

SPECIFICATIONS

DIMENSIONS

Length	26"
Width	20"
Height	23"
Weight	170lbs

ENGINE

Model	Honda GX200
Engine Type	4-stroke, overhead valve, single cylinder
Displacement (Bore x Stroke)	12.0 cu-in (2.7 x 2.1 in)
Compression Ratio	8.5:1
Engine Speed	3500 RPM
Cooling System	Forced Air
Ignition System	Transistorized Magneto
Oil Capacity	0.58 Quart
Oil Type	SJ or higher 10W-30
Fuel Tank Capacity	3.4 Gallons.
Spark Plug	BPR5ES (NKG) W16EPR-U (DENSO)

GENERATOR

Model	Honda EU3000is	
AC Output	Rated Voltage	120 VAC
	Rated Frequency	60HZ
	Rated Current	23 Amps
	Rated Output	2.8 kVA
	Maximum Output	3.0 kVA
Connector Type	Amp plastic Circular, 3 pin, 42 Amp pins Amp # 213889-1 Mating Connector # 213905-1	
Connector Pin Out	Pin 1.....AC+ Pin 2.....AC- Pin 3.....Chassis Ground	
GAS Gauge Display x2	RED.....2-3 cd....<1/3 full AMBER....2-3 cd....1/3 to 2/3 full Green.....2-3 cd....> 1/3 full	

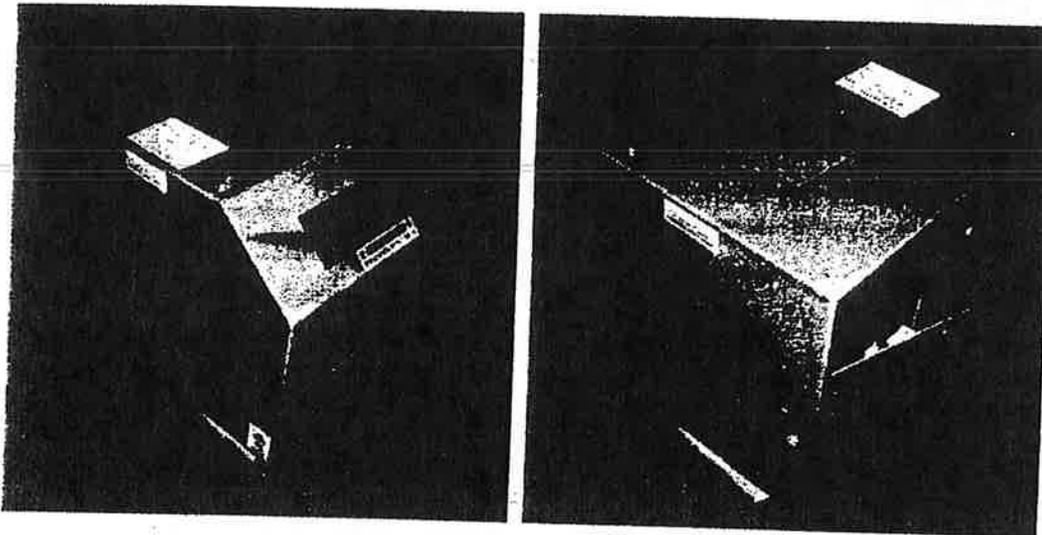
TUNE-UP ITEMS

Spark Plug Gap	0.028-0.031"
Valve Clearance (cold)	Input: 0.15 ± 0.02 mm Output: 0.20 ± 0.02 mm

INSTALLATION and OPERATION

The CUB-20 Generator System is very easy to install and operate. NOTE: Please read this manual before attempting to install this generator at an intersection, paying particular attention to the warnings and controls.

As the pictures below show, the CUB-20 is completely enclosed to prevent accidental access to the hot or electrically hazardous parts of the Generator.

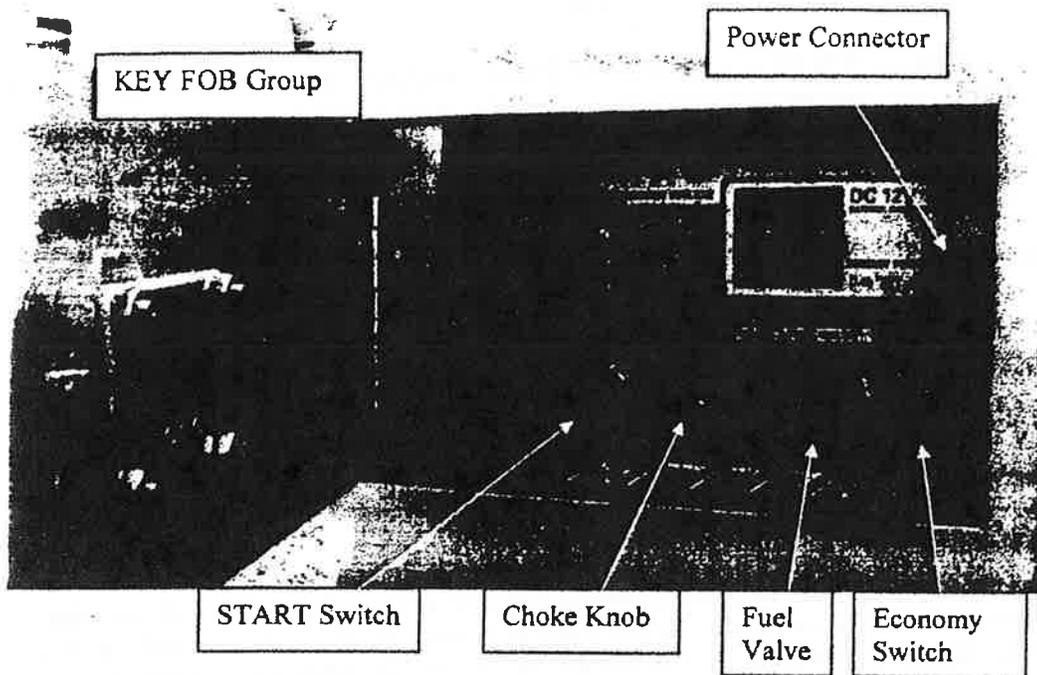


Access doors with locks allow the user access to all parts of the CUB-20 required for normal operation. The picture on the right shows the slots for the carriage bolts for mounting the CUB-20 to the Cabinet shell.

CONTROLS

The picture below shows the main control panel for the CUB-20. As can be seen in the pictures on this page and the next page, the Control Panel is located behind a locked door on the side of the CUB-20. The "Group 1" sticker on the inside of the door refers to the Remote start KEY FOB group for operating the Generator. A particular Key FOB can only control a CUB-20 Generator within its group. The DC 12V Power Supply has been **DISABLED** in Traffic applications. The connector shown on the panel has been disconnected. We do not recommend that the "PARALLEL OPERATION" be used in traffic operations. This allows two Generators be tied together so that 5600KVA can be supplied. Very few intersections require that kind of power.

For proper airflow and cooling in the generator, the doors should be shut during operation.



The Green Indicator labeled “**OUTPUT INDICATOR**” means the Generator is operating normally when illuminated.

The Red Indicator labeled “**OVERLOAD ALARM**” means that the Generator is overloaded and/or the inverter is overheating; the Generator will be shut down in about 5 seconds. The Green “**OUTPUT INDICATOR**” will go out.

The “**OIL ALERT**” indicator will come on if there is insufficient oil in the engine. The engine will automatically be stopped. Check the oil level if this indicator comes on while trying to start the engine.

The “**ECO THROTTLE**” Switch turns the Economy Throttle control on and off. When the switch is turned on, the engine speed on the CUB-20 is lowered to conserve gasoline when the generator has no load or a light load. With most traffic intersections, you can get a much longer operating time when the CUB-20 is operated with the “**ECO THROTTLE**” switch in the **ON** position. If the Intersection has widely changing or heavy loads, the “**ECO THROTTLE**” should be **OFF**.

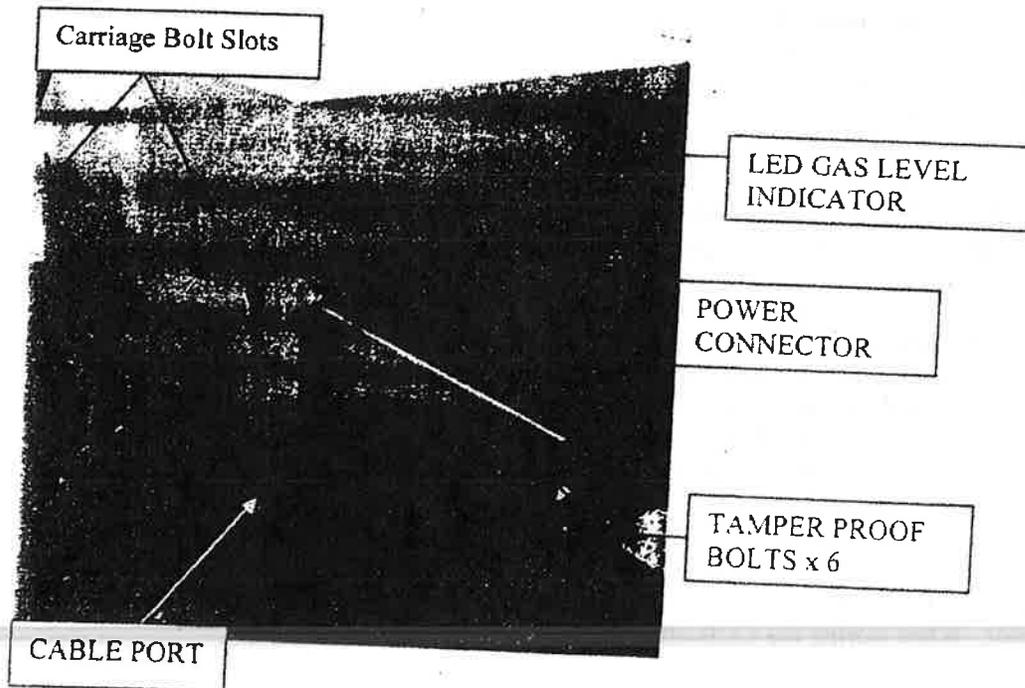
The “**FUEL VALVE**” controls fuel to the carburetor. As shown in the above picture the fuel is **OFF**. When the valve is in the vertical position, fuel is allowed to flow to carburetor. When storing the CUB-20, turn the fuel valve to the **OFF** position.

The “**CHOKE**” Knob enriches the air/fuel mixture when the engine is cold for easier starting. Pulling the Choke Knob **OUT** richens the mixture and pushing the knob **IN** returns the air/fuel mixture to normal ratios.

The “**ENG SWITCH**” is similar to the ignition switch on a car. The “**START**” Position is momentary and engages the starter motor. The “**ON**” position is the normal operating position and is the position the switch should stay in during operation of the CUB-20. The “**OFF**” position turns off the CUB-20 and prevents operation of the generator. **To use the remote start feature, the ENG Switch must be in the “ON” position.** Since power is being used while the switch is in the “**ON**” position, turn the “**ENG Switch**” to the “**ON**” position only when the CUB-20 is deployed.

The “**POWER CONNECTOR**” is the connection point for the CUB-20 to Cabinet Cable. The cable is routed through the porthole in the side of the CUB-20 enclosure and routed to the connector. The mating connector screws on to the bulkhead connector and locks in place. A detent should be felt when the connector is fully mated. AC+, AC- (neutral), and Chassis Ground are supplied through this connector. The pin out is shown in the specification section. AC- and Chassis Ground are not connected together in the generator.

There are two breakers mounted above the Power Connector that are not visible in the above picture. The one on the extreme right is the only one used. These breakers protect the output of the generator and will trip during an overload condition. Pushing the tripped button in will reset them.



The LED Gas Level Indicators give a general indication of the fuel level in the gas tank. The LED Indicators are located on two adjacent sides of the CUB-20 so they are visible when driving by the intersection.

- The Green Color indicates that the fuel tank is more than ½ full.
- The Amber Color indicates that the fuel tank is less or equal to ½ full.
- The Red Color indicates that the fuel tank is less than 1/3 full.

The fuel level indications are approximate.

STARTING THE CUB-20

Before starting the CUB-20, make sure the Engine has sufficient oil and gasoline. Check the maintenance section for the correct oil and gasoline.

There are 3 different ways to start the CUB-20:

- Electric Starting with the Engine Switch
- Remote Starting with the Key FOB
- Manual Starting with the recoil starter

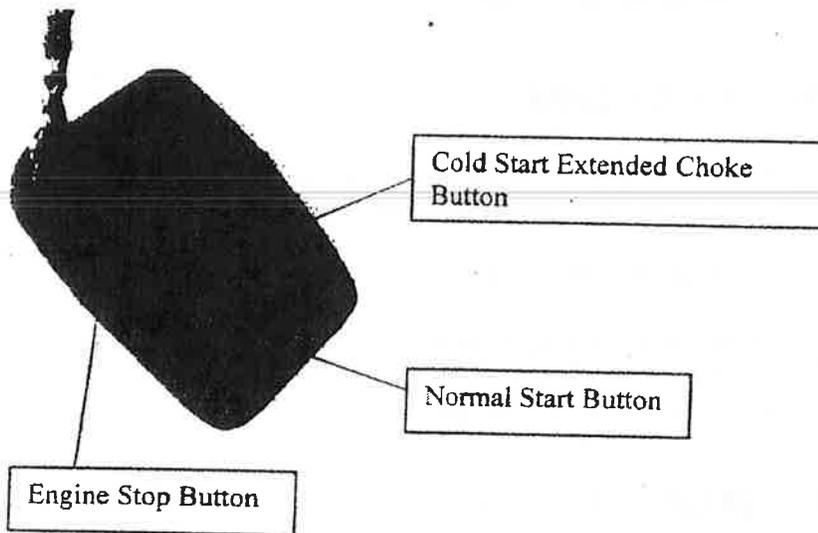
ELECTRIC STARTING

- 1) Open the access door to the control panel and connect the power cable to the Generator.
- 2) Turn the fuel valve to the ON position (vertical).
- 3) If the engine is cold, **PULL** choke knob out. To restart a warm engine leave the choke knob in.
- 4) Turn the Engine Switch to the START position and hold it there for 5 seconds or until the Engine starts.
 - a. Do not crank the Engine for more than 5 seconds or the starter motor may overheat.
 - b. Wait 10 seconds before trying again.
 - c. If the speed of the starter motor drops during cranking, the battery may need to be recharged.
- 5) Allow the Engine Switch to return to the ON position.
- 6) If the Choke Knob was pulled out to start the engine, slowly push the knob in as the engine warms up.

- 7) If you wish to use the EcoThottle system, turn the EcoThottle switch to the ON position after the engine has run for 2 to 3 minutes.

REMOTE STARTING

The CUB-20 can be started or stopped from as far away as 70 feet with the remote starter Key FOB shown below:



Before attempting to start or stop the CUB-20 remotely, make sure you can see the CUB-20 so you can tell if it is running or off.

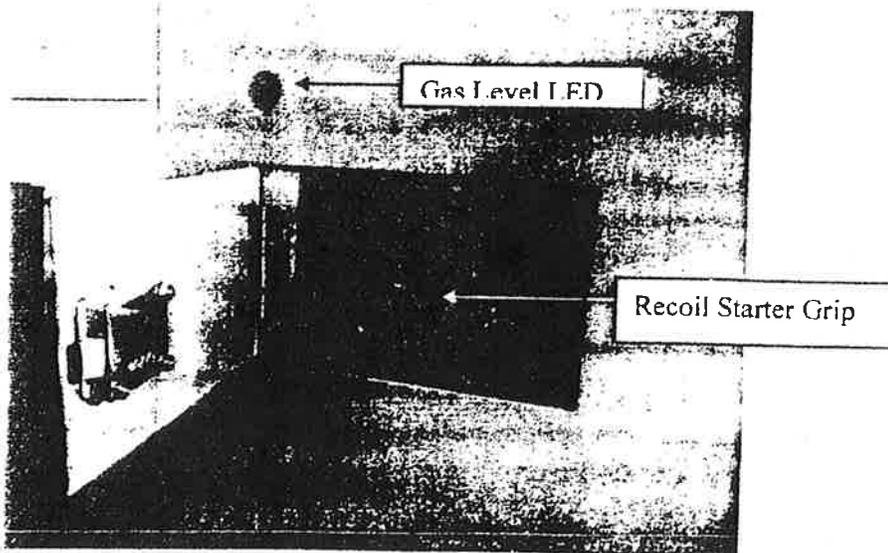
- 1) Make sure the CUB-20 has Gasoline and Oil in it.
- 2) The Engine Switch must be in the "ON" position and Fuel Valve is ON before the Remote Start work.
- 3) Make Sure that the Key FOB is in the same Group Number as the CUB-20 to be started.
- 4) If the Engine is warm, press and release the Normal Start Button.
- 5) If the Engine is Cold, Press and hold the middle blue button for a moment or two longer than the normal button. This applies the choke for a longer period of time while cranking.

Pressing the RED button can turn off the Cub-20. Watch the generator to verify that the CUB-20 has turned off. Remember that the Engine Switch is still in the ON position and should be turned **OFF** if the Generator is going to be stored or just left off for an extended period of time.

RECOIL STARTER

The Recoil Starter (pull cord with grip) can be used to start the CUB-20 if for some reason the electric start system is not working (i.e. a dead battery or starter motor problem). To start the CUB-20 with the Recoil Starter, follow the following procedure:

- 1) Turn the fuel valve to the **ON** (vertical) position.
- 2) **Pull** the Choke Knob out (closed position) if the Engine is cold.
- 3) Turn the Engine Switch to the **ON** Position.
- 4) Open the Door to the Recoil Starter.
- 5) Grab the "T" handle of the Recoil Starter cord and lightly pull the cord until a resistance is felt and then pull briskly. Repeat if the engine doesn't start.
- 6) Do not allow the Starter Recoil "T" handle to snap back against the Engine.
- 7) If the Choke was used, slowly push it back in after the Engine is running smoothly.
- 8) After the Engine has been running for a couple of minutes, the ECOTHOTTLE Switch can be turned **ON**.
- 9) Shut the Doors on the CUB-20.



TURNING THE CUB-20 OFF

To turn the CUB-20 off follow this procedure:

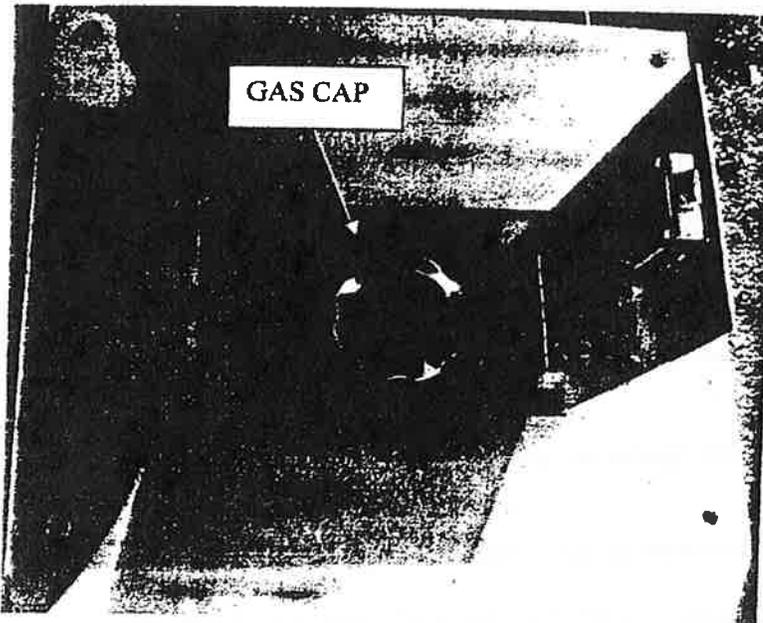
- 1) The load should be disconnected or turned OFF before the CUB-20 is turned OFF. This is done automatically when the PSI Automatic Transfer Switch is used.
- 2) Open the door to the Control Panel and turn the ENGINE SWITCH to the OFF position. The Engine should stop.
- 3) If the Generator is not going to be started again, turn the fuel valve to the OFF (Horizontal) position.
- 4) Turn ECO THROTTLE to the OFF position.
- 5) Close the door to the Control Panel.

INSTALLATION

The following description shows how to install the CUB-20 in a typical Traffic installation.

REFUELING

Access to the Gas tank is through a locked door on the top of the CUB-20 as shown below:



-----WARNING!-----

Gasoline is highly flammable and explosive!

- Stop the engine and keep heat, sparks, and flames away.
- Handle the fuel outdoors **ONLY**
- Wipe up all spills immediately
- If the fuel is spilled inside the CUB-20, allow the fuel to completely evaporate before attempting to start the generator.

FUEL RECOMMENDATIONS

The CUB-20 requires Unleaded Gasoline with an Octane rating of 86 or higher. **Never** use an oil/gas mixture in this engine. Do not use stale or contaminated gasoline.

If you notice a constant pinging or spark knock, you may need a fuel with a higher octane rating. A slight pinging is normal. If increasing the Octane rating doesn't help, the Engine may need to be looked at. Do not allow the Engine to operate for any length of time with a persistent knock as this may damage the Engine.

The CUB-20 can use Oxygenated Fuels as described below:

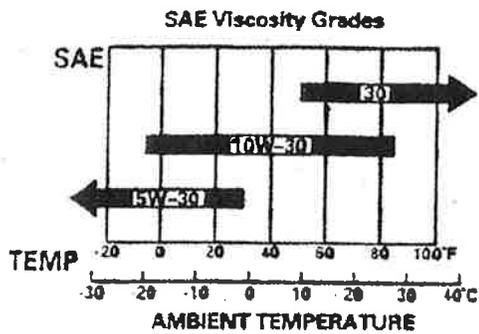
ETHANOL.....10% by volume
MTBE.....15% by volume
METHANOL.....5% by volume (must contain cosolvents and corrosion inhibitors)

PROCEDURE:

- 1) Stop engine. Never refuel with the Engine running.
- 2) Allow the CUB-20 to cool before attempting to refuel.
- 3) Open the door on the top of the CUB-20 and remove the gas cap.
- 4) Place the supplied refueling mat around the fuel tank opening to help contain spills.
- 5) Fill the fuel tank with the appropriate gasoline no higher than the fuel strainer shoulder.
- 6) Remove the fuel mat and wipe up any spilled fuel. Replace the Gas Cap.
- 7) After all spilled fuel has evaporated, close the door on top of the CUB-20.

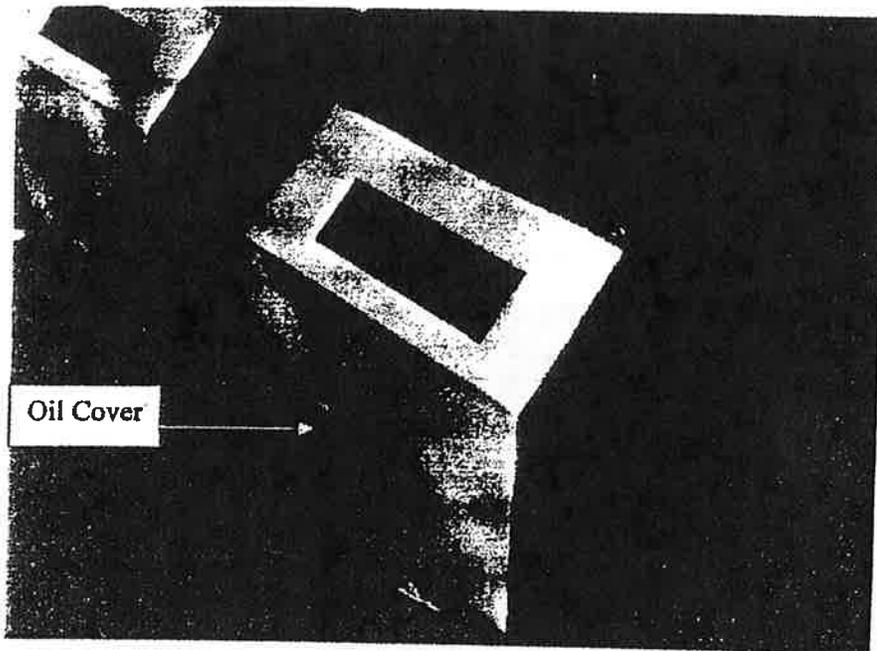
ENGINE OIL

The engine oil should be checked before each use. SAE 10W-30 should be used in most applications. The following chart shows alternate oils you can use if your average temperature is as shown on the horizontal axis of the chart below:



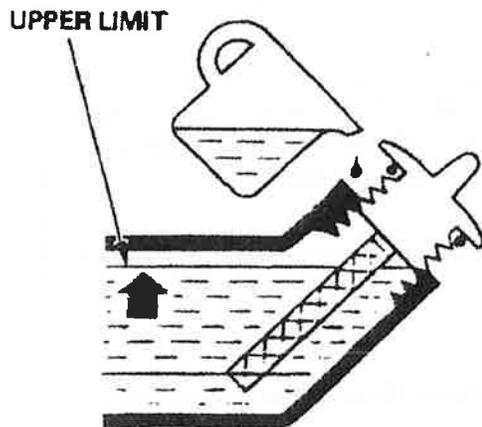
Use 4 stroke motor oil that meets or exceeds the requirements for API service SJ or higher.

The Engine oil can be checked by opening the cover shown in the picture below:



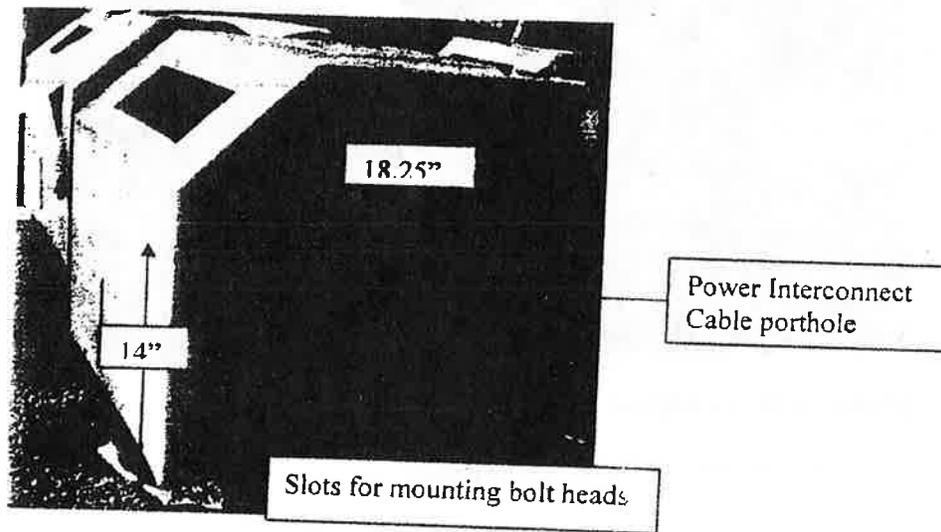
Check the Oil as follows:

- 1) Remove the Oil Cover shown above.
- 2) Remove the oil filler cap and wipe the dipstick.
- 3) Check the oil level by inserting the dipstick into the filler neck without screwing it in.
- 4) If the level is low, fill to the top of the oil filler neck as shown below.
- 5) Screw the filler cap and dipstick back in and replace the oil cover.



INSTALLATION TO THE TRAFFIC CABINET

In most installations the CUB-20 is bolted to the Traffic Cabinet so the interconnect cable is captured between the cabinet and the CUB-20 housing. The picture below shows the slots that the heads of the mounting 3/8" carriage bolts slide in:



The slots allow for a mismatch in height between the Cabinet mounting holes and the CUB-20. The slots are 18.25" inches apart. The middle of the slot is about 14" above the ground. The slots are about 0.410" wide so the flats on the 3/8" carriage bolts' head fit into the slot so the bolt won't spin. The Power Cable is routed so it is sandwiched between the cabinet and the housing. When the installation is complete, the cable is not accessible.

The physical location of the CUB-20 should be selected such that splashing of water and snow from the road will not hit the housing. The air intake for the CUB-20 is around the bottom of the housing. Keep snow and other debris from around the bottom of the cabinet. Pick a location where standing water will not rise above the bottom of the CUB-20 cabinet.

MAINTENANCE

Below is the recommended maintenance schedule for the CUB-20:

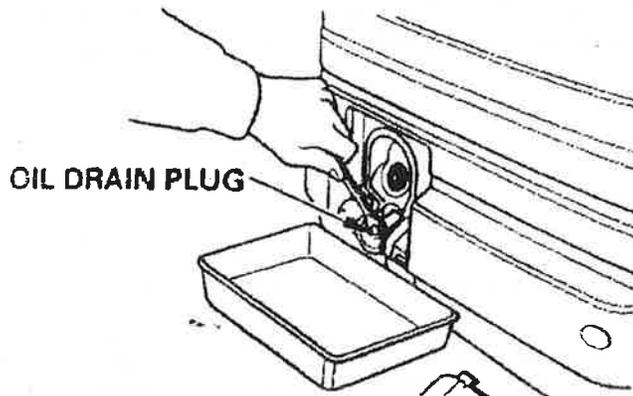
ITEM		EACH USE	20 Hours	50 Hours	100 Hours	300 Hours
Engine Oil	Check Level	X				
	Change		X		X	
Air Filter	Check	X				
	Clean			X		
	Replace					X Paper
Sediment Cup—Clean					X	
Spark Plug	Check-Adj.				X	
	Replace					X
Spark Arrester—Clean					X	
Valve Clearance—Check Adj.						X
Combustion Chamber—Clean			500 hrs			
Fuel Tank and Filter—Clean						X
Fuel Line—Check			Every 2 Years			

ENGINE OIL CHANGE

Drain the oil while the engine is warm to assure complete draining.

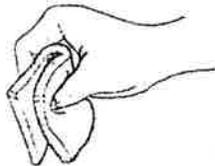
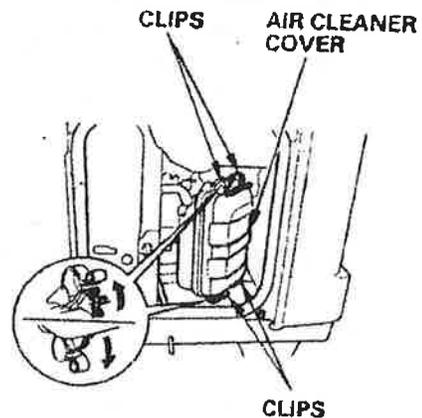
- 1) Remove the Cover on the outside of the CUB-20
- 2) Remove the drain plug and sealing washer.
- 3) Remove the oil filler cap and drain the oil.
- 4) Reinstall the drain plug and sealing washer. Tighten the plug securely.
- 5) Refill with the recommended oil and verify the level.
- 6) Reinstall the oil cover.

- 7) Dispose of the old oil properly

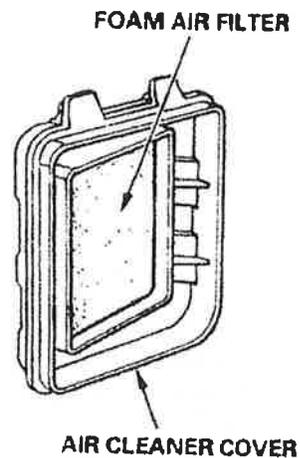
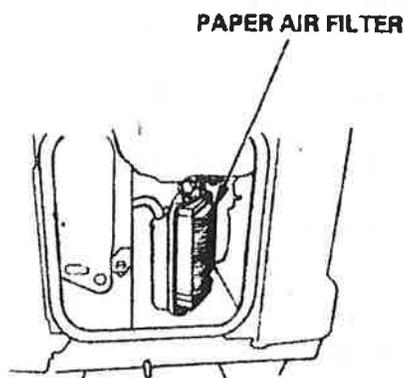


AIR CLEANER SERVICE

- 1) Remove the housing of the CUB-20 by removing the 6-tamper proof screws around the bottom of the cabinet.
- 2) Unsnap the Air cleaner cover.
- 3) Foam air filter Cleaning:
 - a. Remove the foam air filter from the air cleaner cover
 - b. Wash the foam air filter in a solution of household detergent and warm water, then rinse thoroughly, or wash in nonflammable or high flashpoint solvent. Allow the foam filter to dry thoroughly.
 - c. Soak the foam air filter in clean engine oil and squeeze out the excess oil. The engine will smoke during initial startup if too much oil is left in the foam filter.
 - d. Reinstall the foam air filter in the air cleaner cover.



- 4) Paper air filter. If the paper air filter is dirty, replace with a new one. Do not clean the paper filter.
- 5) Reinstall the air cleaner cover.
- 6) Replace the enclosure.

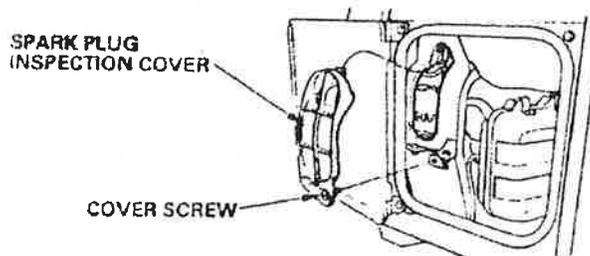


SPARK PLUG SERVICE

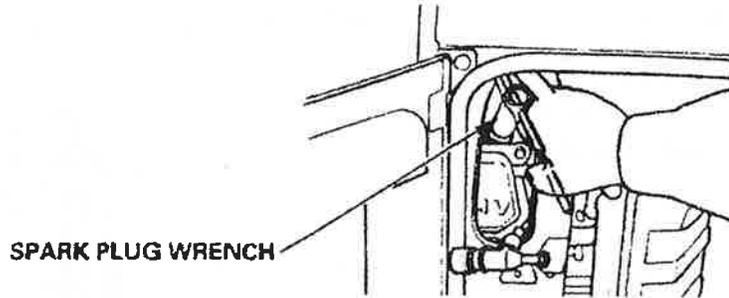
To insure proper engine operation, the spark plug must be properly gapped and cleaned. The specification chart shows the proper spark plug. An incorrect spark plug can cause engine damage.

If the engine has been running, the muffler will be very hot.

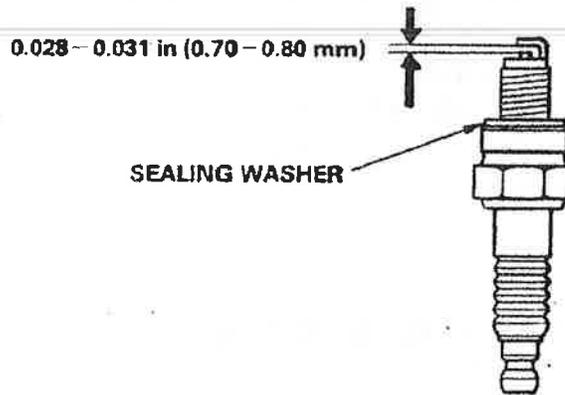
- 1) Remove the CUB-20 outside enclosure.
- 2) Loosen the cover screw and remove the spark plug inspection cover
- 3) Remove the spark plug cap.
- 4) Clean any dirt from around the spark plug base.



- 5) Use a spark plug wrench to remove the spark plug as shown below.



- 6) Visually inspect the spark plug and discard it if the insulator is cracked, chipped or fouled.
- 7) Measure and adjust the spark plug gap (by bending the side electrode) to 0.028-0.031"
- 8) Check that the spark plug sealing washer is in good condition and then thread the spark plug in by hand to prevent cross threading.
- 9) After the spark plug is seated, tighten with a spark plug wrench to compress the washer. When installing a new spark plug, tighten $\frac{1}{2}$ turn after the spark plug seats. If reinstalling a used spark plug, tighten $\frac{1}{8}$ to $\frac{1}{4}$ turn after the spark plug seats.
- 10) Reinstall the inspection cover and CUB-20 enclosure.



FUEL SEDIMENT CUP CLEANING

The sediment cup prevents dirt and/or water, which may be in the fuel tank from entering the carburetor. If the Engine has not been run for a long time, the sediment cup should be cleaned.

- 1) Turn the engine switch to the OFF position.
- 2) Turn the fuel level to the OFF position.
- 3) Remove the CUB-20 enclosure.
- 4) Remove the air cleaner cover and paper filter
- 5) Disconnect the breather hose from the air cleaner base.

6) Remove the 6 mm bolt and two 6 mm nuts and remove the air cleaner base

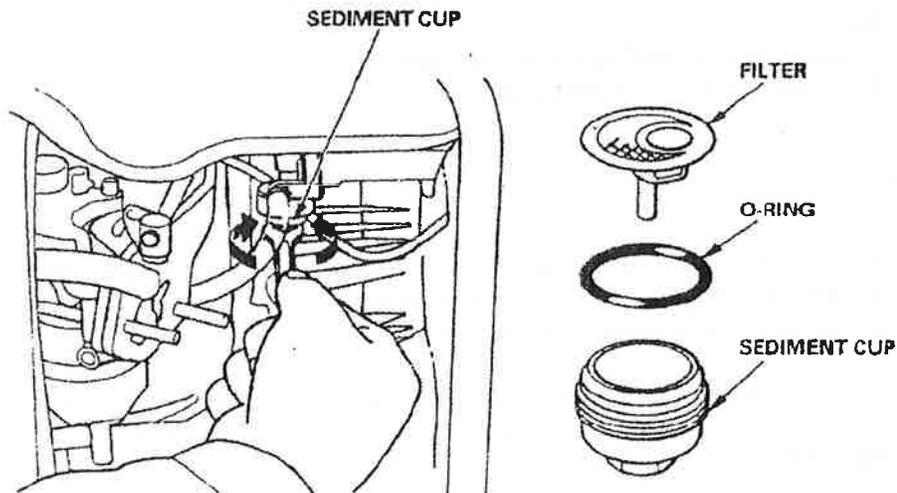
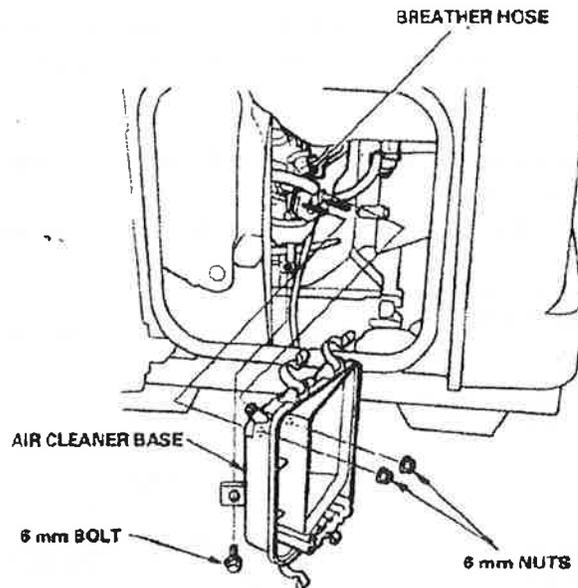
7) Remove the sediment cup by turning it counterclockwise.

8) Clean the sediment cup, O-ring, and filter in a nonflammable or high flash point solvent.

9) Reinstall the filter, O-ring, and sediment cup.

10) Reinstall the air cleaner base and reconnect the breather hose.

11) Reinstall the paper air filter and air cleaner cover.

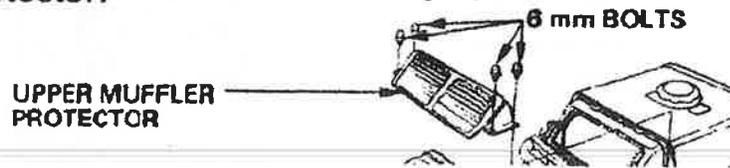


SPARK ARRESTER MAINTENANCE

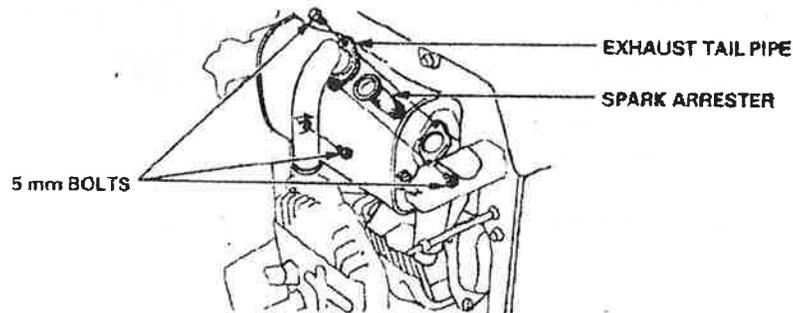
If the CUB-20 has been running, the muffler will be very hot. Allow it to cool before servicing the spark arrester. The spark arrester should be cleaned every 100 hours of operation.

- 1) Remove the CUB-20 outside enclosure by removing the 6 tamper proof screws around the bottom.
- 2) Remove the 6 mm bolts on the upper muffler protector grill.

- 3) Remove the three 5 mm bolts and remove the exhaust tail pipe and spark arrester.



- 4) Use a brush to remove carbon deposits from the spark arrester.
- 5) Inspect the screen for breaks or tears and replace if necessary.
- 6) Reinstall the spark arrester and other parts.



BATTERY

The generator's engine has a 0.5 Amp. Charging system to charge the battery while the engine is running. If the CUB-20 is used only periodically, the battery may have to be recharged monthly to maintain the battery service life.

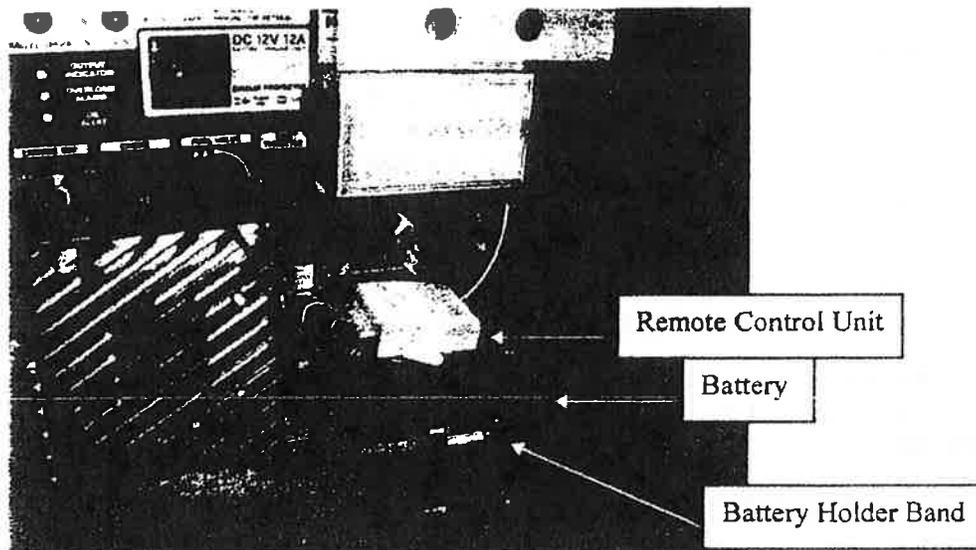
The lead acid battery self discharges at a rate of 0.5 to 1.0% per day. This means that the battery can discharge as much as 30% over a month. This could cause the engine not to crank or shorten the service life of the battery.

The battery used in the CUB-20 is an 8 Amp-Hour battery and should be charged at a **0.8 Amp rate for 3 to 4 hours** or according to the battery charger instructions.

-----**WARNING**-----

- The battery gives off explosive gasses. Keep sparks, flames and cigarettes away from the battery while charging.
- The battery contains sulfuric acid. Avoid contact with skin and eyes. Flush with water if contact occurs.

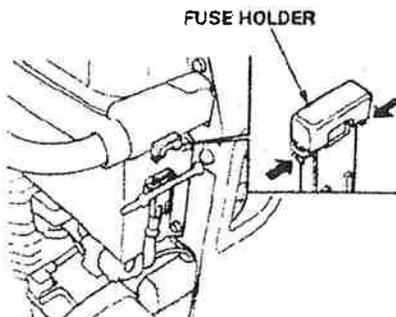
The picture below shows the location of the battery inside the CUB-20.



The CUB-20 enclosure must be removed to get access to the battery.

STARTER MOTOR FUSE

The starter motor is protected with a **5 Amp** fuse. If the Starter Motor won't work and the battery is charged, check the fuse. The fuse is located above the battery as shown below:



STORAGE

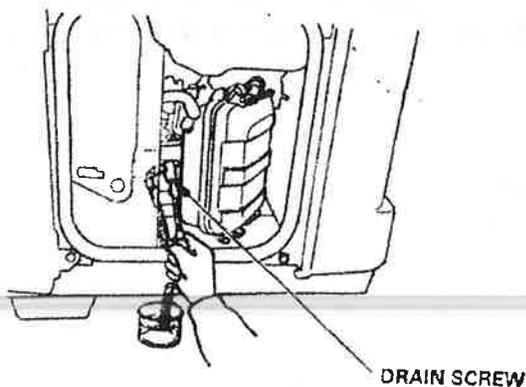
If the CUB-20 is going to be stored for any period of time, follow the recommended service procedure to prevent hard starting.

STORAGE TIME	SERVICE PROCEDURE
Less than 1 month	No preparation required
1-2 months	Fill with fresh gasoline and add gasoline conditioner
2 months to 1 year	Fill with fresh gasoline and add gasoline conditioner. Drain the carburetor float bowl. Drain the fuel sediment cup
1 year or more	Fill with fresh gasoline and add gasoline conditioner. Drain the carburetor float bowl. Drain the fuel sediment cup. Remove Spark Plug. Put a tablespoon of engine oil into the cylinder. Turn the engine slowly with the starter grip to distribute the oil. Reinstall the spark plug. Change the engine oil. After removal from storage, drain the stored gasoline into a suitable container and fill with fresh gasoline.

As can be seen from the above chart, it would make sense to run the CUB-20 on a regular basis to keep it in good running shape and prevent going through a major storage procedure.

STORAGE PROCEDURE

- 1) Drain the carburetor and fuel sediment cup.
 - a. Remove the CUB-20 Enclosure
 - b. Loosen the carburetor drain screw
 - c. Drain the gasoline from the carburetor into a suitable container.
 - d. Tighten the carburetor drain screw.
 - e. Drain the fuel sediment cup.



- 2) Change the engine oil.
- 3) Remove spark plug and add a tablespoon into the cylinder. Crank the engine several revolutions and reinstall spark plug.
- 4) Slowly pull the starter grip until resistance is felt. This makes sure that the valves are both closed for storage.
- 5) Once a month recharge the battery.

WIRING DIAGRAM

