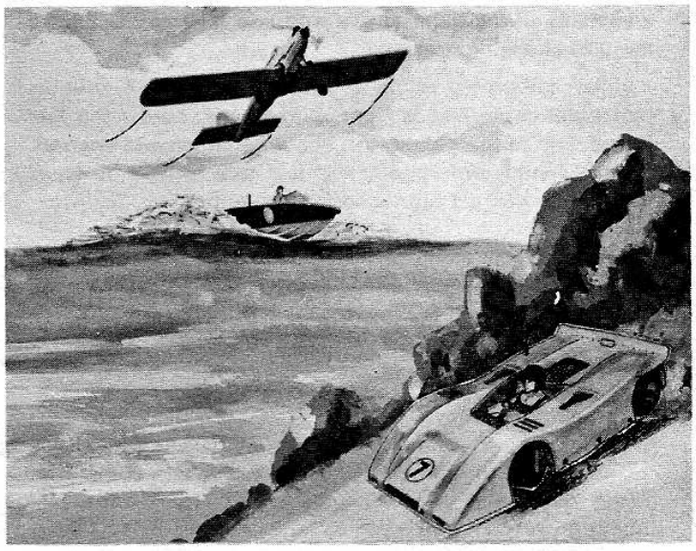
CONGRATULATIONS . . . . . .

As the owner of the famous Veco .19 Series 71 engine, you are equipped for a new experience in high performance and ease of operation in your engine-powered model activities. To assure complete satisfaction with your engine, please read these instructions carefully and follow the few, simple steps for proper installation, operation, and care.

Thank You,

K & B Manufacturing
Division of Aurora Products Corp.

PLANES • CARS • BOATS



INTRODUCTION

Your Veco .19 Series 71 engine operates according to the two-stroke-cycle principle where power is delivered every one revolution of the crankshaft. During each upward stroke of the piston, a new mixture of fuel and air is admitted to the cylinder, where it is highly compressed. A red-hot coil inside the glow plug ignites the mixture when the piston arrives near the top of the cylinder and, then, the burning mixture produces heat and pressure which forces the piston downward. The downward travel of the piston is transmitted by a connecting rod to the crankshaft, which changes the up-and-down movement of the piston into rotary movement to turn the propeller of an airplane or boat, or the wheels of a car.

Flow of the new fuel-and-air mixture, which was obtained at the venturi inlet or the carburetor, into the cylinder, and flow of exhaust gases from the cylinder to the atmosphere, are controlled by the piston travel across ports located in the cylinder wall.

Your engine is designed to deliver more than 12,000 power strokes every minute of top-speed operation. It is cooled by air flow across the cylinder barrel and head; it is lubricated by additives in the fuel. Carburetor-equipped engines employ a rotary baffle in the exhaust port for improved operation at low and idle speeds.

The engine may be used for peak power and dependability in model planes, boats, or cars. The popular choice for constant speed operation, such as full-stunt control line flying, is the Veco.19 BB "Series 71," which is equipped with a venturi inlet and needle valve assembly for control of the fuel/air mixture. The Veco .19 R/C "Series 71," which is equipped with a carburetor and a throttle-coupled rotary exhaust valve, is recommended when idle to full-speed operation is required. The Veco .19 "Series 71" SM Race Car Special is intended for use in sidewinder-type cars. Except for the cylinder head cooling fins being located crosswise to the engine centerline, this engine is identical to the R/C version.

Engineering features of all Veco .19 engines include dual ballbearing crankshafts for maximum smoothness and power output. Cylinder heads are deep-finned for improved cooling and machined from solid aluminum bar stock to eliminate the need for a head gasket.

Optional items include K & B exhaust pipes, carburetor filters, a high-performance venturi and a fuel tank pressure fitting for the 19 BB "Series 71" engines, and a reverse-rotation crankshaft for all 19 "Series 71" engines. A full line of performance-proven glow plugs, fuels, and fuel tanks completes the accessory products.

ENGINE AND FUEL TANK INSTALLATION

The engine may be installed upright, on either side, or inverted (upside down). Refer to the engine drawings for dimensions of the engine mounting holes.

The ¼-inch diameter output shaft mounts standard hole-size propellers and most flywheels used for operation in boats or cars.

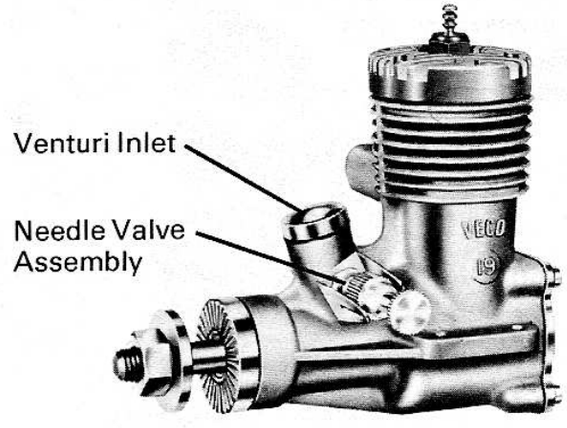
Mount the engine rigidly to hardwood rails, or to metal engine supports. For maximum security, use carbon steel, self-locking hex nuts and hardened alloy steel machine screws to mount the engine.

NOTE

A breakaway plate equal in strength to ¼-inch plywood may be used for the engine mount in an airplane.

The fuel tank size, location, and height have a great influence on engine operation. It should be located close to the engine; and, it must be vented to the atmosphere.

The Veco T-21E Tank, or equivalent, has a capacity of four ounces and will give eight to ten minutes . . . .



Veco .19BB "Series 71" #6711

engine operation. The Veco T-29D Tank, or equivalent, has a capacity of six fluid ounces and will give ten to twelve minutes of engine operation.

For carbureted engines, locate the tank so that its horizontal centerline is from ¼ to ⅜-inch below the fuel connection to the carburetor. For non-carbureted engines, the horizontal centerline of the fuel tank should be equal in height to the fuel connection to the venturi.

NOTE

If normal vibration during engine operation results in foaming or frothing of the fuel that causes uneven engine speed, install a pad of foam rubber under the tank. Retain the tank with rubber bands that will slightly compress the foam pad. Adjust tank height, as necessary, because of the thickness of the foam pad.

Veco medium size, or equivalent, tubing is recommended for connecting the fuel tank to the engine. The fuel tubing must not be allowed to kink. An in-line fuel filter can be installed between the tank and engine, but **don't forget to occasionally inspect and clean the filter.**

ENGINE BREAK-IN

It is unnecessary to give the engine a prolonged break-in. However, it is strongly recommended that **fuels containing more than 10% to 12% nitromethane be avoided until after the engine has been operated several hours on a mild fuel and under mixture-rich conditions.** Mixture-rich operation, where the engine has a slightly "burbling" sound and probably a very smokey exhaust, helps lubrication and cooling when the engine is new. You also may wish to limit operation to two or three minute intervals during the first hour or so of engine life, allowing plenty of time for cooling between each run.

Typically, an engine will be ready for continuous full-throttle and mixture lean operation after less than an hour running. When the engine holds speed after the mixture has been leaned out—when speed does not sag after a moment or so—the engine can be considered to be broken in.

STARTING THE ENGINE

With a full tank of fuel, and a 9-4 propeller installed, and a fully-charged booster battery of no more than 1.5 volts ready for connection to the glow plug, proceed as follows to manually start an engine installed in a plane.

NOTE

To avoid burning out the glow plug, never use a booster battery of more than 1.5 volts. The battery is used to **heat the glow plug coil only** *during engine starting. After the engine has started and is running smoothly, the booster battery is disconnected. Heat from the burning mixture in the cylinder keeps the coil hot.*

1. Turn the needle valve counterclockwise three to four turns from the fully closed position.
2. Place the fingertip over the venturi or the carburetor inlet, and flip the propeller quickly two or three times to prime the engine.
3. Remove the fingertip from air inlet and flip the propeller quickly two or three times.

NOTE

With carbureted engines, the throttle valve should be wide open during engine starting. Prime the engine by placing a few drops of fuel directly into the carburetor and the exhaust port.

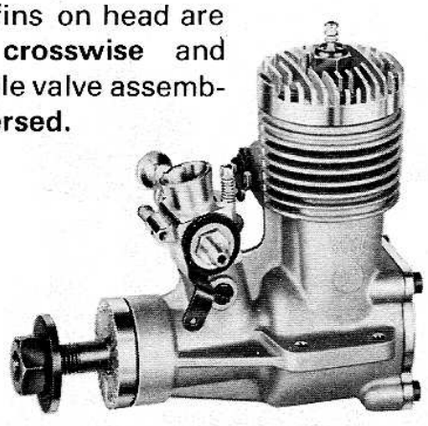
4. Connect the booster battery clip to the glow plug.
5. Slowly turn the propeller (counterclockwise) and "feel" for a momentary resistance—which indicates ignition of the mixture in the cylinder.
6. Quickly flip the propeller to start the engine and, then, disconnect the booster battery.
7. Except for the first few hours or so, when mixture-rich operation is desired, adjust the needle valve to lean the mixture. Adjust the needle valve for maximum engine speed and then open the needle valve several clicks to slightly enrichen the mixture.

ENGINE STARTING IN BOATS AND CARS

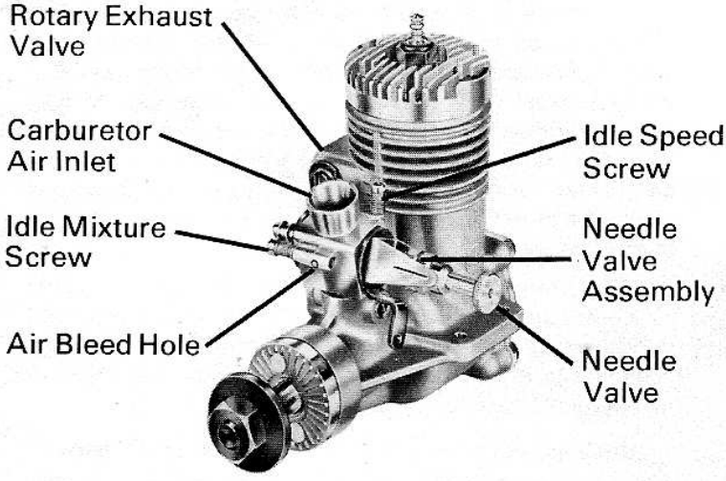
Engine starting in boats and cars requires that a starting cord or motor-driven starting device be used to turn the flywheel. First, however, the engine is primed by placing a few drops of fuel into the carburetor inlet and the booster battery is connected to the glow plug.

A motor-driven starting device will result in more suction at the fuel tank and, possibly, cause the engine to flood during starting. Be sure that the engine is being turned in the correct direction of rotation, and that the starting device is not coupled to an engine which started in the idle position and is running quietly. **Use the start-**

NOTE:
Cooling fins on head are located **crosswise** and the needle valve assembly is **reversed.**



Veco .19 R/C "Series 71SM" #6501 R/C Race Car Special



Veco .19 R/C "Series 71" #6712

ing device only for a few seconds and then remove it from the flywheel to learn if the engine is running. If so, disconnect the booster battery.

To manually start an engine using a starting cord, place the cord under the flywheel after the engine is primed and the booster battery is connected to the glow plug. Then, pull upward on each end of the starting cord and use it to rock the flywheel back and forth. "Feel" for resistance to the rocking movement—accompanied, perhaps, by a popping sound from the exhaust. Then quickly pull the starting cord against the flywheel and allow one end to come out from under the flywheel to start the engine. Disconnect the booster battery.

STARTING HINTS

The inexperienced engine-modeler frequently primes the engine too much. Raw fuel collects in the crankcase and effectively douses the glow plug coil when forced into the cylinder. The engine refuses to start. Typically, raw fuel spurts or drops from the exhaust port.

If too much priming is suspected as a cause of starting trouble, allow the engine to stand for a moment or two with the booster battery connected to the glow plug. If possible, listen for a sizzling sound from the glow plug as it heats and dries itself. Try again to start the engine using less priming and, perhaps, with the needle valve turned in several clicks.

When the engine is severely flooded, it might be necessary to close the needle valve and remove the glow plug and turn the engine through several times to force raw fuel out of the crankcase and cylinder.

An engine that starts easily but stops when the booster battery is disconnected, probably has a weak, leaking, or burned-out glow plug. (A fully-charged battery should cause the glow plug coil to become orange-red.) Other causes can be bad fuel, mixture setting excessively lean or rich, and a loose cylinder head or an excessively worn piston.

An engine that starts with priming but then stops even though the booster battery is connected to the glow plug probably is not receiving fuel from the tank. Probable causes include an empty fuel tank, clogged or restricted fuel tank air vent, needle valve fully or nearly closed, a kinked or collapsed fuel line, clogged or restricted fuel filter, or a loose spray bar in the needle valve assembly that has turned and put the discharge hole up rather than down when the throttle valve is fully open.

CARBURETOR ADJUSTMENTS

The carburetor enables easy adjustment of both the idle speed and idle mixture.

NOTE

Always adjust idle speed first and idle mixture last. Typically, it will be necessary to go back and forth several times to get both the engine idle speed and idle mixture adjusted properly.

Turn the Idle Speed Screw clockwise to increase speed; counterclockwise to decrease speed. Turn the Idle Mixture Screw counterclockwise to lean the mixture; clockwise to enrichen the mixture.

Typically, an idle speed of about 2400 rpm with a 9-5 propeller will permit an airplane to remain in place without need of brakes. About 2800 rpm idle speed is suggested for cars, which is well under the engagement setting of most car clutches.

NOTE

At the determined idle speed, the rotary baffle in the exhaust port must be closed. If necessary, loosen the screw retaining the baffle to the linkage; adjust the baffle by rotating it to the closed position; and retighten the screw.

STOPPING THE ENGINE

The engine may be stopped by blocking the air inlet to the venturi or the carburetor by closing the needle valve, or by pinching the fuel line closed.

PROPELLERS

A 9-5 wood prop is recommended for R/C and regular U-control flying. For high performance, use an 8-6 wood prop. Free-flight flying should be done with a 9-4 or 10-4 wood prop.

All prop recommendations should be regarded as starting sizes. Experimenting with one pitch or diameter larger or smaller can improve results. However, do not use a much larger prop even though the engine appears capable of handling it. **Too large a prop can overload the engine and cause damaging overheating.**

TIPS ON COOLING

Remember that proper cooling requires a flow of air over the engine to carry away heat. **Air must flow against the engine** and, just as important, be able to **get away from the engine.** Otherwise, cylinder head temperature might exceed the recommended maximum of 380°F to 400°F during continuous engine operation at a slightly rich mixture.

A 401°F maximum temperature indicator can be made from a length of 50-50 solder (50% lead, 50% tin) placed between cooling fins, near the center of the head. Secure the solder in place by looping the ends around a fin, or bend the ends downward against the cylinder cooling fins.

Now operate the engine for several minutes as you would do normally. Stop the engine and examine the solder. If it is in place, cylinder-head temperature remained under 401°F. If the solder was attached securely and now it is gone, the cylinder head temperature probably exceeded 401°F—which melted the solder. Air flow over the engine must be improved by enlarging entry or exit passages, or supplementary cooling surface ought to be provided by clamp on or bolt on heat sinks.

TIPS ON AIR FILTERS

Long-life engine operation where dusty conditions prevail, which includes any operation of a car, requires the use of an air filter at the carburetor. The filter must be able to clean the air of dust particles without creating an unnecessary restriction to air flow into the engine. An air filter must be cleaned or replaced frequently, depending on its design.

ENGINE CARE

Dust and dirt are the worst enemies of your engine. At all times keep the engine—and the fuel—clean. Wipe engine surfaces clean with a rag dipped in a solvent such as methanol or paint thinner, or use a soft-bristle, metal brush to clean engine surfaces.

With carbureted engines, always be sure that the tiny hole near the Idle Mixture Screw is not plugged; in which case, the idle will be rich and the engine might die—especially upon sudden de-acceleration.

If it becomes necessary to disassemble and clean the engine, remove only the cylinder head and the backplate from the crankcase. Submerse the engine in solvent while turning crankshaft by hand, and use a **soft-bristle brush** to clean inside engine. **Flush engine repeatedly** to assure removal of any solid particles. Be sure that the transfer and exhaust ports in the cylinder wall are uncovered by the piston.

If the carburetor is to be removed for cleaning, or to enable better cleaning of the engine, disconnect the throttle linkage and, then, loosen the two set screws at the base of carburetor. Lift out the carburetor **taking care not to lose the O-ring seal.** Disassemble and clean the carburetor, using a solvent such as methanol, and blow out all passageways. During reassembly, **adjust the spray bar so the discharge hole is straight down** when the throttle valve is fully open.

When reinstalling the carburetor, press it gently downward against the O-ring seal while tightening the two set screws.

BASIC TROUBLESHOOTING

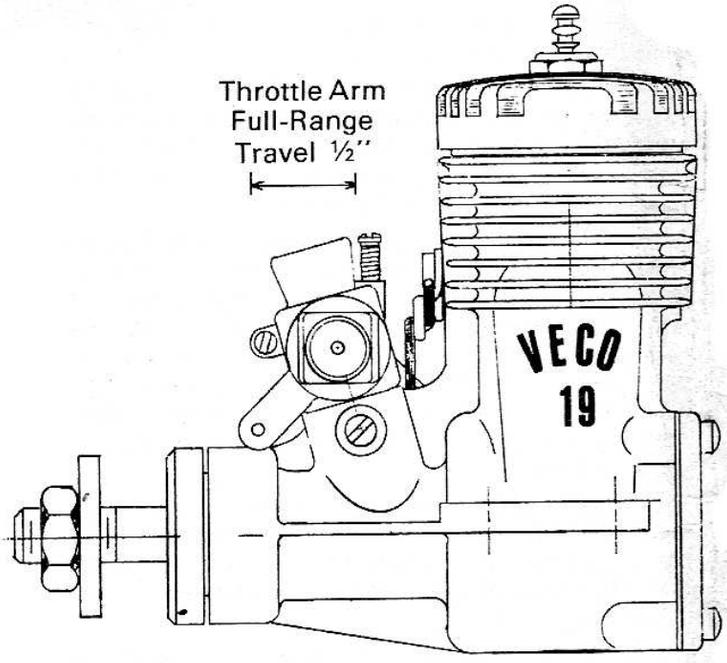
Improper fuel/air mixtures, bad ignition, worn out carburetors, or weak cylinder compression are the main causes of hard starting, poor power, slow throttle response, or unreliable engine idle.

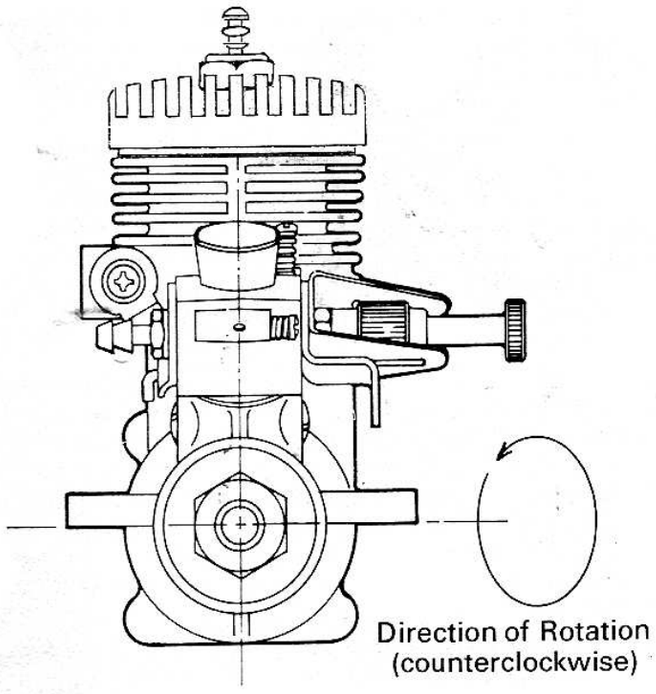
Fuel/air mixtures cause trouble if there is too much or not enough fuel admitted to the cylinder—which can result from improper fuel tank height, design or needle valve adjustment; leaking, kinked or plugged fuel lines; leaking connections or a bad fuel tank vent.

Ignition can be the cause of starting trouble if (a) the booster battery is weak or dead, (b) there are bad connections to the battery or the plug, or, (c) the glow plug coil is burned out. Ignition can be the cause of trouble after the booster battery is disconnected if (a) the glow plug has an air leak at the center post or around the gasket, (b) if the glow plug coil is burned out, or (c) a glow plug without an idle bar is installed in a carbureted engine which is expected to idle.

Compression is evident if the engine has good resistance when it is cold and being turned through by hand. Little or no resistance means that the piston or cylinder wall is worn excessively, or that the cylinder head is loose or leaking.

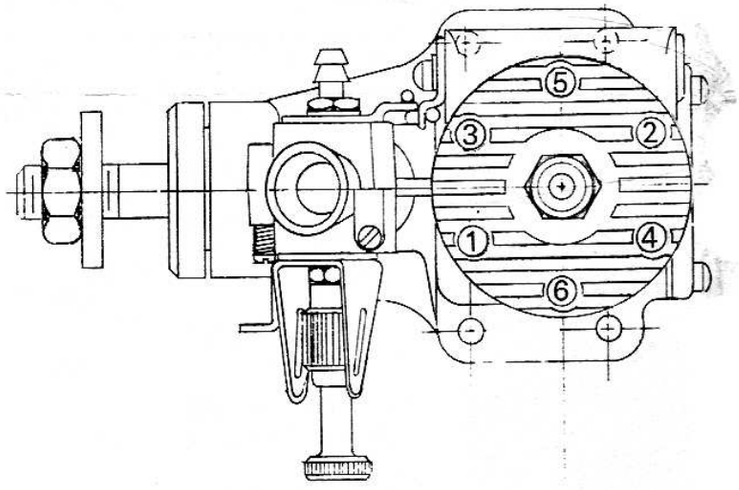
An engine that varies in speed even though the throttle valve or the needle valve is not being moved, probably has an air leak in the crankcase. Other locations of an air leak can be the connections in the fuel line fuel filter, or a pin hole in the fuel line. **First, however, be sure to disconnect the booster battery, if radio control is being used.** The electrical field around the wires carrying the battery voltage can be picked up by the radio antenna, and cause the throttle servomotor to respond.



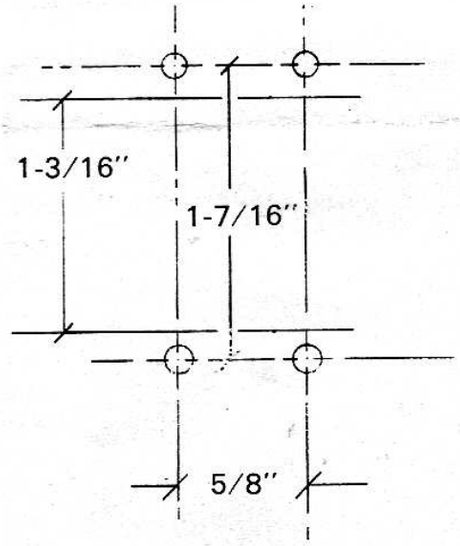


ENGINE DRAWINGS AND DIMENSIONS

(**NOTE:** Drawings are full scale)



Head Screw Tightening Sequence



SPECIFICATIONS

ENGINE	BORE	STROKE	DISPL.
.19	.634	.633	.199
.19R/C	.634	.633	.199

COMP. RATIO	POWER	AT RPM	WEIGHT
8:1	.45	12,500	7 OZ.
8:1	.45	12,500	7½ OZ.

WARRANTY — Each VECO Engine is fully guaranteed against defective materials and/or workmanship for a period of 90 days from date of purchase, providing the engine has not been taken apart or tampered with in any way whatsoever. This Guarantee does not cover any damage to the engine caused by force or violence or as a result of uncontrolled operation. The entire engine must be returned to the factory postpaid for replacement or service under this Guarantee. In requesting service, the date of purchase and the dealer's name and address must be clearly stated in your letter.

K&B®

P/N 6711—001

aurora hobbycrafts
DIVISION OF AURORA PRODUCTS CORP.
12152 WOODRUFF AVE. DOWNEY. CALIFORNIA 90241

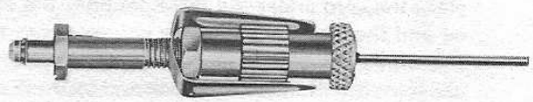
K&B ACCESSORIES

MUFFLER for VECO .19R/C *"Series 71"*

(Designed exclusively for the VECO .19R/C *"Series 71"*) . . .

Considerably reduces exhaust noise. Conforms with standards now being set at many of the airfields. Simple to install.

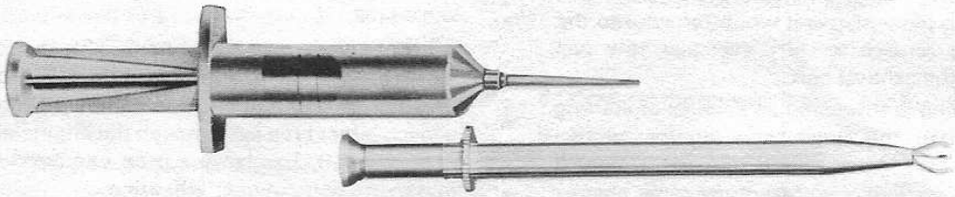
Cat. No. **6507**



K&B UNIVERSAL NEEDLE VALVE

Permits finer adjustments, better fuel mixture, and easier starting. Fits all engines from .19 to .35. Positive adjustment with "Hold Tight" clip.

Cat. No. 2918



K&B ALL PURPOSE GUN

The easy finger-control All Purpose Gun is a must for every modeler. Apply just the right amount of glue exactly where you want it.

Cat. No. 7031 . . . . . **1/5 oz.**
Cat. No. 7221 . . . . . **2/5 oz.**
Cat. No. 7231 . . . . . **1 oz.**

K&B MAGIC FINGERS

Extends your hand to those "hard-to-reach" places. To retrieve small parts; to start screws in recessed holes. Made of tempered steel.

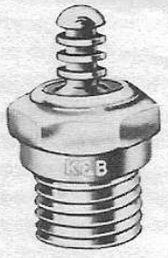
Cat. No. 7237

K & B GLOW PLUG with IDLE BAR

An improvement in the original "idle bar" glow plug. It can be recognized by its distinguishing "gold post." For controlled engine speed that will run at a required given speed up to a constant maximum—for R/C. Carrier, and Scale Flying.

Note: Do not exceed 1½ volts.

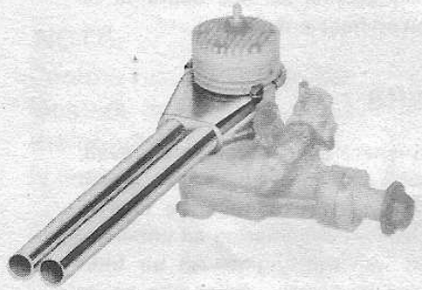
4520



KB-1L and KB-1S GLOW PLUGS

The KB-1L (long reach) and the KB-1S (short reach) are equipped with a newly developed platinum alloy wire element, making the coil element superior to the coil being used in any other plug . . . will withstand the terrific heat of the hottest fuels.

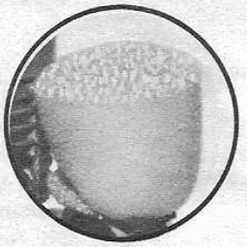
7311 KB-1L (long reach)
7321 KB-1S (short reach)



K&B EXHAUST PIPES—R/C Cars

Designed to be used on Veco .19 R/C engines. Manifold is shaped to allow usage of exhaust rotary valve. Lightweight, all aluminum.

6500

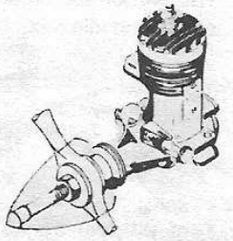


K&B FILTER—R/C Cars

Replaceable polyurethane foam filters. Permits full intake of air while filtering out all harmful dirt. Universal filter. Fits any engine . . .for R/C, U-Control, or Free Flight. Four to a package. Complete with mounting bands.

6504

ENGINE EXTENSION UNIT



For engines with ¼" prop shafts. Used to extend propeller shaft when engine is set back in aircraft.

Cat. No.	
6728	110 (.19, .29, .35)
6729	203 (.45, .45R/C, .50R/C, .61R/C)