TUG-PILOTS NOTES – April 2011

INTRODUCTION

These notes are intended as an introduction to towing at Booker. They will be updated periodically if there are any significant changes to procedures and the way the tugs are to be operated. Minor changes to operating procedures may not be reflected in this document immediately and if there is any discrepancy between what is written here and what is taught by the tug-pilot trainers, then consider their methods correct. If there is any doubt the Chief tug-pilot will deliver the definitive answer.

The notes are divided into sections, the first part being General Advice on engine/airframe management, climb outs, etc.; the second describes the Descent Techniques to be used; the third part contains other General Information related to tugging that you should be aware of whilst operating at Booker.

GENERAL ADVICE

Booker Gliding Club is dependent upon a reliable, efficient launch system. The club member tug-pilots are a useful adjunct to the full-time tug pilots and staff members, but only so long as they maintain this high level of efficiency.

What this amounts to is launching gliders to the most advantageous position whilst keeping cost and noise nuisance to a minimum and maintaining a good launch rate. It requires the application of a fair degree of ability and judgement in order to balance these somewhat mutually exclusive goals that makes towing interesting. *If you get bored after half a dozen tows you are not trying hard enough.*

It must be emphasised that the tugs are ***extremely*** expensive to run and maintain and that the way they are flown has a great influence on this cost. It would be impossible to make every member a tug-pilot, even if they all had licences, and so it is incumbent upon everybody fortunate enough to fly the tugs to operate to the utmost of their ability, in order to keep everyone's flying bill as low as possible.

The BGA has published Aerotow Guidance Notes which should be read and considered alongside this document.

Engine Handling

This is where the biggest gains or losses can be made. The types of engine used in our aircraft are big (6 litre), heavy, slow-turning, low technology machines. They use a large quantity of relatively thick oil for lubrication and are air-cooled, thus they are sensitive to poorly managed cooling techniques.

Because the oil takes some time to reach operating temperature these engines should not be operated in a manner which entails them being started and stopped unnecessarily, since they are not adequately lubricated until the oil is warm.

In quiet periods, do not be in too much of a hurry to start up an extra tug. On an unsoarable day there is no point in starting a tug because there are three or four gliders In the queue if there are already tugs flying. It will only result in doing one or two tows and then shutting down again this is very poor engine management and also contributes to the premature

failure of the starter. When it is not soarable it does no harm for the gliders to wait a few minutes for a launch (providing the onset of darkness isn't imminent).

The minimum warm-up times are as follows:

- *For a cold engine:*

  Before taxi or exceeding 1200 RPM **50' CHT**

  Before power checks **100' CHT**

  Before take-off **150' CHT or 4 minutes**

- *For a warm engine:*

  As above but take-off may be after 2 minutes

Being air-cooled they experience much bigger and more rapid changes in temperature than a liquid-cooled engine with a proper cooling system. This aspect of their operation is the most critical. It is essential at the end of a climb when the engine is very hot owing to a high power setting and low cooling airflow that the descent is not made with a lower power setting and high speed (= high cooling). If this is allowed to happen, the aluminium cylinder head shrinks at a much greater rate than the steel cylinder barrel and valve seats, resulting in thermal stresses which will break the cylinder head. Even if this does not cause the complete failure of the engine it will result in the scrapping of the cylinder at a cost of over £1000. The solution is the careful management of the descent to keep the rate of CHT reduction to a minimum.

The oil also performs an important cooling function. Don't let the oil level drop below 6 quarts, especially in the summer, but remember that if the engine has just been shut down there will be about ½ qt. distributed around the engine.

Make ***all*** throttle movements smooth and gradual. When taxiing try to set an RPM which gives a slow, steady taxiing pace without needing to constantly open and close the throttle. On take-off take ***at least*** five seconds to set full power. Be conscientious about checking the T's & P's both before take-off and when flying. Get to know what the readings should be, and if there is any discrepancy find out what is causing it - it may be an early warning of impending failure.

Airframe handling

Looking after the airframe is largely a matter of common sense combined with a little mechanical empathy.

The first step is a thorough D.I. to discover any incipient damage before it becomes too serious .

- Ensure the 'blue' serviceability folder in each tug is completed each day before flight and if for any reason a tug is found to be unserviceable, complete a red snag card and leave it in the pigeon hole in the office and let one of the duty staff know.
- This is only possible if the airframe is kept clean enough to spot any signs of damage. The aircraft should be cleaned in the morning if they were not cleaned

before being put in the hangar; cleaning equipment is kept in the main hangar, in the blister hangar and by the hose at the Bus end of the trailer park. Canopy cleaning kit is also kept in each tug. If you find any of this kit missing please tell a staff member so it can be replaced.

- When cleaning the tugs it is necessary to clean those areas of the aircraft which are difficult to get to as well as those where accessibility is straightforward, e.g. the underside of the aircraft (in particular the Robin's wing), the underside of the tail planes, the Robin's oleos, the Cub's strobes, etc.
- In addition to the normal daily cleaning routine, the propeller requires to be kept free of contamination by bugs or mud since this has a significant effect on its efficiency. If there is a build up of bugs on the leading edge or blade face it is time to clean the propeller - this may need to be done more than once a day - check the propeller each time you shut down. The blade face is the ***back*** of the propeller i.e. the black side. This is the bit it is most important to keep clean, since it does most of the work. It is also the part which is more rarely cleaned.
- It is unacceptable to fly at Booker (or anywhere else) with a dirty canopy. Clean it whenever it is dirty, preferably each time you shut down at the end of a session of tows; there should be canopy cleaner in the tug. ***Never use a brush or broom to clean perspex.***

The part of the airframe which suffers most from towing is the undercarriage since it is subjected to so many take-offs and landings, generally off rough ground. It is inevitable that the undercarriage of our tugs will take a pounding, but a few simple habits can make a lot of difference:

- ***Always*** carry out ***fully*** held-off landings.
- Keep braking to a minimum. Try to stop at the launch point without using the brakes which will mean using the lowest ***safe*** approach speed. Aircraft brakes, like everything else to do with the tugs, are ridiculously expensive at the moment it costs between 20p and 40p ***per launch*** to maintain the brakes.
- Avoid tight turns when taxiing wherever possible - it places a surprisingly high load on the undercarriage, and the Robin in particular suffers damage from tight turns and turning a too high a speed.
- Get no closer than a gliders wingspan from any person, object or glider – ideally more when taxiing.
- Don' taxi too fast. Again, the Robin undercarriage in particular suffers if it is taxied across grass surfaces at excessive speed. After landing reduce speed to a brisk walking pace before turning, and do not subsequently exceed this speed.
- When ground-handling, the same basic rules as gliders apply. Never push on trailing edges or tail planes and ensure that you can see exactly what is going on if you are manhandling in a confined spaced, e.g. the hangar.
- Additionally, when handling a propeller, extra caution needs to be observed. The propeller should ***always be treated as 'live'***. If other people are helping make certain that they understand the hazards. Ensure the magneto's are switched off, throttle closed and mixture set to idle cut-off before handling a prop. Only push or pull from close to the hub i.e. as near to the spinner as possible. Do not push on the spinner itself as the back plate is of a brittle material and will fail as a consequence of mishandling.
- If pulling/pushing on the struts of the Cub, handle as near to the attachment points of the strut as is practical.

Noise abatement

It is vital for the future of Booker, like all other airfields, that we keep the level of noise nuisance to our neighbours to a minimum. Other airfields have suffered severe restriction of their activities as a result of the actions of well-funded and powerful anti-noise lobbies.

Familiarise yourself with the Noise Abatement Zones, local airspace and airfield procedures. We have built a good reputation with the local residents and are not seen as the 'bad boys' – let's not lose that reputation. Plan your towing pattern to optimise getting the glider into good lift whilst not compromising any of the above.

Details of the Noise Abatement Zone and procedures to avoid are available from the Control Tower. **You must know the position of the noise sensitive areas and avoid them.**

When towing, vary your climb out path as much as possible in order to spread the noise around. Avoid climbing out over buildings, especially when low. Circuits should be at a low power setting, ending in a glide approach.

Climb

Immediately after take-off the priority is to place the combination in a position which maximises the chances of a successful forced landing for both the tug and the glider in the event of a rope-break or engine failure.

Choose a path which puts a reasonable number of fields in front of you until you are at a height where you could consider turning if the engine failed.

In windy conditions be aware of the effect the wind gradient will have on your flight path. If you simply climb at your selected airspeed you will find that your initial rate of climb will be very high as you climb through the wind gradient. As you reach the top of the wind gradient at a few hundred feet you will suffer a sudden drop in airspeed and rate of climb, and will need to lower the nose to regain speed. The glider, however, will probably have been left behind by the abnormal climb rate. As you fall out of the wind gradient it will still be climbing through the same gradient to catch up and it will probably therefore zoom above the tug as you stop climbing. By the time the glider has got its nose down and is getting back down in position you will have regained speed and be climbing once more, thus leaving the glider behind ***again.***

The cure for this undesirable manoeuvre is to fly by attitude. After lift-off, set the tug in its normal climbing attitude and accept the fact that the speed will be a few knots high for the first couple of hundred feet ' it I much easier for the glider to cope with this than the phugoids which result from chasing the ASI.

Once you have reached a few hundred feet it is time to concentrate on where you are going to take the glider. Tow it through all available lift (whilst observing the noise abatement procedures) but bear in mind that different pilots want different things.

A high performance single seater will probably pull off in the first good lift above 800', maybe lower. A K-13 will probably go to 2000', especially if it is a trial lesson, but will still want to soar. Try to arrange the tow such that you reach 2000' in or near lift, and in a position where the glider can climb. It is pointless to drop someone in a thermal at 2000' under the airspace. An early solo pilot will probably want the same sort of tow as the K-13 described above.

Whatever the glider, spend as much of the climb as you can in lift since this will greatly reduce the turn-round time. Do not, however, tow through a thermal where several gliders are circling ' it is better to fly abeam the gaggle and let the glider pilot decide where he wishes to release and join it.

AT ALL TIMES MAINTAIN A VERY GOOD LOOKOUT

DESCENT

As a reminder, here are the descent techniques for all 3 tugs. We can't stress enough how important it is that the tugs are descended properly. Please plan your descents efficiently so that the engine temperatures are managed correctly, but also so that when you arrive at circuit height, that you are actually somewhere close to the airfield. Motoring back from Henley at 1000 feet costs both time and extra fuel.

After the glider has released, first check that it really has pulled off. The vital action is to ***go down*** once the glider has gone. It doesn't matter if, or which way you turn so long as you go down. Likewise the glider may turn either way or not at all, but it must climb. This guarantees separation.

Super Cub

When you are sure the glider is off tow, increase speed to 100 mph while reducing power to keep rpm constant throughout the acceleration phase and then reduce power to 2350 rpm – just above the avoid band – <u>DO NOT reduce rpm and then increase speed.</u>

When the CHT has reduced by 25 degrees, reduce the rpm smoothly to 2150 – just below the avoid band – and maintain 100mph. When the CHT has reduced by a further 25 degrees, reduce the rpm to 2000.

Maintain this until towards the end of the downwind leg and then gradually reduce rpm and speed and then lower flaps for approach as required.

Robin

The Robin runs at a higher rpm at towing speeds that the other tugs. At 75kts, the rpm is just under 2700 rpm; any increase in speed above this will require a power reduction to avoid over speeding the engine.

When the glider comes off tow, increase speed to 95 kts whilst reducing power to hold the rpm constant through the acceleration phase taking care not to allow the engine to over speed. When at 95 kts, reduce rpm to 2500 which will result in a slight descent.

After the CHT has stabilised (after about 30/40 seconds), increase the speed to100-110kts adjusting the throttle to maintain 2500 rpm. Reducing to 2400 rpm after a further 60 seconds will give a good rate of descent.

Maintain this until reducing speed for approach, initially not below 2000rpm until below 100kts.

The flight manual states that it is OK to use full carb heat for the whole descent if required. Note that 100kts at 2500 rpm should give a rate of descent of about 800 to 1000fpm.

Pawnee

When the glider comes off tow, increase speed to 110 mph while gradually reducing power to 2400 rpm.

Speed can be increased to 115- 120 mph with a corresponding increase in rpm if a higher rate of descent is required after the initial CHT has stabilised.

Maintain this until reducing speed for the approach, initially not below 2000rpm until below 100mph.

Please note that Lycoming specifically states that the engine should not be run at a low manifold pressure and a high airspeed - i.e. the propeller driving the engine rather than the other way round.

GENERAL INFORMATION

Signals

There are three signals you need to know – these are documented in 'Laws and Rules for Glider Pilots'.

The first is the ***wave-off***, this is employed to tell the glider to release. Rock the wings several times, make the movements large and obvious ' at least 30 degrees of bank each way. If the glider does not release after a couple of waggles then release it. In a dire emergency where time was critical you would probably dump the glider without giving the signal.

*This signal is to be used only if you **need** the glider to release, it must not be used to indicate you think the glider should release because it is in lift, etc.*

If the glider has its airbrakes open there is a specific signal (try the radio first). Assuming the combination is flying at a safe airspeed and is climbing adequately waggle the rudder. Again, make the movements obvious, and obviously deliberate.

It is vital that this signal is not given unless the tug is flying at a safe speed, and well clear of the ground. If you are struggling to climb and maintain airspeed and ground contact is likely then dump the glider.

Lastly, if the glider finds it cannot release the rope it will fly out to the left and waggle its wings. In this case release the rope, but first check you are not too far from the field since the performance of the glider is greatly degraded by the dangling rope. If necessary tow back towards the field before you release the glider, bearing in mind that it will need to make a steeper than usual circuit and approach.

RT Procedures

The RT procedures at Booker are very straightforward and are in place to protect three areas; the active runway, the taxiway to the 24 threshold and the parallel helicopter taxi lane.

The relevant frequencies are: TOWER 126.55

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GROUND	121.77
LAUNCHPOINT	129.97

At any time whilst towing when it is not necessary to be tuned to the tower frequencies, monitor the radio on 129.97, this frequency will be used on the ground to pass details of pilot's membership number, glider number and other relevant information etc., and in the air for glider to tug communications. Normally we speak to Wycombe Tower (126.55) but at busy periods you may be instructed to call Wycombe Ground (121.77) – details of when the Ground frequency is in operation are posted on the operations board in Control Tower each day.

The procedures are as follows:

Runway 35

The gliding operation is non-radio on these runways, therefore monitor 129.97 all the time. The only time you need to speak to ATC is when requesting clearance to cross the power runway.

Runway 24

It is necessary to call ATC prior t landing in order to ensure the taxiways are clear. The phraseology is to call *'Wycombe (Tower/Ground as appropriate), tug &.. late downwind'.* ATC will reply *'Tug &.. taxiway secure'* or '*&..taxiway obstructed'.* This is not a clearance to land or otherwise - in either case you may continue the approach at your discretion. Should you decide to land behind an aircraft on the taxiway having been advised the taxiway is obstructed, extreme caution should be exercised in case there is another aircraft following or a helicopter hover-taxiing in parallel.

Runway 06

Call ATC before take-off. Once the rope is attached to the glider call '*Wycombe (Tower/Ground as appropriate), tug &. ready for departure'*. Once again, the reply will be either taxiway secure or obstructed, and again it is at your discretion whether or not you take off. If you decide to go having been informed the taxiway is obstructed have a very good look for helicopters, they can be very difficult to spot against the buildings.

Wycombe ATC are generally quite relaxed about the need for calling for start and taxi as far as the tugs are concerned, however you should call for clearance before taxiing to/from the pumps and before crossing any taxiways or runways. Monitor ATCs frequency when in the vicinity of the apron or pumps since they do occasionally call the tugs.