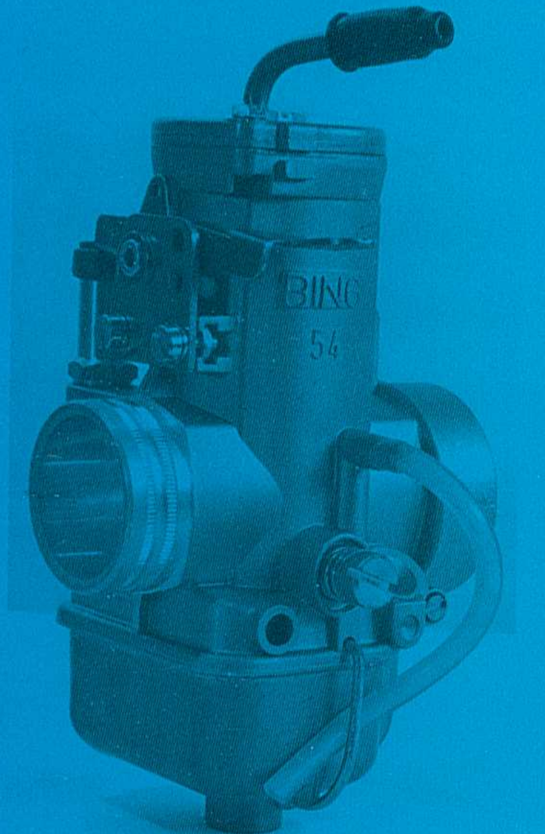
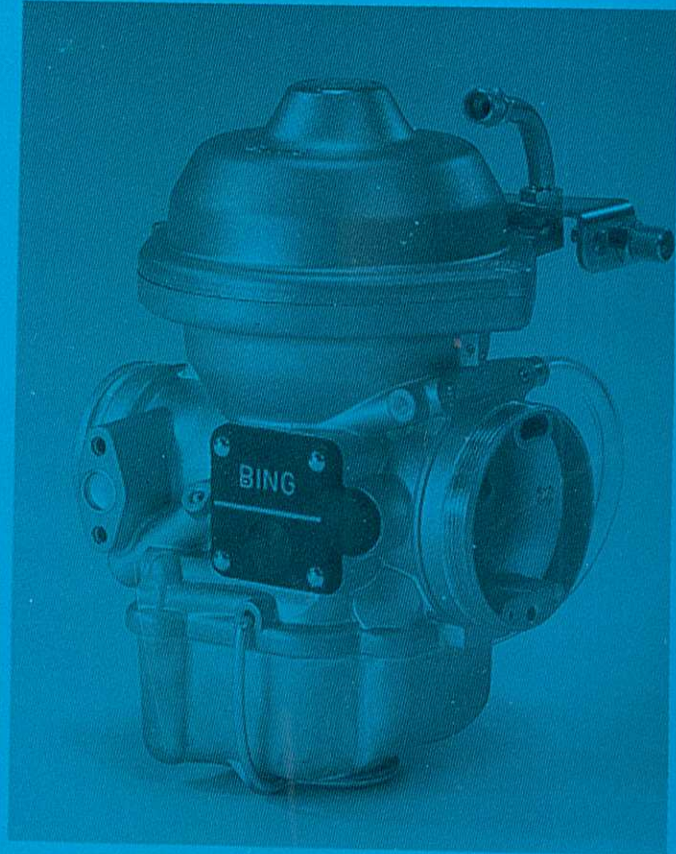
BING CARBURETORS

AIRCRAFT

TUNING & PARTS MANUAL





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ULTRALIGHT CARB SPECS

	ENGINE	CARB # TYPE 54-2	ROTAX #	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION	IDLE SCREW	ATOM-IZER	SLIDE	CHOKE
WITH OR WITHOUT SILENCER	377	54/34/119	292-812	155	50	2.72	8G2	2	0.5	8	2203	HAND
	377	54/34/120	292-813	150	50	2.72	8G2	2	0.5	8	2203	HAND
	277	54/34/121	292-814	125	55	2.74	2H2	2	0.5	8	2203	CABLE
	377	54/34/122	995-740	155	50	2.72	11H2	2	0.5	8	2203	HAND
	277	54/34/123	995-742	125	55	2.74	2H2	2	0.5	8	2203	CABLE
	377	54/34/124	995-741	150	50	2.72	11H2	2	0.5	4	2203	HAND
	377	54/34/125	292-817	155	50	2.72	11H2	2	0.5	4	2203	HAND
	377	54/34/126	995-743	160	50	2.72	11H2	2	0.5	4	2203	HAND
	377	54/34/130	292-818	150	50	2.72	11H2	2	0.5	4	2203	HAND
	377	54/34/131	292-819	160	50	2.72	11H2	2	0.5	4	2203	HAND
	377	54/36/141	292-096	160	55	2.72	8O2	2	1	4	230	HAND
	277	54/36/142	292-098	148	55	2.74	8L2	2	1	4	230	HAND
	503	54/36/143	292-099	155	60	2.78	8G2	2	2	4	230	HAND
	503	54/36/144	292-097	175	55	2.76	8L2	3	1.5	4	230	HAND
	503	54/36/148	995-500	180	60	2.72	8G2	3	0.5	4	230	HAND
	503	54/36/149	995-501	180	60	2.72	8G2	2	0.5	4	230	HAND
	503	54/36/1400	995-502	162	60	2.72	8G2	3	0.5	4	230	HAND
	503	54/36/1401	995-503	162	60	2.72	8G2	2	0.5	4	230	HAND
	377	54/36/1402	995-504	160	50	2.76	8L2	3	0.5	4	230	HAND
	377	54/36/1403	995-505	155	50	2.76	8L2	3	0.5	4	230	HAND
	377	54/36/1404	995-506	160	50	2.76	8L2	3	0.5	4	230	CABLE
	503	54/36/1405	995-507	180	60	2.72	8G2	2	0.5	4	230	CABLE
	447	54/36/1406	995-508	150	50	2.78	8G2	3	2	4	230	HAND
W O	503	54/36/1501	995-510	180	45	2.74	8G2	3	0.5	4	2306	HAND
WITH	503	54/36/1503	995-512	158	45	2.74	6H2	3	0.5	4	2306	HAND
	503	54/36/1504	995-513	158	45	2.74	6H2	3	0.5	4	2306	CABLE
W O	377	54/36/1505	995-514	165	45	2.70	802	2	0.5	4	2306	HAND
WITH	377	54/36/1506	995-515	155	45	2.70	802	2	0.5	4	2306	HAND
	377	54/36/1507	995-516	165	45	2.70	802	2	0.5	4	2306	CABLE
	503	54/36/1508	995-517	180	45	2.74	8G2	3	0.5	4	2306	CABLE
WITH	447	54/36/1509	995-518	155	45	2.70	15K2	2	0.5	4	2306	HAND
	532	54/36/1510	995-519	165	55	2.72	8G2	3	1	4	2306	CABLE
W O	277	54/36/1511	995-570	148	45	2.72	8L2	2	1	4	2306	HAND
W O	503	54/36/1512	995-571	158	45	2.74	8L2	1	0.5	4	2306	HAND
WITH	462	54/36/1513	995-572	195	55	2.74	8L2	3	0.5	4	2306	CABLE
W O	447	54/36/1514	995-573	165	45	2.70	15K2	2	0.5	4	2306	HAND
	462	54/36/1515	995-574	160	50	2.76	11K2	2	0.5	4	2306	CABLE
	277	54/36/1516	995-575	148	45	2.72	8L2	2	1	4	2306	CABLE
WITH	277	54/36/1517	995-576	140	45	2.72	8L2	2	1	4	2306	HAND
	277	54/36/1518	995-577	140	45	2.72	8L2	2	1	4	2306	CABLE
	503	54/36/1519	995-578	158	45	2.74	8L2	1	0.5	4	2306	CABLE
	503	54/36/1520	995-579	155	45	2.74	8F6Z	3	0.5	4	2306	HAND
	447	54/36/1521	995-860	155	45	2.70	15K2	2	0.5	4	2306	CABLE
	447	54/36/1522	995-861	165	45	2.70	15K2	2	0.5	4	2306	CABLE
	532	54/36/1524	995-863	165	55	2.72	8G2	3	1	4	2306	HAND
WITH	462	54/36/1528	995-867	215	55	2.78	15K2	3	0.5	4	2306	CABLE
	532	54/36/1529	995-868	185	55	2.94	10	3	1	4	2306	CABLE
	532	54/36/1530	995-869	205	55	2.94	10	3	1	4	2306	CABLE
	503	54/36/1537	996-413	185	45	2.72	15K2	3	0.5	4	2306	HAND

ULTRALIGHT CARB SPECS

ENGINE	CARB # TYPE 54-2	ROTAX #	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION	IDLE SCREW	ATOM-IZER	SLIDE	CHOKE
503	54/36/1538	996-415	185	45	2.72	15K2	3	0.5	4	2306	CABLE
503	54/36/1539	996-414	165	45	2.70	15K2	3	0.5	4	2306	HAND
503	54/36/1540	996-416	165	45	2.70	15K2	3	0.5	4	2306	CABLE
503	54/36/1542	996-970	168	45	2.74	8L2	1	0.5	4	2306	HAND
503	54/36/1543	996-971	168	45	2.74	8L2	1	0.5	4	2306	CABLE
462	54/36/1615	995-574	160	50	2.76	11K2	2	0.5	4	2306	CABLE
532	54/36/1623	995-862	165	55	2.72	11G2	3	1	4	2306	CABLE
532	54/36/1625	995-864	165	55	2.72	11G2	3	1	4	2306	HAND
532	54/36/1626	995-865	195	55	2.74	15K2	3	0.5	4	2306	CABLE
532	54/36/1627	995-866	170	55	2.74	15K2	3	0.5	4	2306	CABLE
462	54/36/1633	996-410	185	55	2.74	15K2	2	0.5	4	2306	CABLE
462	54/36/1635	996-411	210	55	2.74	15K2	3	0.5	4	2306	CABLE
532	54/36/1642	996-972	175	55	2.72	11G2	3	1	4	2306	HAND
532	54/36/1643	996-973	175	55	2.72	11G2	3	1	4	2306	CABLE
277	54/36/1731	996-290	140	45	2.72	8L2	2	1	4	2306	HAND
277	54/36/1732	996-291	148	45	2.72	8L2	2	1	4	2306	HAND
377	54/36/1736	996-412	155	45	2.68	15K2	2	0.5	4	2306	HAND
503	54/36/1741	996-294	158	45	2.74	8L2	1	0.5	4	2306	HAND
277	54/36/1801	996-950	155	45	2.72	8L2	2	1	4	2306	HAND
277	54/36/1802	996-951	155	45	2.72	8L2	2	1	4	2306	CABLE
503	54/36/1803	996-952	195	45	2.72	15K2	3	0.5	4	2306	HAND
503	54/36/1804	996-953	195	45	2.72	15K2	3	0.5	4	2306	CABLE
503	54/36/1805	996-954	168	45	2.74	8L2	1	0.5	4	2306	HAND
503	54/36/1806	996-955	168	45	2.74	8L2	1	0.5	4	2306	CABLE
532	54/36/1901	996-956	175	55	2.72	11G2	3	1	4	2306	HAND
532	54/36/1902	996-957	175	55	2.72	11G2	3	1	4	2306	CABLE
	54/36/2040		165	45	2.70	15K2	2	0.5	4	2306	HAND
This Carb is the latest Bing 54 UL Carb and will be jetted to your specific engine.											
	TYPE 84										
377	84/32/3435	292-355	135	50	2.62	8H1	2	1.5	5	635-1	HAND
377	84/32/3436	292-356	128	50	2.66	401	2	0.5	5	635-1	HAND
447	84/32/3437	292-357	135	50	2.70	6G1	3	1	5	635-1	HAND
	TYPE 64										
912	64/32/391		158	35	2.72	252	2	3	1	907-1	CABLE
912	64/32/392		158	35	2.72	252	2	3	1	907-1	CABLE
912	64/32/394		158	35	2.72	252	2	3	1	907-1	CABLE
912	64/32/395		158	35	2.72	252	2	3	1	907-1	CABLE
912	64/32/404		158	35	2.72	252	2	3	1	907-1	CABLE
912	64/32/405		158	35	2.72	252	2	3	1	907-1	CABLE
914	64/32/398F		162	35	2.72	252	2	3	1	907-1	CABLE
HKS700E	64/32/406		135	35	2.80	252	2	2.5	10	907-3	CABLE

ATTENTION: The specs on pages 1 and 2 are the factory specs which come out on the corresponding carburettor numbers. For recommended factory jetting of your Bing carburettors see pages 3 and 4 of this manual.
Assume nothing, always check your jets and make sure what is in your Carburettors.

ROTAX FACTORY SPECS

RECOMMENDED JETTING FOR BING CARBURETORS

The following is the factory recommended jetting for Bing Carburetors at sea level and 70F degrees. Apply the Bing Main Jet Correction Chart shown on page 12 of this manual to compensate for temperature and altitude at your location. Jetting for engines equipped with intake silencers are also listed.

Rotax Engines w/o Intake Silencer

Engine Type	Main Jet	Idle Jet	Needle Jet	Jet Needle	Clip From Top	Air Screw
Rotax 277	148	45	2.72	8L2	2	1
Rotax 377	165	45	2.70	8O2	2	0.5
Rotax 377DC	135	50	2.62	8H1	2	0.5
Rotax 447	165	45	2.70	15K2	2	0.5
Rotax 447DC	135	50	2.70	6G1	3	1
Rotax 503SC*	180	45	2.74	8G2	3	0.5
***Up to Serial #3785371**						
Rotax 503SC**	185	45	2.72	15K2	3	0.5
**** After Serial # 3785372**						
Rotax 503DC	158	45	2.70	11K2	2	0.5
Rotax 532SC	195	55	2.74	15K2	3	1
Rotax 532DC	165	55	2.72	11G2	3	1
Rotax 582DC	165	55	2.72	11G2	3	1
Rotax 618DC-pto	160	50	2.68	9M1OJ	2	1
Rotax 618DC-mag	170	50	2.68	9M1OJ	2	1

Rotax Engines with Intake Silencer

Engine Type	Main Jet	Idle Jet	Needle Jet	Jet Needle	Clip From Top	Ai Scre
Rotax 277	140	45	2.72	8L2	2	1
Rotax 377	155	45	2.70	8O2	2	0.5
Rotax 377DC						
Rotax 447	155	45	2.70	15K2	2	0.5
Rotax 447DC	128	50	2.68	15K2	2	1
Rotax 503SC*	158	45	2.74	6H2	3	0.5
***Up to Serial #3785371**						
Rotax503SC**	165	45	2.70	15K2	3	0.5
**** After Serial # 3785372**						
Rotax 503DC	148	45	2.68	11k2	2	1
Rotax 532SC	170	55	2.74	15K2	3	1
Rotax 532DC	145	55	2.68	15K2	2	0.5
Rotax 582DC	145	55	2.68	15K2	2	0.5
Rotax 618DC-pto	135	50	2.68	9M1OJ	2	1.5
Rotax 618DC-mag	145	50	2.68	9M1OJ	2	1.5

BING HAC CARBS

BING HAC CARBS

Engine Type	Main Jet	Idle Jet	Needle Jet	Jet Needle	Needle Position
Rotax 503SC	200	45	2.74	15K2	4
Rotax 503DC	185	45	2.74	8L2	1
Rotax 503DC with Silencer	180	45	2.68	15K2	2
Rotax 532 & 582DC	180	55	2.72	11G2	3

INITIAL STOCK JETTING AND SETUP FOR 2si AIRCRAFT ENGINES

Initial stock jetting is determined under laboratory conditions, ambient temperature 82° F (27.8° C), atmospheric pressure 30.14 in. Hg., relative humidity 53%. Jetting is affected by numerous factors including propeller/airframe combinations, altitude, temperature, humidity and various other climatic and operating conditions. New engines are test run to determine individual jetting, which is recorded on the Induction Setup Tag attached to the engine. Actual initial jetting may vary slightly from stock jetting listed below. **INITIAL STOCK JETTING IS A STARTING POINT. DIFFERENT OPERATING CONDITIONS REQUIRE CHANGES IN JETTING AND SETUP.** These initial jetting figures presume a propeller selected for full-throttle climbout at the engine's horsepower peak. In general, higher RPM's require richer jetting.

ENGINE	CARB#	IGN	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION
230F-22	TYPE 54	P1	175	55	2.70	11G2	2
460F-35	TYPE 54**	P1	195	30	2.80	15K2	2
Tractor Exh.	TYPE 84	P1	185	40	2.68	601	3
Pusher Exh.	TYPE 84	P1	180	40	2.66	601	3
460F-40	TYPE 54	K	205	40	2.74	19K2	3
460L-46	TYPE 84	P2	170	45	2.68	601	3
460L-50	TYPE 54	P2	190	55	2.76	11G2	3
540L-70	TYPE 54	P1 or E**	195	55	2.8	11G2	2
690L-70	TYPE 54	P2	170	35	2.8	6F2	2
808L-95	TYPE 54	P1 or E**	168	55	2.76	11G2	2

**** Denotes: Optional Carburetor or Ignition System.**

Type 54 Carb is 36mm

Type 84 Carb is 32mm

IGNITION SYSTEMS

E = Electromotive Direct Electronic

K = Kokusan CDI

P1 = Phelon Type 1 Inductive Module

P2 = Phelon Type 2 CDI

INITIAL STOCK JETTING FOR CUYUNA ENGINE

ENGINE	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION	AIR SCREW
460F35	180	40	2.68	601	3	

INITIAL STOCK JETTING FOR HIRTH ENGINES

ENGINE	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION	AIR SCREW
2703	185	45	2.27	6P2	1	0.5-1
2703DC	160	45	2.72	6P2	2	0.5-1
2704	160	45	2.74	6P2	1	0.5-1
2704DC	170	45	2.74	6P2	2	0.5-1
2706 Original	170	45	2.78	15K2	2	0.5-1
2706 New Setti	180	40	2.78	15K2	2	0.5-1

ALL NEEDLE POSITIONS ARE FROM THE TOP

INITIAL STOCK JETTING AND SETUP FOR SOLO AIRCRAFT ENGINES

ENGINE	CARBURETOR TYPE	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION
SOLO WITH POWER EXHAUST	TYPE 84	155	30	2.72	6L1	1
MONSTER	TYPE 84	165	30	2.72	6K1	1

INITIAL STOCK JETTING AND SETUP FOR SIMONINI AIRCRAFT ENGINES

ENGINE	CARBURETOR TYPE	MAIN JET	IDLE JET	NEEDLE JET	JET NEEDLE	NEEDLE POSITION
	TYPE 84	165	30 OR 40	2.72	6L1	1

HKS FACTORY SPECS

Engine		Carb #	Main Jet	Idle Jet	Needle Jet	Jet Needle	Needle Position	Air Screw	Atomizer	Slide
HKS700E	UP Intake	64/32/406	125	45	2.70	252	3	1.5	10	#6
	Horizontal Intake		135	45	2.70	252	3	1.5	10	#6

ALL NEEDLE POSITIONS ARE FROM THE TOP

BING ULTRALIGHT CARBURETTORS

INTRODUCTION: There are hundreds of possible jetting/air-valve/atomizer combinations that could be installed in your carburettor. Add to this, an infinite amount of variable mixture adjustments, and the possibilities become astronomical. Fortunately, the designers of your machine determined the proper combination that best fits your overall requirements in terms of power, economy, and reliability. They even left room for the individual pilot to make certain changes to suit his particular requirements. When these changes are required, what changes we make, and the results we achieve is what this manual is all about.

Paramount in the designer's mind is RELIABILITY. We never change anything in the carburettor that reduces reliability, and changing anything else is always a compromise between POWER and ECONOMY. Unless of course, both have been reduced in the first place - only then will we see an improvement in performance and economy.

To make logical changes in our carburation, we first must have at least a passing knowledge of the underlying principles that govern our engine's carburation requirements; - the following discussions hopefully will fulfill this need. By itself, the carburettor does nothing -- but attach it to a reciprocating engine -- it comes to life, providing the very lifeblood that all engines exist on; air and fuel!

AIR: Air that our engine uses in the combustion process contains 21% Oxygen, 78% Nitrogen, and 1% other gasses.

FUEL: The gasoline that we use in our engine contains liquid hydrocarbons (Hydrogen and Carbon).

COMBUSTION: When each Carbon atom in our fuel is combined with two Oxygen atoms from our air supply, Carbon-Dioxide (CO2) is formed during the "burning" process. The Carbon-Dioxide thus formed, and the 78% Nitrogen from our air source absorb the heat from the combustion process and turn it into mechanical energy by expansion.

AIR/FUEL MIXTURE: A chemist will tell you that a perfect mixture, one that will be totally consumed in the combustion process, contains 1 pound of fuel for each 14.8 pounds of air. He is right BUT we cannot use this "perfect" mixture because it produces way too much heat that does nothing for efficient power or economy. Richer mixtures lower combustion temperatures and produce an increase of power until we reach a 13.8 air/fuel ratio. (Figure 1) From 13.8 to 12.5 we realize no increase in power but do see lower temperatures that greatly enhance the combustion process by allowing more time to convert heat to mechanical energy. Beyond 12.5 we experience a pronounced drop in power as excessive cooling by the enrichened mixture robs us of combustion efficiency. Lean mixtures are only tolerated at highway cruising speeds. Below 1/4 throttle, an excessively lean engine will not get you through the intersection -- above 3/4 throttle, you might see a hole where the top of your piston used to be (after an expensive tear-down). For cruising speed only, we can vary the mixture on the lean side between 16.4 and 18.2 to achieve desired economy levels.

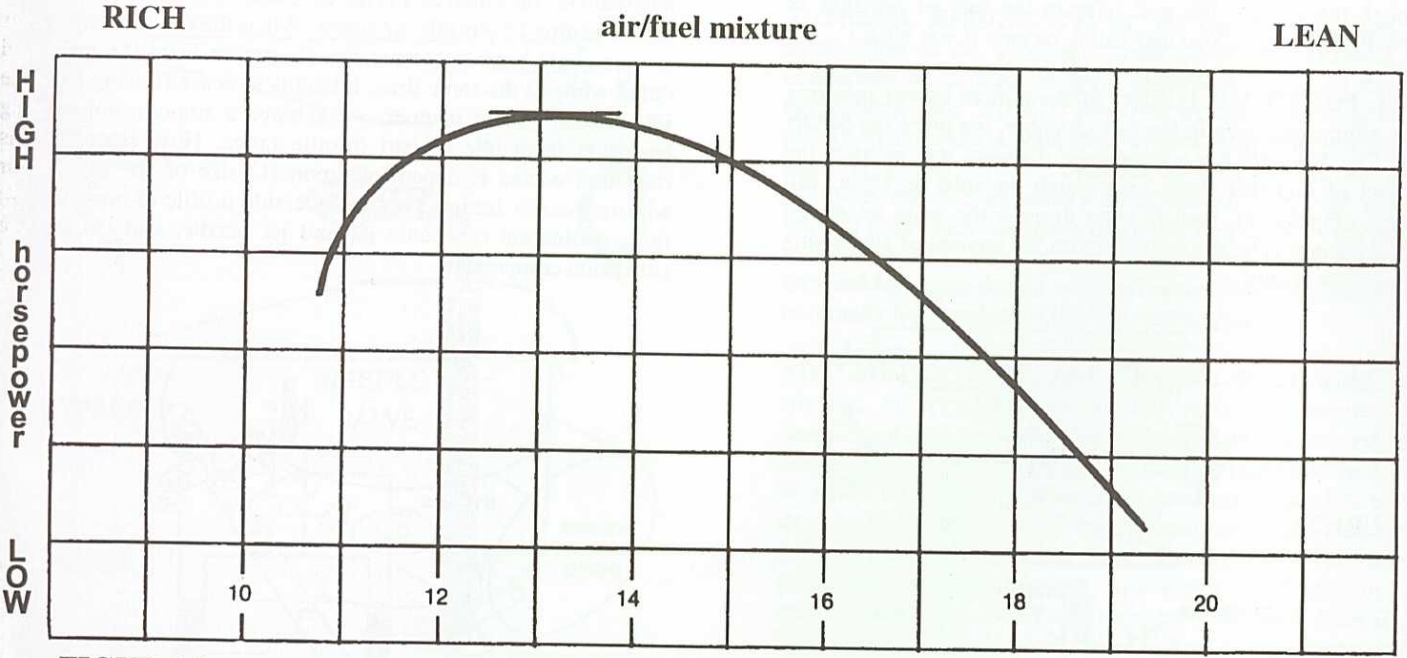


FIGURE 1

AIR PRESSURE: is 14.69 pounds per square inch (psi) at sealevel and 59 degrees Fahrenheit. With the engine at rest, air pressure throughout the engine, carburettor, and exhaust is 14.69psi. As the piston begins downward travel (with intake valve open) a low pressure (partial vacuum) area is created in the cylinder. Outside air at the higher 14.69 psi rushes through the carburettor to refill the low pressure area behind the retreating piston. The amount of air that enters the cylinder during the intake stroke is dependent upon the throttle valve opening.

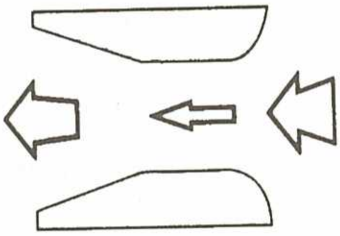
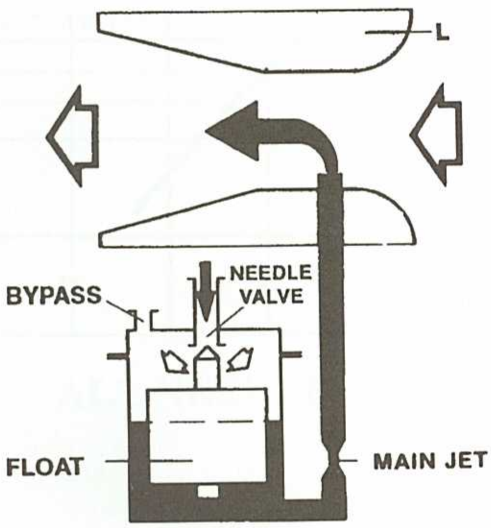


FIGURE 2a

THE VENTURI: (Figure 2a) A basic law of physics states: "as the velocity of air increases, the pressure of air decreases." In a given period of time, the amount of air exiting the carburettor must be equal to the amount entering the carburettor. On its way through the venturi, the air flow encounters a restriction and has to "speed up" to get past the restriction and exit at the same rate that it enters. How does it "speed up"? The only available source of energy to boost its speed through the restriction is PRESSURE. We don't get something for nothing, therefore we have a loss of pressure that is proportional to the increase of velocity through the restriction. At a point in the venturi where the lowest pressure exists, we place our fuel outlet. With a low pressure at the fuel outlet, the higher pressure (atmospheric) in the fuel chamber will force fuel up through our metering tube in an amount proportional to the air flowing through the venturi. In this manner, we now have the means with which to meter the correct amount of fuel for any given amount of air passing through the venturi. We will refer to the loss of pressure as LOW PRESSURE. (You may call it vacuum if you wish.)

FULL POWER MIXTURE: At the bottom of our metering tube, submerged deep in the fuel chamber, we place the MAIN JET. The Main Jet has a fixed bore diameter that restricts the amount of fuel that flows up through the tube at 3/4 to full throttle (Figure 2b). Fuel flowing through the main jet at full power settings is totally dependent on the amount of air passing through the venturi.

FIGURE 2b



PART THROTTLE MIXTURE: We place in the meterin tube a needle jet , and inside this jet, a tapered needle, that wh retracted increases the area through which the fuel must flo (Figure 3) The needle is retracted at the same rate that o throttle (air) valve is opened, therefore we have a correspondi fuel flow for an increase of air flow. In this manner, our air/fu mixture is precisely controlled from about 1/4 to 3/4 throttle.

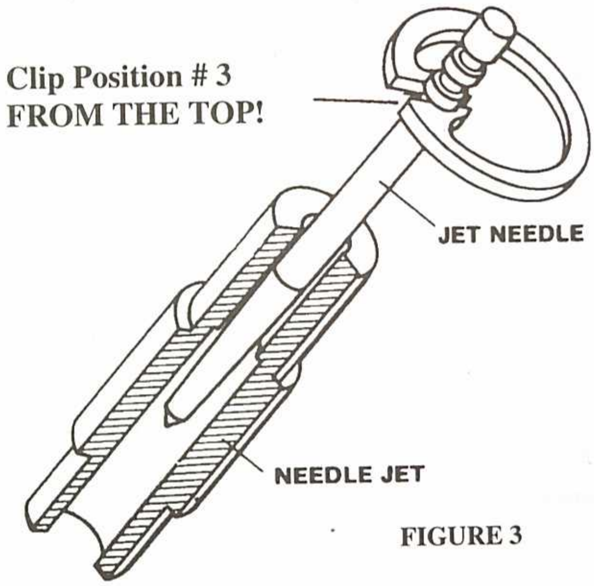
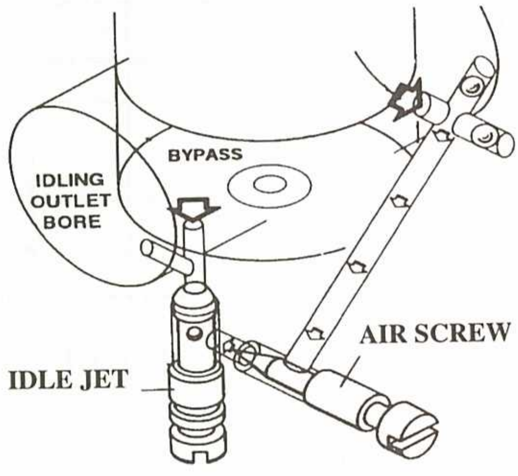


FIGURE 3

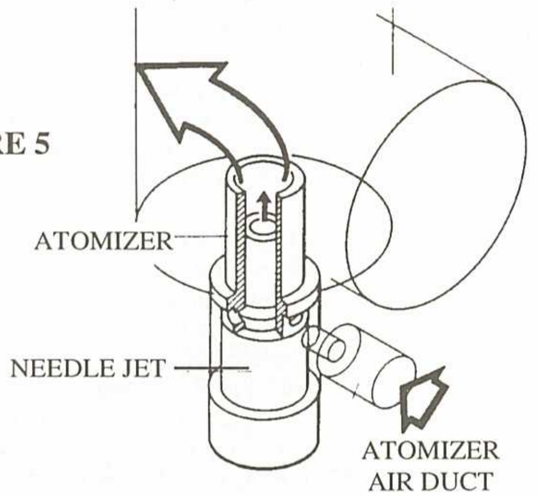
IDLE SPEED MIXTURE: At throttle settings in the idl speed range there is insufficient air flow through the venturi. resulting higher pressure (less vacuum) will not allow fuel flow from the main fuel outlet. The fuel outlet for idle meter therefore is placed between the throttle valve and the int manifold where low pressure exists when the throttle valve nearly closed. (Figure 4) The amount of fuel allowed to enter airstream is controlled by (1) the bore diameter of the idle jet, (2) the setting of our idle air screw. When the throttle valve st to open, fuel begins to enter the air stream from the main outlet while at the same time, it begins to cease flowing from idle circuit. In this manner, we achieve a smooth, unhesita transition from idle to part throttle range. How smoothly transition occurs is dependent upon (1) size of jet, (2) idle adjusting screw setting, (3) the underside profile of our slide, the combination of needle jet and jet needle, and (5) mix correction components.



FIGUI

MIXTURE CORRECTION: At the lower end of our part-throttle range, atmospheric pressure in our fuel chamber is not great enough to force fuel out of the main discharge nozzle and into the air stream. We give the fuel flow a "boost" at this point by directing an air stream into the metering tube (Figure 5). In this manner, we not only help the fuel up and out of the nozzle, we also "break up" the fuel into smaller droplets that are more easily vaporized in the air stream. The component responsible for this pre-vaporization is our ATOMIZER.

FIGURE 5



FUEL LEVEL CONTROL: Much more important than maintaining a constant level in the fuel (or float) chamber, our floats determine the height that the fuel attains in our main fuel metering tube (Figure 6). At the proper height, the pre vaporized fuel is easily "picked off" by the (suction) that exists in our venturi. A "too high" level in the tube will allow more fuel into the air stream than is desired, resulting in an overly enriched air/fuel mixture. A "too low" level produces "lean" mixtures.

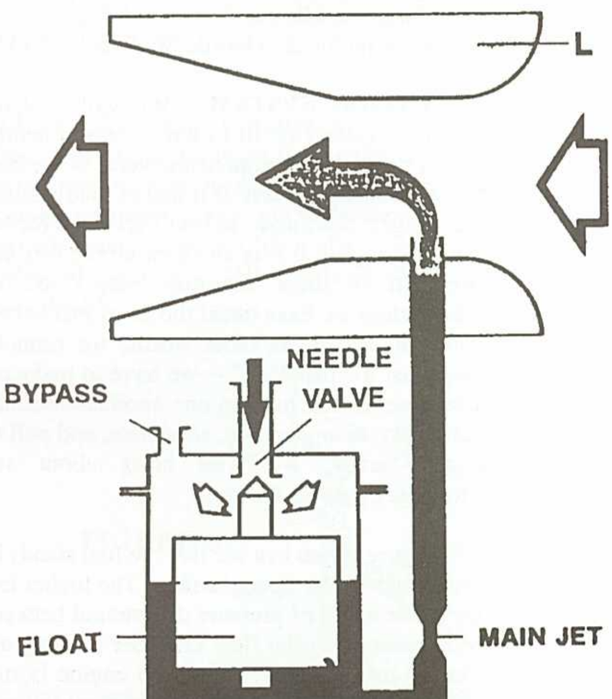


FIGURE 6

STARTING MIXTURE: Bing carburettors may be equipped with starting carburettor or choke. If you have a slide type carburettor and it is equipped with an independent "starting carburettor," it functions in the following manner: Pulling on the starting carburettor lever raises a plunger assembly that allows a pre-determined amount of fuel to enter the carburettor throat when suction is initiated by engine cranking speed. A predetermined amount of air is mixed with the fuel to achieve a combustionable mixture. Bing Constant Depression carburettors function similarly except that a rotary valve replaces the plunger design, and the fuel/air mixture is varied by the lever position. Initially an overly rich mixture is provided to the cold engine and then reduced after the engine is running. This reduction is accomplished automatically by nature of the starting jet design. The throttle MUST remain closed during starting carburettor operation.

TEAMWORK : The best tuned carburettor in the world will not contribute anything to power or economy unless all influencing system components are in harmony! The following paragraphs are presented as an aid to understanding how the carburettor fits into the overall scheme of engine operation. Our fuel system, or rather our total fuel system, is not limited to the gas tank, gas line, and carburettor. It begins with the outside surface of our air filter and ends at the tip of our exhaust system. Our carburettor has to compensate for an infinite amount of subtle, as well as pronounced changes that can and do occur anywhere in between these points. Your engine was designed to provide an optimum level of performance, economy and reliability under a full range of operating conditions. All components must function as a team to ensure that these levels are properly maintained. Gasoline is vaporized, mixed with air, forced into the cylinder, compressed by the piston, then ignited by a spark with resulting heat being converted to mechanical energy. Since it is heat that produces the energy needed for our engine to work, we need to know about Thermal Efficiency.

THERMAL EFFICIENCY: Of the total heat produced by combustion in the cylinder -- only 25-30% is available for conversion to working energy, 15-20% is dissipated through our cooling fins, 5-10% is absorbed by our lubricating oil to reduce friction, and a whopping 40-45% disappears out the tail pipe. With only 25-30% available to do the work we must therefore exercise extremely close control over our air/fuel mixture to produce maximum allowable output with each power stroke. We say "allowable" because if we exceed the limits imposed by engine design, we overheat or overstress our engine, eventually losing what we thought we had gained.

VOLUMETRIC EFFICIENCY RATIO: Simply stated is the amount, or VOLUME of air/fuel mixture (corrected for temperature and pressure) that is drawn into a given cylinder displacement -- as compared to the volume that could be drawn in. At SEA-LEVEL elevation with a standard temperature of 59 degrees F, air pressure is 14.69 pounds-per-square-inch (psi), commonly referred to as "one atmosphere." The above parameters describe standard atmospheric conditions in fair weather, and they in turn, determine a standard AIR DENSITY. If our engine draws in a volume of air/fuel mixture at the above density, and it is exactly equal to our engine's displacement, we can say that we are running at 100% volumetric efficiency. Many factors determine a lesser or greater than 100% volumetric efficiency. Turbocharging naturally would increase it -- a decrease could be caused by, (1) operation at less than full throttle, (2) poorly designed exhaust systems, and (3) air intake obstructions.

EXHAUST SYSTEM: Our exhaust system performs many functions that are useful to us and our engine. In addition to reducing exhaust noise to a comfortable level, its primary purpose is to remove the hot spent gases from the cylinder after combustion has taken place. The momentum of the spent gases exiting the exhaust port creates a low pressure that starts the next air/fuel charge moving into the cylinder even though the piston is still moving upwards. In this manner, the incoming charge aids in removal (scavenging) of all spent gases thereby eliminating fresh-charge dilution. Scavenging only occurs if we have an exhaust system that properly shapes and directs pressure waves that leave and return to the exhaust port precisely on time.

PRESSURE WAVES: The outrush of spent gas into the exhaust header creates a pressure wave that begins at the exhaust valve port and travels to the end of the pipe. At the open end of the pipe it is reflected back to the exhaust port, again turns and heads back to the open end of the pipe. This process is repeated endlessly -- back and forth, back and forth. When the pressure wave reaches the exhaust port and turns around it literally draws spent gas from the cylinder and simultaneously aids in drawing into the cylinder a fresh air/fuel charge -- that in turn acts to push more spent gases out through the exhaust port. It is the task of the exhaust system to insure the TIMING of the above PRESSURE WAVES arrival at the exhaust port precisely on time and at an exact and predetermined pressure that enhances the scavenging process.

INTAKE TRACT: Your engine's total intake tract consists of: (1) the air box that contains the air filter, (2) air duct from air box to carburettor, (3) the carburettor, (4) intake manifold from carburettor to cylinder head, (5) intake port, (6) the cylinder, (7) exhaust port, (8) total exhaust system.

ALL TOGETHER NOW: Let us follow all events that occur during the four complete cycles of engine operation. The air that is present throughout our engine, carburettor, and exhaust system is at rest. Without any piston movement, the pressure is equal throughout at one atmosphere (14.69 psi).

INTAKE STROKE: The piston moves downward in the cylinder creating an ever-increasing empty space and low pressure behind it.

COMPRESSION STROKE: The inrushing air/fuel mixture momentum is sufficient to overcome the rising piston pressure for a predetermined amount of piston travel. The piston continues upward to compress the mixture. At a predetermined point BEFORE the piston reaches TDC (top dead center), the mixture is ignited by the spark. WHY before? Because complete combustion of the mixture requires TIME to BURN, and the maximum pressure created by the combustion process cannot be exerted on the piston until after it passes TDC and begins its downward ...

POWER STROKE: As the piston passes through TDC, it is forced downward by the rapid expansion of the burning mixture. At yet another predetermined point before the piston reaches BDC (bottom dead center), the EXHAUST valve is opened while there still is pressure in the cylinder. In this manner, spent gases get a head start for their exit from the cylinder during the...

SCAVENGING: Also aiding this process is a pressure wave that was timed to arrive at the open exhaust port, then turn around and head back out the exhaust pipe, carrying with it the spent gas.

CARBURETTOR TUNING: The following information is presented on the assumption that all is well with your machine—spark plug of the specified heat range and correctly gapped, specified air filter installed (and clean), ignition settings as specified, factory installed exhaust system, and no air leaks in the intake or exhaust tracts. One last word of advice before we embark on this venture into the unknown—do not expect the carburettor to pry loose any more power than your engine is capable of producing. The Bing Carburettor is a precision-designed instrument, and is quite capable of maximizing to-the-limit, all available energy lurking within your machine.

PRE-TUNING CHECKLIST: We cannot overemphasize the need to verify that all carburettor components are "as specified." This information can be found on pages 1 through 4 of this manual. If you find a component is not "as specified" check your owners manual, as the factory may have made late changes to the carburettor after it was supplied to them by Bing. In addition to all components being "as specified" (prior to tuning) have: (1) Needles at the proper height (clip position). (2) Idle Air Adjusting Screws turned LIGHTLY in against their seat—then backed out (CCW) the specified amount of rotation. Inspect the tips for concentricity with respect to wear. A tip with noticeable indentation will prevent fine regulation of your idle air/fuel mixture, and make carburettor "balancing," next to impossible. (3) Idle Speed Adjusting Screws backed completely off the throttle — CAREFULLY counting the required number of turns. If the number differs between carburettors, you can be sure that your idle system was improperly set. It is quite possible to have one carburettor throttle valve open farther than the other carburettors', yet have normally appearing idle from both cylinders. This is because of the overlapping influence of idle air and idle speed settings. Mis-adjusted cables have a similar over-lapping effect. (4) New Rubber O Rings on Idle Air Screw and Top (on the CV Carb, The Idle Jet, Main Jet Stock, Throttle Shaft and Start Valve).

MIXTURE TRANSITION SYSTEM: We will explain this system first, as it is the easiest of all to tune—reason being, you cannot tune it. It has no tunable components, yet it is the one that determines how our carburettor reacts as it makes many transitions through its various stages: Starting-to-Idle-to-Part-Load (or Needle Control) and Part-Load-to-Full Power and then all the way back in reverse sequence. All of these transition stages are totally dependent upon how close we have tuned the areas just below and above where transition occurs. In other words, we cannot tune "just the idle" and "just the part-load" —we have to make certain that we select components that overlap one another—but not too much! Anyone can make an engine idle, accelerate, and pull G's at full step—it's the "artist" who can bring about smooth unhesitating performance zero-to-flat-out.

FUEL LEVEL: In figure 6, you can see that the fuel stands higher in the metering tube than in the float chamber. The higher level in the metering tube is the result of pressure differential between the higher atmospheric pressure in the float chamber pushing against lower pressure in the metering tube when the engine is running and partial vacuum exists in the venturi. For a given constant RPM, metering tube fuel level is totally dependent upon float chamber fuel level—as determined by our float adjustment setting. If the level in the metering tube is too high, fuel will exit into the venturi at a much lower air velocity, resulting in the air/fuel mixture becoming enriched before it is supposed to—as in the low middle-to-higher RPM range. A too-low fuel level results in just the opposite. As fuel metering jets and jet needles also effect the above discharge rates, it is imperative that an exact pre-determined fuel level is maintained. If you find that a different fuel level improves performance or economy, rest assured that your jetting is improperly set.

NOTE: A WORN FLOAT NEEDLE WILL NOT REGULATE FUEL HEIGHT—NO MATTER WHERE YOU SET FLOATS.

FOR INDEPENDENT FLOAT SYSTEM—Check and adjust float arm in the following manner:

1. If the carburetor is off the engine, turn it upside down, resting on its own weight, the float arm must be perfectly parallel with the carburettor base. If carburettor is mounted on the engine, the same parallelism must be maintained, but this must be ascertained **WHILE NOT DEPRESSING THE FLOAT NEEDLE'S SPRING-LOADED PLUNGER INTO THE NEEDLE BODY.**
2. Adjust for parallelism by bending the float-arm pointer with a small, flat-tipped screwdriver. Exercise care during adjustment - - **NOT TO BEND THE PARALLEL FLOAT ARM LEVERS.** Not only must the arm be parallel with the carburettor, the arm levers must be parallel with each other, in order not to cause binding with the float elements. (See Figure 7)

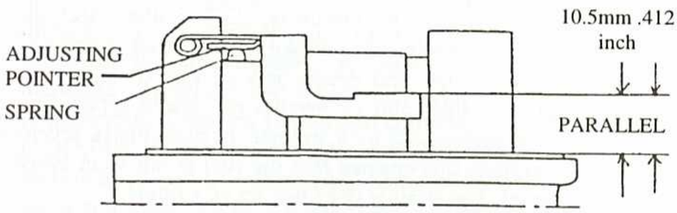


FIGURE 7

IDLE SYSTEM: Slide Carburettor— With the air slide nearly closed, vacuum at the main fuel outlet is insufficient to draw fuel up from the main metering tube. Fuel and air to supplement the small volume of air getting under the slide for idling is then supplied through the auxiliary idle system (Figure 8) which consists of IDLE JET, IDLE AIR SCREW, OUTLET BORE and BYPASS.

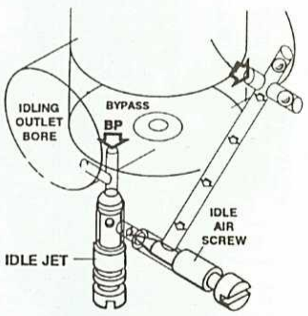


FIGURE 8

The fuel passes through the idle jet whose bore will determine the amount of fuel allowed through. Behind the jet bore the fuel mixes with air that is supplied via cross ducts, the amount of air admitted is determined by the setting of the idle air screw. This initial mixture then flows through the idling outlet bore (LA) and the bypass or transition passages (BP) into the venturi where it is mixed further with pure air.

Idling should always be adjusted with the engine at operating temperature. First the mixture control screw is turned in fully clock-wise and then backed off by the number of turns specified for the particular engine (See Pages 1 through 4). Turning in clockwise direction results in a richer mixture and turning counter-clockwise produces a leaner mixture. The idle setting quoted serves as a guide only. The optimum will generally differ slightly. First select the desired idle speed by using the air slide adjusting screw. The idle air screw is then opened (turned counter-clockwise) until the speed rises. Then turn the screw back by a quarter of a turn.

If your idle jet is partially blocked by dirt or evaporated fuel residue, the air screw will have to be excessively rotated in a clockwise (CW) direction to obtain proper idle mixture. A "too lean" selected jet will also require the same excessive screw setting. If a "too rich" jet is selected, or if the carburettor air passages are partially blocked, these conditions will be indicated by the requirement of an excessive screw setting in the opposite (CCW) direction.

If the air slide is closed down to the idle position while the engine is running, then only the idle outlet bore (LA) is available between slide and engine intake and it is thus exposed to the suction effect. When the slide is in this position, air will enter through the bypass bore (BP) which will make the pre-mixture leaner until idle speed is reached. If the slide is then opened, the bypass bore will also be subject to the vacuum and supply additional fuel to enrich the mixture in the transition range. Idling may be adjusted only by turning the idle speed and the idle air screw or by using idle jets of various sizes. Idle outlet bore (LA) and bypass bore (BP) are matched to the fuel requirements of any given engine and must not be changed.

To facilitate adjusting the idle setting on two cylinder engines having two carburettors, where it is important that they are evenly adjusted, it is possible to connect a vacuum gauge to a nipple (Vacuum Take Off a/k/a VTO) which is normally closed off by a screw. To select the speed, the idle stop screws are in this case adjusted until the same vacuum is indicated for both carburettors. By slightly opening the throttle valve via the accelerator it is also possible to adjust cables or linkages evenly by making this vacuum comparison. (Vacuum Gauge shown on page 28.)

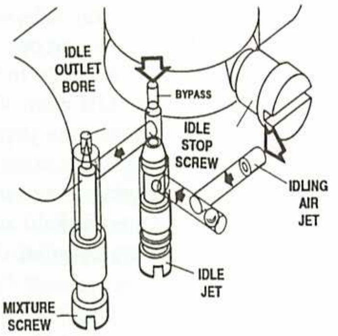
IDLE SYSTEM: Constant Depression Carburettor— During idle and low-load running the throttle valve is closed to such an extent that the air flow underneath the plunger no longer forms a sufficient vacuum. The fuel is then supplied via an auxiliary system (the idle system See Figure 9) which consists of IDLE JET, MIXTURE SCREW, OUTLET BORE, BYPASS, and in the case of later model carburettors, TRANSITION PASSAGES . The fuel passes through the idle jet whose bore will determine the amount of fuel. Behind the jet bore the fuel mixes with air that is supplied via cross ducts in the jet throat from the idling air channel, the amount of air admitted being determined by the size of the idling air jet at the inlet of this duct. This initial mixture then flows through the idle outlet bore, the cross-sectional area of which can be adjusted by the mixture control screw. It then reaches the venturi via bypass or transition passages where it is mixed further with pure air. Idling should always be adjusted with the engine at operating temperature. First the mixture control screw is turned fully clockwise and then backed off by the number of turns specified for the particular engine. Turning in a clockwise direction results in a leaner mixture and turning in counter-clockwise direction in a richer mixture. (Note: this is just the opposite of the direction required in Bing slide carburettor mixture settings.) The idling setting quoted serves as a guide only. The optimum will generally differ slightly. First, select the desired idling speed by using the idling stop screw. When subsequently adjusting the mixture control screw—starting from the basic setting—a speed drop will be noticed in both directions. The optimum setting will generally be found half-way between the two settings at which this speed drop was noticed.

If your idle jet is partially blocked by dirt or evaporated fuel residue the air screw will have to be excessively rotated in a counter clockwise (CCW) direction to obtain proper idling mixture. A "too lean" selected jet will also require excessive screw setting. If a "too rich" jet is selected, or if carburettor air passages are partially blocked, these conditions will be indicated by the requirement of excessive screw setting in the opposite (CW) direction.

To facilitate adjusting the idle setting on two cylinder engines having two carburettors, where it is important that they are evenly adjusted, it is possible to connect a vacuum gauge to a nipple (Vacuum Take Off a/k/a VTO) which is normally closed off by a screw. To select the speed, the idle stop screws are in this case adjusted until the same vacuum is indicated for both carburettors. By slightly opening the throttle valve via the accelerator it is also possible to adjust cables or linkages evenly by making this vacuum comparison. (Vacuum Gauge shown on page 28.)

FIGURE 9

CD IDLE SYSTEM



MAIN REGULATING SYSTEM: (Slide Carburettor) Th amount of mixture drawn in by the engine and thus its perforn ance is determined by the cross-sectional area in the ventu which is opened up by the AIR SLIDE. The air flow produces low pressure or (vacuum) which draws fuel from the float chan ber through the jet system (Figure 10). On its way from the flo chamber the fuel passes through the MAIN JET, the JE STOCK, and the NEEDLE JET; as it leaves the needle jet it pre-mixed with air which is brought in from the filter conne tion via an AIR DUCT (Z) and the ATOMIZER in an annul flow around the needle jet. This air flow assists the atomizir process to form minute fuel droplets and thus favorably affec the fuel distribution in the intake manifold and combustion the engine.

In the part-load range, in other words when the air slide is b tween one and three-quarters of its full stroke, less fuel is r quired than at full throttle. The fuel supply to the venturi therefore reduced by the JET NEEDLE which is connected the air slide and engages the needle jet. Depending on dime sion of the flat cone of the jet needle, the annular gap betwe the jet needle and needle jet is enlarged or decreased. For fi adjustment the jet needle may be located in the air slide in va ous positions (needle positions) which, similarly to the jet ne dle cone, affect the amount of fuel drawn in. For example, higher needle position results in a larger annular cross-section the needle jet which allows more fuel to pass through and vi versa. When the throttle slide opening is reduced, the amount fuel supplied is affected also by the shape of the throttle slide the lower end. With increasing height the cylindrical rece called air cushion results in the mixture becoming leaner. T recess on the filter side, called cut-away, has a similar effect b this extends up to a greater slide stroke. The air/fuel mixture adjusted using main jets and needle jets of various sizes a also atomizers, air slides and jet needles of various types. T main jet may be surrounded by a strainer; in particularly seve operating conditions this ensures that the fuel is not spun aw from the main jet. The strainer does not act as a filter!

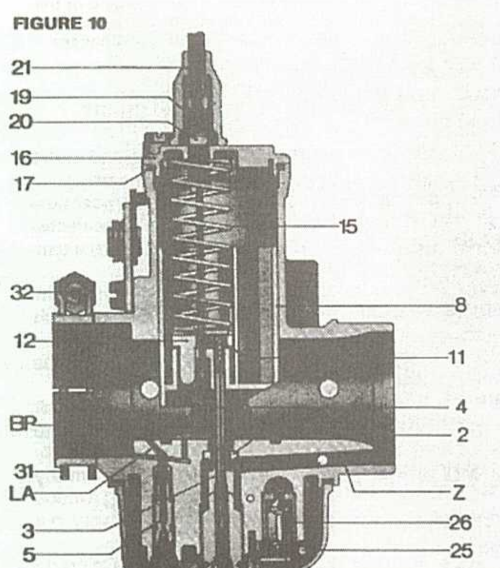


FIGURE 10

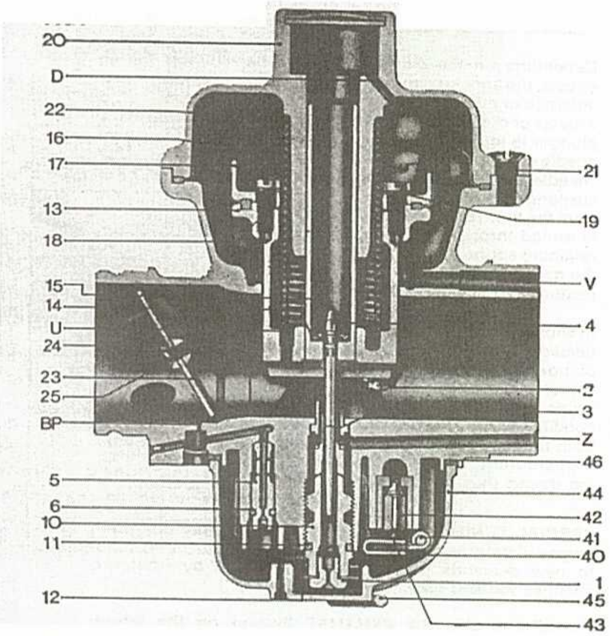


FIGURE 11

MAIN REGULATING SYSTEM: (Constant Depression Carburettor) The amount of mixture drawn in by the engine and thus its performance is determined by the cross-sectional area in the venturi which is opened up by the THROTTLE VALVE (Figure 11). If the throttle valve is opened while the engine is running, the increased air flow results in a vacuum building up at the outlet of the needle jet, drawing fuel from the float chamber through the jet system. At low speeds this vacuum is not sufficient for an adequate fuel supply, it must therefore be increased artificially by using a pressure regulator. For this purpose Bing Constant Depression carburettors are provided with a DIAPHRAGM regulated PLUNGER that reduces the cross-sectional area of the venturi by virtue of its own weight, or in some applications with the additional pressure from a spring and thus increases air velocity and vacuum.

The vacuum in the venturi acts on the top of the diaphragm and the plunger via a bore (U) in the plunger and attempts to lift the plunger against its own weight and spring. The considerably lower vacuum between air filter and carburettor is applied to the underside of the diaphragm via duct (V) as reference pressure.

If the throttle valve is opened when the plunger is closed, then a vacuum will build up in the small cross-section at the bottom of the plunger which is sufficient to provide a supply of fuel. The weight of the plunger and the force of the spring are matched in such a way that the vacuum will be maintained with increasing speed until the plunger has fully opened the venturi cross-section. From this point onwards the carburettor acts as a throttle valve carburettor with fixed venturi. The vacuum increases with increasing speed.

On its way from the float chamber, the fuel passes through the MAIN JET, the JET STOCK and the NEEDLE JET; as it leaves the needle jet it is pre-mixed with air which is brought in from the air filter via an air duct (Z) and the ATOMIZER in an annular flow around the needle jet. This air flow assists the atomizing process to form minute droplets of fuel, thereby favorably affecting fuel distribution in the intake manifold and combustion chamber.

Depending on the dimension of the flat cone of the jet needle, the annular gap between the needle and needle jet is enlarged or decreased and thus the fuel supply is throttled to a lesser or greater extent. The jet needle can be located in the plunger in four different positions which, similarly to the jet needle cone, affect the amount of fuel drawn in. For example "needle position 3" means that the jet needle has been suspended from the retaining spring in the third notch from the top. If the needle is suspended higher up, this will result in a richer mixture and vice versa.

In short the main regulating system is set using main jets and needle jets of various diameters and also jet needles and plungers of various types. Between the main jet and jet stock, a washer is provided which, together with the float chamber, forms a annular gap. In particularly severe operating conditions this ensures that the fuel is not spun away from the main jet. A rubber ring seals the jet stock off from the carburettor housing to avoid any fuel being drawn in via the thread thus bypassing the main jet.

SPECIAL TUNING REQUIREMENTS: Modifications to your engine dictate the necessity for matching the air/fuel mixture to new demands placed upon the engine by whatever changes you have made.

LARGER DIAMETER EXHAUST: Bolting on the larger exhaust system will reduce backpressure thereby allowing the engine to "breathe" easier! Your engine now will have an excess amount of AIR and will necessitate strengthening the mixture.

DUAL PLUG IGNITION: Dual plug ignition systems greatly reduce detonation at high load and high power operation— so does a slightly rich air/fuel mixture. Use of dual plug ignitions therefore will allow you to "slightly" lean your mixture to achieve better economy at reasonable cruising speeds.

DECREASED VALVE CLEARANCE: Decreasing valve clearance from the factory specification lengthens the valve overlap time period, allowing a greater amount of air to enter through the intake port AND an abnormal amount of exhaust gasses to return through the exhaust port—resulting in fresh charge dilution at lower engine speeds. If you choose to reduce valve clearance—ENRICHEN your air/fuel mixture.

AIR/FUEL MIXTURE AT ALTITUDE: From sea-level to about 3,000 feet elevation, atmospheric pressure decreases about one-inch-per-thousand feet of altitude—therefore our 29.92 barometer reading at sea-level now becomes about 27, at 5,000 feet—about 25 and 20.6 at 10,000 feet. Our engine (and carburettor) only react to air velocity—not weight of air. Not knowing this, the carburettor continues flowing the same amount (by weight) of fuel, and all of the sudden our "ideal mixture" at sea-level becomes extremely rich at higher elevations. The Bing carburettor is less susceptible to changes in elevation than other carburettors in use, and in general does not require jetting changes for the idle and lower part-throttle settings. These settings can be compensated for by mixture screw adjustment. However, the upper part-throttle range will require the lowering of the jet needle to lean out mixture. Continuous operation at higher elevation certainly necessitates the changing of the main jet. Table 1 provides all information necessary to determine jetting changes in relation to altitude changes.

MAIN JET CORRECTION CHART

Altitude										
Meters		0m	500m	1000m	1500m	2000m	2500m	3000m	3500m	4000m
Feet		0'	1500'	3000'	4500'	6000'	7500'	9000'	10500'	12000'
Temperature										
F	C									
-22	-30	1.04	1.03	1.01	1.00	0.98	0.97	0.95	0.94	0.93
-4	-20	1.03	1.02	1.00	0.99	0.97	0.96	0.95	0.93	0.92
14	-10	1.02	1.01	0.99	0.98	0.96	0.95	0.94	0.92	0.91
32	0	1.01	1.00	0.98	0.97	0.95	0.94	0.93	0.91	0.9
50	10	1.00	0.99	0.97	0.96	0.95	0.93	0.92	0.91	0.89
59	15	1.00	0.99	0.97	0.96	0.94	0.93	0.92	0.90	0.89
68	20	1.00	0.98	0.97	0.95	0.94	0.93	0.91	0.90	0.88
86	30	0.99	0.97	0.96	0.94	0.93	0.92	0.9	0.88	0.87
104	40	0.98	0.96	0.95	0.94	0.92	0.91	0.9	0.88	0.87
123	50	0.97	0.96	0.94	0.93	0.92	0.90	0.89	0.88	0.86

Example: 158 x .96 = 151.68 ··· Use 152 Main

HOW TO USE THE BING MAIN JET CORRECTION CHART

STEP #1: Assume Nothing!!! Disassemble and check your carburettor(s) to verify the jetting in your carb(s).

STEP #2: Because air density varies with temperature and altitude changes, a main jet correction may be necessary. This chart was calculated at sea level with an air temperature of 60°F or 15°C.

STEP #3: Apply the multiplication factor shown to the main jet size recommended in the chart at the front of this manual.

STEP #4: Your operating conditions will vary by the change of seasons. If your EGT temps vary and your engine experiences performance difficulties, a review of your jetting may be necessary. Return to step #2.

STEP #5: Humidity is also a variable in determining air density. A high humidity means a lower air density of air to be consumed by combustion. Because we are generally not equipped with a way of easily reading the % of humidity present, this can be read into this chart by adding altitude for high humidity and subtracting altitude for very dry climates. An EGT gauge should illustrate changes in these conditions under full throttle readings.

EXAMPLE: An engine run at 4,500 feet landing strip altitude on a 50F air temperature day requires an adjustment in the main jet size. Applying these conditions to the chart shown here will yield a correction of .96. Multiply the recommended main jet size by .96 to get the proper main jet size for these conditions. 158 x .96 = 151.68 (158 being your original main jet size). See selection for nearest available jet size. Follow the steps listed above especially when working with a new powerplant.

When changing jets for altitude, always make correction for temperature as well.

NOTE: Before operating the engine again at lower altitudes, reinstallation of the original jetting is necessary. Engine damage may otherwise occur!!!

CARBURETTOR TROUBLE SHOOTING: Only two ty of trouble occur with any carburettor (1) those that creep gradually and (2) those that show up instantly. The ones t occur instantly are easy to locate through a logical process elimination. Even the troubles that come upon us gradually be pinpointed if we pay close attention to what the sympto are telling us. Locating the exact area of malfunction become relatively easy task if we always think in terms of AIR FUEL. All possible carburettor faults have to be one or other, or both. (Figure 12) provides a general idea of compon control relating to throttle position.

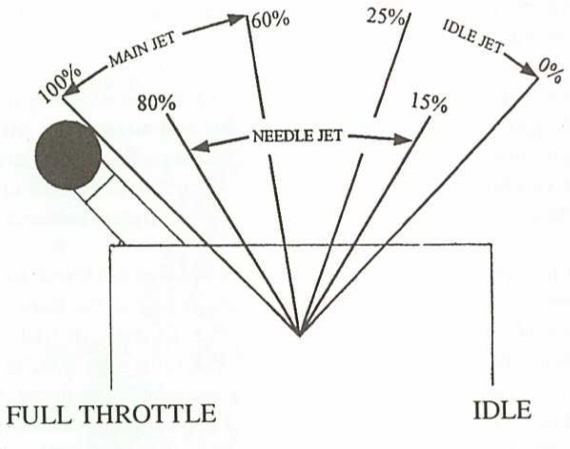


FIGURE 12

One last word of advice before we tear into the carburettor. Take a little time to make sure the problem does not lie elsewhere—(1) do we have good spark and at the correct time? (2) do we have proper compression that tells us our valves and rings are in order? The condition of your spark plug tells all!

READING YOUR SPARK PLUG: The spark plug from a normally functioning cylinder (with ideal air/fuel mixture) will appear as shown in Figure 13A. The ceramic insulator tip will exhibit an extremely light deposit in various shades of white/gray. The bottom edge of the threaded shell will be lightly coated with dry black soot. If the ceramic appears normal, but light reddish/brown soot appears on the shell, a slightly lean condition is indicated. A TOO LEAN plug under the scrutiny of the magnifying glass will have tell-tale signs warning of the degree of leanness. Slightly lean-to-excessively lean signs would include (in order of leanness) (1) almost-white ceramic with sand-blasted surface, (2) shiny-white ceramic with tiny black specks, (3) tiny beads of copper deposited between center electrode and surrounding ceramic insulator, (4) engine in shop for new pistons and valves. (Figure 13B) illustrates the appearance of the spark plug from a rich running cylinder. The entire plug area exposed to combustion has a velvet-black carbon appearance. The above descriptions only relate to air/fuel mixture problems. Other plug conditions, such as burned, pitted and eroded electrodes, oil, sludge, or rust deposits indicate engine or operational faults other than carburetion.

13a

13b

ENGINE FAILS TO START (WET SPARK PLUG): A wet plug indicates excessive rich mixture—excessive to the point of plug fouling by gasoline. One source of this much gasoline would be from a too high fuel level but would usually be accompanied by fuel overflowing onto the ground (unless the overflow tube was plugged). Unless the floats have been mishandled, the chance of them being out of adjustment is slim indeed. A more likely cause of "too high fuel level" is a worn out float needle. If wet fouling occurs after machine has been sitting overnight with tank valve left open, a small amount of dirt may have prevented the float needle from holding back tank fuel (also accompanied by overflowing onto the ground). Repeated cranking with mixture control screw set "too rich" or a too rich idle jet can also cause wet fouling, especially when throttle valve is completely blocking air flow through carburettor.

ENGINE FAILS TO START (DRY PLUG): A dry spark plug indicates a blocked fuel line, starting jet (CD Carburettor) or idle jet (Slide Carburettor) or in the case of normal jets, an excess of air being inducted into the cylinder. If your carburettor is equipped with a "starting carburettor" , the starting jet is located in the float bowl starting chamber where it is vulnerable to any foreign matter contaminating the gasoline. Excessive throttle opening during cranking will prevent the proper amount of fuel from being drawn through the starting system.

ENGINE STARTS BUT DOES NOT IDLE: If the idle speed adjusting screws are backed out too far, the throttle valve (CD Carburettor) and air slide (Slide Carburettor) will close off all air flow through the carburettor venturi. An ideally idling engine needs more air than is supplied by just the idle system. Excessive valve or slide opening allows too much air into the cylinder, therefore necessitating an extremely rich setting of the idle mixture screw. If this situation exists, the slightest idle jet blockage will result in an extremely lean idle condition.

ENGINE SPEED VARIES AT IDLE: The "hunting" of RPM, trying to stabilize itself, accompanied by fast idle (or rather a slow return to idle) pretty much indicates an air leak between the carburettor and cylinder. Most leaks appear at the carburettor connection to the cylinder head intake manifold. Some air leaks have been traced to a worn out, or hardened rubber "O" ring on the throttle valve shaft. If your CD Carburettor has a vacuum take-off port just to the front of the idle mixture screw, make sure the screw is snug (a little silicone seal is a lot of insurance here—and it's easily removed for carb balancing.) On slide carburettors with a clamp-on connection, a worn out or damaged fiber bushing may leak air.

ENGINE MISFIRE (0 to 1/8 throttle): The mixture in this throttle range is controlled by the IDLE JET and MIXTURE CONTROL adjusting screw. Misfiring in this range is a result of a "too lean" air/fuel mixture that is corrected by resetting the mixture screw or changing the idle jet to the next larger size, and matching the screw setting to the larger jet.

ENGINE MISFIRE (1/8 to 1/2 throttle): A lean mixture in this range is made richer by changing the needle jet to the next larger size—the mixture control screw has some influence over this area.

ENGINE MISFIRE (1/2 to 3/4 throttle): Mixture strength in this range is mainly controlled by the taper of the jet needle—increasing the size of the needle jet would certainly enrichen this range however, the 1/8 to 1/2 throttle range will also be enrichened.

ENGINE MISFIRE (3/4 to full throttle): As the jet needle is almost totally retracted in this throttle range—mixture is controlled by the MAIN JET.

LOW POWER UPON ACCELERATION: This condition, if a fault of the carburettor, would be an excessively rich air/fuel mixture. The various stages of throttle opening are similar to those above (for misfire) except the components would be selected to obtain a leaner mixture.

ENGINE BACKFIRES THROUGH CARBURETTOR: An extremely lean mixture burns so slow that it may still contain flame when the intake valve opens to allow the next charge into the cylinder. The incoming charge will ignite in the intake tract.

ENGINE AFTERFIRES THROUGH EXHAUST: An extremely rich mixture burns slow and incomplete. The unburned mixture enters the exhaust system, where it is ignited by the hot exhaust gases.

CARBURETTOR OVERHAUL

This operation is recommended every 100 hours of operation as a preventative maintenance item. Most people don even think about carburetion until a lack of performance is noticed. Sudden lack of power is usually not a carb problen Carb problems usually are slowly developing problems which you don't notice until they have a major effect on engin performance. Once again, your EGT, CHT gauges and tachometer are your best tools to monitor the health of you engine.

Before starting to overhaul your carb, be sure you have the exploded view of your carb for reference, a complete set c parts for a proper rebuild of your carb, a gallon of new carb cleaner, a source of clean high pressure air to blow ou passages, water to rinse the parts in, and a clean, well lighted, well ventilated work area. I also recommend that you hav a clean white cloth to lay the cleaned parts out on before you start reassembly. If you are not sure that you understand th exploded drawing, lay your parts on the clean cloth exactly in the order that they come out of the carb. You can soak th carb body by itself and clean the parts individually if this will help you keep things straight as to what goes where.

After soaking the carb body and parts, rinse with water and blow them dry with the air. **BE CAREFUL! CAR CLEANER IS A VERY POWERFUL CLEANER. WEAR FULL COVERAGE SAFETY GLASSES. KEE SKIN CONTACT TO A MINIMUM.** Wash hands and arms immediately after handling the cleaned parts. Don breathe the fumes any more than you absolutely have to. Keep the can covered before, during and after use! If you g this stuff in your eyes you will actually suffer a chemical burn to your eyes. **DON'T TAKE ANY CHANCE OBSERVE ALL SAFETY PRECAUTIONS.** Now that I've scared the hell out of you we'll continue!

Before starting reassembly examine all parts for wear. Note any defects in all parts, even the ones you are going replace. This could give you a clue to any problems you might have been having. Be sure you have checked all intern passage ways for air flow by blowing them out first with the high pressure air and then by blowing on them with yo mouth. Before reassembling the needle jet check the small end where the jet needle enters. If this is worn thin on o side, the hole will look oval instead of round – replace it. Also check the jet needle to see if it has a worn side on it. you can see or feel any wear to the needle taper, replace it. Once you have decided that everything is ok, replace t o'rings and reassemble your carb. Be sure you set the jet needle to the proper setting and re-check and reset the flo level per my earlier instructions. Reset the idle air mix screw to the recommended base setting. Screw the idle spe screw in until it starts to lift the slide and then screw it in two more turns. This should allow you to start the engine a then you can set the idle speed and reset the idle air mix per my instructions given earlier.

MAIN JET AREAS

MAIN JET	AREA
125	1.23
130	1.33
135	1.43
140	1.54
145	1.65
150	1.77
155	1.89
160	2.01
165	2.14
170	2.27
175	2.40
180	2.54
185	2.69
190	2.83
195	2.98

ATTENTION

If your carburetor does not have the New Style Spri Cup(827-347) and Jet Needle O'Ring(831-715), you **mu** check your Needle Clip(963-500)! Place your Jet Nee in the proper setting. If the needle spins free **ACTION MUST BE TAKEN!** Remove the clip & h the needle up to the light. If the needle is reduced at t clip position, **REPLACE**. If not, offset sides clip and use 240 emery paper or a fine file on each s until light shows between. **Carefully** squeeze c together with pliers. Insert needle in clip and try to s needle again. Repeat until needle does not spin free Needle must show a resistance to spinning.

CHECK EVERY 10 HOURS!

For further assistance call: 316-862-5808

ULTRALIGHT CARBURETTORS

TUNING & TROUBLESHOOTING

First and foremost you must remember that Murphy is alive and well so take nothing for granted and leave nothing to chance. You can't park your Ultralight on the nearest cloud and fix it if it quits.

Before getting into the care and feed of carburettors, please be absolutely sure of the following:

1. Your engine is timed exactly as the manufacturer recommends – not just close, but **EXACTLY.** Two stroke engine timing is probably the biggest cause of catastrophic engine failure as well as causing rough running, loss of power and overheating.
2. The exhaust system is the one recommended by the manufacturer and is clean.
3. There are no air leaks in the crank case or the intake manifold.
4. Your fuel is fresh, properly mixed and clean.
5. The air filter is the one recommended by the manufacturer and is clean.
6. Sparkplug is new, it's gap is set properly and it is the one recommended by the manufacturer.

One last thing – do not change more than one thing at a time when trying to track down a problem. If you do, you won't know which thing that you changed cured your problem, OR, you could inadvertently cause another problem.

OK, let's start with one of the most common problems encountered – fuel leaking from the carburettor. This is usually caused by the float needle valve failing to shut off the fuel flow. There are several things that can cause this:

1. Floats
   - A. Independent floats stuck down.
   - B. Float hinge pin bent or grooves worn in it causing the float arms to bind.
   - C. Float level set incorrectly – see drawing and instructions on page 9 of this manual

2. Float Needle
   - A. Worn or pitted.
   - B. Stuck
   - C. Dirt keeping it from seating.
   - D. Needle seat damaged. Do not try to lap or modify the seat. If it is bad, and this is pretty rare, replacement seats are available.

HOW TO REPAIR THE PROBLEM:

First check the float level setting. If it is incorrect, reset the float level per the drawing on page 9 by carefully bending the tab that contacts the needle with a small screwdriver. You do not need to remove the float arms to do this. The float level is checked with the needle closed and the float arm tab just touching the spring loaded plunger in the needle, not depressing the plunger. To check your work, push the float arms up until the spring loaded plunger has started to depress. Then have someone turn on the fuel and see if it still leaks. If it does, read on ···

If you still have fuel leaking by the needle, you'll have to remove the carb from the engine and then remove the float arms and needle. Be sure you drive the float arms hinge pin out so the knurled end is not driven through the hinge pin bosses. Drift the pin out just a little one way or the other if you're not sure which end of the pin is knurled. You can readily see if the exposed ene is knurled or not.

Once the pin has been driven out, remove the float arms and the float needle. Be sure you note the little hair clip on the float needle plunger and how it fits over the float arm tab. This is IMPORTANT. Be sure when replacing the float needle and float arms that this clip is properly in place!

Now that you have the float arms, float hinge pin and float needle removed, check the hinge pin to be sure it is straig and has no grooves worn in it. If either problem exists, replace it. If it has grooves worn in it by the float arms, repla the float arms also. Now examine the tip of the needle using a magnifying glass. If there is a ring worn in the tip or a little craters or gouges, replace it. Check for debris around the needle and up inside the needle seat. Also, flush t needle seat from the needle side to remove any dirt which may be in the fuel passage above the needle seat. Flush th out on a clean white cloth so you can see if you had any junk in there. It just takes a whisker to keep the needle fro seating!! If you have dirt there you must flush your fuel tank and lines. **CLEAN FUEL IS AN ABSOLUTE MUST!!!**

Examine the hole in the needle seat very closely. It should be perfectly round and sharp edged. If you think it might damaged, try a new float needle before you panic.

If you didn't find any dirt or any other problems replace the float needle first. Check the fuel shut off as suggest before. If you have replaced the float needle and the fuel still won't shut off the seat must be replaced. This will on happen in about 1 in 100 cases. Never attempt to fly with a carb that overflows fuel. It might run OK at take off pow setting but will probably flood and die at below half throttle. I recommend that you replace the hinge pin and flo needle every 100 hours of operation.

Now let's talk about problems with the engine not wanting to run smoothly at all power settings or failing to devel full power. Before you come to the conclusion that the carb is the problem, there is a very simple test you must perfor With the aircraft tied down for a static engine test, bring the engine into the RPM range in which the problem is bei encountered. While the engine is running in the problem area, apply the choke (actually it is a fuel enriching circuit). the engine speeds up and makes more power, it is running lean at that throttle setting. If the engine loses more power, is probably running rich at that throttle setting. If nothing happens when the enriching circuit is engaged, the problem somewhere other than the carb. Check ignition and timing first – Remember—Most carb problems don't happ suddenly, they just sort of creep up on you. If you don't have cylinder head and exhaust gas temperature gauges on yo aircraft you are asking for trouble sooner or later. These two instruments can save you an engine and hours of searchi for a problem, not to mention saving your buns if you catch the problem before your engine decides to quit over T Black Forest.

If your engine suddenly decides to run rich at all throttle settings, check your float setting first then look for somethi plugging the air passage that runs to the atomizer and idle mix circuit. It's the small air hole located at the bottom of t air intake of the carb.

Don't forget that if you change your operating field to a higher or lower elevation of say more than 1000 feet from yo old field, you will need to reject per the chart. A change in air density due to temperature and humidity because of t change in seasons may require rejetting to bring the fuel air mixture into line.

I'd like to mention the Colortune sparkplug that we sell. This simple device will allow you to see the color of the fla in your combustion chamber. If it is cobalt blue the mixture is correct. If it is yellow the mixture is rich. If it is bl white the mixture is lean. These tests are conducted during static run ups of the engine. This plug is never used un the load of flight. This is the most accurate method of checking mixture that I know of short of an exhaust gas analyze

You must set your idle mixture first by adjusting your idle mix screw. If the correct mix cannot be achieved by adjusti the mixture screw the pilot or idle jet must be changed. Once the idle mixture has been properly set you can proceed check the mixture throughout the operational power settings. The needle and needle jet controls the mixture from idle through 3/4 throttle. The main jet will control the mixture for the last 1/4 of throttle. The control of the need needle jet and the main jet do overlap, but for adjustment purposes treat them as I have stated.

There are many combinations of needles, needle jets and main jets. However, the combination furnished by manufacturer is usually quite close to optimum, so don't get too radical in your changes. As stated before, you sho have the cylinder head and exhaust gas temperature gauges to allow you to closely monitor your engine and its f mixture.

For your safety and flying pleasure, I would recommend that you completely clean and rebuild your carb every 1 hours of operation and/or each spring after winter storage. When ordering a rebuild kit or parts, please use the num stamped on your carb and your engine type. These numbers tell us what jets and parts are in your carb.

IDLE MIX SETTING

This adjustment is made by adjusting the idle mix air screw. What you are accomplishing by making this adjustment is setting the fuel/air mixture of the idle circuit.

The idle air mix screw changes the idle fuel/air mix by regulating the air flow to the idle jet circuit. When you open the screw you lean the circuit by letting more air in and when you close the screw you enrich the circuit by letting less air in.

In your owner's manual you should have received a suggested basic setting of the idle mix screw. It was probably 1/2 to 1 turn out from completely closed. Whatever is suggested is the recommended starting point. Once you have the engine warmed up and idling you can make the final setting. Make all adjustments slowly. First, open the screw very slowly. The engine should begin to increase in RPM while you are opening the mix screw. Open it until you reach maximum RPM. Here is where a tachometer is a handy tool to have, but you should be able to readily hear an engine increase or decrease in RPM. If you have opened the mix screw one turn more and noted no change in speed, the air bleed circuit for the idle mix and main jet atomizer is probably plugged. The opening for this circuit is located in the air intake opening of the carburetor. It is the small hole located at the bottom edge of the carburetor air intake. To correct this problem, see the Carburetor Overhaul section of these instructions. Just before the engine begins to run rough is the optimum mix setting. Once you have found the optimum setting by getting the engine to run at the highest RPM without running rough, you have reached the leanest idle mixture. Once you find the leanest idle mixture, I recommend that you close the idle mix screw 1/8 turn which will enrich the mixture just enough to provide optimum performance. If the idle speed has increased too much you can then slow the engine speed by adjusting the idle speed screw. **DO NOT CONFUSE THESE TWO ADJUSTMENT SCREWS**.

The idle air mix screw is the small one located nearest the air intake opening of the carb. The idle speed adjustment screw is very large and is located in the side of the slide bore and adjusts the idle speed by changing the opening of the throttle slide. If you change the idle speed adjustment, reset the idle mix. Remember – if you set your idle mix in the spring when the air is cool and dry you may have to reset it during midsummer when the air is hot and humid. The idle circuit is never shut off so it can have an effect on overall mixture. If you believe your idle jet is too big or too small causing a rich or lean mixture which you can't properly regulate with the mix screw, you will have to change the idle jet to the next size smaller or larger and readjust. However, the original jet as furnished is usually OK. If you are trying to adjust your idle mix screw and cannot get any results at any setting, you probably have a plugged air passage and have unknowingly adjusted the big idle speed screw to open the throttle slide far enough to get the engine to run and you are actually running on the needle jet circuit. If you can't get any change in idle speed by adjusting the idle mix screw, you probably need to overhaul your carb because in all likelihood your air bleed circuit is plugged. I'll cover more of this in another section called Carburettor Overhaul.

If you have adjusted your idle mix and now find that when you try to open the throttle the engine coughs through the carb and stumbles or just hesitates when you try to apply the throttle, you have a lean transition from idle circuit to the needle jet circuit. To solve this you must check and see if your idle jet is too lean (small) or you are setting your idle mix screw too lean (screwed out too far). If you raise your slide needle you will enrich the entire mid range so be sure that's what you want before you do it. If you want a quick check for a lean idle circuit just open the cold start enrichment circuit a little and see if the hesitation goes away. If it does, you are too lean.

MID RANGE ADJUSTMENTS

Your mid range is from 1/4 to 3/4 throttle. The mid range is regulated by the needle jet and jet needle (sometimes called the slide needle). The needle jet comes in a large variety of sizes, but the most commonly used are 2.66, 2.68, 2.70, 2.72, 2.74, 2.76, 2.78, and 2.80. The larger the number, the larger the hole and the richer the mix will be. The jet needle is a tapered needle that is moved up and down by the slide. The needle gets smaller towards the bottom so as the slide opens more fuel can be drawn by the needle through the needle jet. The needle has four step rings on the top (three on the old needles) used for height setting adjustment. The top set ring is #1 and the bottom is #4. The #1 setting is the leanest and #4 is the richest.

The setting is regulated by removing the needle from the slide and changing the position of the clip from slot to slot.

How do you determine if your engine needs a mixture adjustment in the mid range? If you have a EGT gauge you c readily determine this by the operating exhaust gas temperature of your engine. Otherwise, you have to go on felt pow of the engine or read your sparkplug color and if your engine seizes you will then know you were too lean. If you real want to fly safe and prolong the life of your engine, not to mention prolong your own life, get an EGT gauge a properly install it.

For the rest of this instruction I am going to assume that you have an EGT gauge and know exactly where you are wi reference to rich or lean mixture in the 1/4 to 3/4 throttle range.

If you are lean or rich throughout the mid range you can try to lower or raise your jet needle first to see what happens. it helps but does not completely solve the problem, you need to change your needle jet in the appropriate direction. On change one thing at a time so you know exactly what caused any change, good or bad! To regulate a change of mix ov the entire mid range is just a matter of getting the right combination of needle jet and jet needle and jet needle setting.

What if you are experiencing a lean or rich spot only at a certain area of throttle setting? This will most often mean th you need to change your jet needle. There are many different needles available. However, only several will be of val to you for your particular engine. The needles are sized by a number – letter – number system, i.e. 8G2, 15K2, etc. T higher the first number code the richer the mixture above 1/2 throttle. The higher the letter code the richer the m below 1/2 throttle. By following this coding information you can selectively re-regulate mixtures above or below 1 throttle. If you just need to increase or decrease overall you can change to a needle with higher overall value or low overall value or change needle jet. To more accurately determine where you are as to needle jet and jet needle flo areas you should consult the jet needle diameter graph and use the clearance area formula to see what change is made changing the needle jet or jet needle. Don't be terrorized by how complicated the charts look. This is just giving you mathematical way to figure things. You certainly don't have to mathematically figure everything out. Just applying t basic directions for needle jet and jet needle changes and following your EGT gauge will let you get your engi running right.

At this point I would like to mention the atomizer. This is the brass fitting that sticks up into the floor of the carb a your needle jet fits up into it also. This part is lightly pressed into the carb so it usually does not just fall out when y drop your needle jet out. However, it will come out with a gentle tap on its top. The atomizer has a high and low side the end that sticks up into the carb bore. Look down into the carb through the top with the slide removed. Note that t lower side or lower step faces the engine and the higher side or upper step faces the air intake of the carb. It must oriented exactly in this manner to make the carb work right!! When overhauling the carb you must remove the atomiz Be sure you understand the placement of this part!

REGULATION OF THE MAIN JET

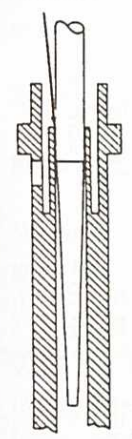
The main jet regulates the air fuel mix above 3/4 throttle, or, when the area opened by the needle jet/jet need combination equals or exceeds the area of the main jet. You can figure this relationship by once again consulting the j needle chart and the clearance area formula and comparing it to the area of your main jet given in the main jet ar chart. If your EGT is not in the normal heat range for full power operations, either high (lean) or low (rich), you will able to change your main jet accordingly. The main jet does have some effect on the flow of fuel at less than 3/4 thrott due to flow dynamics, but you may usually disregard this. Main jet regulation is about the easiest part of carb tuning.

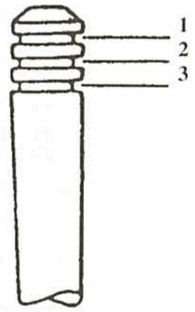
There is one simple test that you can perform at any throttle setting to give you a good idea if you are running lean, ric or even if you have ignition problems. You can lightly apply the cold start enriching circuit. Many call this the chok but it actually is an enriching circuit that simply gives more fuel to the air stream entering the engine. If you light apply the "choke" and the engine picks up power and your EGT drops to normal from too high, your engine is runni lean at that throttle setting. If the engine loses power and the EGT starts dropping farther below normal operati temperature than it already is, you are running rich at that throttle setting. If nothing seems to change at all with the lig application of "choke" you could very well have an ignition problem.

JET NEEDLE CLEARANCE AREA INFORMATION

TYPE 54 ° TYPE 84 ° TYPE 55

Changing the holding plate or "E" clip to position #1(top of pin) will draw the pin out later, causing a leaner condition. Moving the holding plate to the #3 position (bottom of pin) will draw the pin out earlier, producing a richer condition. If you feel your mid-range needs a change, try this first. It only takes a quick minute and doesn't cost anything. If this doesn't cure the problem, consider a change of components in this circuit.





Changing the holding plate position will change your midrange fuel mixture.

Figure #2: Illustrates the relationship of these two components forming the ¼ to ¾ fuel supply.

According to the chart, an 8G2 at 1/2 throttle opening measures around 2.3mm. If you are using a 2.72mm needle jet (the number stamped on this part is the inside diameter), you can figure the clearance area by applying a simple-to-use formula:

Clearance Area=(.25 x 3.14 x D1 squared)-(.25 x 3.14 xD2 squared)
Where:

⇒ D1 = Diameter of the Needle Jet (the number stamped on it).

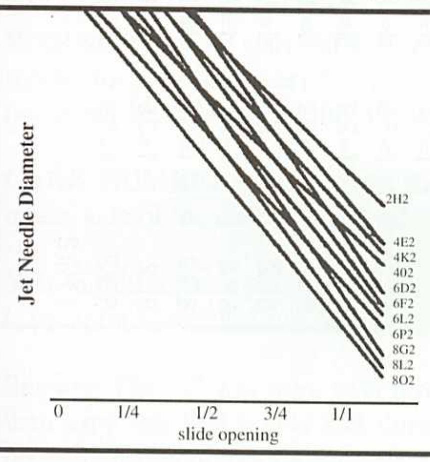
⇒ D2 = Diameter of Jet Needle at a certain throttle opening (from chart)

For Example:

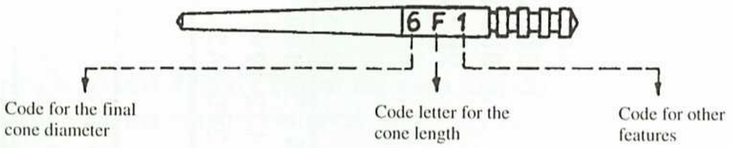
8G2 Jet Needle used with 2.72 Needle Jet
@ 1/2 throttle opening:
Clearance = (3.14 x .25 x (2.72 squared))-(3.14 x .25 x (2.30 squared))=1.66mmsq
@3/4 throttle opening:
Clearance =(3.14 x .25 x (2.72squared))-(3.14.x25x(1.9squared))=2.975mmsq

8L2 Jet Needle used with 2.74 Needle Jet
@ 1/2 throttle opening
Clearance=(3.14 x .25 x (2.74squared))-(3.14 x .25 x (2.2squared))=3.12mmsq

You can apply the clearance formula to figure out at which point these parts are no longer smaller than the main jet passage. The diameter of the main jet passage is also the number stamped on it. (150 Main Jet = 1.50mm diameter; 180 Main Jet = 1.80mm diameter.)
Thus the area of the Main Jet is:
Area = 3.14 x .25 (diameter of Main Jet (squared)).



JET NEEDLE DIAMETER & SELECTION

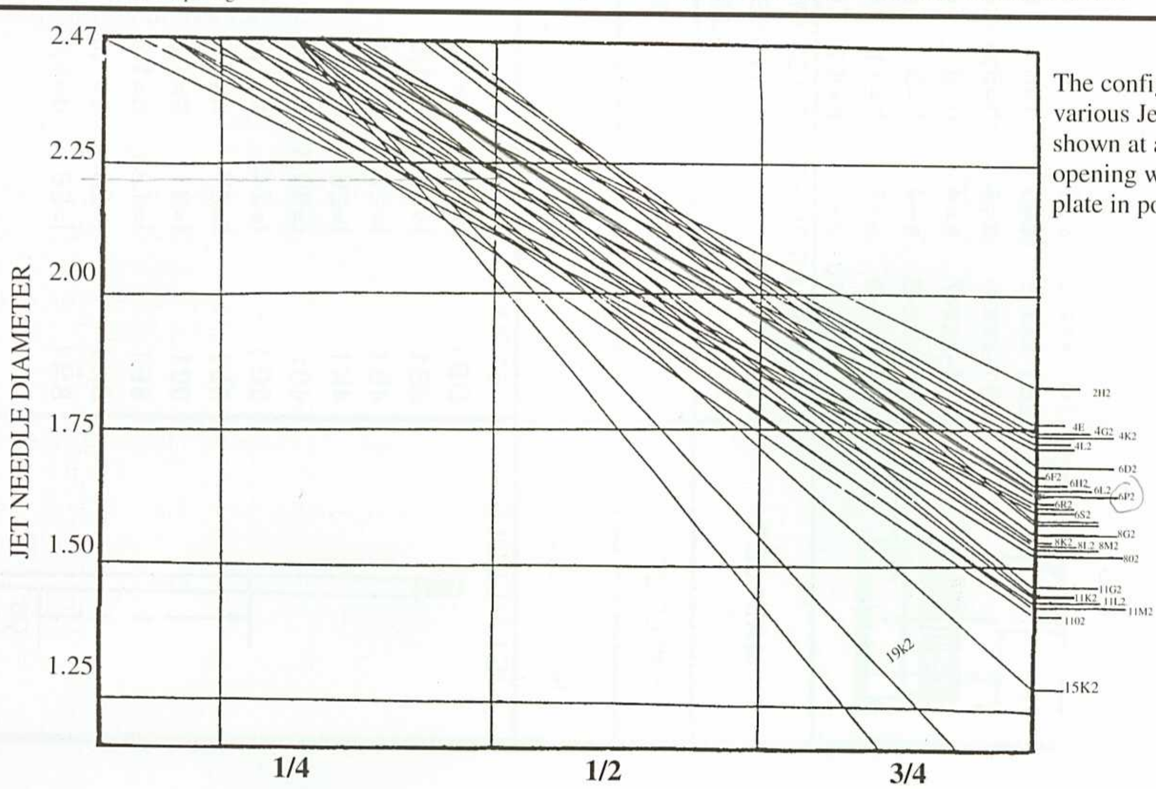


The Jet Needle is selected as follows:

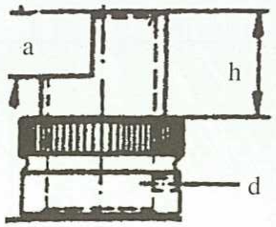
⇒ **Needles with a "Higher Number Code" produce RICHER mixtures above HALF THROTTLE...example- 8L2 instead of 6L2**

⇒ **Needles with a "higher Letter Code" produce RICHER mixtures below HALF THROTTLE...example- 6P2 instead of 6D2**

⇒ **The adjacent regions are also effected to a lesser extent.**



The configuration of the various Jet Needles is shown at any throttle opening with the holding plate in position #2.

CARB TYPE	84-2	54-2	55	64
THROTTLE SLIDE	361-635-1	963-679	261-XXX	961-230
SLIDE SPRING	938-369 normal 938-370 strong 938-371 weak	938-432 normal 938-433 strong 938-434 weak	938-470	938-365
ATOMIZER 	261-xxx-1 a=0 h=5 d=O2,5 261-xxx-2 a=8 h=12,5 d=O2,5 261-xxx-5 a=5 h=6,5 d=O2,5 261-xxx-6 a=4 h=5,5 d=1,2 261-xxx-7 a=4 h=8 d=O2,5 261-xxx-8 a=4 h=8 d=1,2 261-xxx-9 a=8 h=11 d=1,2 261-xxx-10 a=0 h=6,5 d=O2,5	963-xxx a=4 963-xxx a=6 963-xx- a=4 963-xxx a=4 963-xxx a=5,5 963-xxx a=5,5 963-xxx a=7,5 963-xxx a=7,5	h=6,5 d=2grooves h=8,5 d=2grooves h=6,5 d=1,2O h=8,5 d=1,2O h=10,5 d=2grooves h=10,5 d=1,2O h=12,5 d=2grooves h=12,5 d=1,2O	961-200
MAIN JET	70 75 80 85 90 95 100 105 110 115 120 125 130 132 134 135 136 138 140 142 144 145 146 148 150 152 154 155 156 158 160 162 164 165 166 168 170 172 174 175 176 178 180 182 184 185 186 188 190 192 194 195 196 198 200 202 205 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300			
IDLE JET	30 35 40 45 50 55 60 65 70 72 75 80 85			
NEEDLE JET	261-XXX	963-XXX	963-XXX	261-XXX
	2.60 2.62 2.64 2.66 2.68 2.70 2.72 2.74 2.76 2.78 2.80 2.82 2.84 2.86 2.88 2.90			
JET NEEDLE 	261-XXX OB1 l=19 d=1.8 3S1 l=33 d=1,5 4E1 l=23 d=1,4 4K1 l=26 d=1,4 401 l=30,5 d=1,4 6G1 l=24 d=1,2 6L1 l=27 d=1,2 601 l=31 d=1,2 8E1 l=123 d=1,0 8H1 l=25 d=1,0 8M1 l=28 d=1,0	963-XXX 2H2 l=33.5 d=1,7 4E2 l=30.5 d=1,6 4K2 l=34 d=1,6 4O2 l=38 d=1,6 6D2 l=29 d=1,45 6F2 l=32 d=1,45 6L2 l=35 d=1,45 6P2 l=39 d=1,45 8G2 l=32,5 d=1,35 8L2 l=35 d=1,35 8O2 l=39 d=1,35 11G2 15K2	964-XXX 2H6 l=33,5 d=1,69 4E6 l=30,6 d=1,58 4K6 l=34 d=1,58 4O6 l=38,2 d=1,58 6D6 l=29,2 d=1,45 6F6 l=31,9 d=1,45 6L6 l=35,1 d=1,45 6P6 l=39 d=1,45 8D6 l=29,9 d=1,34 8G6 l=32,4 d=1,34 8L6 l=35,3 d=1,34 8O6 l=38,8 d=1,34	961-215

MISCELLANEOUS RECOMMENDATIONS AND TIPS ON CV CARBURETTORS

You should replace the diaphragm in your CV carbs every two years regardless of hours.

When replacing the throttle shaft O'Ring, you must file down the threaded portion of the throttle plate retaining screws that protrude through the back of the throttle shaft before you attempt to unscrew them. If you do not, you will strip the threads out of the throttle shaft because the screws are peened on the threaded ends so that if they work loose they cannot fall out and be ingested through the engine intake valve – which would obviously cause great damage and expense. Be sure to peen the new screws after they are in place.

When you remove your butterfly valve in the CV carbs they absolutely must go back in the same carb exactly the same way they came out. There is normally a small dot or a number stamped on the upper half of the butterfly plate so you know which way to replace it. If not, put a small dot to mark it.

When disassembling the start valve or choke, note that there is a dot on the outer end of the brass threaded shaft that goes toward the cable connection. If you reverse this when you reassemble it, the choke will not work. Also note that there is a left and right choke, and they are marked on the center of the brass shaft inside. Do not mix them up.

When overhauling your carbs be sure that the steel insert crimped in the top of the carb has not come loose. If they are loose, this creates a vacuum leak which hurts the performance almost as if you had a hole in the diaphragm. If they are loose, we can reclamp them for you.

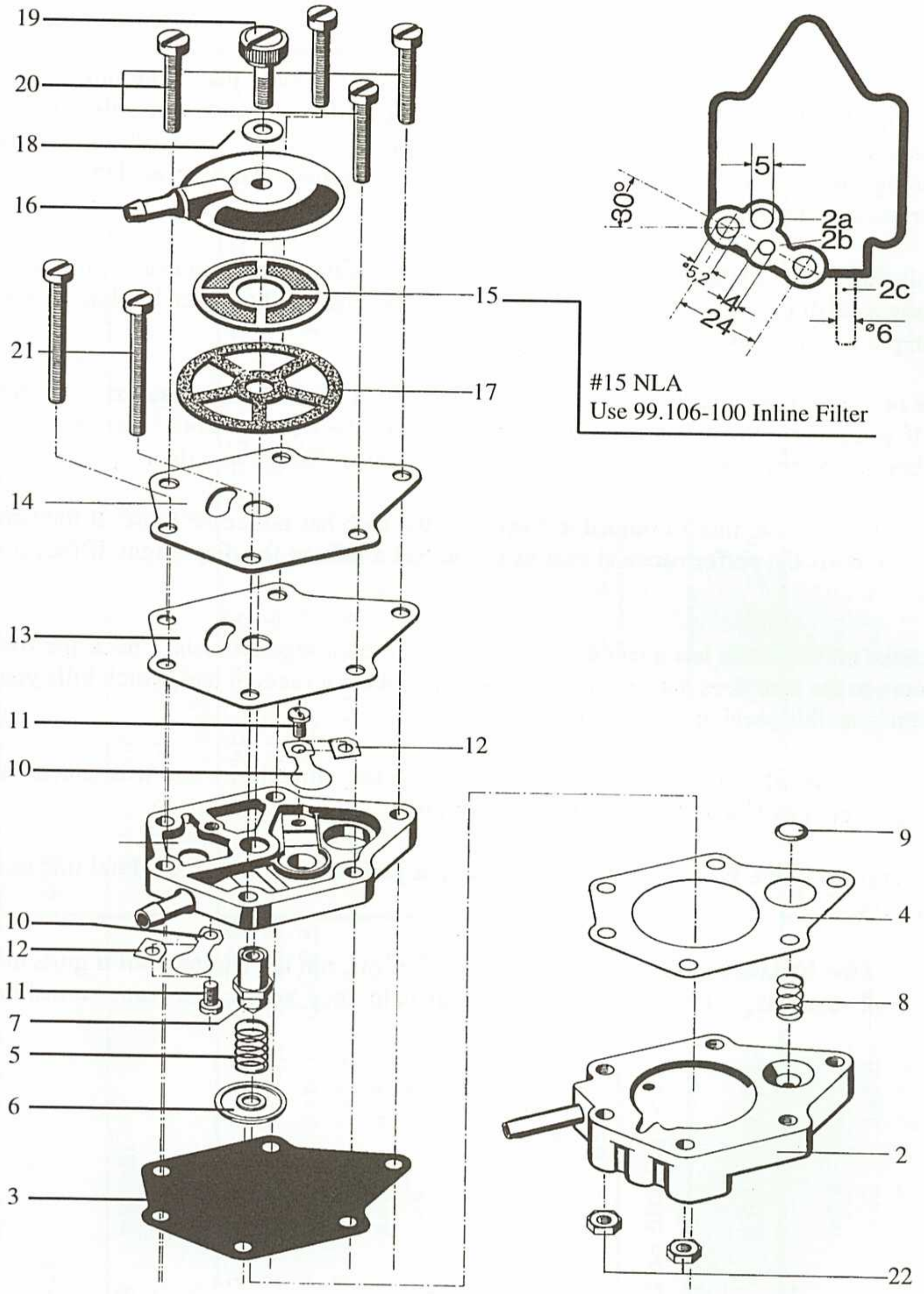
WARNING: The start valve or choke on CV carbs has a tendency to come loose on a regular basis. Check the four screws for tightness every 5 – 10 hours so the carb does not suck in the gasket and create a vacuum leak which kills your performance. A little locktite will eliminate this problem.

CARB NUMBERS: On carbs there is a small web cast directly below the carb top, directly in line with either the intake side of the carb or the head side, which will have the number stamped on it.

You should replace your fuel line every two years. We of course recommend that you use our blue B.A.I. Fuel line as it is resistant to alcohol and other additives.

Storage Tip: If you store your aircraft for 30 days or more at a time, shut the fuel off, run the engine until it quits and then drop the fuel bowls and dump all remaining fuel and residue. This will help keep your carbs from varnishing because of fuel deterioration.

HIGH VOLUME FUEL PUMP 08080-203A



Use Inline Fuel Filter

99.106-100

With High Volume Fuel Pump

08080-203A

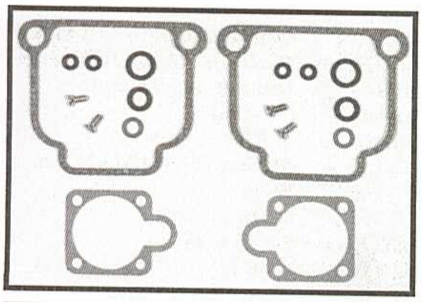
Fuel Pump Rebuild Kit Contains:

1 ea # 3
 # 4
#13
#17
#18
99.106-100 Filter
2 ea #10

HIGH VOLUME FUEL PUMP 08080-203A

The Bing Fuel Pump 08080 with pneumatic drive is especially suitable for the fuel provision of two-stroke combustion engines with performance up to 50 kw (80hp).
It exists in particular of a pump body (1) and the pump cover (2) between which is the working diaphragm (3). The pump body takes up both valve plates (10) which are fastened with the screws (11) and washers (12). The body itself has been built in such a way that it constitutes together with the gasket (13) and the plate (14) separate rooms in which one of the valves serves as inlet valve, the other one as exhaust valve. On the plate (14), the gasket (17) and the filter cover (16) which serves at the same time as fuel feed, is fastened by means of the thread bush (7) which will be put into the pump body from the opposite side as well as the screw (19) and the gasket (18).

CV CARBURETOR KITS

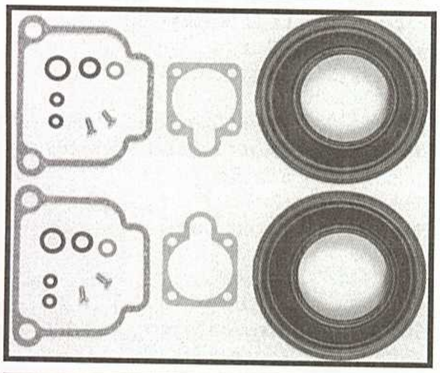


ALL KITS DO TWO CARBS

(SINGLE CARB KITS AVAILABLE ON REQUEST)

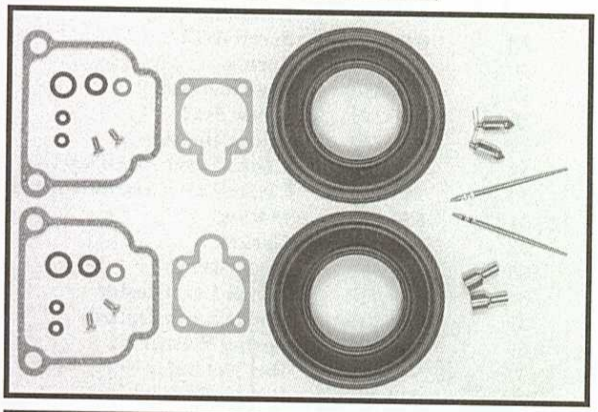
 # 1 - OVERHAUL GASKET KIT CV

2 EA	830-725	BOWL GASKET
2 EA	430-800	JET STOCK "O" RING
2 EA	850-510	START VALVE "O" RING
2 EA	950-030	START VALVE GASKET
2 EA	950-020	THROTTLE SHAFT "O" RING
4 EA	941-200	THROTTLE SHAFT SCREWS
4 EA	831-710	IDLE JET AND MIX SCREW "O" RING



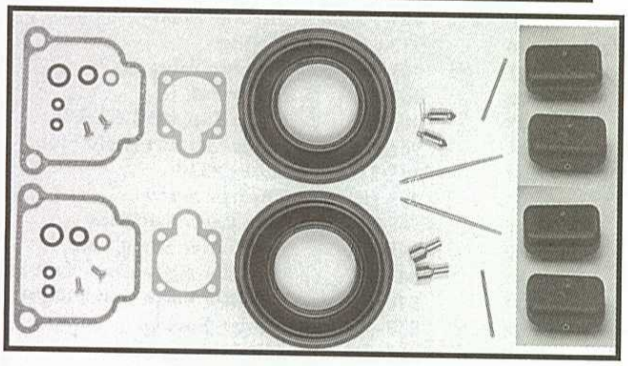
 # 2 - INCLUDES # 1 KIT PLUS:

2 EA	861-115	32MM DIAPHRAGMS



#4 - INCLUDES # 2 KIT PLUS:

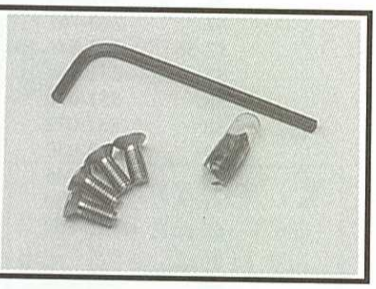
2 EA	261-706	FLOAT NEEDLES
2 EA	261-607 (2.72)	NEEDLE JETS
2 EA	961-215	JET NEEDLES
2 EA	261-710	FLOAT NEEDLE CLIP



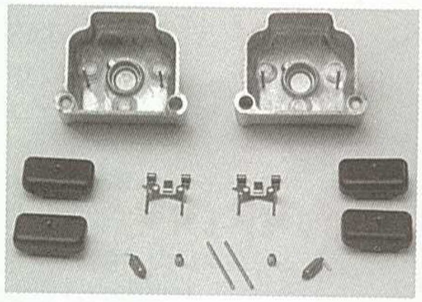
#6 - INCLUDES # 4 KIT PLUS:

4 EA	861-181	FLOATS
2 EA	929-700	PIVOT PIN

STAINLESS STEEL TOP SCREWS

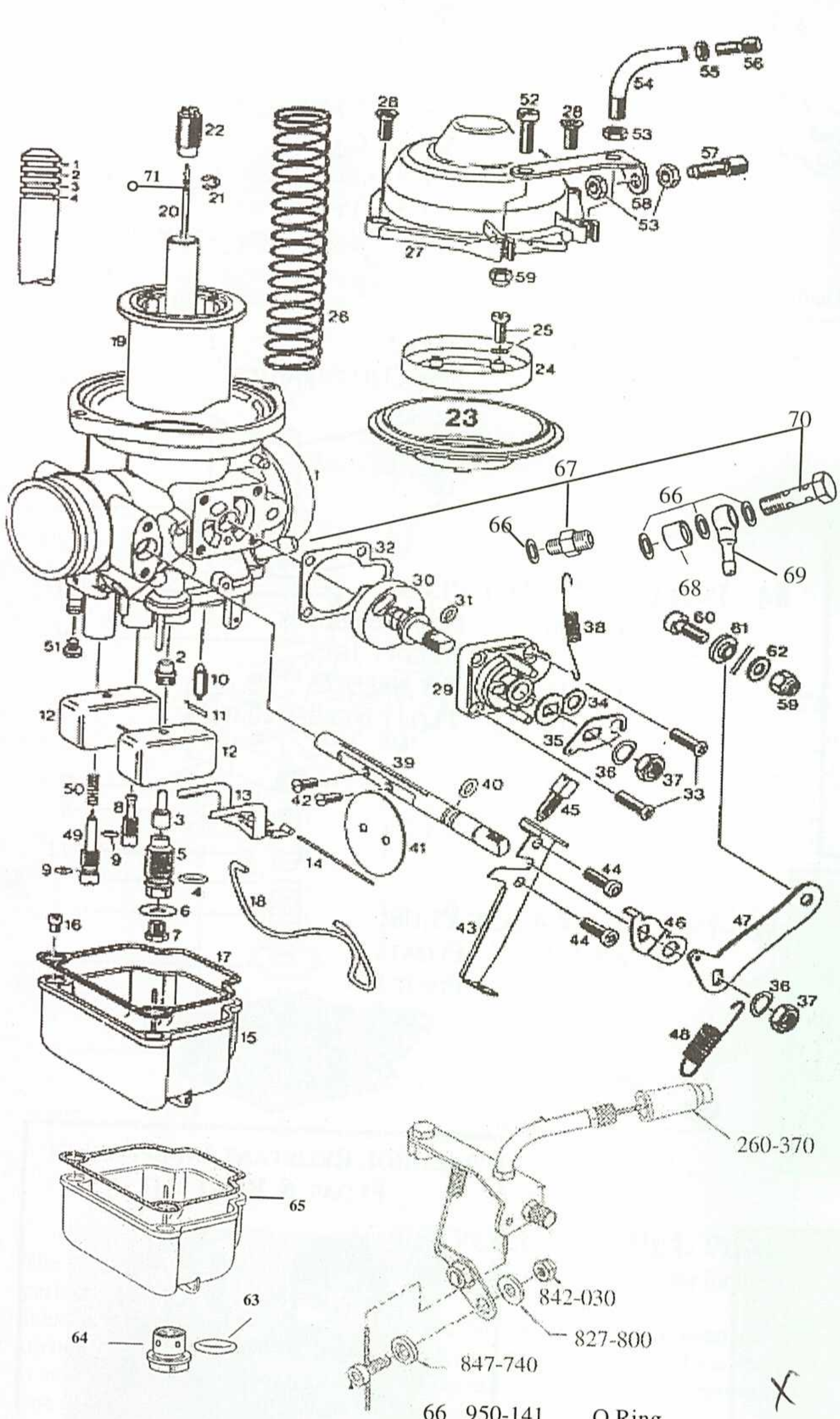


ALCOHOL RESISTANT INDEPENDENT FLOAT & BOWL KIT



BING TYPE 64/32/391-422 4 – STROKE ENGINE
CONSTANT DEPRESSION CARBURETOR

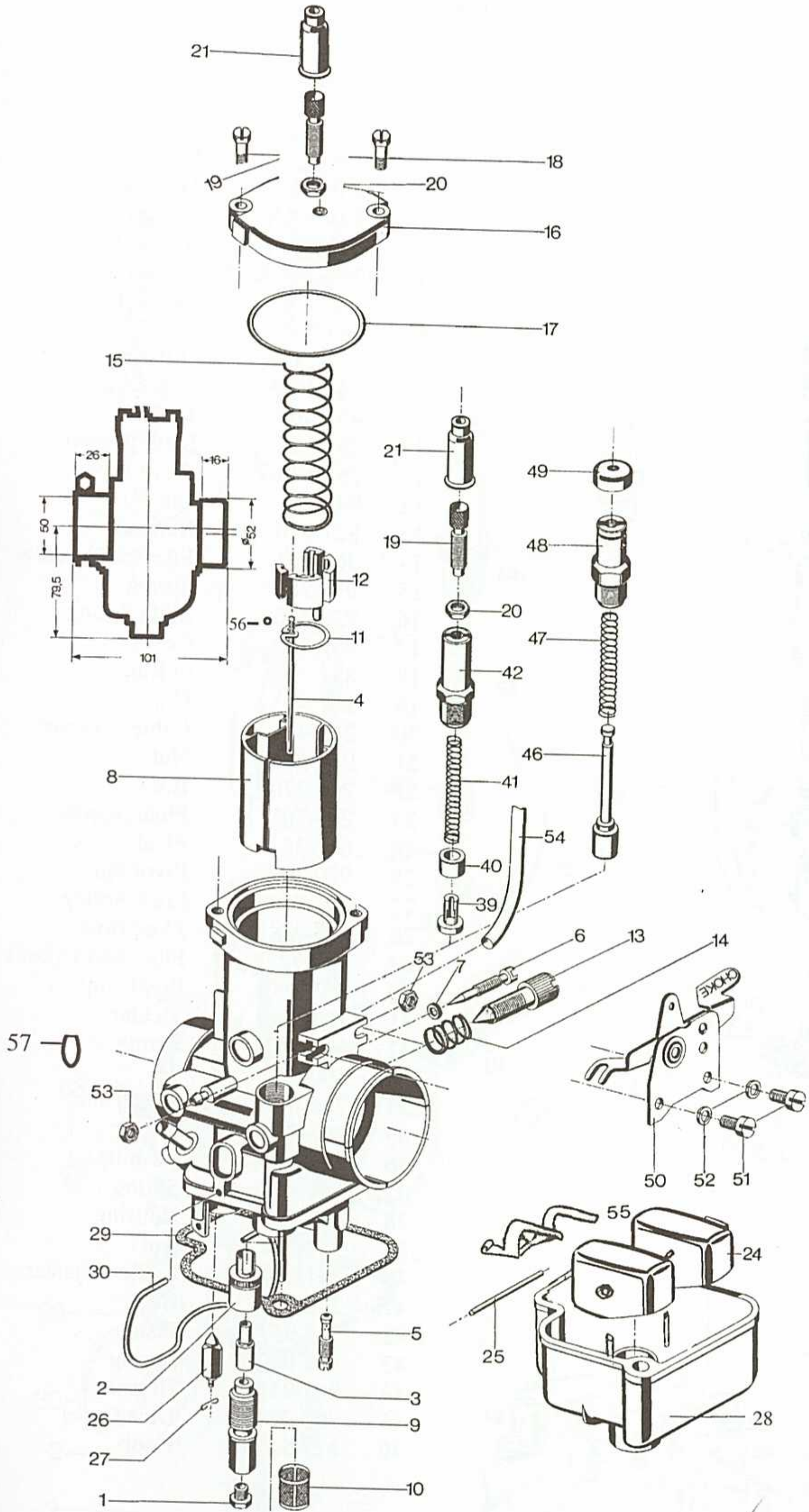
ROTAX 912 & 914 • HKS 700 E • STRATUS



66	950-141	O Ring
67	941-852	Fuel Inlet
68	847-794	Spacer
69	956-312	Banjo Nipple
70	940-872	Banjo Bolt
71	950-430	O Ring for Needle Jet

NO.	PART #	DESCRIPTION
1	995-735	Carb Assembly – Left Sid
1	995-736	Carb Assembly – Right Si
2	961-200	Diffuser a/k/a Atomizer
3	261-607	Needle Jet
4	430-800	O Ring
5	963-130	Mixing Tube (a/k/a Jet St
6	827-160	Shim
7	268-996	Main Jet 158
8	963-143	Idle Jet 35
9	831-710	O Ring
10	261-706	Float Needle Valve
11	261-710	Float Needle Clip
12	861-181	Float
13	861-191	Float Bracket
14	929-700	Pin
15	963-172	Float Chamber Left Side –
15	963-174	Float Chamber Right Side-
16	268-759	Starting Jet 95
17	830-725	Gasket
18	963-180	Spring Clip
19	961-230	Piston
20	961-215	Jet Needle
21	945-785	Circlip
22	961-290	Fixation Screw
23	861-115	Diaphragm
24	961-240	Retaining Ring
25	841-210	Screw 4x12
26	938-365	Spring
27	961-250	Chamber Top
28	841-340	Screw 5x12
29	961-280	Choke Housing
30	961-270	Choke Lever Assembly Left
30	961-275	Choke Lever Assembly Righ
31	850-510	O Ring
32	950-030	Gasket
33	841-360	Screw 4x14
34	848-240	Choke Lever Inside
35	848-245	Choke Lever Outside
36	845-030	Spring Washer
37	942-290	Hex Nut 8x1
38	938-287	Return Spring
39	963-992	Throttle Shaft
40	950-020	O Ring
41	963-665	Throttle valve
42	941-200	Screw 3x6
43	961-260	Cable Support Left Side
43	961-265	Cable Support Right Side
44	241-212	Screw 4x10
45	963-162	Throttle Screw
46	848-230	Stop Lever Left Side
46	848-232	Stop Lever Right Side
47	848-237	Throttle Valve Lever Left Sid
47	848-239	Throttle Valve Lever Right S
48	938-285	Return Spring
49	961-220	Idle Mixture Screw
50	239-460	Compression Spring
51	941-740	Screw 3.5x5
52	240-761	Screw 5x16
53-56	861-640-101	Bent Tube Assembly
57	241-440	Screw 6x.75
58	851-070	Support Left Side
58	851-072	Support Right Side
59	842-030	Locknut 5mm
60	241-846	Allen Screw 5x12
61	847-740	Graduated Sleeve
62	827-800	Washer 5.5mm
63	631-770	O Ring
64	963-281	Bowl Plug
65	963-176	Float Bowl Left—plug style
65	963-178	Float Bowl Right—plug style

SLIDE CARBURETOR - TYPE 54

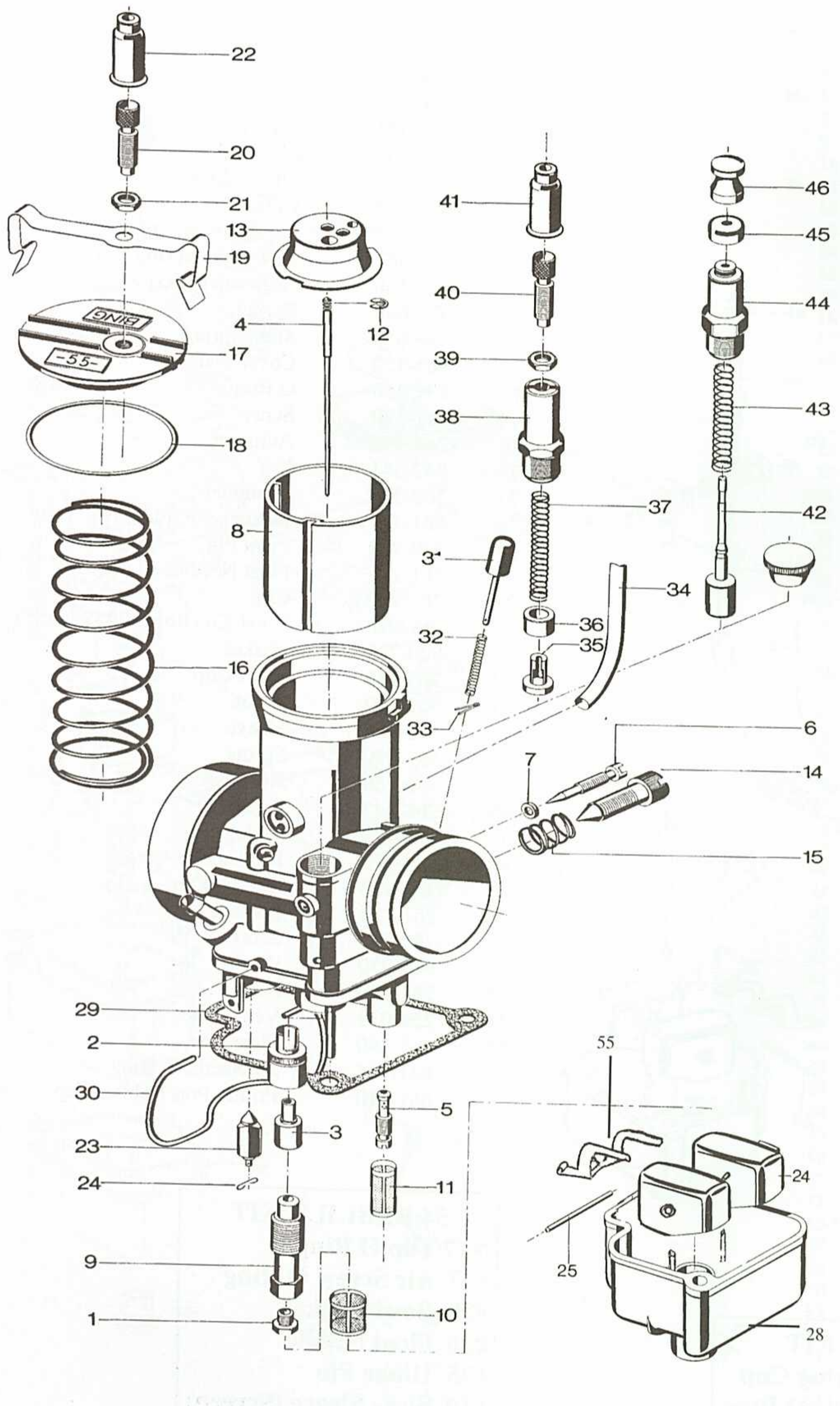


No.	Part #	Description
1	268-978-998	Main Jet
2	251-554	Atomizer
3	963-691-699	Needle Jet
4	963-711-719	Jet Needle
5	963-140-147	Idler Jet
6	963-155	Air Screw
7	831-710	O Ring
8	963-679	Piston
9	963-700	Mixing Tube
10	261-625	Sieve Sleeve
11	963-500	Clip
12	827-345	Stock Spring Cup
12	827-347	New Style Spring Cup
13	963-160	Adjustment Screw
14	938-640	Spring
15	938-655	Slide Spring
16	963-720	Cover Plate
17	831-450	O Ring
18	241-430	Screw
19	241-440	Adjuster
20	942-541	Nut
21	260-370	Grommet
24	861-181	Independent Float
25	929-700	Pivot Pin
26	261-706	Float Needle
27	261-710	Clip
28	261-010	Bowl Kit (Bowl, 24 -27 &55)
29	830-720	Gasket
30	963-180	Bowl Clip
39	963-740	Piston
40	268-850	Sleeve
41	661-050	Spring
42	963-750	Housing
46	268-847	Piston
47	239-730	Spring
48	261-770	Housing
49	260-490	Rubber Cap
50	261-755	Choke Lever
51	240-791	Screw
52	945-750	Washer
53	261-200	Nut
54	256-035	Vent Tube
55	861-190	Float Arm
56	831-715	Jet Needle O Ring
57	861-610	Primer Port Rubber Cap

54 REBUILD KIT
 # 17 Top O Ring
 # 7 Air Screw O Ring
#29 Bowl Gasket
#26 Float Needle
#25 Hinge Pin
#10 Sieve Sleeve (Screen)
#21 Cable Grommet

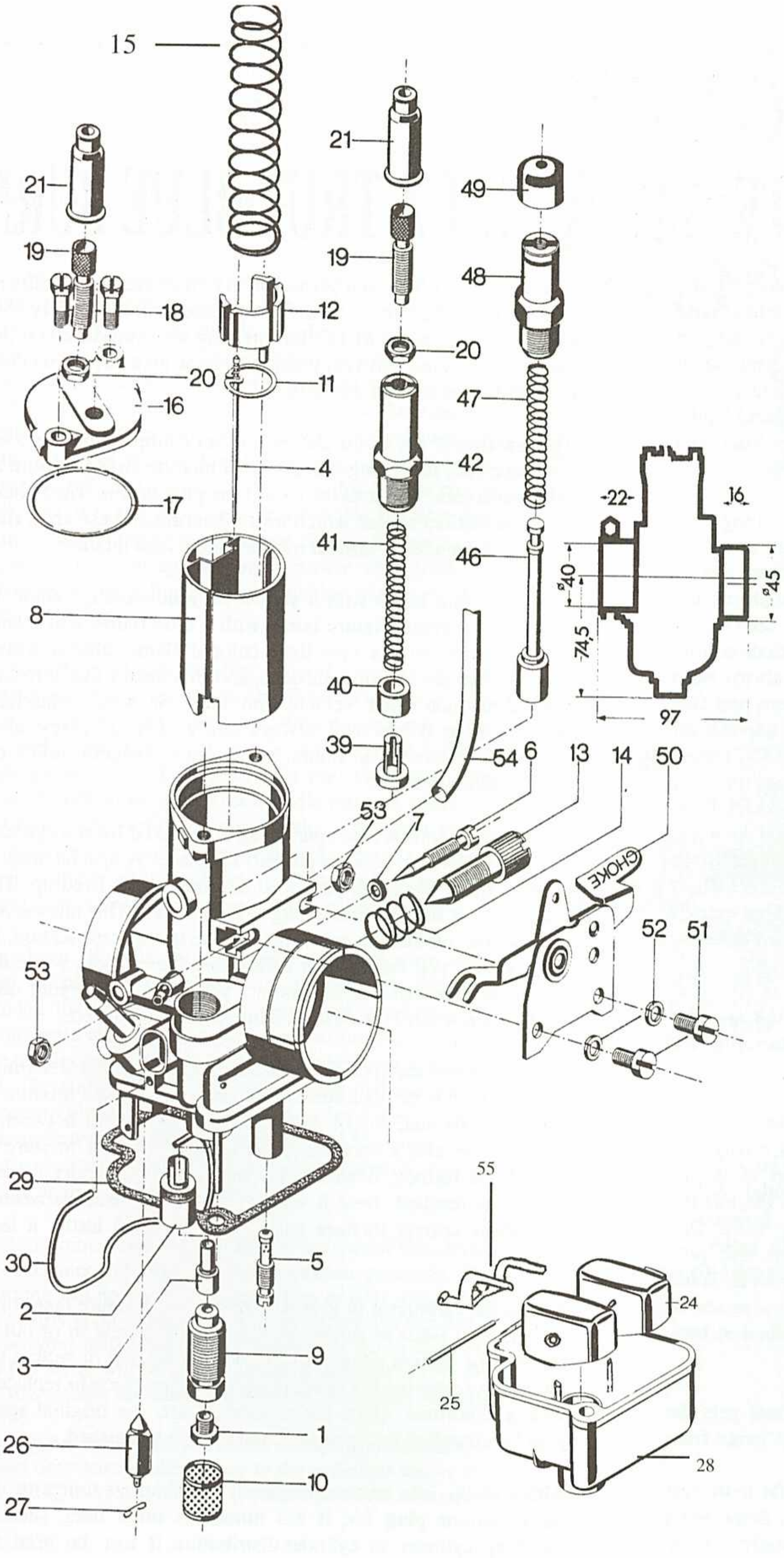
FIX IT KIT
#12 New Spring Cup
#56 Jet Needle O Ring
#11 Clip

SLIDE CARBURETTOR – TYPE 55



No.	Part #	Description
1	268-XXX	Main Jet
2	251-XXX	Atomizer
3	963-XXX	Needle Jet
4	964-380-XXX	Jet Needle
5	963-XXX	Idler Jet
6	963-155	Air Screw
7	831-710	O Ring
8	261-XXX	Piston
9	451-464	Jet Stock
10	261-625	Sieve Screen
11	261-625-2	Sieve Screen
12	945-785	Clip
13	827-346	Retainer
14	963-081	Idle Speed Scre
15	938-282	Spring
16	938-470	Slide Spring
17	963-990	Cover
18	831-765	O Ring
19	261-493	Clip
20	241-440	Cable Adjuster
21	942-541	Nut
22	260-370	Boot
23	261-705	Float Needle
24	861-181	Float
25	929-700	Pivot Pin
27	261-710	Lock Spring
28	963-XXX	Float Bowl
29	830-725	Float Bowl Gask
30	963-180	Bowl Clip
31	100-830	Tickler
32	100-062	Spring
33	100-020	Pin
34	256-035	Vent Tube
35	963-740	Piston
36	268-850	Bushing
37	661-050	Spring
38	963-750	Housing
39	942-541	Nut
40	241-440	Cable Adjuster
41	260-370	Boot
42	268-957	Piston
43	938-090	Spring
44	963-931	Housing
45	860-724	Dust Cover
46	827-545	Knob

SLIDE CARBURETTOR – TYPE 84



No.	Part #	Description
1	268-980	Main Jet 135
2	261-692	Atomizer
3	261-606	Needle Jet 262
4	261-643	Jet Needle 8H1
5	963-140	Idler Jet 50
6	963-155	Air Screw
7	831-710	O Ring
8	261-635	Piston
9	963-130	Jet Stock
10	261-625	Screen
11	261-650	Holding Plate
12	227-635	Spring Cup
13	963-160	Mix Screw
14	938-640	Spring
15	239-700	Slide Spring
16	261-660	cover
17	261-670	O Ring
18	241-430	Screw
19	241-440	Adjustment Screw
20	942-541	Nut
21	260-370	Grommet
24	963-192	Float
25	929-700	Pin
26	261-705	Float Needle
27	261-710	Clip
28	963-170	Bowl
29	830-720	Bowl Gasket
30	963-180	Spring Cup
39	963-740	Piston
40	268-850	Sleeve
41	661-050	Spring
42	963-750	Housing
46	268-847	Piston
47	239-730	Spring
48	261-770	Housing
49	260-490	Rubber Cap
50	261-750	Lever
51	240-791	Screw
52	945-750	Washer
53	261-200	Nut
54	256-033	Vent Line
55	861-190	Float Arm

84 REBUILD KIT
 # 17 Top O Ring
 # 7 Air Screw O Ring
#29 Bowl Gasket
#26 Float Needle
#25 Hinge Pin
#10 Sieve Sleeve (Screen)
#21 Cable Grommet

check and set the idle mixture on dual carburetor setups when your engine has one barrel per cylinder. No doubt many of you have struggled for thirty minutes trying to dial in the idle systems on all four cylinders so that the engine runs smoothly. Many people give up before they ever get there. With the Colortune plug, four-corner idling can be set up so that the engine runs like a watch, even if it does have a 310° cam in it. By blipping the throttle, the accelerator-pump circuit can be verified for correct mixture calibration. When the throttle is blipped the Colortune should show the mixture changing from a slightly rich mixture to a rich mixture if the accelerator pump is working correctly.

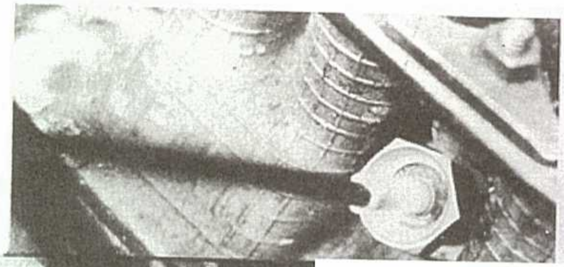
The Colortune can also be used for checking the transition circuit. This is done by opening the throttle gradually in neutral until the engine climbs to about 4000 rpm. The mixture should show signs of running somewhere between the chemically correct mixture and a slightly lean one. If it shows a white burn, then you know the transition circuit is on the lean side. Very often such a situation can lead to a misfire at light throttle openings on the highway. By getting the transition circuit correct, this misfire can be eradicated. It is not commonly realized that the transition circuit is one of the most important circuits for town driving, and if an even application of power with good fuel mileage is to be achieved, the transition circuit must be right.

The Colortune plug looks like a good prospect for off-roaders, especially those who have to race over a wide range of altitudes. By using a Colortune you can adjust your carburetor mixture to suit a new set of conditions much quicker. It isn't going to help you select your main jet, but it will allow you to set the idle mixture, check the transition and check the action of the accelerator pump. The main jet is a much more predictable item if you know just how much altitude change has taken place from the setting that the main jet was previously calibrated for.

Apart from allowing the carburetor to be set more accurately, a Colortune can also be used for trouble-shooting. Included in the kit is a giant diagnostic chart showing various tests which can be performed to trouble-shoot not only carburetor problems but some ignition problems as well. The ability to look into the cylinder and see what is happening gives the home mechanic a far wider scope of tracking down those minor problems which always manifest themselves as one basic, irritating symptom; mainly, that the engine won't run right.

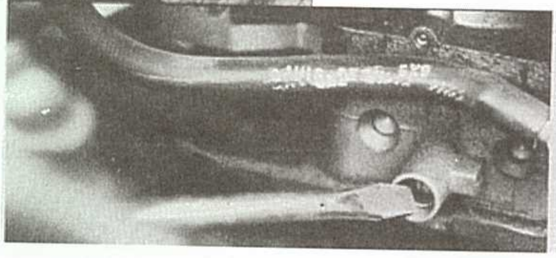
One last point worthy of mention is the use of this device in connection with meeting State emission standards. The Colortune will not evaluate hydrocarbon or NOx, but it does give a fairly good indication of CO levels, and the fact that if you set your carburetor right as detailed in the instructions, your CO levels will be low. Although it does not always follow, this usually indicated that your HC emissions will also be low.

By using the Colortune, you could save yourself that annoying and time-wasting second trip to the emissions testing station, and it's almost worth its purchase price for that reason alone.



Fit Colortune in position, in place of one of the spark plugs.

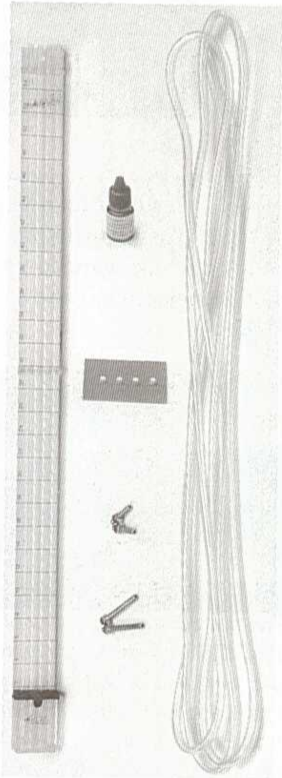
...then connect it to the H.T. system and re-start the warmed-up engine.



Adjustment of the carburettor results in colour changes which make best performance settings very easy.

New COLORTUNE can be fitted to most engines. The standard COLORTUNE (shown right center above) fits all 14mm diameter threaded applications. Adaptors, sold separately, (shown left center above) are to convert it to a 10mm, 12mm, 14mm long or 18mm plug size.

MERCURY CARB SYNCHRONIZER



IMPORT

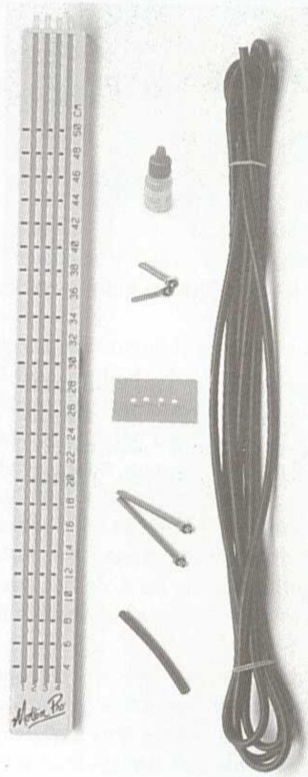
MOTION PRO is the most accurate and convenient to use Carburettor Synchronizer available regardless of price.

⇒ Large Clear Columns. You KNOW when the Carbs are right. Gives you a resolution of 7 to 1 over the average guage.

⇒ Two CM Indica spacing. So you know when you're within factory specs or better.

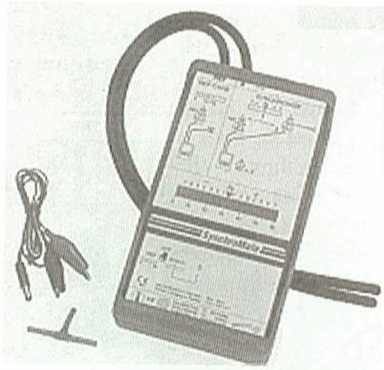
⇒ Laboratory grade mercury (99.99% pure) (.004% non-volatile residue)

⇒ Tough injectionmolded, Unbreakable nylon reservoir.



US MADE

SYNCHROMATE 2



Synchromate 2:

Accurate – Synchronize within 0.2cmHG, true resolut & no friction or inertia.

Compact – The SynchroM 2 can easily be held in one han

Calibrated – Pre-calibrated at the factory. Thereafter, automatically self adjusts to barometric pressure changes.

Rugged – No glass, no mercury, no sensitive dial gauges, moving parts and comes with a protective rubber holster.

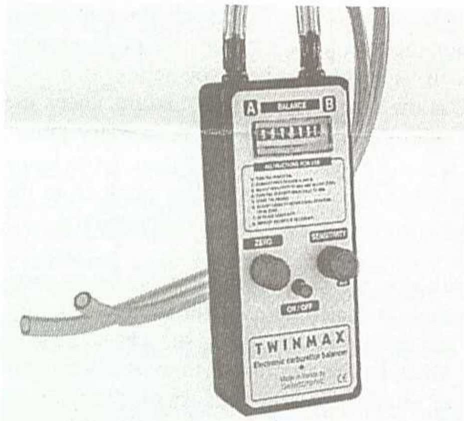
Trouble Free – Built using reliable solid-state electronics.

Easy – Just adjust each carb against the reference carb until dual LED flashes at the "pa" mark.

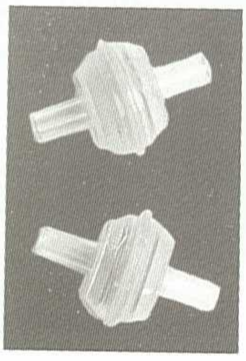
Includes – a tachometer with 50rpm increments.

Plus – Comes complete with **sturdy molded plastic carrying c** and two 5mm & two 6mm rigid threaded carb adapters.

TWINMAX



KARCOMA IN LINE FUEL FILTERS



B.A.I. ALCOHOL RESISTANT BLUE FUEL LINE & PRIMER

(Black Pictured)

Holds 50 PSI Without Clamps

ORDER
TRANSPARENT
BLUE

Gastester
vehicle exhaust CO gas analyser with pulse pump

GASTESTER is used for the testing and setting of all carburettors (petrol, leaded or unleaded) and petrol injection systems on any vehicle. (12 volt D. C. battery supply required - either on the vehicle or from a separate 12 volt battery). Modern vehicles run on lean petrol/air mixtures to save petrol, improve performance and to keep their exhaust emissions as clean as possible. Gunson's GASTESTER provides a simple and inexpensive method of showing when the correct petrol/air mixture is being dispensed.

Accurate results with Gunson's GASTESTER will be achieved if the FULL INSTRUCTIONS provided are carefully followed, as the AA proved.

This simple procedure ensures settings are within the vehicle manufacturer's tolerance limits for CO content in the exhaust gas which is a convenient guide to the most accurate adjustment, to a clean (enviromentally concerned) exhaust, peak performance and economy.

Full Instructions, and all you need to use

GASTESTER Mk2 efficiently collects exhaust gas and drains off condensed water. It is very easy to use.

1. Calibration takes place before each test for greater accuracy, and before inserting the probe to collect the sample.

2. Adjustment of the carburettor or injection system to get the correct reading for perfect performance reduces pollution.

Gunson's - anything else is less

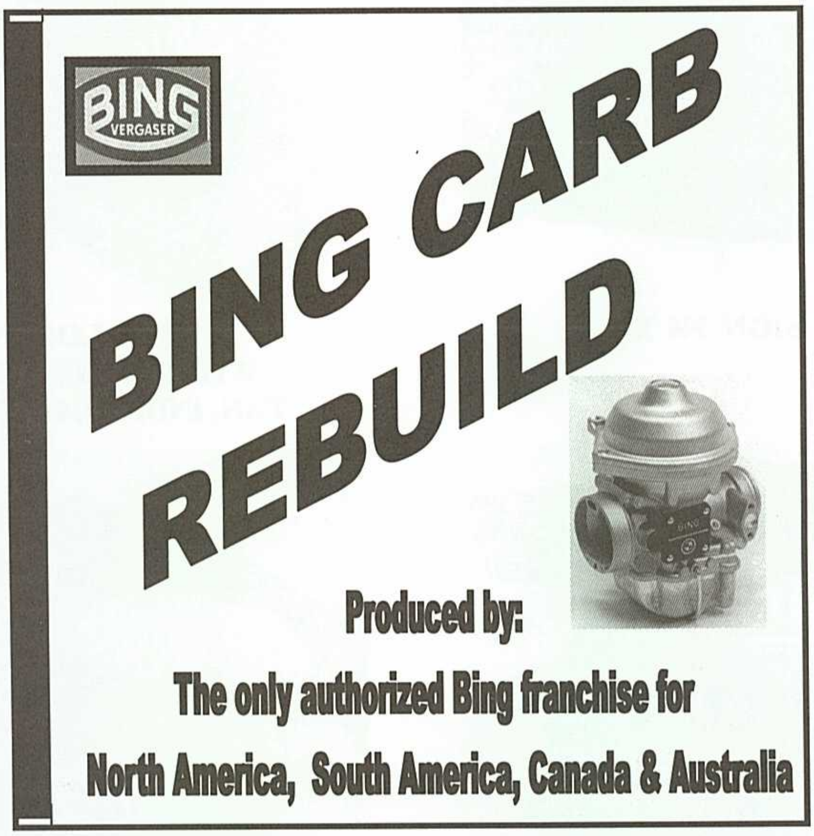
BING REBUILD ON DVD

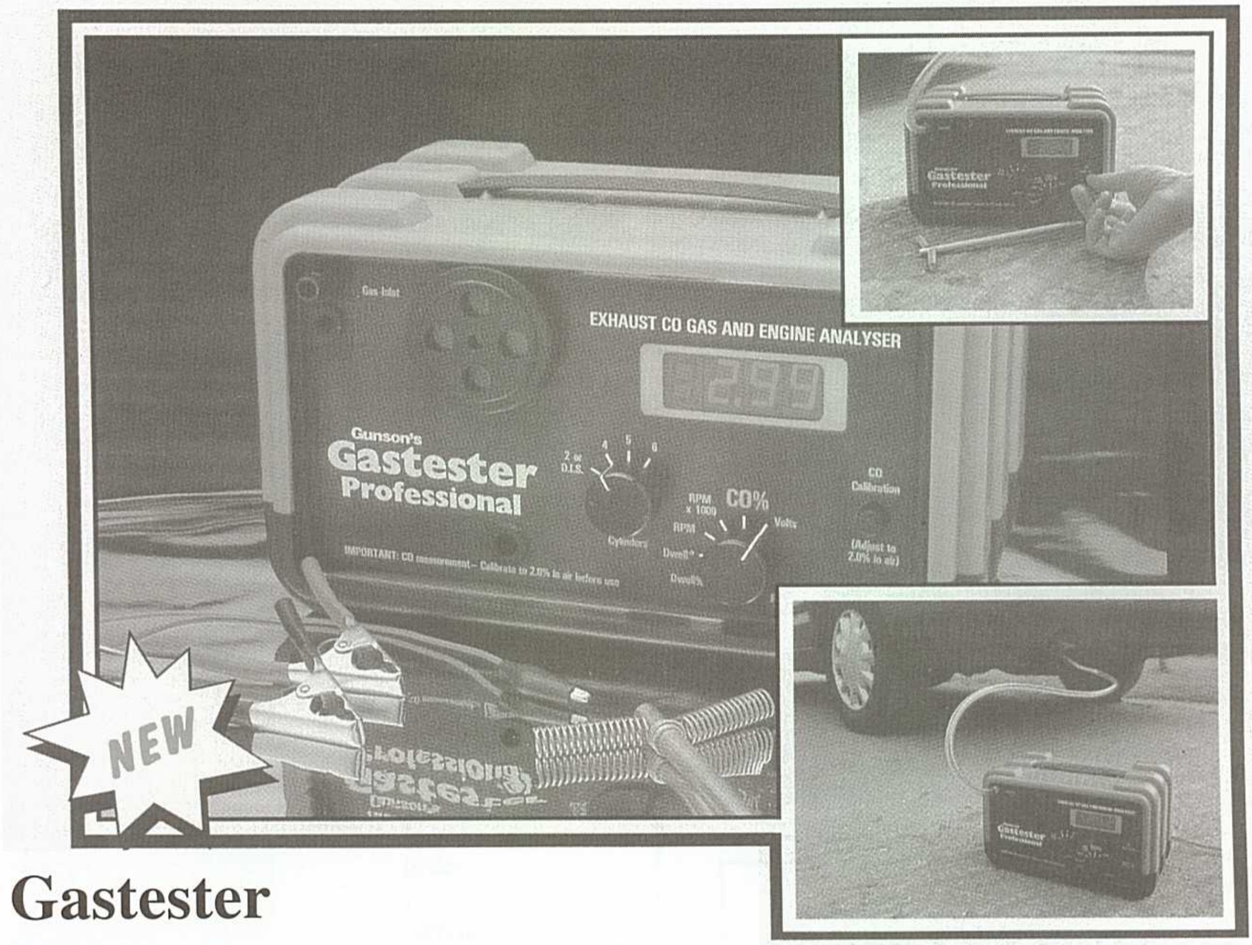
The DVD will walk you through your rebuild step by step and offer tips on tuning and synchronizing the carbs when you put them back on the engine.

CHOOSE YOUR CARB TYPE

TYPE 54 and 84 (Order Part # DVD-54-84)

CONSTANT VELOCITY DIAPHRAM CARBS (Order Part #DVD-CV)





Gastester Professional

Patented

exhaust CO gas and engine analyser

This is a more rugged and versatile version of Gunson's well established exhaust CO analyser GASTESTER MK2 which has been so well received for its accuracy and simplicity.

Gunson has combined these proven qualities with a multimeter to provide just the information the tuner (whether D.I.Y., semi-professional or professional) requires at their finger tips.

Now with no more than the "flick of a switch" the digital LED readout shows engine speed, dwell (in degrees or percent), volts or emission CO percentage.

Accuracy of CO reading is assured by reliable sample collection using Gunson's patent PULSE PUMP and a calibration procedure which takes seconds and uses air as its standard. Filtration is minimised by the unique Gunson design, as is water disposal.

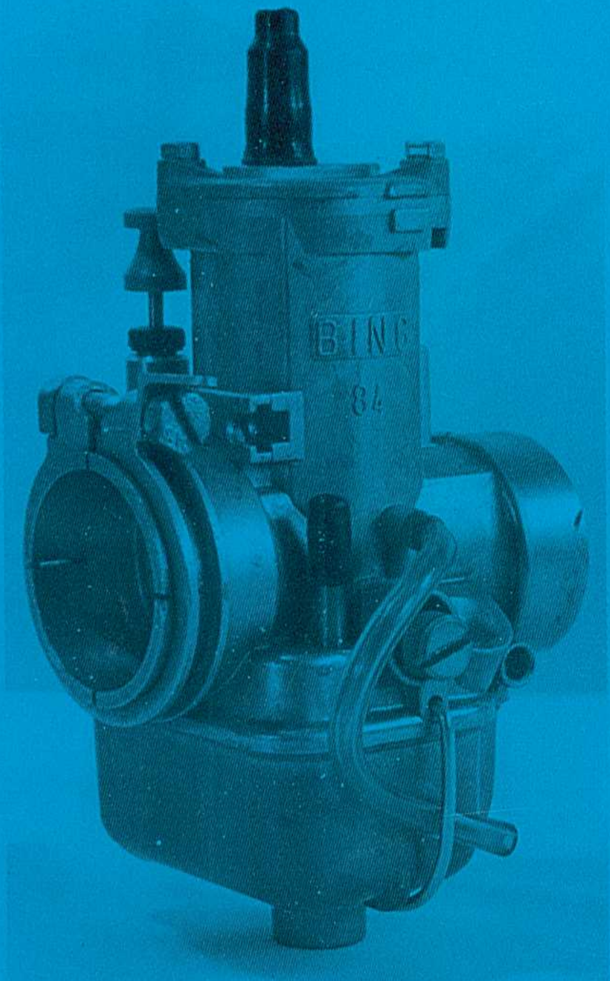
Analysis of ignition faults is facilitated by having that tell-tale indicator-dwell, easily accessible. While voltage to check for battery, continuity or ignition problems is equally available. Tests at specific engine speeds, as prescribed for CO testing or timing, are easily made using two R.P. M. scales.

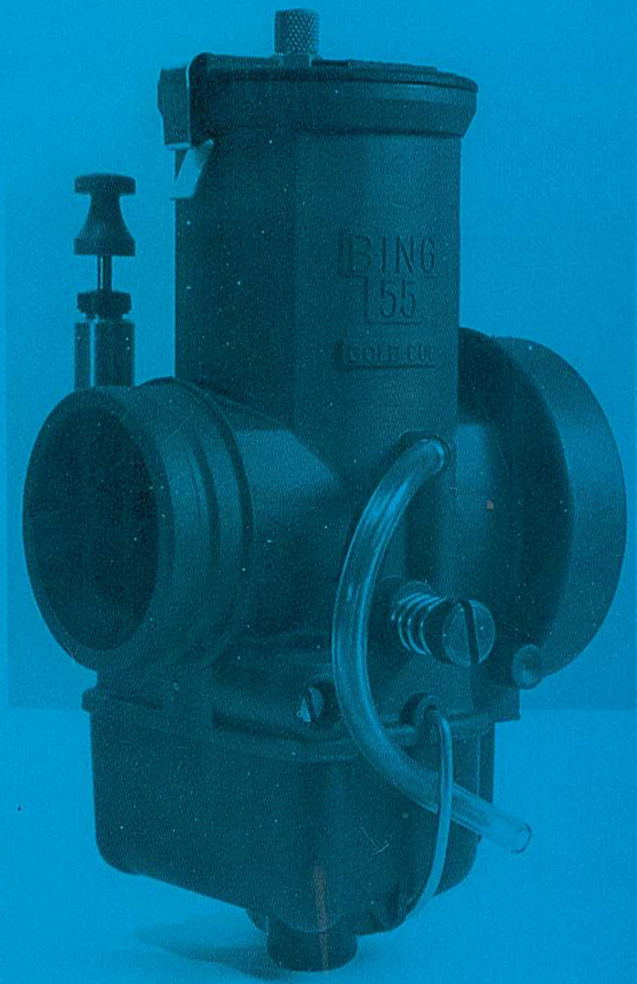
Long leads, a spring loaded aluminum exhaust probe, stout battery clips, dwell data and very full instructions are all provided to make this analyser as complete as any tuner could wish.

GASTESTER PROFESSIONAL is the perfect tune-up analyser, which will give good service for years to any mechanic or technician, on any petrol

Gunson's - anything else is less

BING CARBURETORS





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