THE LUSCOMBE ENDOWMENT, Inc.
2487 S GILBERT RD., STE. 106
GILBERT, AZ 85295
(480) 650-0883
January 20, 2011

Luscombe Changes, Firewalls, and Parts Manuals

Many of you who have called Doug Combs or Donna Losey, know that our service is challenged bythe MANY production changes in the Luscombe airplane during its various production runs. Three different factory(s) have documented some 6500 changes to the Luscombe model 8 design while producing just over 6000 airplanes between 1938 and 1962. That is a LOT of changes, most of which were minor in nature, or done for production convenience.

Many changes were temporary; undertaken simply to accomplish continued production while a vendor was shut down, or due to a shortage of some aluminum extrusion, bearing, or a rubber component. Quite obviously, many of these changes were not reflected in the various iterations of the parts manuals available to pilots and mechanics trying to maintain the airplanes. There are two parts manuals in common circulation, though others do exist.

The most commonly used and popular manual is the Luscombe Silvaire manual produced circa 1959, which contains the best depictions and exploded views of the airplane as produced in 1950-1962 (more or less). This manual has a great depiction of the metal wing and both styles of landing gear, as well as depictions of both the round and square tail structures. It also has both the wing tank and fuselage tank fuel system depictions, and the trim system, flap system, and all of the various control systems with relatively easy-to-read depictions.

The second most common manual is the pre-war Luscombe Owner's Service manual which contains airframe section drawings with phantom lines that depict and identify many parts, sub-parts, and components used in the early airplanes as produced in Trenton NJ. The wing depiction in this manual is of the pre-War rag wing design. Because the post -War rag wing was a transition design supplanted by the metal skinned wing design, we know of no parts manual produced that details and depicts the post war rag wing construction. The Luscombe Owner's Service Manual includes some detail on the bungee trim, the early Budd stainless firewall, the early stick assemblies and early landing gear.

TRIVIA

It is notable that the sheet metal repairs section in this West Trenton Luscombe Manual was plagiarized to develop the CAM 18 manual that later became AC43.13-1B, both of which retained much of the original Luscombe repair language and generic criteria for rivet spacing and repairs in the 'sheet metal repair section'.

We have also identified two other "Parts" manuals that were produced in West Trenton, NJ (1940), and Dallas TX (1945-46).

Firewalls

How does all this relate to firewalls? Many of you may remember an article / warning I did last year about bad aircraft paperwork and an airplane that was grounded for a year because the FAA was unable to identify legitimate modifications that had been in service for 45 years and 1000 flight hours.

Ultimately, they determined that several FAA screw ups led to the problem. But usually that is not the case. The crux of this problem was that the IA and FAA inspector was provided a copy of the 1959 parts manual that did not describe the early Budd stainless steel firewall installed in the airplane around 1960 during a repair. When the airplane looked different from that depiction in the parts manual, the young and inexperienced FAA inspector determined that the repair was 'bogus' or otherwise improper.

To prove out this case We had to review the FAA records and Luscombe Master drawing list to demonstrate that the FAA was wrong, and that there were many production changes to firewalls throughout the history of Luscombe production:

FAA letter : ITEM #2: "Station #1 bulkhead does not meet the type design for model 8A per 14CFR§21.31 (a), (b), (c), (e), 23.307(a). Reference Luscombe Parts manual." We will address this "Type Design" issue from the FAA letter's last reference to first reference.

"Reference Luscombe Parts manual"

Luscombe parts manual definition. There are several different Luscombe parts manuals and illustrated parts lists. The first parts depictions were simple enumerated sections within the "Service manual", (circa 1940) later versions in 1946, 1948, and 1959, were separate illustrated parts listing catalogs (IPC)s (circa 1946, and circa 1959) NONE of these parts listings enumerated ALL of the various configurations and changes made during the different model years, model changes, and those different production 'cycles' prior to 1946.

From 1938-1946, Luscombe drawing changes were plentiful, and mimicked those in the automotive industry with numerous changes to upholstery, appurtenances, creature comfort, and those structural changes needed to accommodate different engines or various changes to engine accessories. (The firewall installed appears to be a firewall design like those undertaken to accommodate the early and rare, "Continental 65-9 or 75

-9" engines equipped with no generator, but utilizing a starter- this was a modification preferred by seaplane operators, but also requested by some land plane owners.)

The most widely distributed Luscombe 'Parts Manual', is that version published in 1959, and later reproduced by Univair, by The Luscombe Foundation, and by others seeking to assist owners with their maintenance needs and communications related to parts procurement. We believe that version of the IPC was the reference cited in #2 of the FAA letter. We found a copy of that 1959 IPC in the aircraft paperwork delivered to us for review.

The 1959 parts manual depicts only two, of at least 7 different firewall configurations approved by the CAA, and used by Luscombe during its production runs**.-- However** that same parts manual at items 23-30, figure 3, page 20; ALSO describes and discusses alternate firewall configurations and various part numbers for those configurations.

We will discuss these different firewall part numbers. This discussion will establish that a variety of different part numbers are legitimate, "CAA or FAA approved" configuration part numbers that can be legally installed into Luscombes.

The CAA/FAA approved data / drawings described by **CFR § 21.31, (a),** were also required by CAR 4.032. These are listed by model & configuration in the Luscombe Drawing list(s) that defined the, "then" current production. These drawing lists may also depict obsolete production part numbers and various configurations that were approved by the CAA & FAA at different times for use in the design.

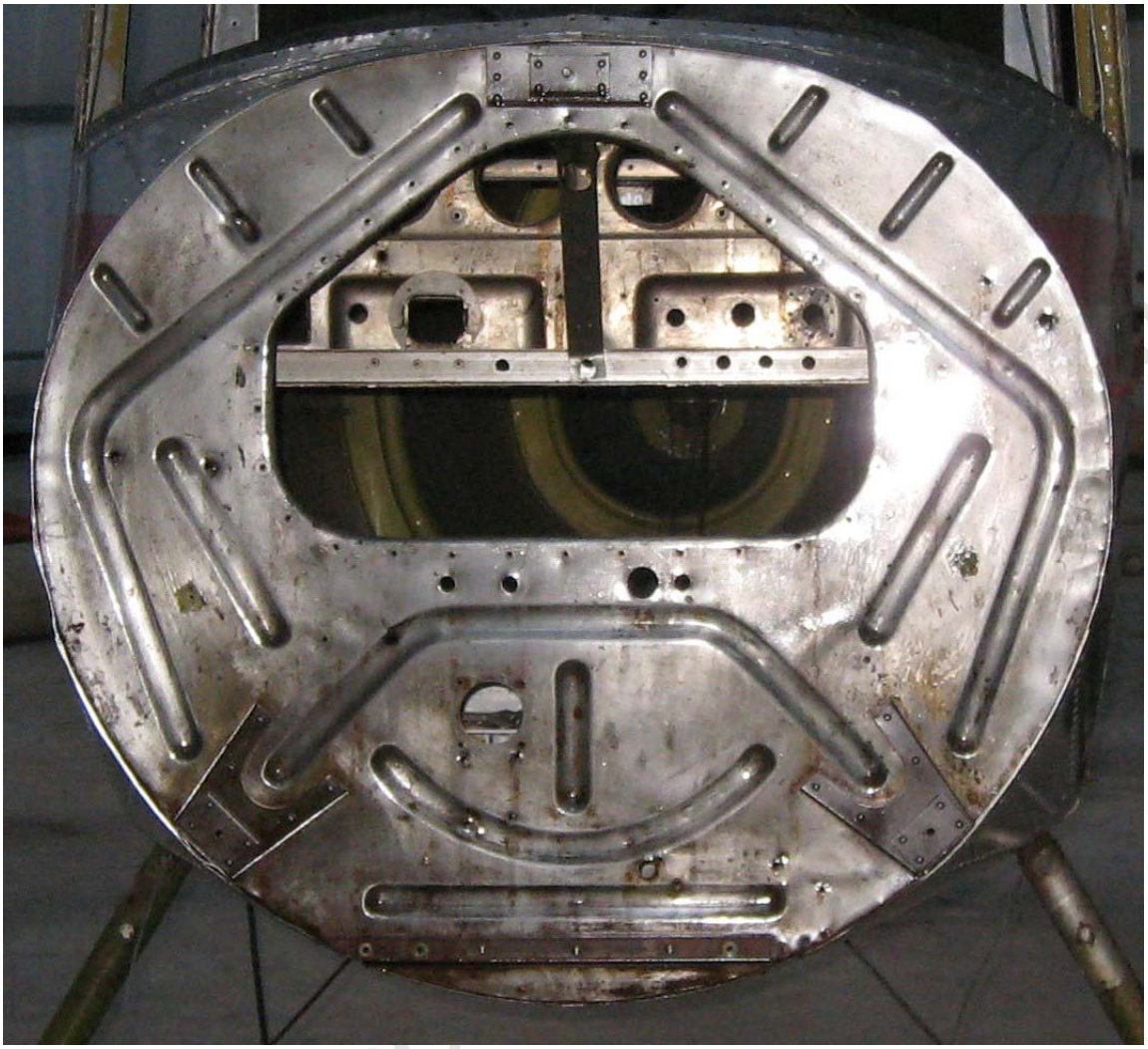
The BEST LISTING of firewall configurations is the Luscombe master drawing list that identifies all of the FAA approved configurations as they were built at different times. In consulting these Luscombe Master drawing list files, we found at least SEVEN different firewall configurations were utilized in the Luscombe 8 series airplanes. Five of these firewall/bulkhead part numbers pre-date those firewalls depicted in the 1959 Illustrated Parts Catalog, and one of those appears to be the firewall configuration installed in the subject airplane, (Part number 48124, or PN 581020). Let us now look at these different firewall configurations- ALL of which have been installed in various Luscombe models.

Luscombe Master drawing list 1938-1945. Includes Luscombe Models 8, 8A, 8B, 8C, 8D., PN **48044 Firewall** *1 first firewall configuration
Stainless or Mild steel.

PN **48124, Firewall assembly** *2 second firewall configuration
Budd Stainless steel (spot welded) Shown in Early Service manual / Parts guide- This unit may be equipped with a trapezoidal cut-out PN581021 about 2/3 from the bottom that allows space for the starter and rear mounted magnetos on a Continental -9 or a -12 engine accessory case where the starter is extended to the rear.

Page 6a, PN **581020, Firewall for starter** *3 third firewall configuration

A mild steel/Stainless steel stamped firewall developed for aircraft with starters. This unit is equipped with a trapezoidal cut-out about 2/3 from the bottom that allows space for the starter and rear mounted magnetos on a Continental -9 or a -12 engine accessory case where the starter is extended to the rear. [5]



PN481021, Cover- Magneto

A trapezoidal steel recess that is installed into the magneto cutout for space to install the starter and rear mounted magnetos on a Continental -9 or a -12 engine accessory case where the starters are extended to the rear.

Page 6b, **PN 581055, Firewall, Lycoming** *4 fourth firewall configuration

Firewall designated for the 8B with a Lycoming 65- Uses different piercings, but otherwise similar to the PN581020

Page 6b, PN 281049, cover plate, firewall

Removable magneto access plate for use with the Lycoming(65) firewall

Luscombe master drawing list, 1946-60, includes later production Luscombe models 8A. Page 5, **PN 581020, Firewall for starter**

Previously described above-

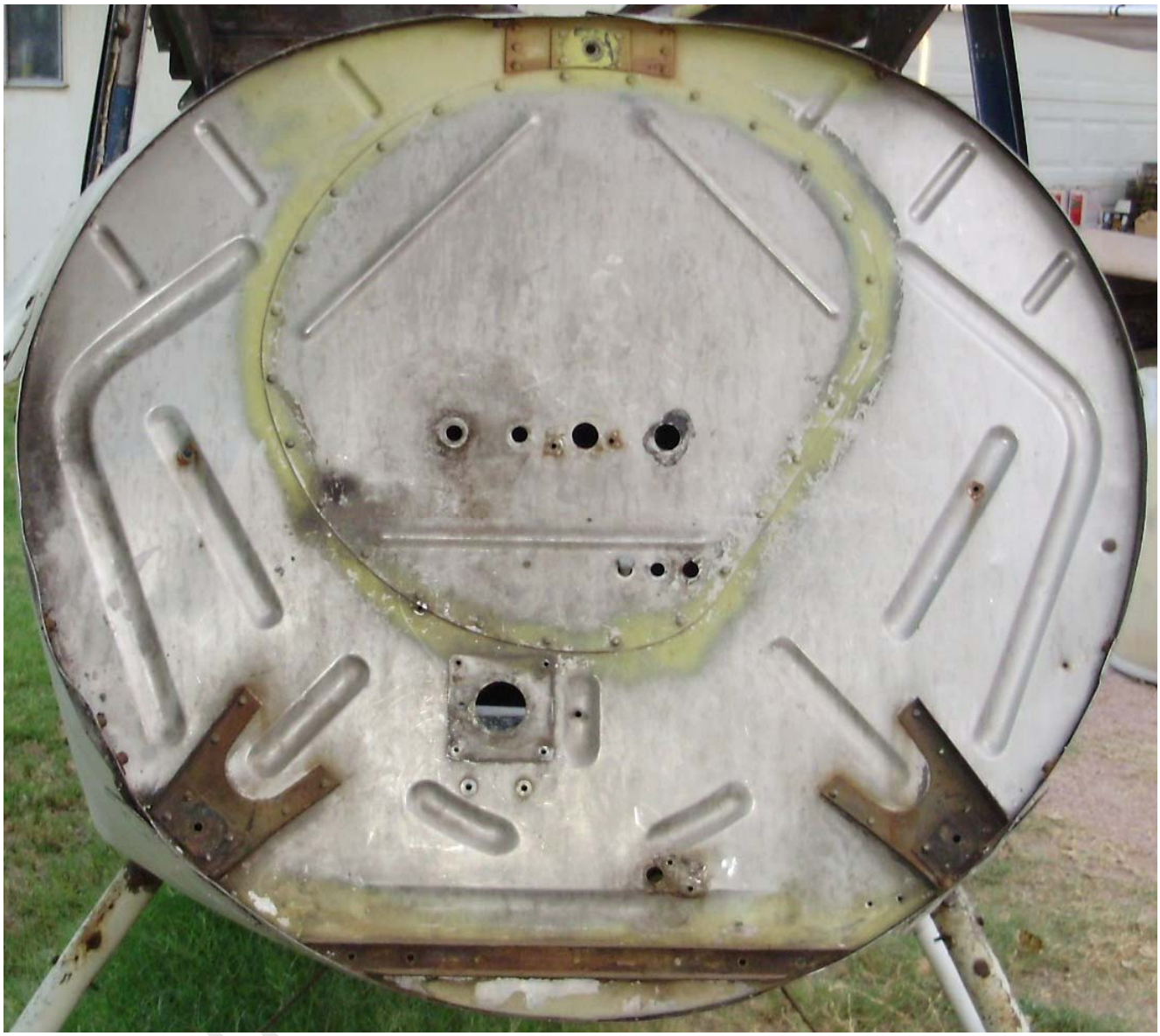
Page 6, **PN081113, Firewall, Fuselage** *5 fifth firewall configuration

This is a Flat firewall stamping blank from which 581020, 081158, and 081159 are made. This part can also be installed without cutting ANY recess holes or riveted lap joints- making the fuselage structure lighter.

PN481116, Cover, Fuselage firewall, 65 HP.

PN081159, Firewall Fuselage 65 HP, *6 sixth firewall configuration

A mild steel/Stainless steel stamped firewall developed for aircraft with starters and generator systems. This unit is equipped with an irregular 'round' cut-out behind the engine that allows space for the starter and rear mounted magnetos on a Continental -12 engine accessory case where the starters, magnetos and generator drive areas are extended to the rear. For the 65HP installation, this recess cut-out is fitted with a FLAT cover plate.



Luscombe master drawing list, 1946-60, includes production Luscombe models 8E.
PN081113, Firewall, Fuselage

Previously described above

PN581158, Recess, Firewall Fuselage 85 HP,

This recess is about 4" deep, and replaces the "flat" coverplate

PN081160, Firewall Fuselage 85 HP, *7 seventh firewall configuration

A mild steel/Stainless steel stamped firewall developed for aircraft with starters and generators. This unit is equipped with an irregular 'round' cut-out behind the engine that allows space for the starter and rear mounted magnetos on a Continental -12 engine accessory case where the starters, magnetos and generator drive areas are extended to the rear. For the 85HP installation, this recess cut-out is fitted with a recessed

cover plate PN581158 using rivets on approximately a 2" spacing. [2]

CONCLUSION / RESOLUTION FAA item #2: Because the airplane is apparently equipped with a factory style firewall and overlay with a cut-out recess such as is identified on the manufacturer's master parts drawing list; and because it uses rivet spacing equal to or closer than the manufacturers original installation[1], and because **the installation conforms with the CAA/FAA approved type design data and CAR 04, it requires no further analysis regarding item #2 of the FAA letter dated April 27, 2009**.

We trust that the above analysis will provide some guidance and assistance in identifying your firewall configuration, or explaining its apparent differences from the parts manual(s) in use. Should you have further questions or need technical help, please remember that the Luscombe Endowment and Classic Aero LLC are available to assist you in Luscombe questions and repairs. Call us at 480-650-0883 or 480-917-0969, or write Mr.Luscombe@luscombe.org

Doug Combs

Cc file

---

[1] The Luscombe Service manual, Section IV "REPAIRS" at "paragraph D", states, "Rivets in a repair or patch should be the same size and spaced the same distance apart as in the original structure." From an engineering standpoint, we know that if the rivet/fastener spacing is closer, or the diameter is larger than the original fastener spacing or the surrounding fastener spacing, the joint will meet or exceed the original design loads.