

B+S

# **OWNER'S MANUAL**

## **PORTABLE ALTERNATORS**

## SAFETY FIRST

**WARNING:** It is required that you are aware of the following recommended procedures for Operator's personal safety.

- Never run the gasoline engine (driving your alternator) in your basement or where area is occupied without an approved ventilating and exhaust system. Exhaust fumes are poisonous.
- Gasoline and other fuels will always present a hazard of possible explosion or fire.
- Keep alternator and engine clean. Remove all oil or gasoline deposits, and accumulated dirt from set and immediate area. Poor housekeeping creates a fire hazard.
- Keep a fire extinguisher close by your set and be familiar on how to use it. Consult your local fire department for correct extinguisher type.
- Do not use open flame, braze, cutting torch, arc welding, smoking, etc. near the alternator or engine fuel tank.
- Guard yourself against electric shock. Avoid personal contact with live terminals, wires or receptacles. The electric output voltage in your alternator can produce a fatal electric shock.
- Use the utmost extreme care if it becomes necessary to operate your alternator in the rain, snow, outdoor wet areas or damp cement.
- Use approved three-prong grounded plugs and three wire cords.
- The alternator must be properly grounded. There is a ground lug (labeled) provided on each set for connection by means of copper wire to metal rod driven into earth.
- The operator must remain alert when using or repairing this set. Keep safety guards and shields in place and secured. Avoid hot mufflers, exhaust manifolds and engine parts which may cause severe burns.
- Never work on the set when you are tired. Do not wear loose clothing, dangling necktie, sleeves, long hair, etc. that could become caught in moving parts.
- Lead-acid batteries emit a hydrogen gas when being charged that is very explosive. Do not smoke or be around open flame when charging or servicing battery.
- Do not disconnect battery on electric start models when set is running or cranking. The sparks during disconnection may produce fire or explosion.
- Battery acid can produce skin and eye damage. Use extreme caution when handling any battery.
- Consult a qualified licensed electrician when using your alternator as a home standby set. If you wire alternator output into commercial power wiring (home wire system), certain safety conditions must be met or serious shock and fire hazards could exist.

**WARNING:** (continued)

- The Home standby installation must comply with all National, State and Local codes.

All gas fuels such as natural gas or LPG must have a separate shut-off for fuel so that unit, during standby condition, does not have fuel pressure to carburetor.

**CAUTION:**

- Your set is equipped with an air-cooled engine which must have good circulation of air. Any attempts to run the engine in a small, non-ventilated compartment or sound-proof box may seriously damage the engine and the alternator.
- Check the oil every time you fill the gas tank or at least every 5 hours. The weight of oil used depends on ambient temperature of which unit operates.
- The engine should not be used with an external pressure fuel pump.
- Always check wattage requirements on nameplates of motors or appliances before attempting to operate them from the alternator. Remember, motors need additional power to start as opposed to after they are running. See motor and appliance chart in wattage requirements section.
- The external electric load should be applied after alternator is running.
- Engine speed is directly proportional to alternator output. If this speed is incorrectly adjusted by user, serious damage can be done to plugged in load by applying too high or too low voltage to the tools or appliances. Also, high voltage and high speed could destroy the internal parts of alternator.
- If an extension cord is necessary, always use as short a length as possible. The longer the cord, the greater the voltage drop, resulting in less power to the connected load. Consult an electrician for proper gauge on extension cords of 50 feet or longer.
- Exercise your gen-set during periods of infrequent use. You should start and run the set for at least 10-15 minutes, every three weeks to keep engine parts lubricated and to keep copper/bronze parts such as slip ring from forming oxide insulator formations.
- Always follow recommendations of manufacturer on oil changes, filter checks and inspections of all normal wear items.

This manufacturer recommends that all repair and service work be performed by only qualified electrical apparatus servicemen. Use only factory approved repair parts.

## SECTION 4 OPERATIONS

### BEFORE STARTING:

Visually inspect the set before the initial start-up and check for any loose or missing parts or shipment damage. Fill the fuel tank with clean, regular grade gasoline. Un-leaded gasoline will also work in the engine. Premium grades should be avoided.

**WARNING:** A hot muffler on engine head is a potential fire hazard. Never fill the fuel tank while unit is hot, or running or in the dark.

Fill crankcase with good quality oil. SAE 30 or 10W-40 is recommended when temperatures are above 40 degrees F. Below 40 degrees F, you should use SAE 5-W-20 or 5-W-30.

**CAUTION:** Do not overfill crankcase and do not mix oil with gasoline as both actions will damage the engine.

Open the fuel shut-off valve below the fuel tank. Remove all electrical loads hooked to the alternator outlets. Never start the engine under load. If the engine has a mechanical type stop lever, make sure it is not touching the spark plug. See Figure 1.

### STARTING:

Adjust the carburetor manual choke as necessary for existing temperature conditions. Smaller engines have a push/pull type of choke while larger ones have a rotary type of lever. Cold starting requires a full choke. Pull the recoil starting rope with a fast steady pull.

**CAUTION:** Do not let it fly loose back into the recoiler as it may damage this mechanism.

As the engine starts, and begins to warm up, adjust the choke back to the open position. The set should be running at the correct pre-set speed and the alternator is now producing electric current. See Figure 1.

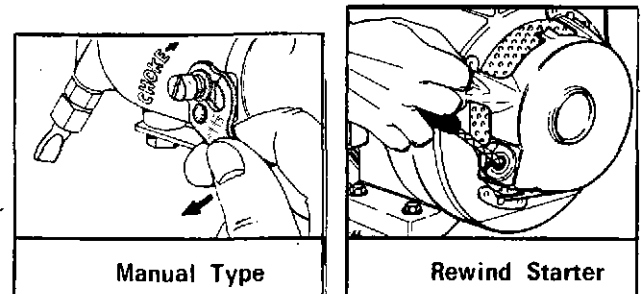
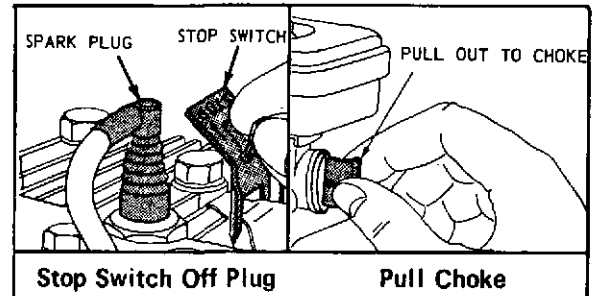
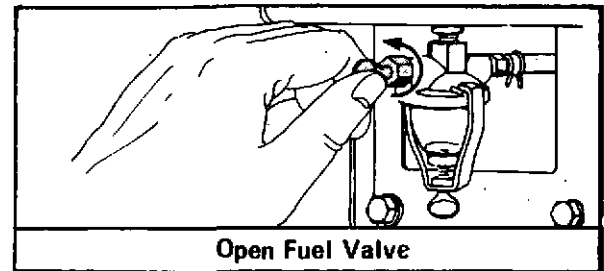


Figure 1

**WARNING:** Gasoline engines give off deadly carbon monoxide exhausts. Never run the engine in the basement of your house or other occupied areas without approved ventilation.

Units with automatic chokes are preset at the factory and will require no further adjustments or manual engagement. Units with attached engine electric starters will have a momentary contact, push button starter. After the electric starter has been connected to a 12 VDC (35 amp/hr. minimum size) battery, hold the start button in, adjust the manual choke to closed position and the engine will start. Release the button and the engine starter will disengage. Also, open manual choke slowly. See Figure 2.

## OPERATION (Continued)

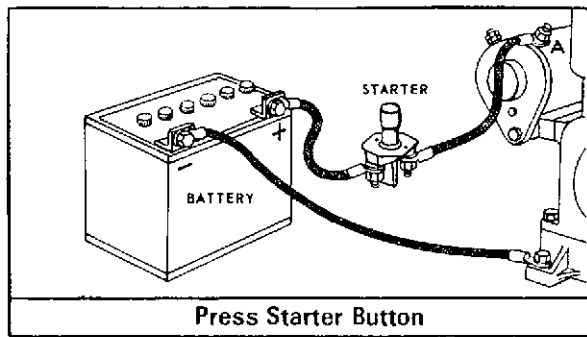


Figure 2

**WARNING:** Batteries emit explosive hydrogen gas. Smoking, open flame or sparks can cause an explosion. Vented batteries should be used whenever possible.

### APPLYING THE LOAD:

Allow the unit to reach normal operating speed & temperature. Avoid connecting an extremely heavy load until after the first one-half hour of operation. Keep the electrical load within the nameplate rating. Continuous overloading may shorten the life of engine and the alternator. Connect load by inserting load plug into the proper receptacle on the set. Use 3-prong plugs to comply with the National Electrical Code (NEC) and Occupational Safety and Health Association (OSHA).

**WARNING:** One side of current producing load line is internally grounded to alternator frame which forms neutral side. Consult wiring diagram to determine where neutral and hot line could result in dangerous shock hazard.

All sets are equipped with an external grounding lug and so marked.

It is advised by NEC to physically ground the unit by attaching wire to this lug and to a good ground device such as cold water pipe, rod driven two feet into the earth or other approved grounds. Consult tables at end of book for sizing set when running motors and appliances.

## OPERATION IN SPECIAL ENVIROMENTS:

When using your alternator set in camping and recreational activities, extreme care should be used if the engine is near dry forest, covered brush or dry grass, which could catch fire from engine heat or exhaust spark.

**WARNING:** The alternator must have a U.S.D.A. approved spark arrestor muffler to be used in all State and National parks or campgrounds.

Also, many Western states require this type of exhaust spark protection on all gasoline engines used anywhere in their states. A spark arrestor screen is available for all sets.

Do not enclose the alternator set into a confined area such as weatherproof-sound-proof housings, recreational vehicle motor homes or travel trailers.

**WARNING:** Operation of this set into an enclosed compartment of a recreational motor home or other vehicle compartment is a possible fire hazard and is prohibited by manufacturer.

Ventilation is important for both personal safety and the life of the engine. It is not recommended to run the set indoors. The portable sets are designed for outdoor operation. Indoor operation requires incoming and outgoing cooling air, special muffler with exhaust line outdoors, special fuel considerations.

**WARNING:** Always provide adequate ventilation for engine operation. The exhaust of engine contains deadly carbon monoxide gases and can cause sickness and possible death if inhaled.

When operation of set during conditions of rain and snow, exert extreme care that you are not in contact with wet earth. Always ground your portable set to earth by means of a metal stake or a ground rod driven into the earth at least two feet. A no. 8 copper stranded ground wire is attached to this rod and the ground lug (so marked) attached on the alternator set. This is in compliance with National Electric Code.

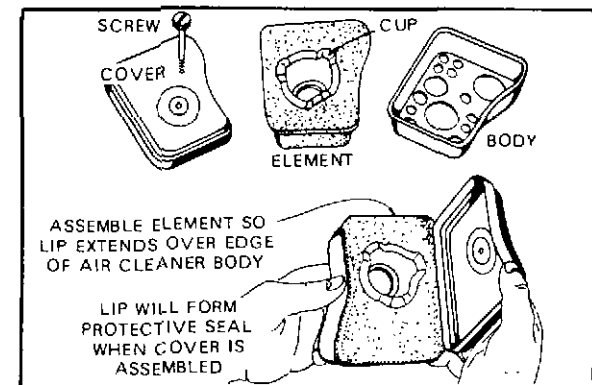
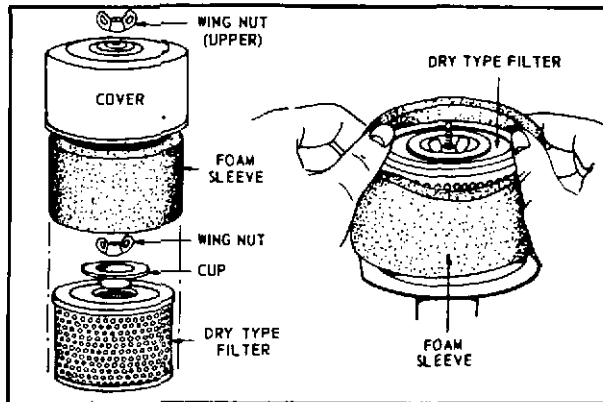
**OPERATION**  
(Continued)

**WARNING:** The set must be properly grounded to earth for prevention of possible shock hazard.

Low and high temperature operation is dealt with separately. Consult your engine manual or local engine dealer for oil recommendations and type of gasoline to be used. Operation in severe dust or dirt environment can cause early engine failure.

**CAUTION:** Check engine air cleaner every 5 hours of operation and cooling shroud around engine air passages every 10 hours in severe dust area.

Clogged filters and air passages will destroy engine life. Under normal conditions, it is recommended that the oil be changed in engine crankcase every 25 hours of operation and the engine air cleaner be serviced every 30 to 35 hours of operation. See Figure 3.



Clean Air Cleaner

Figure 3

**USING THE RECEPTACLE PLATE:**

All sets are equipped with 3-prong grounded receptacles that will comply with OSHA and NEC specifications. All plugs (caps) should be of the 3-prong ground type, attached to the proper 3-wire cord. All extension cords should be of the 3-wire (ground) type. Figure 4 shows receptacle plate installed on the 1.25, 1.75 and 2.25 KW models with 120 volt output, using a duplex, 15 amp receptacle. Figure 5 shows receptacle plate installed on 1.25, 1.75, 2.25, 3.25, 4 and 5 KW models with dual voltage 120/240 output, using a 15 amp 240 volt duplex receptacle and a 15 amp 120 volt duplex receptacle which is split connected for individual one-half wattage output of the specific alternator. (See figure 10.) Figure 6 shows receptacle plate installed on 3.25, 4 and 5 KW models with dual voltage 120/240 volt output using a voltage power toggle switch (connected internal power leads

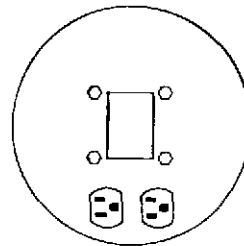


Figure 4

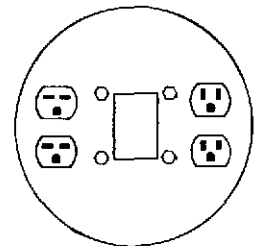


Figure 5

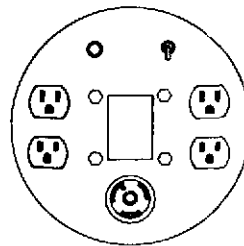


Figure 6

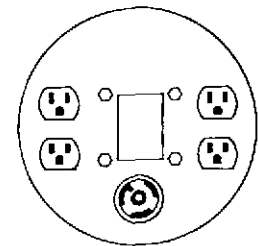


Figure 7

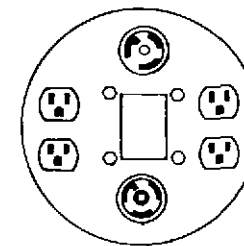


Figure 8



Figure 9

**OPERATION**  
(Continued)

from series to parallel circuits) which allows full wattage output on either voltage and through any receptacle (see figure 11-B), a power indicating neon lamp, (2) 120 volt duplex 15 amp receptacles, and a 240 volt, 3-wire twist-lock 20

240 volt 3 wire twist-lock receptacle, a large illuminating light (night operation) and a full wattage output selector switch for full power on any voltage. Single voltage (bottom picture) 120 volts only has (2) 120 volt 3 wire twist-lock 20 amp receptacles and a large illuminating light.

**PROPER USE OF RECEPTACLES:**

The three basic output receptacle configurations offered are 120 volt output, 120/240 volt output and 120/240 volt output with voltage selector switch. Proper use of the voltage outlet receptacles installed on your alternator is necessary to avoid alternator and receptacle damage and to insure satisfactory operation.

**CAUTION:** Do not plug in loads that exceed the amperage rating of the receptacle. This will cause receptacle burn-outs and internal alternator damage. The user must realize that his alternator is not a source of unlimited electric power. The nameplate rating of each set can be obtained by using a combination of receptacles on face plate or through a single receptacle ampere rating is not exceeded. On dual voltage models and models having voltage selector switch, 120 volt and 240 volt receptacles can be used at the same time. **NOTE:** On voltage selector switch models, the switch must be on the 120/240 V position.

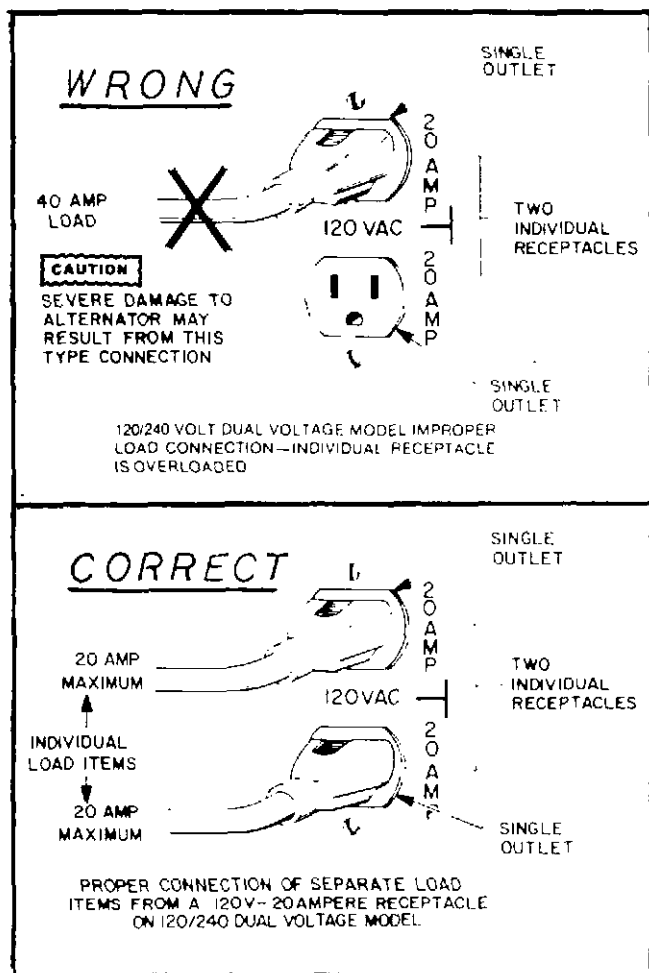


Figure 10

amp receptacle. Figure 7 shows receptacle plate installed on 6.5 and 7.5 KW models with dual voltage 120/240 volt output using (2) 120 volt, 20 amp duplex receptacles and a 240 volt, 3 wire twist-lock 30 amp receptacle. Figure 8 shows receptacle plate installed on 8.5 KW model with dual voltage 120/240 volt output using (2) 120 volt 20 amp duplex receptacles, a 120 volt 30 amp 3-wire twist-lock receptacle and a 240 volt 30 amp 3-wire twist-lock receptacle. Figure 9 shows side mounted receptacle panel (fire department models). Dual voltage (top picture) 120/240 volt output has (2) 20 amp 120 volt 3 wire twist-lock receptacles, a 20 amp

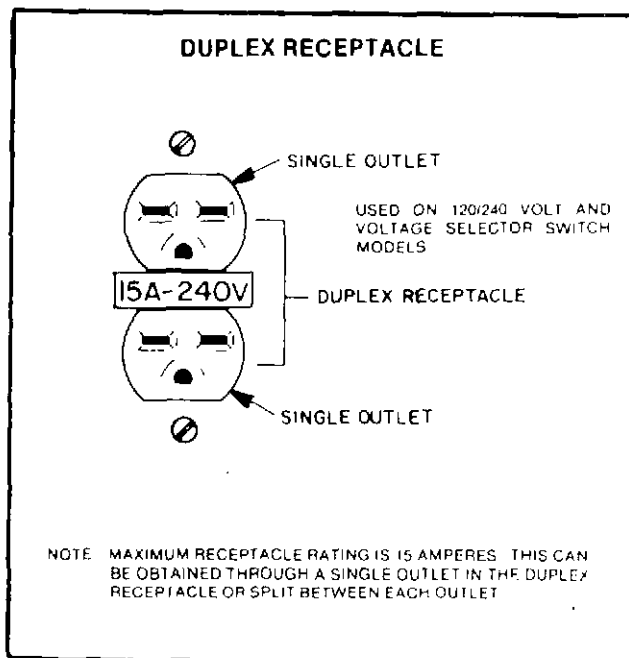


Figure 11

**OPERATION**  
(Continued)

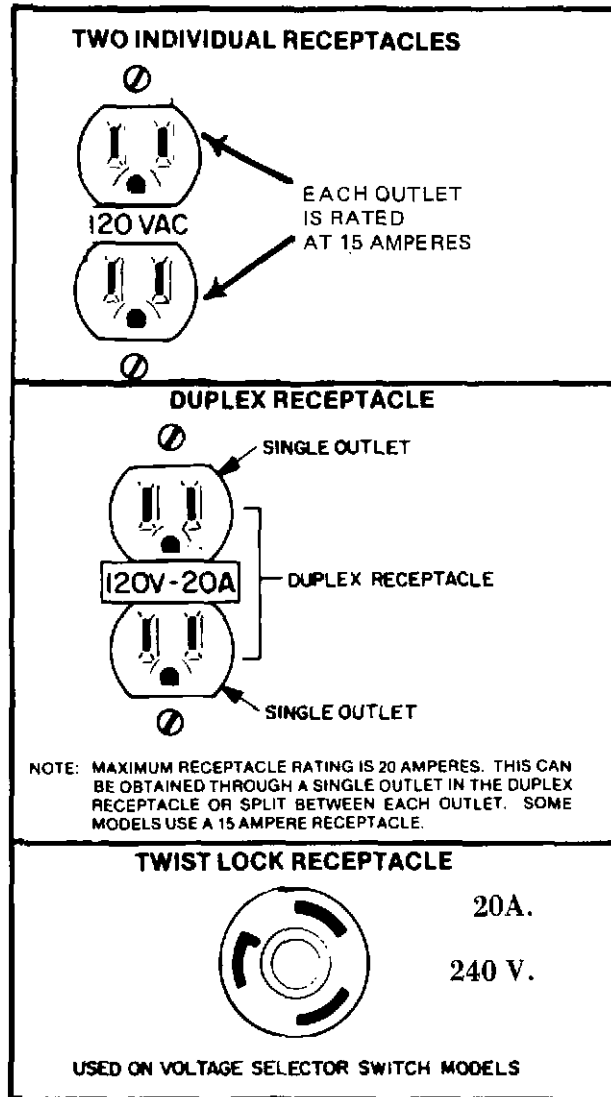


Figure 11-A

**VOLTAGE SELECTOR SWITCH:**

When 120 volt only is selected, the full wattage capacity of alternator can be drawn from all duplex receptacles without the danger of one-half wattage output for each duplex receptacle as is common practice among all other generator sets. In this switch position, the 240 volt receptacle is powerless. When 120/240 volt is selected, the full wattage capacity of alternator can be drawn from the 240 volt 3 wire twist-lock receptacle but only one-half of the rated wattage should be used on the 120 volt duplex receptacles. In the OFF switch position, all receptacles are powerless and its primary purpose is to cause a momentary delay in fast switching from one voltage to another without switch damage.

**CAUTION:** Fast switching from one voltage to another or switching while alternator is under load, may cause damage to the voltage selector switch. In the 120/240 volt

position, full wattage capacity can be drawn from the 240 volt receptacle; but only half of the alternator wattage rating can be obtained from any of the 120 volt receptacles.

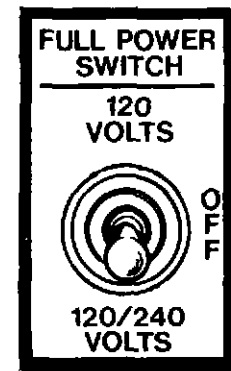


Figure 11-B

**PILOT LIGHT:**

Some models are equipped with a neon light. This light is for the main purpose of showing that the alternator is producing a voltage. Foot-mounted, shaft extended alternators only for belt drive application may have voltmeters installed as optional equipment so that correct speed can be determined by watching voltage registered on voltmeter. Figure 12 shows the operation of the voltmeter for various models.

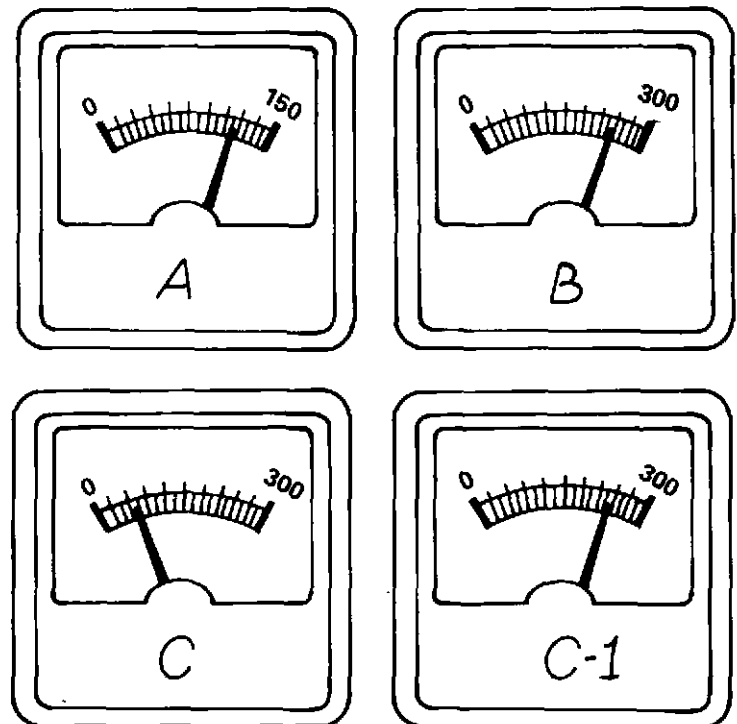


Figure 12

VOLTMETER "A" shows proper needle deflection for operation on 120 Volt Alternators. VOLTMETER "B" shows proper needle deflection for operation on 120/240 Volt or 240 Volt only. VOLTMETER "C" shows proper needle deflection for operation on 120/240 Volt alternators equipped with full output dual voltage switch, while switch is in the 120 Volt position. VOLTMETER "C-1" is the same meter and shows proper needle deflection when switch is in the 120/240 Volt position.

## OPERATION (Continued)

### LOAD DISCONNECTION:

The alternator is inherently self-regulating and will adjust itself as to voltage output as load is applied. The engine governor is a mechanical fly-ball type and compensates in speed for load variations. If possible, it is most desirable to remove load gradually.

**CAUTION:** Removing a full rated load or severe overload immediately may damage field rectifiers.

A shorted load or repeated connection and disconnection of full load (more than six times per minute) may destroy permanent magnets in rotor.

### SHUTDOWN:

Remove the electric load and let engine run a few minutes. Push the STOP lever against spark plug (push STOP button if engine is equipped with it) until unit comes to a complete stop. Releasing the stop mechanism too soon may allow the engine to start up again and continue to run. Never leave the set until the engine has completely stopped.

**WARNING:** On spark plug, stop lever models, a severe shock will result if the terminal of spark plug is touched while pushing stop lever toward the spark plug. See Figure 13.

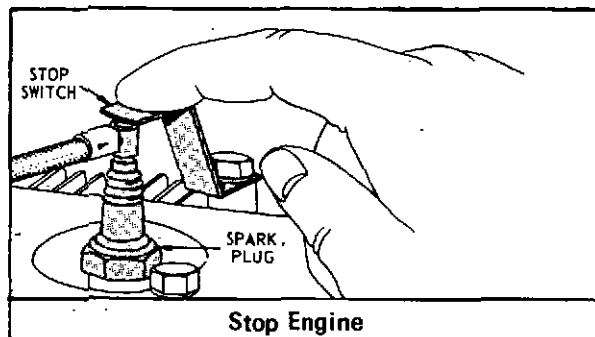


Figure 13

### APPLYING THE LOAD:

Allow the alternator to reach normal operating speed and temperature. Avoid connecting an extremely heavy load until after the first one-half hour of operation. Keep the electrical load within the nameplate rating. Continuous overload may shorten the life of the alternator and the engine. Connect load by inserting load plug (cap) into the proper receptacle on receptacle plate. Use 3-prong plugs (caps) to comply with the National Electrical Code (NEC) and Occupational Safety & Health Association (OSHA).

**WARNING:** This unit must be properly grounded to prevent a lethal electric shock hazard. All sets are equipped with a ground lug and marked as such.

A No. 8 copper stranded ground wire must be attached to this lug and the other end of wire attached to a suitable ground such as a metal stake driven at least two feet into the earth.

**WARNING:** Conductors on 5 KW and smaller units are not grounded to alternator frame. On 6 KW and higher sizes, one side of current producing load line is internally grounded to alternator frame which forms neutral side.

Consult your local electrician to determine where neutral line is before you wire alternator output into other switch boxes, controls or anything else other than portable plugged-in equipment. Reversing the neutral and hot line could result in dangerous shock hazard.

**CAUTION:** Be sure to keep the plugged in load on alternator, within the nameplate of the plugged in equipment (motor, drill, heater, etc.) multiplied by the voltage that alternator produces equals the watts consumed --  
(volts x amps = watts).

## OPERATION (Continued)

The nameplate ampere rating of an electric motor must be multiplied by a factor of 3 in compensating for the starting winding load. See motor starting and appliance load at end of book. Do not increase engine speed to start large motors or to compensate for long extension cords. The engine is designed to operate at 3600 RPM.

**CAUTION:** Excessively high engine speed results in severely high voltage output which could damage loads such as lights, television, record players, etc.

### INFREQUENT SERVICE:

If the alternator set is used infrequently, it may become difficult to start the engine. Gasoline will form a varnish-like residue when left in the fuel system for long periods of time. This tends to clog up the fuel lines and carburetor. There are gasoline additives that prevent varnish build-ups which can be purchased from your local engine dealer. Also, the slip ring of alternator may become corrosive. This will set up an oxide film which actually insulates the brushes from slip ring and stop all electrical output. Run a commutator stone or sandpaper over the slip ring to solve the problem.

### LONG PERIODS OF STORAGE:

If your set is to be used very infrequently, or is to be stored away for a long time, the following procedure should be used:

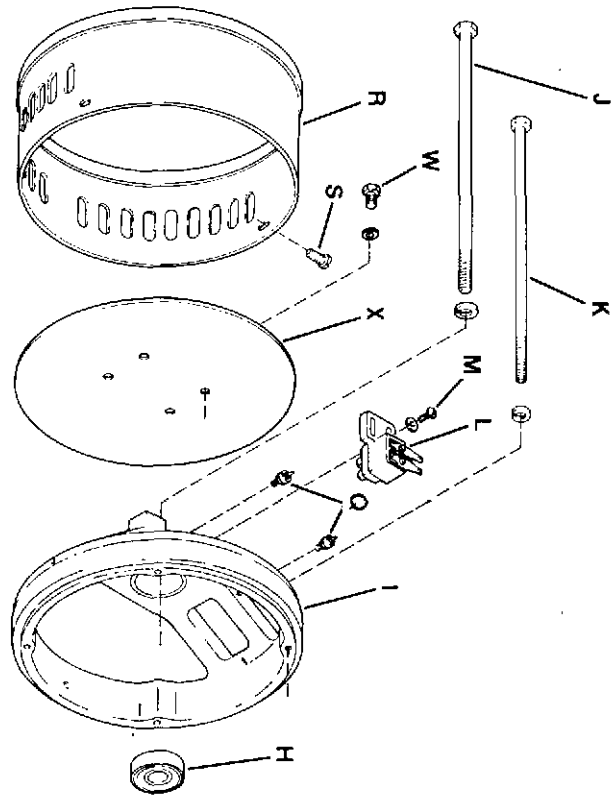
1. Run your set until it is of normal operating temperature (approximately 15 minutes).
2. Drain all fuel from tank and carburetor fuel bowl.
3. Drain all oil from engine crankcase and fill with correct, fresh oil.
4. Service air cleaner.
5. Plug exhaust outlet to prevent entrance of foreign items or dirt.
6. Remove spark plug and pour one ounce (2 tablespoons) of heavy SAE-50 oil or a rust inhibitor into top of cylinder. Crank the engine slowly by hand and replace the spark plug.

7. Plug all alternator holes to prevent dirt, bugs and rodents from entering.
8. Coat items that are susceptible to rust with a thin coat of oil or grease.
9. Provide unit with protective cover.
10. Before putting set back in service, remove all plugs and protective covering, material, etc. Remove spark plug and pull manual rope starter several times. This will exhaust excessive oil from cylinder. Pour fresh gasoline into tank and proceed with starting the engine.

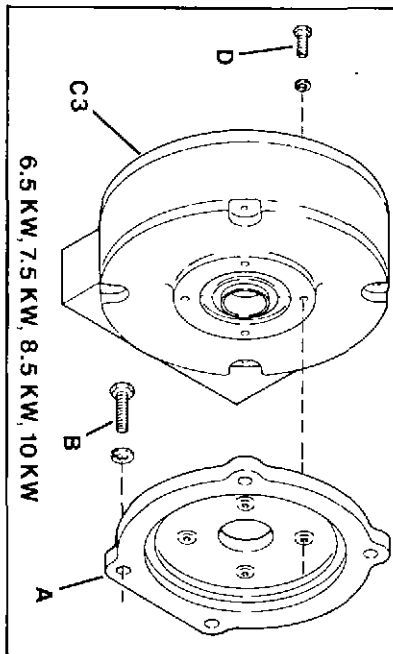
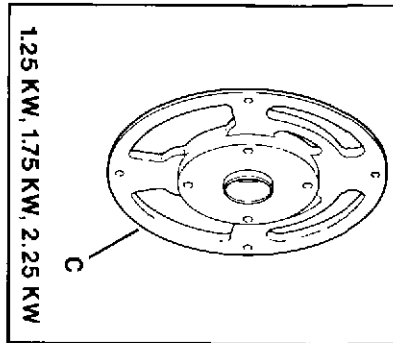
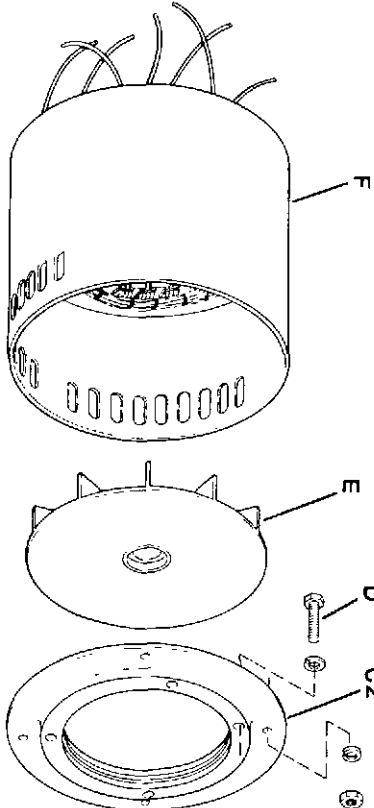
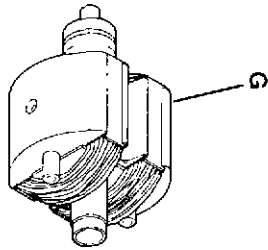
### FOOT-MOUNTED, SHAFT EXTENDED, BELT DRIVE ALTERNATORS:

These alternators are identical to the ones that are directly attached to the gasoline engine. Their main purpose is to be used where the owner has his own engine, electric motor or small garden tractor and wishes to make up his own custom alternator set. The alternator can be direct coupled or belt driven to the prime mover. The alternator can be driven in either direction of rotation. Cooling is equally efficient in either direction. The speed of your alternator must be 3600 RPM. (3000 RPM for 50 Hertz Alternators) This can be checked by using a manual tachometer on alternator shaft, or by plugging a vibrating reed type frequency meter into receptacle outlet. The alternator can also be tested with a voltmeter, plugged into the 120 V receptacle. In this manner the speed should be adjusted so that frequency is 61 hertz; or voltage is 130 on 120 V set; or voltage is 265 on 240 V set; all at no load conditions. The voltage from no load to full load is expected to vary in this manner and is perfectly safe for any appliance, motor, or lighting application. When installing your belt drive alternator, it is recommended that the belt be perfectly aligned.

**WARNING:** Make sure that the complete belt drive or coupling is guarded by full metal enclosure. Loose clothing, long hair, hands, etc., can become caught between belt and pulley while set is operating.



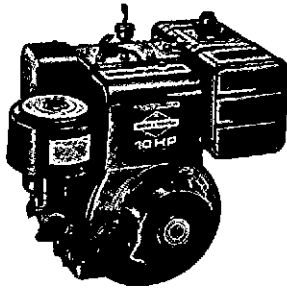
3.25 KW, 4 KW, 5 KW



**PARTS IDENTIFICATION**  
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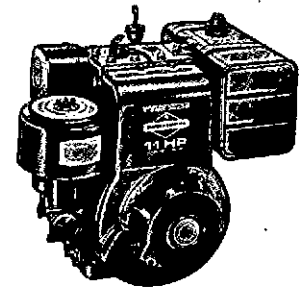
ALTERNATOR REPAIR PARTS LIST			WATTAGE								
			1250	1750	2250	3250	4000	5000	6500	7500	8500
REF. PART NO.	NO.	DESCRIPTION									
A	106	Engine Adaptor							1	1	1
B	112	1½" Lg. Hex Bolt & Washer, 7/16" Dia.							4	4	4
C	110-A	Engine Casting	1	1	1				1	1	1
C-2	110-B	Engine Casting				1	1	1			
D	114	Hex Bolt & Washer, 5/16-24, 1" Lg.	4	4	4				4	4	4
D	115	Hex Bolt & Washer, 3/8-16, 1¼" Lg.				4	4	4			
E	*116	Cooling Fan	1	1	1	1	1	1	1	1	1
F	118	Stator Assembly, 1250W (1000 w/50 HZ)	1								
F	118-1	Stator Assembly, 1750W (1500 w/50 HZ)		1							
F	118-2	Stator Assembly, 2250W (2000 w/50 HZ)			1						
F	118-3	Stator Assembly, 3250W (2750 w/50 HZ)				1					
F	118-4	Stator Assembly, 4000W (3500 w/50 HZ)					1				
F	*118-5	Stator Assembly, 5000W (4250 w/50 HZ)						1			
F	*118-6	Stator Assembly, 6500W (5500 w/50 HZ)							1		
F	*118-7	Stator Assembly, 7500W (6500 w/50 HZ)								1	
F	*118-8	Stator Assembly, 8500W (7000 w/50 HZ)									1
G	119	Rotor Assembly (1250W)	1								
G	119-1	Rotor Assembly (1750W)		1							
G	119-2	Rotor Assembly (2250W)			1						
G	119-3	Rotor Assembly (3250W)				1					
G	119-4	Rotor Assembly (4000W)					1				
G	*119-5	Rotor Assembly (5000W)						1			
G	*119-6	Rotor Assembly (6500W)							1		
G	*119-7	Rotor Assembly (7500W)								1	
G	*119-8	Rotor Assembly (8500W)									1
H	*120	Ball Bearing	1	1	1	1	1	1	1	1	1
I	109	Bearing Casting	1	1	1	1	1	1	1	1	1
J	*121	Rotor Bolt, Spacer, Washer	1	1	1	1	1	1	1	1	1
K	*122	Stator Thru Bolt, Nut, Washer	4	4	4	4	4	4	4	4	4
L	123	Complete Brush Holder Assembly w (2) Brushes	1	1	1	1	1	1	1	1	1
M	124	1/2" LG. Round Head Bolt, Washer	2	2	2	2	2	2	2	2	2
P	127	Brush	2	2	2	2	2	2	2	2	2
Q	128	Rectifier (Diode)	2	2	2	2	2	2	2	2	2
R	129	Inspection Cover	1	1	1	1	1	1	1	1	1
S	130	Cover Screw, 10-24, ½" Lg.	2	2	2	2	2	2	2	2	2
T	131	120 V Duplex Receptacle	1	1	1	1	1	1	1	1	1
T-1	131-A	240 V Duplex Receptacle	1	1	1	1	1	1	1	1	1
U	132	Indicator Light	1	1	1	1	1	1	1	1	1
V	133	Receptacle Screw, Nut and Washer	2	2	2	6	6	6	8	8	8
W	134	Face Plate Screw, Washer	4	4	4	4	4	4	4	4	4
X	*135	Face Plate	1	1	1	1	1	1	1	1	1
Y	136	120 V Receptacle, 30 Amp.				1	1	1	1	1	1
Y-1	136-A	240 V Receptacle, 30 Amp.							1	1	1
Z	137	Dual Voltage, Full Output Switch				1	1	1			
	138	Briggs & Stratton Engine, 3 HP	1								
	139	Briggs & Stratton Engine, 5 HP		1	1						
	*140	Briggs & Stratton Engine 8 HP				1	1				
	*141	Briggs & Stratton Engine 10 HP						1			
	*142	Briggs & Stratton Engine 16 HP							1	1	
	*143	Briggs & Stratton Engine 18 HP									1

\*These parts will vary in size and length according to the different style of engines that are used to drive the alternator. For this reason, full information of model number and serial number will be required when ordering parts. For all foot mounted alternator only parts, add suffix "B" to above listed items.



## Briggs & Stratton OPERATING AND MAINTENANCE INSTRUCTIONS MODEL SERIES

### 221400 to 221499 252400 to 252499



#### IN THE INTEREST OF SAFETY

**DANGER:** DO NOT RUN THE ENGINE IN AN ENCLOSED AREA. Exhaust gases contain carbon monoxide, an odorless and deadly poison. A FIRE OR EXPLOSION CAN OCCUR RESULTING IN PERSONAL INJURY IF THE FOLLOWING INSTRUCTIONS ARE NOT FOLLOWED:

1. DO NOT FILL GASOLINE TANK while engine is running. Refuel, ONLY, after engine has cooled down.
2. Do not operate the engine when an odor of gasoline is present or other explosive conditions exist.
3. If gasoline is spilled, move machine away from the area of the spill and avoid creating any source of ignition until the gasoline has evaporated.
4. DO NOT STORE, SPILL OR USE GASOLINE NEAR AN OPEN FLAME, or devices such as a stove, furnace, water heater which utilize a pilot light, or devices which can create a spark.
5. Refuel outdoors preferably, or only in well ventilated areas.
6. DO NOT OPERATE ENGINE WITHOUT A MUFFLER, inspect periodically and replace, if necessary.
7. Periodically clean the muffler area to prevent grass, dirt and combustible material from accumulating.
8. DO NOT use this engine on any forest covered, brush covered or grass covered unimproved land unless a spark arrester is attached to the muffler.
9. Except for adjustment, DO NOT operate the engine if air cleaner or cover directly over the carburetor air intake is removed.
10. When transporting equipment using an engine with a float feed carburetor and gravity fuel source, the fuel valve must be shut off.

**WARNING:** DO NOT RUN ENGINE AT EXCESSIVE SPEEDS. Operating an engine at excessive speeds increases the danger of personal injury. DO NOT TAMPER WITH GOVERNOR SPRINGS, GOVERNOR LINKS OR OTHER PARTS WHICH MAY INCREASE THE GOVERNED ENGINE SPEED.

A.N.S.I. Standard Safety Specifications for rotary power lawn mowers specify a maximum blade tip speed of 19,000 feet per minute (96.5 meters per second), primarily to reduce the danger from thrown objects.

Do not tamper with the engine speed selected by the original equipment manufacturer.

DO NOT TOUCH hot mufflers, cylinders or fins as contact may cause burns.

Dirt and grass clippings or other debris, in cooling fins or governor parts can affect engine speed. See cleaning instructions in MAINTENANCE section.

TO PREVENT HAND OR ARM INJURY, always pull starter cord rapidly to avoid kickback; starting engine with a loose blade or without a blade may cause a severe kickback.

ALWAYS KEEP HANDS AND FEET CLEAR OF MOVING OR ROTATING PARTS.

TO PREVENT ACCIDENTAL STARTING when servicing the engine or equipment, always remove the spark plug or wire from the spark plug and insert in holding tab, if so equipped, as shown on page 2.

#### WHEN WORKING ON EQUIPMENT

DO NOT STRIKE FLYWHEEL with a hard object or metal tool as this may cause flywheel to shatter in operation, causing personal injury or property damage. To remove flywheel, use Briggs & Stratton approved tools only.

#### IN THE INTEREST OF ENVIRONMENT

A muffler which leaks because of rust or damage can permit an increased exhaust noise level. Therefore, examine the muffler periodically to be sure it is functioning effectively. To purchase a new muffler, see SERVICE AND REPAIR INFORMATION.

**WARNING:** If this engine is not equipped with a spark arrester and is to be used on any forest covered, brush covered, or grass covered unimproved land, before using on such land a spark arrester must be added to the muffler. The arrester must be maintained in effective working order by the operator. In the State of California the above is required by law (Section 4442 of the California Public Resources Code). Other states may have similar laws. Federal laws apply on federal lands. See your Authorized Briggs & Stratton Service Center for spark arrester muffler options.

## SERVICE & REPAIR INFORMATION

If service or repair is needed, contact an Authorized Briggs & Stratton Service Center. To serve you promptly and efficiently, the Service Center will need the model, type and code number on your engine.

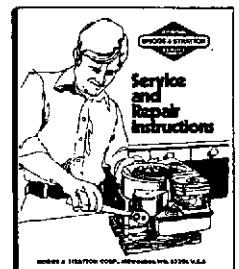
Each Authorized Service Center carries a stock of original Briggs & Stratton repair parts and is equipped with special service tools. Trained mechanics assure expert repair service on all Briggs & Stratton engines.

Major engine repairs should not be attempted unless you have the proper tools and a thorough knowledge of internal combustion engine repair procedure.

Your nearest service center is listed in the "Yellow Pages" under "Engines, Gasoline" or "Gasoline Engines". He is one of over 25,000 authorized dealers available to serve you.



This illustrated book includes "Theories of Operation", common specifications, and detailed information covering the adjustment, tune-up and repair procedures for 2 through 16 H.P. single cylinder, 4 cycle models. It is available from any Authorized Briggs & Stratton Service Center. Order as Part Number 270962.



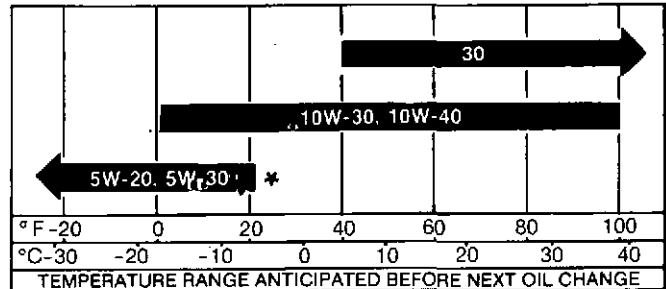
**BRIGGS & STRATTON CORP.**  
Milwaukee, Wisconsin 53201

# BEFORE STARTING

## READ THE OPERATING INSTRUCTIONS OF THE EQUIPMENT THIS ENGINE POWERS

Use a high quality detergent oil classified "For Service SF, SE, SD or SC." Detergent oils keep the engine cleaner and retard the formation of gum and varnish deposits. Nothing should be added to the recommended oil.

### RECOMMENDED SAE VISCOSITY GRADES



\*If not available, a synthetic oil may be used having 5W-20, 5W-30 or 5W-40 viscosity.

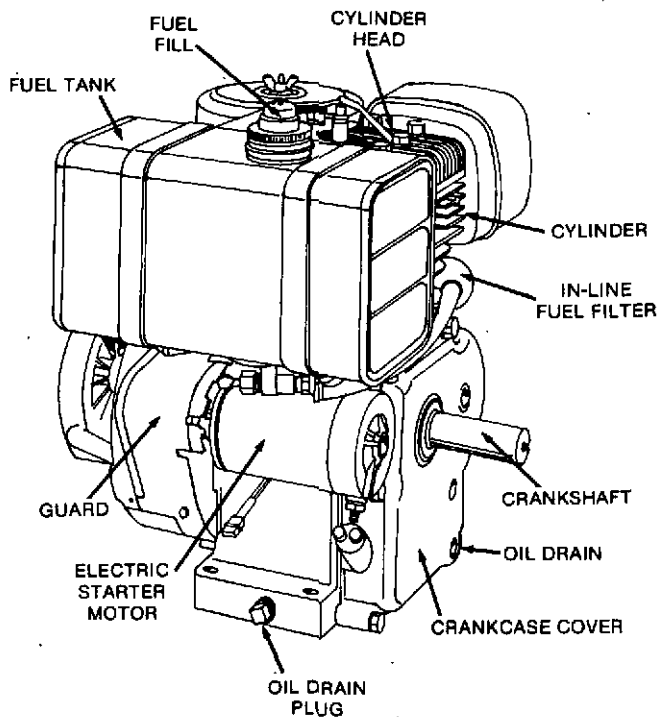
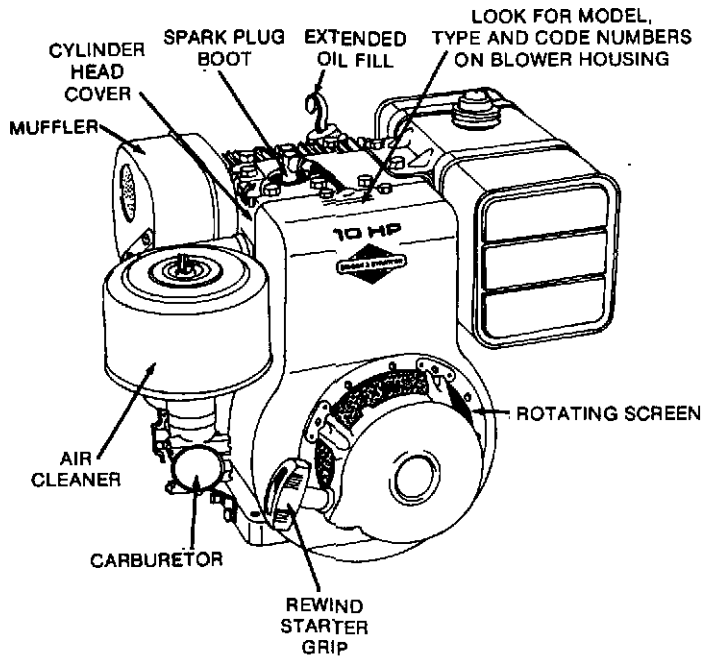
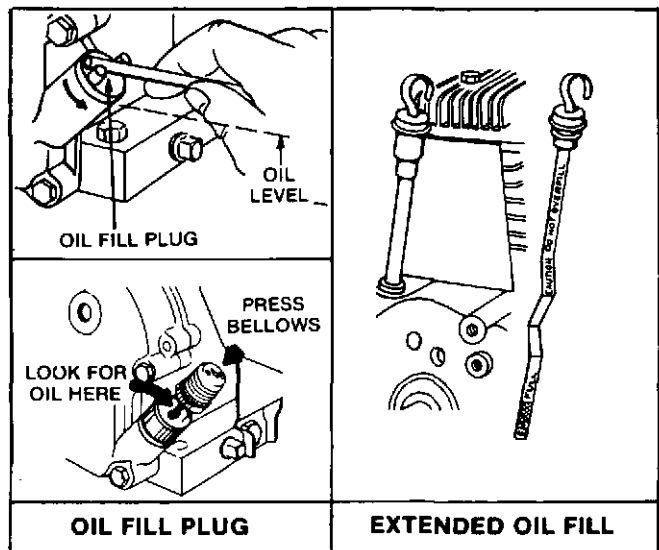
### FILL CRANKCASE WITH OIL

Place engine level. Clean area around oil fill before removing oil fill plug, dipstick or oil-minder.

Model Series	Approximate Oil Capacity
221400 .....	2½ pints (1.18 liters)
252400 .....	3 pints (1.42 liters)

**OIL FILL PLUG** Remove oil fill plug or (optional) oil-minder. Fill crankcase to point of overflowing. **POUR SLOWLY.** Replace oil fill plug or oil-minder.

**EXTENDED OIL FILL.** Remove cap and dipstick. **FILL TO FULL MARK** on dipstick, **POUR SLOWLY.** When checking oil level push dipstick assembly firmly but slowly until cap bottoms on tube. **DO NOT OVERFILL.** Dipstick assembly must be securely assembled into tube at all times when engine is operating.



## CHARGE BATTERY

Charge battery before use on engines equipped with (OPTIONAL) 12V electric starter motor. See equipment manufacturers' recommendations.

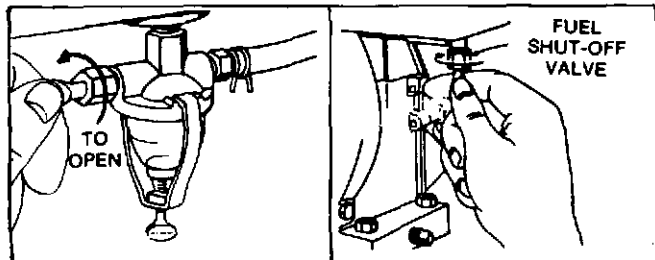
## FILL FUEL TANK

Use clean, fresh, "regular grade leaded, low-lead or lead-free" gasoline. DO NOT MIX OIL WITH GASOLINE.

NOTE: The use of "lead-free" gasoline produces fewer combustion deposits, but may shorten valve life if carburetor adjustment is too lean.

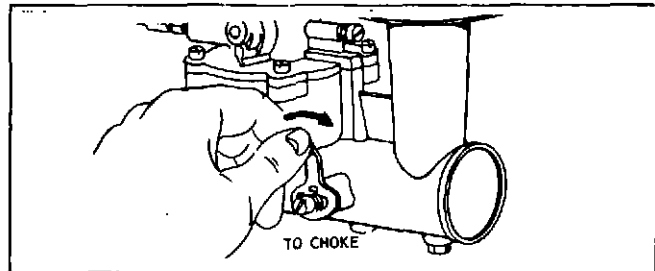
# STARTING

**OPEN FUEL VALVE**— Several turns on engines so equipped.

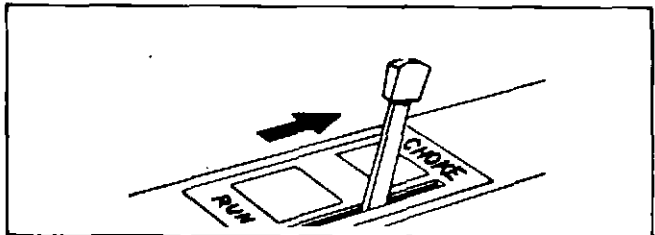


**CHOKE ENGINE:** Engine may be equipped with either manual or remote "CHOKE" controls.

**MANUAL CHOKE:** Move lever as illustrated.



**REMOTE CHOKE:** Move equipment control lever to "CHOKE" position.

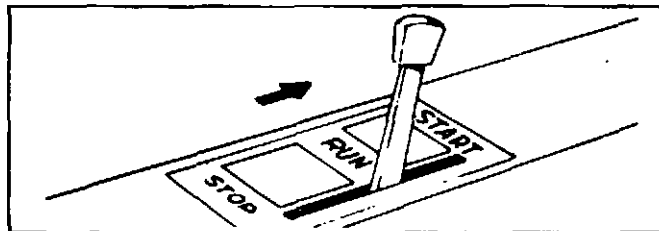


**CHOKE-A-MATIC:** Move lever to "Full Choke" or "Start" position.

NOTE: This should fully close choke on carburetor. If it does not, remote control must be re-adjusted. See ADJUSTMENT section.

NOTE: A warm engine requires less choking than a cold engine

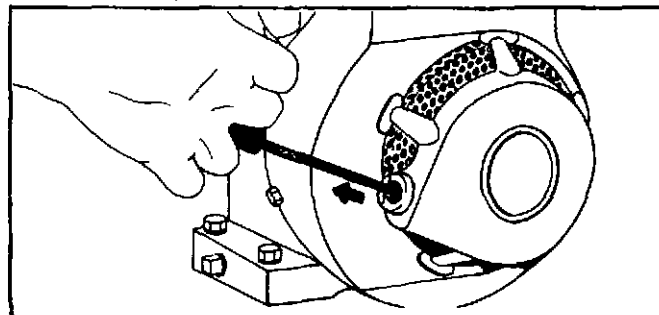
**GOVERNOR SPEED CONTROL LEVER:** Move governor speed control lever to "RUN," "FAST" or "START" position if so equipped.



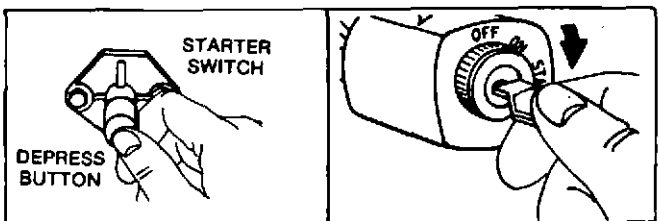
## TO START ENGINE

**DANGER: ALWAYS KEEP HANDS AND FEET CLEAR OF MOWER BLADE OR OTHER ROTATING MACHINERY.**

**Rewind Starter.** Grasp starter grip as illustrated and pull out cord rapidly to overcome compression and prevent kick-back. Repeat if necessary with choke opened slightly. When engine starts open choke gradually.



**Electric Starter.** Turn key to "Start" position and/or press starter button on powered equipment. The best starter life is provided by using short starting cycles of several seconds. Prolonged cranking can damage the starter motor if cranked more than 15 seconds per minute. When engine starts open choke gradually.



NOTE: If fuel drips out of carburetor while trying to start engine, the engine is over choked. Pull starter several times or push starter switch with choke open.

When equipment is not in operation, provide protection from direct exposure to weather.

## COLD WEATHER STARTING HINTS

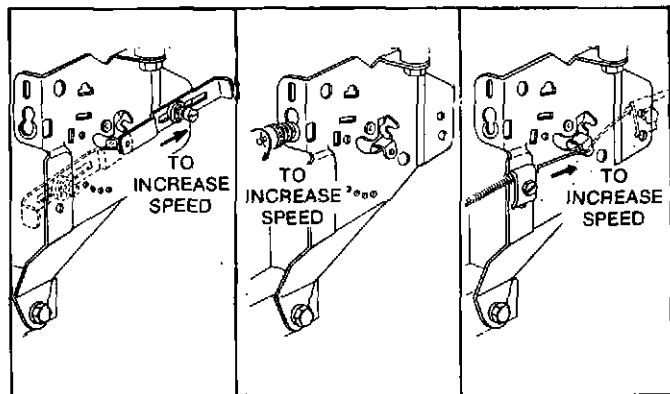
1. Be sure to use the proper oil for the temperature expected.
2. Declutch all possible external loads.
3. Set throttle at part-throttle position.
4. A slightly richer fuel mixture, obtained by turning carburetor needle valve 1/8 turn counterclockwise, will usually improve cold starting.
5. A warm battery has much more starting capacity than a cold battery.
6. Use fresh winter grade fuel.

NOTE: Winter grade gasoline has higher volatility to improve starting. Do not use gasoline left over from summer.

## GOVERNOR SPEED CONTROL ADJUSTMENTS

The acceptable operating speed range is 1800 to 3600 RPM. Idle speed is 1750 RPM. The manufacturer of the equipment on which the engine is used, specifies the top governed no load speed at which the engine may be operated. **DO NOT EXCEED** this speed.

Refer to illustration. Select the control on your engine. To increase engine speed move control in direction shown by arrow.



## GENERAL INFORMATION

These engines are single cylinder, L-head, air-cooled type.

### MODEL SERIES 221400 to 221499

Bore ..... 3-7/16" (87.31 mm)  
Stroke ..... 2-3/8" (60.33 mm)  
Displacement ..... 22.04 cu. in. (361.2 cc)  
Horsepower ..... 10 H.P. max. @ 3600 R.P.M.  
Torque (Ft. Lbs.) ..... 14.8 max. @ 3000 R.P.M.

### MODEL SERIES 252400 to 252499

Bore ..... 3-7/16" (87.31 mm)  
Stroke ..... 2-5/8" (66.68 mm)  
Displacement ..... 24.36 cu. in. (399.2 cc)  
Horsepower ..... 11 HP Max. @ 3600 RPM  
Torque (Ft. Lbs.) ..... 16.8 Max. @ 2800 RPM

The horsepower ratings listed above are established in accordance with the Society of Automotive Engineers Test Code-J607. For practical operation, the horsepower loading should not exceed 85% of these ratings. Engine power will decrease 3¼% for each 1,000 feet (304.8 m) above sea level and 1% for each 10° above 60° F (16° C).

In some areas, local law requires the use of a resistor spark plug so as to suppress ignition signals. If an engine was originally equipped with a resistor spark plug, be sure to use the same type of spark plug for replacement.

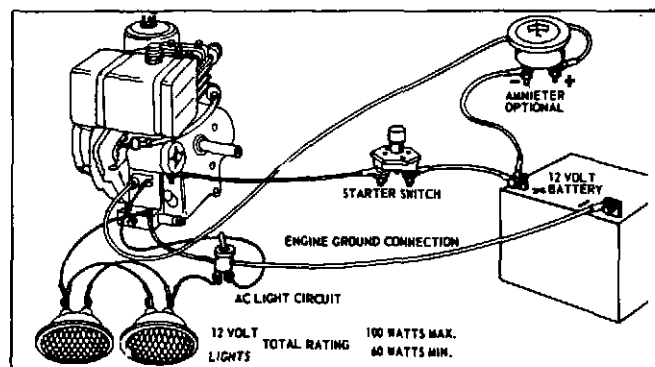
## TUNE-UP SPECIFICATIONS

	Champion	Autolite	Robert Bosch
Spark Plug Type	CJ-8	235	WS9E
Short Plug	J-8	295	—
Long Plug	RCJ-8	245	WSR9E
Resistor Short Plug	RJ-8	306	—
Resistor Long Plug			

Spark Plug Gap ..... .030" (.76 mm)  
Ignition Point Gap ..... .020" (.51 mm)  
Intake Valve Clearance ..... .005" - .007" (.13 - .18 mm)  
Exhaust Valve Clearance ..... .009" - .011" (.23 - .28 mm)

**WARNING:** For electrical safety always remove cable from negative (-) side of the battery before attempting any repairs or maintenance.

## TYPICAL WIRING DIAGRAMS



## STORAGE INSTRUCTIONS

Engines to be stored over 30 days should be completely drained of fuel to prevent gum deposits forming on essential carburetor parts, fuel filter and tank.

Note: The use of a fuel additive, such as STA-BIL, or an equivalent, will minimize the formation of fuel gum deposits during storage. Such an additive may be added to the gasoline in the fuel tank of the engine, or to the gasoline in a storage container.

- All fuel should be removed from the tank. Run the engine until it stops from lack of fuel. The small amount of fuel that remains in the sump of the tank should be removed by absorbing it with a clean, dry cloth.
- While engine is still warm, drain oil from crankcase. Refill with fresh oil.
- While engine is still warm, pour approximately one ounce (30 cc) of engine oil into cylinder and crank slowly to distribute oil. Replace spark plug.
- Clean dirt and chaff from cylinder, cylinder head fins, blower housing, rotating screen and muffler areas.
- Store in a clean and dry area.

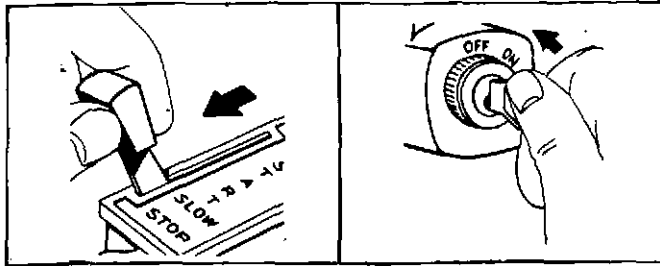
BRIGGS & STRATTON ENGINES ARE MADE UNDER ONE OR MORE OF THE FOLLOWING PATENTS:

28,950	3,149,618	3,276,439	3,526,146	3,625,071	3,968,854
2,999,491	3,194,224	3,305,223	3,572,218	3,650,354	3,882,336
2,999,562	3,236,937	3,457,804	3,572,307	3,745,393	3,901,199
3,114,851	3,242,741	3,465,740	3,625,492	3,738,345	3,981,724
3,118,433	3,252,449				4,168,288

DESIGN  
D-213,476 D-215,769 D-224,170 D-247,177  
OTHER PATENTS PENDING

## TO STOP ENGINE

Move engine stop switch or governor speed control lever to "STOP" or "OFF" position.



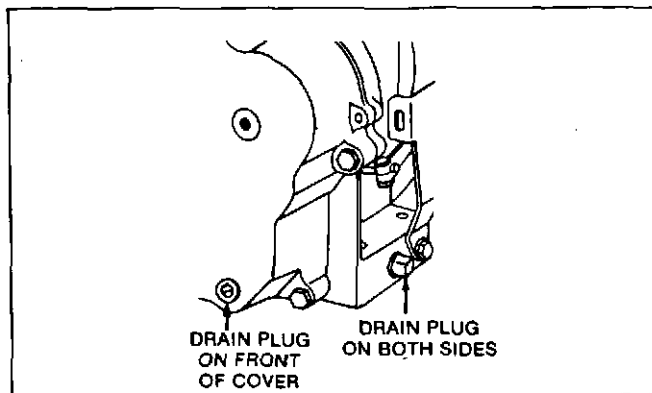
**CAUTION:** Always remove key from switch when leaving mower unattended or when mower is not in use.

**NOTE:** Close fuel shut-off valve when engine is transported to prevent fuel leakage.

# MAINTENANCE

**CHECK OIL LEVEL** regularly — after each five hours of operation. **BE SURE OIL LEVEL IS MAINTAINED.**

**CHANGE OIL** after first five hours of operation. Thereafter change oil every 25 hours of operation. Remove oil drain plug and drain oil while engine is warm. Replace drain plug. Remove oil fill plug, oil-minder or dipstick and refill with new oil of proper grade. Replace oil fill plug, oil-minder or dipstick.

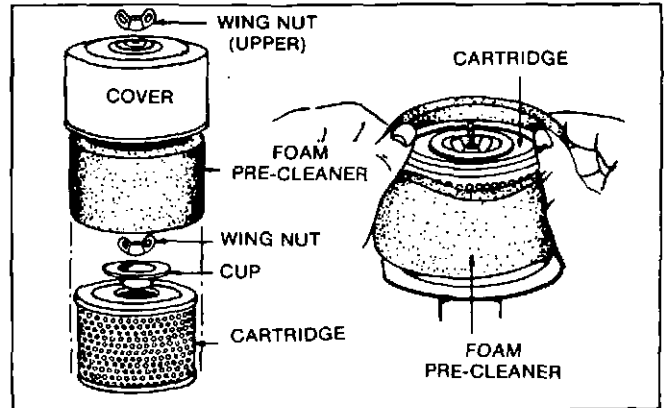


## TO SERVICE DUAL ELEMENT AIR CLEANER

Clean and re-oil foam pre-cleaner at three month intervals or every 25 hours, whichever occurs first.

**NOTE:** Service air cleaner more often under dusty conditions.

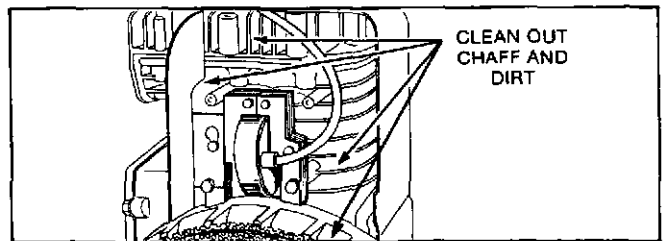
1. Remove wing nut and cover.
2. Remove foam pre-cleaner by sliding it off the paper cartridge.
3. a. Wash foam pre-cleaner in kerosene or liquid detergent and water.  
b. Wrap foam pre-cleaner in cloth and squeeze dry.  
c. Saturate foam pre-cleaner in engine oil. Squeeze to remove excess oil.
4. Install foam pre-cleaner over paper cartridge. Re-assemble cover and screw down tight.



Yearly or every 100 hours, whichever occurs first, remove paper cartridge. Clean by tapping gently on flat surface. If very dirty, replace cartridge, or wash in a low or non-sudsing detergent and warm water solution. Rinse thoroughly with flowing water from inside out until water is clear. Cartridge must be allowed to stand and air dry thoroughly before using. Service more often if necessary.

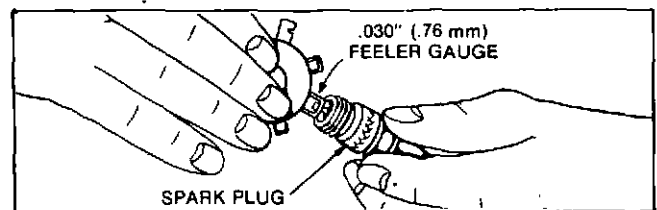
**CAUTION:** Petroleum solvents, such as kerosene, are not to be used to clean cartridge. They may cause deterioration of the cartridge. **DO NOT OIL CARTRIDGE. DO NOT USE PRESSURIZED AIR TO CLEAN OR DRY CARTRIDGE.**

**CLEAN COOLING SYSTEM** — Grass, chaff or dirt may clog the rotating screen and the air cooling system, especially after prolonged service in cutting tall dry grasses. Yearly or every 100 hours, whichever occurs first, remove the blower housing and clean the areas shown to avoid overspeeding, overheating and engine damage. Clean more often if necessary.



**DANGER:** Periodically clean muffler area to remove all grass, dirt and combustible debris.

**SPARK PLUG** — Clean and reset gap at .030" every 100 hours of operation.



**CAUTION:** Do not blast clean spark plug. Spark plug should be cleaned by scraping or wire brushing and washing with a commercial solvent.

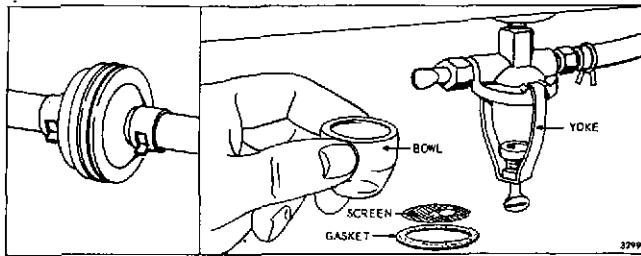
Sparking can occur if wire terminal does not fit firmly on spark plug, or if stop switch vibrates against spark plug. Reform terminal or repair switch if necessary.

**REMOVE COMBUSTION DEPOSITS** every 100-300 hours of operation. Remove cylinder head and cylinder head shield. Scrape and wire brush the combustion deposits from cylinder, cylinder head, top of piston and around valves. Use a soft brush to remove deposits. Re-assemble gasket, cylinder head and cylinder head shield. Turn screws down finger tight. Torque cylinder head screws in a staggered sequence to 165 inch pounds (18.65 Nm).

**SPARK ARRESTER EQUIPPED MUFFLER** — If engine muffler is equipped with spark arrester screen assembly, remove every 50 hours for cleaning and inspection. Replace if damaged.

**CLEAN ENGINE** — Remove dirt and debris with a cloth or brush. Cleaning with a forceful spray of water is not recommended as water could contaminate the fuel and ignition systems.

**FUEL FILTER** — Replace IN-LINE filter or clean screen and bowl every season.



## ADJUSTMENTS

### CARBURETOR ADJUSTMENTS

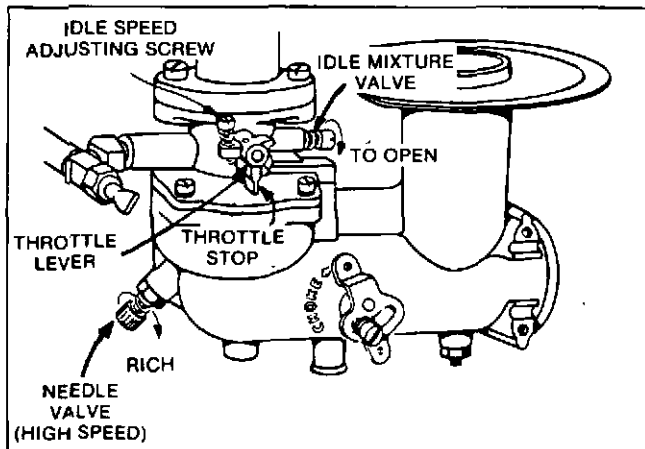
Minor carburetor adjustment may be required to compensate for differences in fuel, temperature, altitude or load.

**NOTE:** The air cleaner must be assembled to carburetor when running engine.

**TO ADJUST CARBURETOR** — Gently turn valves clockwise until they just close.

**CAUTION:** Valves may be damaged by turning them in too far.

Now open needle valve 1½ turns counterclockwise and idle valve one turn. This initial adjustment will permit the engine to be started and warmed up prior to final adjustment.



### FINAL ADJUSTMENT

Place governor speed control lever in "FAST" position. Turn needle valve in until engine slows (clockwise — lean mixture). Then turn it out past smooth operating point (rich mixture). Now turn needle valve to midpoint between rich and lean. Next, adjust idle RPM. Rotate throttle counterclockwise and hold against stop. Adjust idle speed adjusting screw to obtain 1750 RPM. Holding throttle against idle stop, turn idle valve in (lean) and out (rich). Set at midpoint between rich and lean. Re-check idle RPM. Release throttle. If engine will not accelerate properly, the carburetor should be re-adjusted, usually to a slightly richer mixture.

### CONTROL ADJUSTMENTS

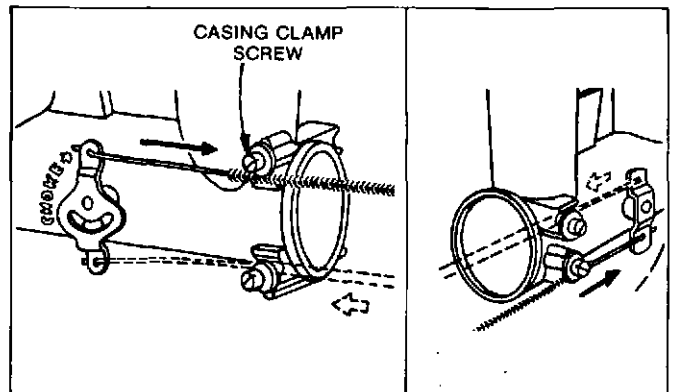
Proper choke and stop switch operation is dependent upon proper adjustment of remote controls on the powered equipment.

#### TO CHECK OPERATION OF CHOKE CONTROLS:

Move remote control lever to "Choke" position. The carburetor choke should be closed.

#### TO ADJUST MANUAL CHOKE:

Place remote control lever on equipment in "CHOKE" position. Loosen control casing clamp screw. Move control casing and wire until choke is completely closed. Tighten casing clamp screw.



#### TO ADJUST CHOKE-A-MATIC CONTROLS

Place remote control lever on equipment in FAST (high speed) position. Loosen control casing clamp screw "B." Move control casing "A" and wire until lever "D" touches choke operating link at "C." Tighten casing clamp screw "B." Move remote control to "STOP" position. Lever should make good contact with stop switch if so equipped.

