VariEze Index

to the

Canard Pusher Newsletter

November, 1990

Includes CP10 through CP65

First Digital Edition, February, 2021

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Introduction

Over the years since the VariEze was introduced, the *Canard Pusher* newsletter has made available to builders a tremendous amount of information about how to build, fly and maintain this unique airplane. So much information has been included that it has become difficult to find the particular bit you are looking for. This index is an attempt to make that task easier. It *IS NOT* intended to replace the *Canard Pusher!* After you have found the reference you need here, always go look up the newsletter article. The notes included in the master listing are just there to help you decide which article you are looking for. In some cases the CP article was short enough and important enough to quote, but in almost all cases I just summarized it. File your newsletters so you can find them quickly, and use them. Replace any missing issues. The *Canard Pusher* newsletter represents a resource that no other airplane, manufactured or homebuilt, offers its owner. Use it and support it so that we all continue to enjoy this valuable asset.

> If you are building or flying a VariEze from first edition plans, you must have newsletters 10 through the current edition.
>
> If you are building or flying a VariEze from second edition plans, you must have newsletters 16 through the current edition.
>
> Special note about CPs 10, 11 and 12.
>
> These three issues of *Canard Pusher* included a lot of plans changes and corrections grouped together on a few pages. *Since they are so easy to find and put in your plans, they are not indexed here.* If you have not already done so, copy these pages, cut them out and glue them into your plans on the appropriate page. (This is a good idea for all major changes or hints.) Office supply stores sell an FAA approved glue stick that helps. The pages not indexed are:
>
> CP 10, pages 4 through 7
> CP 11, pages 5 through 7
> CP 12, page 9
>
> Even if you are far along in construction or flying, do this. These changes are important, and can prevent a lot of confusion if you add them to your plans.

Office supply stores sell a small file called a “box office” that, along with some “pendaflex” folders, will let you store the CP in groups of five or so. This will help you find them quickly. If you also file all of your material receipts, product information, and everything else related to your airplane in this one place, it will impress the FAA with how organized you are when they come to look at your project.

What is indexed here?

This index includes everything that I thought would be of interest to a VariEze builder or pilot. For the most part, information related to the Long Eze and other designs is omitted. If some LE parts or mods can be used on the VE, they are included here. I included the new LE canard since I was curious about why that canard can not be used on the VE. Hints that were intended for the LE but might help with the VE are also included. All accident reports, VE or LE, are

included. Many chapters include listings of “corrections” (minor changes to the plans) and “repairs” (how to fix common errors). Information that is clearly obsolete is not indexed. For example, you won’t find anything about the roll control spoilers the VE briefly used.

The index consists of the following sections. It will help if you glue a small tab at the start of each section.

Plans Table of Contents

Here is where you should start your search. Once you know what chapter you are looking for, you can go to one of the other three sections. This table duplicates the First Edition Table of Contents, with a few changes and additions. “Elevons” have become “Elevators,” and the “Wings” have grown ailerons.

Information on the aileron plans addition is included in Chapter 19, but anything that applies just to the aileron itself is in Chapter 6, Wings.

All information related to brakes, wheels and wheel pants is in Chapter 18. If it is attached to the strut, you will find it in 18.

I have added four chapters that did not appear in the original plans. The landing brake plans were published separately as an option. They are indexed here as a chapter. There are new chapters on maintenance and inspection, safety and accident reports, and “Other.” The “Other” chapter includes lots of interesting information that simply did not fit in anywhere else.

Subject List

This is a list of all subjects indexed and the CP issue and page number where they appeared. If you have a good idea which issue you are looking for, or the subject only appeared in one issue, you can probably find what you want quickest here.

Plans Changes, p. 15

The second section is a list of plans changes only. I have tried to be sure that everything CP listed as a mandatory plans change is included, but remember that *YOU*, not me, not Burt Rutan, not the FAA, not anyone else, are responsible for being sure your aircraft is airworthy. I tried to find everything, but double check me. All I can promise is that this is what *I* used to update *my* plans! If CP indicated a category such as MAN/GND for a plans change, that is included in the listing. Some items that CP did not specifically list as a plans change are included here. They are mostly ideas that require a change in construction, but are optional or not safety related. You can recognize them by their nature and by the lack of a designation such as MAN/GND.

Master Listing, p. 24

Here it all is in one big lump. Over 1,200 entries and 50 pages.* This includes everything in the other two lists, and adds a brief text to give you an idea what the CP article was about. Some items are duplicated in more than one chapter, but for the most part there isn’t a lot of cross indexing unless I thought the item was extremely important.

Finally, let me know what you think. I plan to update the Index yearly. Your suggestions can be included in the next edition. If I said the VE anti-gravity module was in CP80 and you found it in CP81, let me know. If I left out your favorite hint, let me know. If I left out the plans change that keeps the wing from falling off, ***please*** let me know! I don t want my wing to fall off.

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*Note: This digital edition of the Index of longer than Bill's 50 pages because I used a larger font. —RGC

Notes on the 2021 Digital Edition

This digital edition came about through need and generosity. The need was mine; the generosity was due to Bill James who provided a copy of Bill Greer's original 1990 Index. In transcribing the Index for digital use, I have kept the text unchanged. Revisions, including corrections of typos, have been few.

All of Bill Greer's original text is here, but I have not verified his page references, so his caveat is still valid: *If I said the VE anti-gravity module was in CP80 and you found it in CP81, let me know.* Furthermore, I have not attempted to update the data in the 1990 document, some of which is now obsolete. More current information may be found in the references below.

I am deeply indebted to Bill and Bill for the opportunity to contribute to the construction and maintenance of our wonderful machines. Thank you, guys!

Build well, fly safe.

Bob Chester
Tumwater, WA
2021 Feb 1

References

1. Canard Owners and Builders Association (COBA)
   https://canardowners.com
2. Canard Pushers 1 through 82
   http://www.cozybuilders.org/Canard_Pusher/
3. The Central States Association: Index and back copies
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VariEze 1st Edition Plans
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Plans Changes by Chapter

1 — Introduction

corrections	21/4	Cumulative list of plans changes up to July 1979.

2 — Sources of Supply

aileron plans	12/18	MAN/GND Aileron plans announced. See Ch. 19 index listing.
landing brake	11/2	Landing brake plans announced. Flight characteristics, how to install.

3 — Composite Materials & Methods

epoxy balance	14/3	Mods to give proper mix ratio with Safe-T-Poxy.
epoxy balance	16/8	Mods to balance reflect slight change in RAE mix ratio.
hot wire cutting	12/7	MAN Mod to templates helps cut straighter leading edges. Other hints for hot wire cutting.
hot wire cutting	16/6	Styrofoam vendor has changed block sizes. Arrange parts differently for cutting.

4 — Canard Construction

correction	21/5	Build fuselage before canard and elevators.
foam cores	16/6	Arrange templates differently due to change in foam block sizes.
lift tabs	10/3	Install nut plates behind lift tab insert. Do not use method shown in the plans. Other hints for lift tab installation.
lift tabs	14/9	Use only the lift tab insert shown in CP10/3.
span change	14/5	MAN/GND Canard span shortened to 142” (8” trim) to move allowable CG range aft. Benefits, cautions, & how to do it.
surface smoothness	16/4	MAN/GND The top surface of the canard must be smooth within 0.006”. How to check, flight tests to confirm.

5 — Elevators

balance	19/4	MAN/GND Overweight or out of balance elevators must be corrected or rebuilt to prevent flutter. ½ of any weight added must go on outboard weight.
balance	57/8	MAN/GND Inspect for proper construction. New balance requirements & discussion of flutter. Reuse of elevator tube if building new elevator.
construction order	21/5	Build fuselage before canard and elevators.
foam cores	16/6	Arrange templates differently due to change in foam block sizes.
wide chord elevators	17/5	MAN/GND Plans for wide elevators for VE. Optional for those already flying & used to narrow elevators. Templates to check elevator shape.
wide chord elevators	18/5	How to balance wide elevators, pilot reports of results.

6 — Wings & Ailerons

attach fitting	26/6	How to get proper thickness of BID pads. Use number of plies in this CP instead of number called out in plans.
attach fitting	50/4	MAN/GND Use stud finder to verify all screws are installed. Missing screws caused fatal accident.
attach fitting	55/5	MAN/GND Check wing attach fittings for corrosion. Method for replacing fittings.
attach fitting	61/10	MAN/GND Check taper pins & AN-4 bolts for proper fit. Caused fatal accident.
correction	14/8	Template in aileron plans is wrong.
correction	13/6	Photo on plans page 6-5 is misleading. Method is correct but part is from N7EZ.
cuffs	19/2	MAN-25hr. Cuffs added to rear wing to prevent departure at low speed. (Replaced by vortilons.) Good discussion of aft wing stall & departures. AFT CG LIMITED UNTIL CUFFS ARE INSTALLED.
foam cores	16/6	Arrange templates differently due to change in foam block sizes.
hinges	34/7	MAN Aileron hinge pins must be saftied. Shows proper method.
spar	15/8	MEO Changes to dimensions for spar trough and spar glass cloth.
templates	15/8	Waterlines on center templates are wrong. CP gives dimensions to correct.
vortilons	42/4	Vortilon plans for VE. See CP43/3 for missing dimensions.

7 — Winglets

hinges	34/7	MAN Rudder hinge pins must be saftied. Shows proper method.

8 — Centersection Spar

attach fitting	11/7	MAN/GND Apply 2 ply UND wrap around attach fitting.
attach fitting	26/6	How to get proper thickness of BID pads. Use number of plies in this CP instead of number called out in plans.
attach fitting	53/7	MAN/GND Corrosion found on fittings. Alodine treat all new fittings. Do not anodize.
attach fitting	55/5	MAN/GND Check wing attach fittings for corrosion. Method for replacing fittings.
attach fitting	61/10	MAN/GND Check taper pins & AN-4 bolts for proper fit. Caused fatal accident.

9 — Fuselage Bulkheads

correction	2-3	.016 stainless 032 should be 302
correction	9-3	1/0 should be 1.0.
inspection holes	14/6	Add inspection holes to rear seat bulkhead to allow inspection of main gear mounting tabs.

11 — Fuselage Assembly

bottom	11/4	Strengthen floor of rear cockpit to prevent foam crushing.
bottom	16/10	Dimension change to give speed brake more room.
correction	22/8	MEO Page 11-4, AN960-4 should be AN960-416, two places.

12 — Fuselage Exterior

layup	24/6	DES Side layups should be done with Safe-T-Poxy.
step	10/4	How to install a “kick in” boarding step in fuselage side.

14 — Canard Installation

canard cover	13/5	Moving canard cover aft makes battery access easier. Reversing lift tab bolts makes removing canard easier.

15 — Head Rest, Seat Belts

brackets	18/5	Check seat belt brackets for sharp corners.
roll over structure	15/8	Page 15-1, 3.7” should be 2.7”.
seat belts	22/11	MAN/GND Eon E 8000 seat belts are unsafe. They can come open unexpectedly. Do not use.

16 — Firewall & Accessories

fiberfrax	25/4,6	DES Fiberfrax firewall reduces weight 2 lbs.
fireproofing	49/5	MAN/GND Replace aluminum control system parts with steel. Use Ocean #1644 to fireproof CS spar. See page 3 for source of Ocean #1644.
fuel valve	18/9	Fuel valve moved. Gascolator added.

17 — Nose & Nose Landing Gear

canard cover	13/5	Moving canard cover aft makes battery access easier. Reversing lift tab bolts makes removing canard easier.
correction	22/8	12.5” foam piece should be 15”.
nose tie down	26/8	Allows nose to be tied down with gear retracted.
nose tie down	49/7	Allows nose to be tied down with gear retracted, & allows access to NG pivot bolt.
rod ends	23/7	Substitute for RE4M6 rod ends.
rudder pedals	30/5	Modify rudder pedal to prevent tab breaking off. Brock has parts.
screws	54/6	DES Replace AN525 screws that mount NG-15 casting with AN3-14A.
shock strut	25/8	Spring loaded shock strut replaces NG9/NG10.
strut	16/5	MAN/25hr. Strut beef up & mod to NG15.
worm drive	19/3,5,7	MAN/GND Worm drive for nose gear prevents gear collapse. Plans in this CP.
worm drive	21/5	Parts to be reused & discarded when retrofitting worm drive.

18 — Main Landing Gear & Brakes

brake caliper	30/8	There must be 1/16” clearance between caliper and strut. See LPC #75.
brake lines	16/6	MAN/25hr. Install inserts in Nylaflow brake lines. See also CP27/5.
brake lines	27/5	Use Weatherhead insert instead of brass tube called out for nylon brake lines.
correction	14/8	Dimension missing from gear mounting extrusion.
LE gear	23/3	Installation of LE gear on VE, plans available.
strut	20/3	MAN How to prevent and repair compression damage to strut. Mandatory 3 ply mod for new construction, 7 ply fix for damaged struts.
strut	57/10	Installation of heat shields on MLG struts to prevent brake heat from damaging leg.
tabs	12/3	Optional beef up to tabs and required BID wrap of strut. Mod to tabs superseded by later changes.
tabs	14/6	MAN/GND Change main gear tabs to all glass construction. Don’t make tab wider than 2”. Other hints on tab construction.
tabs	15/8	Revised dimensions for MLG mounting tabs. Hints on installing tabs.
tires	26/10	Do not use original 2-ply tires. Be sure wheel pants are ventilated & strut insulated.
tires	29/6	New 11 x 4.00 x 5 tire recommended for VE.
toe-in	18/5	Change toe-in to ¼ to ½ degree. More caused tire wear and high rotation speed.
wheel pants	34/6	Installation instructions for prefab wheel pants.

19 — Control System & Rigging

aileron plans	13/6	¾” 6061-T6 can be substituted for the 2024-T3 tube.
aileron plans	15/8	On page 5, right side, 9-¾” dimension should be 9-¼”.
aileron plans	15/8	Bill of materials, 6061-T6 aluminum can be substituted for 2024-T3 on the ¾” tube.
ailerons	12/18	MAN/GND Install rear wing ailerons. Last minute addition to CP announces availability of aileron plans & how to get them. Explains why ailerons are needed.
ailerons	13/2	MAN/GND Aileron plans announced. Discussion of why spoilers didn’t work, flutter testing, drag, etc.
ailerons	58/7	MAN/GND Check bellhorns, replace within 25 hrs. Rebalance ailerons if vibrating.
fireproofing	49/5	MAN/GND Replace aluminum control system parts with steel. Use Ocean #1644 to fireproof CS spar. See page 3 for source of Ocean #1644.
pitch trim	24/9	LE pitch trim can be installed on VE. Plans for system.
push rods	27/5	Drill an inspection hole in all push rod tubes to be sure enough rod end threads remain in the bushing.

rod ends	20/4	MAN/GND Replace HM-3 rod ends in pitch system with ¼".
rudder travel	22/7,8	MAN/GND Reduce rudder travel from 3.5" to 2".
rudder travel	23/6,7	MAN/GND Reduce rudder travel from 3.5" to 2". Clarification of earlier change. Keep brakes in top shape!
rudder trim	24/5	Removal of rudder trim system, replacement with fixed trim block. Small wheel chock can be used instead of parking brake.
steel parts	50/5	Clarification of changes to control system called out in CP49.

20 — Trim System

pitch trim	24/9	LE pitch trim can be installed on VE. Plans for system.
rudder trim	24/5	Removal of rudder trim system, replacement with fixed trim block. Small wheel chock can be used instead of parking brake.

21 — Fuel Tanks, Wing & Fuselage

drains	10/6	MAN/GND Install drains in forward part of wing tanks. CP gives drawing showing how to install them.
fuel caps	31/5	Install safety chain on fuel cap to prevent loss.
fuselage tank	11/6	MAN/GND Plans for fuselage tank. Discussion of 3 tank fuel system
fuselage tank	18/8	How to make & install fuselage fuel tank.
fuselage tank	25/4	DES Add ram probe vent to fuselage tank to prevent fuel starvation.
layup	24/6	DES Fuel tank layups should be done with Safe-T-Poxy. Be sure to follow CP22 carb inspections.
tank grounding	55/4	Static electricity caused fueling fire. Mods suggested to ground fuel tank.
tank vents	22/8	DES Route vent lines 15" forward.
tank vents	36/6	Drill a hole in vent to prevent engine failure in icing. CP shows location.
tank vents	48/5	MAN/GND Separate tank vents recommended in CP47/6 are a mandatory plans change.

22 — Canopy

correction	13/6	Page 22-10, lower drawing of C-7, solid line should be dashed.
correction	13/6	On the second page 22-8 plans change shown in CP11/7, AN509 should be AN525.
frame	24/5	VE can use lighter LE canopy layup. CP gives layup schedule.
frame	35/6	Optional revision to canopy frame makes it easier to build and lighter. Also shows "drip tray" that keeps rain out of radios.
fuselage tank	18/8	Fuselage fuel tank requires changes in canopy construction.

jigging	11/4	Canopy can be moved forward 2” from position shown on the plans. Gives more room for pilot to lean forward.
safety catch	17/6	MAN/GND Plans for secondary canopy catch. Prevents open canopy accidents. DO NOT OMIT THIS!!
safety catch	25/3	DES To avoid being trapped in back seat, mount safety catch at FS 57.

23 — Covers, Fairings, Consoles

canard cover	13/5	Moving canard cover aft makes battery access easier. Reversing lift tab bolts makes removing canard easier.
lower aft cover	27/3	Removable panel can be installed to allow access to gear attach, fuel valve, etc.

24 — Wing to Winglet Mate

peel ply	16/7	Be sure to peel ply attach layups.
rigging	14/8	Dimension change changes angle of lower winglet to reduce dihedral effect.

Sec II — Engine, Fuel & Oil Systems, Cooling

Continental engines	23/7	MAN/GND Continental engines without starter must install bearing retainer to prevent spontaneous conversion of engine into boat anchor. CP gives plans for retainer.
controls	15/8	Add note to plans: Engine controls must operate smoothly, without play, and must snub against engine stops. Check before running engine.
controls	51/6	MAN/GND Problems with mixture control have caused two forced landings. Check for proper installation & operation.
controls	61/7	MAN/GND Wrong outer cable attachments caused engine failure.
controls	65/7,13	MAN-10hrs. Inspect throttle & mixture springs for proper installation & wear. Failure of these springs caused an engine failure.
cooling baffles	25/4	Baffle hole improves Continental engine cooling.
correction	16/10	Section IIC, page 5, FS 132.77 should be 133.28.
correction	19/5	Section IIA, page 2, 2nd edition, revised part numbers.
engine mount	27/5	Installation procedure for Dynafocal mounts.
exhaust system	13/3	MAN/GND Mods to prevent cracking of 4-pipe systems
exhaust system	16/9	MAN/GND Install safety cables on VE exhaust systems. Article discusses various exhaust systems & problems. See also CP18.
fireproofing	49/5	MAN/GND Replace aluminum control system parts with steel. Use Ocean #1644 to fireproof CS spar. See page 3 for source of Ocean #1644.

fuel lines	18/5	Change in tygothane part numbers.
fuel lines	65/7	MAN/GND Carefully examine every inch of urethane fuel line in all VEs. Some have disintegrated.
fuel system	11/5	MAN/GND Plans & discussion for 3-tank fuel system.
fuel system	11/8	Do the fuel flow tests (step 12) for WING AND FUSELAGE fuel. CP lists other plans changes due to 3-tank system.
fuel system	18/3,7	MAN-25hrs. Revised fuel system adds gascolator and fire resistant fuel lines. Fuel valve relocated. Plans for fuselage tank.
fuel system	21/5	System shown in IIC, page 36, is obsolete.
fuel tank vents	25/4	DES Add ram vent to fuselage fuel tank.
fuel valve	17/4	MAN/GND Replace fuel valve if stiff. (If the valve is stiff, not you.) If valve is selected between wings and fuselage position, the fuselage tank will drain into the wings.
fuel valve	58/6	New fuel valve for VE and LE that should end valve sticking that has caused accidents.
inlet hose	14/8	MAN/GND Drill a ¼" hole in inlet hose low point to drain fuel in flooded start.
installation	31/8	MAN/GND Upgrade fuel & oil hoses to standard shown in CP.
Instruments	30/9	Corrected sender number in CP23 for VDO instruments.
oil pressure gauge	19/5	Revised part number for oil pressure gauge called out in IIA.
throttle	21/5	Section IIC, material for throttle and mixture controls is 0.062 2024-T3.
Sec III — Electrical, Avionics, Lighting		
roll trim	23/7,8	DES Mods to roll trim wiring, installed shorting light.
warning system	24/6	MEO Warning buzzer is Radio Shack #273-051.
wire size	22/8	Page 2, #12 wire can be #18.
Sec IV — Owner's Manual, Operation		
ailerons	13/7	Updated list including ailerons & other changes to date.
checklist	28/9	After "fuel caps on" add "and locked - screws aligned to locked orientation".
checklist	29/7	After "canopy locked" add "visually confirm proper canopy latch engagement and proper safety catch engagement."
checklist	50/5	MAN/GND Should read "Check fuel caps on and positively locked." Check cap O-rings before each flight. Never fly without header tank full. Other cautions related to engine & fuel.
correction	19/5	Add "Are you sure you have complied with all details in Appendix I?"

ditching procedure	33/4	Ditching procedure for VE explained. Add to Owner's manual.
first flight	21/5	Add note to clean out all fuel system screens and carb float bowl before first flight.
first flight	24/6	Test pilot should have 10 hours VE time.
fuel contamination	22/7,8	MAN/GND Change to addition made in CP21. Clean all screens and needle valve before first flight.
fuel filter	15/7	MAN/GND Replace or inspect fuel filter at 25 hour intervals.
hoses	22/4,8	MAN/GND Under power plant add "Inspect induction hoses for correct safety of wire and cord."
landing gear	15/8	In annual maintenance section, add inspection for gear spread.
nose gear	21/5	Add note to grease gears in nose gear.
owner's manual	29/7	Add CAUTION to check prop bolts torque 180 in-lbs when moving from wet climate to dry climate.
owner's manual	31/5	Under engine failure add caution to use power during descents when carb ice is likely.
owner's manual	35/9	Add to page 19, Engine Out, "windmill start will use less altitude if you dive steeply to rapidly attain 135 knots."
performance	15/3	Flight test performance data from N4EZ. Fuel flow, speed, etc. Paste these in the Owner's Manual.
pilot checkout	24/6	Additions to pilot checkout criteria.
prop bolts	17/8	Add note to check prop bolt torque.
slips	22/8	MAN/GND Page 19, add note to avoid aggravated slips at low altitude. Can result in winglet stall. How to recover.
stall characteristics	15/2,7	MAN/GND Strip all unnecessary weight for first flight. Avoid last inch of CG range until stall characteristics are known. Stalls vary from one aircraft to the next.
taxi tests	24/6	MEO Under taxi testing add "Remove wheel pants for taxi tests to avoid overheating brakes."
tie down	18/5	Add note to "set" main gear.
tires	26/6	MAN/GND Sec IV page 33, after 55 to 65 psi add "75 to 80 for 6 ply tires."
weight & balance	14/5	Operation at maximum gross weight of 1110 lbs. approved under certain conditions.
weight & balance	14/6	MAN/GND New CG ranges for 142" (shortened) canard.
weight & balance	18/5	Page 31, do not use bathroom scales, avoid side loads on scales or use grease plates.
Sec V — Finishing, Paint, etc.		
strippers	23/7	MEO Never use any stripper or solvent on glass structure.
surface preparation	18/5	Use 36 grit paper before Featherfill. Do not wet sand Featherfill or use it over primer.

Landing Brake

LB10	24/6	Some Brock LB10 have a hole sized wrong. How to fix.
LB19	43/4	MAN-25hrs. Modify LB19 plywood insert, or add glass reinforcement as shown.
LB29	29/7	MAN/GND See LPC #65 for redesign of LB29. Applies to VE also.
plans announced	11/2	Availability of landing brake plans announced. Flight characteristics, how to install.

Maintenance and Inspection

exhaust system	62/7	MAN/GND Inspect exhaust system for cracks.
hoses	22/4,8	MAN/GND Inspect induction hoses for correct safety of wire and cord.
landing gear	15/8	Inspect landing gear annually for increased spread.
main gear	31/5	At annual or 100 hour inspection jack airplane and check gear for excess motion.
placards	57/7	MAN/GND Check for proper placards in cockpit. Install “You may die if you fly this airplane” placard.
screens	22/8	MAN/GND Clean all screens before first flight, then every 25 hours for first 100 hours, then every 50 hours.
wing fitting	26/6	MAN 100hrs. Remove and inspect wing attach bolts for corrosion annually or each 100 hours. Spray LPS #3 on bolts and cones.
wing fitting	61/10	MAN/GND Inspect AN-4 bolts & taper plugs in wing fittings. Caused fatal accident.

Other — Interesting information that did not fit anywhere else.

plans changes	21/4	Cumulative list of plans changes up to July, 1979.

Master Listing by Chapter

1 — Introduction

correction	21/4	Cumulative list of plans changes up to July, 1979.
FAA	10/8	What the FAA may want to see on a VE, copy of quality control info furnished to FAA by RAF.
FAA	34/4	Be sure you know what the FAA wants to see during construction. You could end up with “a very expensive static display model.”
FAA	50/5	Major changes to an Experimental airplane require FAA approval & new test period.
homebuilder responsibility	43/2	Builder is totally responsible for airworthiness. FAA does not inspect for airworthiness. Don’t modify!
modifications	25/3	Two highly modified VEs have crashed. Be sure you know what you are doing before you modify a tandem wing design!
modifications	46/2	Don’t. If you must, recommended tests and cautions. It will be a different airplane!
RAF	45/1	Burt Rutan announces that RAF will no longer market homebuilt plans.
RAF	46/2	RAF builder support and vendors.
RAF	54/1	What happens if you sell your plans?
RAF	55/1	RAF status. Burt says he will design a new homebuilt - someday.
RAF	63/1	RAF support policy and hours.
RAF	65/1	Support policy and the future of RAF support. Two frivolous lawsuits threaten RAF. YOU MUST REGISTER YOUR PROJECT BY 1 JANUARY 1991.
VE plans	44/9	VE plans no longer available.

2 — Sources of Supply

aileron plans	12/18	MAN/GND Aileron plans announced. See Ch. 19 index listing.
correction	2-3	.016 stainless 032 should be 302
CG calculation	63/9	Computer program to calculate CG.
exhaust system	46/8	New address for Sport Flight, for VE exhaust system.
EZ ideas	62/4	Debbie Iwatate’s idea book.
hinge pin kit	62/4	Teflon pin mod for surface hinges.
IVCHC	54/5	Address and info on International VariEze And Composite Hospitality Club.
IVCHC	56/8	Address and info on International VariEze And Composite Hospitality Club.
landing brake	11/2	Availability of landing brake plans announced. Flight characteristics, how to install.
prop extensions	11/2	Sources & hints on prop extensions.
RAF	47/13	Items available & prices.
RAF clubs	47/7	RAF design clubs and groups, addresses.

VE Index	65/9	This is it! EVERYBODY should have one! It will make your airplane 100 lbs. lighter & 20 knots faster.
vents	61/12	Cockpit vent doors and NLG fenders for VE and LE.
3 — Composite Materials & Methods		
adding glass	17/8	Adding extra glass will in most cases weaken structure and can change flutter modes.
aluminum anodizing	38/4	How to anodize aluminum to prevent corrosion in humid salt environments.
barrier cream	45/6	Evaluation of PR-88 barrier cream. Hints for use.
BID	14/9	How to roll pieces of BID into place.
BID tape	29/8	How to cut & use BID tape. You can't buy a roll of BID tape! ALWAYS peel ply edges of tape.
BID tape	38/4	Neat way to make BID tape.
BID tape	38/5	Quick & easy way to do BID corner tapes with help from some aluminum foil.
bristle roller	11/3	How to use the bristle stipple roller.
brushes	39/7	Freeze epoxy brushes for reuse.
brushes	49/7	Neat way to save epoxy soaked brushes.
countersinking	20/5	How to countersink hard to reach holes.
debonds	17/4	Inspect completed aircraft for debonds in critical areas. See CP 15/5. Use proper precautions with any material that can attack foam.
delaminations	47/10	How to detect and repair.
drilling glass	16/7	How to modify drill bits to give clean holes in glass.
drilling glass	17/8	How to drill large holes.
drilling glass	48/6	DO NOT use any kind of lubricant other than plain water when drilling glass. If you do, nothing will ever stick again.
dry micro	14/9	Use cake decorator's cone to apply dry micro.
dry micro	18/5	When filling trailing edges with dry micro use peel ply.
epoxy	10/3	Mixing cups can be reused, but be sure to zero the balance.
epoxy	10/3	Details on shelf life of RAE epoxy.
epoxy	10/4	How to check pot life of RAE epoxy.
epoxy	10/10	ALWAYS mix epoxy at specified ratio.
epoxy	11/3	Layups done below 75 degrees will take too long.
epoxy	12/4	How to spot defective epoxy. How to deal with epoxy allergy, how to clean up to prevent it.
epoxy	14/10	Causes & cure for tacky surface after one day cure.
epoxy	15/9	Long article about material substitutions recommended by article in Sport Aviation magazine.
epoxy	16/8	Clarification of epoxy mix ratios. Epoxy pump is labeled for mix ratio by volume. Change to mix ratio for RAE epoxy, mods to balance

epoxy	17/4	Do not use epoxy which has exceeded 2 year shelf life.
epoxy	20/3	Why epoxy must be mixed accurately.
epoxy	21/1	Safe-T-Poxy announced. Results of toxicity tests.
epoxy	22/7	Fuel/fiberglass compatibility.
epoxy	23/6	Never store epoxy in a cold place. Hints for storage & how to deal with crystallization.
epoxy	28/4	Safe-T-Poxy can be used at humidity up to 90%. Best temp 75-85. CP has notes on water absorption, other characteristics of this epoxy.
epoxy	29/3	Best temp for Safe-T-Poxy is 77F to 95F. Hints for working at lower temperatures.
epoxy	29/5	Store epoxy on a shelf at room temp, not on the floor. How to fix epoxy that has crystallized or settled out.
epoxy	32/6	Do not use hardener that has any kind of sediment or lumps. See CP29/5 for instructions on how to heat to get sediment back into solution.
epoxy	33/6	Build a foam box to keep epoxy warm. Use fish tank heater or light bulb.
epoxy	43/5	A bad batch of Safe-T-Poxy may have been sold. Always do a scratch test. How to do one.
epoxy	45/4	New “West System” epoxy for micro.
epoxy	55/9	Use West System epoxy for micro, it is easier to sand.
epoxy allergy	13/4	Some reports of epoxy toxicity are talking about polyester resin. Always take precautions against exposure to epoxy, effects are cumulative. Other information on sensitivity & allergy.
epoxy allergy	32/4	Some builders have been allergic to Safe-T-Poxy. Hints on how to avoid or deal with allergy. Avoid presence of MEK, acetone, or lacquer thinner in the shop.
epoxy allergy	36/3	How to prevent reactions to epoxy. Gloves, barrier creams, etc. & how to use them.
epoxy allergy	37/4	How to prevent allergic reaction to epoxy.
epoxy balance	12/8	Balance must be absolutely friction-free.
epoxy balance	14/3	Mods to give proper mix ratio with Safe-T-Poxy.
epoxy balance	16/8	Mods to balance reflect slight change in RAE mix ratio.
epoxy balance	22/4	How to check epoxy balance for accuracy.
epoxy pump	15/9	Ratio pump available, can save epoxy on small layups.
epoxy pump	19/5	Black gunk.
epoxy pump	21/9	Mods to pump for Safe-T-Poxy
equipment mounting	12/8	Be careful attaching things to glass sandwich structures.
filling	11/3	How to deal with a micro fill under glass layup.

filling	22/4	Stitts “micro-putty” can substitute for dry micro.
filling	55/9	While waiting for other things, do a little finish filling.
flox corners	11/3	Paint a coat of pure epoxy inside before adding flox.
flox corners	12/8	How to do flox corners.
foam	14/10	Protect from sunlight exposure.
foam	20/4	Be careful storing foam. Mice love it!
foam	20/6	Color of PVC foam varies, can lead to wrong grade being used. How to tell, how to fix some errors
foam	21/6	How to repair a bad gouge in blue foam.
foam	21/6	“Blue” styrofoam may not be blue.
foam	49/4	Don’t use blue styrofoam near fuel. It goes away.
foam	62/11	Divinycel PVC foam new color & sizes.
form breakdown	10/8	N4EZ has experienced deterioration of some urethane foam. What caused it & how to fix it. Do not substitute foams!
foam carving	12/7	Use weighted thread to help see contours while carving.
foam carving	12/7	Handy tool for carving deep notches in styrofoam.
foam substitutes	26/3	Approved substitutes for red high density PVC. Marine grade instead of aircraft grade OK.
foam substitutes	27/7	Allowable substitutes for PVC foam.
foam substitutes	34/7	Divinycel PVC foam is good quality lower cost substitute of Klegecel PVC foam. Cross over list.
foam, joining	10/4	How to join foam blocks without melting them with an exotherm reaction. Includes “graphic photo.”
foam, joining	11/3	Hints on joining & aligning foam blocks and cores. Use scrap foam to fill large holes, it’s lighter than micro.
foam, joining	13/6	Truss plates are handy for joining blocks of foam
foam, joining	14/9	Neat idea for joining cores without a bump.
foam, joining	28/8	Hints on how to join foam blocks without creating a bump.
glass cloth	36/3	Cheaper version of BID & UND is on the market with same numbers as Rutan cloth. It is not as strong.
glass cutting	12/6	Paper cutter works for cutting glass cloth.
glass cutting	20/4	Mark center of cut pieces.
glass cutting	20/4	Mark 45 degree lines on cutting surface. Helps with BID.
glass cutting	20/5	Quick way to cut glass circles.
glass cutting	32/6	Combination storage area cutting table.
glass cutting	35/7	Method using utility knife on sheet rock cutting board.
glass cutting	51/10	Neat method using tape to keep BID in place during & after cutting.
hardware	31/8	AN to MS crossover chart.
hot stuff	43/5	Instant glue that is great for tacking things in place. Can replace Bondo for some jobs.

hot wire cutting	10/2	Hints on wire temperature controls. Four different ways to control temperature. How to judge temperature.
hot wire cutting	10/3	Hints on building the hot wire & preparing the cores for layup
hot wire cutting	11/4	The temperature control shown in CP10 can be dangerous. This CP gives another idea.
hot wire cutting	12/7	How to judge wire temperature.
hot wire cutting	12/7	MAN Mod to templates helps cut straighter leading edges. Other hints for hot wire cutting.
hot wire cutting	16/6	Styrofoam vendor has changed block sizes. Arrange parts differently for cutting.
hot wire cutting	25/5	How to make & adjust hot wire saw.
hot wire cutting	27/5	Better way to cut spar troughs.
hot wire cutting	29/8	Cheap alternative to a Variac for hot wire temp. control.
hot wire cutting	30/7	Hints for hot wire cutting foam.
hot wire cutting	43/5	Hints for trimming and squaring foam blocks, installing templates on blocks.
hot wire templates	10/3	how to mount template drawings to get good templates.
hot wire templates	13/6	How to make.
hot wire templates	13/6	Masonite makes good templates.
hot wire templates	24/4	Method for making templates. Don't use water base glue to glue plans to templates.
hot wire templates	43/5	Materials and methods for making templates. Two different articles on same page.
house paint	29/6	Information was circulating about painting styrofoam with house paint before laying up glass. Parts built this way are junk.
incidence blocks	12/8	Bondo a board to wings and canard for incidence reference.
jigging	13/6	Hot glue gun is handy replacement for Bondo in some jobs.
layups	10/3	To estimate thickness of layups, BID = 0.013", UND = 0.009".
layups	11/3	Use of paint roller for layups.
layups	11/3	Layups done below 75 degrees will take too long.
layups	12/6	Use roller to stipple leading edge overlaps.
layups	12/6	How to get long layups done faster & easier.
layups	12/7	For faster layups, try making them a little wet and then squeegee off excess.
layups	12/7	Two paint rollers that work well for laminating.
layups	13/6	Thickness of layups. BID = 0.013" per ply, UND = .009" per ply.
layups	14/9	Checklist to use before starting a layup.

layups	14/11	Do not change fiber orientation.
layups	15/6	How to do faster, better layups.
layups	15/7	Use 36 or 60 grit sandpaper to prep glass for a layup. Scotch Brite won't do.
leveling	10/3	There is a wide range of sensitivity among levels. Hints on how to deal with this.
leveling	48/3	How to make & use a water level.
lighting	11/3	Shop must be well lighted to avoid building errors.
locknuts	30/4	Reports of cracks of MS21042-4 locknuts.
micro	48/6	DO NOT put dry micro balloons on completed layup.
micro & flox	56/5	Don't substitute micro for flox, or flox for micro.
moving fuselage	39/7	Method to allow one person to roll a LE fuselage over. Could be modified to work with VE.
peel ply	11/3	What it is, how it works, where to use it.
peel ply	12/7	How & where to use peel ply.
peel ply	13/4	Tests compare peel strength of various surface preparations. Results: use peel ply.
peel ply	14/9	Peel ply wrinkles, Dacron tape works better.
peel ply	16/7	Peel ply edges of all layups that end on the surface of a part rather than the edge. Particularly useful for winglet attach layup.
peel ply	19/5	Do not peel ply entire structure. Do peel ply edges of layups
peel ply	27/5	Don't peel ply entire surface. Peel ply surface edges & to prep for another layup.
peel strength	17/4	Peel strength of layups is not high.
quality control	10/4	"There is no substitute for good workmanship, and no excuse for poor workmanship." Which wrinkles & bumps have to be repaired, & how to do it. Cautions for finishing.
quality control	10/8,14	Reprint of quality control info furnished to FAA offices. Info on what the Feds may want to see.
quality control	11/3	How to avoid dry layups. Clarification of QC standards in plans.
quality control	12/5	How & why of inspection standards. "Laying up glass over junk just makes it harder and more expensive junk."
quality control	12/8	The most important inspection is just after layup is done. Many problems can still be corrected. Get someone else to check it. How to do a post layup inspection.
quality control	15/5	Clarification of inspection criteria. "Critical areas" that must meet all criteria defined.
quality control	16/8	Layup inspection checklist.
quality control	21/7	If a part isn't right, junk it. Other thoughts on QC.
quality control	27/5	Aircraft parts must be perfect. How to get correct epoxy content & determine if it is correct.

ratio pump	22/4	Check pump for accuracy, especially if modified.
ratio pump	35/7	Maintenance hints for epoxy ratio pumps.
repairs	13/5	How to repair poor trailing edge overlap.
repairs	14/9	How to fix a depression, bump, sanded through spot or bubble.
respirator	13/7	Breathing protection for use with epoxy and foam dust.
rivets	32/6	Correct rivets to use for different applications.
Safe-T-Poxy	21/1	Availability announced. Results of toxicity tests.
Safe-T-Poxy	22/5	Hints on use below 70. Don't use quartz bubbles with Safe-T-Poxy, use glass bubbles.
Safe-T-Poxy	23/6	Hints for use at lower temperatures. Shop should be 77F.
Safe-T-Poxy II	40/2	Advantages and disadvantages of new epoxy as compared to regular STP.
sanding	16/8	Zippidi-Do sanding disc works well on glass.
sanding	21/6	Wear ski goggles when sanding.
sanding blocks	48/3	How to obtain & use 3M feathering disc adhesive.
screw removal	53/6	How to remove stuck Phillips head screws.
shaping	54/6	Electric hand held planers cut glass, foam, wood, etc. for neat job.
slurry	11/3	Use plenty of slurry, especially on urethane foam.
static load tests	10/8	How to do load tests without wrecking anything. Limit load info for wing & canard. Load tests are no reason to accept a part with poor workmanship.
static load tests	13/3	How to wreck your structure without really trying.
static load tests	40/3	Why you shouldn't, how to do it if you must.
straight edges	36/6	Aluminum yard sticks make good hot wire straight edges.
tools, various	22/4	Handy tools for shaping glass.
torque values	10/3	Do not over tighten fasteners. Torque values are: #10 = 20 in-lbs, ¼" = 60 in-lbs, 5/16" = 100 in-lbs.
trailing edges	11/4	CP gives minimum TE overlaps. Be sure overlap area is well sanded before laying up top skin.
trailing edges	11/4	Use Dremel #428 wire brush to clean TE overlaps for top skin layup
trailing edges	12/6	How to avoid problems with layups in this critical area.
trailing edges	12/8	Check completed shape and chord length with hot wire template. Be sure to trim at trim line shown on template.
trailing edges	13/5	How to repair poor trailing edge overlap
trailing edges	16/7	How to peel ply trailing edges
trailing edges	28/8	Sketch of how all trailing edges should be trimmed to prevent delamination.

trailing edges	32/6	Glass to glass bonds at trailing edges must be perfect. Do not accept any delaminations or joggles. See drawings in CP. Minimum bond dimensions given.
warping	15/5	Improperly stored parts can warp. How to store, how to correct warps. How to do a post cure.
weight	10/10	What to do if you want full IFR, starter, and alternator in a VE. Where to put the ADF antenna.
weight	12/1,2	Weight control, weight & balance considerations for construction & first flight. Keep it light.
weight	12/7	Additional component weights for VE.
weight	13/4	It grows. Suggestions on how to keep it from happening.
weight	14/4	Why & how you should keep a VE light. Operation at 1110 lb. gross approved under certain conditions.
weight	20/5	Weights of completed VE parts.
weight	22/8	65 lb. fuselage weight given in CP20 should be 72 lbs.
weight	24/4	Too many airplanes are coming out too heavy. Delay installation of extras. Other hints for weight control & mods.
weight	25/4	Remove all excess epoxy. Do not add extra glass ANYWHERE. “Chase after grams, and the pounds will take care of themselves.”
weight	27/4	How weight grows. Details of a LE, but apply to VE, too.
weight	28/6	The “Universal Phantom Weight Law.” How extra weight creeps into an airplane.
weight	30/6	Weights of various VE parts.
weight	48/2	Keep it light! Prototype VE weighed 594 lbs.
West System Epoxy	45/4	New epoxy for use with micro.
West System Epoxy	55/9	Use this epoxy for micro. It is easier to sand.
4 — Canard		
bottom skin	10/3	Be sure elevator slot is correct before skinning bottom.
correction	21/5	Build fuselage before canard and elevators.
flutter	57/9	In flight flutter of canard caused canard to fail. Elevators too heavy, one bolt not installed properly, Elevators modified to wide chord.
foam cores	16/6	Arrange templates differently due to change in foam block sizes.
foam cores	35/6	How to get foam core pieces back together right, how much misalignment can be tolerated.
incidence blocks	12/8	Bondo a board to wings and canard for incidence reference.
lift tabs	10/3	How to put nuts on lift tab bolts to repair drilled out insert threads.

lift tabs	10/3	Install nut plates behind lift tab insert. Do not use method shown in the plans. Other hints for lift tab installation.
lift tabs	12/6	Build them per plans.
lift tabs	14/9	Use only the lift tab insert shown in CP10/3.
lift tabs	16/7	Jig to help find lift tab screw holes in shear web.
lift tabs	47/8	How to replace a lift tab.
mods	13/7	Canard is VE main wing. Don't monkey with it.
new canard	43/1	Info on new Roncz canard for LE, why it can not be used on VE.
new canard	44/2	Details of new Roncz canard for LE. Not recommended for VE.
new canard	45/3	Plans for new Roncz design canard for LE only.
nutplates	14/9	How to install nutplates to allow forward removal of canard mounting bolts.
rain trim change	38/4	Sanding canard leading edge can reduce trim change in rain.
Roncz canard	43/1	Roncz canard flies essentially the same in the dry and in the rain.
Roncz canard	44/2	The rain trim change is essentially nonexistent.
Roncz canard	45/3	Plans available. Not recommended for VariEze.
span change	14/5	MAN/GND Canard span shortened to 142" (8" trim) to move allowable CG range aft. Benefits, cautions, how to do it.
spar caps	10/3	How to do spar cap folding layups.
static load tests	45/3	Results of load tests done at RAF.
surface smoothness	16/4	MAN/GND The top surface of the canard must he smooth within 0.006". How to check, flight tests to confirm.
trailing edges	11/4	CP gives minimum TE overlaps. Be sure overlap area is well sanded before laying up top skin.
trailing edges	12/8	Check completed shape and chord length with hot wire template. Be sure to trim at trim line shown on template.

5 — Elevators

balance	19/4	MAN/GND Overweight or out of balance elevators must be corrected or rebuilt to prevent flutter. One half of any weight added must go on outboard weight.
balance	21/5	Proper balance of elevators most important part of the airplane. How to measure & correct balance. Improper balance will cause flutter!!!
balance	51/4	Control surface balancing. How to sand, balance, and correct improper balance.
balance	57/8	MAN/GND Inspect for proper construction. New balance requirements & discussion of flutter. Reuse of elevator tube if building new elevator.

construction order	21/5	Build fuselage before canard and elevators.
critical dimensions	12/7	Sketch gives critical dimensions for narrow chord elevators.
end play	60/9	Mod to take end play out of Defiant elevators. Might apply to VE also.
flutter	57/9	In flight flutter of canard caused canard to fail. Elevators too heavy, one bolt not installed properly, Elevators modified to wide chord.
foam cores	16/6	Arrange templates differently due to change in foam block sizes.
installation	10/3	When cutting slots for VECS3 brackets, be sure not to damage spar cap.
Installation	19/4	Gap between elevator and canard must be correct.
installation	20/5	How to check elevator fit before floxing VECS3 hinges into canard.
Installation	24/4	Proper position of elevator. Be sure slot & elevator shape are right.
shape	10/3	Template is oversize to allow for foam melt. Other hints on elevator assembly and installation.
shape	48/3	Hints on getting correct elevator shape. Applies to Roncz canard, but should help with original, too.
shape	59/5	Elevator shape critical to proper operation of trim system. How to adjust trim springs.
wide chord elevators	17/5	MAN/GND Plans for wide elevators for VE. Optional for those already flying & used to narrow elevators. Templates to check elevator shape.
wide chord elevators	18/5	How to balance wide elevators, pilot reports of results.
wide chord elevators	20/3	Stability and stalls with wide chord elevator.
6 — Wings & Ailerons		
ailerons	27/6	Be sure to maintain 0.1” gap between aileron and bottom skin of wing.
ailerons	51/4	Control surface balancing. How to sand, balance, and correct improper balance.
assembly	11/4	Above all else, both wings must have the same twist and incidence.
assembly	13/5	Many hints and revised assembly method for wing assembly. Better method for laying up attach fitting pads.
attach fitting	10/3	How to make sure the pad layups come out right.
attach fitting	10/4	Check fit of cores if jig with attach fitting in place before bonding fitting to cores. How fitting should be lined up with cores, clarification of assembly.
attach fitting	10/11	AN525 screws are preferred for step 9 (spar pad).
attach fitting	11/4	Use a lubricant such as Lubriplate on the mating surfaces.
attach fitting	13/6	Polish edges with 100 grit paper before installation.

attach fitting	14/10	How to fix drilled out threads.
attach fitting	15/6	Better method for laying up BID pads at attach fittings
attach fitting	22/4	How to drill screw holes in fittings
attach fitting	26/6	How to get proper thickness of BID pads. Use number of plies in this CP instead of number called out in plans.
attach fitting	50/4	MAN/GND Use stud finder to verify all screws are installed. Missing screws caused fatal accident.
attach fitting	53/7	Corrosion found on fitting. Alodine treat all new fittings. Do not anodize.
attach fitting	55/5	MAN/GND Check wing attach fittings for corrosion. Method for replacing fittings.
attach fitting	61/10	MAN/GND Check taper pins & AN-4 bolts for proper fit. Caused fatal accident.
conduit	10/3	How to install wires in the wing.
conduit	16/7	Use soda straws for electrical conduit & rudder cable housing conduit.
correction	11/3	On page 6-5, the seventh ply of BID is used for wing root and mid span ribs.
correction	13/6	Photo on plans page 6-5 is misleading. Method is correct, but part is from N7EZ.
correction	14/8	Template in aileron plans is wrong.
cuffs	19/2	MAN-25 hr. Cuffs added to rear wing to prevent departure at low speed. (Replaced by vortilons.) Good discussion of aft wing stall & departures. AFT CG LIMITED UNTIL CUFFS ARE INSTALLED.
cuffs	20/2	Pilot report of results of cuff installation.
fiber orientation	18/5	UND plies must be as shown. No fix.
filling dips	12/5	Avoid excess filling around attach fitting.
foam cores	10/7	How to join blocks together to cut cores
foam cores	12/8	How to keep cores in proper alignment and avoid gaps during assembly.
foam cores	16/6	Arrange templates differently due to change in foam block sizes.
fuel leak damage	38/4	Tanks have leaked at outboard rib & damaged styrofoam in wing. How to repair wing if this happens.
hinges	16/8	Be sure to reverse aileron hinges. Outboard hinge can be 1/2 inch shorter.
hinges	22/4	Check for wear.
hinges	28/8	Bend hinge pins to preload & reduce wear.
hinges	34/7	MAN Aileron hinge pins must be saftied. Shows proper method.
hinges	39/7	Teflon tube mod to reduce aileron & rudder hinge pin wear. Source of tube.
hinges	51/6	How to install teflon tube in aileron & rudder hinges.

incidence	22/4	Method for setting wing incidence.
incidence blocks	12/8	Bondo a board to wings and canard for incidence reference.
jigs	11/4	Jig block “F” may need to be shimmed. “E” must be notched to clear attach fitting.
jigs	15/6	Add 2” to jig blocks to allow reaching under wings.
prefab wing	24/4	Did not work. Not recommended
repairs	14/10	How to repair incorrect shear web.
spar	15/8	MEO Changes to dimensions for spar trough and spar glass cloth.
spar caps	10/3	How to do spar cap folding layups.
templates	15/8	Waterlines on center templates are wrong. CP gives dimensions to correct
trailing edges	11/4	CP gives minimum TE overlaps. Be sure overlap area is well sanded before laying up top skin.
trailing edges	12/8	Check completed shape and chord length with hot wire template. Be sure to trim at trim line shown on template.
trim tab	10/11	Do not notch trim tab into the wing. Build it per plans.
trim tab	12/5	How to install a fixed roll trim tab if needed.
vortilons	42/4	Vortilon plans for VE. See CP43/3 for missing dimensions.
vortilons	43/3	Feedback on results of installing vortilons. Dimensions missing in CP42.
vortilons	44/3	Try them, you’ll like them. Remove cuffs before installation.
vortilons	48/2	Do not slit wings to install vortilons. Install them. They work!
wing tip	10/11	Report of wing tip ground strike with N4EZ.
7 — Winglets		
hinges	34/7	MAN Rudder hinge pins must be saftied. Shows proper method.
hinges	51/6	How to install teflon tube in aileron & rudder hinges.
layups	12/8	Use foam left over after cutting winglet core as a jig to keep winglet straight during layup.
spring	13/6	Spring selection & installation, proper return force.
trailing edges	11/4	CP gives minimum TE overlaps. Be sure overlap area is well sanded before laying up top skin.
8 — Centersection Spar		
assembly	13/6	Mask makes assembly easier.
attach fitting	10/3	How to make sure the pad layups come out right.
attach fitting	10/11	AN525 screws are preferred for spar pads
attach fitting	11/4	Use a lubricant such as Lubriplate on the mating surfaces.
attach fitting	11/7	MAN/GND Apply 2 ply UND wrap around attach fitting

attach fitting	13/6	Polish edges with 100 grit paper before installation.
attach fitting	14/10	How to fix drilled out threads.
attach fitting	15/6	Better method for laying up BID pads at attach fittings.
attach fitting	22/4	How to drill screw holes in fittings.
attach fitting	26/6	How to get proper thickness of BID pads. Use number of plies in this CP instead of number called out in plans.
attach fitting	50/4	MAN/GND Use stud finder to verify all screws are installed. Missing screws caused fatal accident
attach fitting	53/7	MAN/GND Corrosion found on fittings. Alodine treat all new fittings. Do not anodize.
attach fitting	55/5	MAN/GND Check wing attach fittings for corrosion. Method for replacing fittings.
attach fitting	61/10	MAN/GND Check taper pins and AN-4 bolts for proper fit. Caused fatal accident.
pattern	10/3	Full size spar pattern is 0.1” shorter than B.L. numbers indicate. Don’t worry about it.
spar caps	25/5	How to lay up spar caps.
9 — Fuselage Bulkheads		
correction	2-3	.016 stainless 032 should be 302
correction	9-3	1/0 should be 1.0.
front seat	38/4	How to move front seat forward 2” for shorter pilots.
inspection holes	14/6	Add inspection holes to rear seat bulkhead to allow inspection of main gear mounting tabs.
instrument panel	13/5	All controls must be labeled. List of required placards.
instrument panel	28/11	Photo of good LE panel.
instrument panel	39/9	Instrument panel photo.
instrument panel	42/4	Photos of VE and LE panels.
instrument panel	47/14	Photos of completed panels.
tracing	25/5	Use carbon paper to transfer plan patterns to foam.
11 — Fuselage Assembly		
bottom	11/4	Strengthen floor of rear cockpit to prevent foam crushing.
bottom	16/10	Dimension change to give speed brake more room.
C/S spar	23/8	It may be easier to install C/S spar after outside skin of fuselage. How to do this.
correction	22/8	MEO Page 11-4, AN960-4 should be AN960-416. Two places.
12 — Fuselage Exterior		
door	24/5	VE can use LE fuselage door. Allows canopy to be locked.
layup	24/6	DES Side layups should be done with Safe-T-Poxy
step	10/4	How to install a “kick in” boarding step in fuselage side.

step	16/8	Simple step to replace kick in step.
14 — Canard Installation		
canard cover	13/5	Moving canard cover aft makes battery access easier. Reversed lift tab bolts makes removing canard easier.
rigging	14/9	Use both templates to check incidence.
15 — Head Rest, Seatbelts		
brackets	18/5	Check seat belt brackets for sharp corners.
roll over structure	15/8	Page 15-1, 3.7” should be 2.7”.
seat belts	22/11	MAN/GND Eon E 8000 seat belts are unsafe. They can come open unexpectedly. Do not use.
seat belts	23/6	Eon E8000 seat belt is not airworthy.
seat belts	24/4	Replace Eon E-8000 seat belts. FAA has issued AD removing them from certificated aircraft.
strength	44/2	Rollover structure is not intended for inverted landings.
strength	65/7	Roll over structure is demoted to head rest. It will not support crash loads.
16 — Firewall & Accessories		
fiberfrax	25/4,6	DES Fiberfrax firewall reduces weight 2 lbs.
fireproofing	49/5	MAN/GND Replace aluminum control system parts with steel. Use Ocean #1644 to fireproof CS spar. See page 3 for source of Ocean #1644.
fireproofing	50/6	Hints on purchase, application and protection of Ocean 1644 fireproof coating.
fuel valve	18/9	Fuel valve moved. Gascolator added.
liquid firewall	38/7	This stuff is sold as replacement for standard firewall materials, but it has no insulating ability. Don’t use it!
rudder cable	49/4	Check to be sure people or wind moving rudder cannot cause cable to foul.
17 — Nose & Nose Landing Gear		
bearings	42/4	Nose wheel sometimes turns on ¼” bolt instead of bearing. How to fix.
canard cover	13/5	Moving canard cover aft makes battery access easier. Reversing lift tab bolts makes removing canard easier.
correction	22/8	12.5” foam piece should be 15”.
fenders	47/13	Nose wheel fenders for all EZ.
inner tube	50/7	Nose gear inner tube problems & solutions. Keep tire properly inflated.
NG crank	42/4	Nose gear sometimes bounces out of downlock. How to add friction to prevent this.
NG crank	62/5	Ratchet prevents nose gear jumping out of position. Source of supply.
NG crank	65/9	Report on installation of nose gear ratchet. Highly recommended.

NG15A	41/5	Nose wheel casting must be perpendicular to the ground or aircraft will “pull” to one side when taxiing. How to fix if it isn’t. Check friction damper often!
NG6 casting	11/4	NG6 as supplied by Brock is narrower than shown in plans. Use spacer included with part.
nose bumper	13/6	How & where to install bumper.
nose bumper	28/3	2x3x1/4” steel pad under nose bumper is good for at least three gear up landings.
nose bumper	51/7	Wrong bumper material caused runaway on starting.
nose tie down	26/8	Allows nose to be tied down with gear retracted.
nose tie down	49/7	Allows nose to be tied down with gear retracted & allows access to NG pivot bolt.
nose wheel	55/6	Brock nose wheels have cracked. Wicks has better replacement wheel.
pitot	30/7	Pitot should run uphill continuously from tip of nose to airspeed indicator. How to route tube.
pivot	32/6	Correct orientation of nose gear pivot is critical to prevent shimmy. CP gives proper angles. Check shimmy damper friction often.
pivot	44/7	Mods to nose gear pivot to reduce wear and improve steering.
rod ends	23/3	Rod end may interfere with strut. How to fix.
rod ends	23/7	Substitute for RE4M6 rod ends.
rod ends	54/5	Replacing shock strut rod ends.
rudder pedals	30/5	Modify rudder pedal to prevent tab breaking off. Brock has parts
screws	51/4	Replace screws in NG-15A.
screws	54/6	DES Replace AN525 screws that mount NG-15 casting with AN3-14A.
sealing the nose	35/10	How to seal up nose so cabin heat will work. Battery must be manifolded type and vented overboard.
shimmy	34/9	Set up, maintenance, and operation hints to prevent nose wheel shimmy.
shimmy damper	30/4	Check shimmy damper often. Check for binding in pivot. Heavy spring helps. Brock has this.
shimmy damper	38/4	How to fix shimmy damper if it does not hold adjustment.
shimmy damper	42/4	How to fix a damper that seems to loosen after a few flights.
shimmy damper	63/9	Davenport damper, highly recommended.
shock strut	25/8	Spring loaded shock strut replaces NG9/NG10.
shock strut	54/5	How to replace shock strut spring. How to tell if it needs replacing.
shock strut	61/5	Stronger spring for NLG shock strut.
strut	16/5	MAN-25hr. Strut beef up & mod to NG15.

worm drive	19/3,5,7	MAN/GND Worm drive for nose gear prevents gear collapse. Plans in this CP.
worm drive	21/5	Parts to be reused & discarded when retrofitting worm drive.
worm drive	21/6	How to use webbed Boston in worm drive.
worm drive	34/8	Friction system for nose gear retraction mechanism.
worm drive	38/5	How to modify Boston gear to work. Brock sells solid gear.
worm drive	43/5	How to reduce gear chatter during lowering.
worm drive	46/7	If crank backs off on rough runway, check to be sure arm is going over center. Can strip gear.
worm drive	48/3	Don't park with nose gear partly extended. Worm gear will strip.

18 — Main Landing Gear & Brakes

alignment	11/4	The 17" dimension on page 18-2 is correct. Gear sweeps forward.
alignment	17/5	Use carpenter's square to check toe-in.
axles	30/6	How to install axles & set correct toe-in.
axles	48/6	Steel replacement for Rosenhann axle.
BID wrap	15/6	Clarification of how to do BID wrap on MLG strut.
brake caliper	30/8	There must be 1/16" clearance between caliper and strut. See LPC #75.
brake fluid	52/4	DOT 5 silicone brake fluid recommended.
brake lines	16/6	MAN-25hr. Install inserts in Nylaflow brake lines. See also CP27/5.
brake lines	27/5	Use Weatherhead insert instead of brass tube called out for nylon brake lines.
brake lines	45/7	Heat and sunlight damage to brake lines. How to route the lines.
brake lines	47/11	Install brake line in plastic tube for easy replacement.
brake lines	51/5	Stratoflex teflon brake lines, advantages & installation. DOT 5 brake fluid.
brake pads	41/5	Cleveland semi-metallic pads. How to break in all types of pads. Where to get info on Cleveland brakes.
brake sticking	42/4	Possible causes & how to fix.
brake torque plates	34/8	Be sure plates fit flush on axle. Filing may be required.
brakes	11/4	Which master cylinders to use with which brakes.
brakes	12/2	How to install & service brakes. Routing of brake lines is very important
brakes	12/7	Use teflon tape on all fittings.
brakes	31/4	Disc should run true within 0.010.
brakes	40/7	Possible causes of bad brakes. Be sure wheel pants clear caliper.

brakes	47/11	Heat damage to nylon brake lines. How to prevent and repair. How to replace brake line.
brakes	49/7	Heavy duty brakes. Modify wheel pants to cool hot brakes. Remove wheel pants for taxi tests.
brakes	52/4	Heavy duty Cleveland brakes may require mod to prevent caliper falling off.
brakes	52/4	How to install & bleed brakes.
brakes	53/7	Check brakes for binding. Wheels must rotate freely.
brakes	63/11	Check for runout in Cleveland brake discs.
Cleveland wheels	12/2	Correct position on strut. Changes info from CP10.
Cleveland wheels	13/6	How to install.
Cleveland wheels	14/11	Hint for installation.
correction	14/8	Dimension missing from gear mounting extrusion.
LE gear	23/3	Installation of LE gear on VE, plans available.
LE gear	25/5	How to install a LE gear on VE.
master cylinders	57/5	Plans for nose mounted brake cylinders.
main LG alignment	55/10	How to check & correct wheel alignment.
Rosenhan wheels	12/7	How to install.
Rosenhan wheels	12/7	How to raise height of Rosenhan master cylinders.
Rosenhan wheels	12/7	Screws can interfere with strut. How to fix.
Rosenhan wheels	14/7	How to adjust & maintain.
Rosenhan wheels	15/2	Mods to Rosenan wheels & brakes. Some units shipped with wrong O-rings.
Rosenhan wheels	16/6	Brake problems. Install retrofit kit.
Rosenhan wheels	19/5	Check for sharp edges.
Rosenhan wheels	45/4,7	Reports of cracks & how to check for them.
Rosenhan wheels	46/7	Cracks & brake chatter. How to fix.
Rosenhan wheels	47/10	These axles crack. How to replace them with steel.
strut	10/3	How to check the strut for straightness before installation.
strut	20/3	MAN How to prevent and repair compression damage to strut. Mandatory 3 ply mod for new construction, 7 ply fix for damaged struts.
strut	57/10	Installation of heat shields on MLG struts to prevent brake heat from damaging leg.
strut installation	12/7,12	How to set strut position on fuselage.
tabs	12/3	Optional beef up to tabs and required BID wrap of strut. Mod to tabs superseded by later changes.
tabs	14/6	MAN/GND Change main gear tabs to all glass construction. Don’t make tab wider than 2”. Other hints on tab construction.
tabs	15/8	Revised dimensions for MLG mounting tabs. Hints on installing tabs.
tabs	21/6	Don’t layup tabs on wax paper.
tabs	28/8	Hints for drilling ⅝ holes in LE type gear tabs.

tabs	42/4	How to fix elongated holes in MLG mounting tabs. Proper bolt torque.
tabs	47/9	Inspection and repair.
tabs	48/5	Inspect LE type tabs for movement. How to repair if they have.
tabs	48/6	DO NOT use any kind of lubricant other than plain water when drilling tabs. If you do, nothing will ever stick again.
tabs & brakes	54/7	How to replace axles & repair loose tabs on VE.
tires	12/2	500 x 5 tires must not be used on the VE.
tires	24/7	6-ply ribbed tires should be inflated to 80 psi.
tires	26/5	Reports of valve stem and side wall failures. RAF believes this is due to under inflation. (3.40 x 5 tire)
tires	26/10	Do not use original 2-ply tires. Be sure wheel pants are ventilated & strut insulated.
tires	29/6	New 11 x 4.00 x 5 tire recommended for VE.
tires	31/10	11 x 4.00 x 5 6-ply tire recommended for VE.
toe-in	11/4	Up to ¼" of strut can be removed to get proper toe-in
toe-in	12/7	How to check toe-in.
toe-in	18/5	Change toe-in to ¼ to ½ degree. More caused tire wear and high rotation speed.
toe-in	20/4	How to check toe-in. This has big effect on tire life.
torsional strength	17/4	Builder experienced torsion failure of gear. BID wrap not installed.
wheel pants	13/4	Results of wheel pants installation on N4EZ.
wheel pants	24/4	Cooling openings in VE wheel pants.
wheel pants	28/10	How to install wheel pants.
wheel pants	30/7	Wheel pants installation hardware.
wheel pants	31/4	Do not conduct taxi tests or first flight with wheel pants on. Insulate strut near brake disc.
wheel pants	34/6	Installation instructions for prefab wheel pants.
wheel pants	34/8	Mud flaps on main and nose gear can reduce prop damage.
wheel pants	44/7	Installation of wheel pants on LE. Might help on VE, too.
wheel pants	54/8	Access doors for wheel pants. Available from Wicks.
wheels	17/5	Check brake disc runout & wheel balance.
wheels	61/6	Wheel balancing, importance of & how to do it.
wheels	62/3	How to balance wheels.

19 — Control System & Rigging

aileron plans	13/6	¾" 6061-T6 can be substituted for the 2024-T3 tube.
aileron plans	15/8	On page 5, right side, 9-¾" dimension should be 9-¼".
aileron plans	15/8	Bill of materials, 6061-T6 aluminum can be substituted for 2024-T3 on the ¾" tube.

aileron vibration	59/9	New balance procedure & bellhorns for LE and VE ailerons.
ailerons	12/18	MAN/GND Install rear wing ailerons. Last minute addition to CP announces availability of aileron plans & how to get them. Explains why ailerons are needed.
ailerons	13/2	MAN/GND Aileron plans announced. Discussion of why spoilers didn't work, fluter testing, drag, etc.
ailerons	58/7	MAN/GND Check bellhorns, replace within 25 hrs. Rebalance ailerons if vibrating.
elevator	12/8	Check zero position of elevator when measuring deflection
elevator bell crank	27/6	Be sure object stored under thigh support can not get into control system, especially elevator bell crank.
elevator rigging	48/4	Max lift of canard must occur at full aft stick. How to flight test, why this is.
elevator rigging	60/6	Be sure max lift of canard occurs at full aft stick. Excess elevator travel causes bad flight characteristics. Check during test flights.
fireproofing	49/5	MAN/GND Replace aluminum control system parts with steel. Use Ocean #1644 to fireproof CS spar. See page 3 for source of Ocean #1644.
friction	11/4	Elevators MUST be free of friction.
friction	33/5	The presence of friction in the pitch controls of an EZ will result in serious degradation in flying qualities.
friction	47/12	Control system must be free of friction. Inspections and mods to be sure.
friction	55/6	Controls must be totally free of friction. How to check with canard under load.
gust locks	49/7	For rudder & aileron.
hinges	51/6	How to install teflon tube in aileron & rudder hinges.
nicopress sleeves	37/3	Cheap swaging tools work fine but must be used properly. Here's how.
pitch disconnect	35/8	LE suffered control disconnect due to clevis pin falling out. How to prevent.
pitch sensitivity	13/1	How to use side stick control.
pitch sensitivity	14/5	Causes & cures for excessive pitch sensitivity.
pitch sensitivity	17/5	Discussion of stick forces & wide chord elevator.
pitch trim	24/9	LE pitch trim can be installed on VE. Plans for system.
pitch trim springs	34/5	Report of springs breaking in flight. Airplane will fly normally.
push rods	27/5	Drill an inspection hole in all push rod tubes to be sure enough rod end threads remain in the bushing.
rain trim change	38/4	Sanding canard leading edge can reduce trim change in rain.
rigging	13/6	Sears angle finder is handy for rigging controls.

rigging	30/4	How to verify correct rigging by measuring speed vs elevator position.
rigging	60/11	How to check if your airplane is straight. How to fix if it isn't.
rod ends	15/4	HM3 rod ends are easily damaged. Do not use HM3C
rod ends	20/4	MAN/GND Replace HM-3 rod ends in pitch system with ¼".
rod ends	30/9	See LPC #81 for correct method of installing rod ends.
rod ends	60/9	Check aileron rod ends for wear. Steel push rods have caused rapid wear of rod ends. Also have caused loose rivets.
rudder cable	49/4	Check to be sure people or wind moving rudder cannot cause cable to foul.
rudder travel	22/7,8	MAN/GND Reduce rudder travel from 3.5" to 2".
rudder travel	23/6,7	MAN/GND Reduce rudder travel from 3.5" to 2". Clarification of earlier change. Keep brakes in top shape!
rudder trim	24/5	Removal of rudder trim system, replacement with fixed trim block. Small wheel chock can be used instead of parking brake.
steel parts	16/5	Use of steel parts for controls aft of firewall.
steel parts	50/5	Clarification of changes to control systems called out in CP 49.
surfaces	51/4	Control surface balancing. How to sand, balance, and correct improper balance.
trim tab	12/5	How to install a fixed roll trim tab if needed
20 — Trim System		
pitch trim	24/9	LE pitch trim can be installed on VE. Plans for system.
pitch trim	59/5	Elevator shape critical to proper operation of trim system. How to adjust trim springs.
roll trim	11/4	Roll trim is mandatory on the VE.
rudder trim	24/5	Removal of rudder trim system, replacement with fixed trim block. Small wheel chock can be used instead of parking brake.
trim authority	18/5	How to fix if you don't have enough up or down trim.
trim tab	10/11	Do not notch trim tab into the wing. Build it per plans.
voltage regulator	14/9	How to prevent failures of voltage regulator.
yaw trim	15/6	Different yaw trim system.
21 — Fuel Tanks, Wing & Fuselage		
cracks	44/9	Bottom skin of tank has cracked at joint with CS spar. Probable cause was sanding away structure at the joint. Watch this!
drains	10/6	MAN/GND Install drains in forward part of wing tanks. CP gives drawing showing how to install them.

drains	14/7	How to place fuel tank drains. How to fix if they are in the wrong place.
fuel caps	14/7	Some Brock caps shipped with wrong O-rings. Be sure they don't swell when soaked in fuel.
fuel caps	28/7	Fuel caps mix-up caused accident. Tethered caps would have prevented this.
fuel caps	31/5	Install safety chain on fuel cap to prevent loss.
fuel caps	50/7	Missing or leaking fuel caps can cause major problems. How fuel & vent system works. How to safety caps to tank.
fuel gauges	14/9	How to be sure gauges are clear.
fuel gauges	24/5	How to be sure to get good clear gauges. What to do if you don't.
fuel gauges	64/7	Clear fuel gauges.
fuselage tank	11/6	MAN/GND Plans for fuselage tank. Discussion of three tank fuel system.
fuselage tank	15/7	Alternate method for building fuselage tank.
fuselage tank	16/8	Clarification of how to construct fuselage tank.
fuselage tank	18/8	How to make & install fuselage fuel tank.
fuselage tank	25/4	DES Add ram probe vent to fuselage tank to prevent fuel starvation.
Jiran tanks	14/9	Tanks may trim up short. This is OK.
Jiran tanks	21/6	How to install.
layup	24/6	DES Fuel tank layups should be done with Safe-T-Poxy. Be sure to follow CP22 carb inspections.
leak check	11/4	If you leak check before installation of outside skin, use no more than 500' pressure.
leak check	38/7	Don't damage tank doing leak check. Use altimeter with 1500 feet max altitude change.
leaks	14/10	How to fix a leak due to a dry spot.
leaks	17/5	How to use soapy water to find leaks.
leaks	20/4	Easy way to find a fuel tank leak.
leaks	35/6	Small hard to find leak may be on center section spar or fuselage side. "Sure fire" method for finding such leaks. How to fix.
leaks	36/6	How to find a tank leak using phenolphthalein.
leaks	38/4	Tanks have leaked at outboard rib & damaged styrofoam in wing. How to repair wing if this happens.
sealing	62/2	Seal tanks with two coats of Safe-T-Poxy.
tank grounding	52/6	More on tank grounding & refueling fires.
tank grounding	53/3	Static caused refueling fire. Causes, theories about how to fix.
tank grounding	55/4	Static electricity caused fueling fire. Mods suggested to ground fuel tank.
tank vents	22/8	DES Route vent lines 15" forward.

tank vents	36/6	Drill a hole in vent to prevent engine failure in icing. CP shows location.
tank vents	47/6	Plugged fuel tank vent caused engine failure.
tank vents	48/5	MAN/GND Separate tank vents recommended in CP47/6 are a mandatory plans change.
tank vents	51/6	Incorrect location of vent caused a VE to siphon fuel out the vent. CP gives correct location.
top	31/4	When floxing top of tank in place be sure flox doesn't drip onto fuel pickup & plug it.

22 — Canopy

air vent	14/11	What to do if air vent doesn't flow at low speeds.
air vent	54/6	Rubber flap to control air flow.
air vent	61/12	Ready made cockpit vent door.
bird strike	58/4	Duck came through canopy.
brace	13/6	Canopy cross brace goes under Plexiglas. The Plexiglas has no holes.
canopy replacement	36/4	How to replace a broken canopy.
correction	13/6	Page 22-10, lower drawing of C-7, solid line should be dashed.
correction	13/6	On the second page 22-8 plans change shown in CP11/7, AN509 should be AN525.
door	24/5	VE can use LE fuselage door. Allows canopy to be locked.
emergency opening	21/7	How & why to install emergency opening system on VE canopy.
frame	24/5	VE can use lighter LE canopy layup. CP gives layup schedule.
frame	35/6	Optional revision to canopy frame makes it easier to build and lighter. Also shows "drip tray" that keeps rain out of radios.
front cover	12/6	If canopy is moved forward per CP11, leave front cover as shown in plans. It is required structure.
fuselage tank	18/8	Fuselage fuel tank requires changes in canopy construction.
inside knob	14/11	Do not omit inside knob on canopy frame.
jigging	10/4	Dimensions to check when jigging canopy, and how to check them.
jigging	11/4	Canopy can be moved forward 2 inches from position shown on the plans. Gives more room for pilot to lean forward.
Jiran canopy	14/9	Check width of canopy before installing.
Jiran canopy	16/2	How to install Jiran mounted canopy.
latches	13/6	Hints for installation & adjustment. How to install a lock & access door.
latches	58/4	Safety catch adjusted wrong. Canopy opened in flight & broke.

plexiglass	29/4	Hints for working with plexiglass.
replacement	36/4	Method to remove and replace a damaged canopy.
safety catch	15/8	A secondary latch system that also functions as a canopy lock.
safety catch	17/6	MAN/GND Plans for secondary canopy catch. Prevents open canopy accidents. DO NOT OMIT THIS!!
safety catch	25/3	DES To avoid being trapped in back seat, mount safety catch at FS57.
seal	42/4	Aircraft Spruce has V seal that works. 20' required.
spraylat	31/4	Apply 2 or 3 coats. It makes removal easier. Wipe off any epoxy spilled on spraylat.
throw over stay	30/7	How to build & install "throw over" canopy stay. Prevents canopy being blown closed.
throw over stay	40/4	This stay may make it harder to close canopy in flight.
trim	26/7	How to trim LE canopy to fit. May help on VE.
yaw string	24/4	How to install & use a head up solid state yaw reference.

23 — Covers, Fairings, Consoles

canard cover	13/5	Moving canard cover aft makes battery access easier. Reversing lift tab bolts makes removing canard easier.
consoles	12/6	Don't try to fly without consoles!
consoles	20/6	Hints & photos for console installation.
consoles	33/6	Make and fit consoles, but do not install until wiring, rudder conduit, control system, landing brake, trim system, etc. are all installed.
consoles	38/4	How to install consoles after control system is built.
front thigh support	27/6	Be sure object stored under thigh support can not get into control system, especially elevator bell crank.
fuel selector	14/7	Do not modify selector position. Mods have already caused one accident.
lower aft cover	27/3	Removable panel can be installed to allow access to gear attach, fuel valve, etc.
lower aft cover	28/10	Lower cover around main gear is required structure. Do not alter if installing NACA scoop.
rear seat	28/8	Thigh support makes rear seat more comfortable. How to make & install.
removable consoles	16/8	Don't make armrests removable. Small access panels are OK.
stick boot	28/10	Soft leather "boot" can be used to cover control sticks instead of glass cosmetic cover.

24 — Wing to Winglet Mate

lower winglet	10/11	Report of wing tip ground strike with N4EZ. Damage to lower winglet.
lower winglet	19/5	Can lower winglet be eliminated?

peel ply	16/7	Be sure to peel ply attach layups
rigging	14/8	Dimension change changes angle of lower winglet to reduce dihedral effect.
rigging	14/10	How to check winglet incidence.
rigging	16/9	More accurate method for aligning winglet for attach layup
rigging	17/8	Method shown in CP16 results in less “cant” for winglet. Other notes & hints for winglet installation.

Sec II — Engine, Fuel & Oil Systems, Cooling

accessories	62/2	Engine accessories can overheat after flight. Drop in door recommended.
air filter	50/6	Neat air filter installation on Lyc powered LE. Might have some hints for VE.
auto fuel	34/4	RAF does not recommend use of auto fuel due to possible damage to epoxy. Saf-T-Poxy is much more resistant.
Bendix carb	13/7	Early reports of problems were false. This carb seems to work fine.
breather hose	47/12	Inspect breather hose. Install spring in hose. Clogged breather can ruin engine & day.
breather system	14/4	Oil separator for VE. Install if losing more than ⅛ qt. per hour out the breather.
breather system	25/4	Modified breather installed on RAF prototype. Eliminates gunk on cowling.
breather system	56/5	New breather system for Lycomings. Eliminates cowl stains.
breather system	59/8	Breather system may have caused engine fire.
cabin heat	19/4	Simple system for VE.
carb floats	41/6	Warning about sinking Marvel-Schebler carburetor floats. Watch for unexplained over rich conditions.
carb heat	26/4	Carbon steel spring in one builder’s heat muff disintegrated. Could get ingested into engine.
carb heat	32/6	How to check carb heat temperature rise.
carb heat	38/4	Aircraft Spruce carb heat muff works well.
carb ice	14/4	Reports of carb ice in N4EZ. It ices often, like a Cessna 150.
carb ice	58/5	Teflon coating of throttle plate prevents carb ice. Use of Prist to prevent ice.
carb ice	60/3	O-200 quit on hot takeoff. Carb ice suspected.
CHT probes	35/6	Locations for CHT sensors.
CHT probes	47/10	Locations for O-200 and O-235.
compression testing	63/7	Differential compression testing.
Continental engines	10/9	Overhaul hints for small Continental engines.
Continental engines	23/7	MAN/GND Continental engines without starter must install bearing retainer to prevent spontaneous

		conversion of engine into boat anchor. CP gives plans for retainer.
Continental engines	63/11	Vacuum pump drive gear screws must be installed.
controls	12/7	Hints for throttle & mixture control return springs.
controls	15/8	Add note to plans: engine controls must operate smoothly, without play, and must snub against engine stops. Check before running engine.
controls	16/8	How to add back seat throttle.
controls	21/9	Throttle/mixture control support for Lyc.
controls	51/6	MAN/GND Problems with mixture control have caused two forced landings. Check for proper installation & operation.
controls	61/7	MAN/GND Wrong outer cable attachment caused engine failure.
controls	65/11	Builder letter about engine failure & how it could have been prevented. Failure was caused by broken throttle spring.
controls	65/7,13	MAN-10hrs. Inspect throttle & mixture springs for proper installation & wear. Failure of these springs caused an engine failure.
cooling	19/4	Builder traced high CHT to strange gauge calibration.
cooling	21/7	Overheating problem traced to too small a main jet.
cooling	42/3	Effect of deflectors in bottom of cowl.
cooling	47/10	VE & LE engine cooling problems and solutions.
cooling	51/5	Large opening around exhaust pipes reduces CHT.
cooling	52/5	Persistent high CHT problem traced to incorrect mag timing.
cooling	53/6	Cowl mod reduces CHT on LE.
cooling baffles	19/5	Hints on fitting.
cooling baffles	22/4	Adding radius to edge of baffles can help cooling.
cooling baffles	25/4	Baffle hole improves Continental engine cooling.
cooling baffles	47/10	Baffles for O-200 and O-235.
correction	16/10	Section IIC, page 5, FS 132.77 should be 133.28.
correction	19/5	Section IIA, page 2, 2nd edition, revised part numbers.
cost	22/5	Hints on how to reduce cost of VE engine.
cowling	14/10	What to do if spark plugs hit top of cowling.
cowling	20/5	Attach rib to wing root. Makes cowl removal easier.
cowling	25/2	Evaluation of “boat tailed” VE.
cowling	26/8	How to do trailing edge close-out on VE cowl.
cowling	28/8	How to store cowl to prevent warpage.
cowling	37/4	The aft stiffener must be taped in with BID.
engine mount	27/5	Installation procedure for Dynafocal mounts.
engine mount	32/5	Proper installation of engine mount to get correct thrust line.
engine mount	38/5	Engine alignment. How to install engine mount.

engine mount	51/3	Engine vibration isolation.
engine mount	54/7	Dynafocal mounts for EZ.
engine vs speed	49/2	Race results.
engine vs speed	52/3	Race results compare speed vs engine used. See also page 4.
engine vs speed	60/2	Race results compare speed of VE with different engines.
exhaust cracks	42/4	How to prevent cracks in exhaust system. For LE, but might help VE.
exhaust gaskets	28/8	Use blow proof gaskets. Mandatory if using cabin heat.
exhaust system	12/4	N4EZ has had cracks.
exhaust system	13/3	MAN/GND Mods to prevent cracking of 4 pipe system.
exhaust system	14/8	4 pipe exhaust system for VE. Thoughts on muffler system. See CP16/10 for missing dimension
exhaust system	15/2	Noise tests with and without mufflers.
exhaust system	16/9	MAN/GND Install safety cables on VE exhaust systems. Article discusses various exhaust systems & problems. Se also CP18.
exhaust system	17/4	Report on Flight Research muffler system.
exhaust system	17/9	How to seal around exhaust pipes.
exhaust system	18/12	How to install VE exhaust system. Plans for four pipe system.
exhaust system	19/3	Exhaust system problems.
exhaust system	20/2	Problems and successes with various systems. Comments on Herb Sanders' system.
exhaust system	31/4	Mods to exhaust system that cause large bumps on the cowl can cause 15 mph speed penalty.
exhaust system	34/8	Do nothing to the exhaust system that could introduce foreign material into the carb heat system.
exhaust system	46/7	Tape sold for wrapping exhaust system disintegrates. Could cause engine failure.
exhaust system	51/5	Recommended systems.
exhaust system	52/5	Exhaust system cracks. Which systems have been reliable.
exhaust system	59/9	Cracks in Brock exhaust system.
exhaust system	61/5	Source of 4-pipe exhaust system for LE.
exhaust system	61/5	4-pipe exhaust system for LE.
exhaust system	63/5	Exhaust system failure and fire on LE. Sport flight system.
fireproofing	49/5	MAN/GND Replace aluminum control system parts with steel. Use Ocean #1644 to fireproof CS spar. See page 3 for source of Ocean #1644.
fuel lines	18/5	Change in tygothane part numbers.

fuel lines	48/3	Tygothan fuel lines degrade. Inspect often, or use better hose per LE.
fuel lines	54/3	Cases of fuel lines plugged by foam & other debris. How to check & clear. Describes fuel flow test.
fuel lines	62/2	Check fuel lines for obstructions and foreign matter.
fuel lines	65/7	MAN/GND Carefully examine every inch of urethane fuel line in all VEs. Some have disintegrated.
fuel pumps	50/7	AC fuel pump problems.
fuel system	11/5	MAN/GND Plans & discussion for 3 tank fuel system.
fuel system	11/8	Do the fuel flow tests (step 12) for WING AND FUSELAGE fuel. CP lists other plans changes due to 3 tank system.
fuel system	12/5	Obsolete header tank system was prone to fuel foaming. Hints on use of fuselage tank in new system.
fuel system	13/5	3 tank system, venting. Loss of a fuel cap will suck all of the fuel out of the wing tanks. Be sure to install system shown in CP12.
fuel system	13/5	Black polyethylene fittings are not meant for use with fuel. Use white nylon instead.
fuel system	14/7	Be sure all components are installed exactly as shown. Use separate vents for fuselage tank & wing tanks. Other installation hints.
fuel system	16/5	Use of tygothane vs fire resistant fuel lines.
fuel system	18/3,7	MAN-25hrs. Revised fuel system adds gascolator and fire resistant fuel lines. Fuel valve relocated. Plans for fuselage tank.
fuel system	21/5	System shown in IIC, page 36, is obsolete.
fuel system	30/10	Don’t install fuel system parts on or near main gear, such that an accident that removes gear would rupture lines, etc.
fuel system	47/5	Fuel flow indicators.
fuel system	49/7	How to prevent fuel leaks & fires. Use steel fittings, remote mount instrument senders.
fuel system	50/4	Fuel related engine failures, causes & prevention.
fuel tank vents	25/4	DES Add ram vent to fuselage fuel tank.
fuel tank vents	47/6	Plugged fuel tank vent caused engine failure.
fuel valve	14/7	Valve has high friction. Suggested better ways to mount valve.
fuel valve	17/4	MAN/GND Replace fuel valve if stiff. (If the valve is stiff, not you.) If valve is selected between wings and fuselage position, the fuselage tank will drain into the wings.
fuel valve	17/8	Substitute screw for rivets attaching U joint to valve. Allows easy removal.
fuel valve	24/5	Use of Parker fuel lube.

fuel valve	29/6	Sticking valves must be fixed. Failure to do so has caused accidents. How to do this.
fuel valve	38/5	Expensive, but good valve that won't stick.
fuel valve	46/4	Problems with fuel valve sticking. "Magic grease" that helps, at $800/lb.
fuel valve	55/7	Stuck fuel valve may have caused accident. How to unstick & mark. (LE, applies to VE too.)
fuel valve	57/13	Continued problems with fuel valves sticking. Suggested valves.
fuel valve	58/6	New fuel valve for VE and LE that should end valve sticking that has caused accidents.
fuel valve	60/8	New fuel valve installation hints.
gaskets	56/4	Valve cover & oil tank gaskets prevent leaks. Source of supply.
hoses	22/4	Be sure to safety the induction hose wire & cord per plans.
hoses	52/5	Aeroquip 601 hose leaks. Recommendations for installation & maintenance of engine hoses.
hoses	57/11	Aeroquip 601 hoses recalled. Use Stratoflex instead.
hoses	64/11	Failure of stainless steel engine hoses.
inlet hose	14/8	MAN/GND Drill a ¼" hole in inlet hose low point to drain fuel in flooded start.
installation	26/11	Photos of Fred Keller's VE engine installation.
installation	31/8	MAN/GND Upgrade fuel & oil hoses to standard shown in CP.
installation	47/3	Get an IA to inspect engine/prop installation before first flight.
installation	50/5	Get a copy of the book "Firewall Forward."
instruments	22/5	New line of engine instruments. Carr tach, VDO instruments.
instruments	23/8	VDO engine instruments.
instruments	30/9	Corrected sender number in CP23 for VDO instruments.
intake hose	55/6	How to install carb intake hose so it won't implode.
Lyc baffles	22/4	Errors exist in section IIC. Baffle installation hints.
Lyc exhaust system	25/5	Plans for an exhaust system for Lycoming engines in VE and LE.
Lyc O-235	14/4	Section IIC, Lycoming installation available. Performance & stipulations for use of O-235 on VE.
Lyc O-235	57/14	Mods to increase power and reduce lead fouling. STC by Engine Components, Inc.
Lyc oil seals	43/6	Wrong seal will blow out. How to recognize correct seal. How to install.
Lycoming engines	10/9	Lyc engines for VE.
mag switches	34/8	Installing mag switches in roll over structure.

mag switches	60/6	Mag switches may have been accidently turned off & caused accident. Recommendations for switches & installation. How to prevent this.
magnetos	32/5	“Left” mag should be as referred to by engine manufacturer, even though it is on the right side of a VE.
magnetos	54/6	Changing screws on mags makes removal much easier.
magnetos	55/9	Timing, removal, replacement.
Marvel Shebler carb	49/4	Small cover collects debris, even if bowl is clean.
mufflers	22/4	Problems & solution for Flight Research VE mufflers.
NACA inlet	26/5	Cooling and speed tests on VE. 3 kts. faster, slightly better cooling.
NACA inlet	26/11	X-rated photos of female VE.
NACA inlet	27/3	Installation of flush cooling air inlet.
NACA inlet	29/3	How to give the VE a sex change.
oil filters	61/7	Spin on oil filters for Continental engines. Free plans for installation. See CP62/5 for correct address.
oil filters	62/3	Source of STC spin on oil filter mod for Continental engines.
oil pressure gauge	19/5	Revised part number for oil pressure gauge called out in IIA.
oil pressure line	31/5	Oil pressure line must have a restrictor fitting installed. CP tells how to make one.
oil separator	19/4	How to install Aircraft Spruce’s oil separator. Other hints on breather installation.
oil temp	47/11	VE O-200 oil temp & Westberg gauges.
power	22/4	How to set & get proper cruise power. Be sure your tach is calibrated.
primer	54/8	Electric engine primer, eliminates primer lines to cockpit.
prop	13/7	Discussion of prop selection & performance.
prop	27/9	Flight test data of VE with “scimitar” prop.
prop	29/2	Dick Rutan loses prop after return from wet climate to dry climate. Check torque often!
prop	33/6	VE lost prop after flying from humid climate to dry climate. CHECK TORQUE OFTEN!!! Proper values & intervals given.
prop	41/5	Recommended bolt torques and intervals to check. Cautions for hand proping.
prop	42/4	Supplier info & best prop sizes for different EZ & engine combinations. Info on torque values for different types of construction. Keep a spare! Check torque after first flight, at 10 hours, then every 25 hours.
prop	45/7	Warning about the use of non-wood props.
prop	55/10	How to check for correct prop.

prop	63/10	Discussion of prop suppliers, situation. Keep a spare!
prop	64/6	RAF recommended prop suppliers for EZ.
prop balance	16/4	How to balance prop & check tracking. Bolt torque.
prop balance	48/6	Chadwick prop balancer.
prop bolts	17/8	Check bolt torque.
prop bolts	38/5	Correct prop bolts to use. Can sub AN6H bolts for AN76 prop bolts & save money.
prop bolts	46/8	Bolt torque for different types of props. CHECK OFTEN!!!
prop bolts	49/4	Don't over torque prop bolts. How to install & torque correctly.
prop bolts	51/5	Correct torque values. Don't over torque!
prop bolts	52/5	Incorrect crush plate caused false torque reading when tightening prop bolts. Could cause lost prop!
prop bolts	60/4	Bolts bottomed causing prop failure & accident. Hints on prop installation. Check bolt torque OFTEN!!!
prop damage	38/5	Anything left loose in cowl will go through prop. Be careful!
prop damage	47/12	How to prevent prop damage.
prop efficiency	13/4	Discussion of prop efficiency, slip, how pitch is measured, etc.
prop extensions	11/2	Sources & hints on prop extensions.
prop extensions	36/3	6" and 3" extensions approved for LE, only 3" for VE.
prop extensions	59/7	Sport Flight extensions have failed. Made from 6061 instead of 2024. Failures were on Defiant.
prop failures	46/8	Warning signs, caution against unapproved props. Proper torque values for different types. CHECK OFTEN!!!
prop, variable pitch	10/9	Why variable pitch props are not a good idea for VE.
rocker covers	46/7	New type rocker cover gaskets prevent leaks.
Rotorway	24/4	RW-100 engine.
spark plugs	35/6	REM37BY plugs for O-200 and O-235 reduce lead fouling. Plug is ⅜" shorter than REM40E. This helps cowl fit on VE.
spark plugs	38/5	Plugs for hard starting engines, VE and LE.
spinner	15/9	Notes on Aircraft Spruce spinner for VE
spinner	32/5	Some spinner/prop combinations may not fit right, leading to prop loss. Check carefully for proper fit.
spinner	51/5	Problems with composite spinners.
springs	12/7	Hints for throttle & mixture control return springs.
starting	21/7	Do not hand prop engine without a functioning impulse coupling
Stromberg carb	23/6	Possible problems with use of this carb on VE.
Stromberg carb	24/5	Hints on use with VE.
tach	17/5	Use Heathkit tach to check tach installed in aircraft.
tach	58/10	Braal digital tach.

throttle	21/5	Section IIC, material for throttle and mixture controls is 0.062 2024-T3.
vibration	35/7	Possible sources of mysterious vibrations.
VW engines	10/9	Why there isn't a VW powered VE.
VW engines	14/4	Why you won't see a VW in a VE.
weight	20/2	Clarification of max engine weight.
Sec III — Electrical, Avionics, Lighting		
alternator	23/8	Conversion of Kobota tractor alternator for use on VE.
alternator	26/11	Two light weight alternators for Continental and Lycoming.
alternator	30/11	Report of RAF experience with B&C alternator on Continental and Lycoming.
alternator	39/8	B&C has lightweight 12 amp alternator for O-200.
alternator	49/4	Light weight B&C alternators & voltage regulators.
alternator	56/4	B&C lightweight alternators & starters, sealed batteries.
antennas	18/5	Pilot reports of antenna performance.
antennas	29/7	Comm antennas on main gear legs can break due to gear flexing. CP has plans for good internal comm antenna.
antennas	30/7	Hints on installation of transponder antenna. Don't microwave your fanny!
antennas	33/6	VE comm antenna that has worked well.
antennas	35/5	Jim Weir, RST, says do not install foil antennas on the gear legs. The foil is not flexible enough. Other suggestions on antennas.
antennas	39/7	Seat back comm antenna for VE. Transponder antenna.
antennas	44/4	Antennas Dynamcs kit. Works well.
autopilot	54/4	Light weight autopilot for VE and LE. Relatively inexpensive kit.
battery	35/10	Suggested manifold vented battery.
cabin heat	35/10	Electrical cabin heat system. Takes 20 amps. How to seal up nose. Battery must be manifold type vented overboard.
electrical info	61/12	Aero-Electrical Connection. Info on how to wire plastic airplanes.
electrical panel	51/9	"Space saver" electrical panel for EZ, source and info.
electrical system	12/3	Two systems described. Recommended battery only system and possible solar powered system.
gaskets	65/9	Silicone gaskets prevent oil leaks.
gear warning	20/5	Resettable defeat system for gear warning.
gear warning	36/6	Gear warning switch must be installed so gear is down and fully locked when switch is made.

gear warning	38/4	Circuit to turn warning back on 60 seconds after defeat is activated.
headsets	60/11	Evaluation of Bose headsets.
instruments	29/8	Run separate ground wire back to firewall for electric gauges
intercom	28/10	Intercom recommended for VE. Noise level tests.
lighting	65/5	Landing lights and cockpit night lighting. How to install & use lights.
Loran C	34/3	Sources of electrical noise. Lots of ideas for making Loran work in LE.
Loran C	37/3	How to install conduit to reduce noise & help Loran work better. Other ideas and some antenna suggestions.
Loran C	38/9	Better ground plane seems to help. Must have a low noise electrical system.
Loran C	39/2	Importance of proper ground plane.
Loran C	40/3	Aircraft grounding, electrical noise reduction, antennas.
Loran C	46/5	Observations & experience with Loran in EZ.
Loran C	49/3	Micrologic Loran installation, antennas in EZ.
Loran C	62/3	Antenna installation for Loran on EZ.
Loran C	63/12	Trouble shooting electrical noise that was killing Loran.
Loran C	65/10	Report on installation of King Loran and an alternator noise filter. Sources for filter.
radio installation	12/8	Nav/Com may need end support. How to build one. Be sure radio does not interfere with controls.
radio installation	20/11	How to wire a push to talk button.
radio installation	53/5	Installation hints & complete radio packages for EZ
radios	60/10	Static related radio blackout. Comm & Nav went away when flying in rain.
roll trim	22/5	Mod to roll trim wiring to prevent back off in flight.
roll trim	23/7,8	DES Mods to roll trim wiring, installed shorting light.
solar power	13/3	Solar powered electrical system plans.
switches	63/4	Melting Cessna switches & connectors.
Vista Aviation	49/4	Avionics shop familiar with homebuilts.
warning system	13/3	Improved warning system wiring prevents gear warning from sounding during nose down parking.
warning system	24/6	MEO Warning buzzer is Radio Shack #273-051.
warning system	47/13	Combo gear, canopy, oil & charge warning.
wire	12/6	#18 wire can be used for mag switches.
wire size	22/8	Page 2, #12 wire can be #18.
Sec IV — Owner's Manual, Operation		
aerobatics	23/7	VE is not aerobatic.
ailerons	13/7	Updated list including ailerons & other changes to date.

ailerons freezing	55/5	Wet ailerons can freeze climbing through the freezing level.
airspeed control	20/8	How to use the VE “head up airspeed indicator”.
canopy opening	40/4	Pilot’s tale of in flight canopy opening. How to deal with it.
canopy opening	52/6	Description of canopy coming open in flight.
checklist	28/9	After “fuel caps on” add “and locked — screws aligned to locked orientation”
checklist	29/7	After “canopy locked” add “visually confirm proper canopy latch engagement and proper safety catch engagement.”
checklist	50/5	MAN/GND Should read “Check fuel caps on and positively locked.” Check cap O-rings before each flight. Never fly without full header tank. Other cautions related to engine & fuel.
cold weather	19/4	Hints on VE operation in cold weather.
correction	19/5	Add “are you sure you have complied with all details in appendix I?”
ditching procedure	33/4	Ditching procedure for VE explained. Add to owner’s manual.
engine failure	52/6	If engine quits at low airspeed, it may not windmill. Check tach.
FAA	50/5	Major changes to Experimental airplane require FAA approval & new test period.
fire extinguishers	50/8	Selection of extinguishers for aircraft use. Keep one around!
first flight	17/7	Check list for first flight.
first flight	19/5	Parachute for first flights & where to borrow one.
first flight	21/5	Many good recommendations on pilot technique for VE.
first flight	21/5	Add note to clean out all fuel system screens and carb float bowl before first flight.
first flight	23/4	Hints & pilot quotes.
first flight	24/6	Test pilot should have 10 hours in VE.
first flight	51/3	More recommendations for first flight.
first flight	52/8	More ideas for first flight.
first flight	62/8	Recommendations for first flight.
fuel contamination	22/7,8	MAN/GND Change to addition made in CP21. Clean all screens and needle valve before first flight.
fuel filter	15/7	MAN/GND Replace or inspect fuel filter at 25 hour intervals.
fueling	63/11	Cautions & hints to be sure tanks are filled.
fuselage tank	14/7	Hints on use of fuselage tank.
hoses	22/4,8	MAN/GND Under power plant add “inspect induction hoses for correct safety of wire and cord.”
ID placard	55/6	FAA now requires ID placard on outside of airplane.

insurance	47/5	Insuring composite homebuilts.
landing gear	15/8	In annual maintenance section, add inspection for gear spread.
leaning	28/5	Hints on leaning for cruise.
lightening	44/3	Possible effects of lightening strike.
lightening	53/9	In flight lightening strike & icing on LE. Probable effects of heavy strike. Avoid lightening!!!
nose gear	21/5	Add note to grease gears in nose gear.
nose wheel shimmy	34/9	Set up, maintenance, and operation hints to prevent nose wheel shimmy.
owner's manual	29/7	Add CAUTION to check prop bolts torque 180 in-lbs when moving from wet climate to dry climate.
owner's manual	31/5	Under engine failure add caution to use power during descents when carb ice is likely.
owner's manual	35/9	Add to page 19, Engine Out, "windmill start will use less altitude if you dive steeply to rapidly attain 135 knots."
oxygen systems	47/6	"Aerox" oxygen system.
parking	31/3	Nose gear must be retracted for parking or the airplane will go over backwards.
performance	15/3	Flight test performance data from N4EZ. Fuel flow, speed, etc. Paste these in the owner's manual.
pilot checkout	24/6	Additions to pilot checkout criteria.
prop bolts	17/8	Add note to check prop bolt torque.
records	41/2	Two world distance records set in VE.
slips	22/8	MAN/GND Page 19, add note to avoid aggravated slips at low altitude. Can result in winglet stall. How to recover.
slips	62/10	Forward slips with VE not recommended.
stall characteristics	15/2,7	MAN/GND Strip all unnecessary weight for first flight. Avoid last inch of CG range until stall characteristics are know. Stalls vary from one aircraft to the next.
stall characteristics	28/5	Some VEs have different stall characteristics. Verify your own & determine your own CG limits.
take off	14/4	Hints on how to obtain book take off performance.
take off	26/10	VE should lift off & land below 65 kts. Higher speeds reduce tire life.
taxi tests	24/6	MEO Under taxi testing add "Remove wheel pants for taxi tests to avoid over heating brakes."
theft	53/2	Stolen LE. What to do, how to prevent.
tie down	18/5	Add note to "set" main gear.
tires	26/6	MAN/GND Sec IV page 33. After 55 to 65 psi add "75 to 80 for 6 ply tires."
water in fuel	24/7	Hints on how to prevent & deal with water in fuel. Don't be in a hurry to switch tanks.

weight & balance	12/1	A slipshod weight and balance can kill you. Hints on how to do it right. First flight considerations.
weight & balance	14/5	Operation at maximum gross weight of 1110 lbs. approved under certain conditions.
weight & balance	14/6	MAN/GND New CG ranges for 142" (shortened) canard.
weight & balance	18/5	Page 31, do not use bathroom scales. Avoid side loads on scales or use grease plates.
weight & balance	20/2	Max gross weight of VE and why it should not be exceeded.
weight & balance	39/3	Sources of error in weight & balance measurements.
weight & balance	55/6	Don't fail to do one!
windmilling	17/8	High compression Lyc engines need higher speed to windmill.

Sec V — Finishing, Paint, etc.

cockpit paint	27/5	Cockpit must be painted for UV protection. Hints on what to use.
color	16/6	Glass airplanes must be painted white. Where dark trim can be used.
color	29/2	Paint plastic airplanes white! Trim limited to vertical surfaces. Chart of color vs temp.
color	57/12	Paint plastic airplanes white.
DuPont Centari	17/5	Results of use on Defiant.
Featherfill	16/8	How to use Featherfill.
Featherfill	17/5	Use 36 grit paper to prep for Featherfill. Use 25% micro in Featherfill.
Featherfill	21/6	How to use Featherfill.
filling	12/5	Avoid excess filling. How to fill around wing fitting.
finishing systems	45/4	Use of West epoxy. Comparison & hints for different finishing options.
Imron	64/5	Imron got in builder's lungs & caused fatal damage.
lettering	57/6	Aerographics N-numbers and lettering stick on or masks.
lettering	58/10	Source of N-numbers, etc.
paint flaking	42/4	Causes & how to fix paint flaking off in humid climates. Use Morton Eliminator or Sterling instead of Featherfill.
primer	11/4	Primer for use with enamel or acrylic enamel.
primer	31/4	Sterling primer works well, but it is expensive. Hints on use.
primer	35/7	Hints for using Sterling primer.
primer	41/4	Comparison of different primers for use on composite aircraft. Featherfill doesn't like humidity!
sanding	22/4	Good material for sanding Featherfill.
Sterling	58/11	New catalyst for Sterling polyurethane extends pot life & reduces pinholes.

strippers	23/7	MEO Never use any stripper or solvent on glass structure.
surface preparation	13/6	Do not use paint removers on an epoxy surface.
surface preparation	17/4	DO NOT wipe surface with any solvent that can attack foam. Debonds can result. How to prepare surface & inspect.
surface preparation	18/5	Use 36 grit paper before Featherfill. Do not wet sand Featherfill or use it over primer.
surface preparation	26/7	CAUTION!! Do not wipe surfaces with thinner. Pinholes can allow the thinner to dissolve foam cores.
wax	62/5	Antistatic wax for paint & canopy.
Zolatone	32/6	How to use Zolatone interior paint.
Zolatone	63/5	How to use Zolatone cockpit paint.
Landing Brake		
fuselage carving	17/8	Don't do fuselage speed brake carving during initial shaping of fuselage. Follow plans.
LB10	24/6	Some Brock LB10 have a hole sized wrong. How to fix.
LB19	43/4	MAN/25 hrs. Modify LB19 plywood insert or add glass reinforcement as shown.
LB29	29/7	MAN/GND See LPC#65 for redesign of LB29. Applies to VE also.
plans announced	11/2	Availability of landing brake plans. Flight characteristics. How to install.
rigging	19/5	How to adjust retraction speed.
rigging	26/7	How to rig speed brake to get proper closing force.
suitcase	15/7	How to make left suitcase fit with landing brake installed.
Safety Info & Accident Reports		
accident	14/11	Canopy came open in cruise. Extreme maneuvers caused engine failure & forced landing. Detailed report of damage resulting from crash.
accident	17/7	First flight away from airport. Possibly weather related. Key was out of ignition switch.
accident	18/6	Tail heavy VE with wrong elevator shape, had not installed wide elevators, had not modified canard. Rolled abruptly at low altitude.
accident	18/6	VE new pilot got too slow on final & developed high sink rate.
accident	19/3	Cessna 172 pulled out in front of VE on take off roll causing collision.
accident	20/7	2.5 hr. VE pilot landing on 2850' snow covered runway. With a crosswind. And trees and power lines at both ends.
accident	20/7	VE canopy came open. Low time in type pilot lost control. No canopy warning installed.

accident	21/6	VE fuel contamination. Debris in carb float bowl.
accident	22/9	VE canopy came open, tried low altitude 180 turn.
accident	22/9	VE crashed on take off. First flight. No details available.
accident	22/9	VE lost power on take off. Water in fuel.
accident	22/9	VE on final. Another aircraft pulled out on runway.
accident	23/7	Possible PIO on pilot's (not aircraft's) first flight.
accident	24/7	Engine failure & forced landing. Cause of engine failure unknown.
accident	24/7	Engine failure & forced landing. Water in fuel.
accident	26/10	Low, slow turn to final. A/C did not level. Seatbelt not fastened.
accident	26/10	Rolled inverted from slip on final. Winglet stall suspected.
accident	26/10	VE ran out of gas on wing tanks, switched to fuselage tank, ran that dry. Landed downwind.
accident	26/10	Vertical dive into ground at high power on downwind at Oshkosh. Pilot incapacitation suspected.
accident	27/6	Pilot buzzed his house and hit a tree.
accident	27/13	VE forgot to tighten nut in pitch system. Suffered in flight disconnect.
accident	28/7	VE had fuel caps interchanged causing engine to quit on aux tank.
accident	29/3	IFR VE picked up ice, pitot iced, ran fuselage tank dry. Good analysis of accident & safety in general.
accident	30/9	Attempted take off from short, narrow runway. Standing water caused swerve off of runway.
accident	30/10	Aluminum oil line fractured on top of clouds over Lake Michigan. Low time pilot, new plane.
accident	31/6	Night take off with fogged canopy. Hit trees.
accident	33/5	Winglet separated from wing during 200 mph+ low pass. Critical parts of wing-winglet attach structure had been omitted.
accident	34/5	Attempted low altitude roll, hit ground.
accident	34/5	Downwind uphill take off, ran off end of runway.
accident	34/5	LE attempted low altitude loop. Hit ground.
accident	34/5	VE flew up box canyon in bad weather.
accident	35/8	Engine missing, tight spiral turn. ???
accident	35/8	Heavy VE on 2500' strip with wind shear. Hit wires on take off.
accident	35/8	Improperly installed bolt fell out causing pitch disconnect.
accident	35/9	Possible pilot incapacitation.
accident	37/5	Crashed on take off. Possible open canopy.
accident	37/5	Flying down river valley. Hit power lines.
accident	37/5	Flying low over water. Hit the water.

accident	37/5	Low flying. Hit trees.
accident	38/10	Fuel contaminated by sand caused carburetor failure. CP has long analysis of accident & pilot actions.
accident	39/5	Attempted take off with 45 knot tailwind
accident	39/5	Inexperienced pilot lost control during go around.
accident	39/5	VE hit power lines in bad weather.
accident	39/5	Weather related loss of control Probably exceeded 400 kts., fluttered. No evidence of “g” overload.
accident	39/5	Attempted low altitude roll in new VE.
accident	40/4	Poorly made plastic prop failed after 3 minutes total time.
accident	41/6	Shorted mag switches caused engine failure. Landed downwind, ran off runway.
accident	41/6	VE took off with canopy unlocked. Pilot tried to close at low altitude with both hands.
accident	42/4	LE attempted take off from rough 1700’ field. Ran off end of runway.
accident	44/8	Flying low over water, hit power lines, lost landing gear & winglet.
accident	44/8	Ran tank dry (LE) in traffic pattern. Too low to get restart.
accident	47/6	Crosswind. Drifted off runway.
accident	47/6	Plugged fuel tank vent caused engine failure.
accident	47/6	Taxi with canard but not wings. Nose lifted.
accident	49/4	Engine fire after overhaul. Possibly fuel leak.
accident	49/4	Engine quit on final. Idle speed may have been too low.
accident	49/4	Got too slow on final. Hit approach lights.
accident	50/4	Lost power & hit power lines.
accident	50/4	Lost power. Hit fence.
accident	50/4	Missing wing attach screws. Wing separated in flight.
accident	51/7	Wrong nose bumper material caused runaway on starting.
accident	52/5	VE attempted low altitude loop.
accident	52/6	Engine stopped during low speed flight. Did not windmill.
accident	53/3	Engine lost power on take off. Bad Marvel carb float suspected.
accident	54/8	Ran tank dry (LE). Dead stick off field landing.
accident	55/7	Possible empty tank & stuck fuel valve.
accident	55/7	Untested plastic prop came apart on take off.
accident	56/6	Engine failure. Hit wires on final. Pilot suspects vapor lock with auto gas.
accident	57/9	In flight flutter of canard caused canard to fail. Elevators too heavy. One bolt not installed properly. Elevators modified to wide chord.

accident	57/9	Inexperienced pilot, PIO on second flight.
accident	58/13	Non-standard induction system on O-200. Carb ice may have caused engine failure.
accident	59/8	LE flying at low altitude shot down.
accident	60/3	O-200 quit on hot takeoff. Carb ice suspected.
accident	60/6	Engine failure. Mag switches may have gotten turned off.
accident	61/7	Fogged canopy & bad weather. Hit obstacles landing.
accident	61/9	Drifted off runway.
accident	61/9	Hit obstacles on go-around.
accident	61/9	Improperly fitted wing attach pin fell out.
accident	61/9	Night landing. Hit tree.
accident	62/8	Got too slow on first flight.
accident	63/11	Ran out of gas. Cautions & hints to be sure tanks are filled.
accident	64/3	Engine quit in steep climb.
accident	64/3	Wing fitting screws missing.
accident data	65/8	NTSB report is a summary of homebuilt accidents from 1983 to 1989. Nearly half were mechanical failures.
canopy	20/8	Canopy Safety Philosophy.
hot dogging	44/8	Low flying causes or contributes to many LE accidents. Don't!
safety	47/2	Homebuilt safety record. Why it is poor.
Maintenance & Inspection		
1000 hr. EZ	46/3	Results & facelift on Mike Melville's LE at 1000 hrs.
aileron hinges	22/4	Check for wear.
ailerons	58/8	Check ailerons for presence of new bellhorn and flight check for vibration.
air filter	44/8	FAA has issued an AD on all air filters. They must be replaced at least every 500 hours.
airspeed indicator	53/7	Check accuracy of airspeed indicator. CP shows manometer for doing this.
brake cable	40/7	Be sure brake cable nicopress sleeve can not jam in hole where it goes through firewall.
brake lines	48/5	MAN/GND Inspect brake lines for damage from disc heat or sunlight.
breather hose	47/12	Engine breather hose must be free of kinks. Check for anti-kink spring installed.
canopy	58/5	Check canopy warning system, safety catch & latches.
carb heat	32/6	Be sure to check carb heat temperature rise. CP explains how to do this.
control system	47/12	Check control system for freedom from friction.

controls	55/6	Controls must be totally free of friction. How to check with canard under load.
cracks	44/8	MAN/GND Cracks have been found in the bottom skin of fuel tank, center section area. They were probably caused by sanding away structure at the edge of CS spar. Includes info on how to repair.
elevator rigging	60/6	Be sure max lift of canard occurs at full aft stick. Excess elevator travel causes bad flight characteristics. Check during test flights.
engine controls	61/7	Inspect outer cable attach points. Caused engine failure & accident.
exhaust system	60/9	Check for exhaust system cracks in Brock system.
exhaust system	62/7	MAN/GND Inspect exhaust system for cracks.
exterior surfaces	28/4	Inspect exterior surfaces & repair all scratches, chips, etc.
fuel caps	24/7	Check condition of O-rings. Bad rings can let rain water into tank.
fuel filter	15/7	MAN/GND Replace or inspect fuel filter at 25 hour intervals.
fuel flow	54/3	How to check for proper fuel flow. Should be done before first flight.
fuel system	11/8	Do the fuel flow tests (step 12) for WING AND FUSELAGE fuel.
high time VE	28/3	Maintenance notes from high time VE owner.
hoses	22/4,8	MAN/GND Inspect induction hoses for correct safety of wire and cord.
installation	47/3	Get an IA to inspect engine installation before first flight.
intake hose	55/6	Check carb intake hose for proper installation and condition.
landing gear	15/8	Inspect landing gear annually for increased spread.
main gear	31/5	At annual or 100 hour inspection, jack airplane and check gear for excess motion.
mixture control	51/6	MAN/GND Problems with mixture control have caused 2 forced landings. Check for proper installation & operation.
MLG attach tabs	47/9	Every 100 hours check main gear mounting tabs for movement. How to repair.
mounts	46/6	Two reports of engine mount cracks in O-200 VE.
nose gear	51/5	Shock strut spring loses tension with use. Check to be sure pilot weight does not compress spring.
nose gear	54/5	How to tell if nose gear strut spring needs replacing.
nose gear pivot	44/7	Check for wear in pivot bearings.
nose wheel	55/6	Check nose wheel, especially Brock wheel, for cracks.
nose wheel shimmy	34/9	Set up, maintenance, and operation hints to prevent nose wheel shimmy. How to pre-flight and inspect.

placards	57/7	MAN/GND Check for proper placards in cockpit. Install “You may die if you fly this airplane” placard.
prop	51/5	Correct torque values for prop bolts. Don’t over torque!
prop	55/10	How to check for correct prop. Expected static & flight RPM.
prop	60/4	Hints on prop installation. Check bolt torque OFTEN!!! See also Section III index.
prop crush plate	52/5	Check to be sure crush plate bolt holes fit bolts properly. Drag on bolts can cause false torque reading.
prop damage	38/5	Anything left loose in cowl will go through prop. Don’t leave tools laying around!
rudder cable	49/4	Check to be sure people or wind moving rudder cannot cause cable to foul.
screens	22/8	MAN/GND Clean all screens before first flight, then every 25 hours for first 100 hours, then every 50 hours.
structural maintenance	28/4	How to care for a composite structure. Be sure to repair all hangar rash.
timing	52/5	Check mag timing before first flight.
wing fitting	26/6	MAN 100 hrs. Remove and inspect wing attach bolts for corrosion annually or every 100 hrs. Spray LPS#3 on bolts and cones.
wing fitting	53/7	MAN/GND Check wing attach fittings for corrosion. Alodine new fittings. Do not anodize.
wing fitting	55/5	MAN/GND Check wing attach fittings for corrosion.
wing fitting	61/10	MAN/GND Inspect AN-4 bolts & taper plugs in wing fittings. Caused fatal accident.

Other — Interesting information that did not fit anywhere else.

aerobatics	10/10	Why VE was not qualified for aerobatics.
air loads	21/9	Wing and canard air loads for VE. Replaces obsolete data from CP10.
amateur designers	10/11	Composite designers had better know what they are doing.
composite structure	10/8	Comparison of aluminum and composite canards of equal weight.
cracking	13/4	Comparison of crack propagation in aluminum and various composite materials.
crash damage	10/10	Analysis of crash damage to N7EZ, the VW powered forerunner to the VE.
cuffs	20/2	Pilot report of results of cuff installation.
design features	24/3	Comparison of VE and LE.
design features	29/2	Advantages of full-core composite construction. Disadvantages of hollow core.
distance record	29/1	Account of Dick Rutan’s distance record flight in LE.

Dynel	10/11	Epoxy glass laminates are approximately 10 times as strong as Dynel layups. Some tests that showed otherwise were very misleading.
epoxy	15/9	Long article about material substitutions recommended by article in Sport Aviation magazine.
epoxy	22/7	Fuel/fiberglass compatibility.
first flight	21/5	Many good recommendations on pilot technique for VE.
flight characteristics	10/2	Early flight test data on VE.
flight characteristics	20/7	How the VE flies with canopy open. How they get left open.
foam breakdown	10/8	N4EZ has experienced deterioration of some urethane foam. What caused it & how to fix it. Do not substitute foams
foreign builders	10/9	Hints for builders outside the U.S.
high altitude	19/2	VE flight to 25,300 ft.
Intn'l ops over water	64/7	Flying the Atlantic in an EZ
Long-EZ	23/2	Development history of the LE.
low temperature	10/8	How composite structures are expected to react to low temperatures.
lower winglet	10/11	Report of wing tip ground strike with N4EZ. Damage to lower winglet.
material selection	10/1	Trials and tribulations of selecting epoxy and foam in the early days of the VE program.
NASA tests	30/2	Results of NASA flight tests of LE.
over water ops	34/3	LE flight from Hawaii to Oshkosh.
peel ply	13/4	Tests compare peel strength of various surface preparations. Results: Use peel ply.
performance	15/3	Flight test performance data from N4EZ. Fuel flow, speed, etc.
performance	18/3	Results of survey of first VEs flying. Most are too heavy. Engine vs speed info.
performance	23/2	Specifications & performance of Rutan prototypes.
pitch sensitivity	17/5	Discussion of stick forces & wide chord elevator.
plans changes	21/4	Cumulative list of plans changes up to July, 1979.
poem	22/3	"St. Peter's Lament" An ode to CP.
power selection	28/5	Discussion of how to select proper amount of power for an aircraft to get best performance & economy.
prop efficiency	13/4	Discussion of prop efficiency, slip, how pitch is measured, etc.
rain effect	22/4	Effect of rain on trim of VE.
rain effect	34/5	Letter from Burt about effects & research of rain on tandem wing aircraft.
rain effect	35/2	"Effects of rain or surface contamination on pitch stability and control." Detailed technical discussion of all tandem wing aircraft.

relief tube	31/4	How to make and install.
rigging	30/4	Flight tests to determine if your EZ is rigged properly with the incidences correct.
short pilots	12/3	How to configure cockpit for short pilots.
spam can vs. VE	10/9	Comparison of flight characteristics and utility of VE and Grumman Tiger.
stall characteristics	18/6	“VariEze Stall Characteristics and Flight Testing.”
technical info	22/3	NASA tests of VE materials, drag of VE.
VE winglet stalls	22/7	Discussion of loss of control incidents with two VEs. Cause was stall of winglet.
wide chord elevator	20/3	Stability and stalls with wide chord elevator.
world flight	53/2	Around the world in an EZ.
world record	23/3	Dick Rutan’s closed course world record flight.