Smart-Choke

A Blankenship Industries Product

Installation Instructions

NOTE: These instructions must be read and fully understood before beginning installation. If this manual is not fully understood, installation should not be attempted. Failure to follow these instructions, including the pictures may result in subsequent system failure.

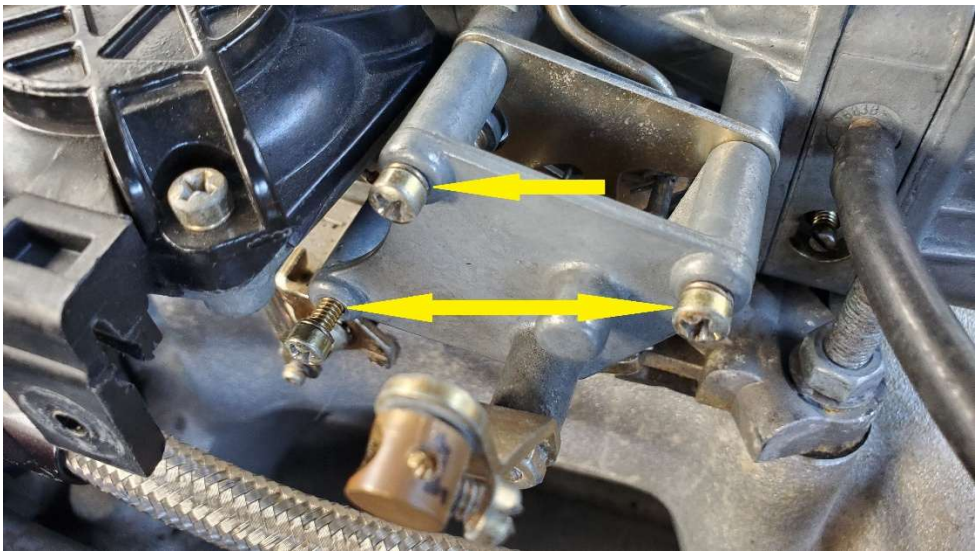
The Smart-Choke system is designed to enhance the starting of a carbureted engine, especially cold starting. However this is not a substitute for a poorly tuned carburetor, if the engine runs poorly during normal operation due to a poorly tuned carburetor, the engine will still run poorly. If you are not using an electric pump, the delay between priming the mechanical fuel pump and filling the bowls on the carburetor during cranking will still exist. However, tests on well tuned engines have resulted in an engine that easily starts and continues running without touching the throttle the-first-time-every-time, even at freezing temperatures.

WARNING: During installation, disconnect the battery cables. When disconnecting the battery always remove the Negative cable first and install it last.

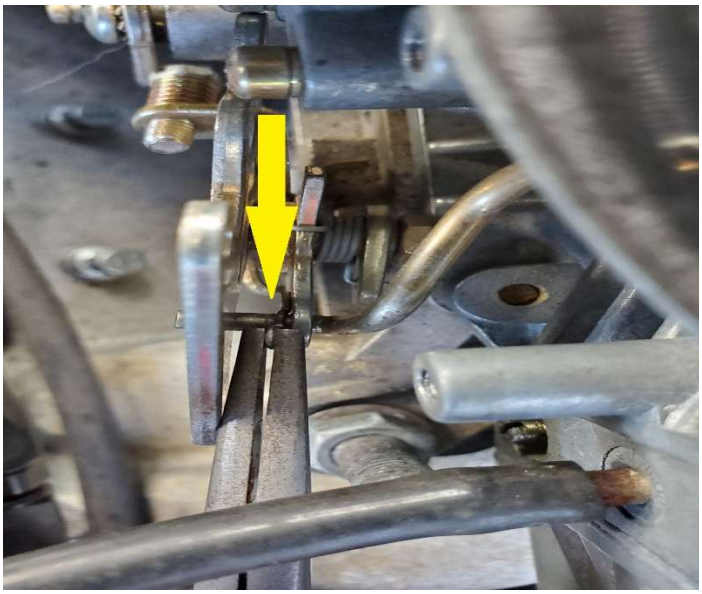
Grounds: A poor ground connection can cause many frustrating problems. When a wire is specified to go to ground, it should be connected to the battery negative terminal, engine block or chassis. There should always be a ground strap between the engine and the chassis. Always securely connect the ground wire to a clean, paint free metal surface.

CHOKE REMOVAL

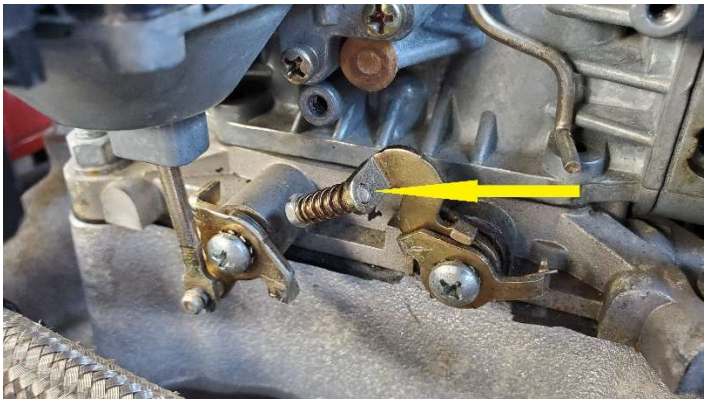
1. Remove old cables and/or wires from choke on the vehicles carburetor.
2. Remove 3 screws attaching choke to carburetor.



3. Remove clip connected to choke rod and remove old choke assembly from engine. Save clip for later.

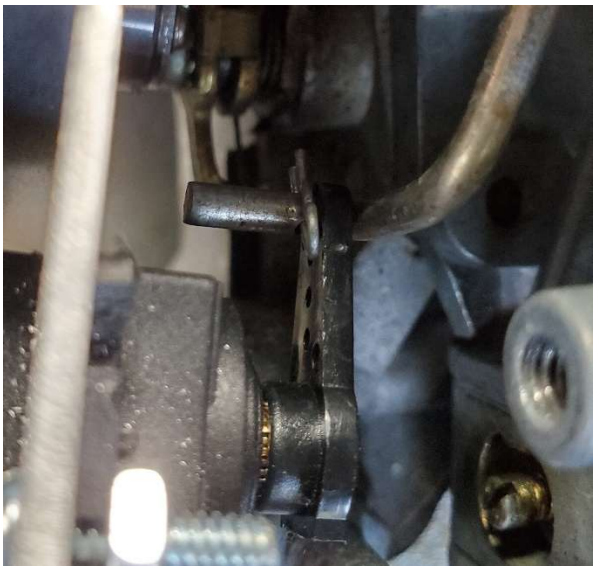


4. Back high idle screw out as far as it will go without coming out completely.



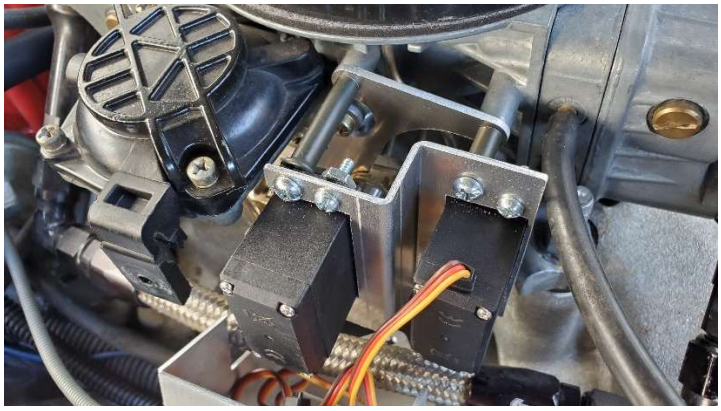
SERVO INSTALLATION

5. Install new choke servo arm through choke rod and install clip saved from step 3.

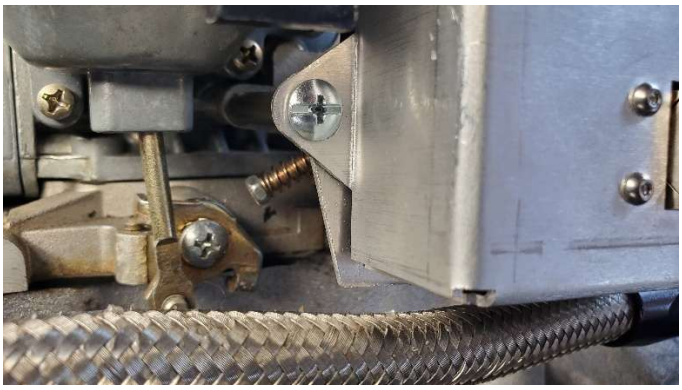


6. Install new smart-choke servo assembly using spacer plate and 2 flanged spacers in the top 2 holes with short screw and medium length screw. Install spacers with flanges facing the servos.

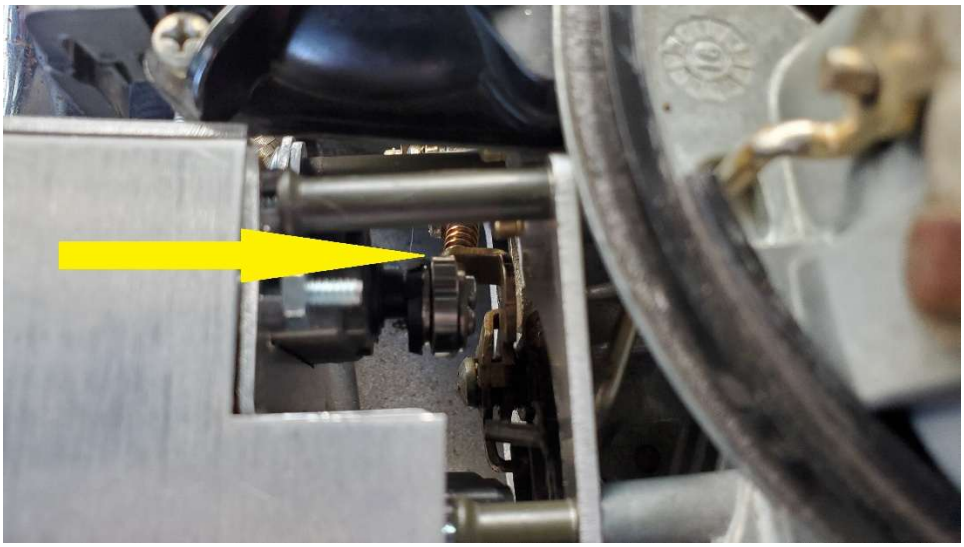
a. NOTE: If your carburetor uses a screw through the vacuum port and you wish to retain the screw you can cut around the gasket on the spacer plate.



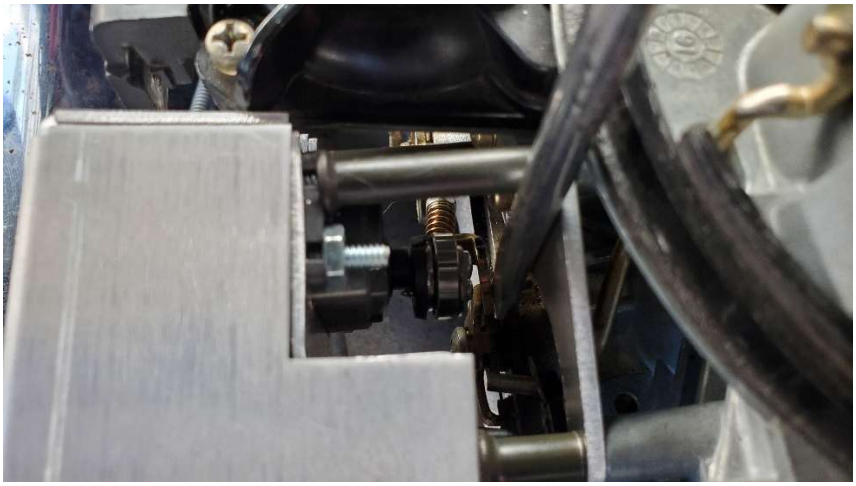
7. Install Servo Cover using spacer without flanges and long screw.



8. Turn high idle screw in until it just begins to contact the new high idle bearing. This can be felt by spinning the bearing back and forth with your finger until a slight resistance is felt. Then back the screw out 1/2 turn.



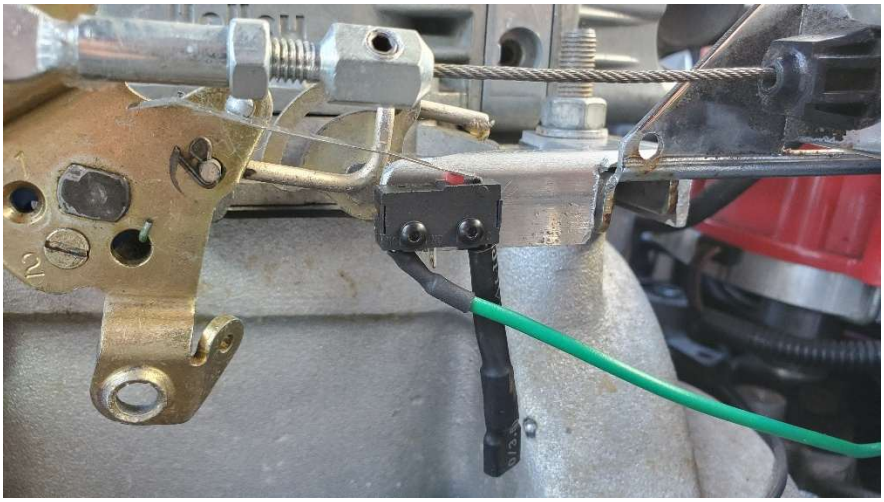
NOTE: If the idle screw does not make contact with the center of the idle servo bearing, the idle screw bracket should be bent so that it does. It can be easily bent inward with your thumb or bent outward using a flat screwdriver.



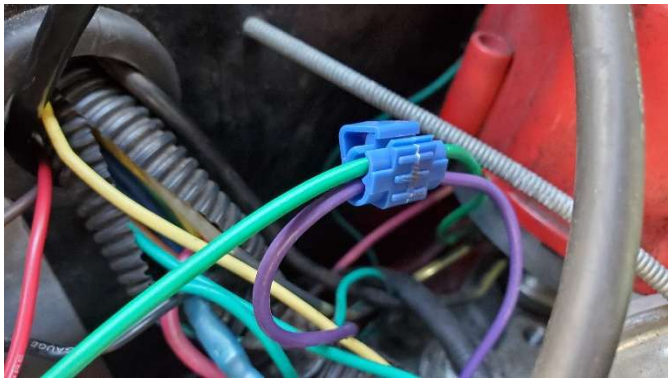
CLEAR FLOOD INSTALLATION

9. Install clear-flood bracket and switch. Adjust the switch so that the switch is activated when the throttle is opened fully. It is recommend to have someone press the gas pedal to the floor to confirm the switch is being activated when pressing the pedal from inside the vehicle. A click can be heard from the switch when it is activated. The switch arm can be bent if necessary to suite your application.
    a. NOTE: It is highly recommended that you use the clear-flood switch so that you may easily start you're engine by pushing the gas pedal full throttle in the event of a flood, however it is possible to use the smart-choke system by removing the clear-flood switch and connecting the incoming RED clear-flood switch wire directly to the start wire or by mounting the switch where it won't be activated.
    b. NOTE: Some modifications of the clear-flood switch bracket may be necessary to work with your throttle bracket depending on what bracket you have.

Example of modification to work with auto-parts store style throttle bracket.



10. Connect the GREEN clear-flood switch wire to the vehicle's starter wire using provided quick connect.



WIRING

11. Install temperature sensor in a coolant port in the intake manifold.
    a. NOTE: The smart-choke temperature curve is designed to work with the sensor installed in the intake manifold coolant passage, NOT in the cylinder head.
12. Install the smart-choke ECU inside the cab of the vehicle away from heat sources. It is recommended to install the ECU in a spot where the choke and high idle potentiometers are easily accessible.
    a. NOTE: The ECU MUST NOT be installed in the engine compartment.
13. Route ECU wires into engine compartment, connect ECU Start wire to Clear-Flood Switch. Connect Temperature Sensor. Connect RED Power Wire to a switched 12V power source that stays powered during cranking (NOT an accessory power source), with a 5 amp fuse. Connect the BLACK power wire to a good chassis ground. Connect Servo Housing and ECU together using the included RJ45 cable.
    a. NOTE: In some applications with troublesome electrical noise it may be necessary to use a relay (Not included) for the main power, Using switched power to control the relay and drawing power directly from the battery through the relay contacts to the ECU Power Wires.
    b. NOTE: It is recommended to keep ECU wires as far away from spark plug wires as possible.
    c. NOTE: It is recommended to keep wires only as long as necessary for installing in your application and avoid creating loops in wires. Wire loops can act as antennas that send electrical noise to the ECU.

FIRST START AND ADJUSTMENT

14. Crank the starter until the engine starts. This may take up to 3 seconds for the choke to fully close and fuel to be siphoned through the idle circuit of the carburetor. A proper installation should result in the engine starting without using the throttle within 5 seconds if the bowl of the carburetor is already full of fuel.
    a. If the idle is too high when the engine starts, adjust the Idle potentiometer to bring the idle down to the desired level. 1600 RPM is a good starting point, anything between 1600RPM and 2000RPM during the high idle period is acceptable.
    b. If the engine stalls, restart the engine. If it stalls repeatedly it may require small adjustments of the choke and high idle potentiometers.

15. It is normal for the engine to not run totally smooth within the first 30 seconds however if the engine has not fully smoothed out after 30 seconds, slowly adjust the choke potentiometer one direction and then the other until the engine smooths out. Small adjustments make big differences. Simultaneously adjust the high idle potentiometer to keep the RPM at approximately 1600 RPM.
    a. NOTE: In extreme cases of displacement to intake mismatch (example: 289 small block with large duration cam and 750cfm or larger carburetor) it may be necessary to go outside of the normal RPM range during warmup. In these extreme cases it may be necessary to have the high idle set as high as 2500rpm to keep the engine from dying during the taper period between 155 and 180 degrees.
16. The best time to make adjustments to the choke potentiometer is between 30 seconds and 2 minutes of the engine running. It may take several days of cold starts during the winter to get the engine running perfectly during the warm up period. It is

best to make these adjustments after the engine has cooled off completely overnight.

17. NOTE: The Smart-Choke system does not provide a priming pulse prior to cranking the engine, if the engine has sat long enough for fuel to evaporate out of the intake manifold, the engine will have to crank long enough to re-siphon fuel through the idle circuit, however the engine should always start without using the throttle. The fuel can completely evaporate out of the manifold in as little as 5 minutes on hot days.
18. Any time the starter is cranking, the high idle servo will move to the high idle position to aid in starting the engine even when warm, similar to how the idle valve works when starting a fuel injected vehicle.

19. **Fan Control:** Fan Control is incorporated into the ECU if you choose to use it. This is done by connecting the Black wire in the Start loom to the ground side of a relay coil. DO NOT connect this wire to a positive voltage source. A relay MUST be used for fan control, DO NOT connect this wire directly to your fan. The fan can be adjusted to turn on anywhere from 160 degrees to 230 degrees and will automatically turn off when the temperature drops 10 degrees below the set point.

Choke Potentiometer Adjustment and Temperature Curve:

The system is designed so that the choke will be fully opened anytime the coolant temp is above 160F and this setting cannot be changed. The choke potentiometer changes the open/close rate of the choke by adjusting at what temperature the choke would be fully closed, ranging from -200F to +32F. The system comes with this preset at -30F meaning that if the coolant were to be -30F the choke would be fully closed and would fully open at +160F. With the potentiometer turned fully clockwise the choke would be fully closed at +32F and open completely at 160F. This setting would generally not be recommended as the engine is unlikely to run with the choke fully closed even at +32F.

High Idle Potentiometer Adjustment:

The high idle potentiometer simply sets the limit of the high idle. The system is designed to hold the engine at high idle anytime the coolant temp is below 130F. The high idle will always gradually taper down to normal idle between 130F and 180F. If the temperature at which the engine settles to normal idle must be changed this can be done by adjusting the idle screw that was adjusted in step 7. It is recommend to always have a minimum of 1

turn of gap between the screw and the bearing when the servo is at the normal idle position. Failure to maintain this gap may result in damage to the servo.

How the system operates:

Whenever the starter is cranking, the high idle servo will move to the high idle position. This aids in starting by providing a small priming pulse of fuel from the accelerator pump and also bringing in extra air to bring the engine RPM's up before falling back to normal idle when the engine is warm. If the coolant temp is below 130F, the choke will fully close during cranking to provide enough vacuum to pull fuel through the idle circuit to aid in cold starting. Once the engine has started and the starter is released, the choke will go to the position that it is commanded to according to coolant temp, likewise the high idle will also go to the position that it is commanded to according to coolant temp. Once the engine temp has risen to 130F, the high idle will begin to taper down to normal idle which should be achieved by 180F. The Smart Choke system does not provide an electric fuel pump or a priming pulse prior to cranking the engine. Because if this, anytime the engine has sat not running for long enough that residual fuel in the intake manifold has evaporated, extra cranking may be required to bring fuel into the intake manifold from the bowl of the carburetor. This time will vary depending on the engine temp and ambient air temperature.

In the event of a flood, depressing the throttle fully will activate the clear-flood switch which will open the start circuit and prevent the choke from fully closing during cranking.

Carburetor and Choke Plate Selection:

Newer Holley carburetors with factory electric chokes now have a cut-out in the choke plate. With this cut-out in the choke plate there will unfortunately not be enough vacuum generated to pull fuel into the intake manifold during the start sequence of the smart choke, which may present itself as a failure to start, especially when the engine has sat overnight. A single pump of the accelerator pedal will normally be enough to take care of this, alternatively you can purchase a choke plate online without this cut-out for less than $20.

If you have not yet purchased your carburetor it is recommended to get a manual choke model which does not have this cut-out in the choke plate.

For questions or comments, please call 206-963-7021.

Feedback is welcomed and appreciated!

WARRANTY

This Product has a 90 day Limited Warranty that is extended to the original consumer only. This Limited Warranty is not assignable or otherwise transferable. There are no warranties that extend beyond those stated herein. No other warranties are expressed or implied beyond this Limited Warranty.

In the event of an alleged defect in material or workmanship, the manufacturer's responsibility is strictly limited to repair or replace the defective product. The manufacturer has no other obligation expressed or implied. Final warranty determination will be in the sole discretion of the manufacturer. The manufacturer shall not be responsible for; (a) actual or alleged labor, transportation, or other incidental charges; or (b) actual or alleged consequential or other damages incurred by use of any product from the manufacturer.

To initiate the warranty process, the consumer must return the alleged defective product to the place of purchase with a dated receipt and completed applicable warranty claim tag. Warranty claims will be rejected if the date of purchase cannot be established by the consumer.

This Limited Warranty sets forth specific legal rights. The consumer may have other rights as a result of variations in state laws or provincial laws. This Limited Warranty supersedes all prior warranty statements.

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