Western Canada

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Volume 4 Issue 1

RVator

Newsletter of Van's Air Force—Western Canada Wing

Saving Space

This is how Home Wing members Kevin Lane and Brian Moentenich manage to keep two RV-6As in one normal T hangar. Kevin is using a motorized winch to haul N3773 up onto the storage ramp.

RV Builder's Conference

Tedd McHenry, Editor

Barry Tunzelmann, perennial organizer of the Salmon Arm RV Builder's Conference, will be out of the county for much of 2000, and won't be able to organize the conference this year. At the moment, no conference is planned. But I'm looking for someone in the Vancouver area to organize a conference for this year. If you'd like to have a go at filling Barry's boots, please contact me. My addresses and numbers are in the masthead on page 8.

There are about 14 members in the Vancouver area, compared to about 8 in the Salmon Arm/Kamloops area. So, in principle, we ought to be able to get enough people together to organize a conference.

Inside...

Glareshield Integral Lighting

John Allen (fliier@onebox.com)

I elected to install a fiberglass glareshield in my RV-6A. I did this because I wanted the look of a padded glareshield, and because I wanted a removable means of attaching overhead lighting.

To do this I used the existing aluminum skin as a mold for the fiberglass. I installed the skin on the fuselage with clecos (with a couple of low profile screws under the fiberglass layup). I used just 3 or 4 layers of glass to allow for flexibility in the finished product. (Remember the mold release.)

I then trimmed both the fiberglass glareshield and the skin to make the intersection of the two fair neatly into each other. The finished aluminum is no less than 1" from the panel in the center, and of course much wider at the sides to fit the windscreen appropriately.

For lighting I used flexible lighting strips (like light bulbs in vinyl tubing) from JC Whitney. I bent a very thin and lightweight piece of aluminum angle with my shrinker tool to fit the inside curve of the glareshield and used double sided sticky foam to adhere the lights to the inside of the angle.

On top of the glareshield I used vinyl I purchased from a auto upholstery shop over a layer of very thin foam. I also purchased some edge stripping from them, which just snaps onto the edge of the glareshield and makes a nice finish. Contact cement was used to glue the vinyl and foam to the glareshield.

The glareshield itself is attached to the airframe with rivnuts.

The system is powered by a 5amp solid state system from Aeroelectric Connection.

The end result was a very good lighting effect, except for the A/I and D/G. Both of these instruments have pointers at the very top of the instrument which are shadowed in the overhead lighting. For these two instruments I used Whelen post lights driven from the same power source.

It was an interesting experiment that achieved the desired lighting effect and attractiveness at the expense of additional weight and time.

Rational Self-training

Brian Lloyd, Cameron Park, CA (brian@lloyd.com)
[Brian is a CFI, an engineer for Lucent, and a frequent contributor to the RV List.]

I thought that, in light of the current threads on training and transition, I would throw out some ideas that I try to impart to others with whom I fly.

How many of you have sat down and asked yourself:

1. The engine just quit; what do I do now?
2. The electrical system just quit; what do I do now?
3. The prop just failed, what do I do now?
4. I have a fire forward of the firewall; what do I do now?
5. I have a fire in the cockpit; what do I do now?
6. I have an apparent control failure in pitch, roll, yaw, or power; what do I do now?
7. I have to get out of this airplane in flight; what do I do now?
8. I have to get out of this airplane on the ground; what do I do now?

Think about it. Build a picture in your mind. Sit in your cockpit as you do this. Go through the motions. Try to think of more things that will impinge on the process and incorporate them into the process.

"Think about it. Build a picture in your mind. Sit in your cockpit as you do this. Go through the motions."

For instance, let's assume cockpit fire. Can you turn off the fuel and ignition sources? Can you reach your fire extinguisher? (I would not consider an extinguisher in the back seat of a -4 or -8 to be accessible.)

A control failure in pitch may seem intractable, but you might discover you can fly the aircraft in pitch with the trim. Can you do it? Have you tried it? You might decide, based on experience, that you could land the aircraft using pitch trim. You also might decide that you can't. But I'll bet that, if you can get it really close to the ground in approximately landing attitude, your chance of survival is pretty good when you finally chop the power (even if the aircraft's isn't).

This type of training is training you can give yourself. It may not be perfect. You might not think of everything. An instructor might think of something you have not though of. But it is much better than getting surprised in flight and trying to think through the problem as the flames are consuming your lower extremities.

Equipping Your RV for IFR Flight

It's not just attitude, performance, and navigation.

A nice, clean VFR panel installation, by Bob Cutting of Richmond, BC. Bob is an experienced builder and AIR/ABA inspector who is building his first RV.

(Bob Cutting photo)

Garrett Smith, Calgary, AB

Some builders may think that if they have all the necessary instruments, and perhaps a Stormscope, their RV is ready for IFR flight. I have never flown with Stormscope radar specifically, but I have several thousand hours flying with good quality radar in the Dash-8, and in King Air 100 and 200 aircraft. I have never seen a radar unit that will point out ice and turbulence!

"Flying through stratus type clouds near the freezing level will produce ice accumulation on an aircraft, and it can be at 14,000 feet, or even higher."

The radar will 'paint' a return from airborne (or ground) water, which will show up as a red, yellow or green blob on the screen in the cockpit display. Red indicates the highest concentration of water, green the least. Typically, you expect areas of turbulence and icing if you fly your aircraft into or in close vicinity of these return-producing clouds. I have flown and picked up a lot of ice in conditions that would not produce a radar return.

Flying through stratus type clouds near the freezing level *will* produce ice accumulation on an aircraft, and it *can* be at 14,000 feet, or even higher. Radar will produce a defined return from more vertical areas of water such as towering cumulus (TCU) and cumulonimbus (CB) clouds, which can provide a very lively ride indeed, as well as plenty of ice. Stratus, or layer, type clouds tend to produce a less defined return, but still can provide a great deal of ice accumulation with a relatively smooth ride, until the wing stops flying...

Just because you have an aircraft that is equipped with IFR instruments doesn't mean you have an IFR equipped airplane. In order to be considered IFR certified, you need to have prop de-ice, pitot/static heat, wing de-ice, tail de-ice, fuel vent heat, windshield heat and probably a few other things I've forgotten. How heavy would your RV be with all that equipment?

The avionics shop will love you if you decide to spend a pile of money buying the latest instruments and navaids, but after all that money you may not be any safer than flying with a basic VFR instrument panel and a map.

[Some of the equipment mentioned here is only required for commercial IFR operation. But Garrett's point is well-made: don't take IFR operations lightly, especially where icing and turbulence are concerned—Ed.]

TIP

Cleaning Tape Residue

Mike Graves
Van's Airforce Homewing

I recently bought an abandoned -6A project that had been in storage for 10 years. Unfortunately, the previous owner had taped some skins together using filament tape which left behind some nasty residue. I tried a couple of chemical solvents that were handy but nothing helped. Finally, I tried a can of printed circuit board cleaner (flux remover). The residue wiped right off!

Drag Percentages

This is a reproduction of two posts to the rec.aviation.homebuilt newsgroup on the internet. The posts, by John Johnson and Corky Scott present some interesting ideas about the drag on a light airplane, and were inspired by a question about the percentages of drag from various sources on an "average" homebuilt airplane.. John is the EAA Technical Counselor for Chapter 277, and has inspected quite a few RV's of various flavors. "It is a good design, one of a handful that I actually recommend to people who are looking for an airplane to build," he says. *Corky is a regular contributor to the newsgroup, who always has interesting insights into airplane building and aerodynamics.*

Charles K. (Corky) Scott

There are lots of places to counter drag. Take a look at the "Mister Mulligan" next time you see it at a big fly in for hints on where to pay attention to streamlining and other details.

With an air-cooled flat engine, "efficient" and "airflow" really shouldn't be spoken together. The intake openings are in an ok space, but often the openings are simply flat cutouts against the nose. You'll notice that the most efficient openings are round holes with a protruding lip around them and often they are smaller in size than what you are used to.

The air must go past the cylinders, which are very draggy. Then the air, which has just become heated and therefore wants to rise, is forced down and out the bottom of the cowl, usually. Often the air must go by numerous objects within the engine compartment, each of which makes their contribution to the drag of the flow. Then the air is going downward and must transition to horizontal flow to match that of the air passing the fuselage. A torturous route for air to follow.

Some aerodynamicists attempt to alleviate the flow problem by exiting the air in front of the windshield, which is good in that at least the heated air wants to go up. But it's bad in that close to the windshield it is a high pressure zone. Air exhausted into a high pressure zone will flow very poorly, if at all.

That's why, in theory anyway, it's possible to set up a more efficient flow-through system using a radiator for a liquid cooled engine than to design something for an air cooled flat four. Unfortunately, it's still not easy because unless you use a radiator specifically designed for your space considerations, you will face compromises in fitting it. Lots of guys lay the radiator down flat and bend flow through it. This works, but obviously isn't as good as flow straight through an upright radiator so the air doesn't have to bend much.

Then again when you're dealing with an airplane that only cruises at 130 max and has a big high-lift wing, would having the perfect cooling system make any difference?

John Johnson

Unfortunately, I can't give you a list of numbers, like 30% cooling, 28% wing, 37% fuselage, 10% gear, etc. Any numbers I gave would only apply to one specific design in one specific condition. I know, you did specify the "cruise" condition, which is probably the most reasonable speed to evaluate an airplane for drag.

However, I can make a few general statements. Cooling drag, for a piston engine airplane, is one of the largest contributors of drag at cruising speeds. That is because you must have enough cooling to keep things from overheating on a *hot* day with an extended slow speed climb. That is your critical condition. Very few airplanes actually have enough cooling to climb for any length of time at the maximum climb rate speed on a hot day without overheating somewhere. You will often find a "cruise climb" recommended for that reason. The higher airspeed in a "cruise climb" allows slightly better cooling.

Clearly, the mods that do the most to increase speed when airplanes are "modded" for speed have to do with reducing cooling drag. The P-51 is a case in point, as are all of the airplanes that have been worked over by LoPresti. The first thing he does is clean up the cooling system. That is probably where the largest gains can be made for minimum effort.

The next largest contributor to drag is probably that caused by gaps and intersections. Good fairing and gap seals are the next largest contributor and the next best return for effort. Notice the plethora of speed mods that do things like seal gaps and fair protrusions. This includes sealing around wheel wells and around doors and windows.

The old Lindbergh trick was to go up and fly in the rain. Look around you at the airplane. Every place you see water piling up tells you where you need a fairing! It even gives you a good idea of the size and shape of the fairing. Some are quite counter-intuitive.

More on page 5...

Member's Corner

Tedd McHenry, Editor

New Membership System

I've decided to change the membership system. Beginning in December 2000, I'll be asking everyone to pay their membership for the upcoming year. This will make it much easier for me to keep track of who's membership is current. I'll be using a "pro rata" system to make the transition. You'll find a membership code next to your name on the enclosed member list. Here's what the code means.

E	membership expired; pay $10 for 2000
Q1	paid until end of March 2000; pay $7.50 for 2000
Q2	paid until end of June 2000; pay $5.00 for 2000
Q3	paid until end of September 2000; pay $2.50 for 2000
Q4	paid until end of December 2000; pay nothing
Q4+	paid past the end of 2000; pay nothing

I'm encouraging everyone to pay their 2000 membership now, to help me switch to the new system. However, you will continue to be a member and receive the RVator until your paid-up date. If your membership hasn't expired, and you don't want to write a cheque for less than $10, consider adding $10 to the above amount and getting a membership good until the end of 2001.

Still Seeking Editor

I'm still looking for someone to take over the newsletter. I've had offers of assistance, which I greatly appreciate. But what I really need is someone to take responsibility for it.

First Manitoba Member

Western Canada Wing has its first-ever member in Manitoba, Jim Oke of Winnipeg. "I'm flying an RV-3, C-FIZM," says Jim, "and I've just begun an RV-6A. [There are] half a dozen or more RV-6s in the Winnipeg neighbourhood."

Kitchener to Iqaluit in an RV-6

Many of you probably read the article in the COPA newspaper about Terry Jantzi's trip to Iqaluit in his RV-6. Now, Terry has produced a video documentary of the trip, which you can buy from him for $12.

I really enjoyed the video. It shows beautiful scenery along the route from Kitchener, Ontario to Iqaluit, Nunavut. Terry and his brother have expertly edited the footage, and mixed a musical sound track for it. If you need inspiration to get you started building, or inspiration to do more with the RV you've already finished, this would be a good place to look.

If you'd like a copy of the video, write to Terry Jantzi at his email address (tjantzi@netrover.com) or his postal address:

Terry Jantzi
8 Anvil Street
Kitchener, ON
N2P 1X6.

...Drag Percentages (page 4)

A simple rule that will help clean up an airplane design is this. Every time air has to turn a corner or change direction it causes drag. The sharper the corner, or the greater the change in direction, the larger the drag increment. That is why the most drag comes from the *back* side of something pushed through the air. You *have* to move air to fill the gap where you just went by.

You can see the result of drag with a boat by the wake. Airplanes make a similar wake and the magnitude of the wake is a direct measure of the energy spent *making* the wake. That wake-making energy is what we call "drag." Look at the wake behind a canoe and compare that to the wake behind a standard V-bottom powerboat. The drag and the wake of a boat increases alarmingly at a certain speed based on the waterline length. This is similar to the effect of Reynolds Number in aerodynamics. Drag can be quite low at speeds low enough to remain relatively laminar. As speed increases and Reynolds Number increases, laminar flow becomes much harder to maintain.

If you place a burning cigarette in an ashtray in a still room, you can see a smooth tight stream of smoke rising above it. Suddenly, a few inches above the burning cigarette, the tight smooth column of smoke will break into swirls and eddies and increase markedly in size. That is the laminar/turbulent transition point. *Anything* will trip the flow mode. There is no way you can force the stream to turn and stay laminar. The turbulent flow has a *lot* more wake, hence drag

RV Landing Techniques

Brian Lloyd, Cameron Park, CA (brian@lloyd.com)
[Brian is a CFI, an engineer for Lucent, and a frequent contributor to the RV List.]

This is an interesting discussion but it mystifies me that it is even going on. I have found my RV-4 to be one of the most docile landing aircraft I have ever flown regardless of the amount of flaps extended. I guess I must have missed something somewhere.

An aircraft that is flying power off is going to bleed energy at a given rate out of ground effect and at a lower rate in ground effect. It will bleed energy at different rates depending on the AoA and the configuration, i.e. gear, flap, and speed-brake position. If you are flying straight and level this manifests itself as deceleration. If you are holding a constant airspeed it manifests itself as a given sink rate. The engine lets you add in energy to adjust the rate at which the energy disappears.

All you are trying to do when landing is to have sufficient energy to adjust the aircraft path to make it parallel to the runway before there is no extra energy left and the aircraft stalls. If you want to come in power off, you just need to ensure that you have extra energy in the form of airspeed (kinetic energy) so that you can round-out before you run out of energy. If you arrive with too little energy, you will not complete the round-out before you run out of energy. If you arrive with too much energy, you will complete the round-out with extra energy which must bleed off in ground effect. Since energy bleed-off occurs more slowly in ground effect, you end up "floating".

If you want to come in with less energy than you need for a power-off approach you can use the engine to add energy at a rate that offsets the extra loss. This may be done at any point. One approach would be to reduce airspeed (low energy to start with) and add power continuously to offset the increased energy loss. This is the "drag it in hanging on the prop" approach. You can also add in just enough energy at just the right moment to allow the airplane to round-out before it stalls. This is the "shot of power so I don't slam into the runway" approach. (If done right this one is really cool!)

Then there is my favorite, the "hang it on the prop oh sh__ I am too slow give it a big shot of power oops I just ballooned now I need another shot of power to prevent the crash oh damn now I am floating three quarters of the way down the runway will I get it stopped in time oh hell I had just better go around again" approach. Remember, energy management is your friend.

This message is an example of YANFITHGTSE (yet another new flight instructor teaching his grandmother to suck eggs).

More on Auto Engine Endurance

Tedd McHenry, Editor

Some of you may recall that a couple of years ago I wrote an article hypothesizing that there is no reason not to expect auto engines to have adequate durability when used in an airplane (WC RVator, April, 1998). I based my hypothesis on an analysis of cylinder pressures, piston speeds, and piston accelerations in a Chevy 4.3 compared to a Lycoming O-320 and O-360. My belief is vindicated by this quote from a Chrysler engineer about the test cycle used in the development of their truck V10 engine for use in the Viper sports car (reproduced from Contact! magazine). The test cycle he describes is much more severe than the certification requirements for aircraft piston engines.

"Almost the entire Chrysler test was run at loads greater than what the aircraft industry would call full rated power."

"We use an [sic] unique 500 hour endurance cycle. The traditional Chrysler endurance cycle for trucks had been 800 hours. To shorten our program timing, we discarded all of the specified light duty and idle test modes and got it down to a 500 hour cycle. It's pretty much a WOT test between peak torque and peak power with a little bit of light load in between. We set our targets at passing three 500-hour durability tests, a general 500 hour test, an ECE test, which is a European emissions certification procedure and a 100 hour test traditionally done for the exhaust manifold durability. Engines must pass a minimum of those tests."

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A Modern FADEC System

Archie Frangoudis

[Archie is a regular contributor to the Matronics Engine List email listserver.

First of all, I wish to thank Dave Pizza, of GFW Maintenance for arranging this meeting with Mr. Fred Martin, of ADLOG Publications, the famous aircraft record keeping system. Mr. Martin flew his 172K from 21N to ASH on October 29th to allow first-hand observation of this endeavor, which is a co-operative effort of Mattituck Air Base, and Aerosance.

A fresh 0-320, overhauled by Mattituck Airbase, was installed and fitted with the Aerosance modifications, and after a few hours of local flight, flew to OSH for "Airventure 99".

This FADEC (Full Authority Digital Engine Control) system uses modern

technology previously unused on aviation piston engines. (remember the PFM?)

The FADEC system began in the automotive industry where it is well proven, airlines and the military incorporate it on turbine powered aircraft.

At first glance, I noticed that the bulky, heavy mags were missing, the spidered

injector nozzles were fitted with wires, ala automotive, and HEY! WHAT"S THIS?

a carburetor also? How can this be?

Upon further investigation, no fuel line to the carb is seen. Well, rather than re-invent the wheel by designing an air throttle body, the carb is gutted, and utilized as an air control. This also eliminates intake redesign, keeping costs minimal. KISS.

The system consists of two small boxes, each of which contains two computers, a harness, sensors, fuel injectors, and an annunciator panel. Each computer controls one cylinder, and serves as a backup for a second cylinder, providing a fail-safe mode.

The computers calculate optimum pulses for the injectors and ignition timing based on speed, pressure, temperature, and piston TDC location in each cylinder. When the engine is started, the computers calculate engine temp, primes the cylinders, and adjusts the mixture according to the above, including throttle position and altitude changes. At cruise, changes are constantly monitored and adjusted for fuel flow, spark advance, (or retard), individually in each cylinder. This is done through feedback on EGT, CHT, fuel pressure, manifold pressure, manifold temperature, and RPM.

The annunciator panel in the cockpit indicates high or low temp & oil pressure, a channel loss to a cylinder, fuel pump failure, or power source failure. Also incorporated is a data port for downloading all monitored profiles @ every .5 second for diagnostic profiles and computer performance.

Total weight increase for the aircraft is approximately 14 lbs., largely due to the use of a backup power source- small, secondary battery.

With final testing, and FAA certification, sales and installations could begin in the spring of 2000.

In summary, the FADEC system is a first step in updating 80-year-old technology.

- Fuel consumption improved up to 15%
- Tests indicate a 10 horsepower increase
- No magnetos
- No manual mixture control needed
- No manual primer needed
- System redundancy
- No carb heat required
- Smoother running

In a hypothetical, devil's advocate question to Mr. Martin: "What will happen if you do not receive FAA approval?" "We will have to revert to a carb and magnetos, but I would not look forward to it"

OK, now the question on everyone's mind: How much? Current projected cost is around $4000. minus installation (and could possibly be less). Not bad at overhaul time, just deduct the cost of mags and carb or injector from the overhaul, and it becomes very attractive.

...Auto Engines (page 6)

To put this in perspective, remember that a Lycoming produces rated power at peak torque. So when an auto engine is tested at peak power (which is above peak torque), it is actually being run at loads beyond what a Lycoming ever sees, either in testing or in use. Almost the entire Chrysler test was run at loads greater than what the aircraft industry would call full rated power. And all of the test was at loads at least equal to "full rated power." Furthermore, the FAA certification requirement is for a 100 hour test at rated power. So the Chrysler test is also five times as long as is required for certification.

I think this test shows that auto engines are extremely durable, and easily capable of handling the loads they would be exposed to in a typical aircraft installation.

Van's Air Force
Western Canada Wing
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Mission

To provide information and entertainment for members of Van's Air Force—Western Canada Wing, builders and flyers of kits made by Van's Aircraft.

Membership

Membership is CDN$10.00, or US$7.50 per year, which includes four issues of WCRVator. U.S. members are welcome. Mail membership dues to the address above.

Submissions

We encourage submissions from any source, without compensation but with thanks. You can submit by hard copy, disk, or email. Mail submissions to the address above, or email them to

tedd@compuserve.com

Data Formats

Disks	DOS (Windows) and Macintosh—please use ASCII (text only) format
Image Files	GIF, TIFF, JPEG, or PICT
Email Encoding	Please use ASCII. We do not support HTML encoding. We also do not support any proprietary encoding scheme, such as CC:Mail, Word, or RTF. We will not extract executables. Please don't use any of those formats.

Disclaimer

Calendar

May 20-21	*Grand Forks Fly in* *Ron/Cheryl Wyers* *250 442-3630* *Fax 250 442-0188* *rcwas@sunshinecable.com*
May 21-22	*Okanagan* *Ultra Light Assn. Fly In* *Salmon Arm Airport* *John McDermott* *250 836-2616 or* *Harry Winterhalder* *250 832-4482*
May 27	*99's Poker Run* *Roberta Baker* *250 545-5154* *rfbaker@junction.net*
June 3-4	*Nanaimo Flying Club* *Poker Run & Pancake Bkfst* *Frank Benvin 250 753-5421* *quadrajt@island.net*
June 4	*Thompson Valley* *Recreational Pilots Assn.* *Location T.B.A* *Ken Barry 250 376-?*
June 11	*Vernon Fly In Breakfast* *Barry Harsent* *Tel/Fax 250 260-1007* *bharsent@bc.sympatico.ca*
June 17	*Penticton* *RAA lunch & BBQ* *Doug Robinson* *250 497-5424* *robinson@neteng.bc.ca*
June 18	*Salmon Arm* *Fathers Day Air Affair* *Gunter Angermann* *250 675-4895* *g.j.angermann@telus.net*
June 24	*Salmon Arm Steak BBQ,* *Dinner 5:30, RSVP.* *Gunter Angermann* *250 675-4895* *g.j.angermann@telus.net*
June 25	*Merritt Fly in Breakfast* *Ed. Gott 250 378-0960*
July 1-2	*Kelowna* *Electric City Fly Out* *Les Holmes 250-7684007* *Fax 250-768-4910* *lholmes@kent-macpherson.com*
July 8-9	*EAA Fly In* *Arlington, Washinton*
July 8-9	*COPA National Convention* *P.E.I*
July 16	*Kamloops Fly In Breakfast* *Trevor Bentz 250 554-2179* *bentz@direct.ca* *Fax 250-554-2678*
July 22-23	*Penticton Fly Out* *Surprise Destination?* *Larry Taylor 250 492-0810* *ltaylor@cnx.net*
July 30	*Salmon Arm* *Fly out to Mable Lake* *Ron Brown 250 832-2004*
Aug 5-7	*Kelowna, Fly out to 108 Mile* *Les Holmes 250 768-4007* *lholmes@kent-macpherson.com*
Aug 12-13	*Abbotsford AirShow*
Aug 19	*Vernon Fly In, B.S., Burgers and Beans* *Barry Harsent* *Tel/Fax 250 260-1007* *bharsent@bc.sympatico.ca*
Aug 26	*Oliver Fly In Breakfast* *Larry Chalmers 250 498-6887* *larryjoanchalmers@telus.net* *Fax 250-498-6458*
Sept 9	*Penticton Taylorcraft Fly In* *Doug Robinson 250 497-5424* *robinson@neteng.bc.ca*
Sept 10	*Penticton Fly In Breakfast,* *Doug Robinson 250 497-5424* *robinson@neteng.bc.ca*
Sept. 10	*Vernon* *RAA Corn Roast Lunch* *Cameron 250 769-6246 or* *Rupert 250 763-9109* *rgreun@silk.net*
Sept 17	*Kamloops Fly In Breakfast* *Trevor Bentz 250 554-2179* *bentz@direct.ca* *Fax 250-554-2678*
Oct 8	*Salmon Arm* *Lunch Fly out to Oliver* *Ron Brown 250 832-2004*