE**  
Checking engine oil level - see General Maintenance section.

- Install and tighten dipstick.



**DRAINING/REFILLING ENGINE OIL**

- Remove oil gauge from engine crankcase.
- Tilt the generator to drain oil from crankcase completely. For more rapid and complete draining, perform while engine is warm.



- Put the generator on a level surface, refill with fresh oil to the top of the filler neck.
- Reinstall oil gauge.

# WATTAGE CALCULATION INSTRUCTIONS

## CALCULATING WATTAGE REQUIREMENTS (AC)

### IMPORTANT

These generators provide limited output for stand-by power installations. Do not exceed rated capacity of your generator.

Two types of electrical appliances may be powered by your generator:

1. Resistive load devices such as light, heaters, TV sets, radios.
2. Inductive load devices, such as electric motors, hand held power tools.

The starting wattage required by resistive loads is the same as the running wattage needed to run the appliance. The starting wattage for an inductive load appliance is higher than the appliances' running wattage requirements. Maximum inductive load capacity, therefore, is smaller than the maximum resistive load capacity, since starting wattage must be compensated for.

### NOTE

The starting wattage for inductive load appliances may be 1.5 to 3.5 times greater than the appliances running wattage requirements. This 1.5 to 3.5 power factor is generally proportionate to motor size, i.e., the bigger the motor the larger the power factor.

GENERATOR APPLICATION WORKSHEET			
Requirements	Running Wattage	Starting Wattage	Total Wattage
Lights	60	0	
Radio	80	0	
TV	255	0	
Total	395	0	395

### IMPORTANT

Do not exceed rated capacity of your generator. Serious damage to the generator or appliance can result from overload.

Before operating the generator, perform the following exercise to determine what items or combinations of items the generator can power.

1. List all light bulbs, appliances, and tools which will be operated.
2. Fill in any running wattage of items listed and total the values.

### NOTE

Wattage can usually be found on light bulbs or appliance nameplate. If not, determine wattage by multiplying listed amperage by voltage. This will determine running wattage.

Volts x Amps = Watts.

Use actual wattage values, if available.

If not, use the values in the following charts as a guide.

There are examples of appliances in the charts that are over the rated generator capacities. These are being shown for reference data only. The running and inductive starting wattages shown in these charts are approximations.

WATTS REQUIRED TO START MOTOR				
Motor Size (HP)	Running Watts	Repulsion Induction	Capacitor	Split Phase
1/6	275	600	850	2050
1/4	400	850	1050	2400
1/3	450	975	1350	2700
1/2	600	1300	1800	3600
3/4	850	1900	2600	—
1	1100	2500	3300	—

**NOTE**

Operating generators with simultaneous AC and DC loading is not recommended.

**IMPORTANT**

Total running wattage can be equal to generator rated capacity. However, total inductive starting wattage must be less than generator maximum capacity. Maximum capacity is generally 10% greater than rated capacity. If inductive (motor) load use is expected, total running wattage must be less than generator rated capacity.

**NOTE**

The starting wattage for inductive load appliances may be 1.5 to 3.5 times greater than the appliances running wattage requirements. This 1.5 to 3.5 power factor is generally proportionate to motor size, i.e., the bigger the motor the larger the power factor.

**GENERATOR CAPACITY CHART**

Model EG	Continuous Running Wattage Capacity	Maximum Wattage Capacity	Maximum Inductive Starting Wattage Capacity
650	550	650	300

**GENERATOR APPLICATION WORKSHEET**

Requirements	Running Wattage	Starting Wattage	Total Wattage
Furnace "1/8" HP	300	500	
Lights	60	0	
Radio	80	0	
TV	255	0	
<b>Total</b>	<b>695</b>	<b>500</b>	<b>895</b>

In the above example 695 watts is the running requirement whereas 895 watts is the starting requirement. Generator max. capacity must be at least 895 watts.

3. Using figures calculated, use chart to compare requirements to generator capacity.

If generator capacities are not adequate to cover all requirements, deduct the least needed appliance so generator can be used without overloading.

If requirements are mandatory and cannot be reduced, obtain a larger capacity generator.

**STARTING WATTAGE**

Volts x Ampere x Power Factor = Watts

**EXTENSION CORD USAGE**

When using a tool at a considerable distance from power source, a 3-conductor, grounding-type extension cord of adequate size must be used for safety, and to prevent loss of power and overheating. Use the following table to determine the minimum wire size required.

**NOTE**

Use only three wire extension cords with a three-prong grounding type plug and three-pole receptacles which accept the tool's plug. Replace or repair damaged cords immediately.

**WARNING ⚠ DANGER**

**A cord that is hot to the touch is overloaded.**

**WIRE GAUGE CHART**

EXTENSION CABLE LENGTH	EG-650
	120V
25 Ft. (7.62 M)	10
50 Ft. (15.24 M)	10
75 Ft. (22.86 M)	10
100 Ft. (30.48 M)	8
150 Ft. (45.27 M)	8
200 Ft. (60.94 M)	8

*American Wire Gauge Size*

## VOLTAGE DROP IN ELECTRIC EXTENSION CORDS

When a long electric extension cord is used to connect an appliance or tool to the generator, a certain amount of voltage drop occurs in the extension cord which lessens the effective voltage available to the appliance or tool. The

chart below has been prepared to illustrate the approximate voltage loss when an extension cord of 300 feet (approx. 100 meters) is used to connect an appliance or tool to the generator.

Nominal cross section	A.W.G. Gauge No.	Allowable current	No. of strands/strand dia.	Resistance	Current Amp.							Voltage Drop
					mm <sup>3</sup>	No.	A	No./mm	Ω100/m	1A	3A	
0.75	18	7	30/0.18	2.477	2.5V	8V	12.5V	—	—	—	—	—
1.27	16	12	50/0.18	1.486	1.5V	5V	7.5V	12V	15V	18V	—	—
2.0	14	17	37/0.26	0.952	1V	3V	5V	8V	10V	12V	15V	—
3.5	12 ~ 10	23	45/0.32	0.517	—	1.5V	2.5V	4V	5V	6.5V	7.5V	—
5.5	10 ~ 8	35	70/0.32	0.332	—	1V	2V	2.5V	3.5V	4V	5V	—

## MAXIMUM OUTPUT OPERATION

Limit operation of the generator at maximum output to 3 minutes. Additional 3 minute periods of maximum output are possible if the generator is allowed 10 minutes to cool between periods of maximum output. Cool engine by operating in the throttle position with the output load disconnected.



# MISCELLANEOUS WATTAGE REQUIREMENT

REQUIREMENTS	TOTAL Inductive Starting Watts	REQUIREMENTS	TOTAL Inductive Starting Watts
Air Condition, Central 20,000 BTU 24,000 BTU	5,800 8,750	Furnace Fan (Gas or Fuel Oil) 1/8 HP 1/6 HP 1/4 HP 1/3 HP 1/2 HP	800 1,250 1,600 2,100 3,225
Blanket, Electric*	400	Grinder, Bench 6 inch 8 inch	1,720 3,900
Charger, Battery* 4 amp 10 amp 15 amp 30 amp w/200 amp boost 60 amp w/250 amp boost	90 200 380 650/3,600 1,500/5,750	Heater, Portable Space (Kerosene, Diesel Fuel) 30,000 BTU 50,000 BTU 85,000 BTU 90,000 BTU 140,000 BTU 150,000 BTU 350,000 BTU	800 1,000 1,225 1,225 1,625 1,625 2,125
Cleaner, Grain 1/4 HP	1,650	Iron*	1,200
Coffee Maker*	1,750	Light Bulbs*	Indicated on Bulb
Compressor, Air 1/2 HP 1 HP	3,000 6,000	Lights, Flood HID Metal Halide Mercury Vapor (Not recommended) Sodium Vapor)	125 313 — 1,250
Conveyor, Portable 1/2 HP	3,400	Mixer (Vacuum Pump) 2 HP	10,500
Cooler, Milk	2,900	Milker 3-1/2 cu. ft. 1/2 HP	3,300
Cultivator, Electric	2,100	Mixer, 55 gal. drum 1/4 HP	1,900
Dehumidifier	1,450	Motors, Farm Duty Standard (e.g. conveyor feed auger, air compressor) 1/3 HP 1/2 HP 3/4 HP	1,720 2,575 4,500
De-icer, Stock Tank*	1,000	High Torque (e.g. barn cleaners silo unloaders, silo hoists, bunk feeders) 1-1/2 HP	8,100
Dish Washer Cool Dry Hot Dry	2,100 1,000	Motors, Industrial Duty Split Phase 1/8 HP 1/6 HP 1/4 HP 1/3 HP	800 1,225 1,600 2,100
Drill, Hand 1/4 inch 3/8 inch 1/2 inch	350 400 800		
Dryer, Clothes Gas Electric	2,500 7,550		
Dryer, Hair	300 - 1,200		
Elevator, Grain 3/4 HP	4,400		
Fence, Electric* (25 mile)	250		
Freezer	2,900		
Frypan, Electric	1,300		

\* These are resistive loads which starting wattage requirements do not exist.

# MISCELLANEOUS WATTAGE REQUIREMENT (CONT.)

REQUIREMENTS	TOTAL Inductive Starting Watts	REQUIREMENTS	TOTAL Inductive Starting Watts
Capacitor Start Induction Run 1/3 HP 1/2 HP 3/4 HP	2,020 3,075 4,500	Electric chain saw 1/2 inch, 1-1/2 HP 14 inch, 2 HP	900 1,100
		Table saw 9 inch 10 inch	4,500 6,300
Capacitor Start Capacitor Run 1-1/2 HP	8,100	Television* Color Black and White	300 100
Fan Duty 1/8 HP 1/6 HP 1/4 HP 1/3 HP 1/2 HP	1,000 1,400 1,850 2,400 3,500	Toaster* 2 Slice 4 Slice	1,050 1,650
		Trimmer, Hedge 18 inch	400
Opener, Garage Door 1/4 HP 1/3 HP	1,650 9,225	Trimmer, Nylon Line Standard 9 inch Heavy Duty 12 inch	350 500
		Vacuum Cleaner Standard Deluxe	800 1,100
Oven, Microwave (625 watt)	2,800	Vacuum, Wet & Dry 1.7 HP 2.5 HP	900 1,300
Polisher, Floor 16 inch — 3/4 HP 20 inch — 1 HP	4,500 6,100	Washer, Clothes	3,450
		Washer, High-Pressure 5/8 HP 1 HP 1-1/2 HP	4,600 9,050 10,310
Pumps Centrifugal, 900 GPH Submersible, 400 GPH Sump 1/3 HP 1/2 HP Wet 1/3 HP 1/2 HP	900 600 2,100 3,200 2,150 3,100	Welder* 70 amp 100 amp 200 amp	2,000 3,600 9,000
		Radio*	50 - 200
Refrigerator	2,900		
Saws Bank, 14 inch Circular, 6-1/2 inch 7-1/4 inch 8-1/4 inch	2,500 500 900 1,400		

## IMPORTANT

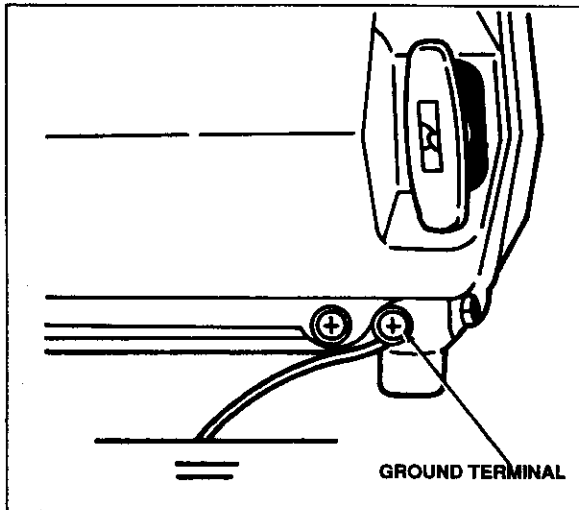
There are examples of appliances in this chart that are more than generator capacities. They are shown for reference data only. The running and additional inductive starting wattage shown in this chart are approximations. Actual wattage can usually be found on light bulbs or appliance name plate. If not, determine wattage by multiplying listed amperage by voltage.

\* These are resistive loads in which starting wattage requirements do not exist.

# PRESTARTING INFORMATION

## 1. GROUNDING GENERATOR

The National Electrical Code (NEC) requires that all separately derived AC systems be grounded per Article 250-26. Manufacturer has added a grounding lug type terminal per Article 250-26 (a) from the noncurrent-carrying metal parts to the conductor to be grounded. Manufacturer does not supply the required grounding conductor or grounding electrode because it would be impossible to cover every exception and all local code requirements. See your local codes and the NEC manual for the proper grounding for your application.



Location of grounding terminal

### NOTE

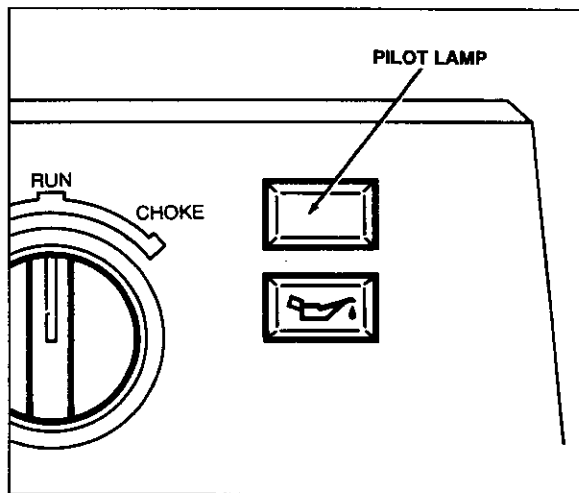
- As a general rule, do not use electrical equipment in wet or damp areas. Additional rules from NEC, OSHA and state codes apply to portable generators when used on construction sites.
- It is the responsibility of the consumer to meet the above requirements.

### IMPORTANT

The generator must be placed on a firm, level surface for proper lubrication of the engine.

## 2. POWER INDICATOR PILOT LAMP

Power Indicator Pilot Lamp is bright green at full power and dim or flickering when engine is idling, during AC or DC operation.



Location of Power Indicator Pilot Lamp

## 3. AC/DC RECEPTACLES — CIRCUIT BREAKER

### IMPORTANT

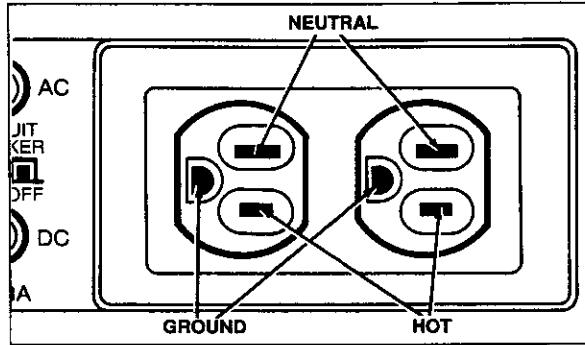
Do not exceed rated capacity of your generator, as serious damage to the generator or appliance could result.

Do not start engine under load, i.e., when appliance is connected.

### 3-1 CONNECTING 120V RECEPTACLES

**IMPORTANT**  
 Note receptacle wiring polarity to prevent equipment or generator failure.

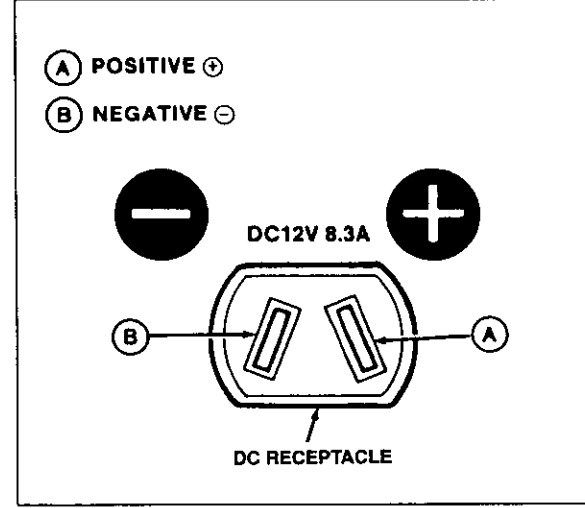
Plug connections to all equipment should be as follows:



### 3-2 CONNECTING 12 VDC

**IMPORTANT**  
 Note wiring polarity to prevent equipment or generator failure.

Plug connections to all equipment should be as follows:



**NOTE**  
 Circuit breaker trips automatically under circuit overload. When a circuit breaker trips, determine the cause. Typical causes are excessive loading or electrical system shorting.

If a circuit breaker trips, locate and correct the problem, and allow circuit breaker to cool for one minute. Then reset circuit breaker by pushing switch to "ON."

### 3-3 MAXIMUM OUTPUT OPERATION

Only operate generator at maximum output for 3 minutes. Allow generator to cool for 10 minutes before operating again. Cool generator by operating engine at maximum rpm with all loads disconnected.

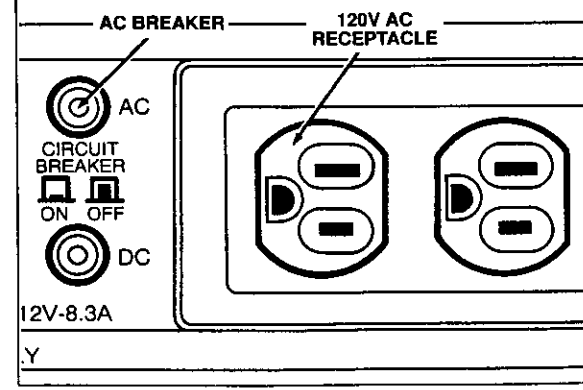
### 4. AC RECEPTACLES/CIRCUIT BREAKER

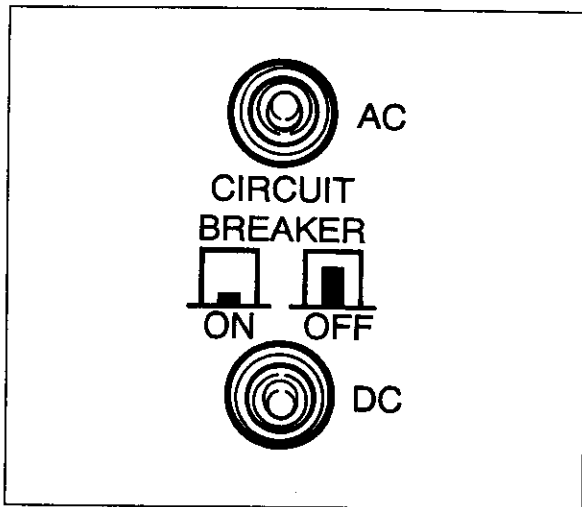
Rated Continuous Duty 550 Watts/  
 Maximum/650 Watts (3 Minutes)

The receptacles are protected by push button type circuit breakers.

**NOTE**  
 Circuit breakers trip automatically under circuit overload. When a circuit breaker trips, determine the cause. Typical causes are excessive loading or electrical system shorting.

If a circuit breaker trips, locate and correct the problem, and allow circuit breaker to cool for 1 minute. Then reset circuit breaker by pushing switch to "ON."





## 5. MAXIMUM OUTPUT OPERATION

Only operate generator at maximum output for 3 minutes. Allow generator to cool for 10 minutes before operating again. Cool generator by operating engine at maximum rpm with all loads disconnected.

## 6. OPERATING GENERATOR /AC OUTPUT

1. Make sure all power tools, extension cords, appliances are disconnected from the generator.
2. Check that equipment switches are in the "OFF" position.
3. Start engine (See Starting The Engine).

### IMPORTANT

Do not plug in extension cords to generator receptacles or attempt to operate electrical tools or appliances when engine is operating at idle or intermediate speed positions, as damage to generator or appliance could result.

4. Allow the engine to warm up 2 ~ 3 minutes before connecting tools or appliances.
5. Connect equipment to generator receptacle.

6. Switch "ON" the equipment.

7. The green pilot light on the receptacle panel will be "ON" when generator is operating properly.

## 7. FREQUENCY (HZ)

Your generator has been factory preset to 60 cycles (one Hertz (Hz) equals one cycle/per second, the same as 120 volt household current,) at 3600 rpm with throttle in FULL position, under load.

The 60 cycle output is the standard electrical frequency for the United States.

### IMPORTANT

Certain appliances should only be operated at specific frequencies, such as a clock, record player or tape recorder. Check with the operating instructions or date plate of the appliance.

### NOTE

Adjustment or changing of frequency should only be made by an authorized ECHO servicing dealer.

## 8. DC RECEPTACLES

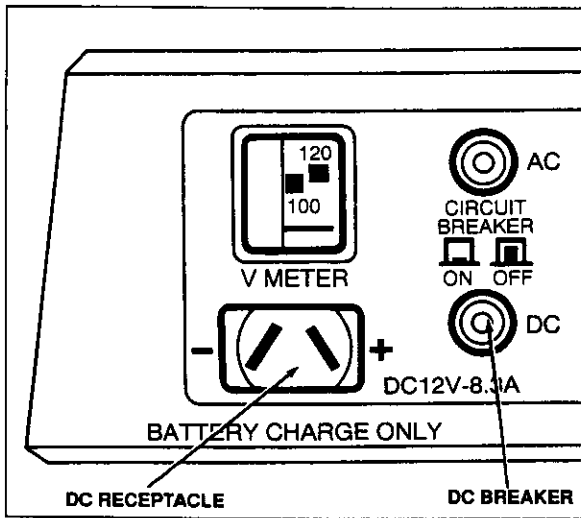
Before attempting to use generator, check wattage requirement on nameplate of appliance to be operated. (See Calculating Wattage Requirements in this section.)

### IMPORTANT

Wattage requirements for equipment usage or battery charging must not exceed generator capacity.

Do not start engine under load, i.e. when appliance is connected.

Usable DC capacity is 12V at 8.3 amps or 100 watts. The generator is equipped with 12 VDC receptacle and a battery charging supply cord. The DC receptacle circuit is protected by a 12 amp breaker.



**NOTE**

Circuit breaker trips automatically under circuit overload. When a circuit breaker trips, determine the cause. Typical causes are excessive loading or electrical system shorting.

If a circuit breaker trips, locate and correct the problem, and allow circuit breaker to cool for one minute. Then reset circuit breaker by pushing switch to "ON."

**9. DO NOT USE GENERATOR AS A BOOSTER**

**IMPORTANT**

Do not use generator to boost or jump start a vehicle as serious damage can result to generator and vehicle electrical system. 12V DC output is 100W. Typical automotive starting motors may require in excess of 200 amperes.

**WARNING ⚠ DANGER**

Use generator for charging a lead-acid automotive type battery only. Do not use battery charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.

NEVER charge a frozen battery.

**NOTE**

Using the generator DC output to charge an extremely discharged 12-volt battery may overload the circuit and trip the breaker.

**10. OPERATING GENERATOR/ DC CHARGER OUTPUT**

**IMPORTANT**

Do not connect charging supply cables to battery while engine is running.

To help prevent overheating of charging wire or cable when charging batteries, use 14 gauge (AWG) wire or larger.

**NOTE**

Larger wire will have smaller AWG number.

1. Connect charging leads to battery or equipment. (See Connecting Generator to Battery or Equipment.)
2. Start generator engine. (See Starting Engine/Operating Engine Section.)
3. Place control switch in "RUN" position.
4. Plug in battery charging supply cable to 12-VDC receptacles.
5. The amber pilot light on the receptacle panel will be "ON" when the generator is operating properly.

# CHARGING BATTERIES

## DO NOT USE GENERATOR AS A BOOSTER

### IMPORTANT

Do not use generator to boost or jump start a vehicle as serious damage can result to generator and vehicle electrical system.

## PREVENT BATTERY EXPLOSIONS

Battery gas can explode. Charge batteries in a well ventilated area. Keep sparks and flames away from batteries. Do not short across battery terminals. Do not lay tools on top of battery.

Always remove grounded (-) battery clamp first and replace it last.

## AVOID ACID BURNS

Sulfuric acid battery electrolyte is poisonous. Even though it is diluted, it is strong enough to cause sight loss, burn skin, or damage clothing.

Fill new batteries in a well ventilated area, wear eye protection and rubber gloves, and avoid breathing any fumes from the battery when the electrolyte is added. Avoid spilling or dripping electrolyte when using a hydrometer to check specific gravity readings.

If acid gets in your eyes, flush them right away with large amounts of water, and see a doctor at once. If you spill acid on yourself, flush your skin immediately with lots of water. Apply baking soda or lime to help neutralize the acid.

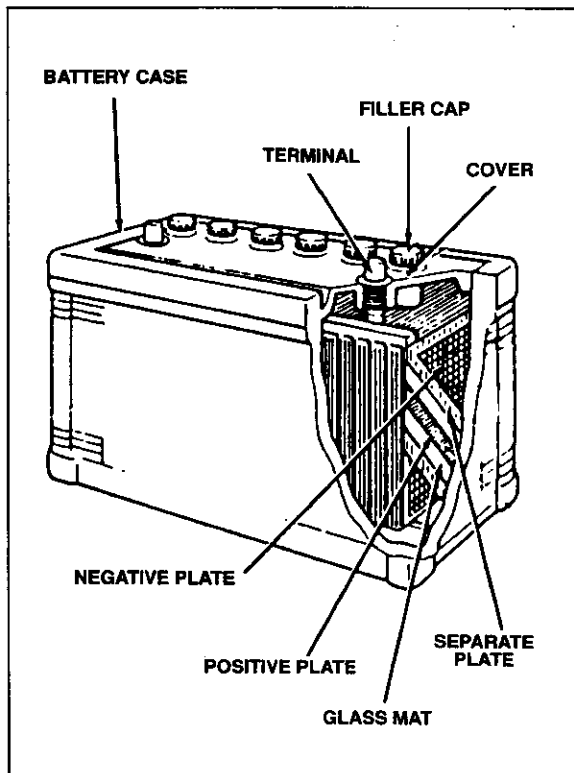
## PREPARE THE BATTERY

1. Before charging, make certain battery has enough electrolyte in each cell to cover top of plates.
2. If battery is equipped with vented caps, make certain they are properly installed.

### WARNING DANGER

Be careful to keep corrosion from coming in contact with eyes. Never smoke in vicinity of battery.

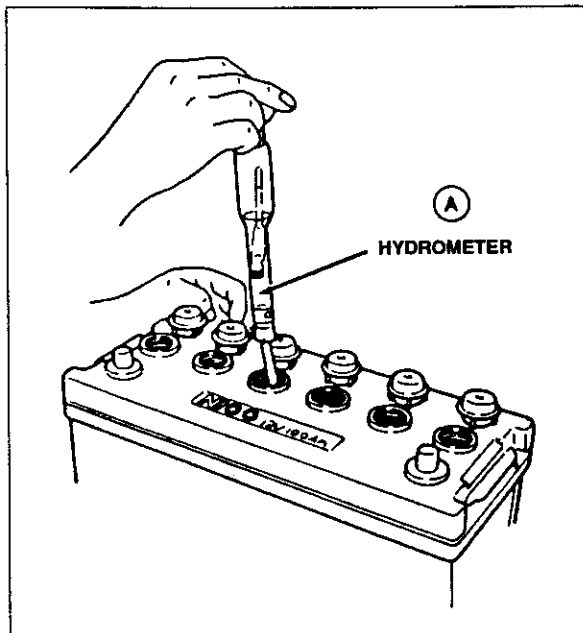
3. Clean battery terminals.



## CHECK BATTERY SPECIFIC GRAVITY

Use a hydrometer (A) to determine state of charge. Refer to chart to obtain percent of charge.

Hydrometer reading	Battery test reading
Specific gravity	Percent of charge
1.260	100%
1.220	75%
1.180	50%
1.140	25%
1.100	0%



### NOTE

Any battery 25% charged or lower, may readily freeze and should be charged at once.

### IMPORTANT

If battery has just been charged, a surface charge may exist creating a false or higher than normal reading.

To eliminate surface charge, the battery must be discharged for 3 to 5 minutes by creating a load such as turning lights on.

## CONNECTING GENERATOR CHARGER TO BATTERY OR EQUIPMENT

### WARNING ▲ DANGER

Never charge marine batteries on board. Do not physically touch battery charging leads, battery terminals, or equipment simultaneously. Injury can result from electrical shock. Do not allow charging leads to contact each other or vehicle. Sparks could ignite gases and cause an explosion. Do not connect **NEGATIVE** charging lead to carburetor or fuel lines.

1. Connect **POSITIVE** generator charging lead to the **POSITIVE (+)** battery terminal or the **POSITIVE (+)** equipment terminal.

### WARNING ▲ DANGER

Make certain to check vehicle to determine if electrical system is positive or negative grounded. Connect clamps accordingly.

- 2a. If battery is not installed in the vehicle, attach at least a 610 mm (24 in.) long 6-gauge (AWG) insulated battery cable to **NEGATIVE (-)** battery terminal. Connect **NEGATIVE** generator charging lead to end of insulated battery cable attached above.
- 2b. If battery is installed in the vehicle, attach **NEGATIVE** generator charging lead to clean, well grounded area on the chassis away from battery.

### WARNING ▲ DANGER

If sparking occurs between battery charging supply cord clamps and battery posts or the battery charging supply cord plug, disconnect battery charging supply cord from generator immediately; clamps or battery charging supply cord is being connected to wrong battery posts or terminals. Check battery and wiring to correctly identify **POSITIVE** and **NEGATIVE** battery post.



3. Start generator engine. Set throttle lever to "FULL" run position and allow engine to warm up.
4. Plug battery charging supply cord into 12 volt DC receptacle.

## STOPPING AND DISCONNECTING GENERATOR CHARGER FROM BATTERY OR EQUIPMENT

### WARNING ▲ DANGER

Do not remove charging leads from battery terminals while generator is operating. Sparks could ignite gases and cause an explosion.

1. Stop engine.
2. Disconnect generator charging leads from battery.
3. Disconnect charging leads from generator.

## CHARGING TIME

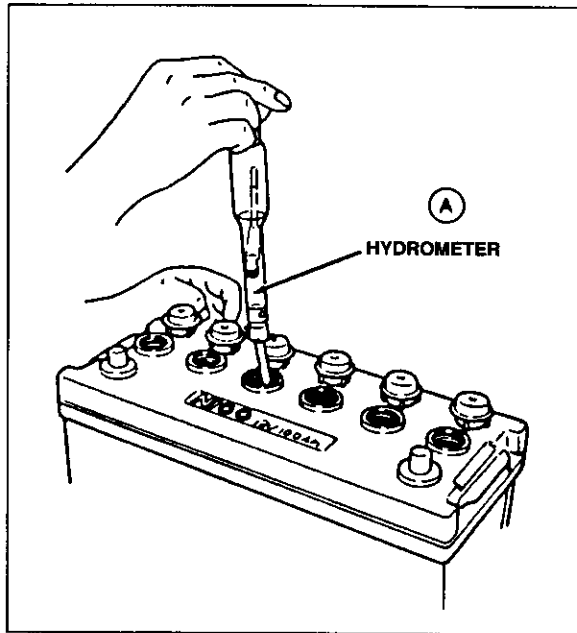
### WARNING ▲ DANGER

Do not leave generator on battery for indefinite long periods. Overcharging will boil electrolyte and can damage battery.

The charging rate will be dependent on the internal condition (percent of charge) and size of the battery. A very cold battery, one that is sulfated or larger batteries charge at slower rates.

After charging battery, use a hydrometer (A) to determine the specific gravity. Refer to "Check Battery Special Gravity" in this section.

If higher percent of charge is desirable, put the generator back on the battery until desired level is reached.



# PRESTART CHECKS AND OPERATING THE ENGINE

## STARTING THE ENGINE

### WARNING DANGER

Do not run engine in an enclosed area. Exhaust gas contains carbon monoxide, an odorless and deadly poison.

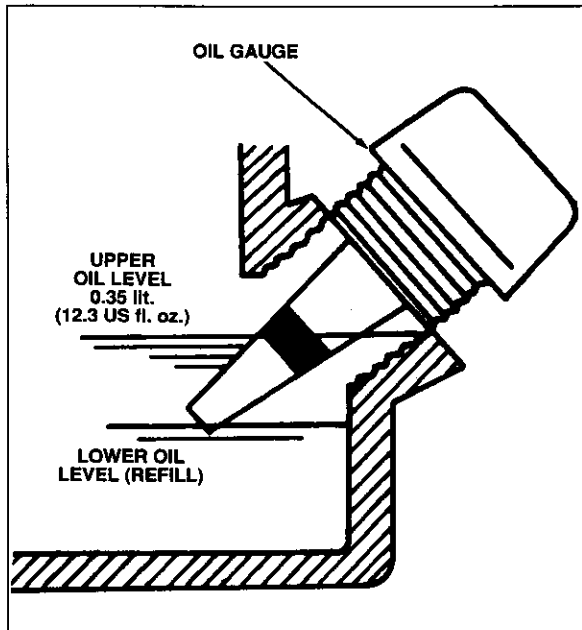
### IMPORTANT

Do not start engine with AC or DC loads connected. Damage to the generator or appliance may result.

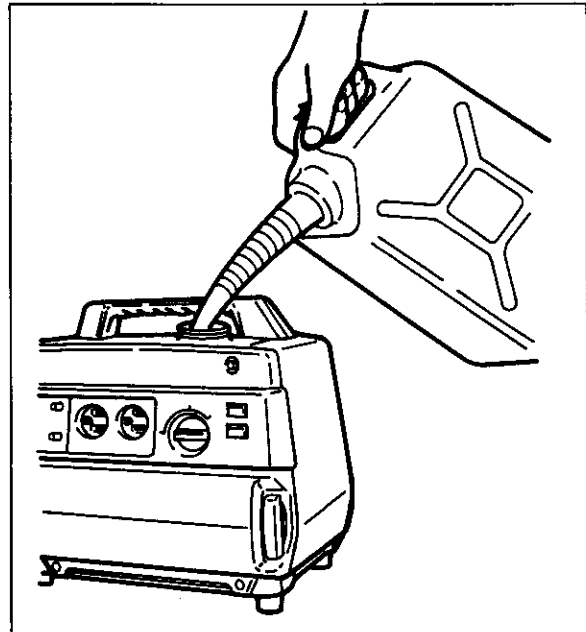
### IMPORTANT

Before starting engine for first time, add oil as unit is shipped dry. (See Changing Engine Oil in Service/50 Hours)(Breaking in after first 20 hrs.)

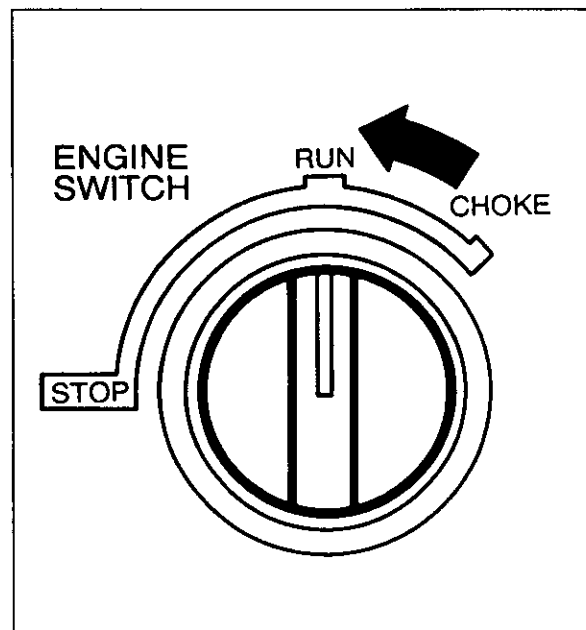
1. Check engine oil level before each use.
2. Never check or add oil while engine is running.



3. Fill fuel tank (See Fuels and Lubricants section).



4. Fuel valve is integrated with the engine control switch. Set control switch to RUN position.



## BREAKING IN A NEW ENGINE

Breaking in a new engine is very important. During the first 20 hours (considered the breaking in period), the engine will require special operating attention.

### IMPORTANT

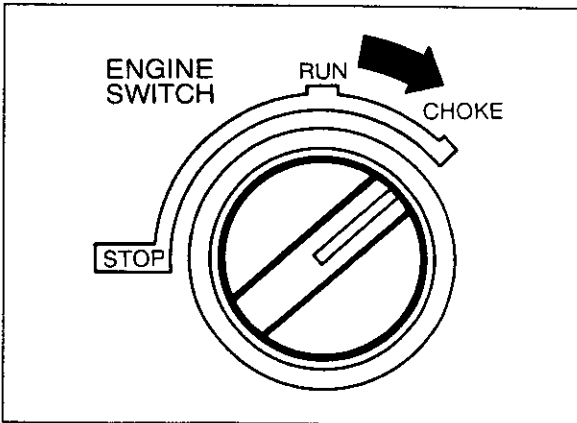
Subjecting the generator to heavy or maximum usage during the breaking in period could result in serious engine damage.

## ENGINE BREAK IN REQUIREMENTS

1. Allow engine to warm up at idle no-load for 5 minutes after starting engine.
2. Avoid peak power loads during the break in period. Run only small power tools or appliances requiring low wattage.

## STARTING THE ENGINE — COLD START

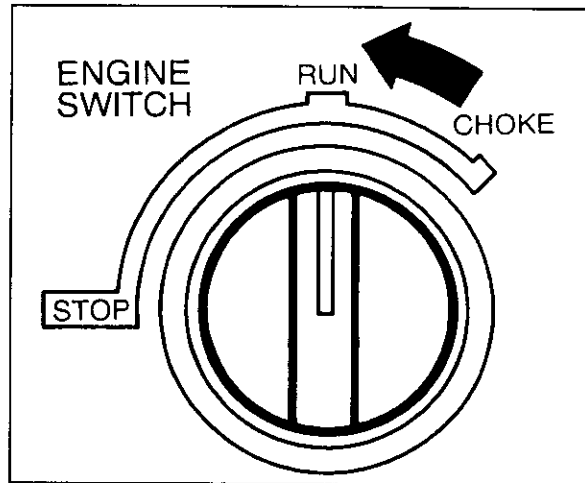
1. Set control switch to CHOKE position.



### NOTE

Choke is used only to start a cold engine. In cold weather it may be necessary to leave the choke lever in the choke/cold start position for a brief period after the engine starts.

2. A hot engine requires no choke. Start the engine with control switch set in the "RUN" position.

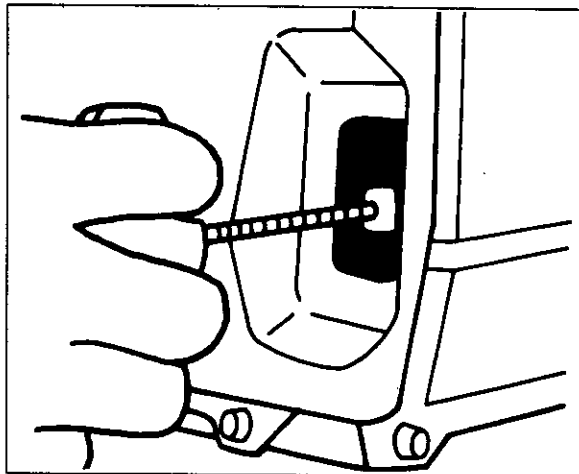


## STARTING THE ENGINE — RECOIL STARTING SYSTEM

### IMPORTANT

Recoil starter may be damaged if starter handle is pulled abruptly, is allowed to snap back, or is pulled while engine is running.

1. Pull the starter handle slowly until resistance is felt. This is the "Compression" point. Return the handle to its original position and pull rapidly.



2. Do not fully pull out the rope.
3. After starting, allow the starter handle to return to its original position while holding the handle.
4. If the engine fails to start after several attempts, repeat above procedures with control switch returned to "RUN" position.

**IMPORTANT**

Make sure the engine is operating at full throttle before connecting tools or appliances.

**AUTOMATIC LOW OIL LEVEL SHUTDOWN SYSTEM**

If engine oil level falls below safe level or generator is placed on an incline exceeding 25°, "Low Oil Warning Lamp" (red) will come on. Engine will continue to run approximately two seconds and stop. Low oil level shutdown system is designed to automatically stop the engine to prevent damage. (See Checking Engine Oil Level in Fuels and Lubricants section.)

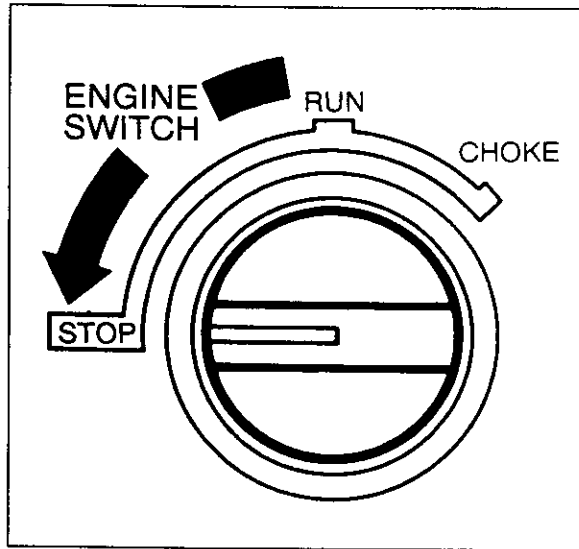
This is only an emergency device and is not intended to indicate when oil is needed.

**STOPPING THE ENGINE**

**IMPORTANT**

Damage to the generator or appliance may result if generator is stopped under load. (With tools or appliances connected).

1. Disconnect all power cords from generator receptacles, including the (DC) 12 volt charger if it is being used.
2. Cool engine by idling it for 2-3 minutes to cool.
3. Turn engine control switch to "STOP" position.



**WARNING ▲ DANGER**

Allow generator and engine to cool before touching the unit or transporting the generator. Never touch a hot engine or muffler.

# GENERAL MAINTENANCE

## WARNING DANGER

Do not attempt to make any electrical repairs or alter the unit in any way. All repairs and maintenance, other than what is explained in the general maintenance section of your owner's manual, should be made by an authorized Echo servicing dealer.

## SERVICE BEFORE EACH USE CHECKING ENGINE OIL LEVEL

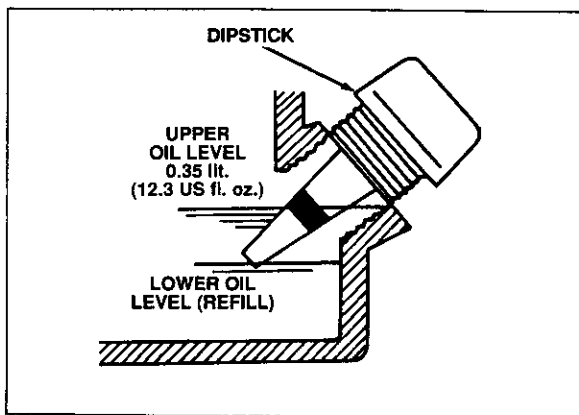
### WARNING DANGER

Never check or add oil while engine is running.

1. Stop engine and place generator on a level surface.
2. Wipe dirt and dust from around dipstick area.
3. Remove dipstick and wipe clean.
4. Install dipstick. Do not screw in when checking.
5. Remove dipstick to check oil level.
6. Oil must be in between L and H marks.

### IMPORTANT

If oil level is at or below bottom of L mark on dipstick, do not run the engine.



7. If oil level is low, add oil to bring oil level no higher than H mark area of dipstick. (See Engine Oil in Fuels and Lubricants section for correct oil).

### IMPORTANT

Check O-ring placement and condition on dipstick before installing.

8. Install dipstick and tighten finger tight.

### IMPORTANT

The generator should be placed on a flat surface when refilling the crankcase. If the generator is tilted, overfilling will result, causing the oil temperature to increase to the danger level during operation. If too little oil is added, serious engine damage could result.

## CLEANING AIR FILTER ELEMENT

### IMPORTANT

Do not run engine with element removed.

## AIR FILTER SERVICE

The air filter function is to keep dust and dirt out of the engine. Operating the generator with a dirty or defective filter can lead to costly engine damage. Always replace the filter if torn or damaged. A dirty air filter will restrict the flow of air to the carburetor. To prevent carburetor problems, service the air filter regularly (25 hrs.). Service the filter more frequently when operating the generator in extremely dusty areas.

### IMPORTANT

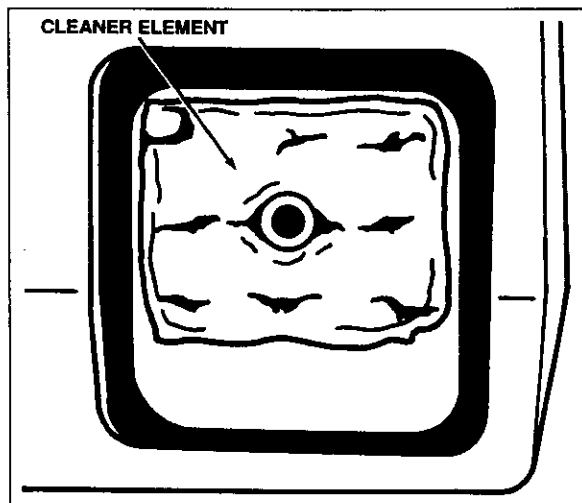
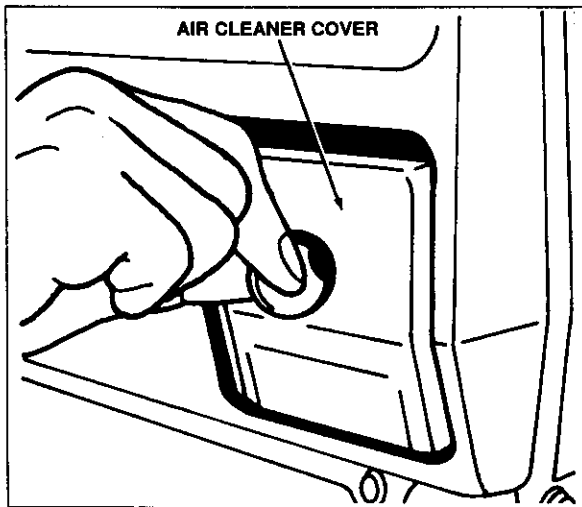
Never run the generator without the air filter. Rapid engine wear or damage will result.

## WARNING ▲ DANGER

Never use gasoline or low flash point solvent for cleaning the air cleaner element; a fire or explosion could result.

### TO CLEAN AIR FILTER

1. Brush or wipe away any dust, dirt or debris from around the air filter cover.
2. Using a coin, loosen screw securing air cleaner cover in place and remove cover.



3. Remove foam element from the air filter.
4. Wash the foam element in liquid detergent and warm water. Wrap the foam element in cloth and squeeze dry.
5. Soak the foam element in clean SAE-30 weight engine oil. Squeeze to remove excess oil, then wrap in clean cloth and squeeze as dry as possible (be careful not to tear element).
6. Dampen a clean cloth in solvent and clean the interior of the air box and air cleaner cover.
7. Install foam element into air cleaner.
8. Reinstall air filter cover. Make sure cover fits flush and is fastened securely.

#### NOTE

Air filter should be cleaned periodically. Replace filter if torn or damaged.

### SPARK PLUG MAINTENANCE

The spark plug (NGK BMR4A or equivalent) should be cleaned periodically and changed as required.

To remove spark plug:

1. Turn engine control switch to STOP position.

## WARNING ▲ DANGER

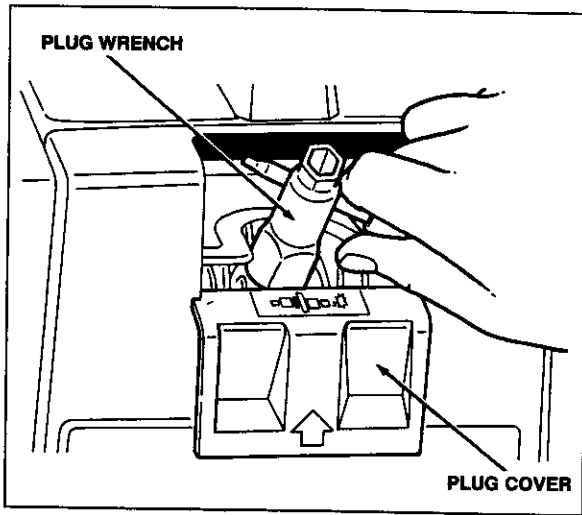
Before checking spark plug:

- Stop engine
- Wait for engine to cool

### IMPORTANT

Removing spark plug from hot engine can cause threads to be torn from the cylinder head.

2. Open plug cover.



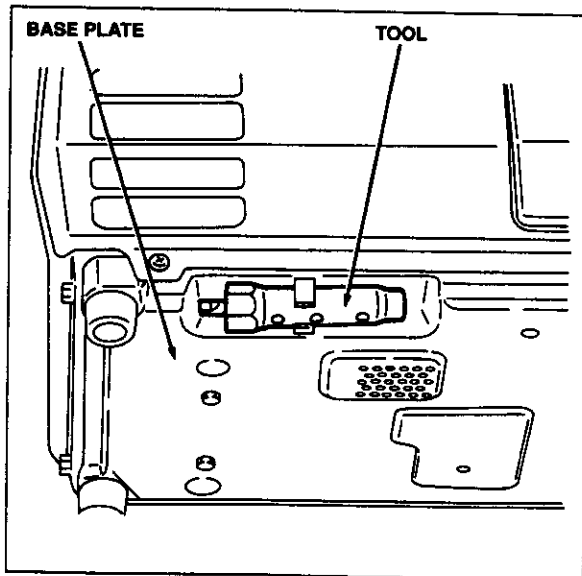
3. Disconnect rubber spark plug boot connection by twisting and pulling. At the same time clean any dirt from around the spark plug base.

4. Remove spark plug with a spark plug socket wrench. Do not use any other type tool.

A plug wrench is attached to the bottom of generator base plate.

### WARNING **▲** DANGER

Do not try to remove the attached wrench while the generator is running.



### IMPORTANT

Do not clean spark plugs in a machine using abrasives.  
Clean spark plug by carefully scraping or with a wire brush.

### WARNING **▲** DANGER

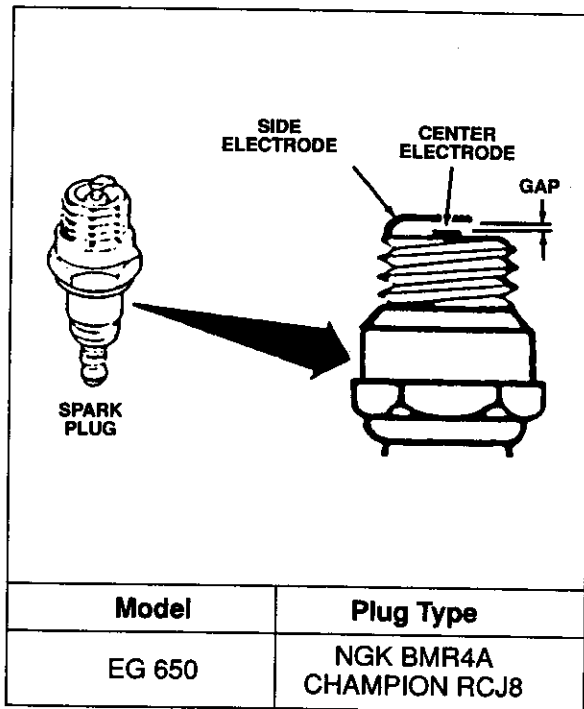
Wear full eye protection during these operations.

5. Visually inspect the spark plug. Discard it if the porcelain insulator is cracked or chipped. Discard if electrodes are pitted or damaged.

6. Check plug gap with a wire feeler gauge.

Gap must be 0.6~0.7mm (0.024~0.028 in.).

To change gap bend only side electrode, using spark plug tool.



7. Attach the plug washer and thread the plug in by hand to prevent cross threading.

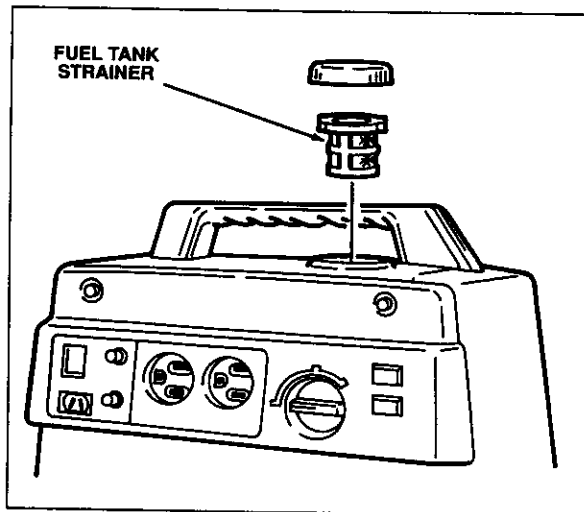
- After a new spark plug has been seated by hand, it should be tightened 1/2 turn with a wrench to compress the seat washer. If a used plug is being reinstalled, it should only be tightened 1/8~1/4 turn after being seated.

### IMPORTANT

Never use a spark plug with improper seat range. Spark plug NGK BMR4A or equivalent is recommended.

## FUEL TANK STRAINER

The fuel tank filter should be cleaned as required.



- To clean fuel strainer, remove fuel tank cap and lift out filter.
- Wash in nonflammable clean solvent.
- Reinstall.

## SPARK ARRESTER SCREEN/ EXHAUST OUTLET

An improperly maintained clogged spark arrester screen can cause engine power loss and faulty functioning of exhaust system.

### WARNING ⚠ DANGER

Never operate unit without a spark arrester screen installed. (See Safety Instructions.)

## TO CLEAN OR REPLACE SPARK ARRESTER SCREEN

### WARNING ⚠ DANGER

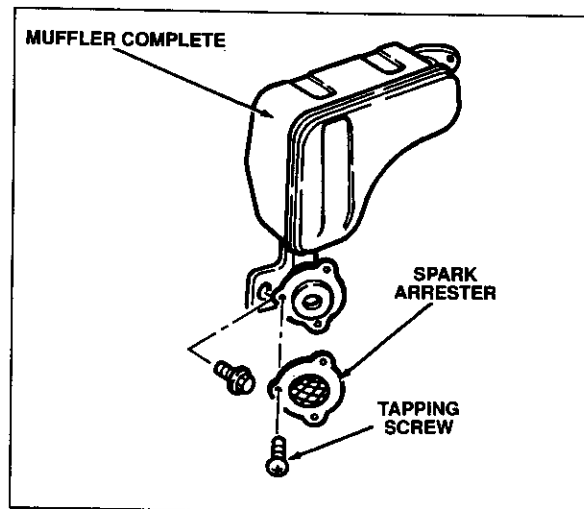
Do not touch or attempt this operation if the muffler or engine is hot. Allow unit to cool.

- Remove screws retaining exhaust outlet and detach spark arrester screen.
- Use a wooden scraper or small wire brush to scrape away any dirt or carbon deposits from exhaust outlet opening and spark arrester screen.
- Reinstall spark arrester screen.

### NOTE

Spark arrester screen should be inspected daily to make sure screen is not clogged by carbon deposits. Screen should be cleaned and replaced as required.

To maintain efficiency the spark arrester screen should be changed every 100 hours.





# STORAGE

## SHORT TERM STORAGE (90 DAYS OR LESS)

### WARNING DANGER

Store generator in a dry place, out of reach of children. Do not store in an enclosure where fuel fumes may accumulate or reach an open flame or spark.

1. Clean exterior of generator to remove all accumulations of grease, oil, dirt, or debris. Never use water to clean generator.
2. Perform any periodic lubrication or services as required.
3. Tighten all cap screws and nuts.
4. Touch-up paint as required.
5. Remove spark plug cable to help prevent accidental starting.
6. Close fuel valve.
7. Place a suitable cover over generator.

## LONG TERM STORAGE (LONGER THAN 90 DAYS)

### NOTE

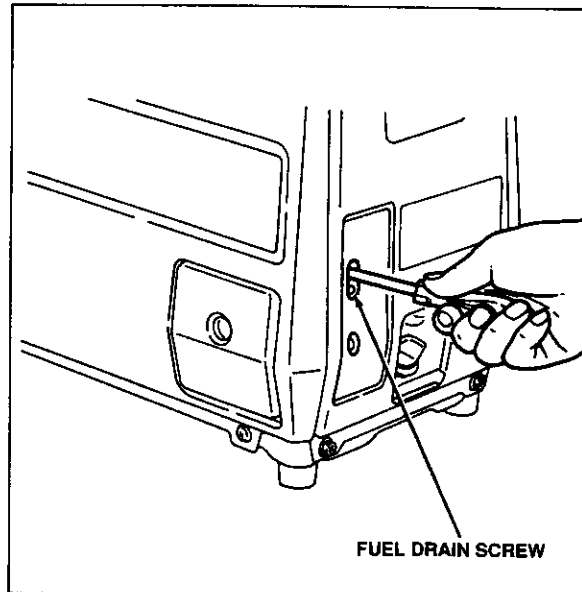
Follow all procedures above plus the following steps:

Do not store generator for a prolonged period of time (3 months or longer) without performing protective storage maintenance, which includes the following procedures:

1. Changing engine oil.
2. Lubricating combustion chamber.
3. Draining and cleaning fuel tank and filter.
4. Draining carburetor and cleaning fuel bowl and strainer.

1. Change engine oil.  
(See Changing Engine Oil in Service/50 hours section.)
2. Remove spark plug and pour 1/3 oz. (10 ml) of fresh engine oil into cylinder.
3. Place clean rag over spark plug hole.
4. Pull recoil starter handle twice to distribute oil.
5. Install spark plug leaving cable detached.
6. Close engine valves by pulling recoil starter handle until compression is felt, then pull handle 3~4 cm (1~2 in.) farther.
7. Drain fuel tank carefully. Gasoline left in the fuel tank will eventually deteriorate making engine-starting difficult.
8. Drain carburetor of gasoline also.

To drain fuel from carburetor and fuel tank, turn fuel drain screw counterclockwise. Turn the control switch to "RUN."  
Do not remove drain screw.  
After draining fuel, retighten fuel drain screw and turn the control switch to "STOP."



## **REMOVING GENERATOR FROM STORAGE**

Turn engine control switch to STOP position.

1. Check engine oil level.
2. Remove spark plug. Cover spark plug hole with clean rag.
3. Pull recoil starter handle several full strokes to remove oil from cylinder.
4. Check spark plug gap; install plug. Connect spark plug cable.
5. Check that guards and shields are fastened in place.
6. Fill fuel tank with correct gasoline. (See Fuels and Lubricants section.)
7. Turn the fuel valve "OPEN."
8. Turn engine control switch to "CHOKE."
9. Start and run the engine for 5 minutes before connecting an electrical load.

# PREVENTIVE MAINTENANCE CHECK CHART

ITEM	MAINTENANCE	DAILY	EVERY 50 Hrs.	EVERY 100 Hrs.	EVERY 300 Hrs.	EVERY 1000 Hrs.	As Req
Screws/Nuts/Bolts	Inspect & Tighten	●					
Fuel Tank	Check & Refill Clean	●					●
Spark Plug	Clean & Adjust Change		●				●
Engine Oil	Check Change	●	● **				
Air Filter	Inspect Replace	●	● Clean				●
Spark Arrester Screen	Inspect Replace	●	● Clean				●
Exhaust Port	Clean				●		
Fuel Tank Filter	Clean			●			
Fuel Bowl/Strainer	Clean			●			
Fuel/Oil Hoses	Inspect Replace*	●				●	●
Starter Rope	Inspect Replace*	●					●
Carburetor	Clean*				●		
Piston Ring	Replace*					●	●
Shock Mounts	Inspect Replace*	●				●	●
Control Switch	Inspect	●					
Circuit Breaker	Inspect Replace*	●					●
Receptacles	Inspect Replace*	●					●
Intake Valves	Reface Replace*					●	●
Exhaust Valves	Reface Replace*					●	●

\* Recommended for maintenance by an authorized ECHO servicing dealer.

\*\* First oil change at 20 hours.

# TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Engine does not start	<ol style="list-style-type: none"> <li>1. Unit loaded during start-up</li> <li>2. Low on fuel or oil</li> <li>3. Faulty spark plug</li> <li>4. Loose wire</li> <li>5. Control switch "STOP"</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove load</li> <li>2. Add fuel or oil</li> <li>3. Replace</li> <li>4. Inspect &amp; repair</li> <li>5. Turn to CHOKE or RUN position</li> </ol>
No electrical output	<ol style="list-style-type: none"> <li>1. Faulty circuit breaker</li> <li>2. Faulty receptacle</li> <li>3. Circuit breaker</li> <li>4. Faulty power cord</li> <li>5. Worn brushes</li> </ol>	<ol style="list-style-type: none"> <li>1. a) Reset to ON position b) Replace</li> <li>2. Replace</li> <li>3. Push to ON position</li> <li>4. Inspect &amp; replace</li> <li>5. Inspect &amp; replace</li> </ol>
Repeated circuit breaker tripping	<ol style="list-style-type: none"> <li>1. Overload</li> <li>2. Faulty equipment or cords</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce load</li> <li>2. Check for bare wires or frayed insulation on equipment</li> </ol>

## TROUBLESHOOTING

When the engine will not start:

1. Is there enough fuel?
2. Is the fuel valve open?
3. Is gasoline reaching the carburetor? To check, loosen the carburetor float bowl drain plug with the fuel valve on.

### **WARNING ▲ DANGER**

**If any fuel is spilled, make sure the area is dry before testing the spark plug or starting the engine. Fuel vapor or spilled fuel may ignite.**

4. Is the engine control switch "CHOKE" or "RUN?"
5. Is there enough oil in the engine?  
If not, the oil alert lamp will go on when the starter grip is being pulled.

6. Is the control switch in its proper position (CHOKE or RUN)?
7. Is there a spark at the spark plug?
  - a. Remove the spark plug cap. Clean any dirt from around the spark plug base, then remove the spark plug.
  - b. Install the spark plug in the plug cap.
  - c. Set the control switch "RUN."
  - d. Ground the side electrode of the spark plug to any engine ground, pull the recoil starter to see if sparks jump across the gap.
  - e. If there are no sparks, replace the plug. If OK, try to start the engine according to the instructions.
8. If the engine still does not start, take the generator to the nearest ECHO dealer.

## PARTS BOOKS

To obtain a replacement parts book, complete this order form and enclose a check or money order for \$2.00. Make payable to ECHO, INCORPORATED, and mail to:

ECHO, INCORPORATED  
P. O. Box 67  
Lake Zurich, IL 60047  
ATTN: Technical Publications

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Purchaser's Name

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Address (Street)

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(City)

(State)

(Zip Code)

ECHO Model No. Generator EG-650  
Parts Book No. 999 222 01940



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