VAN'S AIRCRAFT
P.O BOX 160 • NORTH PLAINS, OREGON 97133 • (503) 647-5117

Feb. 25, 1982

Dear RV-3 Builder/Owner,

As you are no doubt aware, during March of 1981, the following GENOT was issued:

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

GREAT LAKES REGION
2300 EAST DEVON AVENUE
DES PLAINES, ILLINOIS 60018

DATE: March 16, 1981

IN REPLY REFER TO: AGL-212

SUBJECT: ACTION: Operating Limitations for an Experimental Aircraft Commonly Known as Van's Aircraft RV-3

FROM: Chief, Engineering & Manufacturing Branch, AGL-210

TO: AWS-344
ATTN: C. Schaffer

Recommend GENOT be issued as follows:

TO: All Regions 1/200, All GADOs/All FSDOs/All EMDOs

SUBJECT: Operating Limitations for an Experimental Aircraft Commonly Known as Van's Aircraft RV-3

1. PURPOSE: Establish new operating limitations, before further flight, to prohibit aerobatics in Experimental Aircraft built from plans supplied by and commonly known as Van's Aircraft RV-3.

2. BACKGROUND: There have been four, possibly five, fatal accidents in Experimental Aircraft commonly known as Van's RV-3. In-flight wing separations have occurred during possible aerobatic flight maneuvers or during a pull-up following a high speed dive. In some cases, the pull-up may be associated with a turn or rolling maneuver.

3. ACTION: To preclude further occurrences, an additional operating limitation prohibiting aerobatics should be added to all currently issued Special Experimental Airworthiness Certificates for this airplane. Existing certificates are considered suspended until new operating limitations are issued (ref. FAR 21.181) which specifically prohibit aerobatic flight maneuvers.

All inspectors should advise all holders of Airworthiness Certificates of this GENOT and apply these criteria to future Airworthiness Certificate issuances as well.

W.F. Horn

By reading closely, you will note that the GENOT does not specifically say that there was any fault found with the design of the RV-3 or the construction quality, but only that a number of failures had occured and that the restrictive action was being taken. From the wording of the GENOT and other communications with the responsible FAA office, I concluded that I should try to determine the cause and possible cure of the accidents, and to make recommendations to the FAA which would lead to the removal of the aerobatic restrictions. Toward this end I undertook to review all accident findings, have additional stress analysis performed, and perform static destruct testing on RV-3 wings.

From my own flight test experience with the prototype RV-3, and from that of others with plans built RV-3s, I knew that no properly built RV-3 should fail below the design limit of 6 Gs. Engineering calculations from at least three separate sources indicated that the RV-3 wing would withstand a load of 9 Gs (ultimate load) before failure, with the possible exception of the root rib. Static load testing confirmed that all wing components withstood a 9 G load before failure, including the root ribs. A review of the accidents showed that there were 3, possibly 4, rather than 4, possibly 5 wing failure accidents as stated by the FAA in the GENOT. Of these, the first happened during a very sharp pull-up at a high speed. Several bolts had been omitted from the construction of the spar center section, which according to calculations would have reduced the ultimate strength from 9 Gs to just over 6 Gs. The official conclusion was that the root rib had been the initial failure point. The second accident also involved pull-ups from high speed passes, but this RV-3 had major errors in the main spar construction which no doubt reduced its strength greatly. The third happened as the RV-3 was entering a turn. The FAA investigation report stated that the failure was a clasic overstress of the spar. Based on the forgoing strength verification data, it would seem obvious that this RV-3 either had a defective structure or it was being overstressed in a manner not obvious to observers. The fourth failure also resulted from a sharp pull-up after a high speed pass. The rear spar attach failed, presumably because undersize bolts had been used, possibly in conjunction with marginal edge distance.

I have determined that construction errors existed on all RV-3s which experienced wing failures, and that all were piloted by someone other than the builder. This suggests the possibility of the pilots not being familiar with the overstress limits of a high performance airplane.

I also found that none of the accidents occured during formal flight testing, the period in which the airplane should be subjected to its highest ever flight loads under controlled conditions, i.e., parachute and altitude.

There is no conclusive evidence that any of the RV-3 wings, when accurately constructed, failed below design load levels. My static testing indicated that an RV-3 wing built in accord with the original, unaltered RV-3 plans, will withstand loads up to the 9 G ultimate limit.

A presentation of these findings in a much more detailed form was submitted to Mr. Horn, the FAA official who had issued the GENOT. Along with these, I included a copy of my proposed Change Notice CN-1,and a copy of the professional wing stress analysis which I had comissioned, with the expectation that he would favorably review it and exempt from the restrictions of the GENOT any RV-3s which complied with it. After waiting 6 weeks or so, I called him and was told that the GENOT was permanent in nature and that no RV-3 would ever be authorized for aerobatics, regardless of the evidence and data supplied. However, he informed me that if an RV-3 were re-designated, it would no longer be subject to the limitations of GENOT RWA 1/40 SVC B. To obtain further clarification of this, I wrote the following letter and recieved the reply also printed below. Please read both letters carefully so that you fully understand the FAA position.

VAN'S AIRCRAFT
P.O BOX 160 ● NORTH PLAINS, OREGON 97133 ● (503) 647-5117

Jan. 30, 1982

Department of Transportation
Federal Aviation Administration
Great Lakes Region
2300 East Devon Ave.
Des Plaines, IL 60018

Subject: GENOT RWA 1/40 SVC B (Requiring re-issuance of VAN'S AIRCRAFT RV-3 airworthiness certificates prohibiting aerobatics.)

TO: W.F. Horn, Chief, Engineering & Manufacturing Branch AGL-210

Dear Mr. Horn:

Through written and telephone correspondence with you office, I understand the following to be true. Please confirm these statements or offer corrections and clarification where necessary.

1. After three, possibly four, fatal accidents involving wing failures of VAN'S AIRCRAFT RV-3 amateur-built experimental aircraft, GENOT RWA 1/40 SVC B was issued as a safety measure to preclude further occurences of wing failure. The GENOT had been issued because the accidents had occured, and not because any specific cause for the accidents had been determined. The wing failure accidents could have resulted from any, or a combination of the following factors: construction error, design error, pilot error overstress.

2. The GENOT will not be recinded or altered regardless of accident findings or structural integrity verification data provided to the FAA.

3. The only method of obtaining aerobatic authorization for present and/or future VAN'S AIRCRAFT RV-3's is to change their designation so that they are no longer subject to GENOT RWA 1/40 SVC B.

4. The FAA will not issue any form of approval or recognition of adequacy for an Ametuer-built Experimental Aircraft, in this case the VAN'S AIRCRAFT RV-3. However, they will issue guidelines or directives authorizing appropriate FAA personel to change the designation of any RV-3 which has shown compliance with certain procedures recommended by me, the designer of the RV-3.

Based on the forgoing, I would appreciate answers to the following questions:

1. If I determine that no alterations to an accurately constructed RV-3 are necessary to meet 6 G aerobatic limit loads, will redesignation of the aircraft be authorized upon completion of a compliance inspection?

2. Will the owner of a redesignated RV-3 be issued a new airworthiness certificate? Will this RV-3, because of the new certificate, be issued operating limitations like any new Experimental Ametuer-Built aircraft, or will it be credited with previously logged flight test time toward the

removal of flight test restrictions.

3. Will the owner of a redesignated RV-3 be required to re-register the aircraft with the FAA Records Branch in Oklahoma City?

I would appreciate a prompt reply to these questions so that I can prodeed with the preparation of instructions for the many conscientious RV-3 builders and owners who have been waiting patiently to get their airplanes out of limbo. Thank you.

Sincerely,

Richard VanGrunsven

Richard VanGrunsven
Owner, Van's Aircraft

U.S. Department
of Transportation

Federal Aviation
Administration

Central
~~Great Lakes~~ Region

2300 East Devon Avenue
Des Plaines, Illinois 60018

February 17, 1982

Mr. Richard VanGrunsven
Van's Aircraft
P. O. Box 160
North Plains, Oregon 97133

Dear Mr. Van Grunsven:

Your letter of January 30, 1982 offered four statements and posed three questions concerning amateur-built aircraft, specifically, the Van's Model RV-3.

Before addressing the seven issues of your letter, let us clarify the relationship of the Federal Aviation Administration (FAA) Aircraft Certification Office to experimental (includes amateur-built) aircraft.

The primary purpose of an Aircraft Certification Office (includes Engineering and Manufacturing) is to issue FAA approvals (Type Certificates, Supplemental Type Certificates, Parts Manufacturer Approvals, and Technical Standard Orders) to persons who satisfy the regulatory requirements. Experimental aircraft designs are exempt from these engineering and regulatory procedures (ref. Federal Aviation Regulation (FAR) 21, Subpart H, Para. 21.175). The FAA does not get involved in the design or evaluation of the design of experimental aircraft.

Airworthiness Certificates for experimental aircraft have been issued by an FAA General Aviation District Office (GADO), and, increasingly in more recent years, by an FAA Manufacturing Inspection District Office (MIDO) (formerly called an EMDO). FAA engineering is not involved with the issuance of the Airworthiness Certificate.

The FAA Chicago Aircraft Certification Office is responsible, however, for monitoring experimental aircraft accidents and incidents. Due to this authority, GENOT RWA 1/40 SVC B was issued on the Model RV-3 amateur-built aircraft.

Now, concerning your statements, the following explanations are given:

1. Generally, statement 1 is essentially correct. The GENOT stated that four, possibly five, rather than three, possibly four accidents had occurred. The GENOT purpose was to point out the occurrence of the accidents and the apparent conditions under which they happened. Please note that there was no attempt to identify the cause of the wing failures. Obviously, the cause of the wing failures could result from

design, construction, maintenance, or operation, or any combination thereof. The FAA has not determined a specific cause.

2. At the present time, there are no plans to rescind or alter the GENOT. FAA engineering does not intend to get involved in the verification of structural integrity of amateur-built designs.

3. If an amateur-built airplane which resembles a Van's Model RV-3 was presented to an FAA Manufacturing Inspector as a Model XYZ, the inspector would most likely issue an Airworthiness Certificate in the same manner as he/she handles any other amateur-built airplane. An aerobatic authorization is usually obtained by flight demonstration competency of selected aerobatic maneuvers.

4. The first statement is essentially true. FAA engineering does not evaluate the design of an amateur-built airplane. There are no published FAA airworthiness requirements for amateur-built aircraft. The second sentence is addressed by Paragraph 3 above.

In response to your three questions, these comments are given:

1. Type certificated acrobatic category airplane designs have been demonstrated to provide satisfactory structural integrity to 6g limit and 9g ultimate loads. There are no design criteria imposed by the FAA for amateur-built aircraft. The GENOT addresses a pull-up or rolling maneuver following a high speed dive as a possible cause of wing failures on the RV-3. Redesignation of the Model RV-3 would probably be handled as discussed previously (see 3 above).

2. An owner of a modified, redesignated RV-3 may be issued a new Airworthiness Certificate indicating a changed model number. Operating limitations would be determined according to current procedures utilized by FAA inspectors. Previously logged flight time may be credited towards removal of flight test restrictions. Each FAA inspector makes this judgement based upon FAA guidance and experience.

3. A redesignated RV-3 would require a change in model designation of the aircraft with the FAA records branch in Oklahoma City to show the new model number.

We hope these comments and answers satisfy the issues presented.

Sincerely,

W. F. Horn

W. F. Horn
Chief, Chicago Aircraft Certification
Office, ACE-115C

The essence of this correspondence is that the registered designation of present and future RV-3s (or what up to this date has been known as an RV-3) is to be determined by the owner and his FAA Inspector.

As a designer of homebuilt airplanes, I have long been aware that I have no control over changes which builders may make to my designs, or over the names (designations) they may register them under. Most builders have chosen not to intentionally alter or re-designate their RV-3s. The developments described above may cause builders to chose a different course in the future.

Since I am able to act only in an advisory capacity, I am issuing CN-1 to all known owners and builders of RV-3s. The essence of CN-1 is that builders who comply with its structural and administrative provisions can redesignate their airplanes as RV-3As. The advange to the owner/builder of complying with CN-1 and registering his aircraft as an RV-3A is that it will show that his aircraft has meet standards higher than those required for any other amateur-built experimental aircraft. It would seem an advantage to be identified as a popular design with a good reputation. (which the RV-3 had, and presumeably will regain). The disadvantage is that with this popular designation, it might again be subject to some similar FAA restrictions which it wouldn't be if it were an individual model.

As stated before, no definate design flaws have been attributed to the RV-3. However, based on the fact that I don't profess infalibility and that other factors than design integrity are involved in the safety of homebuilt aircraft, I have chosen to recommend that RV-3 owner/builders make alterations to any structural components even slightly suspect of being marginal. Thus, CN-1 requires that alterations be performed to the rear spar attach and the wing root ribs on all RV-3s to qualify them for re-designation as RV-3As.

Since all RV-3 wing failure accidents showed evidence of either or both construction error or pilot error, the Quality Control provisions of CN-1 are included. Through accident investigation and correspondence with RV-3 builders, I have found that certain construction errors tend to occur. Thus, CN-1 includes a section entitled "INSPECTION POINTS" which lists some, but by no means all, wing construction errors which will reduce its strength. Any aircraft built from RV-3 plans, but with construction errors or variations which may have a negative effect on its strength, is not trully an RV-3. Thus, in an effort to protect the designer and those builders and owners of structurally sound RV-3s; CN-1 includes a provision to exclude any known defective RV-3 from being re-designated an RV-3A

The owner of an RV-3 with structural variations, listed or otherwise, which could reduce its strength, has several options:

1. Register it as an RV-3 and accept a non-aerobatic status.

2. Register it under some designation other than RV-3 or RV-3A. As such, it would not be subject to the restrictions of GENOT RWA 1/40 SVC B. Under this option, the builder should be able to demonstrate aerobatics and have this noted on its operating limitations just like any other non-condemed homebuilt design. However, for his own safety and that of

others who may eventually fly the airplane, its aerobatic gross weight should be lowered in proportion to the calculated reduction in strength, or its limit G load should be lowered similarly.

3. Register it as an RV-3A despite the defects. I obviously do not recommend this course of action because it could lead to the assumption on the part of some future pilot that it meets RV-3A strength standards. This could prove detrimental to the health of the pilot and to the financial liability of the owner/builder.

If you are a bit confused by the forgoing, you probably have lots of company. The FAA stand is somewhat indefinate, leaving the final determination up to the inspectors in the field. This means that I cannot guarantee that procedures suggested here will be accepted by your FAA inspector. I have recommend modifications, inspections, and test procedures which I feel will enhance the operational safety of your airplane. The rest is up to you. Good luck.

Sincerely,

Richard VanGrunsven

Richard VanGrunsven