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T-18 SURVEY - Perhaps you are wondering why you are receiving another newsletter when you didn't send in your questionnaire. Since only 24 have been returned in two weeks, I will no doubt have a real short mailing list next month. Better get yours in today. Anyway, I had some hot info as a result of a trip to Los Angeles so rather than hold it up for the questionnaires -- here it is.

How it feels to fly a T-18 - Dick Hansen was gracious enough to give me a demonstration ride in his 180 hp T-18 today. I had a number of questions about the flight characteristics of the T-18 so he let me get the answers myself.

Getting into his ship is no problem because the canopy slides well back to give plenty of space between it and the windshield. Also, the side door is very convenient since it reduces the height of the step. He had no-skid material on the top of the tunnel, making it a convenient step. (Don't clutter up the top of the tunnel with gadgets to prevent using it for a step because using it in this way permits easy entry and exit without stepping on the seat cushions.)

The seat arrangement was comfortable although I could have used more leg room - I'm 6'2". The rudder pedals had been moved aft to provide brake pedal clearance at the fuel tank support. To compensate for this, the seat back had been moved back about 2" behind the 598 frame. Even so, my legs were doubled up so my knees were above the top of the stick. The stick had an offset bend which moved it about an inch closer to the outside of the cockpit. This is a good idea for it centered the stick better between my legs. However, with the radio console between our knees, I could move the stick only about 3/4" toward the center of the cockpit.

The seats were very comfortable, made of what looked like a molded fiberglass bottom and back and covered with deep foam rubber and beautiful leatherette covers. Since the upholstery was applied directly on the inside of the side skins, it didn't take away any valuable cockpit width at the seats. Although the corner of the tunnel cut into my hip, it wasn't too bad. I still plan to round off my aft tunnel because of this.

The seat back was made in two parts, the lower part was fixed to the bottom and came up to the bottom of the baggage compartment door which opened down. Then an additional cushion was affixed to the baggage compartment door.

When this door was opened it revealed a good-size as well as a unique compartment which extended all the way to the bottom skin. The tunnel was carried all the way through the baggage compartment to protect the push rod and cables. Dick enjoys flying out to his ranch to play golf so he has a hole cut in the rear of the compartment and an extension just big enough to fit in a set of golf clubs. He values his baggage space and says he wouldn't want to lose any of it by cutting off the hump.

One thing the homebuilder usually forgets about is passenger comfort, especially when it comes to fresh air vents. On the ground, we taxied in real comfort with the canopy open. But when we pulled it shut for take-off it got hot mighty fast under that California sun. Then when we started moving I discovered how effective were the air vents Dick had installed. The vents were located on both sides of the fuselage near the floor, just forward of the main spar. Intakes were from holes just under the leading edge radius of the wings about one foot inboard of the junction of the inner and outer wing panels.

Dick made the take-off by lifting the tail off slightly after we got up to a pretty good speed and then easing the main wheels off at about 80. After we had climbed out of the smog, I took over and proceeded to do a series of turns. All normal flight maneuvers could be done with two fingers on the stick and not enough rudder to even mention. Dick still uses a

spring hooked to the stick for trim but this isn't adequate with a full load and an empty tank so he is planning to put in the trim system which John will be publishing soon.

Indicated cruise speed was 160 mph at 6500 feet. This is about 182 true.

Having heard rumors that the T-18's stall is tricky, I asked Dick about it. He said "No, I think it handles as well or better than most factory jobs in a stall, just watch." So he pulled on carb heat and cut the throttle. When the needle read 70, it started to buffet and this increased until the speed dropped to 65. Then the left wing dropped and Dick picked it up with aileron and kept whipping the stick around to keep the wings level until the nose dropped and he let it pick up speed. I asked if he could hold it level with rudder only so he tried another one. He kept the wings level until it began to buffet at 70 mph. But soon a wing dropped and he chickened out and used aileron. Then I tried several stalls with the same results. I was surprised at the effectiveness of the ailerons all the way through.

I asked Dick if he recommended a full stall landing. He said that it is not very practical because the tail wheel drags first. If you go ahead and stall it, the tail will hit first then the front will bounce down on one wheel or the other. Dick usually touches down at between 75 to 80 with the tail wheel touching just a little before the main gear.

When we made our approach, Dick came over the fence at about 85 and greased it right on, touching down at just under 80. He then seemed to do quite a bit of fancy work with the rudder to keep it rolling straight. He let me finish the roll out and taxi back to the ramp. He has brakes on both sets of pedals.

I asked Dick how small a field the average guy could operate a T-18 out of and he replied "2500 feet at first, 2000 after you get the feel of it." With flaps he thinks it should cut down on the runway requirements.

Ground handling during roll-out is pretty tricky and now I can understand why Bill Warwick said he wouldn't let anyone else land his ship -- it has only one set of brakes. Dick said he didn't have too much trouble getting the feel of his ship. He just made some taxi runs first and then took it off. However, I might add that he is a very accomplished pilot and does such things as flight test converted turbo-prop twin Beeches for his own company.

Dick says he hasn't had the time to do so yet, but he plans to conduct a thorough flight test program in cooperation with John. No one has yet rolled or done any form of acrobatics in a T-18 although John did a one turn spin. I asked him why he didn't do more and he said that he didn't trust any of the canopy arrangements. Hansen's is rugged enough but because of the horizontal rails, the canopy can't be opened in flight and it would be hard to get out of it in an emergency. Aerodynamic forces on the canopy keep it forced forward. The sloping rails shown in the plans will still cause a small forward force but it will be only about 20 pounds.

What's my reaction to the T-18 now that I've flown all three ships now flying? One word describes the experience -- tremendous! If I have gone into considerable detail about a few little items which need improving or attention, it doesn't mean that I'm anything less than enthusiastic about the workmanship in these three ships and in the T-18 design in general. It is hoped that these comments will be of assistance to you as you complete and equip your ship.

Occasionally we find a guy who has no flying or building experience but who plans to modify the T-18 to a 4-place version and fly it out of a 1000 foot strip which has a few trees at the down hill end -- after he gets a little dual. If you know of anyone like this, try to talk him out of it.

FLASH - Just got word that Bob Kaergaard's ship has been flown - once around the field accidentally while making taxi runs.

Wing Fittings - Some people have complained about the amount of machine work connected with the inner wing (601) fittings. John says these were purposely designed to be made on a drill press and band saw. They are way over-designed so don't worry about holding close tolerances except on the main pin hole. Drill through the corners to establish a nice radius, then saw to shape and file out the scratches.

Mandatory Bulletins - The following bulletins are recommended on all T-18's.

1. Fuselage Skin Stiffener - Add a stiffener to the side skin at the upper front corner of the main spar cut out. Material is 0.063" thick 2024 T4 sheet. See sketch.
2. Fuel Tank Support - It is necessary to provide a stress carry-through from the 528 tank support to the dash. This can be accomplished by making an angle bracket from 0.063" extrusion or bent up from sheet stock. Attach to the dash with two 1/8" rivets and to 528-2 with two rivets. Extend the 528-4 all the way to the dash. Make the 528-4 stiffener 12" long.
3. Tail Spring Attachment - Two failures have occurred at the front tail spring attachment point. In one case, the 591 bracket cracked from fatigue and the other was a broken 1/4" attachment bolt. Change the 591 to one with the same dimensions made from 0.090 4130 stock and change the bolt and plate nut from 1/4" to 5/16".
4. Counterbalance - Eliminate the 626 counterbalance weights. Redline airspeed can now be raised to 200 mph IAS.

Seat Attachments - Why is an angle shown on the side of the tunnel for a seat attachment but none on the skin? The tunnel drawing was made later and John added the angle to provide a low seat support when a seat type chute is used. One should also be put on the skin. A piece of 3/8" plywood can be inserted when a chute is used. The regular seat can be attached to the 1 x 1 angles.

Safety Belt Attachments - Drill a hole through the skin and the 1 x 1 angle and attach outside belt with a bolt. Inside belt is secured with a bolt through the angle on the tunnel. Shoulder harness can be attached to a plate riveted to the top bulkhead behind the seat.

Main Gear - I was surprised to find that John's gear without wheels and axles weighs 48 to 49 pounds. My gear as described in NL #11 weighs 37.5 lbs.

More Drawings - How many more? John says he will probably end up with 200. He initially figured on about 30 to 40. The lofting drawing of the canopy has been completed and sent to those who are going to tool up to make canopies. Since the average homebuilder is not equipped for this type of work, this drawing will not be sent to everyone. If you really need one, write to John. The other canopy drawings are nearly complete and will be mailed out soon. John says his twin Beech conversion work is now completed so he will get busy on the fuselage drawings which cut off the hump under the canopy. The baggage compartment will have provisions for two jump seats with a 100 pound total limit. Frames 598 and 571 will be changed. Other drawings will show details on cowling, carb heat box and exhaust system.

Gear Fairings - Dick Hansen's main gear leg fairings are mighty nice. They are made of aluminum sheet wrapped around and riveted at the trailing edge. They are attached with two clamps which clamp to the gear leg at top and bottom. Each clamp has two 1/4" long pieces of rod welded to it 180° apart which stick out through slots in the fairing. The fairing is thus just floating on the leg. It works perfectly with no tendency to crack or buckle.

Engines - A few 125 hp GPU engines have become available again. If you can find one, better grab it quickly for they won't last long. If you are planning to buy a new crankshaft it might help to know that John just bought one and found the price had increased slightly - from \$350. to \$450. That's right, for a crankshaft!

Roll-over Bars - If you want to save 2 pounds and have better compass operation, use an aluminum roll-over bar. Rudy Adler, 13503 Cheltenham Dr., Sherman Oaks, Calif., makes them for \$55.

Welding Aluminum - John says that 6061 aluminum welds very nicely but the secret is to use hydrogen gas instead of acetylene. The hydrogen burns with less heat than acetylene but it is sufficient for aluminum. The main thing is that it burns much cleaner than acetylene. Of course, flux must be used.

Making Fiberglas Tips - Fiberglas parts can be molded in one of two ways, with a male mold or a female mold. At first glance, the novice might think that it is much easier to use a male mold since it eliminates one step in the process. If you don't care about the appearance of the finished product, this is probably true. However, if you want a nice smooth finished product, it will take considerably longer to finish off a part made on a male mold than to make a female mold. I have never seen a finished part made on a male mold which looked really smooth although it might be possible with enough effort. So, when I made my fiberglas wing tips for the T-18 I used a female mold.

The first step with any fiberglas molding process and by far the most time consuming, is to make a pattern of the part. There are a number of ways to go about making a pattern and the builder will usually select the one which best suits his circumstances. The pattern can be made from soft wood, styrofoam, balsa, or plaster. I chose plaster for the wing tips since it is very inexpensive and yet fairly easy to shape. We have made patterns for nose cowlings, wheel pants and tail tips from soft pine but this really takes a lot of whittling - about one month for a SkyCoupe nose cowling for instance.

If styrofoam is used, it must be coated with a material which will seal it from the resin. Otherwise the resin will destroy it. The cost of styrofoam in this area is completely prohibitive.

White gauging plaster works very well and costs about \$1.50 for a 50 lb bag. Mix it with nothing but water - no sand since it would make it difficult to shape. Don't add too much water or the plaster will become too soft.

To establish the rough shape of the finished part, it is advisable to build a framework from cardboard or plywood. For the wing tips, cut out spanwise formers from 1/4" plywood, cut out a notch in each and mount them on a 1" x 3" board which serves as a backbone. The more formers, the less guesswork in establishing the correct shape. Cut out a 1/4" plywood rib conforming to the wing profile and attach the skeleton to it. Set this framework on a piece of aluminum or waxed paper and slap on the plaster. The formers should be slightly smaller than the finished wing tip dimension so they can be covered with about a 1/4" layer of plaster. Sanding and finishing a surface composed of materials of different hardness is very difficult.

The handiest tool I found for shaping plaster is a body rasp, called a "Vixen," used in auto body shops. It is slightly flexible and the cutting surfaces are in the shape of smooth semicircles. It cleans very easily and makes no scratches. I consider it a must for shaping plaster. Very little finish sanding is required. If plaster is allowed to cure for about a week it files better.

The bare plaster pattern will undoubtedly be filled with many air holes. Filling them in with plaster is not as simple a job as you might think for the plaster block sucks the water out of the wet plaster so fast that it crumbles before you get it smoothed up. Try to fill in the largest holes but don't be too worried about the smaller ones. I wasted alot of time carefully filling the holes with red lead body putty but this caused me other problems and I had to remove it.

The plaster must be finished off with a material impervious to resin. We tried laquer on one pattern and found that if there were any pin holes in the wax, the resin would soak through and lift the laquer. Then I tried ordinary water-base latex wall paint and this worked perfectly. It dries quickly, fills holes well, and wet sands very easily. I sprayed it on to get an even coat. I found that if it started to run I could just spray the run (while still wet) with plain water and it would disappear. About the only problem I had was that the latex paint just wouldn't stick to the putty I had used. I strongly recommend this type of paint for sealing a one-shot type of pattern. It is important that the pattern be finished very smoothly for its finish will determine the finish on the final part.

The pattern is then covered with several coats of a hard paste wax. Johnson's floor wax is ok. I recommend making a split mold for the wing tip, otherwise the trailing edge must be made too thick. To make a split mold, the top and bottom half must be made separately. The dividing line is formed by cutting a hole the shape of the wing tip plan form in a piece of aluminum and building a crude wooden framework to support the aluminum at the desired parting line on the pattern.

The mold can be made of either plaster or fiberglas. I used fiberglas to make it durable enough for re-use. The pattern and parting flange are then sprayed with a parting agent called poly vinyl alcohol (PVA). This is not absolutely necessary but it facilitates separation. Wax alone works fairly well. Then one half of the mold is laid up.

To get a decent finish, it is necessary to use gelcoat resin for the first coat. Gelcoat does not get air bubbles like regular resin. Brush on a coat of gelcoat and let it stand until set-up, preferably overnight. I rushed it once and found that the next coat of resin raised the gelcoat in places.

Next cut out glass cloth or mat, brush on a coat of resin and apply the fiberglas to the wet resin. Now if you haven't seen this operation performed, it would be wise to get a demonstration from someone who knows the ropes. It is really quite simple, but it is really messy to learn the hard way. Put on two or three layers of heavy fiberglas and then cut out some cardboard "egg crate" stiffeners and apply to the mold with resin to make the mold as rigid as possible. Stiffness can be covered with glass cloth for added strength. A flange of about 2" should be made at the parting line.

After the mold has set-up, turn it over and remove the aluminum parting line form. Apply wax and PVA to the pattern and parting flange. Then lay up the second half of the mold like the first. After it has set up a little prying will then separate mold from pattern.

To mold the wing tip, do one half at a time. After the mold has been sanded, put on about 5 polished coats of hard paste wax. Then follow with PVA sprayed on very very lightly. If it starts to pile up in globules, wash off with water and start over. Then apply gelcoat and two layers of 7 to 10 ounce glass cloth. While the resin is still rather soft, trim at the parting line with a razor blade. (continued next month).

SPINNERS - John Tonzer is retracting the \$31.50 spinner offer after December so send me a check now if you want one.

GET 'EM FLYIN'!!!

SKIN STIFFENER

Asst Fus. Side SKIN

