Ural (Урал) - Dnepr (Днепр) Russian Motorcycle Carburetors

Part 11: VM 28mm Mikuni

(See Also Part 11A: VM Mikuni Carb Manual)

Ernie Franke

eafranke@tampabay.rr.com

04/2011

Mikuni VM-28 Round-Slide Spigot

- 28 mm Mikuni VM Was Standard Issue for 650cc '98 US Import Versions for Ural
- Added to Satisfy US EPA Requirements
- Every Ural Is Shipped Lean from the Factory
  - –Re-Jet with 120 to 125 Main and 40 to 42.5 Pilot Jet
- Product Information
  - –Left-Side Idle Screw
  - –Right-Side Air Screw
  - –Left-Side Lever Choke (can be converted to right side)
  - –35 mm OD Intake Spigot Fitting
  - –44 mm Filter Fitting
- VM-28 Round-Slide No Longer Manufactured by Mikuni
- Ural Changed to Keihin Seiki L22AA for US Imports in 2000

The 28 mm Mikuni VM was standard-issue for 650cc '98 US import versions for Ural until 2000, when Keihin took over.

Russian Carburetor Time-Line (03/2011)

K-37 (M-72)

K-37 (M-72, M-72K, M-72M, M-72H, K-750)

K-38 (M-61, M-62, M-63)

K-301Б (M-63, M-66, K-650/MT-9)
K-301В (MT-10)
K-301Г (M-63, M-67, M-67.36)
K-301Д (MT-10, MT-10.36, МВ-650М, K-650/MT-8/MT-9)

K-37 | K-37A | K-38 | K-301

1940 1945 1950 1955 1960 1965 1970 1975

K-302 (MT-11, MT-12, IMZ-8.103)

K-62 (MT-16, MT-12, МВ-650)

K-63/K-65 (MT-11, MT-16)

28 mm Mikuni (8.103)

K-68 (МВ-650)

CVK32 Keihin (8.103, 8.107)

Urals

Last of the Dneprs

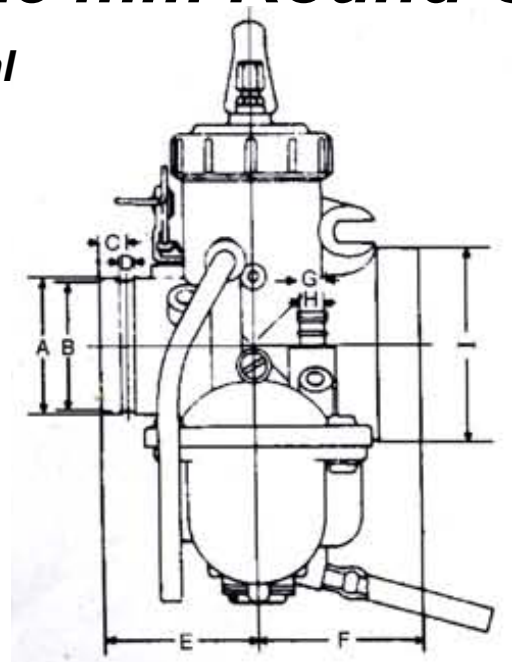
K-302 | K-62 | K-63/K-65 | K-68

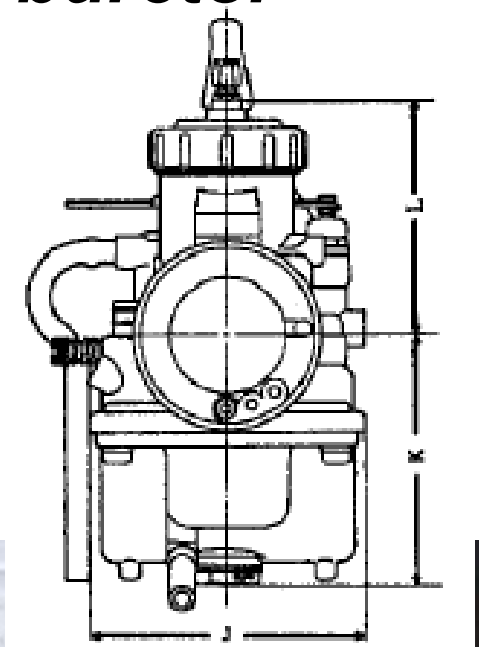
1975 1980 1985 1990 1995 2000 2005 2010

The 28 mm Mikuni VM was standard-issue for 650cc '98 US import versions for Ural until 2000, when the Keihin took over.

VM-28-49 28 mm Round-Slide Carburetor

- VM28-49 in 1998 Ural Manual
- Main Jet: 4/042 #200
- Pilot Jet: VM22/210 #60
- Needle Jet: N-8 #169
- Jet Needle: 5F21
- Throttle Valve: VM28-56 2.5
- Main Air Jet: BS30/97 0.5
- Needle Valve: VM26/26 2.5
- Dimensions:
  - A: 35 mm
  - B: 33 mm
  - C: 10 mm
  - D: 4 mm
  - E: 49 mm
  - F:44 mm
  - G: 7 mm
  - H: 6 mm
  - I: 44 mm
  - J: 72 mm
  - K: 66 mm
  - L: 54 mm
  - Total Width: 72 mm
  - Throttle Adjuster: Left
  - Air Screw: Right
  - Weight: 0.55 kg
  - Material: Aluminum
  - Float Height: 15-17 mm (0.59-0.66”)
- VM28-49 Manufacture Discontinued





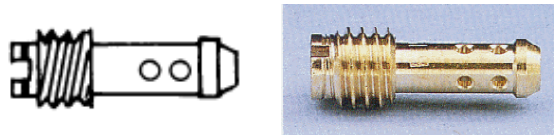
VM28 Components (www.sudco.com)

Jet Needles

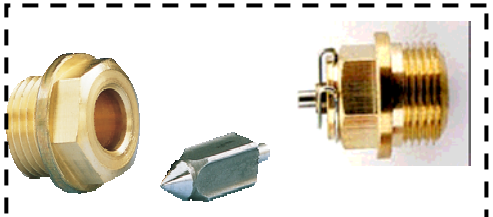
Needle Positioning Clips

Needle Jets

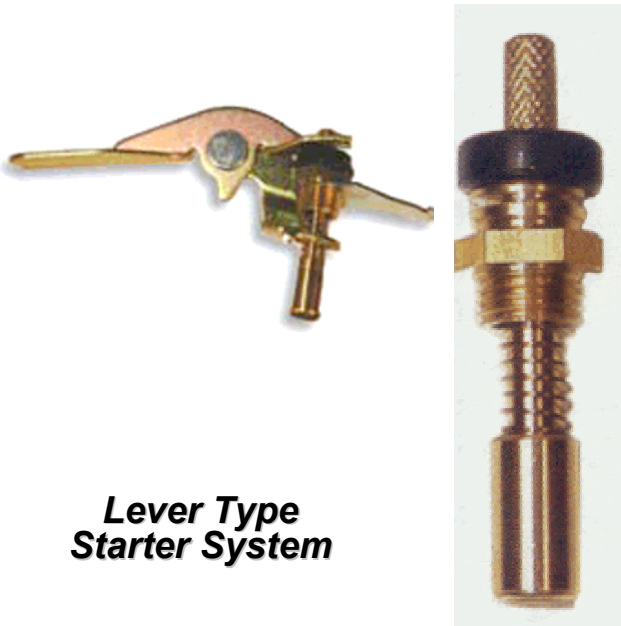
Needle Jet and Jet Needles



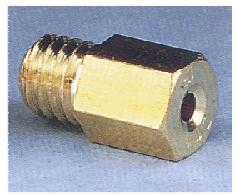
Pilot Jets

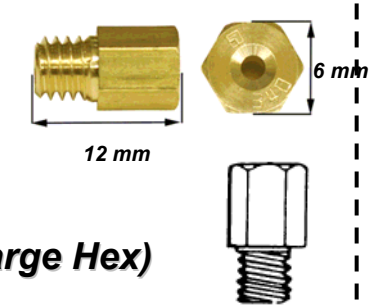


Needle Valves



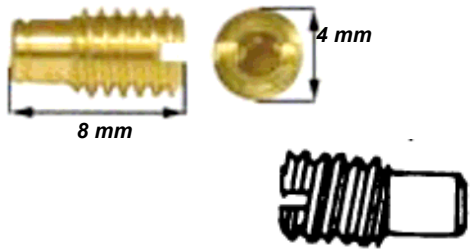
Lever Type
Starter System





Main Jets (Large Hex)

Throttle Valve (Round-Slide)



Air Jets

Even though the VM28-49 carburetor is no longer manufactured, parts are still readily available on the internet.

VM Spigot-Mount Exploded View (1998 Manual)

Exploded View

(not all parts listed are available)

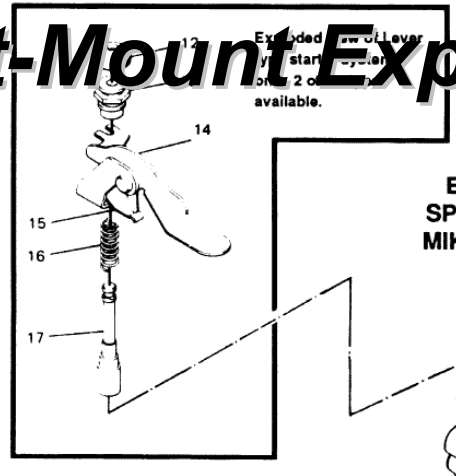
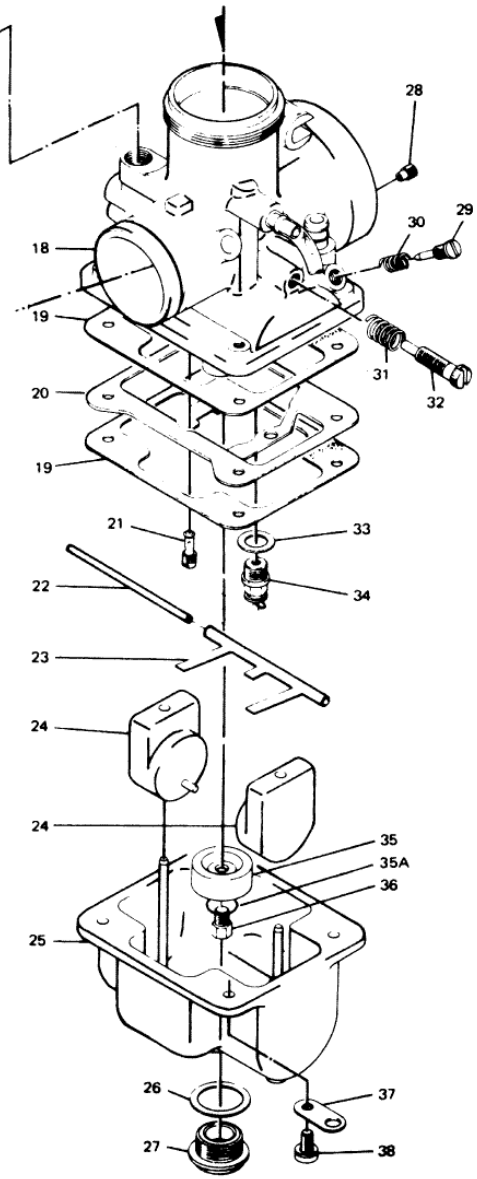
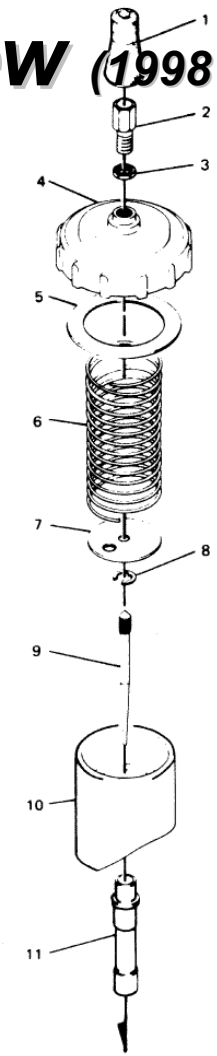


DIAGRAM A
Exploded view of a SPIGOT MOUNT TYPE MIKUNI CARBURETOR





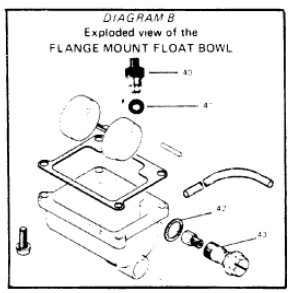
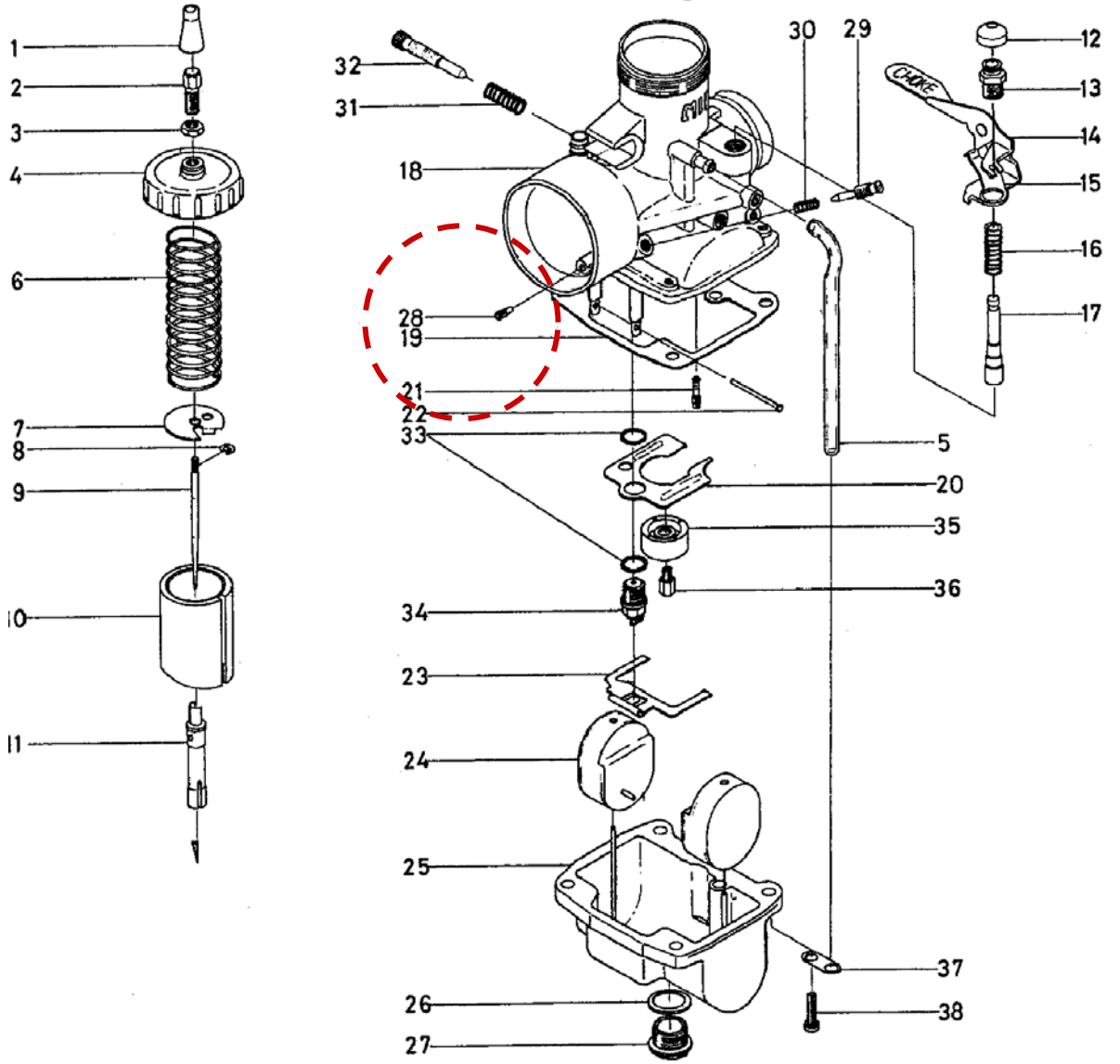


DIAGRAM B
Exploded view of the FLANGE MOUNT FLOAT BOWL

VM28 Spigot (http://www.sudco.com/Carburetor/SudcoMikuniCatalog.pdf)

Description	*Mikuni Part #*
1. Rubber Cap, Throttle Cable	VM26/46
2. "A" Cable Adjuster (7mm)	VM28/256
3. Locknut, Cable Adjuster	B30/247
4. Top, Mixing Chamber	VM26/56
5. Gasket, Mixing Top	Gasket comes with each VM Mixing Chamber Top
***6.* Spring, Throttle Valve**	VM28/58
7. Plate, Spring Seat	VM28/132
8. Needle Positioning Clip	***VM20/369***
9. Jet Needle	#5 Series (5DP7, 5F21, 5F3, 5L1)
10. Throttle Valve (Slide) Pg.131-132	**VM28/56**
***1*1. Needle Jet**	#169 Series
***1*2. Rubber, Starter Plunger**	VM20/455
13. Fitting, Starter Plunger	***VM26/116***
14. Lever, Starter	***VM28/124***
15. Spring Plate, Starter Lever	VM32/17
16. Starter Plunger Spring	***VM16/42***
17. Starter Plunger	Not Used
18. Mixing Chamber Body	Not Available Separately
19. Float Bowl Gasket	VM28/129
20. Float Bowl Baffle Plate	VM34/72
21. Pilot Jet	VM22/210
22. Float Arm Hinge Pin	BV26/22
23. Float Arm	VM28/166
24. Float (Independent, Type A)	VM28/164
25. Float Bowl	Not Available Separately
26. Main Jet Plug Washer	VM28/134
27. Main Jet Plug (Drain Plug)	VM28/133
28. Air Jet	BS30/97
29. Air Adjusting Screw	VM20/214
30. Air Adjusting Screw Spring	M12F/46A
31. Idle Adjusting Screw Spring	M20/221
32. Idle Adjusting Screw	VM24/224
33. Needle Valve Washer	VM26/25
34. Needle Valve Set (Needle Valve & Seat Assembly)	**VM26/26 All Needle Valve seats for VM series are thread-in type. See Chart**
35. Main Jet Ring	VM28/228
35A. Main Jet Washer	VM15/80A
36. Main Jet	4/042 Series
37. Vent Tube Anchor Plate	VM15/164
38. Float Bowl Screw (4x16mm)	VM20/416
39. Main Jet Extender	***Not Used***
40. Needle Jet Setter	***VM32/04***
41. Needle Jet Setter O-Ring	***VM26/124***
42. Banjo Bolt Washer	***VM15/80A***
43. Banjo Bolt	***Not Used***
Mikuni Rubber Mounting Flanges, See Page 142	VM28/200

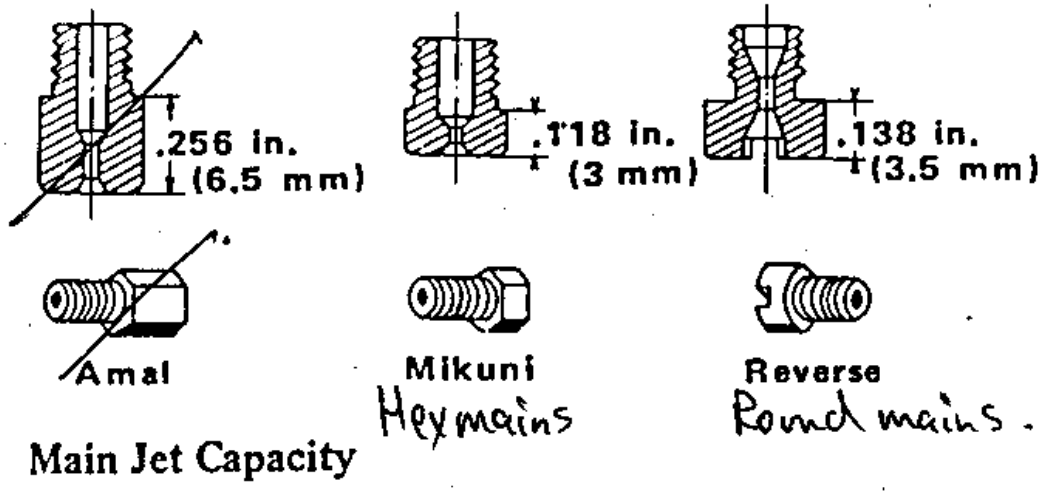
VM-28-49 (turned-around)

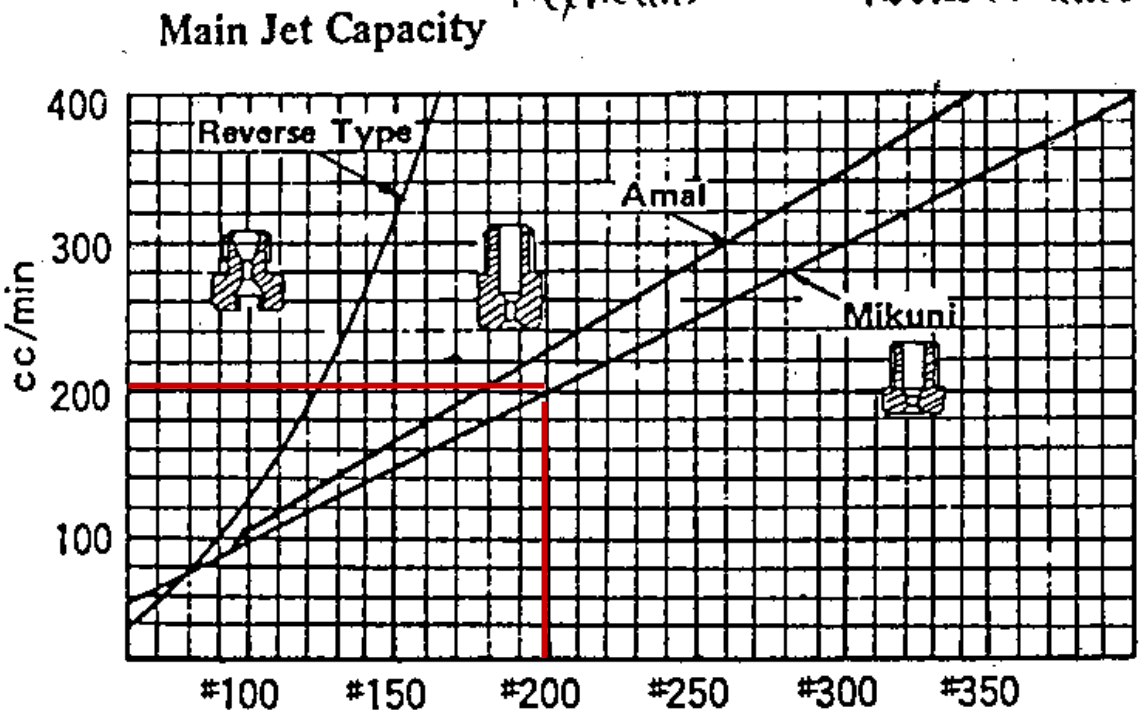


1. Rubber Cap, Throttle Cable
2. Cable Adjuster
3. Locknut, Cable Adjuster
4. Top, Mixing Chamber
5. Tube, Air Vent
6. Spring, Piston Valve
7. Plate, Needle Retainer
8. "E" Ring
9. Jet Needle
10. Piston Valve
11. Needle Jet
12. Rubber Cap, Starting System
13. Cap, Starter Plunger
14. Lever Assy, Starting System
15. Leaf Spring, Lever Positionin;
16. Spring, Starter Plunger
17. Plunger, Starting System
18. Body, Mixing Chamber
19. Gasket, Float Chamber
20. Baffle Plate, Float Chamber
21. Pilot Jet
22. Pin, Float Arm Hinge
23. Float Arm
24. Float
25. Float Chamber
26. Washer, Float Chamber Plug
27. Plug, Float Chamber
28. Air Jet
29. Air Screw
30. Spring, Air Adjusting Screw
31. Spring, Idle Adjusting Screw
32. Screw, Idle Adjusting
33. Washer, Needle & Seat Assy
34. Needle & Seat Assy
35. Cup, Fuel Retaining
36. Main Jet
37. Plate, Vent Tube Retaining
38. Screw, Float Chamber

Vance Blosser reported finding "one last shiney brass piece," which is often missed. It is listed as an "air jet" part # 28 on the above diagram. It is hidden down a small hole, on the very bottom of the inlet side of the carb, and takes a very narrow screwdriver to remove.

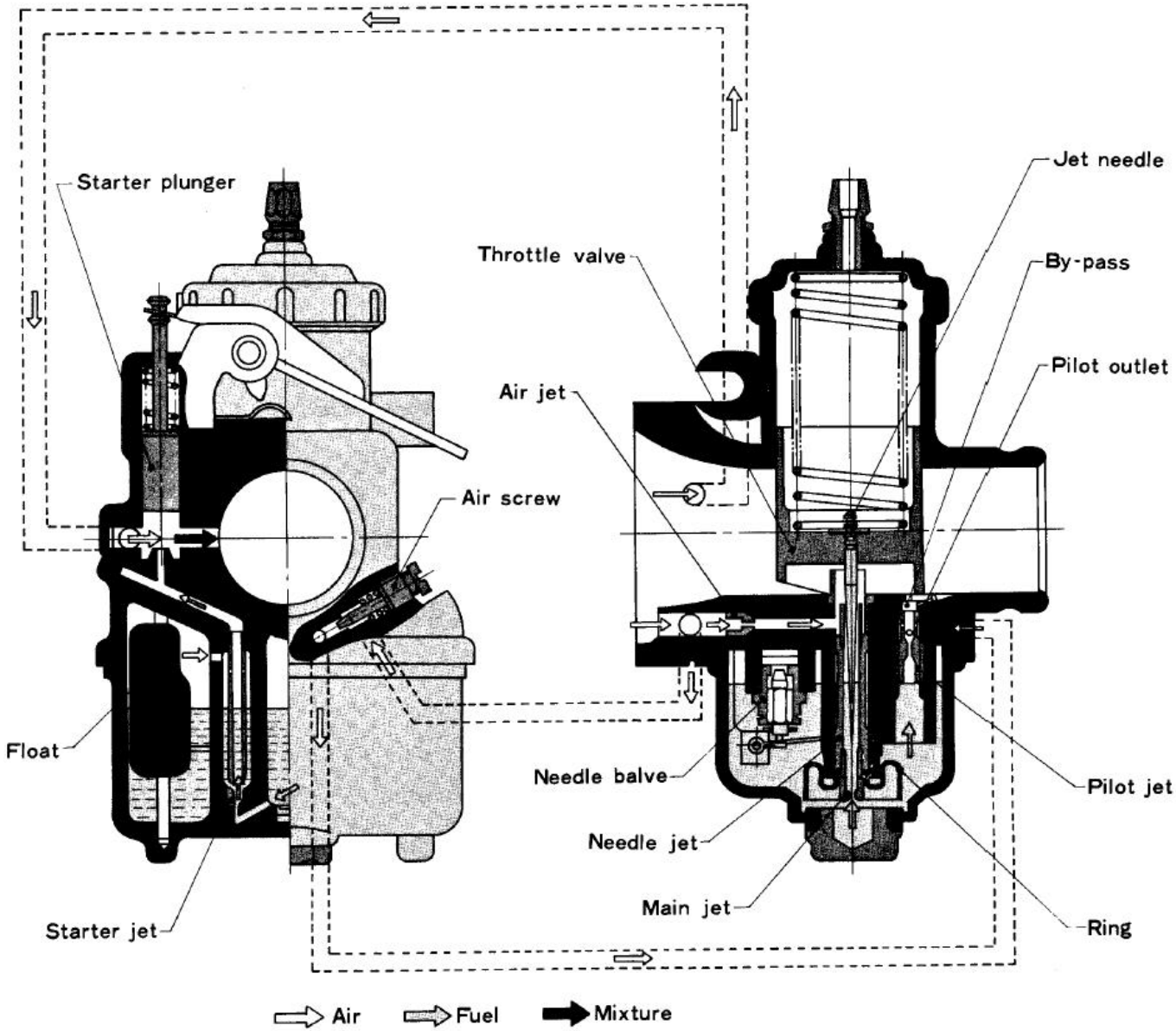
Mikuni Main Jet Orifice Diameter Comparisons





The VM-28-49 Mikuni uses a 4/042 #200 main jet.

1998 Ural Manual *(650cc, 28 mm Mikuni)*



The arrows show the direction in which air, fuel, or air/fuel mixture flow.

Carburetor Troubleshooting Chart (1998 Ural Manual 650cc, 28 mm Mikuni)

PROBLEM	POSSIBLE CAUSE	CORRECTIONS
HARD STARTING	Incorrect use of choke	Correct use of choke
	Incorrect air-fuel mixture adjustment.	Set mixture adjustment screw in accordance with Owner's Manual.
	Clogged fuel filter.	Clean filter.
	Clogged low speed fuel jets.	Disassemble carburetor and chemically clean.
	Clogged vent in fuel tank cap.	Unclog vent or replace cap.
	Float stuck.	Remove float bowl, check float operation and correct or replace.
	Float damaged or leaking.	Replace float.
	Incorrect float level.	Set float height in accordance with shop manual specifications.
	Intake air leak.	Check carburetor mounting flanges for air leaks.
	Ignition problem.	Repair, replace or adjust as necessary.
	Low cylinder compression.	Repair, replace or adjust as necessary.
POOR IDLE OR STALLING	Idle speed adjustment(s) set too low.	Adjust idle rpm in accordance with specifications in Owner's Manual.
	Idle speed adjustments are unequal Equalize throttle stop settings. (twin carburetor models and multi-carburetor models using individual throttle stop adjustments).	Equalize throttle stop setting.
	Clogged idle and low speed air bleed.	Disassemble carburetor and chemically clean
	All causes listed under "HARD STARTING."	
IDLE MIXTURE ADJUSTMENT IS INEFFECTIVE. CARBURETOR DOES NOT RESPOND TO MOVEMENT OF THE IDLE MIXTURE SCREW.	Idle speed set too high.	Adjust idle speed in accordance with specifications in Owner's Manual.
	Clogged low speed air-bleeds.	Disassemble carburetor and chemically clean.
	Damaged mixture adjustment needle.	Replace mixture adjustment needle.
	Mixture adjustment needle "O" ring is not sealing (models using "O" ring).	Replace "O" ring.
	All carburetor problems listed under "HARD STARTING."	

Carburetor Troubleshooting Chart (1998 Ural Manual 650cc, 28 mm Mikuni)

PROBLEM	POSSIBLE CAUSE	CORRECTIONS
SLOW RETURN TO IDLE	Idle speed set too high.	Adjust idle speed in accordance with specifications in Owner's Manual.
	Idle speed adjustments are unequal (twin carburetor models and multi-carburetor models using individual throttle stop adjustments.)	Equalize throttle stop settings.
	Throttle valve sticking.	Clean and inspect throttle valve and return spring. Replace if necessary.
	Throttle linkage sticking.	Clean and inspect throttle linkage and return spring. Lubricate, repair or replace as necessary.
	Throttle cable binding	Correct routing or replace cable as necessary.
ENGINE SURGES WHEN CRUISING AT A CONSTANT SPEED	Incorrect air fuel mixture adjustment.	Low speed - Low speed jet size change. Intermediate – jet needle height adjustment. High speed - Main jet size change.
ENGINE DOES NOT DEVELOP FULL POWER OR MISSED ON ACCELERATION.	Incorrect use of choke.	Correct use of choke.
	Clogged air cleaner.	Clean or replace.
	Incorrect air-fuel mixture adjustment	Low speed - Low speed jet size change. Intermediate – jet needle height adjustment. High speed - Main jet size change.
	Throttle valves not synchronized (models with two or more carburetor s)	Adjust throttle valve synchronization.
	Clogged fuel filter.	Clean or replace fuel filter.
	Clogged fuel jets.	Disassemble carburetor and chemically clean.
	Clogged air bleeds.	Disassemble carburetor and chemically clean.
	Fuel jets loose.	Tighten fuel jets.
	Fuel jets "O" rings leaking (models using "O" rings)	Replace "O" rings.
	Float stuck	Remove float bowl, check float operation and correct or replace.
	Float damaged or leaking.	Replace float.
	Incorrect float level.	Set float height in accordance with shop manual specifications.
	Ignition problem.	Repair, replace or adjust as necessary.

Mikuni Pilot (low-speed) Fuel System (1998 Ural Manual)

- Since Engine Is Operated with Throttle Valve Almost Closed at Idling or in Low-Speed Range, the Velocity of Air Flowing thru the Needle Jet (2) is Slow
  - Consequently, Vacuum Strong Enough to Draw Fuel from Needle Jet in the Main Fuel System Is Not Created
  - Fuel Supply during Low-Speed Operation Controlled by Pilot Outlet (3) and Bypass (4) Situated Near Intake Port
- At Idle, When Throttle Valve Slightly Opened, Fuel Metered by Pilot Jet (5) Is Mixed with Air Adjusted in Proper Amount by Air Screw (6) and Is Broken into Fine Particles (vapor)
- Mixture Again Mixed with Fuel Coming from Bypass and Drawn into Pilot Outlet to Mix with Air Flowing thru Main Bore (7)
  - Fuel Mixed at This Stage Then Goes into Engine
- When Throttle Valve Is Opened Slightly during Low-Speed Operation, Pilot Outlet Alone Cannot Supply Required Fuel and Shortage Has to be Made Up with Fuel Injected from Bypass
- Adjustment of Mixture Ratio during This Stage Made by Pilot Jet and Air Screw, in the case of a two-hole type fuel system (Fig. 3)
- While at Low-Speed Operation, If Full Throttle Is Initiated a Similar Shortage of Fuel Exists and During This Transition from Low-to-Medium or Low-to-High, the Fuel Again Has to be Injected from Bypass until Enough (vacuum) Can Be Created to Draw Fuel from Main Fuel System

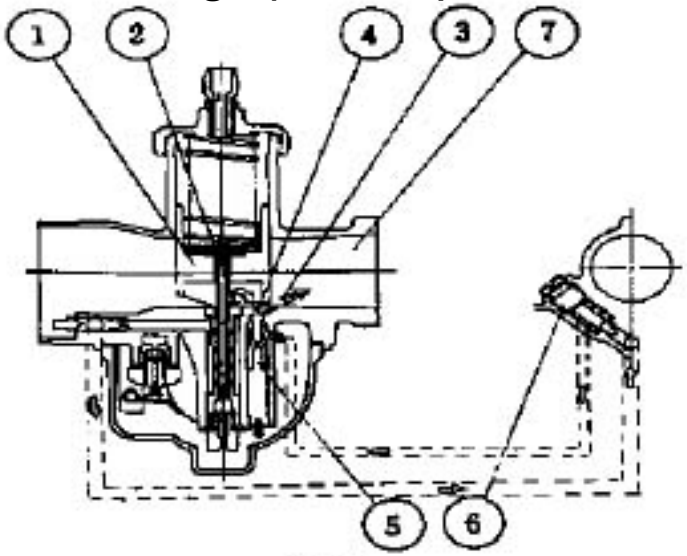


Fig. 2

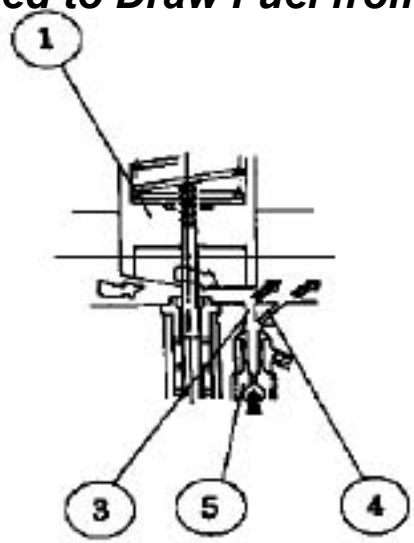
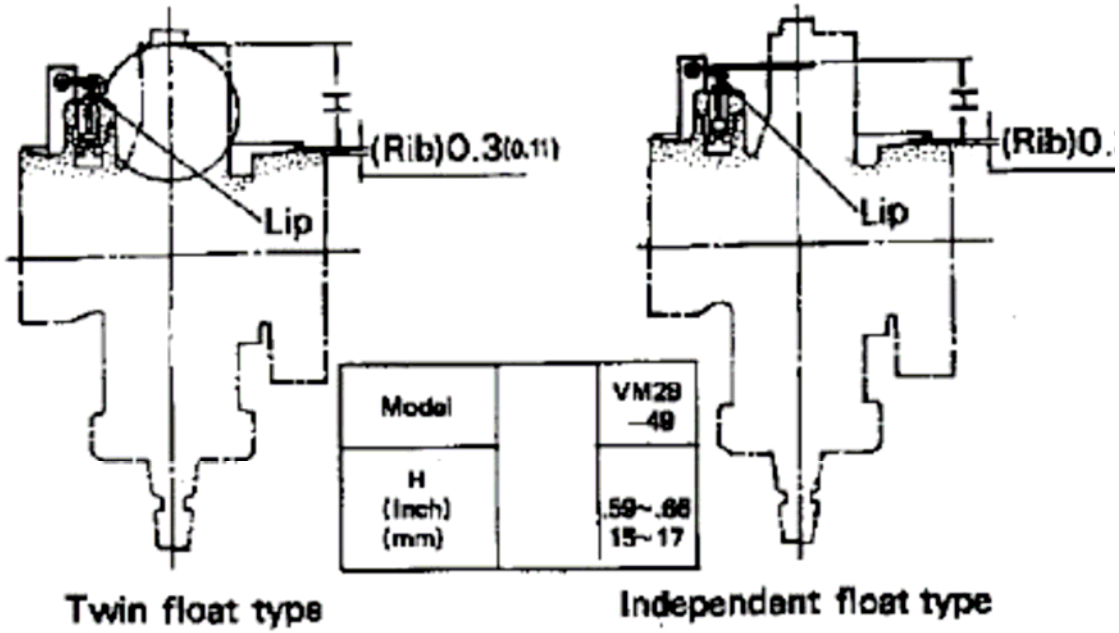
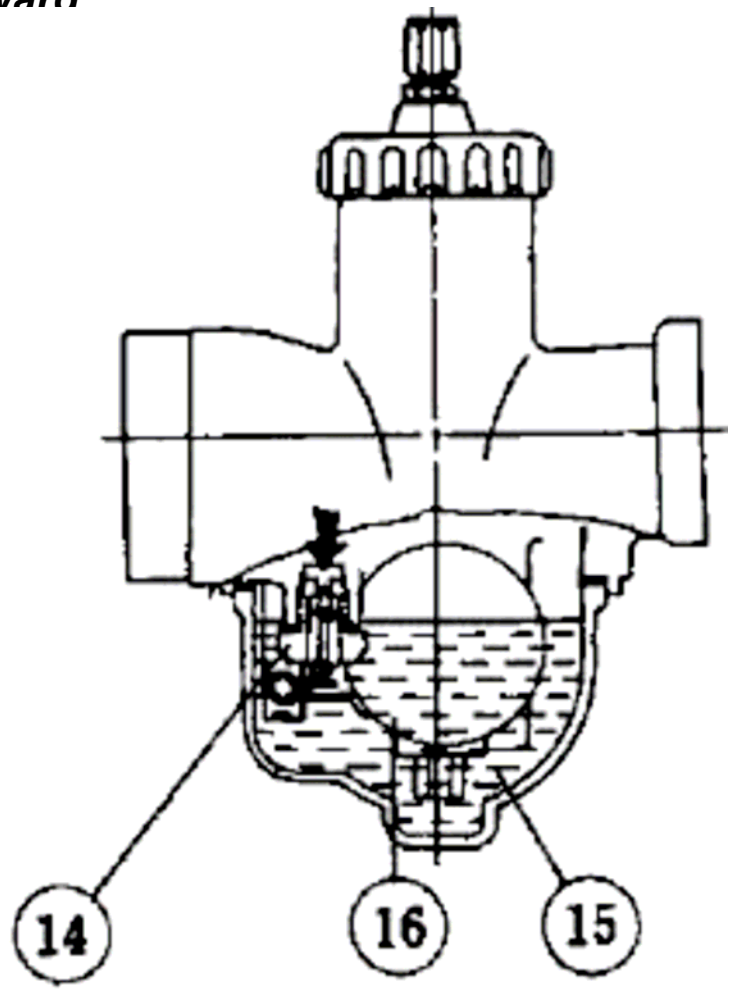


Fig. 3

VM 28 Float System (1998 Ural Manual)

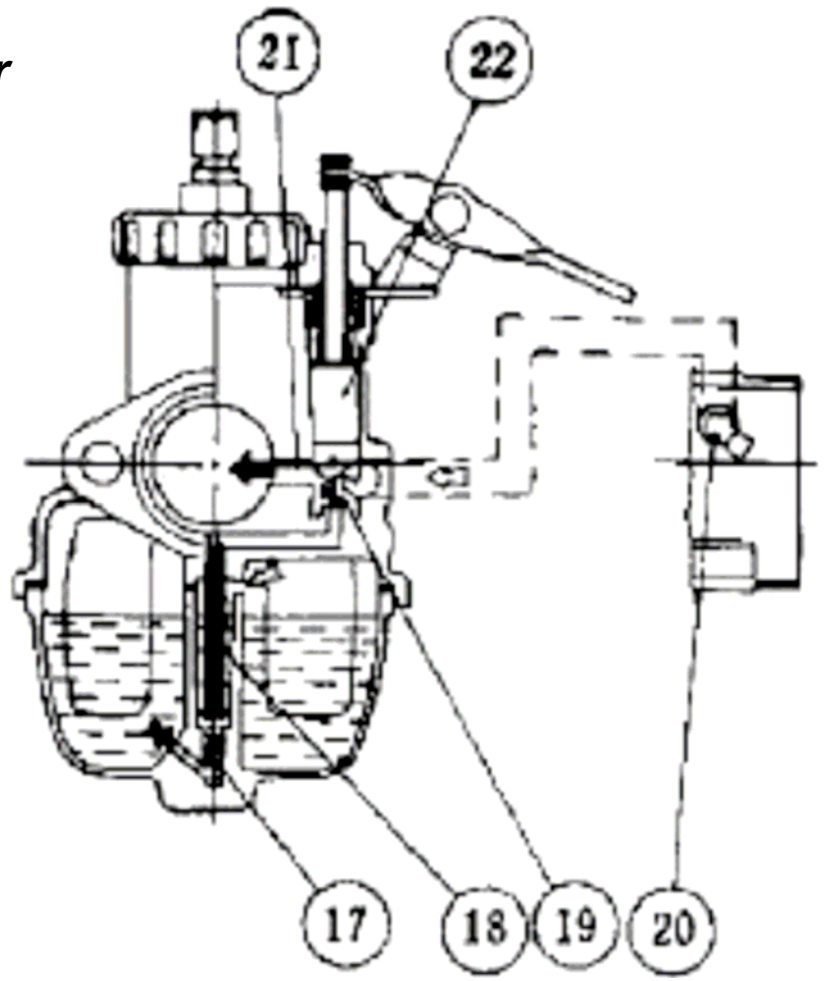
- *Float System Maintains Constant Fuel Level in the Bowl*
- *Fuel Flows thru Needle Valve (14) and Enters Float Chamber (15)*
- *As Fuel Enters Float Chamber, the Float (16) Moves Upward to Pre-Determined Level because of Buoyancy*
- *When Fuel Reaches Pre-Determined Level, Needle Valve Begins to Close, Due to Lever Action of Float Arm Rising Float Attains Buoyancy, thus Shutting Off the Supply of*
- *Fuel Lever in Bowl Controls Amount of Fuel Metered to Optimum Fuel Mixture*
  - *Too High a Level Allows More Fuel than Necessary to Leave the Needle Jet Enriching the Mixture*
  - *Too Low a Level Results in Leaner Mixture, as Not En Fuel Leaves the Needle Jet*
  - *Pre-Determined Fuel Level Should Not Be Changed*





VM 28 Mikuni Enrichment System (1998 Ural Manual)

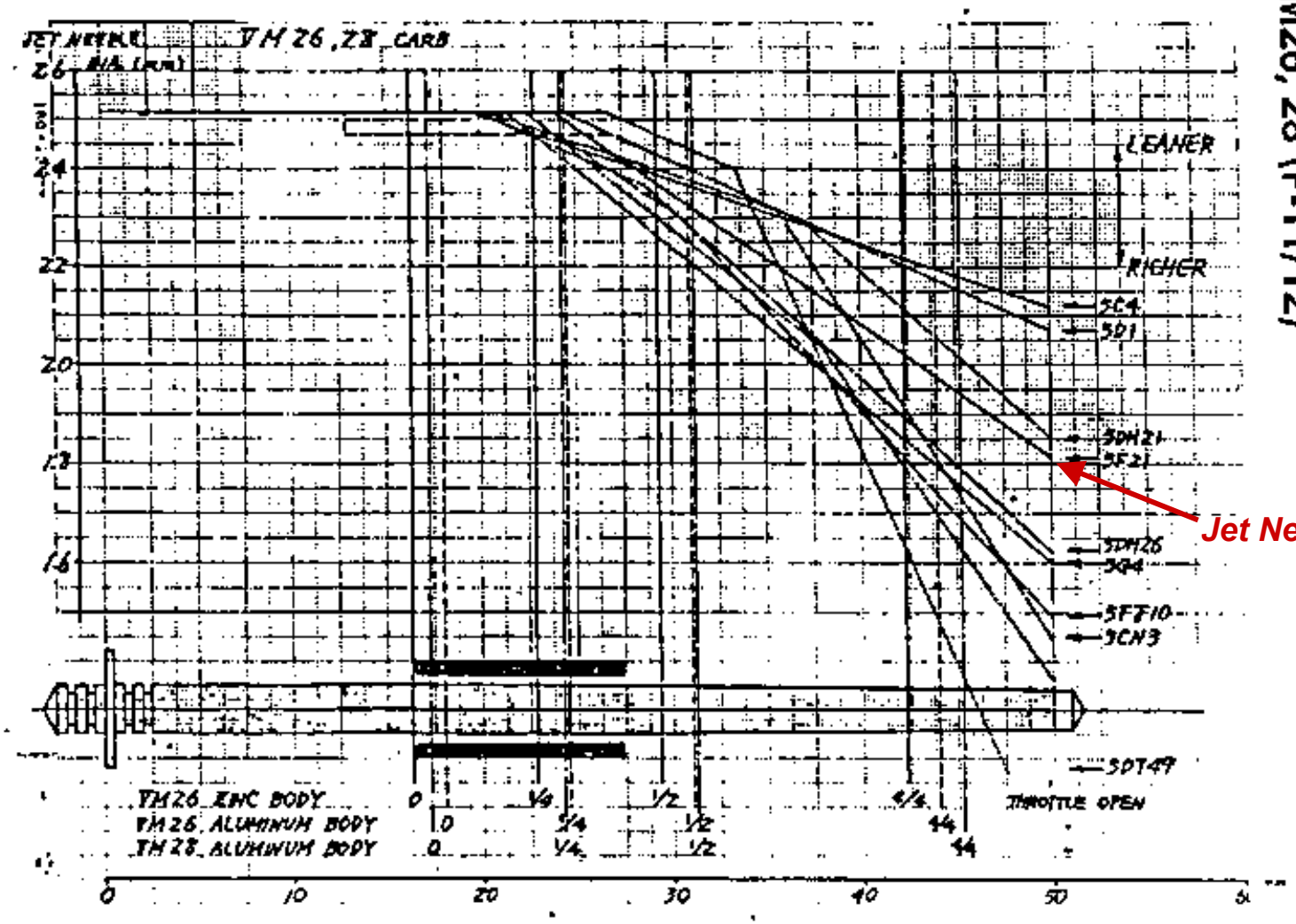
- Enrichment System Used on Mikuni Carburetors in Place of Choke
- Fuel and air for starting the engine are metered by entirely independent jets
- Fuel Metered by Starter Jet (17) Mixed with Air and Broken into Tiny Particles in Emulsion Tube (18)
- Mixture then Flows into Plunger Area (19), Mixes Again with Air Coming from Air Intake Port for Starting and Delivered to Engine in Optimum Air-Fuel Ratio thru Fuel Discharge Passage (21)
- Enrichment Valve Opened and Closed by Means of Starter Plunger (22)
- Enrichment Constructed to Utilize Vacuum of Inlet Passage (20)
- Important that Throttle Closed when Starting Engine



The Mikuni carburetor uses a lever/plunger to initially supply an increased supply of fuel for cold-weather starting.

Mikuni Jet Needle

VM26, 28 (P-11/12)



Jet Needle: 5F21

Jet needles control the fuel mixture in the mid-range 1/4-to-3/4 throttle position. The taper of the needle determines the amount of fuel. For example; the thinner the diameter of the needle, the more fuel will be drawn. The thicker the diameter of the needle, the less fuel can be drawn.

VM 28 Main Fuel System
Flow Chart of Internal Air, Fuel & Mixture Circuits
(1998 Ural Manual)

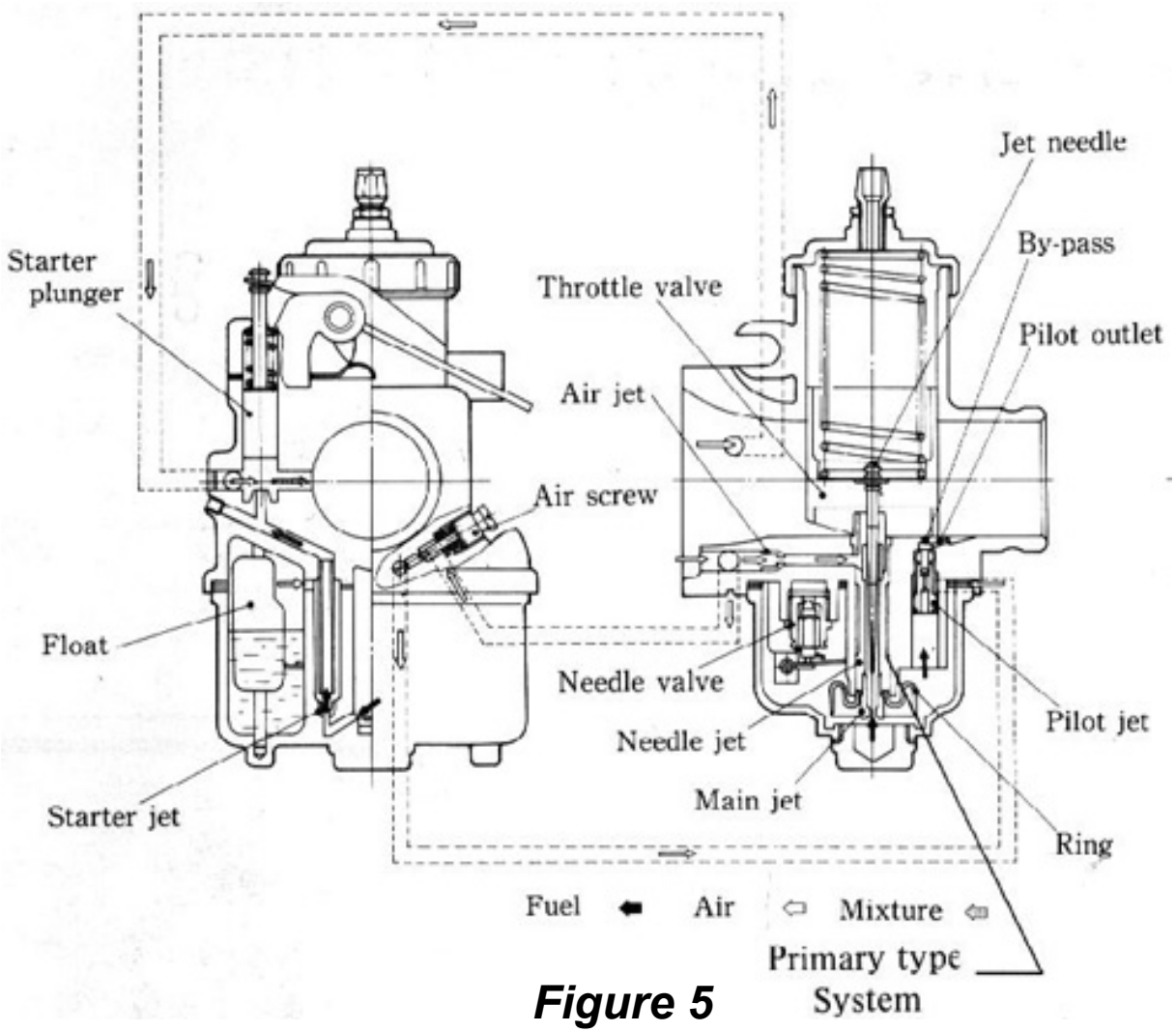
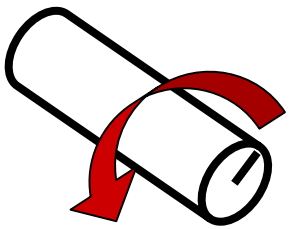


Figure 5

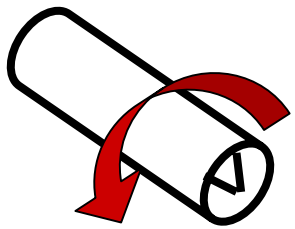
On Mikuni VM-type carburetors, the pilot system and the main system are of independent construction.

Fuel Jet vs. Throttle Position

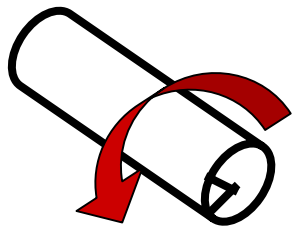
- Idle Range
  - Set Idle Speed to Proper r.p.m, by Adjusting the IDLE SPEED SCREW
  - Turn IDLE MIXTURE SCREW or AIR SCREW, Achieving highest speed and best response
  - IDLE MIXTURE SCREW controls fuel delivery to Idle Port
- Off Idle To 1/4 Throttle Range
  - The JET NEEDLE is the most effective component in this range
    - If Mixture Is Rich at 1/4 Throttle and Lean at 3/4 Throttle, a JET NEEDLE with Larger Taper Is Needed
    - If Mixture Is Lean at 1/4 Throttle and Rich at 3/4 Throttle, Change to Smaller Taper
    - If Calibration Is Lean from 1/4 to 3/4 Throttle, Raise the JET NEEDLE by Lowering Clip Position, or Use JET NEEDLE with Shorter Length
    - If Calibration Is Rich, Lower the JET NEEDLE with a Longer Length
  - Changing the STRAIGHT DIAMETER Changes the Calibration in Transition Range from the SLOW Circuit to the MAIN Circuit (1/8 to 1/4) Throttle
    - Smaller Diameter Makes This Range Richer and Larger Diameter Leans This Range
- Wide Open Throttle (W.O.T.) Range
  - Changing the MAIN JET Affects This Range
  - Select Size of MAIN JET Which Offers Best WOT Performance, Then Install One Size Larger for Ideal Engine Durability



Pilot or Idle Jet System (comprised of pilot air jet, pilot fuel jet and pilot fuel screw): Controls Idle Up to 25% Open Throttle

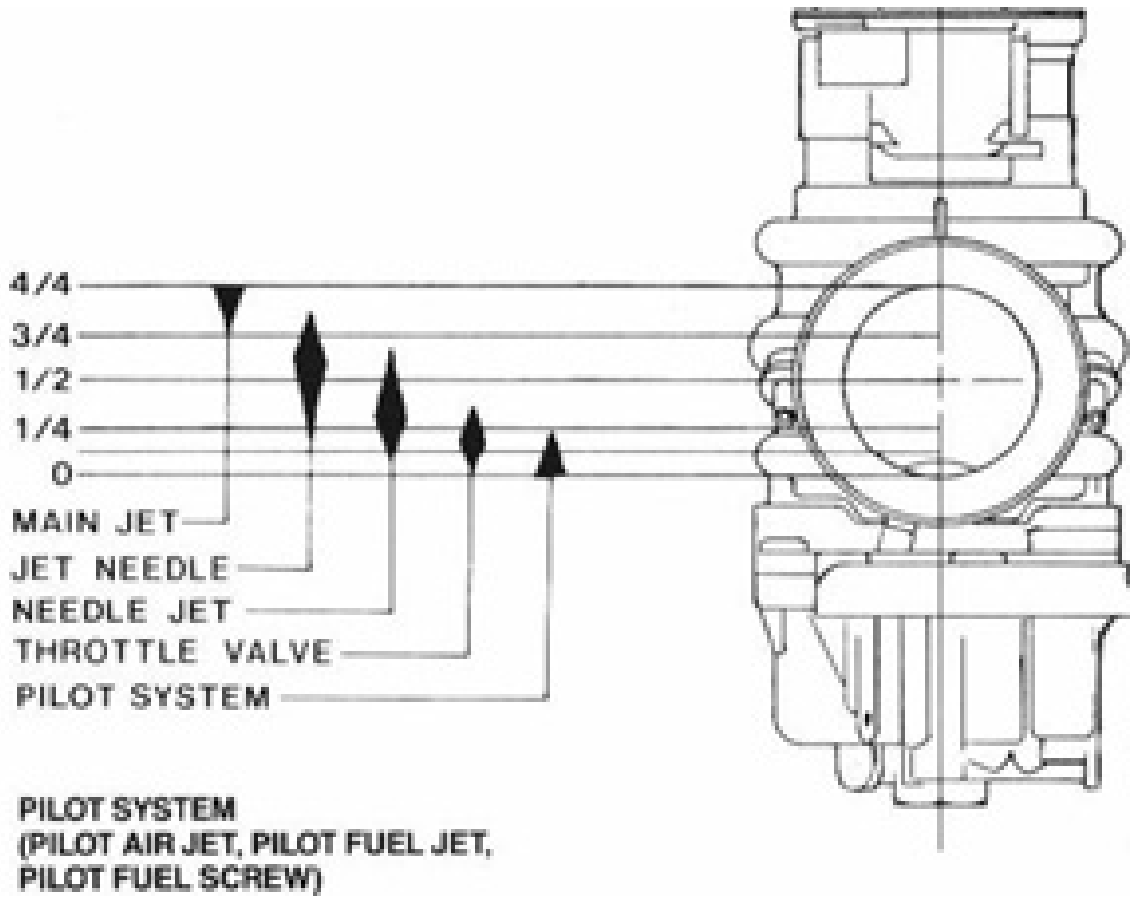


Needle Jet: Doesn't Even Look Like a Jet. Controls Fuel Mixture from 15% to 60% Open Throttle.



Main Jet: Controls Fuel mixture from 60% to 100% Wide Open Throttle (WOT)

Metering Circuits by Percentage of Throttle Opening



This chart is an approximation of each tunable part is doing during various ranges of throttle application.

Mikuni Compliant Mounting Flange

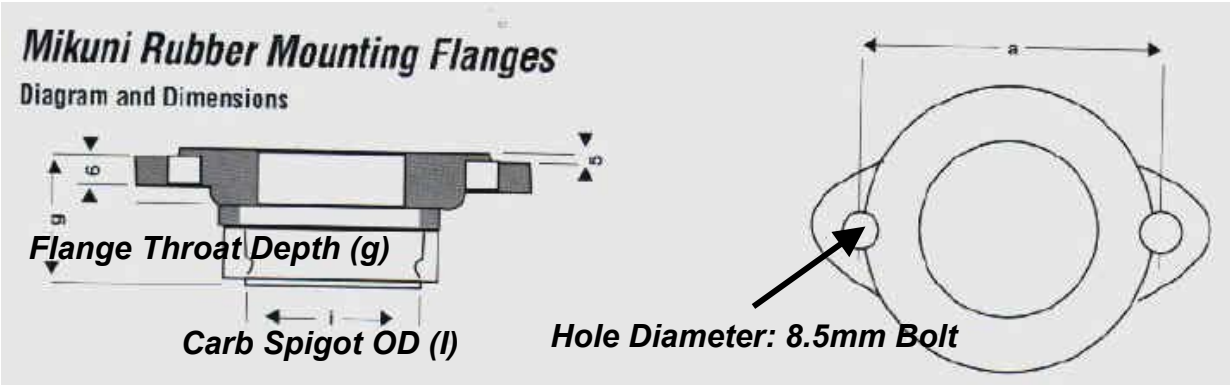
- Compliant Mounting Flange
  - Russian Ones Are RPOC
  - Far superior to the Russian rubber.
  - Improved Flanges Have Embedded Steel Insert
- Hole-to-Hole Center Spacing on U.S. Imports
  - 1994-1999: 52 mm to Fit Mikuni Compliant Mounting Flange
  - 2000-Present: 57 mm to Fit Keihin Compliant Mounting Flange
- Hole-to-Hole Center Spacing on Russian Models
  - 52 mm to Fit K-68's
- Compliant Flanges for Mikuni Carbs
  - Gene at Holopaw
    - Has Vacumm Ports
    - holopawcorvette.webpointusa.com
  - Ural Northwest
    - Mikuni Carb Flange for the 750 with Keihin carbs
    - uralnwco.ipower.com

The flange mounting holes must be filed oval from 52 mm to 57 mm to accomondate the Keihin.

Adapts Spigot-Mount Carbs to Flange-Mount Manifolds

http://www.mikunioz.com/r_m_flanges.htm

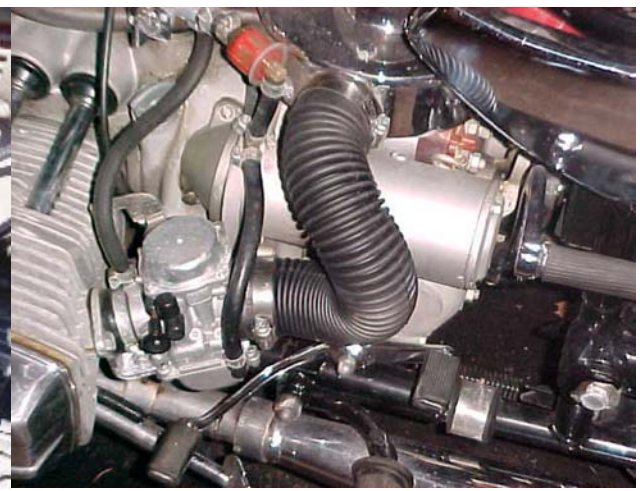
Part Number	8.5 mm Bolt Hole Center-to-Center (a)	Carb Thru-Bore Size	Carb Spigot OD (l)	Flange Throat Depth (g)	Typical Carb Size
M-VM28-200K	60 mm	30 mm	35 mm	28 mm	26-28 mm
I-VM28-200-1	60 mm	30 mm	35 mm	28 mm	26-28 mm
VM30/288	57 mm	30 mm	37 mm	23 mm	26-28 mm



Carbs to Flange-Mount gaskets must be checked for leaks, otherwise it subjects the engine to serious damage.

Air Cleaner-to-Carb Hose Possibilities

- Aircraft "CEET" Type Ducting
  - –Two Plies of Neoprene-Impregnated Fiberglass (similar to CAT except wire between plies)
  - –Fabric Liner on Inside Diameter Allows Air to Flow Smoothly Even in Tight Bends
    - Less Air Friction Loss than Unlined Ducting
  - –Reasonably Priced (around $15-$20 to do two sides)
    - Sold by the foot
  - –Pretty Darn Tough Stuff
    - No "flop factor"
  - – http://www.dwightrahl.com/Finished_Left_Side.JPG
  - –Multiple Sources on Internet: www.aircraftspruce.com/catalog/appages/ceet.php and www.aircraftspruce.com/pdf/2011Individual/Cat11110.pdf
- Radiator Water Hose
  - –NAPA Radiator Hose
    - Part Number 8539 Cut in Half and Used for Both Carbs
  - –John Deer Radiator Hose
    - Part # B35601
    - About $11
    - http://sovietsteeds.com/forums/viewtopic.php?f=11&t=11398&p=118791&hilit=John+Deere+B35601#p118791
    - http://sovietsteeds.com/forums/viewtopic.php?f=5&t=81&p=109910&hilit=John+Deere+B35601+hose+mod#p109910



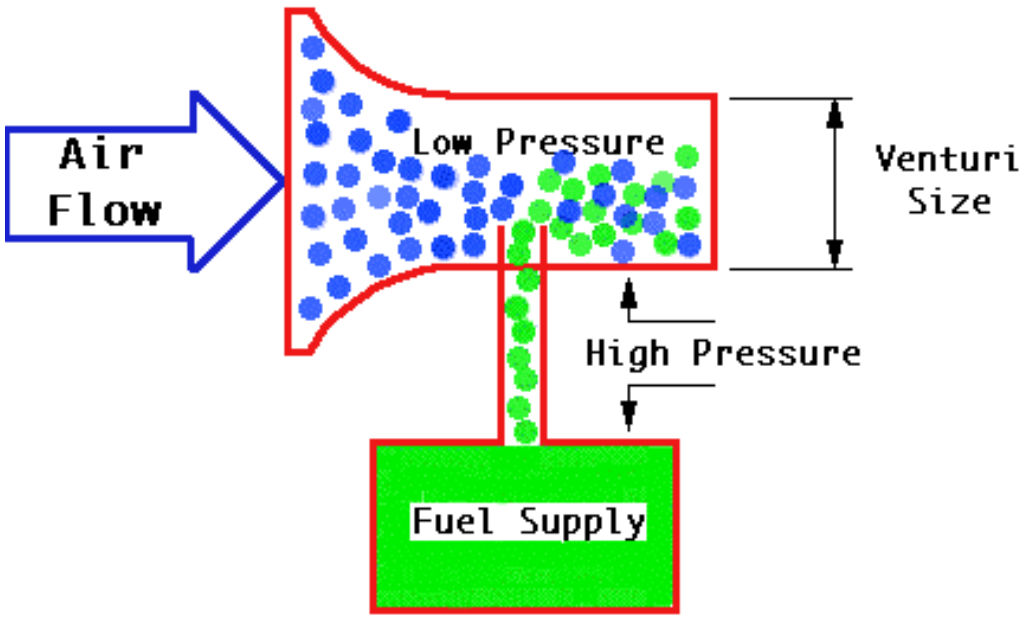
John Deere B35601 Hose Mod

Aircraft "CEET" Type Ducting

Mikuni Motorcycle Carburetor Theory -101

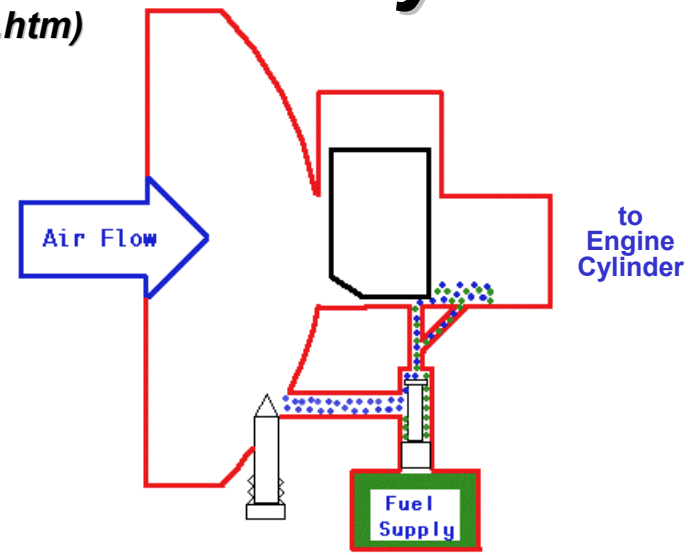
(www.iwt.com.au/mikunicarb.htm)

- All Carburetors Work Under Basic Principle of Atmospheric Pressure
  - Atmospheric Pressure Is Considered to be 15 pounds per square inch (PSI)
  - By Changing the Atmospheric Pressure inside the Engine and Carburetor, we can make Fuel and Air Flow
- Russian Motorcycles Use Four-Stroke, Air-Cooled Engines
  - Atmospheric Pressure Forces High Pressure to Low Pressure
  - As the Piston Goes Down, a Low Pressure Is Formed Within the Piston
  - This Low Pressure Causes a Low Pressure, or Suction, Inside the Carburetor
  - Since Pressure Is Higher Outside the Engine, Air Is Drawn into the Carburetor
  - The Moving Air thru the Carburetor Will Pick-Up Fuel and Mix with the Air
- Inside a Carburetor is a Venturi (restriction that forces air to speed-up)
  - Speeding Air Causes the Atmospheric Pressure to Drop inside the Carburetor
  - The Faster the Air Moves, the Lower the Pressure inside the Carburetor



Mikuni Motorcycle Carburetor Theory -101

(www.iwt.com.au/mikunicarb.htm)



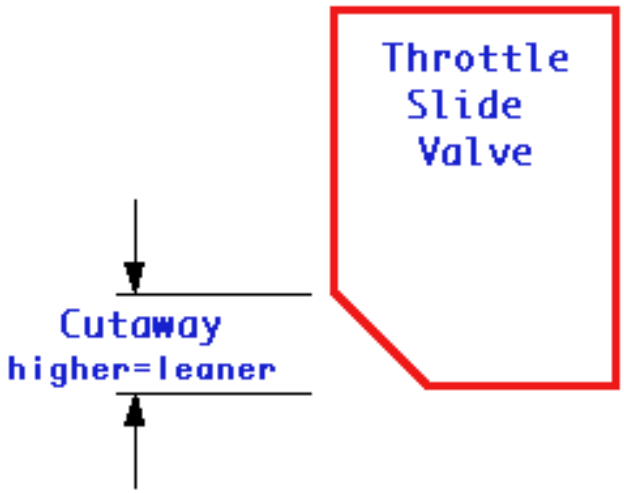
- Five Metering Circuits Overlap Each Other:
  - Pilot or Idle Circuit
  - Throttle Valve
  - Needle Jet and Jet Needle
  - Main Jet
  - Choke or Enrichener Circuit
- Pilot Circuit Has Two Adjustable Parts
  - Pilot Air Screw
    - Air Screw Can Be Located Either Near the Back-Side or Front-Side of Carb
    - If Screw Located Near Back, It Regulates How Much Air Enters
    - If Screw Turned In, It Reduces Amount of Air and Richens the Mixture
      - If Screw Turned Out, it opens the passage more and allows more air into the circuit which results in a lean mixture.
    - If Screw Located Near Front, It Regulates Fuel
      - Mixture Will Be Leaner If Screwed In and Richer If Screwed Out
    - If Air Screw Has To Be Turned More than 2 Turns Out for Best Idling, Next Smaller Size Pilot Jet Needed
  - Pilot Jet
    - Supplies Most of the Fuel at Low Throttle Openings
    - Has Small Hole which Restricts Fuel Flow thru It

Both the pilot air screw and pilot jet affects carburetion from idle to around 1/4 throttle.

Mikuni Motorcycle Carburetor Theory -101

(www.iwt.com.au/mikunicarb.htm)

- Throttle Slide Valve
  - –Affects Carburetion between 1/8-thru-1/2 Throttle, with Lesser Effect Up to ½ Throttle
  - –Comes in Various Sizes
    - Size Is Determined by How Much Is Cutaway from Backside
    - Larger the Cutaway, Leaner the Mixture (more air is allowed thru it)
    - Smaller the Cutaway, Richer the Mixture (less air is allowed thru it)
  - –Throttle Valves Have Numbers On Them That Explain How Much Is Cutaway
    - If There Is a 3 Stamped into the Slide, It Has a 3.0 mm Cutaway
    - A Number 1 Stamp Has a 1.0 mm Cutaway (which will be richer than a 3)
  - –Notch Needed for Smooth Transition from Low-Speed to Higher-Speed Operation

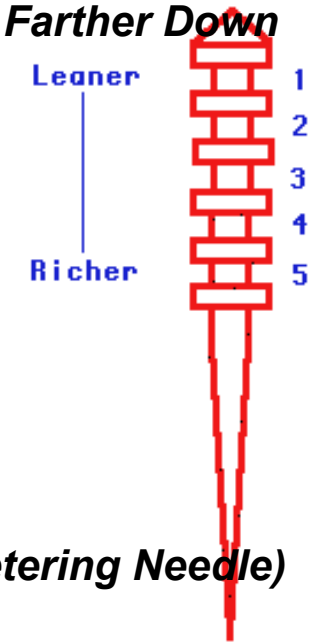


The throttle valve especially affects between 1/8 and ¼ throttle.

Mikuni Motorcycle Carburetor Theory -101

(www.iwt.com.au/mikunicarb.htm)

- Jet Needle and Needle Jet Affect Carburetion from ¼-thru-3/4 Throttle
- Jet Needle (Tapered Metering Needle)
  - –Long Tapered Rod that Controls Quantity of Fuel Drawn into Carburetor Venturi
  - –Thinner the Taper, Richer the Mixture
  - –Thicker the Taper, Leaner the Mixture
  - –Thicker Taper Will Not Allow as Much Fuel into Venturi as a Thinner One
  - –Tapers Precisely Designed to Give Different Mixtures at Different Throttle Openings
  - –Jet Needles Have Grooves Cut into Top-Part
  - –Clip Goes into One of These Grooves to Hold It from Falling or Moving from the Slide
  - –Clip position Can Be Changed to Make Engine Run Richer or Leaner
  - –If Engine Needs to Run Leaner, Clip Moved Higher, Dropping the Needle Farther Down into Needle Jet and Causing Less Fuel to Flow Past It
  - –If Clip is Lowered, Jet Needle is Raised and Mixture Will Be Richer
- Needle Jet
  - –Needle Jet Is the Hole that the Jet Needle Slides Into
  - –Depending on Inside Diameter of Needle Jet, It Will Affect the Jet Needle
  - –Most Tuning for This Range Is Done to Jet Needle, Not the Needle Jet



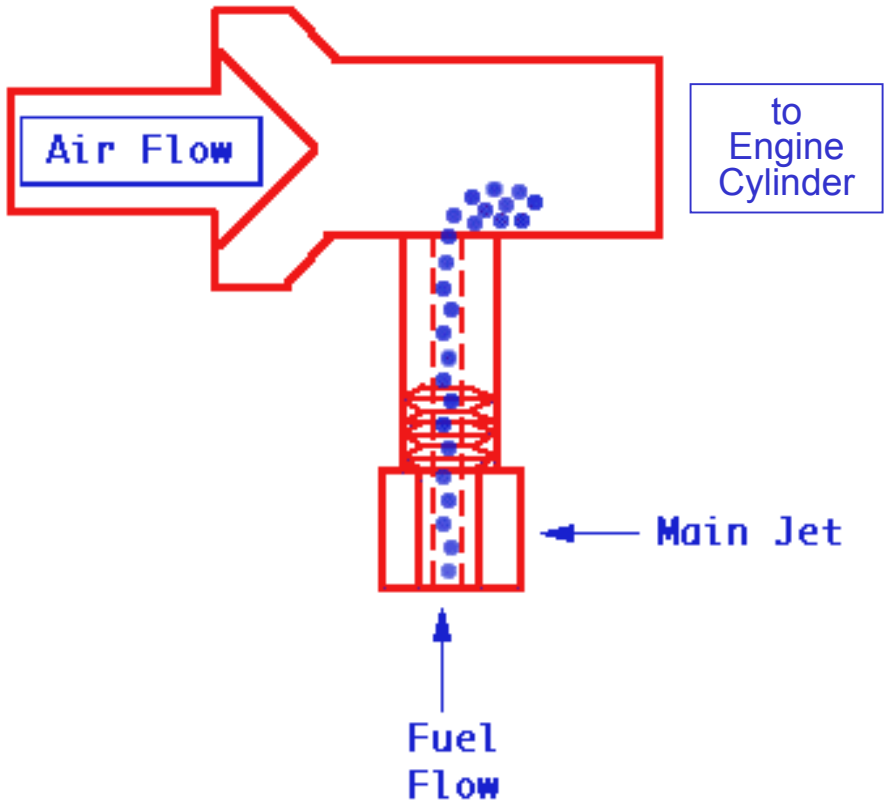
Jet Needle (Tapered Metering Needle)

The needle jet and jet needle work together to control the fuel flow between the 1/8 thru 3/4 throttle range.

Mikuni Motorcycle Carburetor Theory -101

(www.iwt.com.au/mikunicarb.htm)

- Once Throttle is Opened Far Enough;
  - Jet Needle is Pulled High Enough Out of the Needle Jet
  - Size of the Hole in Main Jet Begins to Regulate Fuel Flow
- Main Jets Have Different Size Holes
  - Bigger the Hole, the More Fuel Will Flow (and the richer the mixture)
  - Higher the Number on Main Jet, More Fuel Flows Thru It and Richer the Mixture

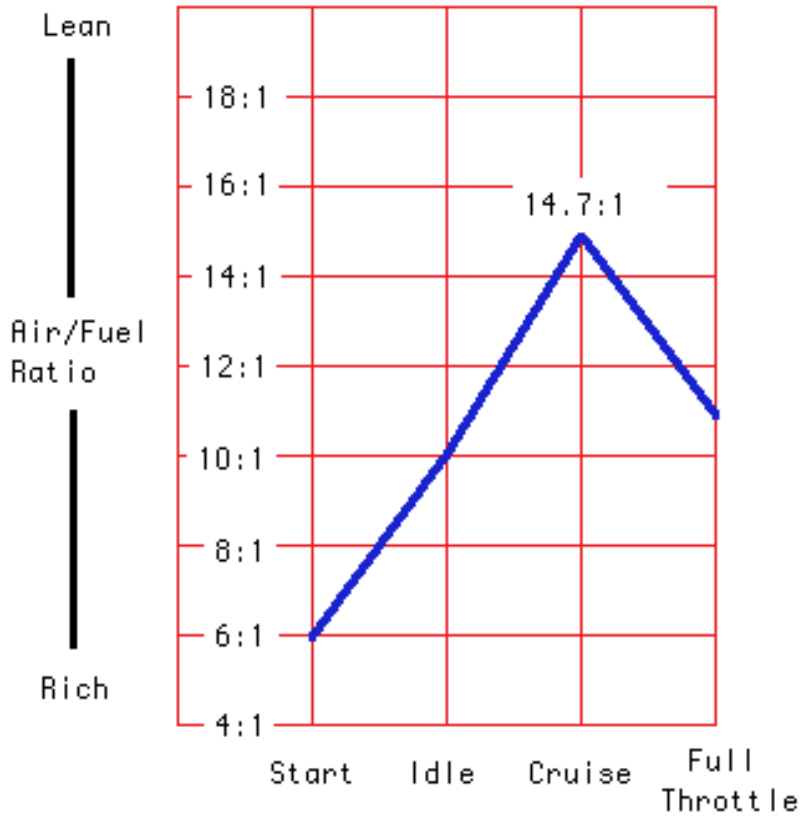


Main Jet Controls Fuel Flow from ¾-thru-full throttle.

Mikuni Motorcycle Carburetor Theory -101

(www.iwt.com.au/mikunicarb.htm)

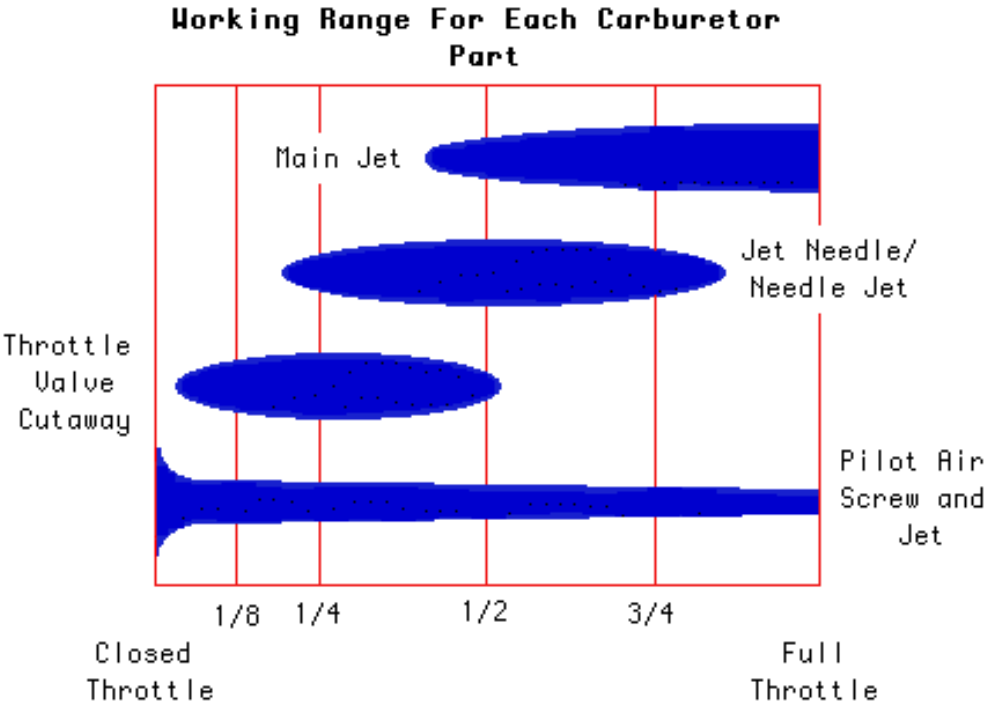
- Choke System Used to Start Cold Engines
  - Since Fuel in a Cold Engine is sticking to the cylinder walls due to condensation, the mixture is too lean for the engine to start
  - Choke System Adds Fuel to Engine to Compensate for Fuel that Is Stuck to Cylinder Walls
  - Once Engine Is Warmed-Up, Condensation Is Not a Problem, and Choke Is Not Needed
- Air/Fuel Mixture Must Be Changed to Meet the Demands of the Engine
  - Ideal Air/Fuel Ratio Is 14.7 grams of Air to 1 gram of Fuel
  - Ideal Ratio Is Only Achieved for a Very Short Period While the Engine Is Running
  - Due to Incomplete Vaporization of Fuel at Slow Speeds or Additional Fuel Required at High Speeds, Actual Operational Air/Fuel Ratio Is Usually Richer
  - Actual Air/Fuel Ratio for Any Given Throttle Opening Shown Here

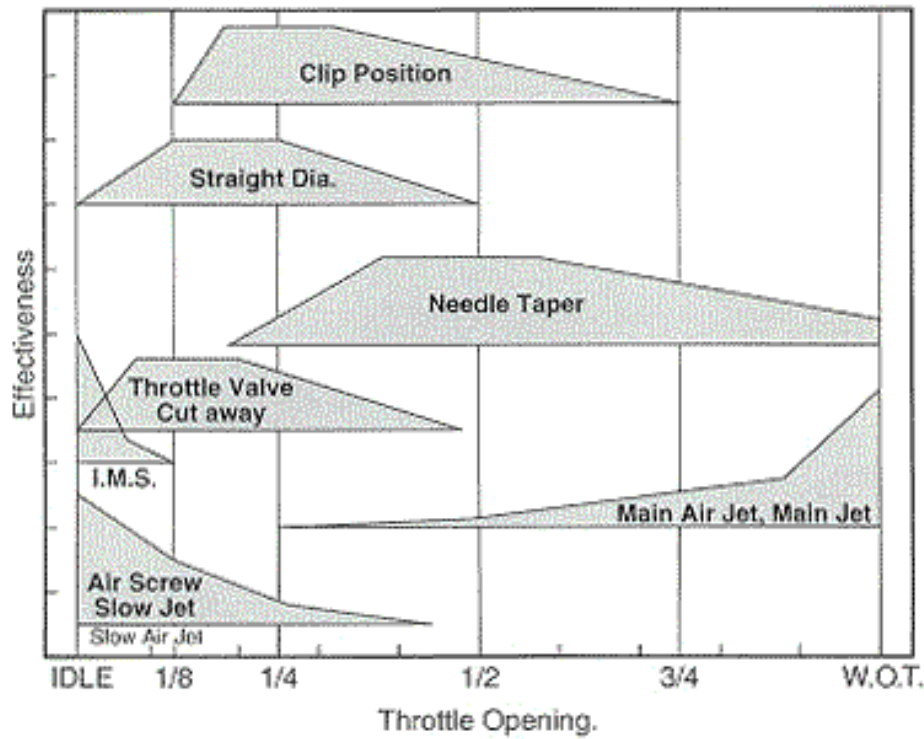


Carburetor Jetting Troubleshooting

(www.iwt.com.au/mikunicarb.htm)

- First Step In Trouble-Shooting Is Finding the Region Where the Engine Is Running Poorly;
  - –If Engine Having Troubles at Low rpm (idle to 1/4 throttle), the Pilot System or Slide-Valve Is Likely Problem
  - –If Engine Has Problems between 1/4 and 3/4 Throttle, the Jet Needle and Needle Jet (most likely the jet needle) is Likely Problem
  - –If Engine Is Running Poorly at 3/4 to Full Throttle, the Main Jet is Likely Problem





W.O.T. = Wide Open Throttle

Carburetor jetting is determined by throttle position, not engine speed.

Altitude, Humidity and Air Temperature Correction Factors

(www.iwt.com.au/mikunicarb.htm)

- Once Jetting Is Set and Bike Running Good, Many Factors Can Change the Performance
- Altitude, Air Temperature and Humidity Are Big Factors Affecting How an Engine Runs
- Air Density Increases as Air Gets Colder
  - There Are More Oxygen Molecules in the Same Space When the Air is Cold
  - When Temperature Drops, Engine Runs Leaner and More Fuel Is Needed to Compensate
  - When Air temperature Gets Warmer, the Engine Runs Richer and Less Fuel Is Needed
  - An Engine Jetted at 32°F May Run Poorly When Air Temperature Reaches 90°F
- Altitude Affects Jetting Since There Are Less Air Molecules as Altitude Increases
  - A Bike that Runs Well at Sea Level Will Run Rich at 10,000 ft Due to Thinner Air
- Humidity Is the Amount of Moisture in the Air
  - As Humidity Increases, Jetting Will Be Richer
  - Bike That Runs Well in Dry Morning Air May Run Rich as Humidity Increases
- Correction Factors Are Used to Find Correct Carburetor Settings for Different Temperatures and Altitudes
- This Chart Shows Typical Correction Factors
- To Use This chart;
  - Jet the Carburetor and Record Pilot and Main Jet Sizes
  - Determine Correct Air Temperature and Follow the Chart Over to the Right until the Correct Elevation is Found
  - Move Straight Down until the Correct Correction Factor is Found
  - Using an Example: Air Temperature is 95°F and the Altitude is 3,200 ft. The Correction Factor will be 0.92. To Find the Correct Main and Pilot Jets, Multiple the Correction Factor with Each Jet Size. A Main Jet Size of 350 Would Be Multiplied by 0.92 and the New Main Jet Size Would Be 322. A Pilot Jet Size of 40 Would Be Multiplied by 0.92 and the Pilot Jet Size Would Be 36.8.