#16

QUESTIONS FOR JOHN THORP

1. How can the 0-290G engine be modified to give higher horsepower?

"To soup up the 0-290G for higher horsepower, a crankshaft from an 0-290D, D2, or 0-320 engine should be used. This gives the added strength required for the higher horsepower. The sludge tubes in the 0-290G crankshaft are larger than in the other engines.

Different pistons can be used to step up the horsepower. (D-2's give 7.5:1 compression ratio, D-2B's give 7.0:1).

2. Can a propeller be safely attached to the bare 0-290G crankshaft flange?

"No. The thin flange is not safe without a ring gear or a 1/4" thick spacer available from Lycoming. Recently an 0-290G engine lost a propeller with flange. No spacer or ring gear had been used.

3. What is the story on flaps?

"Since aircraft with a high wing loading require flaps in Canada, I will put out flap drawings and send them, at no added cost, to all who hold plans. The design will permit flap installation on an already built T-18 wing so you don't have to hold up work on the wing just because you want to add flaps. The design has been worked out and as soon as I find time I'll put out drawings."

4. How many more prints are forthcoming? What on and when?

"Eight more drawings plus flap drawings. The trim system is being worked out now."

5. Why the aluminum tailspring?

"A steel spring would be about 50% heavier."

6. How is the tailwheel spring made?

"Make from 2024-T3, bend on an arbor press, then re-heat treat. Heat to 960°F and quench in cold water."

7. What exhaust system should be used?

"A cross-over system is most efficient. There should be adequate space for mufflers, one on each side. Due to the high cost of stainless tubing you will probably want to use regular automobile exhaust tubing available everywhere in various shapes and sizes. The completed system can be porcelinized for added life. This service is available in the larger metropolitan areas."

8. What canopy will you use?

"The T-18 needs a canopy for passenger comfort. The canopy I'll use will be something between a Skooter canopy and a Darringer canopy. The rails will lie in a plane passing through STA 100.6795 at WL 49.96 and STA 139.0 at WL 55.220. The small door would not be used, although at least one builder is putting a section of rail in the top of the door.

I will put out some drawings on the canopy for free."

9. Other interesting information from John:

"I have designed a 4" prop shaft extension, drawings for which will come for free. I have also designed a 12" diameter, 14" long spinner drawings for which I will furnish free. I am working on cowling and exhaust system for the T-18 builders."

John says that he doesn't approve of adding a lot of extras to the T-18 to weight it down. The predicted high performance will be degraded when the gross weight increases. "But even so the limit load factor is 5.0 at 1500 pounds." "The beam is designed close for limit L.F. of 6.0 at 1250 lbs gross. Bill Warwicks T-18 grosses at 1450 lbs and Earl Love's, 1500 lbs."

Some T-18 builders who have flown Warwick's ship at the fly-in have asked if it would be possible to make the landing gear softer to improve the ride on rough fields. The gear is only stiff to taxi. John is doing a stress analysis for someone on a tailwind type gear now but says it is heavier.

John says that the present gear could be modified to be assembled with bolts in order to fit into smaller heat treat facilities. If there is sufficient interest, I'll put the sketch, which he made for me on this modification, in the newsletter.

RIVETING

Here are a few essentials which everyone should know before doing any riveting on aircraft parts.

REFERENCES: Get a book on aircraft riveting and read it. Talk to other people with experience in this type of work.

TYPES & SIZES: If you are using pop rivets, write to United Shoe Machine Co., West Medway, Mass. for a catalog. If you can't find a local dealer who handles the rivets, Dick Cavin can get them for $11. per thousand. Order monel rivets with the steel shank.

Conventional rivets come in many sizes, shapes and materials. The plans specify diameter so that is no problem. Length of the rivet is determined by the thickness of the materials being joined. Take the sum of the sheet thicknesses being riveted and add 1.5 rivet diameters. Since rivets come in lengths of 1/16 in. steps, the nearest standard-length rivet greater than the calculated sum is used. You will find it very worthwhile to purchase a rivet cutter for cutting extra long rivets to the right length. This tool is not only easy and fast to operate, but it also makes a clean square cut. Rivets cut with diagonal cutters cannot be driven properly. The size and shape of the driven head tells the inspector the story of whether or not the proper length rivet was used and how well it was driven. The driven head (the one you form) should be 1.5 times the rivet shank diameter when the proper length rivet is used. The thickness of the driven head should be at least one half the rivet shank diameter. If you overdrive a rivet and the driven head is larger in diameter and thinner than these dimensions, you had better drill it out because the inspector will make you remove it later when it is more unaccessible. The reference books don't give tolerances on the driven head dimensions so use your judgement but don't depart very much. It is a good idea to make go-no-go gages out of sheet metal for the most common sizes of rivets. Show the FAA inspector that your rivets have been checked in this manner and he will have more confidence in your work.

You will soon learn that a 1/8" rivet won't fit in a 1/8" hole. Use the drill or Whitney punch sizes as follows:

Drill Size	Rivet	Drill Size	Rivet
# 50	1/16"	# 30	5/32
# 40	3/32	# 10	3/16
# 30	1/8	17/64"	1/4

Use the correct edge distance which is two rivet diameters from the center of the rivet to the nearest edge of the sheet. (1/4" for 1/8" rivets).

If a hole is oversize or not round, the next size rivet should be used. A few oversize rivets is an indication of your honesty since everyone goofs sometime.

Round head rivets can be used where they are not exposed to the slipstream. It appears that most T-18 builders are willing to go to the little extra work necessary to use flush rivets on all external surfaces. This requires dimpling the skin. Counter-sinking is not recommended when the skin is less than 0.050" thick.

Except where hi-shear rivets are specified, most of you will want to use A17S-T rivets which can be driven without heat treating. These Rivets have a small dimple in the head. Rivets with raised markings must be heat treated before driving.

DIMPLING: Dimpling tools can be purchased for hand dimpling, or for use in a Whitney punch or rivet squeezer. However, if you have a lathe available or know someone who has one, you will find it a simple matter to make one. For the male part, make from a steel rod of almost any diameter larger than the rivet head. Cut the shank equal to the rivet diameter and about 1/2" long to act as a guide. The portion which forms the dimple should have the same angle as the rivet being used. Note that pop rivets have a 120° head, while standard rivets usually have a 100° head. The female portion of the dimplershould be rather heavy and of a convenient shape to fit in tight quarters. Several female parts can be made to fit the various locations required.

DRIVING RIVETS: The best way to drive rivets is with a rivet gun. This requires a substantial supply of compressed air for power. When using a rivet gun, the rivet set is placed against the factory head, and the bucking bar against the shank. Some builders have reported success in driving flush rivets backwards with a flatiron used for a bucking bar and held against the factory head. This procedure has the obvious disadvantage of driving the rivet back out of the hole if the flatiron is not held firmly in place. Driving rivets by hand is accomplished in the same way with the rivet set placed against the shank end of the rivet to receive the blows of the hammer and the bucking bar held against the factory head. A rivet squeezer is ideal for rivets close to the sheet edge. It is important that all tool surfaces which come in contact with the rivet be polished to remove all scratches to avoid setting up stress risers in the rivet.

LANDING GEAR: If you are planning to weld up your own gear, you had better plan on using a heliarc welder. This is what John Thorp recommends. One builder reports much difficulty in using an oxyacetylene torch for the job. He says it took two welding torches and a blow torch to get enough heat. Considerable warping occurred. Machinecraft, Troy, Ohio has the necessary tubing for about $45.

SHEET METAL HANDBOOK: Paul Poberezny has asked Dick Cavin to coordinate the publishing of an EAA sheet metal handbook. If you would like to contribute articles or just handy tips, contact Dick immediately. Most of us have been on the receiving end of EAA and have never contributed anything. Let's all do our part.

EARL LOVE'S T-18 — The second T-18 to fly was built by Earl Love, who hangars it at Fox Airport near Palmdale, Calif. It also carries a 180 hp engine with adjustable prop. It now has flown the required 50 hours. He has reportedly been doing some fancy acrobatics and on one occasion got some horizontal tail flutter at a speed well in excess of 200 mph. John has since red-lined all T-18's at 180 until he can identify and correct this problem. Do not make the counterbalance for the anti servo tab (626) because this part is being changed.

Ralph Tenhaus' T-18 — Ralph's ship is the third to fly. It has 5 hours on it now and performs very well with a 125 engine and open cockpit. Cruise is 130 indicated at 5,000 feet with a 1250 fpm rate of climb.

GAS CAP — Gas caps are available from Dave Gengenback, 12147 Woodley Ave., Granada Hills, Calif. for about $5. Write to him.