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SERVICE LETTER 19-04-30

Date Released:	June 20, 2019
Date Effective:	June 20, 2019
Subject:	Elastomer nose gear leg and engine mount retrofit
Affected Models:	Tricycle gear RV-7A/9A
Required Action:	None – Optional change
Time of Compliance:	N/A
Supersedes Notice:	NONE

Synopsis:

A new nose gear and engine mount design for RV-7A and RV-9A airframes, which utilizes elastomer disks for shock absorption, was introduced in June 2019. The new design is compatible with Dynafocal I (D1) engine mounts on which certain O-320/IO-320/O-360 vertical induction engines and IO-360 vertical or horizontal induction engines are installed.

As a result of this release, two different engine mount/gear system options are now available for the RV-7A and RV-9A:

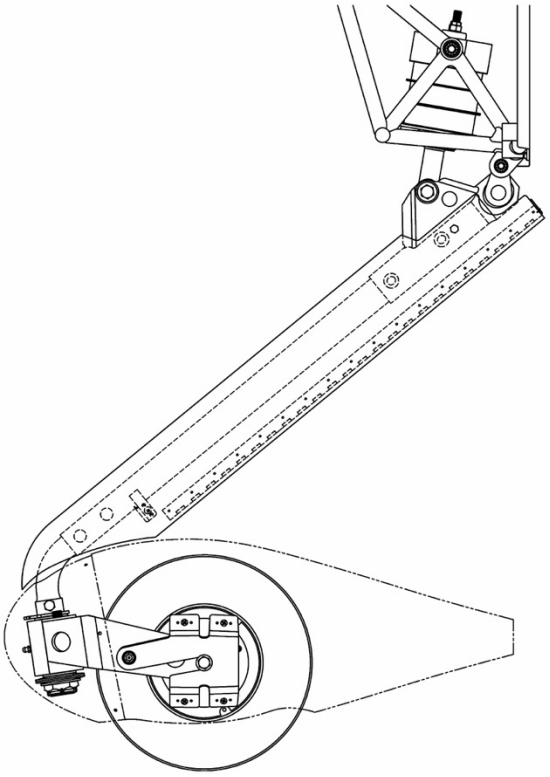
- The original-style system that has been available and used for the past few decades
- The new-style system, which is designed similarly to the engine mount and nose gear found on the RV-10 and RV-14A

New Installations:

Van's will ship the new mount/nose gear system as the default on newly ordered kits, but the original style mount/gear will remain available to order as an optional configuration for new builders. Some of the differences between the two systems are described later in this document.

Note that while RV-6A builders/owners could potentially use the RV-7A/9A plans and instructions and adapt to their installations, there is greater variability in RV-6A structures, which implies greater variation in terms of fitment.

The RV-8A uses an entirely different different engine mount and gear – this option does not apply to that aircraft model.



Retrofit Considerations:

There are several important points to consider before embarking on a retrofit project. While installation of the new mount/gear system during a new airplane build is simple, retrofits to existing aircraft will likely be complex. The list of items that may require changes and how much work is involved will vary – sometimes significantly – between individual aircraft. Therefore, our initial advice for owners of flying airplanes is to weigh the following information while deciding whether to take on this project.

You should consider trade-offs and potential necessary changes when deciding which system is appropriate for your aircraft. These include:

- Overall heavier total weight of the new system; redistribution of weight and associated CG impacts
- Potential modification and/or relocation of various aircraft components where needed to ensure safe weight and balance
- Potential need to modify and/or replace significant aircraft parts and assemblies forward of the firewall
- Potential changes to cowl airflow, engine cooling and aircraft speeds

This new-design gear system represents an evolutionary change, which Van's Aircraft has been asked by customers to provide. The design is adapted directly from our experience with the RV-10 and RV-14A engine mounts/gear and includes a few characteristic features from those systems, including an elastomer shock-dampening system at the connection of the gear leg to the engine mount and changes to the gear leg attachment mechanism, which allows the gear leg to pivot/shift differently in a severe gear-overstress scenario.

The new design weighs more, requires potentially significant adjustments to several major parts FWF when retrofitted to an existing aircraft, and in some cases (specifically where the existing aircraft has a CG close to the forward limits) may require a lightweight battery replacement and/or relocation of the battery (or other similar changes) in order to properly accommodate and configure safe aircraft weight and balance.

By way of illustration, during installation of the new mount and gear system on the Van's Aircraft RV-9A factory demonstrator aircraft, the following changes were measured before and after the modifications described in this service letter had been completed.

NOTE: Your aircraft will not match these weight and balance figures; this information is taken from a single aircraft and is provided for illustration purposes only. You will need to re-weigh your aircraft and complete a new weight and balance document upon completion of your project.

- **Empty weight:** Increased from 1088 lbs to 1093 lbs (+5 lbs)
- **Nose wheel arm:** Moved forward 1.18 inches
- **CG in specific typical max-gross-weight loading scenario:** Moved forward from 81.447 inches (21.60%) to 81.174 inches (21.08%)
- **Nose wheel weight measured in specific typical max-gross-weight loading scenario:** Increased from 318.0 lbs to 333.3 lbs (+15.3 lbs)
- **Cooling changes:** Due to the changes to the engine mount and gear structure near the exit area of the cowl, exit airflow was reduced. Louvers were added to increase exit airflow and properly cool the engine. Net result on the demonstrator aircraft after all modifications including louvers was slightly lower operating engine temperatures than before the changes, with improvement especially noted during climbs. Airspeed was unaffected.

It is not possible for Van's to predict specifically what will need to be adjusted or replaced on any given aircraft in a retrofit scenario, due to the custom-fit nature of individual aircraft components. Therefore, it is important when starting this project to account for the most costly/time-consuming scenario. Detailed, comprehensive 3D-modeling capability and design tools in use today were not available when many of these kits were originally designed. As such, exact fitment of major interdependent parts varies from one aircraft to the next. In addition, a wide variety of engines are used on these aircraft, which further complicates the equation. Older engine mounts, manufactured by different companies over time, were custom-fit to each airplane when installed. For that reason, it’s not possible to build a new engine mount that will exactly match the ones it is replacing.

While a 1/4 inch or so variance in the location/position of the engine in a given dimension(s) may not affect W&B significantly, that same geometric variance can have a major impact on important details like spinner, cowl and baffle fitment and may require significant rework or replacement of affected parts. This is the primary reason we often advise aircraft owners not to replace a cracked engine mount unless it is determined to be unrepairable: Better to properly repair the existing part where appropriate, assuming it's serviceable, because replacing the engine mount with a new one often results in a need to rework the cowling, spinner and other parts due to engine mount geometry differences from one mount to the next. Such a fix is more akin to major surgery than a simple doctor’s office visit.

When initiating this project, one will of course already be aware of the need to replace the engine mount, gear leg and fairings. But one should also be prepared to modify or replace and re-fit the filtered air box, engine cowling and baffles, engine control cables and the spinner. It may be necessary to modify the exhaust geometry depending on extent of dimensional changes, and (only in extreme cases) replace the firewall structure. Be prepared to re-paint fiberglass and metal parts that have been replaced or modified.

In other words, performing a mount/gear retrofit is not just a simple "swap-out-a-few-parts" project. Rather, it's a significant re-work effort, the full scope of which is determined while actually performing the work described below.

Repairing or replacing a damaged engine mount:

Never try to repair an engine mount that has been broken and is deemed unsafe to repair. If your existing engine mount is damaged and unrepairable, now is a good time to determine whether you want to perform your repair with the original mount/gear system or the new system, since the project will likely be significant either way.

Owners who wish to upgrade to the new design should follow the procedures contained in this service letter. Specific steps required for determination, adjustment and replacement of parts that no longer fit are the responsibility of the person doing the work.

Materials Required:

The following materials are required to complete the steps necessary to achieve compliance with this Service Letter:

- **7A/9A DYNA I MNT KIT RETRO:** For use with carbureted and fuel-injected engines configured with horizontal induction

- **Plus, one of the following as applicable:**

    - **7A/9A DYNA I MNT ADD CARB:** For use on installations with carbureted engines
    - **7A/9A DYNA I MNT ADD FI:** For use on installations with fuel-injected engines configured with horizontal induction

Method of Compliance:

Step 1: Remove cowling and remove the engine from engine mount (support the aft end of the aircraft to prevent it from tipping while the engine is removed).

Step 2: Remove the engine mount from the firewall.

Step 3: Use a 3/8 diameter bolt to center WASHER-00018 on one of the four outboard engine mount attachment points on the forward side of the firewall. Use a fine point marker to trace the 1-1/4 diameter circumference of the washer on the firewall. Repeat for the remaining three outboard attachment points.

Step 4: Use a 3/8 diameter bolt to center WASHER-00019 on one of the two bottom, inboard engine mount attachment points. Trace the 1-3/8 diameter circumference of the washer on the firewall. Repeat for the remaining bottom, inboard attachment point.

Step 5: Drill firewall penetration holes as necessary. See DWG 19, "FIREWALL PENENTRATION POINTS." Use a step drill with plenty of lubricant (e.g., Boelube) and keep the drill speed low. Back-up the firewall with a piece of wood while drilling.

Plug any hole that will no longer be used with the appropriately sized, stainless steel firewall plug (e.g., FF 5/8 FIREWALL PLUG available from Van's Aircraft). Seal around the plugs with fuel tank sealant or silicone sealant.

Step 6: For carbureted engines, drill the F-982E Access Plate for the new carb. heat and vertical induction alt. air cable locations. See DWG 34A.

Step 7: Drill out the two indicated firewall rivets next to both lower, outboard engine mount attachment points. See Figure 1.

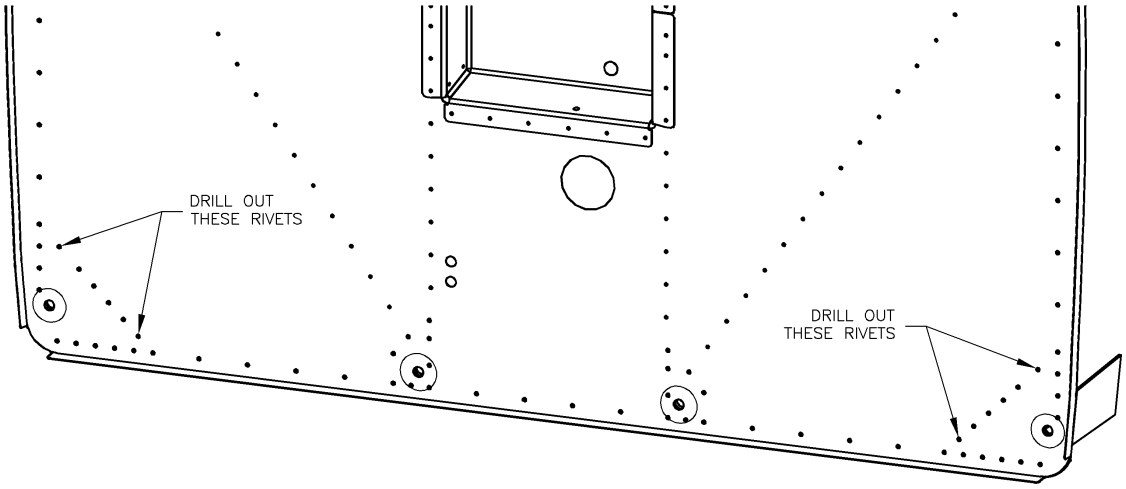


FIGURE 1: DRILL OUT FIREWALL RIVETS

NOTE: Completing the following steps that describe adjusting and drilling the engine mount will be easier with two people.

Step 8: Place the WD-00740 Engine Mount against the firewall. Secure at the top with duct tape attached to the engine mount and to the F-7106 Forward Top Skin; this will hold the top of the engine mount against the firewall. Support at the bottom with two small wood blocks between the bottom flange of the firewall and the outboard members of engine mount that roughly parallel the flange. Since these members are not quite horizontal, the engine mount can be adjusted vertically by moving the blocks inboard or outboard along the firewall flange.

Step 9: Slip the VA-270 Support Plates between the firewall and engine mount with the circular cut-out in the plates capturing the outboard engine mount bushings as shown in Figure 2.

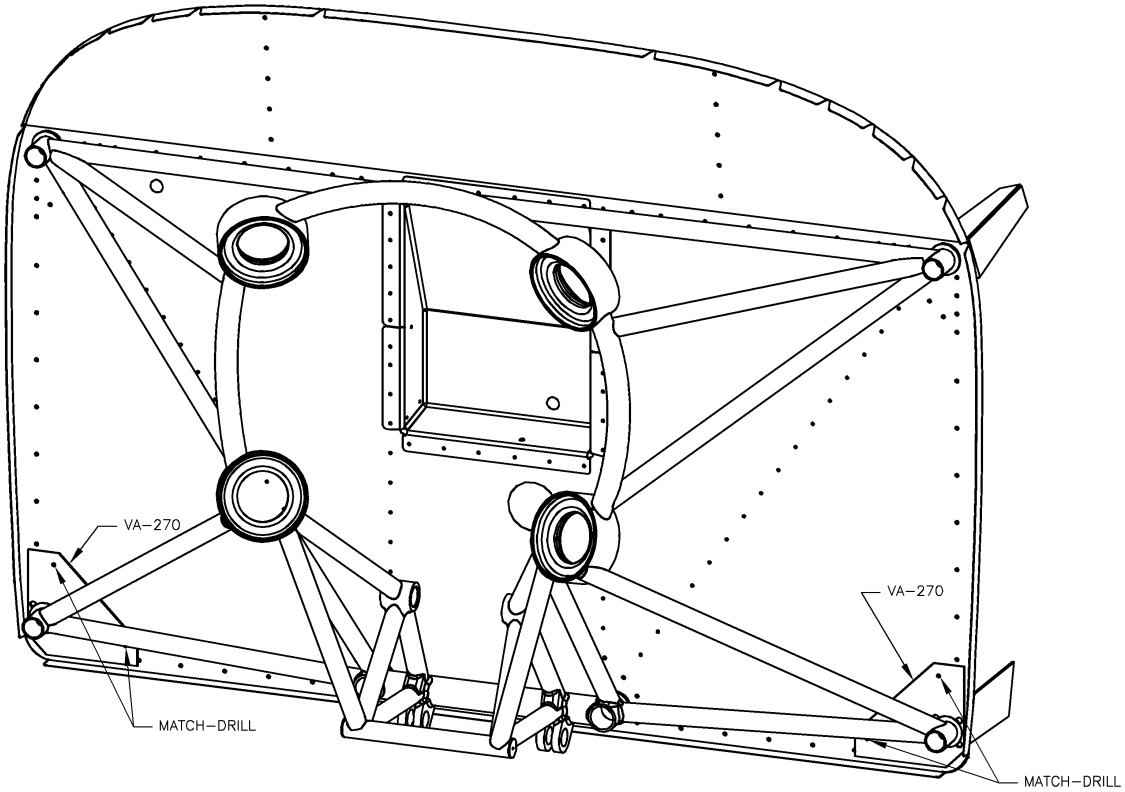


FIGURE 2: VA-270 SUPPORT PLATES

Step 10: Center the engine mount bushings as closely as possible between all six circles traced concentrically around the firewall bolt holes. (The circles for the bottom outboard bushings can be sighted through the four notches surrounding the cut-out in each support plate.)

The greatest distance between the four outboard engine mount bushings and their corresponding circular traces must not exceed 3/16 of an inch. This will ensure that the 3/8 inch holes that will be match-drilled form the firewall into the engine mount do not interfere with the I.D. of the bushings. (The outer extent of the notches in the support plates are at 3/16; ensure that the traces are visible in the notches.) The two bottom, inboard bushings must be within 9/64 of an inch from the traces to ensure that the head of the bolt, once installed, does not interfere with the I.D. of the bushings.

Step 11: From the back side of the firewall, match-drill #40 the two previously drilled out rivet holes into the VA-270 Support Plates. Have a second person hold the plates while drilling. Cleco the support plates to the firewall; they will help maintain position of the engine mount while match-drilling.

Step 12: From the back side of the firewall, insert the reduced diameter end of the VA-268 Drill Bushing into the Ø.375 [9.5 mm] hole in one of the WD-603-1 Lower Engine

Mount Brackets (see DWG 19). Hold the drill bushing against the engine mount bracket and, with one person holding the engine mount against the firewall, and while keeping the drill bit perpendicular to the firewall, match-drill Ø.125 the engine mount.

Step 13: Remove the VA-268 and insert the VA-269 Drill Bushing. Drill up the Ø.125 hole to Ø.250.

Step 14: Remove the VA-269 Drill Bushing, then final-drill .375 the attachment hole in the engine mount using the firewall bracket as guides. Secure the engine mount to the firewall with a 3/8 bolt and nut.

Step 15: Repeat Steps 12-14 for the attachment hole in the opposite lower engine mount bracket, then for the remaining attachment holes. Secure each location with a bolt while progressing.

Step 16: Remove the VA-270 Support Plates, then reinstall the four drilled-out firewall rivets. See DWG 19 for rivet size.

Step 17: Permanently attach the engine mount to the firewall using the hardware called-out in DWG 46A.

Step 18: Install the nose landing gear as described in Section 10 under “INSTALLING THE NOSE LANDING GEAR LEG” and DWG 46A.

Step 19: Install the nose wheel and set the nose wheel breakout force as described in Section 10 under “INSTALLING THE NOSE WHEEL” and “SETTING THE BREAKOUT FORCE OF THE NOSE WHEEL” and DWG C1.

Step 20: To accommodate the difference in angle between the new and original nose gear leg, the nose wheel fairing will have to be modified (or replaced if preferred), and the U-713C-L/R brackets will have to be replaced with U-00713C-L/R-1 brackets. Install the nose wheel fairing and brackets as described in Section 10 under “INSTALLING THE NOSE WHEEL FAIRING and U-00713C-L/R-1 FAIRING BRACKETS” and DWG C1.

Step 21: Install the nose landing gear fairing as described in Section 10 under “FIBERGLASS NOSE GEAR LEG FAIRING” and DWG C1.

Step 22: Modify the top and bottom cowl if/as necessary to achieve proper alignment and spacing with the prop. spinner.

Step 23: Modify the baffling and sealing between the engine and cowl if/as necessary.

Step 24: Modify the bottom cowl for nose gear clearance and install the FF-00096 Bottom Cowl Cover and FF-00097A & B Bottom Cowl Close-Out as described in Section 10 under “COWL/NOSE GEAR LEG INTERFACE” and DWG 45.

Step 25: Install the FF-00101 Louvers on the bottom cowl. See Section OP-58.

Step 26: For carbureted engines, install the VA-174 Engine Control Bracket, WD-00103 Mixture Cable Bellcrank, and WD-00105 Mixture Cable Bracket. See DWG OP-26A.

Step 27: Remount the engine.

Step 28: Support the exhaust with the hanger arrangement shown in OP-54. Adjust as necessary to maintain clearance with the engine mount, nose gear, and bottom cowl.

Step 29: Rout and attach the engine control cables; see DWG OP-26A. After installation, ensure smooth operation, full travel, and sufficient clearance of all associated moving parts.

Step 30: Reconnect all hoses, wires, etc. Pay attention to clearances and proximity to heat sources; adjust and add heat shields as necessary. Fuel systems for IO-360 engines will have to reroute the firewall to engine driven fuel pump fuel hose replacing the original fuel hose with the VA-136 Hose Assembly. See OP-32.

Step 31: Weigh the airplane and update the aircraft weight and balance documentation. Replace the previous weight and balance information in the aircraft with the new documentation.