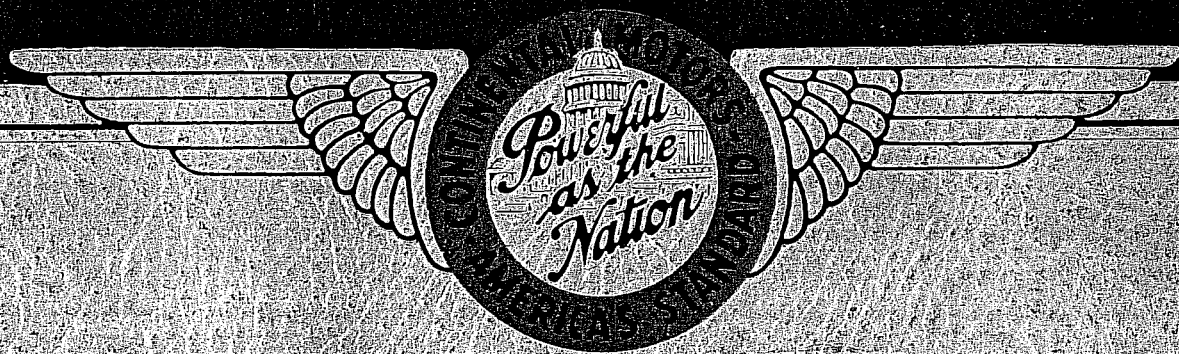


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# INSTRUCTION AND SERVICE MANUAL Stromberg Carburetor NA-S3A1



CONTINENTAL MODELS

**C75** AND **C85**

AIRCRAFT ENGINES

*Continental Motors Corporation*

*Aircraft Engine Division*

MUSKEGON, MICHIGAN

PRICE \$350

## Section 17

**CARBURETOR - STROMBERG  
NA-S3A1****SERVICE INSTRUCTIONS****a. Installation.**

(1) 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 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 mixture control lever is located on top of the float chamber on the right hand side. 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 at the carburetor inlet is nineteen (19) inches under all normal conditions of flight.

**b. Starting.**

(1) As these carburetors are not equipped with a priming device, the following procedure is recommended for starting. With the mixture control in the full rich position and 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.

**c. Adjustment.**

(1) 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 except at altitude when the mixture control may be used to obtain best power. An idle adjustment is provided to take care of slight production variations in the carburetors and engines. The small knurled screw 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. 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.

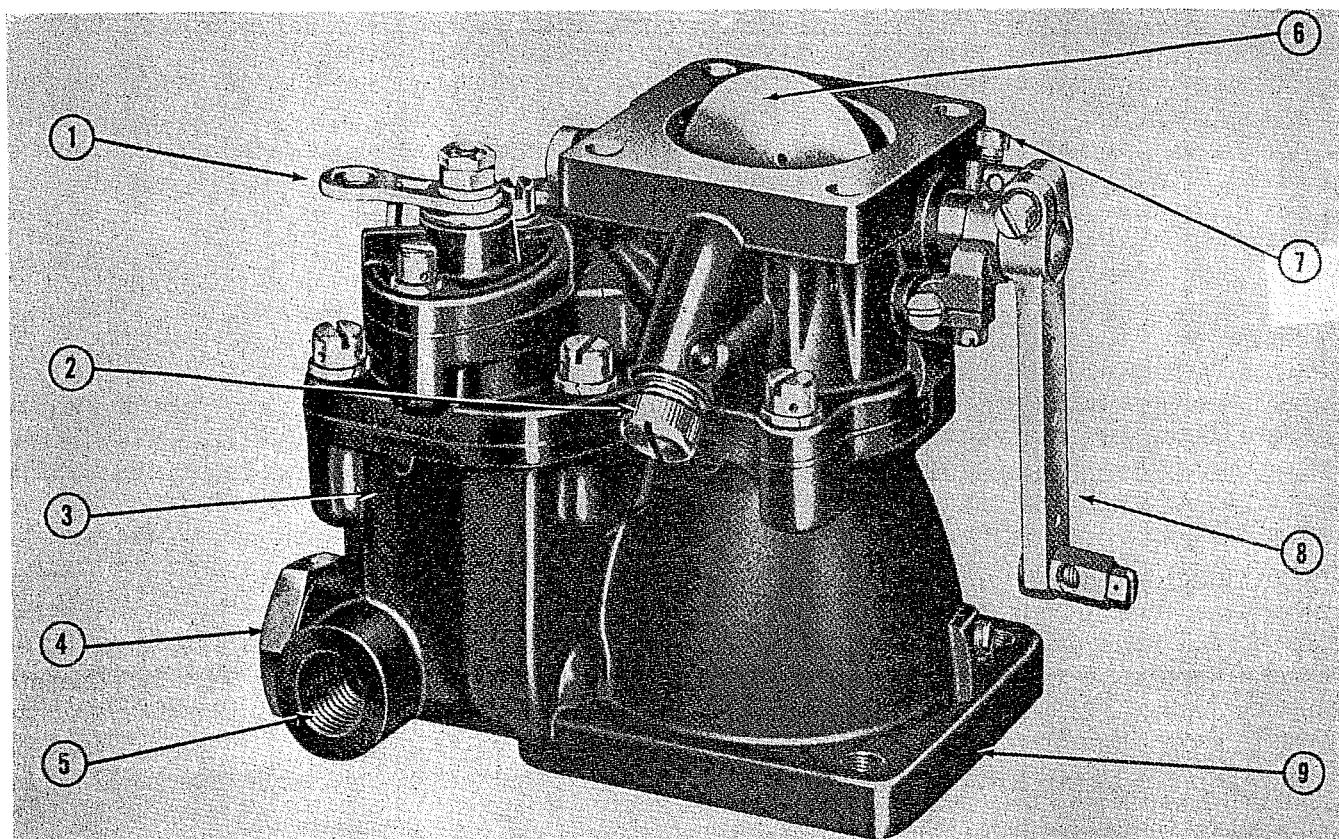
**d. Servicing.**

(1) 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 or the float chamber. The entire carburetor should also be inspected to see that all parts are tight and properly safety wired.

**e. Description and Functioning of Carburetors.**

(1) **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

**CARBURETOR SERVICE INSTRUCTIONS — Continued**



**Figure 47 — Stromberg Carburetor NA-S3A1**

- |                            |                                   |
|----------------------------|-----------------------------------|
| 1. Mixture Control Lever   | 6. Throttle Valve                 |
| 2. Idle Mixture Adjustment | 7. Idle Speed Adjustment          |
| 3. Float Chamber           | 8. Throttle Lever                 |
| 4. Strainer Retaining Plug | 9. Parts List Number Stamped Here |
| 5. Fuel Inlet              |                                   |

|                          |          |          |                               |        |        |
|--------------------------|----------|----------|-------------------------------|--------|--------|
| Engine Model .....       | C75-12   | C85-12   | Idle Discharge .....          | 58     | 58     |
| Continental No. ....     | 40059    | 40590    | Holes Up-Low .....            | 56     | 56     |
| Stromberg No. ....       | 380162-1 | 380167-2 | Idle Tube Feed Hole .....     | 68     | 68     |
| Venturi .....            | 1-5/16"  | 1-3/8"   | Idle Air Bleed M.B. ....      | 60     | 60     |
| Main Discharge Jet ..... | 22       | 22       | Float Needle Valve Seat ..... | 383911 | 383911 |
| Main Air Bleed .....     | 60       | 60       | Float Level .....             | 13/32  | 13/32  |
| Main Metering Jet .....  | 46       | 45       |                               |        |        |

period of service to install new parts. For information concerning the proper level see the section of these instructions pertaining to "Overhaul."

(2) **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 R.P.M. to full throttle speed.

(3) **MIXTURE CONTROL:** The altitude or mixture control is of the back suction type which may be used to lean out the mixture by a portion of the venturi suction on the fuel in the float chamber so that it opposes the suction in the venturi on the main discharge nozzle. This control consists of a venturi suction channel from

**CARBURETOR SERVICE INSTRUCTIONS — Continued**

above the mixture control plates to the throttle bore at the upper edge of the venturi, a manually operated valve, and the necessary passages to the float chamber and venting system. The valve consists of a lower and upper valve plate, the former fastened in place and the latter free to move. When the control is in the full rich position, holes in both the upper and lower plates mate and air is allowed to flow through the plates from the space behind the venturi. As the mixture control is moved from the full rich position to the full lean position, a series of progressively smaller holes open up over the hole in the lower plate, thereby restricting the flow of air from the vent space behind the venturi and increasing the suction on top of the fuel in the float chamber and a leaner mixture is the result.

(4) **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 R.P.M.

**f. Overhaul.**

(1) **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 of heater taken off, the halves of the carburetors may be separated by the removal of the fillister 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 mixture control may be disassembled by removing the two fillister head screws holding the cover to the throttle body. 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.

(2) **INSPECTION AND CLEANING:** The bodies and all parts should be thoroughly cleaned in gasoline, and all passages blown out with compressed air.

The float needle valve and seat should be inspected and if either part is worn both parts should be replaced as it is very difficult to fit a new needle to an old seat or a new seat to an old needle. The needle valve is made of stainless steel and the seat of naval brass so that under ordinary service these parts should last for many hundreds of hours. Check the main metering jet and float needle seat to make sure they are tight. It is important that the throttle valve fits in the barrel tightly when in the closed position and that the lower edge be flush with the top of the lower idle hole. If it is found necessary to replace either of the mixture control plates, they should be lapped in with a very fine lapping compound to eliminate any possibility of air leakage.

(3) **REPLACEMENTS:** If due to accident or wear after long service it is necessary to make replacements, the parts should be obtained from the Bendix Products Division, Stromberg Carburetor Section, 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 the sizes of some parts are different for different engines. Ordering by part numbers as shown in the service parts list and also giving the

**CARBURETOR SERVICE INSTRUCTIONS — Continued**

serial number of the carburetor will greatly facilitate service.

(4) 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 square inch (19" gasoline at .710 Sp. Gr.) 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  $5/64$ ".

The mixture control lever should be correctly pinned to the stem so that when the stop is in the full rich position, the large hole in the upper plate lines up with the hole in the lower plate. The parts of the carburetor should be safety wired before installing on an engine.



# CONTINENTAL C75 AND C85 ENGINES

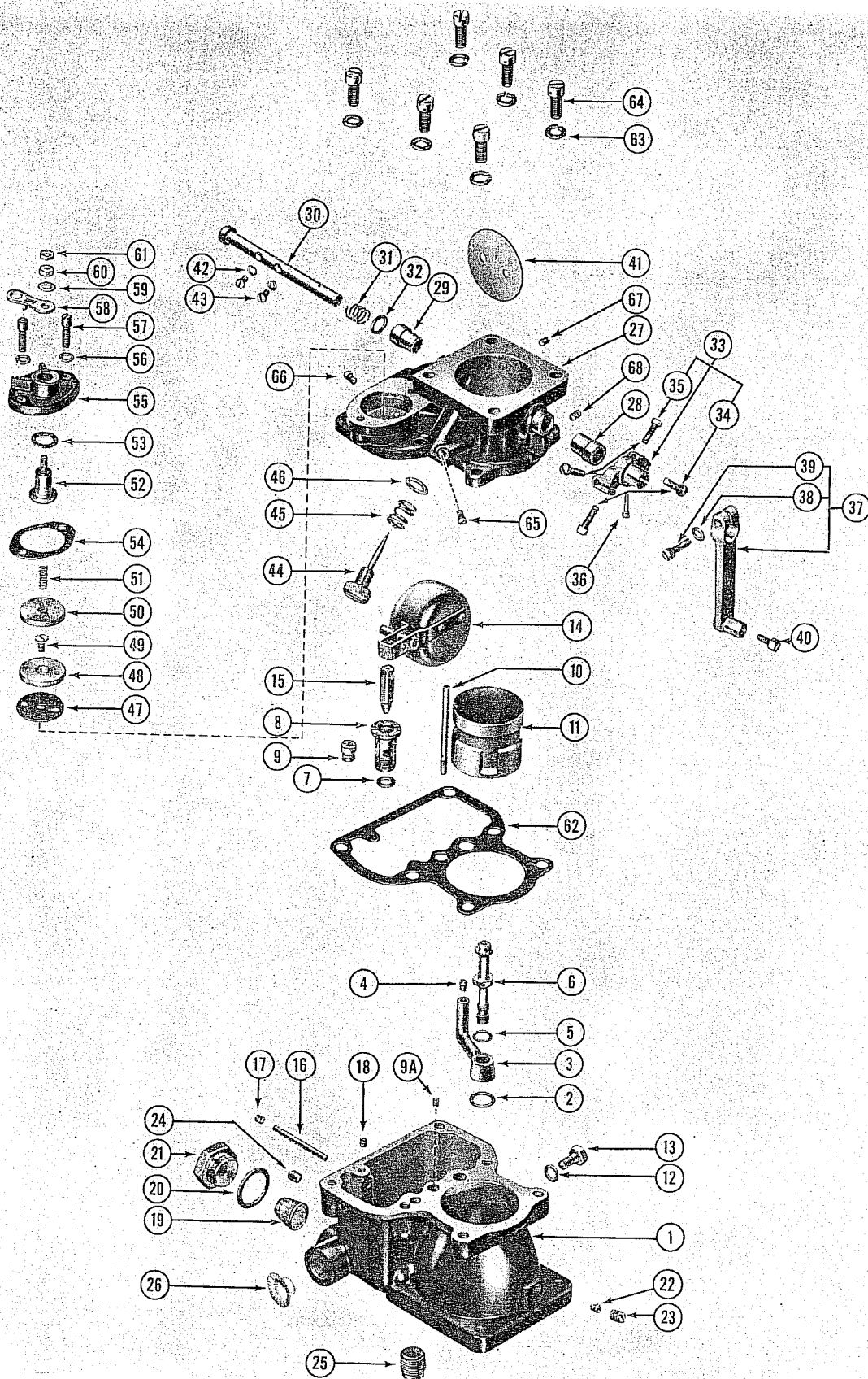


Figure 48 — Exploded View of Stromberg NA-S3A1 Series Carburetor

# SERVICE PARTS LIST

## STROMBERG NA-S3A1 CARBURETOR

Date: 2-20-46

| Figure Number | Index Number | Bendix Part Number   | Carburetor Used On and Number Required |       |        |         |         |        | Nomenclature   |
|---------------|--------------|--|--|-------|--------|---------|---------|--------|--|
|               |              |  | NA-S2                                  | NA-S3 | NA-S3A | NA-S3A1 | NA-S3A1 | NA-S3B |  |
| 48            |              | A-15202<br>A-15203<br>A-18003<br>A-18173<br>380168<br>380156 | 1                                      | 1     | 1      | 1       | 1       | 1      | Carburetor Assembly—NA-S2<br>Carburetor Assembly—NA-S3<br>Carburetor Assembly—NA-S3A<br>Carburetor Assembly—NA-S3A1<br>Carburetor Assembly—NA-S3A1<br>Carburetor Assembly—NA-S3B |
|               | 1            | P-2885   | 1                                      | 1     | 1      | 1       | 1       | 1      | eBody—Main (variable idle air bleed)   |
|               | 2            | P-16537  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Main air bleed arm  |
|               | 3            | 384524   | 1                                      | 1     | 1      | 1       | 1       | 1      | Arm Assembly—Main air bleed  |
|               | 3            | P-61057  | 1                                      | 1     | 1      | 1       | 1       | 1      | Arm Assembly—Main air bleed  |
|               | 4            | P-16179  | 1                                      | 1     | 1      | 1       | 1       | 1      | Arm Assembly—Main air bleed  |
|               | 5            | P-5329   | 1                                      | 1     | 1      | 1       | 1       | 1      | eBleed—Main air  |
|               | 6            | P-16166  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Discharge nozzle and main air bleed arm   |
|               | 7            | P-12999  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Main discharge  |
|               | 8            | P-7881   | 1                                      | 1     | 1      | 1       | 1       | 1      | eNozzle—Float needle valve seat  |
|               | 9            | P-9201   | 1                                      | 1     | 1      | 1       | 1       | 1      | #Gasket—Float needle valve seat  |
|               | 9A           |  | 1                                      | 1     | 1      | 1       | 1       | 1      | #Gasket—Float needle valve seat  |
|               | 10           |  | 1                                      | 1     | 1      | 1       | 1       | 1      | eSeat—Float needle valve.  |
|               | 11           |  | 1                                      | 1     | 1      | 1       | 1       | 1      | eJet—Main metering   |
|               | 12           | P-12699  | 1                                      | 1     | 1      | 1       | 1       | 1      | eBleed—Idle channel reducer  |
|               | 12           | P-6580   | 1                                      | 1     | 1      | 1       | 1       | 1      | eTube Assembly—Idle  |
|               | 13           | P-16178  | 1                                      | 1     | 1      | 1       | 1       | 1      | eTube—Venturi  |
|               | 13           | 384537   | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Venturi set screw   |
|               | 14           | P-16156  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Venturi set screw   |
|               | 15           | 390077   | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Venturi set  |
|               | 16           | P-16160  | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Venturi set  |
|               | 17           | P-6387K  | 1                                      | 1     | 1      | 1       | 1       | 1      | Float Assembly   |
|               | 18           | P-16161  | 1                                      | 1     | 1      | 1       | 1       | 1      | Valve—Float needle   |
|               | 19           | P-12958  | 1                                      | 1     | 1      | 1       | 1       | 1      | Pin—Float fulcrum  |
|               | 20           | 174522   | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Float fulcrum pin   |
|               | 21           | P-14220  | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Float fulcrum pin set  |
|               | 22           | P-21472K   | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Strainer Assembly—Fuel   |
|               | 23           | P-60138K   | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Strainer plug   |
|               | 24           | P-60138K   | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Strainer  |
|               | 24           | P-6406   | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Headless screw (8-32)   |
|               | 25           | P-21475K   | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Headless screw (3/4-28)   |
|               | 25           | P-8505   | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Headless screw (3/4-28)   |
|               | 26           | P-19492  | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Headless screw (3/4-28)   |
|               | 27           |  | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Headless screw (5/16-24)  |
|               | 28           | P-16169  | 1                                      | 1     | 1      | 1       | 1       | 1      | Plug—Pipe (1/4 inch)   |
|               | 28           | P-16169-1  | AR                                     | AR    | AR     | AR      | AR      | AR     | Plug—Pipe (1/4 inch) (An913-2)   |
|               | 28           | P-16169-2  | AR                                     | AR    | AR     | AR      | AR      | AR     | Plug—Shipping  |
|               | 29           | P-16169  | 1                                      | 1     | 1      | 1       | 1       | 1      | eBody Assembly—Throttle (variable lower idle discharge hole)   |
|               | 29           | P-16169-1  | AR                                     | AR    | AR     | AR      | AR      | AR     | Bushing—Throttle shaft (standard)  |
|               | 29           | P-16169-2  | AR                                     | AR    | AR     | AR      | AR      | AR     | Bushing—Throttle shaft .005 in. OS on OD (first OS of P-16169)   |
|               | 30           | P-16151  | 1                                      | 1     | 1      | 1       | 1       | 1      | Bushing—Throttle shaft .010 in. OS on OD (second OS of P-16169)  |
|               | 30           | 384411   | 1                                      | 1     | 1      | 1       | 1       | 1      | Bushing—Throttle shaft (standard)  |
|               | 31           | P-16171  | 1                                      | 1     | 1      | 1       | 1       | 1      | Bushing—Throttle shaft .005 in. OS on OD (first OS of P-16169)   |
|               | 32           | P-16170  | 1                                      | 1     | 1      | 1       | 1       | 1      | Bushing—Throttle shaft (standard)  |
|               | 33           | P-15237  | 2                                      | 2     | 2      | 2       | 2       | 2      | Bushing—Throttle shaft .010 in. OS on OD (second OS of P-16169)  |
|               | 34           | P-2266   | 2                                      | 2     | 2      | 2       | 2       | 2      | Shaft Assembly—Throttle  |
|               | 35           | P-12375  | 1                                      | 1     | 1      | 1       | 1       | 1      | Shaft Assembly—Throttle  |
|               | 36           | P-5015   | 1                                      | 1     | 1      | 1       | 1       | 1      | Spring—Throttle shaft  |
|               | 37           | P-14710  | 1                                      | 1     | 1      | 1       | 1       | 1      | Spring—Throttle shaft spring   |
|               | 37           | 384244   | 1                                      | 1     | 1      | 1       | 1       | 1      | Washer—Throttle  |
|               | 38           | 901004   | 1                                      | 1     | 1      | 1       | 1       | 1      | Stop Assembly—Throttle   |
|               | 39           | P-6588   | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Throttle stop  |
|               | 40           | P-21244  | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Throttle stop  |
|               | 41           | P-61314  | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Throttle shaft and stop taper  |
|               | 41           | P-15229  | 1                                      | 1     | 1      | 1       | 1       | 1      | Lever Assembly—Throttle  |
|               | 41           | 384538   | 1                                      | 1     | 1      | 1       | 1       | 1      | Lever Assembly—Throttle  |
|               | 41           | P-61385  | 2                                      | 2     | 2      | 2       | 2       | 2      | Lockwasher—Throttle lever screw  |
|               | 42           | 901045   | 2                                      | 2     | 2      | 2       | 2       | 2      | Screw—Throttle lever   |
|               | 43           | P-16173  | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Throttle lever wire connector  |
|               | 44           | P-16177  | 1                                      | 1     | 1      | 1       | 1       | 1      | Valve—Throttle   |
|               | 45           | P-11556  | 1                                      | 1     | 1      | 1       | 1       | 1      | Valve—Throttle   |
|               | 46           | P-15225  | 1                                      | 1     | 1      | 1       | 1       | 1      | Valve—Throttle   |
|               | 47           | P-61035  | 1                                      | 1     | 1      | 1       | 1       | 1      | Lockwasher—Throttle valve screw  |
|               | 48           | P-61031  | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Throttle valve   |
|               | 49           | P-61038  | 1                                      | 1     | 1      | 1       | 1       | 1      | Valve Assembly—Idle needle   |
|               | 50           | P-61030  | 1                                      | 1     | 1      | 1       | 1       | 1      | Spring—Idle needle valve   |
|               | 51           | P-8770   | 1                                      | 1     | 1      | 1       | 1       | 1      | Washer—Idle needle valve spring  |
|               | 52           | P-61034  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Lower mixture control plate   |
|               | 53           | P-15505  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Lower mixture control valve   |
|               | 54           | P-61033  | 1                                      | 1     | 1      | 1       | 1       | 1      | Plate—Lower mixture control valve plate  |
|               | 54           | 384425   | 1                                      | 1     | 1      | 1       | 1       | 1      | Screw—Upper mixture control valve  |
|               | 55           | P-61037  | 1                                      | 1     | 1      | 1       | 1       | 1      | Plate—Mixture control valve plate  |
|               | 55           | 384407   | 1                                      | 1     | 1      | 1       | 1       | 1      | Spring—Mixture control   |
|               | 56           | P-15350  | 2                                      | 2     | 2      | 2       | 2       | 2      | Stem—Mixture control   |
|               | 57           | P-21854  | 2                                      | 2     | 2      | 2       | 2       | 2      | Gasket—Mixture control stem  |
|               | 57           | P-61289  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Mixture control cover   |
|               | 58           | P-16289  | 1                                      | 1     | 1      | 1       | 1       | 1      | Gasket—Mixture control cover replacement plate   |
|               |              |  |  |       |        |         |         |        | Cover Assembly—Mixture control   |
|               |              |  |  |       |        |         |         |        | Plate—Mixture control cover replacement  |
|               |              |  |  |       |        |         |         |        | Washer—Mixture control cover screw   |
|               |              |  |  |       |        |         |         |        | Screw—Mixture control cover  |
|               |              |  |  |       |        |         |         |        | Screw—Mixture control cover replacement plate  |
|               |              |  |  |       |        |         |         |        | Lever—Mixture control  |

e—Variable Parts. Refer to Specification Sheet for Size.  
 AR—As Required.

OS—Oversize.  
 OD—Outside Diameter.

# CONTINENTAL C75 AND C85 ENGINES

## PARTS LIST — Continued

| Figure Number | Index Number | Bendix Part Number | Carburetor Used On and Number Required |       |        |         |          |                               | Nomenclature                                |
|---------------|--------------|--------------------|--|-------|--------|---------|----------|-------------------------------|---|
|               |              |                    | NA-S2                                  | AN-S3 | NA-S3A | NA-S3A1 | NA-S03A1 | NA-S3B                        |   |
| 48            | 59           | P-20364            |  |       |        | 1       | 1        |                               | Washer—Mixture control lever nut (AN960-10) |
|               | 60           | P-60834            |  |       |        | 1       | 1        |                               | Nut—Mixture control lever (AN315-3R)        |
|               | 61           | P-20170            |  |       |        | 1       | 1        |                               | Nut—Mixture control lever lock              |
|               | 62           | P-16155            | 1                                      | 1     | 1      | 1       |          | 1                             | Gasket—Main body to throttle body           |
|               | 62           | 384535             |  |       |        |         | 1        |                               | Gasket—Main body to throttle body           |
|               | 63           | P-15344            | 6                                      | 6     | 6      | 6       | 6        | 6                             | Lockwasher—Main body to throttle body screw |
|               | 64           | P-6550             | 6                                      | 6     | 6      | 6       | 6        | 6                             | Screw—Main body to throttle body            |
|               | 65           | P-21472K           | 1                                      | 1     | 1      |         | 6        |                               | Plug—Headless screw (8-32)                  |
|               | 66           | P-21472K           | 1                                      | 1     | 1      |         |          |                               | Plug—Headless screw (8-32)                  |
|               | 67           | P-60138K           | 1                                      | 1     |        |         |          |                               | Plug—Headless screw (1/4-28)                |
| 68            | P-8460       |                    |  | 1     |        |         |          | Plug—Headless screw (3/16-24) |   |