

# INSTRUCTIONS ON STROMBERG NA-S2 AND NA-S3 AIRCRAFT CARBURETORS

## Introduction

The Stromberg NA-S2 and NA-S3 carburetors are designed to meet the exacting requirements of small two, three, and four cylinder aircraft engines, such as are used in small airplanes. The principles of operation as described in these instructions are quite similar to those used in all Stromberg aircraft and motor car carburetors. The specification or setting in the carburetor is the result of a great deal of test work conducted by the engine and carburetor manufacturers in the laboratory and in flight, and should not be changed unless it is absolutely certain that a change is necessary to meet unusual operating conditions.

## Installation

The carburetor should be so mounted on the engine that the float chamber is at the side of the throttle barrel, preferably with the fuel inlet to the rear. With the carburetor in this position, the throttle control lever, which is adjustable to any radial position, is at the right side of the carburetor as viewed from the rear of the engine. The fuel inlet is a  $\frac{1}{4}$ " pipe tap connection located at the back near the bottom of the main body if the carburetor is installed as above. When the fuel level is set at the factory a pressure of one-half pound per square inch at the carburetor is used. As these carburetors will undoubtedly be used on engines having a gravity feed system, it is recommended that the tanks be located so that the minimum head of fuel on the carburetor inlet is twenty-four (24) inches under all normal conditions of flight.

## Starting

As the carburetor is not equipped with a priming device, the following procedure is recommended for starting. With the throttle closed the engine should be turned over two or three times before the ignition is turned on. This will draw fuel up through the idle system and then if the ignition is turned on the engine will usually start on the next turn over. As soon as the engine starts to fire, it is usually necessary to open the throttle slightly to keep the engine running and to warm it up sufficiently for normal operation.

## Adjustment

The main metering jet used in the carburetor is of the fixed orifice type, and its size as well as the remainder of the carburetor specifications has been determined by test work as previously mentioned, so that no adjustment for cruising and full

throttle speeds is required. An idle adjustment is provided to take care of slight production variations in the carburetors, and engines. A small knurled screw near the edge of the butterfly valve, on the throttle valve body, may be adjusted to control the richness of the mixture at idling speeds. Turning this screw in a clockwise direction closes off the passage leading to the upper idle discharge hole and leans out the idle mixture. Turning in the opposite direction of course gives a richer mixture. **CAUTION!** If the Idle Adjusting Needle is screwed into its seat with too much force the needle will be grooved and the needle seat in the throttle body will be damaged. This will prevent an accurate idle adjustment and will generally necessitate replacement of the needle and throttle body. Great care should therefore be exercised when adjustment is being made not to turn the needle into its seat more than finger tight. In case the needle has been screwed into its seat by the fingers and the engine is still apparently idling too rich, it is suggested that the engine primer be inspected to see if it is allowing fuel to enter the engine. But under no circumstances should the Idle Needle be screwed in with a pair of pliers or by using much force on a screw driver. A throttle stop is provided on the throttle shaft next to the throttle control lever, which should be adjusted to obtain the desired idling speed. Both the throttle stop and the idle adjustment should be set with the engine hot to obtain the proper idling speed and smooth operation.

## Servicing

Once the carburetor is properly installed and the idle adjustment made, very little attention is required in service. A fuel strainer is provided near the fuel inlet of the carburetor, and may be removed by the removal of the large hexagon head plug on the side of the float chamber. A small square head plug is provided as a drain in the bottom of the carburetor. The strainer and drain plug should be removed frequently to get rid of any dirt or water which may have accumulated in the strainer chamber of the float chamber. The entire carburetor should also be inspected to see that all parts are tight and properly safetied.

## Description and Functioning of Carburetor

**FLOAT MECHANISM:** A conventional hinge type of float mechanism located in a float chamber having ample fuel capacity to operate in all ordinary maneuvers is used. This float mechanism is adjusted at the factory to obtain the proper

fuel level, and requires no adjustment in service unless it is necessary after a long period of service to install new parts. For information concerning the proper level see the section of these instructions pertaining to "Overhaul."

**MAIN METERING SYSTEM:** The metering system used in the carburetor is of the plain tube type with an air bleed to the main discharge nozzle. The main discharge nozzle is located at the center of the venturi and is screwed into a boss projecting into the air intake. The main air bleeder is screwed into the air bleed arm which is held in place by the main discharge nozzle. The actual metering of the fuel is accomplished by the main metering jet which is assembled in the bottom of the float chamber in a channel through which the gas flows to the main discharge nozzle. The size of the main metering jet affects the fuel consumption at all speeds from approximately 1000 RPM to full throttle speed.

**IDLING SYSTEM:** Inasmuch as the main metering system will not function at very low air flows (low engine speed), an idling system is provided. This consists of an idle tube with an idle metering orifice in the bottom and several air bleed holes in the wall, an idle air bleed, and two holes in the throttle barrel, which act as idle discharge nozzles. A needle valve type of adjustment is provided on the upper discharge nozzle, which regulates the quality of the idle mixture. Fuel for the idle system is taken from the annular space around the main discharge nozzle, passes through the idle metering jet and mixes with the air from the idle air bleed located in the main body behind the venturi. The air enters the tube through the bleed holes and the mixture then passes out of the upper or lower idle discharge hole. The relative quantities passing through the upper and lower idle hole depends upon the position of the throttle. At extreme idle, all the fuel passes through the upper hole and as the throttle opening is increased, more and more of it passes through the lower hole. The idle system operates up to an engine speed of approximately 900 to 1000 RPM.

### Overhaul

**DISASSEMBLY:** The carburetor should be disassembled for cleaning and inspection each time the engine is given an overhaul. After the carburetor has been removed from the engine and the hot spot and air intake or heater taken off, the halves of the carburetors may be separated by the removal of the flister head screws at the parting surface. The venturi is held in the lower half by a hexagon head screw.

Remove the set screw which holds the float fulcrum pin in place and the plug at the side of the carburetor, which will permit the removal of the float fulcrum pin. The float and the float needle valve will then come out and it will be possible to remove the main metering jet, which

is located below the float. Remove the idle tube which is screwed into the main body. If there is any indication of dirt or foreign matter in the float chamber, it is advisable to remove the main discharge nozzle. The removal of the above parts will permit a thorough inspection and cleaning of the carburetor, and unless replacements are necessary, further disassembly is not recommended.

**INSPECTION AND CLEANING:** The bodies and all parts should be thoroughly cleaned in gasoline, and all passages blown out with an air hose.

The float needle valve and seat should be inspected for wear and if the needle valve is badly grooved, both parts should be replaced. The needle valve is made of stainless steel and the seat of naval brass so that under ordinary service conditions these parts should last for many hundreds of hours. Check the main metering jet and float needle seat to make sure that they are tight. It is important that the throttle valve fits the barrel tightly when in the closed position and that the lower edge be flush with the top of the lower idle hole.

**REPLACEMENTS:** If due to accident or wear after long service it is necessary to make replacements, the parts should be obtained from the Bendix Stromberg Carburetor Company, South Bend, Indiana, or an authorized Stromberg aircraft carburetor service organization.

In ordering parts, be sure to state on what make and model engine the carburetor is being used as size of some parts are different for different engines. Ordering by part numbers as shown on the attached assembly drawing and also giving the serial number of the carburetor will greatly facilitate service.

**REASSEMBLY:** All headless screw plugs below the fuel level should be assembled with shellac, being careful not to get it on the end of the plug where it will come off and be carried by the fuel into one of the metering orifices. Headless screw plugs above the fuel level and all other threaded parts screwed into the bodies should have a compound of graphite and castor oil put on the threads.

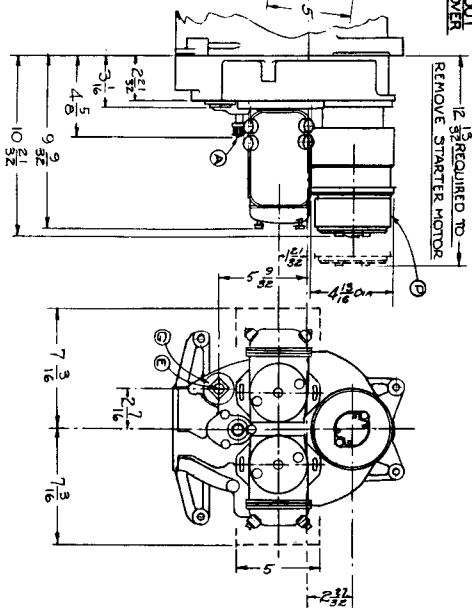
The float level on these carburetors should be 13/32" below the parting surface and is dependent upon the thickness of the gasket under the needle valve seat. The level should be checked under the same conditions encountered in service as regards the fuel used and the fuel pressure or head at the carburetor. The levels are set at the factory with a pressure at the carburetor of one-half pound per sq. inch (19" gasoline at .710), and this is recommended for setting the levels in the field. If, after fitting new parts, the level is not correct, remove the needle valve seat and put in thicker gaskets to lower the level, and thinner gaskets to raise it. One-sixty-fourth inch change in gasket thickness will change the level approximately 5/64".



GIVE SERIAL NUMBER OF CARBURETOR IF POSSIBLE WHEN ORDERING PARTS.

REBER	REBER	1
CHECK	APPROV.	DATE
P12		6-9-30

**CARBURETOR**  
**MODEL NA-S3AI**



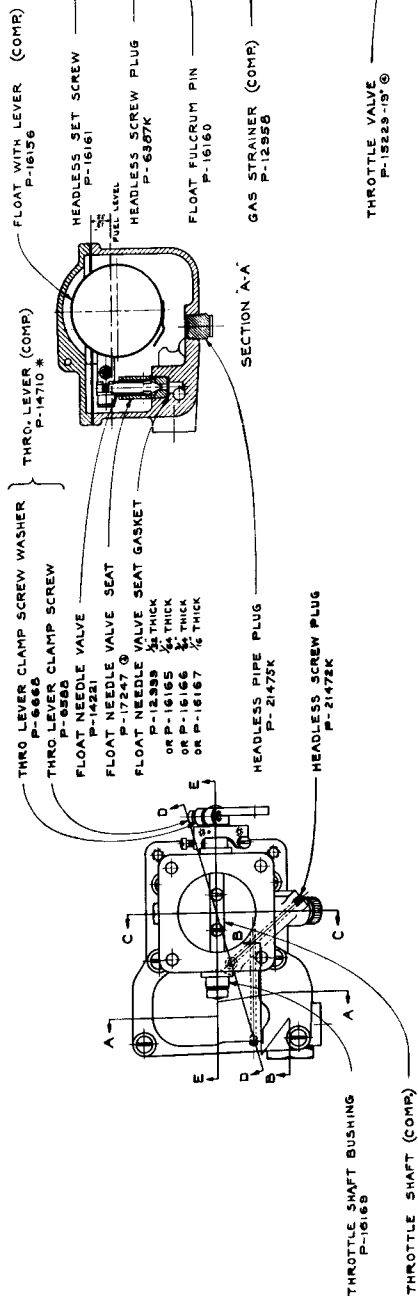
THIS CLEARANCE REQUIRED  
ABOVE HT. TERMINALS  
TO REMOVE THEM WITHOUT  
REMOVING MAGNETO COVER

12 3/4" REQUIRED TO --  
REMOVE STARTER MOTOR

- A--THERMOMETER DRIVE SAE STD. 1/2 ENGINE SPEED C.C.W. ROT.
- C--NAME PLATE
- D--OIL PRESSURE GAGE CONNECTION 1/2 PIPE TAP
- E--OIL THERMOMETER CONNECTION SAE STD.
- F--EXHAUST MOUNTING FACE
- G--OIL SCREEN
- H--OIL PUMP
- I--OIL PRESSURE RELIEF VALVE
- J--OIL DRAIN
- K--PRIMER JET
- L--CARBURETOR MIXTURE CONTROL
- M--FUEL INLET CONNECTION
- N--BREATHER CONNECTION 5/8 ID HOSE
- O--OIL QUANTITY GAGE
- P--STARTING MOTOR SAE STD. SMALL TYPE MOUNTING

OUTLINE ASSEMBLY  
MODEL A-75 SERIES 3  
FOUR CYLINDER OPPOSED  
3 7/8 BORE, 3 5/8 STROKE 171 CU. IN.

1. THIS DRAWING IS THE PROPERTY OF BENDIX STROMBERG CARBURETOR COMPANY. IT IS TO BE KEPT IN THE OFFICE OF THE ENGINEER IN CHARGE OF THE PROJECT AND NOT TO BE LOANED, REPRODUCED, COPIED, OR IN ANY MANNER DISSEMINATED OUTSIDE THE COMPANY.



SECTION B-B

SECTION A-A

THROTTLE VALVE P-15223-15' ⑥

WASHER (IDLE NEEDLE) P-15223

HELICAL SPRING P-11556

IDLE NEEDLE VALVE (COMP) P-16177

HEADLESS SCREW PLUG P-6038

LOCK WASHER P-6664

VENTURI TUBE SET SCREW P-16176

MAIN DISCHARGE NOZZLE \* P-16175

GASKET (UPPER) P-5329

MAIN AIR BLEEDER ARM (COMP) P-16537

GASKET (LOWER) P-2865

WASHER (THRO. SHAFT) P-16170

HELICAL SPRING P-16171

HEADLESS SCREW PLUG P-21472K

MAIN AIR BLEEDER \* P-16175

THROTTLE VALVE SCREW P-16173

THRO. VALVE SCREW LOCK WASHER P-12167

HEADLESS SET SCREW P-5015

VENTURI TUBE \* P-16176

SECTION C-C

SECTION E-E

THROTTLE BODY WITH BUSHINGS \* P-16162

HEADLESS SCREW PLUG P-21472K

FILL HEAD MACH. SCREW P-6550

LOCK WASHER P-6664

MAIN BODY \* P-16163

GAS STRAINER PLUG P-14220

GAS STRAINER PLUG GASKET P-6556

THROTTLE STOP SET SCREW P-15237 ⑥

THROTTLE STOP CLAMP SCREW P-2266

MAIN BODY GASKET P-16155

HEADLESS SCREW PLUG P-6038

CARBURETORS PRIOR TO SERIAL N8379113  
 USED P-3201 IDLE AIR BLEED  
 NOW BEING DRILLED IN THE BODY  
 TO SPECIFICATION SHEET FOR SIZE OR  
 SPECIAL PART NUMBER.

DO NOT SPECIFY THIS DRAWING  
 NUMBER ON ORDER -  
 GIVE NAME AND MODEL OF  
 ENGINE FOR WHICH CARBURETOR  
 IS ORDERED.  
 GIVE SERIAL NUMBER OF  
 CARBURETOR IF POSSIBLE  
 WHEN ORDERING PARTS.

CARBURETOR  
 MODEL N-A-S3  
 SCALE: FULL SIZE

SHEET NO. 1  
 OF 1  
 DRAWING NO. A-15203

BENDIX STROMBERG CARBURETOR COMPANY

