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Dear Falco Builders:

Since our last letter most of my time has been taken up with the design of the instrument panel. It has been no small job having taken up about 4 months so far, and I am not quite finished. At the risk of seeming immodest, I am rather pleased with the design that we now have. While it is not a difficult matter to design an attractive instrument panel, it is quite another thing to make it easy to work on. Those of you that have ever built or worked on instrument panels know only too well what a nightmare they can be. When I first removed the left side of the instrument panel on my Falco, it took me three hours. The Lear jet has a more complex panel, but it is extremely well-designed; you can remove the entire instrument panel in five minutes and have it on your workbench in short order. Should we have anything less? You will not be able to take our panel out in five minutes, but you will be able to do it in about ten minutes.

The panel itself is a sheet of .080" aluminum formed into a channel at the bottom. There are a few limitations on what you will be able to install into the panel, but I think it will take care of almost all of you. There is an eight inch tall radio stack on the right side and to its left are ten 3" gauges providing (from left to right) for (on the top row) airspeed, artificial horizon, altimeter, VOR indicator, manifold pressure/fuel flow, (on the bottom row) turn & bank, directional gyro, rate of climb, VOR indicator, and tachometer. Below the left three rows is the engine instrument cluster which includes CHT, oil temperature, oil pressure, amps, and two fuel quantity gauges. At the far left on the bottom is the ignition switch and to its right the master and alternator switches. To the left of the airspeed and turn & bank are the clock/timer and g-meter (both 2"). Just to their left is the gear selector switch and above the clock/timer is a 1" vacuum gauge. Above the artificial horizon is space for a marker beacon, and a remote King or Narco DME can be installed above the altimeter. Above the VOR indicator and manifold pressure/fuel flow is the audio switching panel. The gear position lights are just above the audio panel. Below the radio stack and extending all the way over to the right side are the circuit breakers. To the right of the radio stack you have room for a Silver Fuelgard, Davtron digital OAT and three 2" gauges, which I have as an EGT (single or 4 cylinder), David Clark Isocom intercom, and combination voltmeter (which reads the load on the alternator, and has a "press for volts" button).

To simplify and to conserve space, we will be using six "toggle breakers" which are circuit breakers that look like switches. This saves quite a bit of space and eliminates the need to purchase switches. These "switches" will have indicator lights to show that the switches are on. There will be a green indicator light to indicate that the master switch is on, and a red indicator light above the alternator switch which will indicate low voltage. Above the ignition switch are the microphone and headphone jacks for the pilot. In the same place on the far right are the jacks for the passenger, which have to their left two light dimmer knobs. These will be solid state light dimmer circuits, and we will have one circuit for post lights and one circuit for "map lights" which will be four lights flooding the panel mounted under the glare shield.

The flange on the back of the instrument panel will serve as a place to mount a variety of things. In the center will be three AMP circular plastic connectors which will carry all electrical connections from the panel to the airframe except for the EGT leads (which should not be run through connectors) and the antenna leads (which will require BNC quick disconnects). The rest of the back of the panel will provide room for two terminal strips, fuse holders, landing gear circuit relays, light dimmer transistors, and grounding points. We will also provide for mounting the gear horn and flasher. The bottom of the instrument panel channel will provide for an alternate static source valve, mounting of a left hand throttle, and connection with the center console, as well as a series of holes to ty-wrap the wiring bundle in place.

There are nearly two hundred holes in the complete instrument panel, and it is my intention to offer the instrument panel with the holes drilled and in blank form for those of you who want to "roll your own". One of the shops that does a lot of work for us has just bought a machining center which will be able to cut all of the holes to extreme accuracy. I have not yet decided how many of the holes I should cut. My plan is to cut all holes except those that provide for the following: marker beacon, DME, intercom, voltammeter, EGT, Fuelgard, and OAT. I have enclosed a questionnaire for you to fill out to give me some indication of your feelings on these items.

There are a few limitations to the instrument panel. First, you will not be able to use the Narco all-in-one NAV radios as they are too deep. The same goes for an HSI. In designing the panel, I have largely used King radios. The principal reason for this is that the King radios are the most compact, and this is very important if you want a full panel, in fact, King radios are the only ones you can use if you plan to have a complete IFR panel with dual nav/com, ADF, transponder and DME. For basic dual nav/com, and transponder, I think any of the Narco, Collins or other makes will fit, but remember that you are limited to 8" in radio stack height. The basic King radios are the KX165 & 155 nav/com (2.00" high), KR86 ADF (2.62" high) with integral indicator, and KT79 transponder (1.30" high) with gaseous discharge display or the KT76A transponder (1.62" high) with the usual mechanical display. If you wish to use dual nav/com, ADF and transponder, you will have to use the KT79 transponder for a total panel height of 7.98". If

you wish to use a KNS 80 or KNS 81 RNAV, you may do so only if you omit the ADF. If you wish to do any radio stack layouts, take the height for each radio given on the specifications sheet and add .050" for the mounting rack for each radio and then subtract .050" for the top and bottom if you wish to use a back-mounted rack, which looks better. This will give you the total height of the radio stack cutout. I am a little undecided on how deep to cut the radio stacks in our kits. There are three logical sizes: 7.98" for dual nav/com, ADF and transponder, 5.675" for dual nav/com and KT76A transponder, and 3.625" for single nav/com and KT76A transponder. There are too many combinations of radios for us to fit everyone's needs, but we may be able to offer the panel with two or three standard radio stack heights. It is not terribly difficult to make the hole deeper, particularly if we have already given you some straight sides to continue. Please indicate your preference on the radio stack height on the enclosed questionnaire. I am unable to provide for space for an autopilot head and suggest that a Mitchell Century I would be the best choice. While many people go for the heading bugs and other features of more sophisticated autopilots, I have flown with the Century I with VOR tracker and have found that the performance is nearly identical to the more sophisticated units.

Part of the decision on how many holes to drill will also be influenced by the finish you put on the panel. If you paint the panel black, you can easily make up some inserts for the holes, which are not necessarily unattractive, and this would allow you to install additional equipment at any time and with great ease. If you plan to cover the panel with a fancy wood veneer, you could leave the veneer intact over the un-used hole.

After giving the matter a lot of thought, I have finally decided to use a quadrant for the engine controls. There are a number of reasons for this. If you use Vernier controls, the console immediately becomes so wide you lose a lot of valuable leg room. In our landing gear circuit, we will have a throttle position switch which will activate a horn and flashing light if you throttle back to about 15 inches (also if you lower the flaps more than 18°). This is rather difficult to do with the Vernier controls. There is also the matter of flying the airplane; even with a constant-speed propeller you will be jockeying the throttle a lot during aerobatics, particularly so in formation flying. While this can be done with a push-pull "non-Vernier" throttle, it is far from ideal since the G forces are working on your arm. Also, we have a lot of builders who only feel comfortable flying aerobatics with their right hand on the stick and left hand on the throttle. A left hand throttle is impossible with a Vernier throttle and very difficult with a push-pull throttle. I should also mention that the installation of push-pull cables is further complicated by the fact that the cables must go forward and down at about 45° to clear the front tank.

What I have done is to design the panel and throttle quadrant so that a left hand throttle can be easily installed at any time. Unfortunately, a throttle quadrant is not a simple matter since it has a lot of parts. This will make it somewhat more expensive, but those of you to whom I have talked have approved of the idea. Those of you who

make all of your own parts will find that the quadrant is not beyond your skills, so if you cannot afford it, at least you can build it. We will offer the left hand throttle as an extra to the kit and the standard instrument panel will have the nutplates installed to accept it.

I'll mention a few other things about the design of the panel. I considered the possibility of having a split buss but rejected the idea. This would have provided for a separate avionics buss switch which would operate a relay. You need an over-ride switch to operate the radios in the event of a failure of the relay. The thing became a can of worms, and I opted for simplicity and light weight. I would prefer to have the gear lights with the selector switch, but there simply isn't the room. The gear selector switch will be a lever-lock switch with a Bonanza wheel-shaped knob. To select gear up or down, you must first pull the switch out. Also, the gear will not come up on the ground or below 68 kts (we will be using a pitot pressure switch for this purpose). Even so, these Falcos that you are building will be very personal machines, and I have positioned the gear selector switch to the far left so that passenger will have to reach clear across the cockpit to get to it. The gear indicator lights will be in the top center of the panel where the lights will be in clear and prominent view. The gear indicator lights will be three, green for "gear down", red for "gear in transit" (on when the motor is running) and flashing yellow (plus honking horn) for "gear warning". When the gear is up all lights will be off. The gear warning light and horn will be activated when (1) "gear up" is selected on the ground or below 68 knots, and in this event the gear will not come up, (2) when the throttle is retarded or flaps lowered when the gear is up, or (3) when below 68 knots with the gear up. I decided against having an automatic gear extension system since it is my impression that most of you guys are too macho for such things, since the gear would be extending at the top of a loop, and since this system makes it nearly impossible to land with the gear up unless you ignore the light and horn. I should also mention that the post lights will be mounted above the instruments and not through the instrument mounting screw hole. This is for two reasons. First, I have unhappily discovered in my Falco that mounting the post light in the screw hole puts the post light in such a position that it partially blocks the face of the gauge. Additionally, it is much easier to remove instruments without also having to mess with the wiring. This is particularly true of the bottom row of instruments, since you have to first remove the upper instrument to get to the back of the post lights of the lower instrument. There is one exception to this, the left post light of the airspeed indicator will be through the screw hole due to lack of room above the instrument. Fortunately, this light does not interfere with the sight line. The engine instrument cluster will have internal lighting and these lights plus the internal radio lights will be controlled by the post light dimmer circuit, as will be the compass light.

I hope all of this discussion is helpful to you, if only to serve to explain why things take so long. I have wasted more time and money buying various indicator lights and trying them and chasing down little details like the proper hole size and pattern for the transistor

mounting. Little details can sometimes be the most frustrating, but I hope I have or will have all of the things nailed down so that the panel will go together with relative ease. One little detail: I was a little worried that the bolt threads for the left hand throttle and center console would cut into some of the wiring, but I stumbled over the perfect solution -- a nut plate with a plastic cap over the end of the threads.

As we may be delivering the panels before our next letter, I should mention a few things on the assembly. First, you should check the fit of each instrument you intend to install first and make the necessary modifications (there will be none if you use the instruments we will specify). You should cut all holes for all other instruments you intend to install. Next, you should bolt the console to the panel, place in the airplane and drill all mounting holes into the woodwork. When this is done, you should paint or apply whatever finish to the panel that you intend to use. Then you may begin the assembly of the panel. I will have detailed instructions out later, but certain things will be obvious, such as the need to install the indicator lights early.

Also, when you assemble the throttle quadrant, it will be important to tighten up the friction knob to the desired friction and keep it that way when you drill the holes for the attachment to the center console. If you do not do this, you could find that the mixture lever will be loose while the throttle is too tight.

One of the reasons the instrument panel has taken so much time has been that many associated details must also be finalized. These include the throttle quadrant, the center console, the nose wheel cover, the flap indicator system, the left hand throttle, the pitot-static system, the vacuum system, and the grand-daddy of them all -- the electrical system. Fortunately, I have been able to enlist the aid of two competent electrical engineers, one a Piper design engineer, and the other a radio installer. I have driven manufacturers nuts with nit-picky but important questions such as "may we run these wires through connectors?" (only Alcor said "Please don't"). Aside from the fact that the electrical system must be completed at some point, we needed to know a lot about the system before we could finalize the instrument panel. Specifically, we needed to know the number of circuit breakers and indicator lights required and the number of wires (and their sizes) running from the instrument panel to the airframe. We were able to get all of these in three connectors, and we still have an adequate number of spare pins for future use. The key to the system is the AMP circular plastic connectors. The installation of the pins to the wires requires the use of some fairly expensive tools. With our kits, we will install the pins on the appropriate wires and you will have to insert the pins into the appropriate hole until you hear an audible "click". We will also supply extraction tools (cheap) to correct mistakes. All of the wires will be numbered on the drawings and we will supply the wires with the numbers printed on them. This is the way it is done on all production aircraft, and in my view it is the only way we should do it. While it will add slightly to the cost, it will make installing and working on the airplane a simple matter. The electrical system and instrument panel are the type of things that

sometimes takes a builder a year or more to complete, but I think with the drawings and kits you will be able to install both in a week or two if you have everything in hand. The drawings will extensively detailed and unlike the usual schematic drawings you may have seen. They will be installation drawings rather than schematics, so you will find them easy to use to install the system, and more difficult in trying to make a study of how the system works. Each and every wire will have a termination point assigned, every connector will be specified, and all wires will have pin numbers assigned at the circular plastic connectors. Please be patient. These drawings will be very difficult since there are so many little details to be nailed down.

On to other matters. I am embarrassed that I have made a typographical error on the installation of the elevator balance weight (see revision G21c). I have talked to a number of you who have assembled the part with reference to the airplane and not the drawing and so far have not discovered anyone who has assembled the part incorrectly, but if you have been working from one of our kits and have followed the drawing religiously, please get in touch with us, and we will supply the needed parts to correct our mistake. Those of you who like to buy "deals" might also be prepared for a few mis-drilled but useable elevator control arms at bargain prices! My thanks to Jerry Preiser for discovering this mistake.

Speaking of deals, those of you who are making your own parts might want to look at two additions to our price list. If you are going to weld up your own tanks, you might want to consider the semi-finished tank (S/F P/N 728A & S/F P/N 729A) consisting of tank ends pre-formed and all of the machined fittings. Also, the screwjack "special" might be of interest to the budget-conscious. As you might remember, there was an error in the length of the screwjack sleeves. We had to make new screwjacks sleeves for the main gear as they were too short, but we have been able to use the short right-hand threaded sleeves to make up the nose gear screwjacks. We will be unable to use the left-hand threaded sleeves in such a manner. If you go for this special, you will have to cut the screwjack sleeves and splice a larger tube over them.

I have mentioned to some of you that it would be a good idea to install an accessory shelf between frames 6 and 7 on the left side of the airplane. In thinking further, I am not sure that this is really needed. You will need a place to install the ELT, strobe power pack, remote altitude encoder and remote DME. The ELT can be installed under the baggage compartment floor on the right side of the plane, and the rest can be installed on the back side of frame No. 6. I will also have a terminal strip in this area, and it too can be installed on frame No. 6.

My wife, Meredith, has been after me for some time to take a trip to Europe, and she has finally won me over on the condition that I make something of a Falco trip of it! We will be in London for a few days, then while Meredith is off to a big school reunion in Switzerland, I will fly to Italy to press a visit on Mr. Frati and Nustrini, then we will join up in Copenhagen with her step-mother and I hope to see Per Bruel's Falco there. I'll take along my camera and will have some slides for the Oshkosh booth.

United Kingdom builders take note. If you want to get a shot at me and see a Falco, this is your best time. Peter Hunter now has his Falco out of the shop after a year's restoration. By all accounts it is a beauty, "Ferrari red" per James Gilbert's inspiration in our flight report. We will have a meeting of Falco builders and potential builders on Sunday June 27th at 2:30 in the afternoon at the Elstree Aerodrome. Peter Hunter will have his Falco there and might be willing to give a few rides for fuel costs. If you want to hit me with construction questions, you might want to bring along a set of plans. Depending on how things progress, we may end up in a pub together that night, but don't expect too much of me as I will have been up all the previous night on the flight over.

Peter Hunter reports that he is getting 175 mph indicated at 2000 feet and 24"/2400. Peter has a Series III Falco that has been converted to the 160 hp engine and constant speed prop.

I have had the opportunity to do a bit of flying in my Falco since it got out of the radio shop. I took it to Florida in February and had a ball! It was my first real cross country flight in it. I was interested to notice that you change the trim every 30 minutes or so as the fuel burns off, quite obvious when you think of it, but I never had. I found I was able to cruise at 175 mph at six to eight thousand feet. Once you trim the airplane up, it is quite stable and you can fly it nearly hands off -- using either a finger on the stick or with feet on the rudder pedals.

Those of you who were at Oshkosh met my friend, Parke Smith. Parke has a CAP-10, and we have flown the two planes together a few times. In a full throttle race, I was a little faster than Parke. Later at my "Oyster Fly-In" this Fall, I flew with Butch Harbold in his 260 hp Super Chipmunk (identical to Art Scholl's). When Butch formed up on me, I gave it full throttle out of sheer macho, and I was later surprised to hear Butch say he had to give it full throttle to keep up with me. We did a formation loop and landing, which greatly impressed all of the gawkers there. Butch is an unlimited class aerobatic competition pilot, and he said that the Falco would definitely roll faster than his Chipmunk.

I have also given about one ride a week to a builder or potential builder. I have been interested to hear the impressions. A lot of people comment on how quiet it is. Almost everyone is surprised at the roominess of the cockpit. Everyone that has flown in the plane has been delighted with it, and I have found that ex-military pilots are always saying that the handling reminds them of the T33 jet trainer (I think we have had about 8 mention this, without any suggestion from one of us). The usual pilot on his first ride in the Falco tends to over-control the plane for the first three minutes or so. I have found that I can prevent this by instructing them to rest their arm on their leg. This way they fly it with movements of their fingers and wrist, and not their arm. After a few minutes of this, they are quite at home in the plane.

One of the real joys I have now in my Falco is the intercom. As I mentioned in our last letter, I have a David Clark Isocom voice actuated intercom. Earlier I had bought and assembled an RST intercom, but elected not to install it in the Falco for a number of reasons. For one thing, Parke Smith has one and has had a lot of trouble making it work. It was, by his estimation, nearly useless in the air. I knew the Isocom was the best piece of equipment on the market and so went for a sure thing. Since that time, I have spent some time with Parke on the problems of his intercom, and we have them completely cured. Parke was using the wrong type of battery and a modification had come out last Fall which added a transistor to the circuit to improve the operation of the squelch. With both the RST and David Clark intercoms, it is essential that you use one of the new electret microphones (we both use David Clarks). With the older David Clark dynamic mics, the Isocom is nearly unusable in the air since the squelch has to be set so high. I also took my RST intercom along on the Florida trip and did some side-by-side comparisons. I would say that the David Clark unit has the better audio quality. It is quite noticeable in a side-by-side test, but I doubt that you would notice it if you got out of one airplane with the Isocom and into one with the RST intercom. There is also a difference in the squelch, the Isocom seems to really have it knocked. The full rotation of the knob is useable with the higher settings requiring a loud spoken word to kick in the intercom which cuts you off quickly at any soft conversation, and at lower settings the intercom comes in quickly on the first utterance and then takes longer to cut out. The RST unit has a narrower band of useful adjustment and a seemingly uniform cut out time regardless of the setting of the squelch. These differences are very apparent in any side by side comparison, but they are relatively minor in the usefulness of the units. I judge the Isocom as the superior unit, but I also think many of you should consider the RST intercom. Without any question, the RST intercom offers the most value for the money since it is a third the cost of the Isocom. At something over \$300.00, the Isocom is the most expensive on the market, but when you take it in perspective and realize that of the \$13,000.00 in radio gear in my Falco, it is the most used piece of equipment and performs as well as you could expect, it begins to look reasonable. To sum it up, I can recommend them both.

I failed to mention it earlier in the discussion of the electrical system, but the electrical system will include a complete wiring diagram for the audio system. The system will be tied to a terminal strip on the back of the panel, so all your installer has to do on the installation of a radio is to connect the radio audio output to the appropriate terminal. In other words, the airplane will be prewired for a complete system. We will also include wiring for the installation of an intercom, either the Isocom or the RST intercom. With the Isocom, the intercom is mounted in a 2" instrument hole. The RST intercom is in a box which can be mounted on the side of the radio stack box or on the side of the fuselage. This will save some panel space as all you need to have is two round knobs on the panel. There are some fine points concerning the installation on which I am not yet clear. On the Isocom, there are no "active electronics" between the pilot and the radios and with a built-in installation you can cut the intercom off and still use the radios. I am not completely sure how the RST unit is set up, but on

mine you cut yourself off from the radios when you cut the intercom off, but you can cut the volume down as low as it will go, effectively eliminating the intercom. I'll get this all straight before I finish the electrical system drawings.

Wyn Jordan of Flight International at Newport News, Virginia, is the radio installer who put the new radios in my Falco, and he is also one of the two electrical engineers who have been helping me with the electrical system. Wyn has offered to assist you in your radio installation. Since he is intimately familiar with the panel design and the aircraft, he will be able to sell you a radio package with the wiring harness ready for installation in your Falco. You would have to install the radio racks in the panel and plug in the harness to the appropriate radios. Wyn's prices are reasonable, and I think his unusual familiarity with the Falco might serve you well. If you would be interested in such a service, please indicate this on the questionnaire.

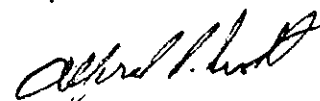
As I mentioned in our last letter, I plan to take my Falco to the CAFE 400 competition. This is in Santa Rosa, California and is on June 18 and 19. I haven't worked out my schedule yet, but I plan to get a note out to the west coast builders if I am going to stay over for any length of time so that we can get together.

Those of you who are making your plans for Oshkosh might want to plan to attend our annual builders dinner. This will be at 8:30 on Tuesday, August 3, at the Midway Motor Lodge in Appleton. For those of you that were there last year, I promise not to tell my Indian joke again!

At some point I plan to get a drawing out for the flooring in the cockpit. Until then, I can tell you a few things that should keep you out of trouble. The wing skin extends into a point 60mm from the centerline. This is to match the 125mm inside dimension of the console covers. Between frames 3 and 4, this center section is fixed, but there are removable floorboards to either side. Mr. Frati advises that the removable panels are 275mm wide, but those in my Falco go almost to the side walls. I want to check to make sure that the control stick support can be removed before I finish the drawing. (I would appreciate it if any of you could make this check in your planes.) The luggage compartment floor has a center section that is removable, and it is about 640mm wide. The back of the luggage compartment will be a removable piece of plywood.

That's all for now.

Sincerely,
SEQUOLA AIRCRAFT CORPORATION



Alfred P. Scott
President

ROLL CALL

Please send in your progress report on a separate piece of paper and not as part of a letter as these entries go into a separate file. Please give your name and builder number.

572. Larry Black. Tail half woodwork complete. Front half skinned except for bottom. Wing spars complete. Ribs complete. Nearly all fittings make. Landing gear 70%. Aileron and Falp assembled but no plywood installed except for webs.

660. Rex Hume. My fuselage jig is complete awaiting "Bare Bones" frames from Little River Aircraft. (Rex has since written that these have arrived.) All wing ribs are complete. All tail ribs are complete. Rudder is skinned and attached to vertical fin which is ready for plywood skin. Presently concentrating on fuselage and wing metal parts.

695. Garlington C. Wilburn. All spruce acquired except for major spars. All plywood acquired. Kits 801, 822, 823, 803-3, 806 and 820 on hand. Kit No. 804 now on order. All spruce machined to final cap strip dimensions for all of airframe except for major spars. Son David committed to make fittings using Kits 822, 823 and 820, and he is under way. I will be leaving Korea soon to a new job location. Details in the next update.

720. Bill McKaig. I'm initiating construction. All the reference material is in hand. Kits for the horizontal and vertical tail spars and ribs and fittings are on order along with the wood required for assembly.

FALCO INSTRUMENT PANEL QUESTIONNAIRE

If you will probably want to purchase an instrument panel with the holes already cut for you, please indicate if you would like the holes for the following instruments cut in addition to the basic instrument holes.

	Yes	No
EGT (check one of these)		
Single cylinder	()	()
Four cylinder	()	()
Combination Voltmeter/Ammeter	()	()
David Clark Isocom intercom	()	()
Davtron digital outside air temp	()	()
Silver Fuelgard	()	()
King or Narco DME	()	()
King Marker beacon	()	()

Please give us any comments you may have about the instrument panel design, including such things as whether the panel we have designed will fit your needs, any instruments you would like to see included or excluded, or any other thing you would like to see done with the panel.

How deep would you like to see the radio stack cut on the finished instrument panel?

- 7.98" ()
- 5.675" ()
- 3.625" ()
- Other (specify) () (inches)

Please check if you would be interested in Wyn Jordan of Flight International offering custom radio installations for the Falco.

()

Indicate intercom you think you might use.

- David Clark Isocom ()
- Radio Systems Technology ()
- I don't plan to use an intercom () (You'll be sorry!)

Please use the form below for your roll call entry.

ROLL CALL

Builder Number:

Name:

Report: