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Diagnostic Dilemmas: Servicing Quadrajets Carburetors

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May 01, 2008



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Introduced at the dawn of the emissions control era of the early 1960s, the "spread-bore" Rochester Quadrajets carburetor was considered leading-edge fuel delivery technology for the time. The "spread-bore" configuration consists of two small-diameter primary venturis designed to maintain high primary air velocities during normal driving for maximum fuel economy and low exhaust emissions. The two large secondary venturis are designed to produce maximum intake airflow and fuel delivery for maximum horsepower output.

Shortly after its introduction, mechanics unfamiliar with the principles underlying the design pronounced the Quadrajets a "junk" carburetor. Fortunately, drag racers competing in the National Hot Rod stock engine classes soon found that the carburetor responded well to various "tweaks" and the carburetor soon proved its worth in the performance market. Currently, the Edelbrock Corporation manufactures several different versions of the Quadrajets for performance applications. A number of aftermarket racing carburetor specialists also rebuild and customize Quadrajets carburetors to fit various restoration and performance applications.

Design Features

Unlike any other carburetor on the market at the time, the Quadrajets nestled its float bowl between its two primary venturis so that intake air would cool the float bowl assembly. The float bowl's fuel volume is also kept to a minimum to maximize fuel circulation through the float bowl. Both features drastically reduce fuel percolation in the float bowl when underhood temperatures reach a high extreme.

The primary venturis feature dual-venturi fuel delivery nozzles designed to achieve maximum air velocity for accurate fuel metering and optimum fuel vaporization. A pair of metering rods is located in the primary float bowl meter fuel to the primary venturis. Idle mixture is adjusted by turning two idle mixture adjustment screws located in a separate throttle plate assembly. Some later models contain an adjustable metering rod stop that allows the rod height to be adjusted for a smooth transition from off idle to main metering. The adjustment is located under a plug located between the idle mixture adjustment screws.

The Quadrajets's large secondary venturis are controlled by a lower set of throttle plates that are opened by a progressive linkage connected to the primary throttle shaft. The spring-loaded air valves located at the top of the secondary venturis are designed to maintain a constant depression or vacuum at the secondary fuel delivery nozzles as the secondary throttle plates open. This air valve assembly also contains a cam that coordinates the opening of the secondary fuel metering rods with the opening of the air valve assembly.

Although the Quadrajets was primarily designed for General Motors's engines, the Quadrajets was also used on many Ford and Chrysler engines. Many Quadrajets were application-specific and were manufactured with exhaust-heated and electric chokes, right-hand and center fuel feeds, and a wide number of choke pull-off configurations. In short, few models of Quadrajets are identical because they were produced in an era of increasing exhaust emissions standards.

When restoring a collector vehicle, it's important to make sure that the carburetor model number

corresponds to the application. The fact that the carburetor resembles original configuration does not ensure that the carburetor will perform correctly. In most cases, the metering rods, metering rod spring, main jets and air valve adjustments are designed to correspond to specific applications. Because the secondary throttle is a constant-depression design, airflow specifications aren't as critical on Quadrajets as on conventional carburetors.

In addition, some late-model Quadrajets were configured to only partially open the air valves or secondary throttle plates on small-displacement engines such as the Chevrolet 305 cubic-inch V8 engine. Such a carburetor will not perform correctly on a larger displacement engine.

Last, some Quadrajets were built with an altitude compensation aneroid capsule located opposite the accelerator pump assembly. These aneroids should not be adjusted or tampered with. A computer-controlled, feedback version of the Quadrajets was also produced during the 1980s. Because only a few of these carburetors are on the road today, suffice it to say that a few special tools available from aftermarket tool suppliers are required to adjust the primary metering rod height and travel during a rebuild. A common ignition point dwell meter set on the six-cylinder scale and attached to the green connector at the carburetor wiring harness can be used to adjust the idle fuel mixture. A scan tool may also be used to indicate metering rod solenoid dwell. Idle dwell times generally run best at 30°. Most of the basic electronic inputs are familiar to modern driveability technicians, so we'll leave feedback carburetor technology at that.

Failure Points



Photo 1: Leakage from the secondary metering well plugs are the most common Quadrajets failure.

Because the Quadrajets was a mass-produced carburetor, it suffered from a few failure points in its basic design. The most notable failure in a Quadrajets is the secondary metering rod well plugs leaking fuel into the intake manifold air stream. The symptoms of leaking well plugs are a rich idle air/fuel mixture or a rolling idle caused by a fuel drip into the intake air stream.

Early Quadrajets used brass well plugs that could be replaced with a more durable O-ringed aluminum plug. The well plugs on later Quadrajets were swaged into the main body and are better sealed with a hardening epoxy like JB Weld or a similar

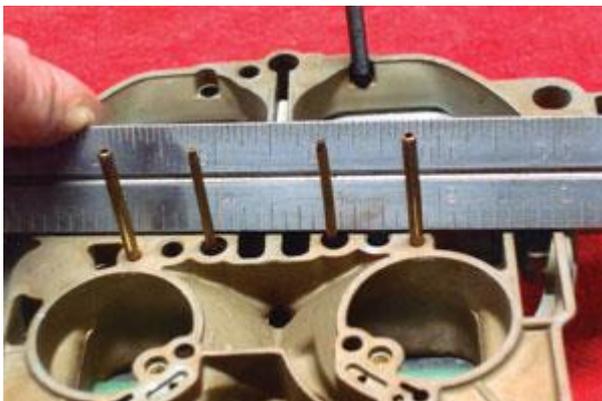


Photo 2: Float bowl cover distortion is common on well-used Quadrajets carburetors.

hardening epoxy compound. Inserting a lozenge-shaped neoprene plug into the cavity below the secondary metering wells can seal minor leaks. Both products are



Photo 3: Although the process requires care and patience, Quadrajets float bowl covers usually can be straightened.

available from aftermarket suppliers. **See Photo 1.**

A second common failure is fuel-metering problem caused by over-tightening the Quadrajets two 5/16" diameter front mounting bolts. **See Photo 2.**

Over-tightening these bolts essentially warps the bowl cover, forcing it away from the main body casting. The problem can sometimes be remedied by suspending the cover between two steel bars mounted lengthwise in a hydraulic press and incrementally applying pressure until the cover comes back into tolerance. **See Photo 3.** Fuel-saturated floats also may cause a Quadrajets to run rich or flood during normal operation. Float level



Photo 4: Float level can easily be measured on the Quadrajets.

can be measured by inserting a special Kent-Moore float level gauge into the bowl vent located just aft the choke valve. **See Photo 4.**

Measuring the distance from the top of the bowl vent to the float and then subtracting the dimension from the bowl vent to the cover gasket can also determine the float level. If a repair manual with adjustment specifications is available, refer to the float level specifications listed for the model number stamped vertically on the driver's side of the carburetor main body or on a tab attached above the primary throttle shaft. Although most Quadrajets float levels are set at 3/8", the specification can vary from 5/16" to 1/2". Last, the metering rod piston can stick in its

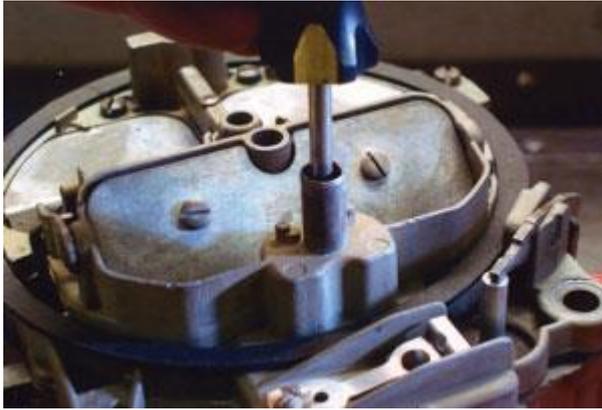


Photo 5: Metering rod travel can be easily checked by inserting an applicable tool into the front float bowl vent.

bore, causing a lean air/fuel condition. The metering rod travel can be checked by inserting a screwdriver or punch into the bowl vent hole in front of the choke valve to see if the metering piston spring returns the metering rods to a raised position with the engine off. Spraying some penetrating oil into the bowl vent and tapping on the metering rod hanger with a screwdriver or punch can often loosen the metering rods. **See Photo 5.**

Quadrajets Adjustments

The Quadrajets has a number of critical adjustments that make it perform better. The initial adjustment for idle mixture screws on most Q-jets, for example, should be lightly seated and then



Photo 6: Metering rod travel can be easily checked by inserting an applicable tool into the front float bowl vent.

backed out three turns. Initial idle speed can be obtained by seating the primary throttle plates and then turning the idle speed screw in about two turns.

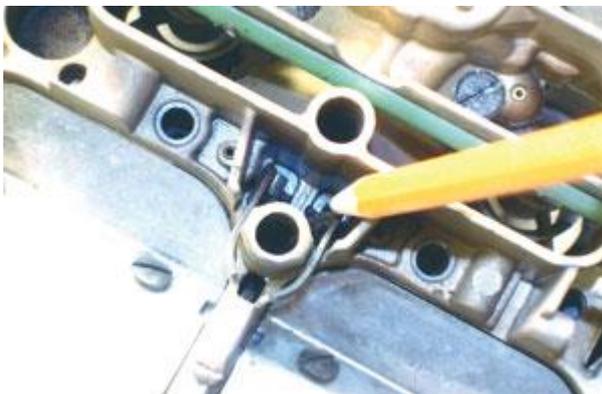


Photo 7: The secondary metering rod height adjustment should be checked to ensure delivering a correct secondary air/fuel ratio.

Primary jetting is most easily corrected by increasing the jet size in two-step increments. To remove the primary metering rods, lightly tap the metering rod hanger with a screwdriver handle. Spring pressure will pop the plastic retainer from the main body casting.

Before installing any Q-jet, make sure that the secondary throttle plates are seated and that the secondary throttle linkage is adjusted to specification. A tab on the primary throttle shaft actuates the secondary linkage. This tab determines the open position of the secondary plates. When the tab contacts the secondary linkage, the linkage pushes against the upper part of the secondary throttle shaft lever. At that point, the linkage should be located mid-point in the slot located below. **See Photo 6.**



Photo 8: Use a 3/32" hex wrench to loosen the lock screw on the air valve spring preload adjustment.

On the topside, the secondary metering rod hanger should be adjusted to ideally achieve equal metering rod height and to allow both metering rods to touch the bottoms of their respective wells. This adjustment is done incrementally to avoid binding the rods in their hanger and to avoid damaging the hanger itself. **See Photo 7.**

Secondary air valve adjustment is critical to Quadrajet performance because correct secondary air/fuel metering requires a constant depression or vacuum in the secondary venturis. If a repair manual with adjustment specifications is available, begin with the applicable spec. If a specification is not available, preload the air valve spring adjustment one-half turn,



Photo 9: Make sure the secondary throttle lockout disengages when the choke valve opens.

then road test the vehicle. If the engine stumbles as it accelerates, increase the spring preload in one-half turn increments until the stumble disappears. **See Photo 8.**

Last, always make sure that the choke valve lockout is allowing the secondary throttle plates to open. Some Quadrajet models incorporate the lockout at the upper choke housing linkage while others locate the lockout at the secondary throttle shaft. In either case, the choke valve linkage keeps the air valves closed until the engine warms up. **See Photo 9.**

Quadrajets Wrap-Up

When serviced correctly, the Quadrajets will prove to be a very responsive and economical carburetor to use for many street driving and racing applications. Although Quadrajets is very dependable, it pays to clean the external choke linkage and air bleeds with an aerosol cleaner. When changing the fuel filter, remember to replace the plastic gasket located on the end of the fuel inlet housing before reinstalling. Cross threading the inlet housing can be greatly reduced by cleaning and oiling the housing threads before installation. If the threads are seriously damaged, aftermarket kits can be used to replace the factory housing. In virtually all cases, a well-maintained late-model Quadrajets will maintain exhaust emissions within legal limits for collector and street rod vehicles while providing a full-bore performance experience.

Rochester Quadrajets Model E4ME: Exploded View

It is representative of 1981-87 passenger-car Q-jets.

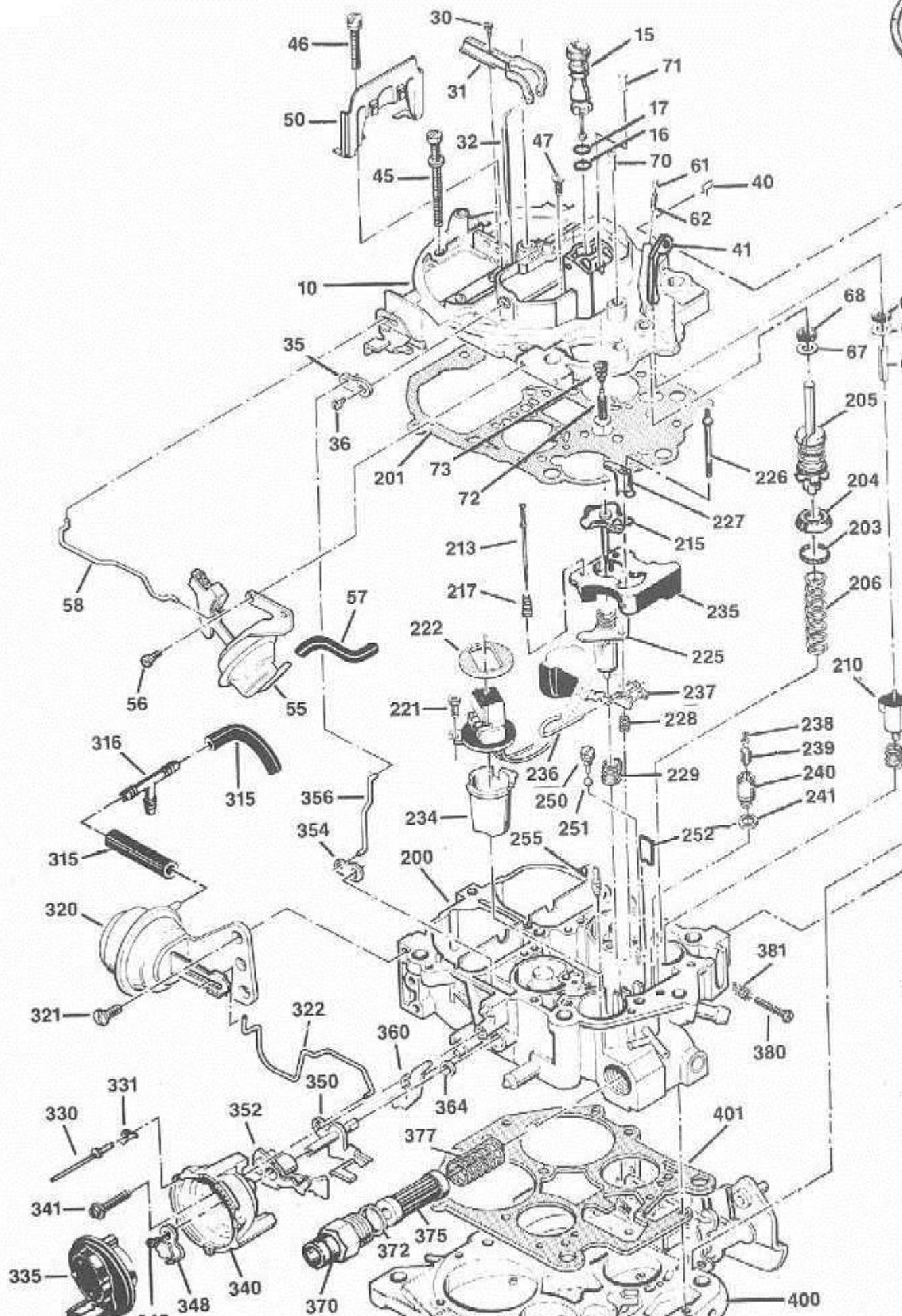
Parts labeled below.

Rich stop limit (#227) may not appear on some applications.

Drawing and part description courtesy Rochester Products Division, GM.

Also available in Haynes Techbook #10230 Rochester Carburetor Manual.

Note: This picture shows the "Chevy Style" Quadrajets, with the passenger side exiting fuel inlet. Functionally the same as any other CCC Q-jet besides this. Pre-Computer Q-jets use many of the same pieces, except the electrical connectors, and the modified primary jet/rod setup found in the CCC Q-jets from 1980-1990. Dorian Yeager -----



-
- 1 Gasket-air cleaner
 - 5 Gasket-flange
 - 10 Air horn assembly
 - 11 Rivet-cover attaching
 - 11 Rivet-cover attaching
 - 12 Cover-air bleed valve
 - 15 Air bleed valve assembly
 - 16 O-ring-air bleed valve lower
 - 17 O-ring-air bleed valve-upper
 - 30 Screw-secondary metering rod holder attaching
 - 31 Holder-secondary metering rod
 - 32 Rod-secondary metering
 - 35 Lever-choke
 - 36 Screw-choke lever attaching
 - 40 Retainer-pump link
 - 41 Lever-pump
 - 45 Screw assembly-air horn to throttle body
 - 46 Screw assembly-air horn to float bowl
 - 47 Screw-air horn to float bowl (countersunk)
 - 50 Baffle-air horn
 - 55 Vacuum break assembly-primary side (front)
 - 56 Screw-primary side (front) vacuum break assembly attaching
 - 57 Hose-primary side (front) vacuum break
 - 58 Link-primary side vacuum break-air valve lever

- 60 Plunger-sensor actuator
- 61 Plug-TPS adjusting screw
 - 62 Screw-TPS adjusting
 - 65 Retainer-TPS seal
 - 66 Seal-TPS plunger
 - 67 Retainer-pump stem seal
 - 68 Seal-pump stem
- 70 Plug-solenoid adjusting screw
 - 71 Plug-solenoid stop screw
- 72 Screw-solenoid stop rich mixture
- 73 Spring-rich authority adjusting
 - 200 Float bowl assembly
 - 201 Gasket-air horn to float bowl
 - 203 Spring- pump plunger
 - 204 Cup-pump plunger
 - 205 Pump assembly
 - 206 Spring-pump return
- 210 Sensor-Throttle Position (TPS)
 - 211 Spring-sensor adjusting
 - 213 Rod-primary metering
 - 215 Plunger-solenoid
- 217 Spring-primary metering rod (E2M, E4M only)
 - 221 Screw-solenoid connector attaching
 - 222 Gasket-solenoid connector to air horn
 - 225 Mixture control solenoid assembly

- 226 Screw-Solenoid adjusting (Lean mixture)
 - 227 Stop-rich limit
- 228 Spring-solenoid adjusting screw
 - 229 Spring-solenoid return
 - 234 Insert-aneroid cavity
 - 235 Insert-float bowl
 - 236 Hinge pin-float
 - 237 Float
 - 238 Pull clip-float needle
 - 239 Needle-float
 - 240 Seat-float needle
 - 241 Gasket-float needle seat
- 250 Plug-pump discharge (retainer)
 - 251 Ball-pump discharge
 - 252 Baffle-pump well
 - 255 Primary metering jet assembly
- 315 Hose-secondary side (rear) vacuum break
- 316 Tee-secondary side (rear) vacuum break
- 320 Vacuum break assembly-secondary side (rear)
- 321 Screw-secondary side (rear) vacuum break ssembly attaching
- 322 Link-secondary side (rear) vacuum break to choke
 - 330 Rivet-choke cover attaching
 - 331 Retainer-choke cover
- 335 Electric choke cover and stat assembly
- 340 Choke housing assembly

341 Screw and washer assembly choke housing to float bowl

345 Screw-choke stat lever attaching

348 Lever-choke stat

350 Intermediate choke shaft, lever and link assembly

352 Fast idle cam assembly

354 Lever-intermediate choke

356 Link-choke

360 Lever- secondary throttle lockout

364 Seal intermedtate choke shaft

370 Nut-fuel inlet

372 Gasket-fuel inlet

375 Filter-fuel inlet

377 Spring-fuel filter

380 Screw-throttle stop

381 Spring-throttle stop screw

400 Throttle body assembly

401 Gasket-float bowl to throttle body

405 Screw assembly-float bowl to throttle body

410 Link-pump

420 Needle-idle mixture

421 Spring-idle mixture needle

422 Plug-idle mixture needle

425 Screw-fast idle adjusting

426 Spring-fast idle adjusting screw

500 Solenoid and bracket assembly

501 Screw-bracket attaching

505 Bracket-solenoid

510 Throttle kicker assembly

511 Bracket-solenoid

512 Nut-throttle kicker assembly attaching

513 Washer-tab locking

515 Idle speed control assembly