



MODEL 49A McCULLOCH KART ENGINE

the "49er"

INSTALLATION

Your McCulloch Kart Engine (or engines) is designed to operate efficiently, mounted in any position. If single engine operation is to be used, the engine may be mounted on either the right or left hand side of the frame.

Make certain that the engine mounting plate is flat, and that the engine fits flat and flush. If the engine mount plate is warped, or is too weak, crankcase cracking will result when the engine is pulled down tight.

Also, tighten down the engine retaining bolts evenly. If one bolt is pulled down tight and the others are then tightened, crankcase cracking can result. Before mounting the engine, be sure that the crankcase bottom and the mount face are both clean and free of foreign matter.

Use care to make sure that the drive and driven sprockets are perfectly aligned. Slight misalignment of sprockets may cause vibration and flexing of the crankshaft which can result in crankshaft failure.

Do not use a flywheel adapter as a power take-off for driving your kart. Use of a flywheel adapter will very likely cause crankshaft flexing which in turn, will result in a broken crankshaft. If you must drive from the flywheel side of the engine, use a good, well aligned outboard bearing mount. Although the outboard bearing approach is not infallible, its use will reduce the possibility of crankshaft bending or breaking.

NOTE

If the outboard bearing is not aligned, it can also contribute to crankshaft failure.

FUEL MIXTURE

The proper fuel for your McCulloch Kart Engine, as with most two-stroke-cycle gasoline engines, is a mixture of gasoline and oil.

The best kind of gasoline to use in the fuel mixture is white marine-type gas of 100 octane rating. However, any good regular grade gasoline may be used. Gasolines which have high octane ratings because of excessive leading are not good fuels for two-stroke-cycle engines. Any highly leaded gas used in the fuel mix will cause formation of lead balls on the spark plug electrodes. These lead balls will eventually short out the plug.

When preparing the gasoline-oil mixture for your kart engine, use a good grade of Two-Cycle Engine Oil with a viscosity rating of SAE #40. Mix the fuel blend in a ratio of 20 parts of gasoline to 1 part of oil.

The oil in the fuel mixture provides the only lubrication of the engine's moving parts and, for this reason, the amount of oil in the mixture -- as well as the kind of oil -- is extremely important. High-speed racing engines require the very best lubrication possible if long, trouble-free service is expected.

If a synthetic lubricant is used, the gasoline-to-lubricant ratio should be as recommended by the lubricant manufacturer.

When castor oil is used for engine lubricant, one of the "de-gummed" types is recommended. By using a "de-gummed" type, the possibility of ring sticking and gum formation (normally associated with castor oil) will be greatly reduced.

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OPERATING YOUR NEW ENGINE

Never attempt to start your new engine without first making certain that it is adequately lubricated. A "dry" engine can be quickly ruined by pushing the kart a very short distance.

Pre-lubricate your engine before starting it for the first time to give all of the moving parts sufficient oil for starting and running until the fuel-oil mixture is supplying the necessary lubrication.

Lubricate the engine by pouring about 1/4-cup of a rich, 75% fuel, 25% oil, mixture into the carburetor throat. Remove the spark plug and pour a tablespoon of the same mixture into the spark plug hole. Rotate the flywheel--or crankshaft--at least a dozen times to give the cylinder wall and bearings a coating of the lubricating mixture.

Holding the engine with the exhaust port down, continue turning the crankshaft until the excess fuel is pumped out of the engine. Install the spark plug and the engine is ready to go.

Break-in your new engine by at least 1/2 to 1 hour of mild running with a rich carburetor setting, before you try any all-out racing. You may foul the spark plug, but the price is cheap compared to replacing your engine.

Prolonged operation of your kart engine at part throttle, followed immediately by a burst of speed of full throttle, may result in engine damage. The lubrication of a two-cycle engine is dependent upon the amount of fuel/oil vapor that has been drawn into the crankcase through the carburetor venturi and the droplets of oil suspended in the vapor furnish the engine lubrication.

When the throttle has been held at a more or less constant opening, only the amount of fuel mixture needed for that particular speed will have been drawn into the crankcase. A sudden advance of the throttle upsets this mixture balance and before the increased engine speed can draw enough additional mixture vapor through the carburetor venturi to supply the additional lubrication for this increased speed, the engine damage has occurred.

To overcome this tendency of lubrication starvation occurring after an extended period of running at partially opened throttle, ease up on the throttle for several seconds before going to full open position. This permits a build-up of an extra supply of fuel/oil mixture in the crankcase which will furnish lubrication for the higher speed until the increased mixture from the carburetor is supplying the additional lubrication needed at the higher speed.

SPARK PLUG

McCulloch Kart Engines are factory equipped with 14-mm, 3/8-inch reach spark plugs.

Spark plugs are considered hot or cold according to the length of the inner insulator from nose to plug shell.

The longer the insulator, the longer it will take for the heat to travel to the shell and the hotter the plug will run. With a short heat path, the heat dissipates rapidly and the spark plug runs cooler.

Examination of the electrodes and the insulator will tell you whether the spark plug in your engine is hot or cold enough for your running conditions. A spark plug of the correct heat range will show brown to grayish-tan deposits around the insulator. Wet, black and sludgy carbon deposits indicate the need for a hotter spark plug. Whitish deposits, a blistered insulator nose and badly burnt electrodes call for the use of a cooler spark plug.

Only in case of emergency should you use an automotive-type spark plug in your kart engine. When an automotive-type plug is used, oil is likely to collect between the electrodes and cause the spark plug to foul and short out.

CAUTION

If your McCulloch engine is operated with a too-lean fuel mixture, the spark plug--regardless of heat range--will show all the indications of being too hot. And the too-lean mixture will seriously damage the engine through overheating and lack of lubrication. Before installing a colder spark plug, check to make sure the carburetor is correctly adjusted.

FUEL HOSE

A poor fuel hose connection on the kart engine can result in fuel starvation, especially when the engine is operating at the high end.

When installing the fuel hose, don't depend on the tightness of the connection to hold the fuel hose in place. When the hose is not clamped or otherwise secured on both the pump and the tank fittings, vibration can cause an intermittent air leak. When an air leak occurs at either of the fittings, it is easier for the fuel pump to suck air into the fuel line than it is for it to pump fuel. The air entering the fuel line causes a condition similar to a vapor lock and will prevent fuel being pumped to the carburetor.

To eliminate air leaks at these connections, use 0.020 to 0.025-inch (0.508 to 0.635 mm) safety wire to fasten the fuel hose securely on the fuel pump and fuel tank fittings. Make two complete turns around the hose, pull the wire tight with pliers, and twist the ends together at least three times.

EXHAUST STACK

It's always advisable to use the exhaust stack when operating your McCulloch Kart Engine. Without an exhaust stack to provide back pressure at the exhaust ports, your engine will probably run uncontrollably lean. Such a condition can cause rapid engine failure.

If you add an extension to the exhaust stack furnished with the engine, make sure that there are no sharp bends or square corners in the length of the extension.

ADJUSTMENTS

SPARK PLUG

The spark plug should first be cleaned and then re-gapped, using a wire type feeler gauge to check the gap. The gap is set by bending the side electrode only. Any attempt to bend the center electrode will crack the insulator and ruin the plug. Set the gap at 0.025-inch (0.64 mm).

CARBURETOR

Preliminary Adjustment

1. Close the main and idle fuel adjustment needles (turn clockwise) until they just seat.

CAUTION

Do not jam the needles into their seats beyond the point of resistance. This will damage the needles and the carburetor body beyond repair.

2. Open the main fuel adjustment needle (turn counterclockwise) 1-1/2 turns. Open the idle fuel adjustment needle 1-1/4 turns.
3. Start the engine and warm it up to operating temperature.
4. Adjust the idle speed adjusting screw until the engine runs smoothly at lowest speed with the throttle off.

Final Adjustment

1. Put the kart on the track and warm it up thoroughly.
2. Adjust the idle fuel needle to obtain smooth, rapid acceleration from the idle to full throttle. Test acceleration on coming out of tight turns on the track. If the engine runs rough and smokes heavily on acceleration, close the idle needles (turn clockwise) until it smooths out. If the engine falters and mis-fires on acceleration, open the idle needles (turn counterclockwise) until the engine accelerates smoothly and without hesitation. Make adjustments or changes in the needle setting in steps of about 1/8 turn at a time.
3. Test the engine performance at high speed or full throttle. Adjust the main fuel needle (both needles on dual carburetors) by opening the needles (turning counterclockwise) until the engine begins to four-cycle (fire every other stroke) at a maximum rpm. Close the needles (turn clockwise) to lean the mixture just enough to return to two-cycling at full throttle.

CAUTION

Always adjust the main fuel needles under load conditions to avoid carburetor settings that will run the engine too lean. If the setting is too lean, overheating and lack of lubrication will seriously damage the engine in a very short time.

LAMINATION-TO-FLYWHEEL GAP

For best magneto output, there should be a 0.010 to 0.012-inch (0.254 to 0.305 mm) clearance between the lamination and the flywheel rim. Use a feeler gauge and have the flywheel magnet positioned directly under the lamination when measuring the gap under each of the two outer legs. If the clearance isn't between 0.010 and 0.012-inch (0.254 to 0.305 mm), adjustment is necessary.

1. Rotate the flywheel so that the magnet is not under the lamination.
2. Loosen the coil and lamination mounting screws, raise the assembly, and then re-tighten screws.
3. Rotate the flywheel until the poles of the magnet are directly under the lamination.
4. Insert a 0.010-inch (0.254 mm) feeler gauge under each of the laminations.
5. Loosen mounting screws and let the coil and lamination assembly drop onto feeler gauges and flywheel.
6. Tighten the mounting screws securely.
7. Remove the feeler gauges and rotate the flywheel through several revolutions to make sure that the lamination legs do not rub on the flywheel.

BREAKER POINTS

The breaker points will be found under the flywheel. The under-flywheel breaker points are actuated directly from a cam on the crankshaft. Check the rubbing block before setting the breaker point gap. If the block has been worn by the cam replace the entire breaker point assembly. It is also advisable to replace the condenser every time the breaker point assembly is replaced.

When installing new breaker points, be sure to remove the wax-type preservative from point faces. Remove all wax by drawing a small card, saturated with carbon tetrachloride, between the points.

WARNING

Carbon tetrachloride is toxic! Keep in small quantities when using and make sure room is well ventilated. Avoid inhaling fumes.

SPECIFICATIONS

Weight of Unit	11-1/2 lbs.	Carburetor Type	Diaphragm type with integral fuel pump. Adjustable for idle speed mixture and high speed mixture.
Type of Engine	Single cylinder, two stroke air-cooled, crankcase scavenged.	Type Fuel Recommended	Automotive regular grade.
Type of Cylinder	Die cast, deep finned alum. alloy w/precision honed reborable cast iron liner and integral head.	Fuel-Oil Mixture	20 to 1 ratio
Bore	2.125 in.	Type Crankcase Valve	Phenolic reed.
Stroke	1.375 in.	Type Cyl. Scavenging	Loop.
Displacement	4.9 cu. in.	Crankcase Material	High pressure die cast alum. alloy for high strength to weight ratio.
Compression Ratio to 1	6:1	Crankshaft Material	Drop forged steel, carburized, hardened and precision ground.
Direction of Rotation (Drive Side of Engine)	Clockwise.	Connecting Rod Material	Drop forged steel, carburized, hardened and precision ground.
Type Ignition	Water-proof, high tension magneto; permanent magnet cast integrally with flywheel. Specially designed McCulloch moisture-proof coil insures easy starting.	Connecting Rod Length (Center to Center)	2.51 in.
Coil to Flywheel Clearance	0.008 - 0.012 in.	Connecting Rod Crankpin Bearings	Needle roller.
Ignition Timing B.T.C.	26° static.	Connecting Rod Wrist Pin Bearing	Automotive type bronze bushing.
Location of Breaker Points and Condenser	Behind flywheel.	Main Bearings	One needle, one ball.
Breaker Point Gap	0.019 - 0.020 in.	Piston	Oversize available.
Spark Plug Type	Champion J8J	Piston Rings	2 - cast iron, low friction and long life.
Spark Plug Gap	0.025 in.	Flywheel	High pressure alum. alloy die casting w/integral magneto magnets and with steel hub and reinforcing plate.
Switch	Positive "on-off" type.	Starter	Spring rewind and nylon rope.
Throttle Type	Butterfly.		