Your Mikuni HSR is fitted with the tuning parts we found to work with the great majority of engine performance modifications. However, the large number of differing exhaust systems and cams available makes it impossible to accommodate all possible combinations with one carburetor set-up. Your HSR will almost certainly run correctly on your engine without exchanging any parts. But, if it doesn’t, you may alter its tuning to suit your engine’s needs by following this guide.

Some exhaust system designs strongly interfere with carburetor tuning. For instance, it is very difficult to get smooth and responsive carburetion through the entire rpm range with straight pipes and completely open exhausts. In addition, very small volume, small diameter mufflers are often ‘seen’ by the engine as straight pipes and present the same tuning difficulties.

Very long duration cams often cause relatively poor running below about 3,000 rpm, depending upon the individual cam’s intake valve closing point. Such cams cause reverse airflow out the mouth of the carburetor (often called: “reversion” or “stand-off”) that can be mistaken for a carburetor tuning problem.

Harley-Davidson Screamin’ Eagle performance parts are proven and predictable. If you have any doubts about a particular exhaust system, air cleaner or ignition, you may substitute the standard Harley Screamin’ Eagle parts as a “reality check.”

When re-tuning is required, it usually involves small alterations to the idle and/or main system. The following paragraphs supply enough detail information to make such changes an easy matter for an experienced mechanic.

Finally, please note that there is simply no point in attempting to tune any carburetor unless the engine is sound and in a good state of tune. If you have any doubts about the general condition of your engine, have it checked by your dealer or an experienced mechanic before attempting to fine-tune your new Mikuni carburetor.

**AIR LEAKS:**

We have found that a certain percentage of Harley-Davidson Evo and Twin Cam engines have minor air leaks between the manifold and heads. The leaks affect air/fuel mixtures at low throttle settings and can be troublesome at idle. For best performance, it is important that you test for such leaks and eliminate them if any are found.

It is easy to test for intake manifold air leaks: With the engine warm and idling, spray WD-40 around the junctions of the manifold, carb and heads. If the engine changes from its steady idle, if it surges, misses, etc then there is an air leak that must be corrected if the engine is to run its best.

Because of the frequency of air leaks, we recommend that you replace all three manifold seals when you install your new Mikuni carburetor. These parts are available from any Harley dealer.

If you lubricate the seals just before installation, they will seat more smoothly and are less likely to develop leaks. Liquid dish detergent works well. WD40 is also a good choice but evaporates quickly.

It is important that the manifold be aligned before the lubricant sets or evaporates. Otherwise, the parts may stick to the seals, which, in turn, can cause leaks when the parts are moved into alignment.

**NOTE**

For the quickest and most accurate results when fine-tuning your HSR, we recommend using "witness" marks on the throttle grip and throttle housing. Use masking tape on the grip and an indicator mark on the throttle housing. Mark the tape in ¼ throttle increments from idle to full throttle. You can then identify the throttle opening where a tuning change may be required and then adjust the correct tuning components.

![Figure: T1]

**HSR TUNING SYSTEMS:**

The HSR42 carburetor is divided into four interdependent systems:

1. The choke system
2. The idle system
3. The main system
4. The accelerator pump system

Each of these systems has its major effects in a different throttle range. While there may be some overlap, each system can generally be treated as though it is completely responsible for its range of throttle settings. Three of the systems have replaceable components that allow fine-tuning should the need arise.
TUNING THE MAIN SYSTEM

JET NEEDLE (1/8 – 1/4 throttle)

The straight diameter portion of the jet needle controls the mixture from just above idle to approximately ¼ throttle. If the mixture is too rich or too lean in this throttle range, the needle will need to be exchanged for a larger or smaller one. HSR jet needles are available in four sizes. Only the diameter of the straight part of the four jet needles differ. The richest is the “-95” and “-98” is leanest.

LEAN CONDITION:

If the needle is too lean (large in diameter), part throttle acceleration will be flat. There may also be some detonation during part throttle acceleration from low rpm, (although this may have other causes). A lean needle also results in an abnormally slow warm-up.

If any of these conditions exist, install a one-size smaller needle and compare the performance.

RICH CONDITION:

While a black, sooty spark plug is a sure sign of richness; there are more subtle signs. If your engine responds crisply at low throttle openings when it is cold, chances are the needle is one size smaller than it needs to be. This assumes, of course, that the idle mixture is correctly tuned.

Poor fuel mileage is another sign of an over-rich condition. Because of the way most of us ride our Harleys, that richness is usually the result of a jet needle that is too small (rich). The color of the end of the exhausts is a sign of mixture strength. Dark gray with some black is normal for today’s lead-free gasolines.
TM-4
JET NEEDLE (1/4 - 3/4 throttle)

The tapered portion of the jet needle begins to rise out of the needle jet at about ¼ throttle. From that point until the main jet takes over near ¾ throttle, the jet needle taper is the main influence on mixture strength.

When testing, consider the rpm effects of any accessory cam you may have installed. Long duration cams tend to perform poorly below some critical minimum rpm. If you attempt to test below this rpm, the engine may seem soft, flat and unresponsive. No carburetor can compensate for the engine being “off the cam.”

All jet needle and main jet testing should be done with the engine near the middle of its rpm range, but high enough to be “on the cam.” With the engine at operating temperature, accelerate at ½ throttle in third or fourth gear.

LEAN CONDITION:
If acceleration seems soft or flat and the engine is slow to respond when the throttle is quickly opened from the ½ to the ¾ position, the mixture is too lean. Raise the needle one notch and repeat the test (refer to page: TM6).

RICH CONDITION:
If acceleration is crisp but the engine hesitates or staggers as the throttle is quickly shut down from ¾ to ½ throttle, the mixture is too rich. Lower the needle one notch and repeat the test. The needle will be correct when acceleration is crisp at mid-rpm yet the engine does not load up during throttle shut down.

NOTE
See the “How To” section at the back of this manual for jet needle adjustment and removal procedures.

WARNING
Please do not disassemble the throttle lever linkage. It is not normally necessary to remove the bolt to change position of the jet needle. However, if you do remove the throttle shaft bolt, be certain that you:
1. Apply a drop of blue Loctite™ to the threads.
2. Torque the bolt to 18in./lb.
3. Replace the tab washer and bend it up until it is flush against one of the bolt head flats.

MAIN JET: ¾ — full throttle
The main jet controls fuel flow from ¾ to full throttle. It is the last you need tune and is the easiest to get right.

METHOD ONE:
An accurate method for choosing the correct main jet is to accelerate at full throttle between two points and note the speed at the second point.
1. Select markers that are far enough apart so the engine gains about 2,000 rpm (in third or fourth gear) between the two.
2. When you pass the first marker, quickly roll the throttle fully open and note the speed as you pass the second marker.
3. The jet that gives the highest speed is the correct one. This method is simple but effective.

METHOD TWO:
1. The best method is to use a dynamometer. The main jet than produces the most power is the correct one. If two jets deliver the same power, use the smaller one.

TUNING THE ACCELERATOR PUMP:
The accelerator pump has two adjustments and one replaceable tuning part, the accelerator pump nozzle, that can be adjusted or changed to refine the performance of the accelerator pump system.

The accelerator pump injects a metered and adjustable amount of fuel into the engine when the throttle is opened from or near its closed position.

The beginning point of the pump stroke is adjusted with screw #1 on the white plastic pump lever. To start the pump sooner (smaller throttle opening), back the screw out. To start it later, turn the screw in.

The end of the accelerator pump stroke is adjusted by screw #2 located on top of the carburetor just behind the pump lever. Best performance is generally achieved when the pump stroke ends before 2/3 throttle.

The accelerator pump nozzle size (#50, #60 or #70) determines the rate at which fuel is delivered to the throat of the carburetor. A larger nozzle delivers fuel at a higher rate than a smaller nozzle.

Figure: T3
STANDARD SETTINGS & ADJUSTMENTS:
The standard nozzle size is #70. If the engine seems to run too rich when the throttle is first opened the nozzle may be too large and the fuel delivery rate too high. In this case, fit a smaller nozzle.

The #1 screw is normally adjusted to establish a gap of about 2mm (about the thickness of a nickel) between the white plastic lever and pump rod end. If there is a hesitation just off idle, reduce the gap.

The #2 screw is normally adjusted to stop the pump action at about 2/3 throttle. If you tend to accelerate from low speeds in a tall gear, you may need to adjust the pump for a longer stroke. If you tend to downshift before accelerating from low speeds and/or have a lighter bike then you might consider shortening the pump stroke.

For best results, the accelerator pump nozzle should be pointed directly at the jet needle. The nozzle is held in place by the friction of an O-ring and can be turned easily with a pair of long nosed pliers. Nozzle adjustment should be made with a minimum of pump strokes to avoid flooding the engine.

SERVICING:
There are few moving parts in the HSR series carburetors and they do not require frequent servicing. However, here are a few suggestions that, if followed, will assure good performance season after season.

1. If the motorcycle is to be stored for any length of time, the carburetor float bowl should be drained.
2. The float bowl drain plug (main jet access) should be removed periodically and cleaned of any sediment that may have accumulated during long periods of use.
3. DO NOT drill or modify any part of this carburetor for any reason, as the result will surely be more problems.

FLOAT LEVEL ADJUSTMENT:
1. Invert the carburetor and remove the float bowl.
2. The float assembly's actuator tab should just contact the Needle Valve assembly when the bottom of the float is 18mm from the carburetor bottom surface as shown.
3. Bend the actuator tab to adjust float level.

NOTE
Check the condition of the float bowl O-ring. If it is worn or does not fit in the groove correctly, replace it.

MIKUNI OR SCREAMIN' EAGLE AIR FILTER:
Mikuni, Screamin' Eagle and many others are made by K&N and do not need frequent cleaning. A cleaning interval of once a year or 5,000 miles is often enough. However, if you ride in very dusty conditions, clean the filter when it is obviously dirty over 50% or more of its surface.

1. Tap the element to dislodge embedded dirt; then gently brush with a soft bristle brush.
2. Roll the filter element in a large shallow pan of K&N air filter cleaner (Simple Green, 409, etc) with the depth set to ¼ of a pleat. Remove immediately and let sit for approximately 10 minutes. IMPORTANT: Do not use gasoline or cleaning solvent to wash the filter element, as this will damage the filter.
3. Rinse the element with low-pressure water. Always flush from the inside of the filter out to ensure that dirt is washed out of the filter and not into it. IMPORTANT: Air dry only; do not use compressed air.

4. After the filter is completely dry, re-oil sparingly. Apply K&N filter oil with one pass per pleat. Wait 10 minutes and re-oil any white spots.

HOW TO REMOVE & REPLACE:

JET NEEDLE:
1. Back out the idle speed adjuster five or six turns to ensure that the throttle valve is fully bottomed.
2. Remove the three top cover screws and remove the cover.
3. Loosen the Allen screw located on the slide (long 2.5mm Allen wrench).
4. Swing the clip aside.
5. With the slide bottomed, remove the jet needle. You may use a long-nose pliers or tweezers for this. Be sure to save the small plastic washer under the jet needle clip.
6. To reassemble, reverse steps 1. through 5. Be sure to snug the Allen screw and replace the plastic washer under the jet needle clip.

HOW TO ADJUST:

JET NEEDLE CLIP:
1. Remove the jet needle per previous instructions.
2. Place the open end of the jet needle clip against a hard surface.
3. Cover the clip area with your hand (to prevent loss of the clip) and press the needle down to snap the clip off the needle.
4. Place the clip in the desired groove on the needle.
5. Place the clip against the hard surface with the open end up.
6. Again cover the clip area with your hand and press down on the needle to snap the clip into place.

MAIN JET:
1. Turn the fuel petcock to the OFF position.
2. Use an 11/16" or 17mm wrench to loosen & remove the drain bolt.
3. Use a good fitting slot type screwdriver to remove the main jet.
4. Reverse steps 1 through 3 to replace the main jet. The jet need only be hand-tight; do not over tighten.

PILOT JET:
1. Turn the fuel petcock to the off position.
2. Remove the four screws retaining the float bowl (#2 Phillips). Remove the float bowl.
3. Use a good fitting slot type screwdriver to remove the pilot jet.
4. To reinstall the pilot jet, Reverse steps 1 through 3. Start the jet by hand, as the threads are small and relatively fragile. Do not over tighten; snug is enough.

ACCELERATOR PUMP NOZZLE:
1. Turn the fuel petcock to the OFF position.
2. Remove the four screws retaining the float bowl (#2 Phillips). Remove the float bowl.
3. Use your finger to push the nozzle out of the throat of the carburetor (see exploded view).
5. Re-install the float bowl.
6. Turn the fuel petcock on and work the throttle several times to prime the accelerator pump.
7. Use long-nose pliers to turn the nozzle until the fuel stream points to the middle of the carburetor throat.
HSR42/45 Carb. Rebuild Kit: KHS-016
Part numbers in bold are included in kit

Part Number (000-000) = no available stock

NO. PART NO. DESCRIPTION
1. C5-0140-8 Screw, Top Cover (fla...head)
2. CM7-0141-8 Screw, Top Cover
3. 776-30005 Top Cover
4. TM4204 Gasket, Top Cover
5. 89163126 E-Ring, Jet Needle
6. 826-63002 Washer, Jet Needle
7. J6-BCJ019-97 Jet Needle (42) 97 STD
7a. J6-BCF020-96 Jet Needle (45) 98 Leaner
8. V84706 Lebek
9. BSAP686 E-Ring, Lower Lever
10. B40110 Packing, Link Lever
11. BS84684 Pin, Link Lever
12. TM4208 Throttle Valve
13. 739-63002 Screw, Needle Retainer Clip (L=10 mm)
14. TM42106 Clip, Needle Retainer
15. TM42160 Sealing Ring/Fixed
16. TM4210 Seal, Throttle Valve
17. 925-68006 Pulley, Cable Bracket
18. 53974 E-Ring, Cable Bracket
19. TM42/21 Bracket Assy, Cable
20. B3-03520-B Bolt, Bracket
21. VM82040 Spacer
22. TM42/38 Plate, Lock Tab
23. GS-06444-B Screw
24. 640-12001 Cap, Starter
25. VM41/241 Spring, Starter Plunger
26. N1850312 Starter Plunger
27a. TM44106 Body Assy, Bearing & Spigot (N/A)
28. 616-94029 Seal, Spigot Body
29. 925-68011 Ring (Steel)
30. TM42/243 Lever, A/P
31. N130319 Pin, Throttle Lever
32. TM42/46 Lever, Throttle
33. M12F86-88 Spring, A/P
34. MC-0318-B Screw, A/P
35. TM42/47 Spring, A/P
36a. TM42/9601-B Body Assy (N/A)
36b. BA52000 Packing, Check Ball, Nut
36c. TM42/006 Adjusting Screw, A/P
37. B30035 O-Ring, A/P Screw
38. TM42/69 Bolt
39a. TM42/17 Plate, Lock Tab for Shaft
40. BN38/43 Pin, Return Lever
41. TM42/246 Lever, Return
42. TM42/245 Adjusting Screw, Throttle Stop
43. N3-04 Nut, Throttle Stop
44. TM42/19 Spring, Throttle Return
45. TM42/19 Throttle
46. 799-65492 Nut, Throttle
47. TM42/16 Plate, Fuel Joint Retainer
48. BS44646 Screw, Fuel Joint Retainer
49. 60-0644-B Screw, Fuel Joint Retainer
50. 604-26014 Screw, Pilot Air Adjusting
51. N133-206 Spring, Pilot Air Screw
52. VM12/205 Washer, Pilot Air Screw
53. N133-937 O-Ring, Pilot Air Screw
54. TM40/27 Fuel Joint
55. K11050 O-Ring, Fuel Joint
56. B300398 Packing, Idle Adjuster
57. VM22/136 Washer, Idle Adjuster (Steel)
58. 730-30018 Spring, Idle Adjuster
59. 925-15001 Ring, Idle Adjuster (Brass)
60. TM42/32 Idle Adjuster Ass'y (Long)
61. 990-605-005 Screw, Idle Adjuster Screw (Short)
62. B300370-006 Air Jet (Blank)
63. 784-430008-X6 Needle Jet (723 Series)
64. TM4211-70 Nozzle, Accelerator Pump
65. N124083 O-Ring, A/P
66. VM28/486-25 Pilot Jet
67. TM44040 Extension Memjet
68. N100604-160 Main Jet
69. 816-33003 O-Ring, N.V.
70. VM13-216 Screw w/Washer, N.V. Retainer
71. 798-27001-4.2 Needle Valve Assy w/O-Ring
72. 859-65227 Float Assy
73. BV20/22 Pin, Float
74a. C2-0410 Screw, Float Pin
75. 616-24028 Packing, Float Bowl
76. TM42/05 Float Chamber Body
77. N122-038 Hose, Overflow
78. VM28/234 O-Ring, Drain Plug
79. TM32/14 Drain Plug
80. C2-0412-B Screw, Float Bowl, short (3)
81. C2-0416-B Screw, Float Bowl, long (1) (TC88 Only)
82. TM3644-1A Rod, A/P
83. TM36/81 Boot, A/P Rod
84. TM36/80 Plunger, A/P
85. VM14/13-89 Spring, A/P
86. N108163 Rubber Cap, Purge Port
87. TM42/35 Guide Plate (TC88 Only)
TROUBLE SHOOTING GUIDE:

OVERFLOW: Fuel runs out of carburetor through overflow tube on bottom of float bowl, from vent fitting on side of carburetor or from body/float bowl junction.

Foreign matter around fuel needle valve & seat:
Includes paint flakes, rust or bits of fuel hose.

Stock or clogged tank vent:
Factory one-way tank vents can cause pressure in tank. Clogged tank vent can result in fuel starvation.

Deteriorated gasoline causing sticking fuel needle valve.
Loose float bowl or damaged float bowl packing.

POOR FUEL ECONOMY (at normal cruise speeds):
Mikuni installations normally deliver fuel economy very close to that of the completely stock Harley.

Choke cable routing:
The choke cable must be fully bottomed in the metal elbow (at carburetor end). There must be some perceptible free-play in the choke knob.

Stock or clogged tank vent:
Many current stock Harley tank vents do not allow gasses to leave the tank and pressure may develop from engine heat. Open the vent to allow two-way air flow. Clogged tank vent can result in fuel starvation if the vent valve becomes stuck or partially blocked.

Incorrect jet needle:
A too-rich or too-lean jet needle for engine tuning set-up or altitude can cause poor mileage. Highly tuned engines often require leaner jet needles as do motorcycles operating at high altitude.

Stock or clogged tank vent:
Factory one-way tank vents can cause pressure in tank. Clogged tank vent can result in fuel starvation.

Air leak:
It is common that Evo series engines have intake manifold air leaks. An air leak can lead to a lean running condition and even detonation at part throttle.

Loose jets:
A loose main jet can result in an overly rich mixture.

POOR FULL-THROTTLE PERFORMANCE:
Detonation, flat acceleration, misfiring.

Clogged tank vent:
Factory one-way tank vents (located in the tank cap on most models) sometimes fail to allow enough air into the tank to replace fuel flow at high throttle openings. The result is a partial vacuum and fuel starvation.

Fuel flow restriction:
Clogged fuel filter or fuel petcock screen (located inside tank) can result in fuel starvation.

Incorrect main jet size:
A too large or too small main jet can lead to poor power output.

Clogged main jet:
A partially clogged main jet may allow enough fuel flow for part-throttle operation and yet starve the engine at full throttle.

Dirty air filter:
Stock air filters can become dirty enough to restrict air flow and power output.

BACKFIRE THROUGH CARBURETOR:
When the engine is cold only (choke off):
This can be considered normal. A cold engine does not vaporize fuel completely which can result in an overly lean mixture and backfiring through the carburetor.

Long duration cams:
Cams with late intake valve closing points encourage backfiring at low rpm.

Exhaust systems:
Some very open or incorrectly designed exhaust systems encourage backfiring. Stock length and diameter header pipes together with typical small slip-ons, like those furnished by Harley-Davidson, typically do not have this problem.

Incorrect accelerator pump adjustment:
If the accelerator pump adjustment is set to start too late, backfiring may occur due to an overly lean mixture just off idle.

BACKFIRING IN EXHAUST SYSTEM when the throttle is closed, especially noticeable from high rpm, is not caused by lean mixtures, although lean mixtures can contribute to its intensity. This is a normal condition when using high performance exhaust systems.
Open exhaust system:
High performance mufflers with large exit area or low-restriction baffles.

Air leak in exhaust system: Air entering at the junction of the header pipes and mufflers can cause popping upon deceleration.

Ignition failure: Out-of-time ignition together with misfiring may lead to loud backfiring. Such backfiring usually occurs irregularly and at large throttle openings.

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**HSR Accessories**

Optional Tuning Components and Accessories for HSR Carburetors

These parts may be ordered through your local Mikuni dealer

**Low & High Speed Jets:**

VM28/486-(Size)
- Pilot (Idle to ¼), increments of 2.5
  - (Standard: 25, normal range: 20 to 35)

N100.604 – (Size)
- Main (¾ to Full Throttle), increments of 2.5
  - (Standard: 160, normal range: 150 to 180)

**Jet Needles (Mid-Range: 1/8 to 3/4)**

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<thead>
<tr>
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<th>HSR42</th>
<th>HSR45</th>
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<tr>
<td>Richer</td>
<td>J8-8DDY01 – 95</td>
<td>J8-8CFYO2-95</td>
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<tr>
<td>Richer</td>
<td>J8-8DDY01 – 96</td>
<td>J8-8CFYO2-96</td>
</tr>
<tr>
<td>Standard</td>
<td>J8-8DDY01 – 97</td>
<td>J8-8CFYO2-97</td>
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<tr>
<td>Leaner</td>
<td>J8-8DDY01 – 98</td>
<td>J8-8CFYO2-98</td>
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Standard HSR42 Jet Needle straight diameter is 2.97 mm. This portion of the needle affects tuning from idle to approximately ¼ throttle opening.

**Accelerator Pump Nozzles**

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<tr>
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<th>Leaner</th>
<th>Std. for Sportster kits</th>
<th>Std. for Big Twins</th>
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<tr>
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<td>TM42/11–50</td>
<td>TM42/11–60</td>
<td>TM42/11–70</td>
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**Mikuni Jet Kit**

Jet Tuning Service Kit for HSR42/45 ............. KHS–025
Jet Kit Contains: 18–Main Jets (2 each 150 thru 170)
  - 10–Pilot Jets (2 each 22.5 thru 35)
  - 3–Needles (1 each –95, –96, –97)
  - 2–#60 Pump Nozzle
  - 4–Needle E-Ring Clips & Washers
  - 1–Plastic Box

**HSR42/45 Carburetor Rebuild Kit**

Carb Rebuild Kit ...........................................KHS–016
See exploded view drawing for kit contents.

**Short Idle Screw**

Idle Adjuster Screw (Short) ................. 990-605-065
(See item #59a in exploded view of carb.)

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**NOTE**

Do not modify idle screw or any of its component pieces. If the screw is removed, be sure it is re-installed with the components in place as illustrated in exploded view.