

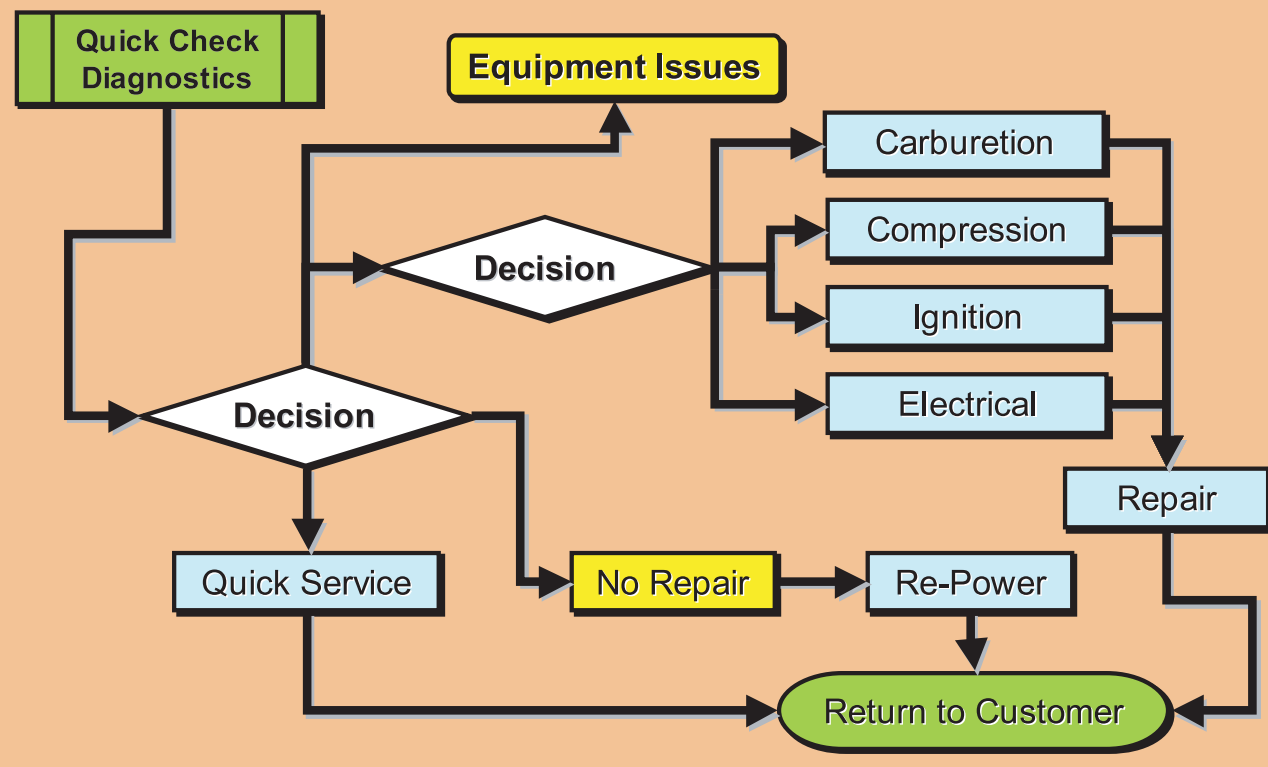


Carburetion Troubleshooting Quick Reference Guide

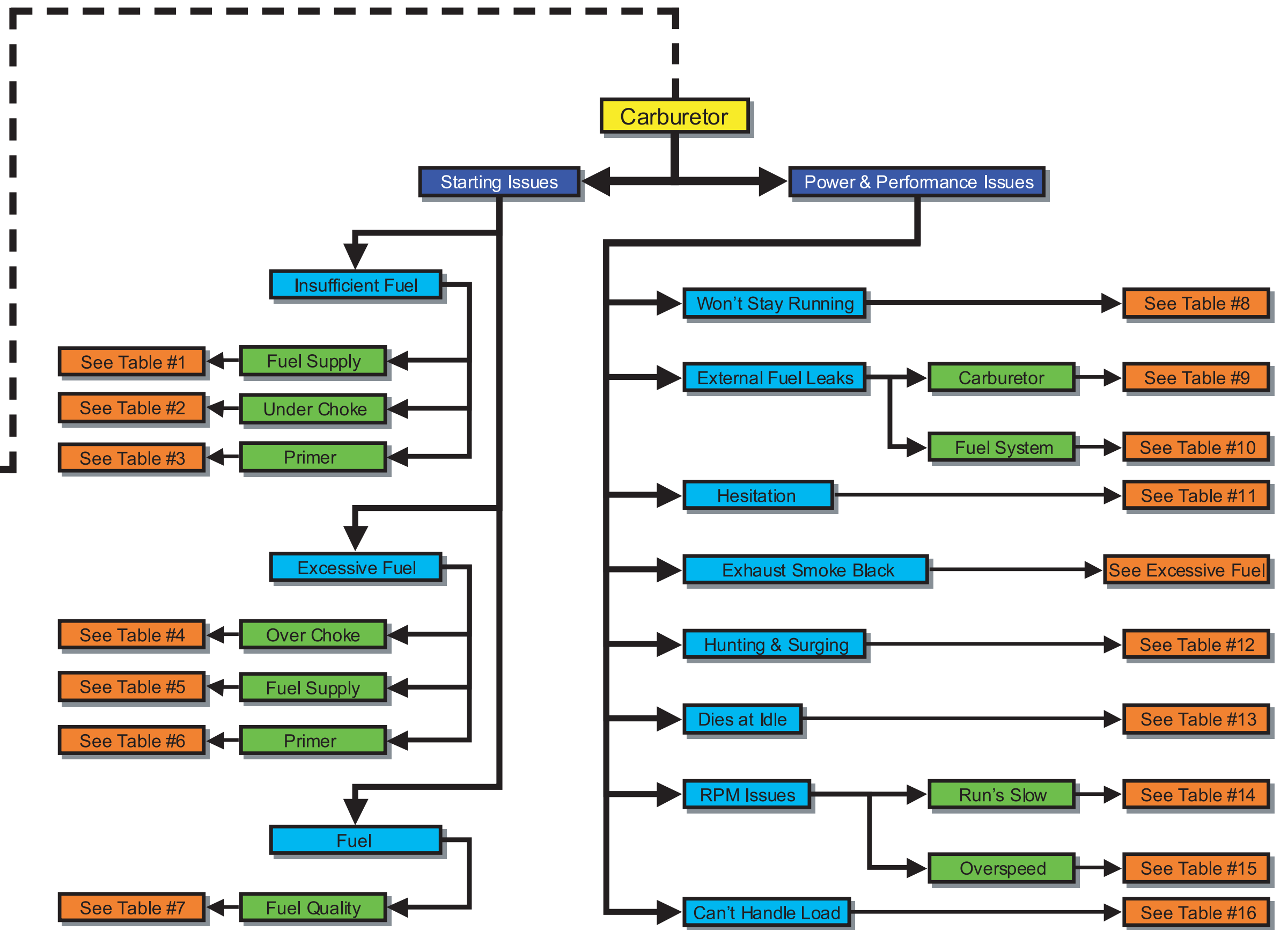
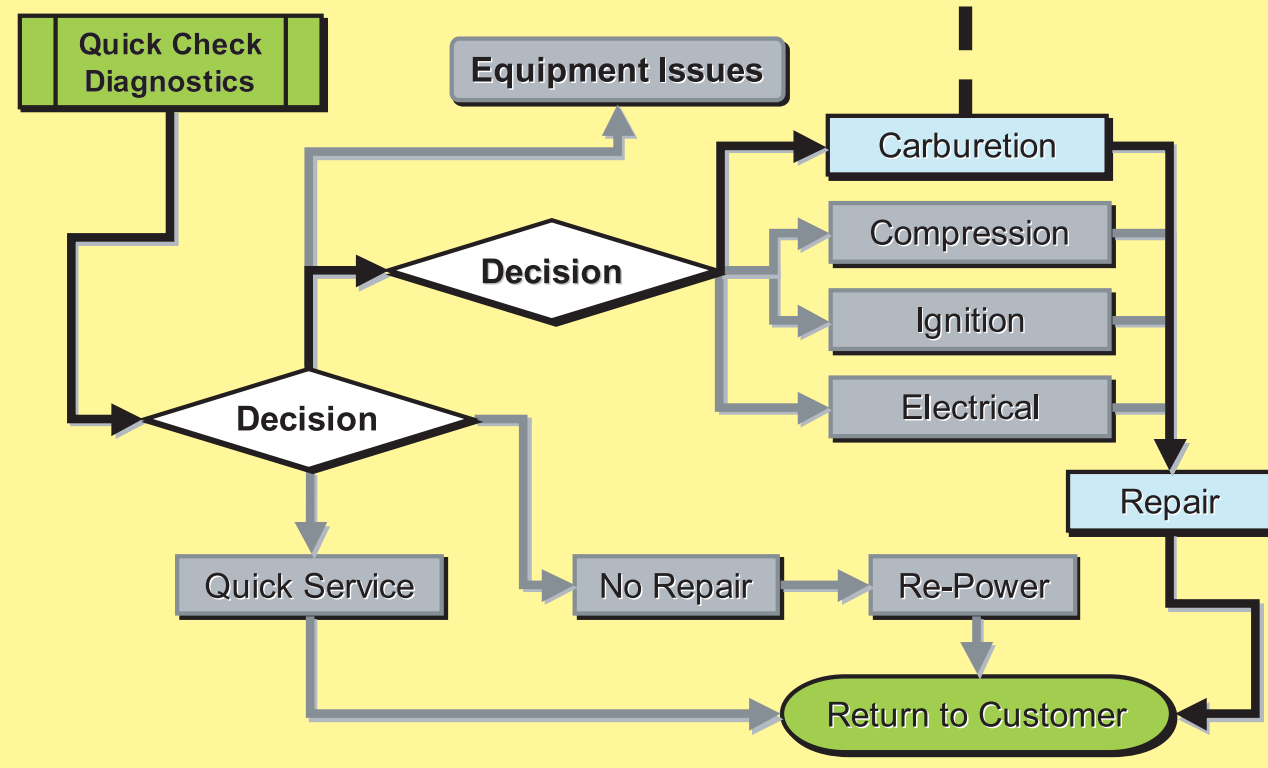


SERVICE DIAGNOSTIC OVERVIEW

A logical, planned approach can move service work through a repair center in a smooth and efficient manner. Fueled by information from a thorough Quick Check, the nature of the repair work required can be quickly established.



Once the problem is established as an engine issue, the process continues through a system of checks or tests until the affected engine system is determined. A skilled technician will accurately establish the symptoms of the problem and drill down to the root cause such as those listed in the tables below.



Failure Table #1 Fuel Supply
<ul style="list-style-type: none"> No Fuel in Tank Fuel Shut-Off Valve Kinked Fuel Line Fuel Filter, Restricted Fuel Level Low Fuel Tank Mounting Low Fuel Pump Fuel Solenoid Vapor Lock

Failure Table #2 Under Choke
<ul style="list-style-type: none"> Choke Cable Choke Control Cable Choke Linkage Choke Shaft Inoperative Choke Plate Manifold Gasket No Human Intervention

Failure Table #3 Primer
<ul style="list-style-type: none"> Primer Bulb Check Valve Primer Line Backing Plate Gasket Restricted, Passage No Human Intervention Manifold Gasket

Failure Table #4 Over Choke
<ul style="list-style-type: none"> Choke Cable Choke Control Cable Choke Linkage Choke Shaft No Human Intervention Air Cleaner, Restricted Air Intake, Restricted Bi-Metal Choke Spring Automatic Choke

Failure Table #5 Fuel Supply
<ul style="list-style-type: none"> Head Pressure Pump Pressure Inlet Needle & Seat Float Porous Casting Fuel Quality

Failure Table #6 Primer
<ul style="list-style-type: none"> Human Intervention

Failure Table #7 Fuel Quality
<ul style="list-style-type: none"> Stale/Old Fuel Wrong Type Fuel Contaminated Seasonal Fuel Issues

Failure Table #8 Won't Stay Running
<ul style="list-style-type: none"> Float Level Fuel Filter, Restricted Fuel Delivery Volume, Low Kinked Fuel Line Debris in Carburetor

Failure Table #9 Won't Stay Running, Carburetor
<ul style="list-style-type: none"> Bowl Gasket Bowl Nut Bowl Vent Air Cleaner Manifold Porous Casting Warped Tank Gaskets Loose Screws

Failure Table #10 External Fuel Leaks, Fuel System
<ul style="list-style-type: none"> Hole in Tank Loose Fitting Loose Fuel Line Clamp Human Intervention Fuel Line Fuel Filter, Leaks Sediment Bowl Gasket Fuel Shut-Off Valve

Failure Table #11 Hesitation
<ul style="list-style-type: none"> Float Adjustment Debris in Carburetor Jet, Main Fuel Mixture Screws Jet, Pilot Idle Speed, Mis-Adjusted Parasitic Load Fuel Quality Air Cleaner, Restricted

Failure Table #12 Hunting & Surging
<ul style="list-style-type: none"> Jet, Main Fuel Restricted, Passage Jet, Pilot Governor

Failure Table #13 Dies at Idle
<ul style="list-style-type: none"> Restricted, Passage Jet, Pilot Welsh Plug Mixture Screws Idle Speed, Mis-Adjusted

Failure Table #14 RPM Issues, Runs Slow
<ul style="list-style-type: none"> Throttle Control Throttle Control Cable Throttle Shaft Idle Speed, Mis-Adjusted Governor

Failure Table #15 RPM Issues, Overspeed
<ul style="list-style-type: none"> Throttle Control Throttle Control Cable Throttle Shaft Idle Speed, Mis-Adjusted Governor

Failure Table #16 Can't Handle Load
<ul style="list-style-type: none"> Float Adjustment Debris in Carburetor Jet, Main Fuel Mixture Screws Parasitic Load Fuel Quality Air Cleaner, Restricted Fuel Filter, Restricted Kinked Fuel Line Fuel Delivery Volume, Low



Carburetion Troubleshooting Detail Reference Guide

A	
Air Cleaner Manifold	Problems involving the air cleaner manifold are normally related to loose mounting screws and/or damaged or leaking gaskets. A leaking gasket allows unmetered air to enter the intake system. Symptoms, based on severity of the leak, can range from an overly lean condition where the engine will have trouble accepting or handling load to the engine won't start or run at all. See Backing Plate Gasket
Air Cleaner, Restricted	Restricted air filter elements effect engine operation differently based on the carburetor venting system. The mixture for Internally vented carburetors typically becomes lean while the fuel mix for externally vented carburetors becomes overly rich. Based on the carburetor design, effects can range from an engine that loads up and runs overly rich to an engine that can't handle a load because there is not enough fuel available.
Air Intake, Restricted	See A/C, restricted
Automatic Choke	The automatic choke function of the Pulsa-Jet carburetor used on vertical crankshaft lawnmower style engines can cause an overly rich condition during starting and operation. The default choke position is on. If the diaphragm stiffens over time, it will not allow the choke plate to open smoothly and the choke can stay on longer than it should. If the diaphragm has a hole at the link or through the material, the choke will not disengage as it should. A small vacuum metering jet into the diaphragm spring cavity can become plugged, defeating the choke pull off.

B	
Backing Plate Gasket	A leak in an air cleaner backing gasket means, among other things, that unmetered air is entering the engine and leaning out the fuel mixture. This can result in power and performance issues. Some primer equipped carburetors use the air cleaner backing plate gasket to seal a passage through which air pressurized by the primer bulb travels. If this pressurized air escapes, the priming pulse is lost and the engine may be hard to start or will not start. See Air Cleaner Manifold.
Bi-Metal Choke Spring	Used on vertical crankshaft lawnmower type engines with Pulsa-Jet and Vacu-jet carburetors, the Bi-metal spring aids the choke in staying closed to augment cold starts and assists the choke in opening when the engine is warm.
Bowl Gasket	Seals the carburetor bowl to the carburetor body. An improperly seated or damaged bowl gasket can result in fuel leaks.
Bowl Nut	On one-piece Flow-Jet carburetors, the bowl nut secures the float bowl to the carburetor body and seals against leakage via the bowl nut gasket. Should damage to the gasket occur, external fuel leakage is probable.
Bowl Vent	Air at normal ambient pressure is allowed access to the float bowl via the bowl vent. The vent assures smooth fuel delivery. As fuel is removed from the bowl by the carburetor circuits, volume is being removed. Unless air can enter to take up the space, the pressure in the bowl will drop, effecting fuel delivery through the circuits. An engine with an obstructed bowl vent will act as though it is running out of gas. Engine symptoms can be hard starting, hesitation, and hunting and surging.

C	
Check Valve	Pulsa-prime carburetors. This wet bulb primer incorporates a check valve in the priming circuit that allows fuel to fill the bulb via the fuel supply but closes when the bulb is depressed. If the valve leaks or does not work, there will be reduced or no prime and a hard or no start condition.
Choke Control	See Choke Linkage, Choke Control Cable
Choke Control Cable	Both the throw of the choke control cable and the location of the cable clamp will effect the

	operation of the choke mechanism. If the choke will not fully close, cold starting can be difficult. If it does not fully disengage, engine operation can be effected.
Choke Linkage	Choke linkage that is misadjusted or damaged can cause improper engagement or disengagement of the choke mechanism. If the choke will not fully close, cold starting can be difficult. If it does not fully disengage, engine operation can be effected.
Choke Shaft	One of the few moving parts in the carburetor, the choke shaft determines the range of motion of the choke plate. Should the shaft become restricted in its travel, the choke plate will correspondingly be limited in motion. Without full choke engagement, an engine may be hard to start or not start at all.
Contaminated	A carburetor should contain nothing but fuel and air. The presence of anything else suggests that the carburetor is contaminated. In terms of fuel contamination, this can be anything in the fuel that does not belong there such as dirt, debris, varnish, water, etc.

D	
Debris in Carburetor	Debris, also grouped with dirt, can be considered as any loose material found in fuel systems that is not fuel. Some dirt and/or debris will cause no problems because it is small enough to pass through all the orifices. Of concern is material that blocks or limits fuel or airflow. Effects will vary based on the degree of blockage. Minor blockage of a fuel passageway may result in a slight hesitation. Complete blockage can result in a no start condition. Debris in air passageways may result in hesitation or overly rich running conditions.

F	
Float	Found in Flow-Jet carburetors, the float controls the operation of the inlet needle and seat. As the name implies, the float “floats” on top of the fuel in the carburetor bowl. Based on the float level adjustment, The float position will either shut off the fuel supply via the inlet needle and seat or pull the
Float Adjustment	See float level. Most floats are non adjustable. If adjustment is possible, it typically involves bending a tang on the float bracket that will alter the float position.
Float Level	See Float. The float level establishes a base line for carburetor calibration/adjustment. The low pressure signal in the carburetor venturi is the force that accomplishes the work of

	moving fuel from the bowl to the carburetor throat. The lower the fuel level, the higher it must be lifted. To move the same amount of fuel, the pressure must drop even lower. Engine operating symptoms of a carburetor with a float level too low can be hesitation and inability to handle load due to a mixture that is too lean. A float level set too high will usually leak fuel. If the engine does operate, it may show signs of a mixture set too rich such as the engine loads up, exhaust gas smells rich, spark plugs foul easily, etc.
Fuel Delivery Volume, Low	If fuel delivery is too low, the engine will typically display signs of running too lean.
Fuel Filter, Leaks	Fuel leaks can occur at fuel filter connections or through a cracked or damaged filter body.
Fuel Filter, Restricted	Fuel filter restriction can result in varied symptoms based on the severity of the restriction. Minor restrictions can cause hunting and surging. Major restrictions will prevent the engine from running.
Fuel Level Low	Fuel flow occurs in gravity feed fuel systems because the fuel level is higher in the supply tank than it is in the carburetor bowl. The pressure or force that moves fuel from one area to the other is called head pressure. The closer the levels become, the lower the pressure. Home made or modified systems may not have enough head pressure to move enough fuel to the carburetor when the tank level becomes low. See Float Level, Fuel Tank Mounting Low.
Fuel Line	Issues involving the fuel line will usually be fuel supply restrictions or fuel leakage. Fuel restrictions can be the result of a kink or sharp bend in the line, which will either stop or slow fuel delivery or a high point in the line, which can be the cause of vapor lock. Poor connections, loose clamps or old, stiff or cracked fuel line can be the cause of external fuel leaks.
Fuel Pump	When used, the fuel pump is the primary fuel delivery device. Pump problems will obviously result in fuel supply issues. These may range from intermittent, all of the time or just under certain conditions such as high, outside ambient temperatures.
Fuel Quality	Old, stale gasoline may not even burn. Fuel quality can be responsible for no start, hard start or power and performance conditions.
Fuel Shut-Off Valve	A fuel shutoff valve must be all the way open to allow full fuel delivery. Anything less may be responsible for a restriction in fuel delivery. See Fuel Line, Fuel Delivery Volume Low.
Fuel Solenoid	Some systems will have an inline fuel solenoid, which will stop fuel delivery to the carburetor

	when the key is turned off. Most often, fuel solenoids are anti afterfire solenoids, which are similar. These stop fuel delivery from the carburetor bowl to the main jet. Either can be responsible for a no start or won't run condition should they be defective or should they lack a 12-volt electrical supply.
Fuel Tank Mounting Low	See Fuel Level Low

G	
Gaskets	See Backing Plate Gasket, Air Cleaner Manifold

H	
Head Pressure	This describes the weight of the surrounding air pressing down against fuel. This will cause fuel flow to occur from a higher vessel to a lower vessel, as is the case in a gravity feed fuel system. The higher the vessel, the greater the flow pressure will be. Limits exist for maximum heights. At some point the pressure will get too high and overpower the inlet needle causing fuel leaks.
Hole in Tank	Most holes in a fuel tank will cause external fuel leakage.
Human Intervention	The equipment operator is required to perform certain acts properly to aid in correct engine operation. For example, if a primer is pushed improperly or too often, the engine may fail to start. An equipment operator may also be the cause of fuel leaks or weeping due to over choking.

I	
Idle Speed, Mis-Adjusted	Refers to the mechanical idle speed adjustment which limits how far the throttle plate can close when moved to an idle position. If allowed to close too far, not enough airflow will be allowed past the plate, which will cause the engine to stall.
Inlet Needle & Seat	Functions as a valve between the fuel supply and the carburetor bowl. Failure mode ranges from stuck closed resulting in no fuel flow to stuck open which will drain the fuel tank quickly into the engine intake.
Inoperative Choke Plate	See Choke Shaft

J	
Jet, High Speed Air	A partial obstruction to a high speed air bleed may result in a pronounced stumble during acceleration, a lean backfire during engine operation and hard starting.
Jet, Low Speed Air	A partial obstruction of a low speed air jet may result in an overly rich condition at idle and top no load speed.
Jet, Main Fuel	A partial obstruction at the main jet can be responsible for hesitation upon acceleration or a miss under load conditions or inability to handle load. Engine temperatures may rise due to an overall lean engine running condition.
Jet, Pilot	Fuel to support the idle circuit and engine operation at top no load speed is delivered through the pilot jet. Should an obstruction be present, expect a lean condition at idle or top no load speed. Such a condition can result in hunting and surging.

K	
Kinked Fuel Line	A kink in a fuel line will cause a restriction to the inside diameter of the line. This can cause a reduction in fuel flow. See Fuel Filter, Restricted

L	
Loose Fitting	A loose inlet fitting at the carburetor body can cause a fuel leak
Loose Fuel Line Clamp	A loose fuel line clamp can cause a fuel leak
Loose Screws	Loose screws on diaphragm type carburetors can cause engine performance issues due to improper operation of the diaphragm/fuel pump. Because the diaphragm is a seal between the carburetor and tank, loose screws can also cause a potential fuel leak.

M	
Manifold Gasket	Leaks in manifold gaskets generally allow excess, unmetered air into the intake tract. This results in an overly lean fuel mixture. Engine symptoms will range from hard start to low power and inability to handle load.
Mixture Screws	When present, an improper mixture adjustment can account for hesitation or poor

	acceleration. This will be due to either an overly lean mix that can't support load or acceleration or an overly rich mix that loads up during operation.
--	---

N	
No Fuel in Tank	No fuel in tank results in a no start condition.
No Human Intervention	See Human Intervention. When the operator is expected to perform an operation such as engage the choke or disengage the choke, and doesn't, engine starting or operation can be affected.

P	
Parasitic Load	This is load applied to the engine that it may not be prepared to deal with. Parasitic load, particularly an unaccounted for load such as a tight bearing, affects engine power and performance. Engine hesitation can occur during acceleration or the equipment maximum load may be limited such as a 4 KW generator that can only pull 3800 watts.
Porous Casting	During manufacturing, poor mold fill can result in carburetor bodies that leak fuel through the metal walls of the carburetor body. This is rare on modern day carburetors.
Primer Bulb	Dry bulb primers force air under pressure over the top of fuel in the float bowl. This in turn forces fuel up the emulsion tube to enrichen the fuel air mixture during starting. A poorly sealing bulb, or one that has lost its elasticity will result in a poor prime and consequently hard starting.
Primer Line	On all dry bulb four cycle engines equipped with primers, the primer line carries an air pressure pulse to the carburetor. Any damage or poor installation of the line will cause a loss of prime and a hard or no start condition.
Pump Pressure	See Fuel Pump

R	
Restricted, Passage	Any restriction to the passageway that delivers the pressure pulse from the primer bulb to the float bowl can result in hard starting. See Primer Bulb.

S	
Seasonal Fuel Issues	Gasoline volatility is adjusted in response to government mandates, particularly in climates that experience extremes in temperature. Fuel blended for use in hot weather may cause hard starting or a no start condition if used in cold temperatures due to poor vaporization and vice versa.
Sediment Bowl Gasket	A sediment bowl captures debris that settles out in a fuel supply tank due to gravity. It is located as low as possible in the fuel supply system. Because of its location, any sealing problem at the gasket may cause an external fuel leak.
Stale/Old Fuel	See Fuel Quality

T	
Throttle Control	See throttle control cable.
Throttle Control Cable	Maladjustment or the throttle control cable can result in an inability to obtain top no load speed.
Throttle Shaft	A worn or damaged throttle shaft may prevent smooth operation or movement of the throttle plate. This can affect the speed the engine can obtain. Maverick air entering the intake tract past the throttle shaft will affect the fuel/air mixture.

V	
Vapor Lock	See Seasonal Issues and Fuel Line. Fuel blended for use in the winter is more highly volatile so it will vaporize more readily. If used in the summer months, it may vaporize in the fuel system and stop the flow of liquid fuel to the carburetor.
Vent, Gas Cap	As fuel leaves the fuel supply tank to be consumed by the engine, air is allowed to enter via the tank venting system to equalize pressure differentials. Should the vent become plugged or restricted, fuel delivery to the carburetor can be compromised. Engine operation can vary from hunting and surging due to a lean condition to the engine stopping completely.

W	
Warped Tank	See loose screws.
Welsh Plug	A missing or leaking welsh plug at the transition ports will allow prevent fuel from entering the transition port chamber and allow maverick air to enter the intake tract. This would invariably result in an engine that dies at idle and would probably result in an inability to handle load and possible problem with hesitation.
Wrong Type Fuel	Engines are designed to operate on a specific fuel. If the wrong type fuel were used, it would not be uncommon to experience a hard or no start condition.