Simplicity Can Be The Answer

By Georges Jacquemin, EAA 3618

On light aircraft fuel tanks are generally odd shaped and their construction has proved difficult to many amateurs not familar with sheet metal work. The lightest tank is of course made of welded aluminum. However, welding of aluminum must be done by specialists who are not always available, so light aircraft fuel tanks are usually made of steel, either tinned or galvanized, and are of welded construction. Since welding destroys the tin or zinc coating, the steel is exposed to corrosion along the welds. Water coming from condensation or sometimes present in the fuel will start rusting of steel. There is the risk of rust flakes forming sediment in the tank and plugging a fuel line.

To avoid this trouble Henri Mignet used to make his fuel tanks of thin brass sheets, approximately .015 in. thick, in the annealed state. Annealed brass is easy to bend with a few tools. The tank construction is shown in Fig. 1. It is built like a tin can and finished by soldering with a hot iron or small gas torch. The fuel gauge shown on the drawing is for a high wing aircraft such as the HM-8 or the Flying Flea. The same system can be reversed for use on a low wing aircraft, but a simpler gauge can be made in this case from a rod attached to a float sticking through the filler cap. In Mignet's tank the outlet and the passage for the fuel gauge wires are simply made of two car tire valves set in fuel proof neoprene washers.

Nowadays the amateur can find most instruments from surplus stores at reasonable prices. Twenty years ago he had to make most of his own instruments and use a lot of ingenuity. Transforming a barometer into an altimeter or modifying a small compass was simply done by changing the scales. Speed indicator, tachometer and variometer can also be made fairly easily. Fig. 2 and 3 show two types of speed indicators described by Henri Mignet. The only real difficulty is in the calibration but this can be done with sufficent accuracy on the road during a calm evening, taking the mean of two or more runs in opposite directions. The venturi or the spring vane should be placed far enough from the car so that they are not affected by turbulence. The manometer of the venturi should be filled with colored antifreeze and water.

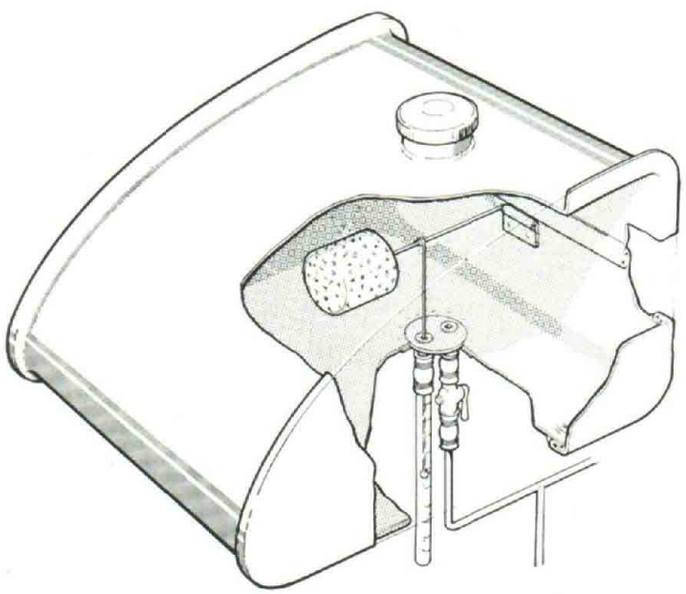

Fig. 1. Typical Fuel Tank (From HM-8)

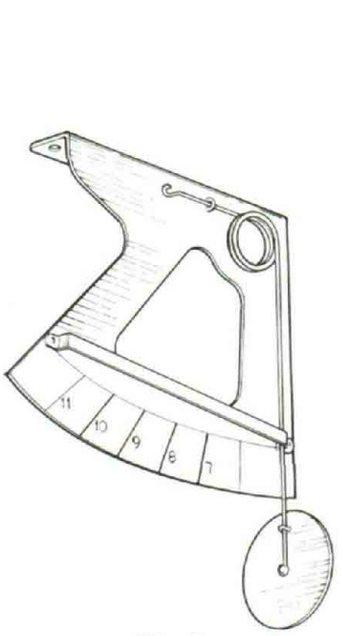

Fig. 2
Flat plate speed indicator.

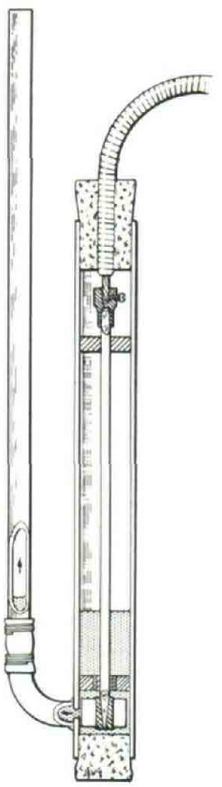

Fig. 4
Tachometer

Fig. 4 shows a tachometer designed by Mr. N. F. W. Hanning, a Flying Flea builder on Madagascar Island who had great difficulty in obtaining equipment. A small turbine at the bottom of the oil tank pushes the oil up the glass tube thereby indicating the RPM. Calibrating this tachometer can be done easily but since it is dependent on the viscosity of the oil, its readings are valid only in a narrow range of temperatures. It is of course possible to calibrate it at various temperatures and have an adjustable scale which can be set according to the temperature of the tachometer oil indicated by a small thermometer.

The variometer (Fig. 5) is another useful instrument which can be made at home. The bottle is an ordinary thermos flask. The control leak can be made out of a plugged piece of tube with a small hole and the mano-

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Dear Junior Members

By Dennis Edelmann, EAA Jr. 8916

There are currently many Junior members of the Experimental Aircraft Association. In the two and one-half years that I have received SPORT AVIATION, I have seen very few articles by junior members. Most other juniors probably have more experience, I am a self-taught aviator because my parents don't fly, and really have little interest in aviation.

Why did we become Junior Members? A good question with a few basic answers. (1) A junior membership costs less than a subscription. A good reason because when I found out that a junior membership costs less than a subscription, I decided to be a member, and get the advantages of senior members. (2) Junior members' parents are active EAA members or their parents are flyers, mechanics, etc. (3) Because lone eagles, like me, have found out that amateur-built aircraft are better in a lot of ways than commercially-built aircraft. Amateur-builts as a rule, cost less, fly faster, and are more maneuverable than production aircraft of the same size and power. I belong in the third group. Since becoming a member, I have decided to make designing and building aircraft my main vocation.

Why have Junior Members? The main purpose of juniors, as I see it, is that they are the active seniors of a few years from now. Being a junior for a number of years helps us to become acquainted with the way full-size aircraft are built. The Seniors know that the real foundation for a good movement depends on what is coming up.

What can we do? A lot of juniors probably started out in aircraft by building model planes. Those that did or do are a lot farther along than I am, for I never was too interested in building models, but I was always interested in the full-size planes themselves. (The similarity between flying model construction and real aircraft construction is quite evident.) Another activity juniors can do is to design aircraft, using Teichman's "Airplane Design Manual" for most of the essential formulas of designs, weight and balance, and preliminary performance estimates. One of the basic rules I use is to decide on one design scale and use it for all of the designs, (literally design studies). I am now going to combine the two and build models for the designs I have done during the past year and a half.

I started aircraft designs when I was in the fifth grade. From the fifth grade to after the eighth grade, I did all different kinds of designs using no set scale. For my 14th birthday I was offered a choice of any aircraft subscription I wanted. I chose SPORT AVIATION. Then I started using a scaled ruler for my designs. Last year I did over 40 designs, all on the scale of 1 in. equals 2 ft. (1/24 size). Now as an 11th grader at 16, my design studies can almost be made into working designs. My present best design study is a modified plane of the Cougar-Tailwind type with Cessna-type landing gear and a 145 hp Continental engine.

I would like to receive letters from other juniors on their special interests and ideas.

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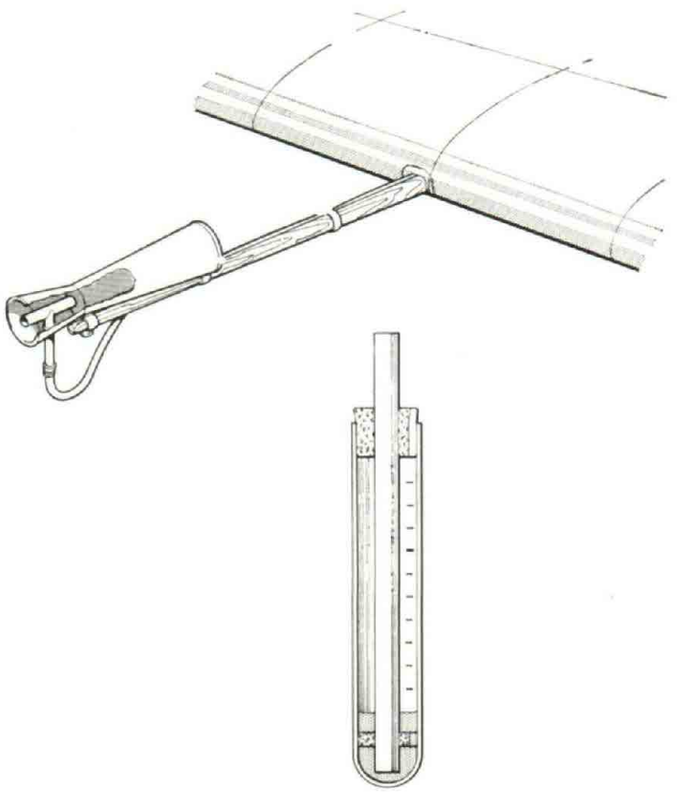

Fig. 3
Venturi speed indicator

meter is similar to the speed indicator. This variometer can be calibrated easily during a flight with an aircraft equipped with a capsule variometer.

Of course these crude instruments cannot be compared with those industrially, but there are cases where it may be useful to know how to make them. For instance, if a very low speed indicator cannot be found, then a venturi type could be made for use in the lower range.

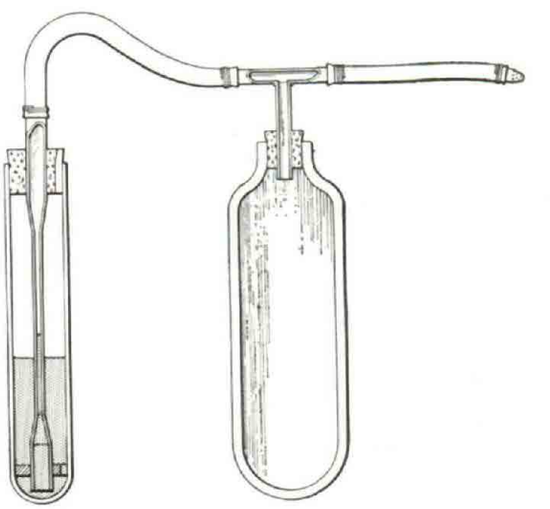

Fig. 5
Variometer