



Here's Gordon, pictured with Jazz 20 and his other pride and joy, his own designed Formula Vee racing car.

# JAZZ TWENTY

*Get a flying start from Gordon Rae's 47" compact sportster*

The modern generation of light-weight sport twenty engines, as typified by the OS 20 FP, are excellent power units. Along with plenty of power and economical fuel consumption, they can be throttled

down to a reasonable speed. With these thoughts in mind, the concept of a compact model with a grown up performance looked to be an attractive proposition to supplement my usual gliding activities.

One aspect of power flying that I enjoy is having a model with a wide flight envelope that successfully meets the compromise of low and high speed flight. From take off to aerobatics, through low & slow fly-bys, both upright and inverted, and then finishing with a nicely lined up and execut-

ed landing, all with a carefully manipulated throttle, makes for a satisfying flying session.

For those of you raring to go, you can skip the next bit, but if you are interested in the 'why and how' and contemplate an original creation of your own, then the following notes may be helpful.

Getting down to the drawing board focuses the mind onto the various parameters required to achieve the intended performance. With Jazz Twenty it was decided to use a low wing configuration from the beginning, so we had a starting point for the layout. If one requires a particular performance, the wing loading is one of the major decisions to be made, so it is useful to consider the all up weight of the various items required and then go for the target loading.

It is also useful if you've got a good eye for line and proportion, as it is nice to generate a pleasing shape. If you can do this and be a little different, you are well on the way to producing something you can be pleased with.

## Feel the weight!

Taking into account the 'scale effects' disadvantage of a smaller model, together with the low speed

flight characteristics I required, a wing loading of below 18 ozs./sq. ft. was deemed desirable. A check on the various components' weights will give an idea of the wing size necessary to achieve this loading:

- Engine/silencer/mount/  
tank/prop & spinner..... 9 ozs
- Fuselage/tail unit/  
undercarriage etc..... 16 ozs
- Wing and all Solarfilm  
covering..... 9 ozs
- Radio gear: Fleet mini/  
500 mAh battery..... 8 ozs
- Plus possible 2 ozs. for  
ballraced engine..... 2 ozs

Total = 44 ozs

One could safely use a 270 mAh battery and get rid of another 0.25 or 0.5, but with four servos, I prefer the extra security of the 500 for longer flying sessions.

Given the weight, we can now decide on the wing area for our chosen wing loading.

#### Wing Area required:

44 (ozs.)/18 x 44 = 352 sq ins of wing area.

Now to the all important wing in more detail. Structurally, two hefty 1/4" sq hardwood spars, together with leading edge sheeting and central panel spar webbing to take care of bending and twisting loads in the form of a "D" box, are used in the conventional way. This, together with a sufficiently wide, stiff trailing edge from which the ailerons can be cut, provide the main load bearing structure, integrated with the ribs and capping. The planform, together with a symmetrical 16% section at the root and 13% at the tips, combine with the curved tips to provide the necessary aerodynamic washout and tip vortex control at higher angles of attack. This provides the required low speed stability, enhanced still further by not having the ailerons extending into the critical trailing edge tip area where it would adversely upset the local angle of attack. The planform is not critical in the high speed/low angle of attack situation.

The aspect ratio of the wing is chosen to give a sufficiently high roll rate, together with reasonable glide/low speed performance, i.e. lower A.R. = faster roll rate; higher A.R. = better low speed/high performance.

#### Aspect Ratio:

Span 47" divided by mean chord 7.75" = 6.1 to 1.

While on the subject of control surface effectiveness, one should note that a sealed (gapless) aileron hinge line will also improve roll rate. In fact all control surfaces hinge lines should always be sealed for best performance.



*An old HB 20 gets Jazz 20 smartly off the grid. Fitted with a modern ABC motor, the performance should be exhilarating, whilst still retaining good low speed handling.*

To control the wing, the tail has an area of just over 25 percent of the wing area and a moment arm of 11" (T.E. to L.E.), with an elevator of 35 % of tail area. The fin and its associated area is a generous 9 % of wing area, with around 50 % of that as rudder to give good bite for take off, stall turns and, with enough power, "knife edge" flight etc. The nose moment is chosen to achieve the desired centre of gravity position, taking into account the weight of the engine mount and fuel tank. The two wheeled undercarriage is chosen for its weight advantage over the trike and is swept forward from the correct wheel position to the strong point of the engine bulkhead for attachment and in so doing gives it that distinctive rakish look.

The overall package of Jazz Twenty has worked out very well, with an airframe weight of less than the original estimate, giving a wing loading of under 16 ozs./sq. ft. The use of stan-

dard radio gear in place of the "mini" I used would still come within the target figure.

## Flight

As a change from my usual gliding exploits, flying my Jazz Twenty with an old, but excellent non Schneurle ported HB20 is positively exhilarating. From a smooth surface Jazz Twenty steers well with rudder on that fixed skid and once lined up, a dab to half throttle and she's away and up in about 15 ft., responding to the lightest touch throughout the climb. The acceleration on opening to full r.p.m. is satisfying and she responds to the commands of the ailerons with a light touch on the sticks. Once airborne and in the groove she moves along at a fair pace and will perform just about any manoeuvre you point her into.

*The undercarriage is attached to the strongest part of the structure, the engine bulkhead, giving Jazz 20 its distinctive rakish look.*



Neutral stability in all three axis is trimable for straight and level flight. The prototype achieved this with all control surfaces set at neutral. As roll response is particularly good, and if this is your introduction to a model of this type, you may appreciate a little more roll stability. To this end it is suggested that an extra  $3/8$ " dihedral is used, making a total of  $3/4$ " dihedral under each tip.

Try your own Jazz Twenty. She'll do the lot, both slow and fast. If you've graduated to ailerons, this could be your next step up the performance ladder, with a little essential help from a proficient tutor. For those of you wanting to go like a "ladder rat", then a 25 up front will give you that extra zip. But do watch that weight if you wish to preserve the excellent low speed performance.

As Jazz Twenty is intended for modellers with some experience and not for beginners, only brief coverage will be given in following constructional notes.

## Construction

The wing uses balsa throughout, apart from the two main spars, which should be carefully selected from straight grained hard wood, such as

spruce. The ribs are formed using the sandwich method, with the root and tip ribs as templates, and all held together with "cycle spokes" through the stack, bent over one end and the nipples screwed on the other to hold it all together whilst shaping. Spar cut outs are formed on the completed stack using a junior hacksaw. Remember to make a left and right hand set.

Built over the plan, the wing will have a taper in thickness towards the tip. This is the underside and it should be turned over on completion to give a flat topside. The servo and aileron cables, using whichever system of aileron control you prefer, are installed before the top sheeting is glued in place. The slight dihedral that the taper imparts, together with the sweep on the leading edge, is sufficient to give the required in flight roll stability and correct rudder response. As suggested earlier, an additional  $3/8$ " may be incorporated under each tip. The ailerons are cut from the completed structure. Remember to mark one side for later identification. Face the ailerons and the wing cutouts with  $1/16$ " strips for top hinging.

The tail surfaces are built to a rough outline and sanded down in thickness towards the tips, as is the

sheeting, before being glued and weighted down for 48 hours to thoroughly dry out. They can then be shaped and sanded to section. These type of hollow built up structures are superior to solid sheet, being stronger and more warp resistant.

The fuselage is built up in the usual way, with sides complete with ply doublers, and spaced with formers, top deck and under sheeting.

The nose is cut away on the starboard side to accommodate the "side winder" mounted engine, mounted onto the  $3/16$ " ply bulkhead. Remember to fix the undercarriage to this bulkhead (and fit the anchor nuts) before installing in the fuselage. Glue the fuselage sides together at F4 and F6 while it rests flat on the building board, with the undercarriage overhanging the edge and the rear fuselage flat on its straight rear undersurfaces. Check with a square that F3 is at right angles to the board and that the rear is upright to receive the fin spar.

## Approaching the finish

A large opening is provided for radio and tank access, and also a firmer wing seating, while still maintaining a reasonably slim profile. The servo mounting tray and installation is a simple, convenient way of mounting these components and enables easy removal for maintenance. I use it to swap to other models using the same system.

Iron-on film is appropriate for covering, but before the fuselage covering is applied, the engine and tank bay should be fuel proofed using "Tufkote" or similar resin. The covering film can be used as the hinges, or, as I have, use "Ultimate Hinges" from M&M Developments, which are simply ironed in place to form efficient gapless hinges on all control surfaces.

## The chequered flag!

Remember, before committing your model to the exciting bit, check the balance point, control surface throws and sense before that first flight. Good luck and have many happy flights. ●