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

Part 3: K-38 Carburetor

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K-38 Carburetor

- Used in Later Dnepr K-750 (750 cc) Boxer Engines
- Used in Ural M-61 and M-62 (650 cc) Boxer Engines
- Left and Right Carburetors Are Completely Similar
- Later Replaced by K-301
- Specifications:
  - Diameter of Inlet Pipe: 24 mm
  - Diameter of Mixing Chamber: 24 mm
  - Distance from Fuel Level in Float Chamber to Plane of Connector: 19 mm
  - Weight of Float: 8.8 g
  - Diameter of Fuel Holes Idle Nozzle Chamber: 0.5 mm
  - Carburetor Weight: 0.85 kg
  - Capacity of Main Jet: 150 cm^3/min

K-38 carbs were used on Later Dnepr K-750's, and
Ural M-61's thru M-63's, until replaced by the K-301 carburetor.

Russian Carburetor Time-Line (06/2011)

K-37 (M-72)

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

K-38 (Later K-750's, 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, MB-650M, 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, MB-650)

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

28 mm Mikuni (8.103)

K-68 (MB-650)

CVK32 Keihin (8.103, 8.107)

Urals

Last of the Dneprs

K-302

K-62

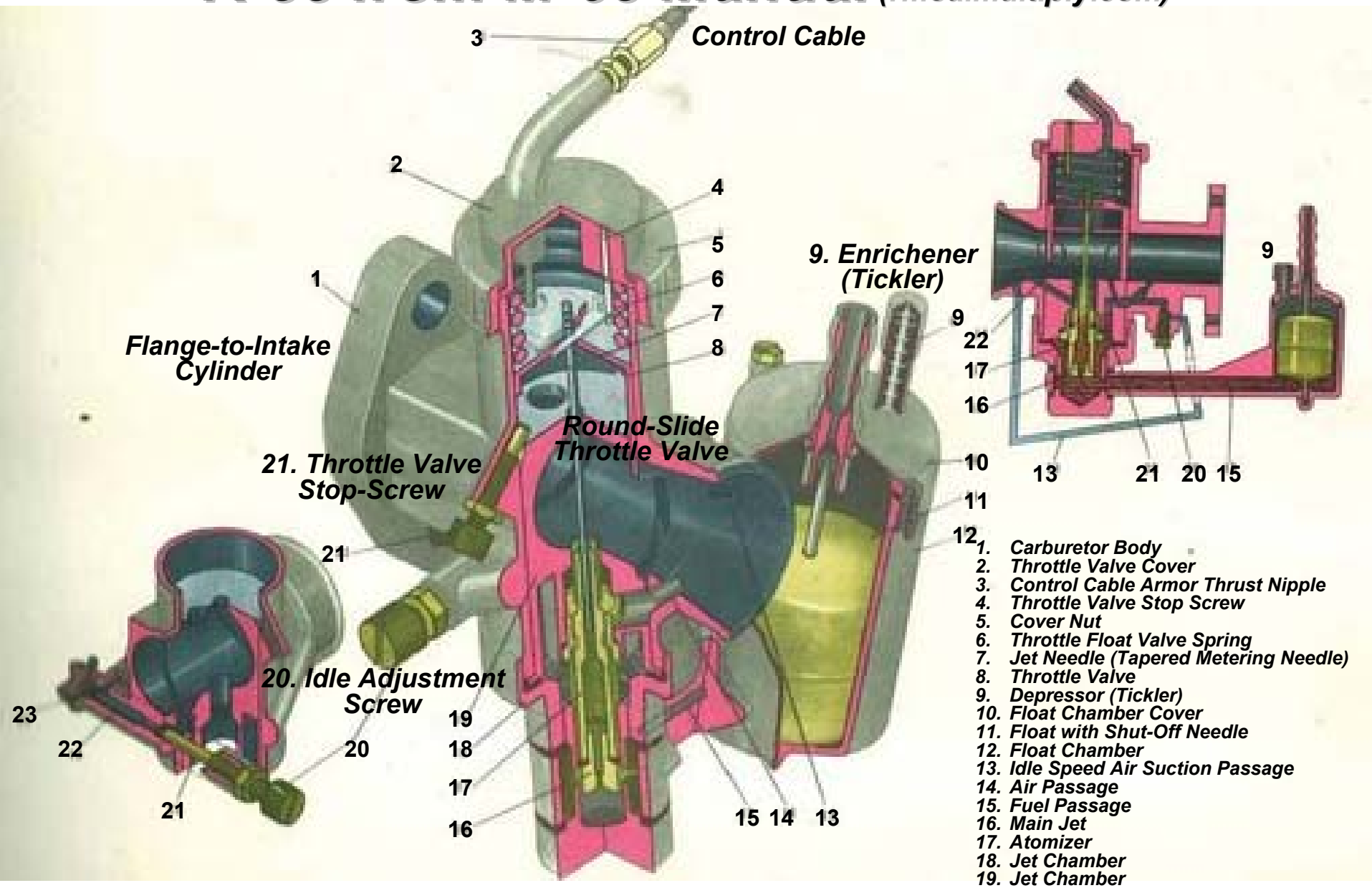
K-63/K-65

K-68

1975 1980 1985 1990 1995 2000 2005 2010

We have seen the gradual migration of the K-37 to the K-37A and then the K-38. The K-301 went through several iterations before the K-302 came along, followed by the K-Series carburetors.

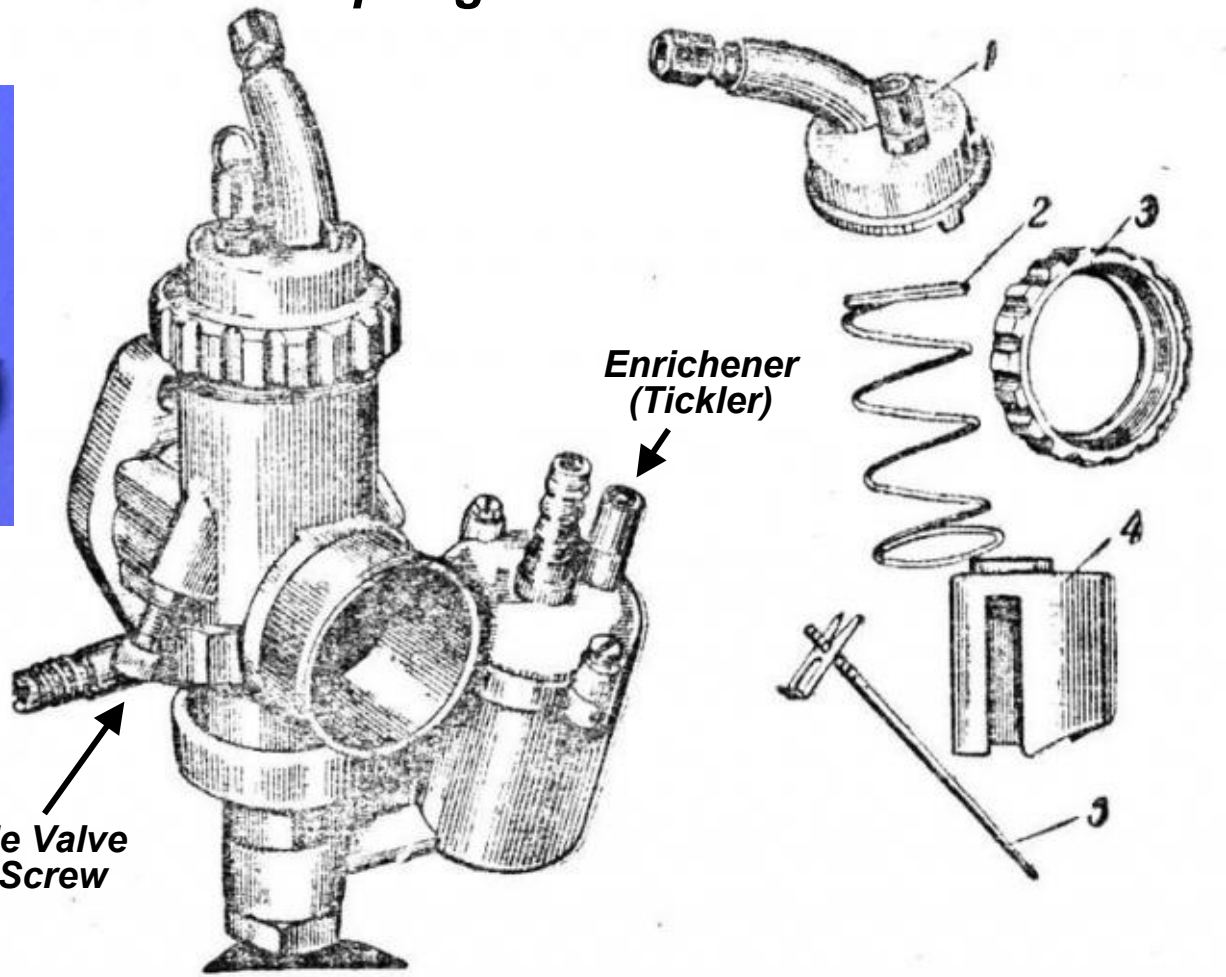
K-38 from M-63 Manual (rmoa.multiply.com)



1. Carburetor Body
2. Throttle Valve Cover
3. Control Cable Armor Thrust Nipple
4. Throttle Valve Stop Screw
5. Cover Nut
6. Throttle Float Valve Spring
7. Jet Needle (Tapered Metering Needle)
8. Throttle Valve
9. Depressor (Tickler)
10. Float Chamber Cover
11. Float with Shut-Off Needle
12. Float Chamber
13. Idle Speed Air Suction Passage
14. Air Passage
15. Fuel Passage
16. Main Jet
17. Atomizer
18. Jet Chamber
19. Jet Chamber
20. Idle-Speed Adjustment Screw
21. Throttle Valve Stop-Screw
22. Idle-Speed Fuel Passage
23. Drain-Hole Gauze

Карбюратор К-38 (kotjar.spb.ru)

1 - Cover Carburetor Body
2 - Throttle valve Spring
3 - Nut Cover
4 - Throttle Valve
5 - Tapered Jet Needle with Spring Lock



K-38 from M-63 Manual (M-63 Manual at rmoa.multiply.com)

- Carburetor at Idling
  - Gasoline Delivered from the Fuel Feed (9) to the Float Chamber (12), then Thru Fuel Passage (13), Atomizer Hollow (16), Idle-Speed Duct in Jet Chamber (18) and Settles on the Level of Fuel in the Float Chamber
  - At Engine Starting, Round-Slide Throttle Valve (19) In Lower Position and Only Raised a Little by the Throttle Valve Stop-Screw
  - Air Will Flow at a Great Velocity thru the Slit Opening Influenced by High Vacuum beyond the Throttle
  - Fuel Rises along the Duct in the Jet Chamber, Being Mixed on the Way with Air that Flows from Inlet Throat of Suction Conduit thru Idle-Speed Air Suction Passage (14), Directed in a Focus of Emulsion to Mixing Chamber
  - Emulsion Is Pulverized by Air Passing at High Velocity thru Slit between Throttle and Chamber Wall
  - Combustible Mixture Delivered to Engine Cylinders
  - During Idling, Main Jet Atomizer Not Working because of Reduced Vacuum above Main Jet (15)
- Carburetor at Medium Load
  - As Throttle Valve (19) Is Raised, More Vacuum Formed above the Atomizer
  - Main System Brought into Operation, Consisting of Main Jet (15), Atomizer (16) and Tapered Metering Needle (6)
  - Outflow of Fuel Limited by Circular Slit between Calibrated Portion of Atomizer and Metering Needle of Throttle Valve
  - When Engine Is Running at Medium Loads, Vacuum at Atomizer Is Compensated Partially with Air Flowing to Atomizer thru Air Passage (17), Connecting Atomizer Hollow with Suction Conduit Throat
  - Outflow of Fuel from Atomizer then Diminishes
  - Mixture Becomes Lean, and Engine Consumes Less Fuel
- Carburetor at Full Load
  - With Throttle Increased to Last Quarter of Travel, Quantity of Fuel Passing thru Atomizer is Not Limited by the Tapered Metering Needle (6), but Depends on Capacity (size of bore) of Main Jet

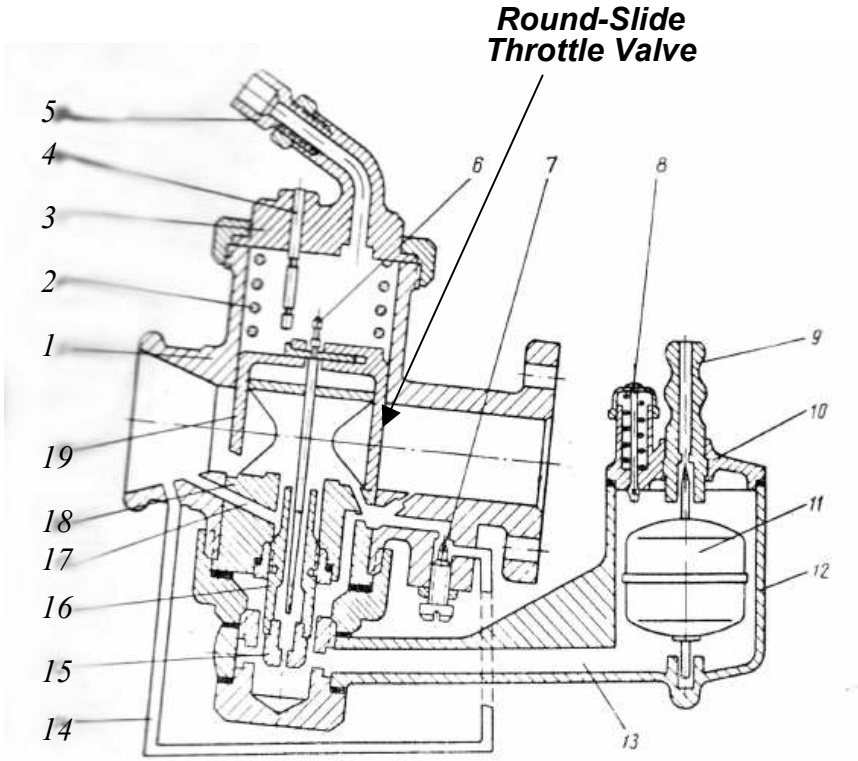


Fig. 9. Carburetter Diagram:

1 — carburetter body; 2 — throttle valve spring; 3 — throttle guide cover; 4 — throttle valve stop screw; 5 — control cable armour thrust nipple; 6 — metering needle; 7 — idle speed adjusting screw; 8 — depressor; 9 — fuel feed pipe union; 10 — float chamber cover; 11 — float with shut-off needle; 12 — float chamber; 13 — fuel passage; 14 — idle speed air suction passage; 15 — main jet; 16 — atomizer; 17 — air passage; 18 — jet chamber; 19 — throttle valve

Adjustment of Carburetor K-38 (M-63 Manual at rmoa.multiply.com)

- Start Engine and Warm-Up
  - Adjustment Carried Out on Cold Engine Will Change when Engine Is Warm
  - Idling Adjustment at Low Revolutions Is Important for Engine Performance
- Each Carburetor Is Adjusted Independently
  - Remove Cap from Spark Plug of Right Cylinder (disable)
  - Slacken Lock-nut (1) of Armor Thrust Nipple of Throttle Control Cable in Left Carburetor and Screw-In Thrust Nipple to Provide for Gap between Cable Armor and Thrust Nipple
  - Slacken Lock-Nuts of Throttle Set-Screw (7) and Idle-Speed Screw (8), Tighten Home the Idle-Speed Screw
  - Using Set-Screw (7), Set Minimum Steady Revolutions of Engine
  - While Turning Idle-Speed Screw (8) Out, Set Maximum Possible rpm of Engine, with Throttle Valve Screw in Given Position
  - Releasing Gradually, Set Screw (7) Set Min. Steady Rev's
  - After Adjusting, Tighten All Lock-Washers on the Screws, Cut Off Left Cylinder, and Adjust Right Carburetor in Same Manner
- Sychronizing Carburetors Are Checked with Warm Engine and Carbs Already Adjusted
  - Cut Off Alternatively Right, then Left Cylinder, by Removing Cap from Respective Spark Plug
  - Determine Any Variation in Speed by Ear as Each Cylinder Working Alone
  - If Engine Speed, when Running on Right or Left Cylinder Alone, is Found Different, Readjust Carburetor by Turning Throttle Valve Set-Screws In or Out till Uniform Speeds Are Obtained in Both Cylinders
  - Tighten Lock-Nuts of Set-Screws
  - When Adjusting Idle Running, Ensure Idle-Speed Screws Are Not Turned to Their Limit
  - Never Drive If idle-Speed Screws Are Tightened to the Stop

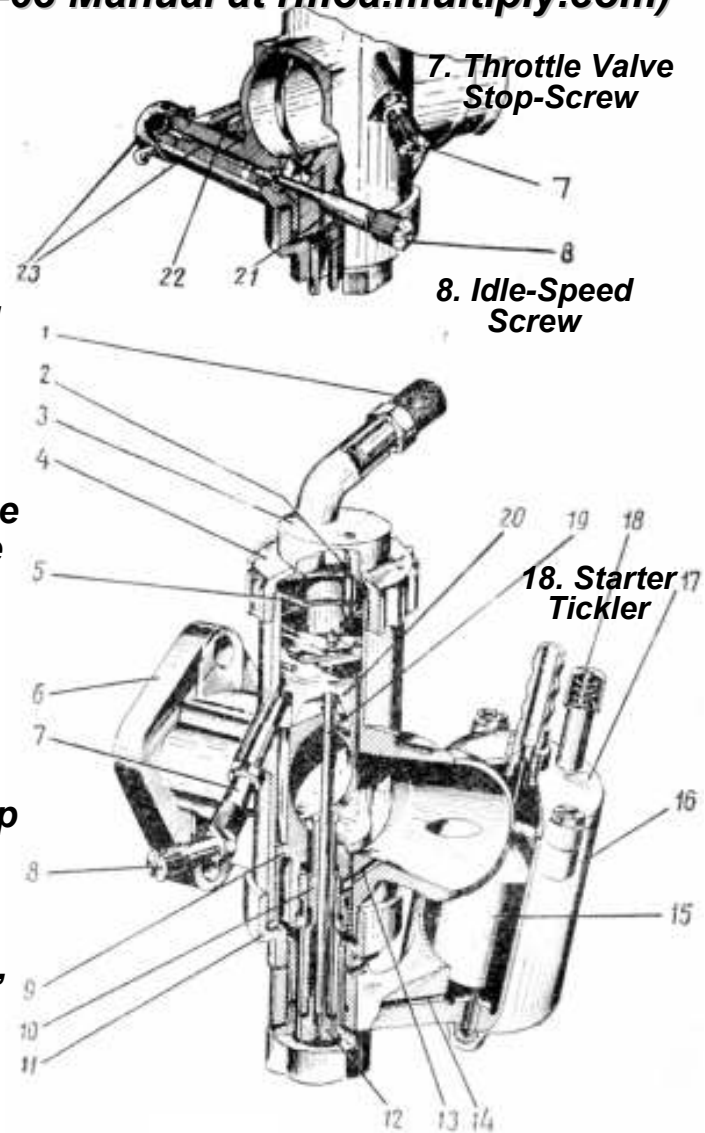


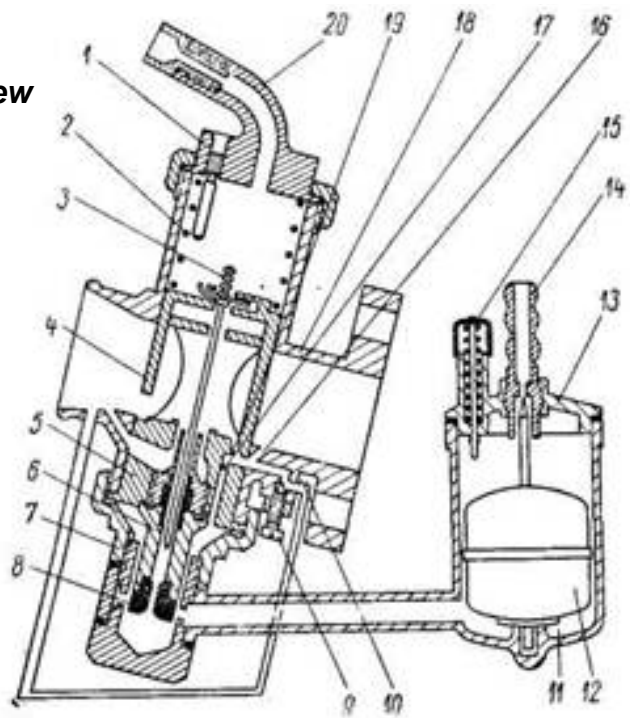
Fig. 10. Carburetter K-38:

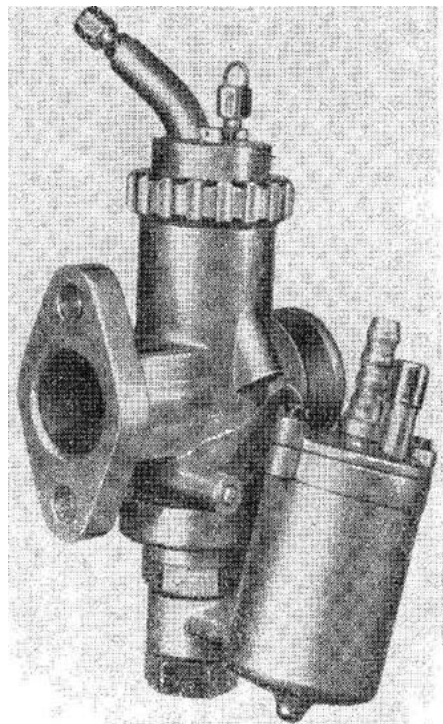
1 — control cable armour thrust nipple; *2* — throttle valve stop screw; *3* — throttle guide cover; *4* — cover nut; *5* — throttle valve spring; *6* — body; *7* — throttle valve set screw; *8* — idle speed screw; *9* — jet chamber; *10* — atomizer; *11* — jet chamber holding nut; *12* — main jet; *13* — air passage; *14* — fuel passage; *15* — float; *16* — float chamber; *17* — float chamber cover; *18* — depressor; *19* — metering needle; *20* — throttle valve; *21* — idle speed fuel passage; *22* — idle speed air suction passage; *23* — drain attachment

Карбюратор К-38 Operation

- *Adjusting Air/Fuel Mixture Carried Out by Dosing Needle Shaped and Management Vacuum in Dispenser Main Dosing System*
- *In Addition, Carburetor Has Independent System Idling*
- *Carburetor Consists of Mixing Chamber (18), with Connecting Flange, Nozzle Chamber (5), Float Chamber (11), Throttle Valve (4) and Lid of Mixing Chamber (1)*
- *Housing of Carb K-38 and Air Path to Horizontal Plane Makes an Angle of 15 °*
- *All Major Carburetor Parts Made of Zinc Alloy Injection Molding*
- *Mixing Chamber (18) for Right and Left Carburetor Are the Same Casting thru Appropriate Mechanical Refinements Specially Provided for This Purpose and Channels*
- *Nozzle Chamber Inserted into Bottom of Mixing Chamber and Pressed against Contoured Threaded Sleeve (7)*
- *Between the clutch and the casing is installed Fibre Sealing Strip.*
- *In Nozzle Chamber Is Channel to Install a Spray of Main System, a Channel for Supplying Air to Main System, a Fuel Channel Idle and Outlet Idling (19)*
- *Body Spray Made of Zinc Alloy with Brass Calibrated Tube in the Middle*

1. *Mixing Chamber Lid and Throttle Valve Stop-Screw*
2. *Throttle Valve Spring*
3. *Tapered Metering Needle*
4. *Throttle Valve*
5. *Nozzle Chamber*
6. *Atomizer*
7. *Contoured Threaded Sleeve*
8. *Main Jet*
9. *Idle-Speed Adjustment Screw*
10. *Drainage Hole*
11. *Float Chamber and Fuel Float Shut-Off*
12. *Float in Float Chamber*
13. *Float Chamber Cover*
14. *Brass Fuel Nipple*
15. *Depressor (Tickler)*
16. *Idle Passage*
17. *Jet Chamber*
18. *Mixing Chamber*
19. *Outlet Idling Channel*
20. *Throttle Valve Control Wire Conduit*





Карбюратор К-38 Operation

- *In Lower Part of Main Jet Screwed Nozzle (8)*
- *Idling Fuel Feed System Made Directly in Shell Nozzle Chamber*
- *Calibrated Idling Orifice (17) Drilled from Side of Nozzle Chamber*
- *Air to Main Dosing System Goes thru a Channel, Available in Bottom of Receiving Pipe*
- *Then into Annular Cavity around Nozzle, Adjusting Accordingly to Vacuum in Main System*
- *Air Supply to System Idling Is Also from Front of Receiving Pipe thru a Special Channel in the Body of Mixing Chamber*
- *Adjusting Idle Screw (9) Horizontally Regulates the Flow Passage for Air*
- *Two Idles: One in (19) before Trailing Edge of Throttle Valve, Second (16) in Mixing Cavity*
- *Throttle Valve Made of Zinc Alloy in a Cylindrical Shape*
- *Throttle Valve Placed in Vertical Channel*
- *On Throttle Valve thru a Spring Plate Lock Is Installed a Profiled Metering Needle (3)*
- *Top of Tapered Metering Needle Has Five Ring-Indentations for Adjustment, Based on Specific Operating Conditions*

1. *Mixing Chamber Lid and Throttle Valve Stop-Screw*
2. *Throttle Valve Spring*
3. *Tapered Metering Needle*
4. *Throttle Valve*
5. *Nozzle Chamber*
6. *Atomizer*
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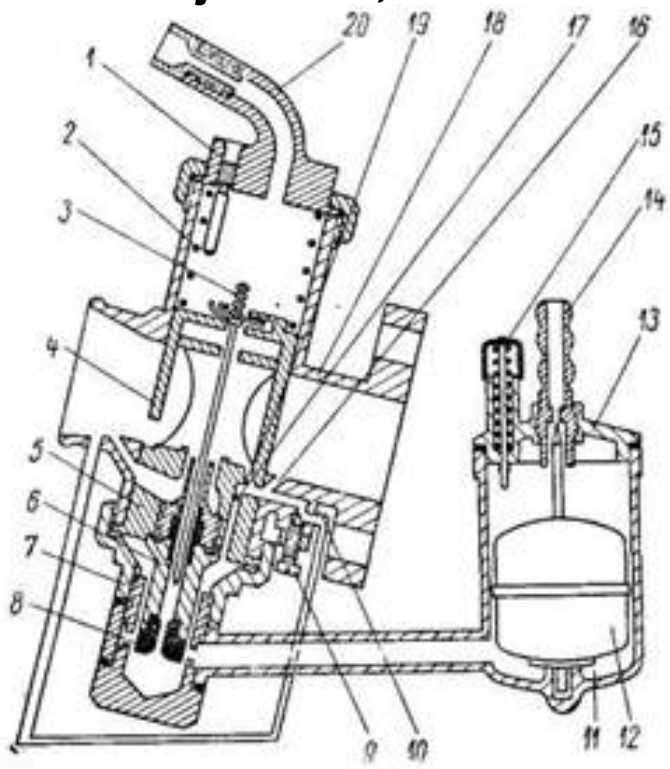

Карбюратор К-38 Operation

- *Mixing Chamber Cover Attached to Body with Contoured Threaded Nut*
- *Mixing Chamber Cover Has an Angled Tube (20) with Adjusting Sleeve Cable*
- *Inside Lid, Pin (1) Pressed inside Cover to Limit Travel of Throttle Valve*
- *Spring (2), between Cover and Throttle Valve Tends to Keep Throttle in Closed Position*
- *In the Side of Mixing Chamber Is Set-Screw that Regulates Down Position of Throttle Valve, with a Jam-Nut.*
- *Float Chamber Attached to Mixing Chamber thru a Special Bolt*
- *At the Joint Bolt Is a Fuel Strainer*
- *Float Chamber Cover (13) Attached to Float Body by Two Screws*
- *Float Chamber Has Depressor (tickler) (15), Fuel Fitting (14) and Saddle Fuel Shut-Off Valve in the Socket*
- *Brass Fuel Fitting (14) in Lid of Float Chamber*
- *Needle of Fuel Shut-Off Valve Mounted on Float (12)*
- *Guide Needle for Only Vertically Movement of Float*

1. *Mixing Chamber Lid and Throttle Valve Stop-Screw*
2. *Throttle Valve Spring*
3. *Tapered Metering Needle*
4. *Throttle Valve*
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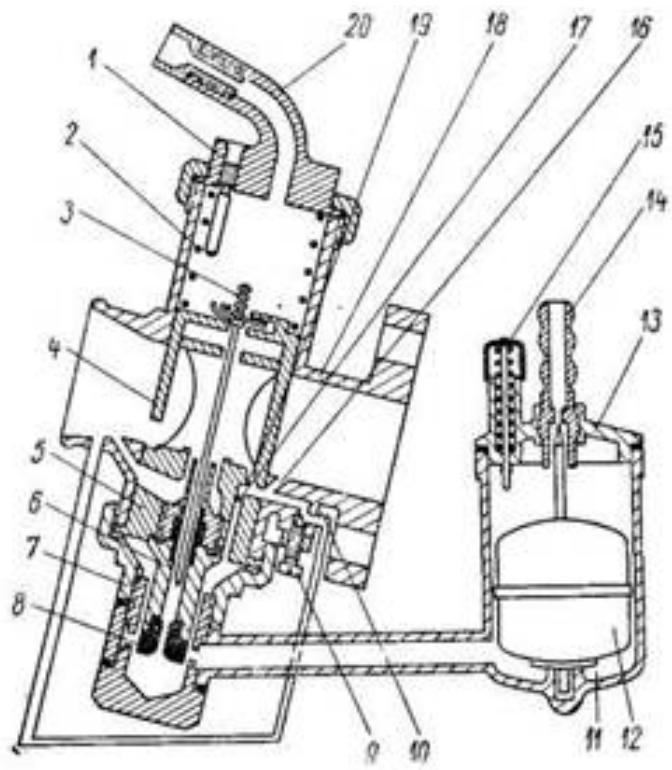

Карбюратор К-38 Operation

- *When Engine at Min Idling Speed, Throttle Valve Is Almost Completely Closed (lowered)*
- *Maximum Dilution Occurs in Mixing Chamber*
- *Fuel as a Result of Dilution Is Transmitted thru Idle Output Channel (16), Coming from the Float Chamber by Spraying Using Idle, Made in the Nozzle Chamber, Mixes with Air Supplied thru the Channel, Adjustable Screw, and in the Form of an Emulsion thru Idle Outlet Channel (19)*
- *With the Opening of the Throttle Valve, Vacuum at Idle Output Channel (19) Increases and Emulsion Also Starts to Come thru It*
- *This Ensures, That When Lifting the Throttle Valve, There Is a Smooth Transition from Low Engine Speeds to Increased Speed*
- *With Further Opening of the Throttle Valve, Carburetor Enters the Main Dosing System*
- *Smoothness of Engine Achieved by the Depth of Front Notch of Throttle Valve and Position of Nozzle in the Mixing Chamber*
- *Required Fuel/Air Ratio Using Main Metering System Due to Ring-Shaped Spacing between Metering Needle (3) and Walls of Main Jet*

1. *Mixing Chamber Lid and Throttle Valve Stop-Screw*
2. *Throttle Valve Spring*
3. *Tapered Metering Needle*
4. *Throttle Valve*
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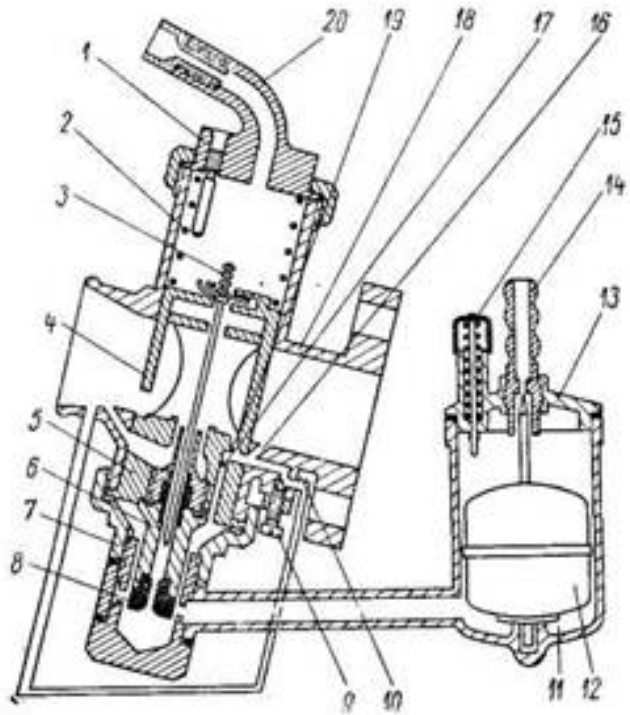
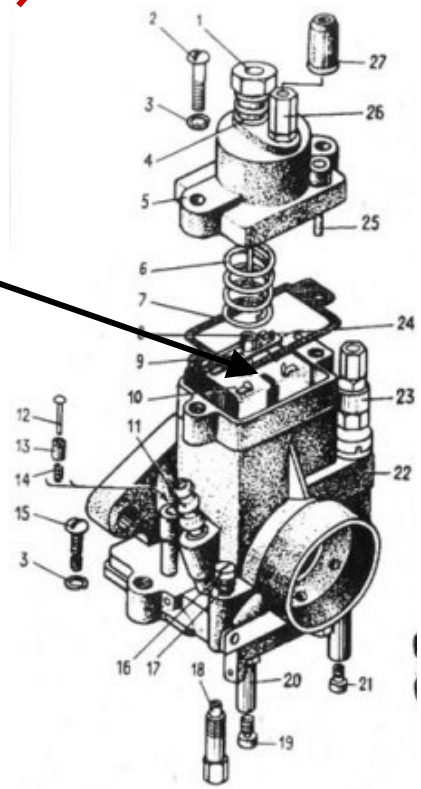
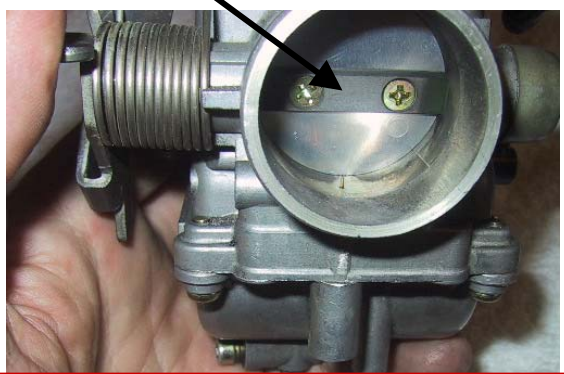


Round-Slide vs. Flat-Slide vs. Butterfly Throttle Valves

- **Round-Slide Throttle Valve**
  - K-37, PZ-28, K-38
  - Kaptex VDC-RAM
  - K-68
  - Mikuni VM-28
  - Jikov 2928
- **Flat-Slide Throttle Valve**
  - K-301 / K-302
  - K-62 / K-63 / K-65
- **Butterfly Throttle Valve**
  - Keihin CVK32

Front Notch of Throttle Valve

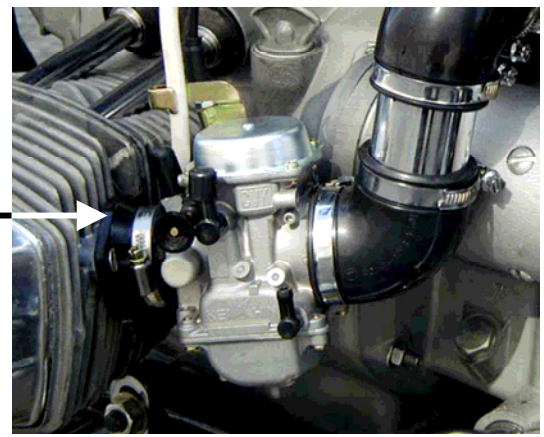




One term describing carburetors is round-slide, flat-slide or butterfly throttle valves.

Flange-Mount vs. Spigot-Mount

- **Flange-Mount**
  - Bolts Directly on Cylinder Head or Adapter
  - K-37, PZ-28, K-38
  - K-301 / K-302
  - K-62 / K-63 / K-65 / K-68
  - Kaptex VDC-RAM



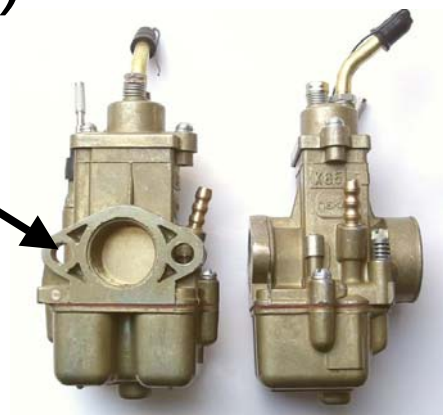
- **Spigot-Mount**
  - Rubber Compliant Mount to Cylinder Head
  - Mikuni VM-28
  - Jikov 2928CE
  - Keihin CVK32

Another term describing carburetors is flange-mount or spigot-mount.

Flange-Mount: Vertical vs. Horizontal

- *Vertical Mounting Holes (MT-9's, MT-10's)*
  - *K-37, PZ-28, K-38, K-301, K-302*

- *Horizontal Mounting Holes (MT-11's, MT-16's)*
  - *K-62, K-63, K-65, Kaptex VDC-RAM, K-68*



- *Transition from Vertical-to-Horizontal*
  - *Used to Transition from Older K-37/38 and K-301/302 Carbs to Modern K-62 / K-65 / K-68 Carbs*
  - *Adapter Plates Readily Available*

An adapter plate is needed to upgrade older motorcycles to the modern horizontal pattern for the K-63 / K-65 / K-68 type carbs.

Regular Carburetor Periodic Maintenance

- *Carburetors Require the Sediment in the Float Bowls Be Drained Periodically*
  - *Ensures That Any Contaminants Accumulated Do Not Enter the Main or Idle Jets of the Carburetors*
  - *Fuel Can Be Drained by Opening the Drains Provided on Bottom of Float Bowls*
- *Fuel Filters Should Be Changed Every 10,000 km or When They Appear Dirty or Not Flowing Fuel Correctly*
  - *Changing the Filters Ensures That Clean Fuel Is Provided to the Carburetors and That There Is No Fuel Starvation*
- *Carburetor-to-Cylinder Head Adapters Should Be Checked for Leaks and Cracks Every Trip*
  - *Failure of Adapters Will Cause the Carburetor Fuel Mixture to Become Lean, which Could Cause Internal Damage to the Engine*

Regular maintenance helps prevent the mysterious problems associated with the carburetor.