

LASHAM GLIDING SOCIETY

TUG OPERATION MANUAL

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CHAPTER 1

POLICY & GENERAL

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1. POLICY & GENERAL

1.1 GENERAL POLICY

The tugging operation exists to satisfy the demand for aerotows by the members of the Lasham Gliding Society. The object is to carry this out as efficiently as possible within the bounds of safety. The operation is also a contributor to the finances of the society.

1.1.1 Management

The management, control and discipline of tugging matters at Lasham are delegated by the Committee of Management of Lasham Gliding Society (LGS) to the Tugmaster through the Manager, Flying Committee and CFI.

1.1.2 Tug Pilots

Aerotowing of gliders at Lasham is carried out by volunteer tug pilots, who are full LGS members, by a staff tug pilot (STP) (when one is appointed by LGS), and by members of LGS Staff who are tug qualified. Towing by non-LGS members is not allowed (except that, in exceptional circumstances, a temporary member who is suitably qualified may be allowed to fly LGS tugs). The LGS member tug pilots carry out aerotowing at weekends, winter weekdays and during the week in the summer they supplement tows carried out by the STP. Other LGS staff fill-in where necessary, but tug flying is not their primary duty. All tug pilots are expected to remain current as glider pilots (para. 1.3) and take a bi-annual check flight (para. 1.12). Tug pilots must be prepared to make a significant contribution to Lasham's launching needs; a minimum of 50 tows per year should be flown, and preferably at least 100.

1.1.3 Order of Use of Tugs

LGS staff enter the order of use of each tug, on the notice board in the Brown Elephant. Pilots are required to use the aircraft in the order of priority shown, which is generally decided by the hours to the next check or inspection (see para. 1.11.5).

1.1.4 The Staff Tug Pilot (STP)

The staff tug pilot is appointed during the summer months only and is on duty from Monday to Friday inclusive, except bank holidays, which are covered by member tug pilots in the same way as the weekends. The STP must have knowledge of gliding club operations and preferably have a BGA instructor's rating (further details in para. 1.10).

1.1.5 Training of New Tug Pilots

Training of new tug pilots is carried out when the Tugmaster judges that more tug pilots are required to meet the demands for aerotows. Tug pilot training is at the new tug pilot's expense. Potential tug pilots must meet the requirements in para. 1.4 before applying. Training is covered in more detail in Section 4.

1.1.6 Members Wishing to Fly Tugs but Not Tow

The primary purpose of LGS light aircraft operations is the towing of gliders. However, in order to increase the utilisation of the tug fleet, and provided it does not interfere with towing, suitably qualified members may fly Lasham tugs at

their own expense. A list of those members will be kept in the office, and displayed on the Tug notice board. Members so approved will be required to have a Lasham Bi-annual Check Flight with one of the Lasham check pilots, and to pay a contribution to the Tug insurance. Each flight must be authorised in accordance with Section 6.1.1.

1.1.7 First and Last Flight Times

In order to keep good relations with our neighbours, for noise reasons, no towing will take place before 8 am local time except when approved by LGS management, CFI or Tugmaster, and then only for a specific purpose such as performance testing in the still morning air. Lasham tugs are not certified and therefore not insured for night flying. Night is 30 minutes after sunset and 30 minutes before sunrise. More details in para 1.7.

1.2 AUTHORISATION TO FLY LASHAM TUGS

Each March, before the start of the main soaring season, the current list of tug pilots is reviewed. Those pilots who have not flown sufficient tows are removed from the list and the remainder are checked to ensure they have paid their subscriptions. A new list, which is updated from time to time throughout the year, is then put on the notice board. Pilots on the current list may fly LGS tugs for local towing or circuit practice without seeking further authorisation provided they are in current practice (para. 1.3), their check flight is current along with their medical, licence and certificate of experience.

1.3 FLYING CONTINUITY – TUGGING AND GLIDING

A pilot who has not flown a tug for three months is not regarded as in current flying practice and should seek authorisation from one of the LGS nominated check pilots before flying (see Annex G). If one of these is not available the CFI or Operations Manager may give authorisation. Depending on the pilot's flying and gliding experience, a check flight may be required but as a minimum a briefing on any changes in procedures followed by three FULL STOP circuits and landings is required. Tug pilots are expected to remain current glider pilots and must carry out at least six solo aerotows at Lasham spread throughout the year including at least one in a K13 and one in a fibreglass glider.

1.4 APPLYING TO BECOME A TUG PILOT

There are usually people waiting to join the tug list and sometimes they may have to wait several seasons before being allowed to join it. This is because each Lasham tug pilot is required to carry out at least 50 tows (and preferably 100) per year. A proportion of the tug pilots carry out more than this. LGS has to keep the number of tug pilots in proportion to the number of tows likely to be done at Lasham each year so that pilots do not have to fight for tows in order to maintain safe flying continuity. If there were too many tug pilots, everyone's chances of tug flying would be reduced and eventually tug pilots would stop turning up. It would be more difficult to man non-rostered tugs on good days when we are trying to fulfil our primary purpose, that of launching lots of gliders into good soaring conditions. If you qualify put your request on paper with your Name, Address, Telephone Number, Flying and Gliding Experience and post it via the pigeonholes in the office to the Tugmaster. If the waiting list becomes too long it may be closed for a period at the discretion of the Tugmaster.

1.4.1 Requirements for Potential Tug Pilots

These include the minimum legal requirements for flying experience agreed with our insurers at the time.

1.4.1.1 Gliding Experience

An active and useful full flying member in regular gliding practice, either holding a Silver C or better or with the prospect of holding a Silver C within a year of becoming a tug pilot.

1.4.1.2 Power Flying Experience

Holder of a UK NPPL (group A) or higher licence with an R/T endorsement. At least 10 hours unassisted P1 on Group A aeroplanes after gaining the PPL, or in the last 12 months if the licence has been held for more than 1 year. This cannot be flown on Lasham tugs except in exceptional circumstances.

1.4.2 Pilots with Power Experience but who have not Tugged Before

Such pilots should be gliding members at Lasham for a minimum of one year before being considered for tug pilot training.

1.4.3 Pilots who are already Experienced Tug Pilots

New members who are already experienced tug pilots at other clubs may be considered for conversion to Lasham tugs, once they have carried out three months regular gliding at Lasham to become familiar with the site. They must, however, take their turn on the waiting list if one is in use at the time.

1.5 TRAINING PROCEDURES – OUTLINE

The training procedure is designed to first get a new pilot familiar with the type of aircraft chosen for the training, to follow this with some solo flying, and then carry out tows with a check pilot. Once accepted for training, a new pilot will carry out a type conversion with either the Tugmaster or one of the tug trainers (see Annex G). Once solo, further experience is gained on type by flying on at least three separate days and doing at least 10 landings. A minimum of six tows will follow with a check pilot before being cleared for solo towing on type. Further type conversions will be required for all types operated by LGS at the time. The cost of the type conversions and subsequent solo flying is at the expense of the trainee tug pilot; tug training will be carried out during normal towing operations. The tug pilots' levy must be paid before flying solo (para. 1.6). Chapter 4 covers type conversion and training in detail.

1.6 TUG INSURANCE

Lasham tugs are insured to be flown by LGS members who are on the current lists of authorised pilots described in paras. 1.1.6 and 1.2. Tug insurance is for daytime flying only and covers the use of the tugs for normal towing, retrieves, training and cross-country flying as part of normal LGS operations

1.6.1 Tug Pilot's Levy

An annual tug pilot's payment, normally paid each year at the same time as annual subscriptions, covers each tug pilot against having to pay the first part of any insurance claim, and also helps contribute towards the cost of the operation

and replacement tugs. The amount paid by tug pilots is set by the Committee of Management and approved together with subscriptions at the EGM in November each year. New pilots pay pro rata from the month they start their training. Pilots returning to towing after a break will be expected to pay pro rata from the month they are re-instated on the tug pilots list.

1.6.2 LGS Tugs at Other Sites

Insurance conditions may vary from time to time, and may not, for instance, cover the use of our tugs flown at other sites even if flown exclusively by LGS pilots and towing LGS gliders, unless special conditions are arranged with the insurers for a particular time and place. Therefore, for expeditions or loans to other clubs check with the Tugmaster or Manager first. If you think this may apply please give plenty of notice so that insurance cover can be arranged.

1.7 FIRST AND LAST FLIGHT TIMES

1.7.1 During the Week

In order to help our relations with the local community, training by aerotow should not start before 8 am local time. If there is a legitimate requirement for the occasional tow such as a high tow in the early morning calm air for performance testing, then it is permitted but the quietest tug should be used and the flight path varied for successive flights.

1.7.2 Weekends and Public Holidays

At weekends and public holidays towing is not to start until 9 am unless special reasons prevail, and the Manager, CFI or Tugmaster authorises the activity.

1.7.3 Last Flight Times

Lasham tugs are only cleared for daylight flying, and must be on the ground by 30 mins after official sunset (last landing times will be displayed on a notice board in the Brown Elephant). If it's getting dark and someone tries to tempt you to do that extra tow, refuse; in the event of an accident after daylight hours, we would not be insured. Bear in mind that the glider will be landing when it's even darker, unless it does spinning or aerobatics. Also there may be occasions where the light fades sooner than 30 mins after official sunset; in these cases good judgement should be used to decide when to stop towing. It must also be remembered that if it's dark you can't see to refuel and clean the tug before it is put away.

1.8 FLYING PASSENGERS IN TUGS

Tugging increases the risks normally associated with light aircraft flying because a higher proportion of the time is spent at low altitude and also low speed. There are also increased risks associated with the towing of gliders and it is for these reasons along with the increase of weight which increases the cost of the tow that **THE CARRYING OF PERSONS OTHER THAN ON THOSE OCCASIONS LISTED BELOW, IS NOT ALLOWED DURING NORMAL TOWING OPERATIONS.**

1.8.1 Authorised Flights

Exceptions to the rule in para 1.8 may be authorised by the Tugmaster, CFI, Operations Manager or Manager on a one off basis.

1.8.2 Training

Training flights may be carried out by authorised check pilots listed at Annex G during normal towing operations.

1.8.3 Familiarisation Flights

At the discretion of the instructor in charge of the airfield or the Tugmaster; **ONE** familiarisation flight is allowed for students who are post solo or very close to solo and have been briefed on the increased risks associated with the flying of tugs. Use the flights as an exercise and brief the pilot before the flight; this should include explaining the dangers of the glider getting out of position, the need for a clearly marked release from tow and point out the reduced visibility whilst towing. It should also include the normal briefing for passengers in the event of an emergency (see CAA General Aviation Safety Sense leaflet 2A "Care of Passengers" for more information on the content of this briefing).

1.8.4 Cross Country Towing

It is permissible to take another LGS member on cross-country retrieves except field retrieves or retrieves from strips where the increase in weight may limit the take off. In these cases priority should be given to those members who will gain useful cross-country experience and a map should be provided for the purpose. The flight must be authorised as set out in section 6.1 and should include the name of the person you intend to accompany you on the flight. The passenger should be briefed in accordance with para. 1.8.3.

1.8.5 Non-Towing Flights

Passengers can be flown in tugs on non-towing flights provided they are full members or have filled in a temporary membership form that has been handed in to the office. Authorisation procedures for such flights are those set out in section 6.1.

1.8.6 Tug Seat Insurance

To comply with current EU requirements, all passenger seats in all the tugs (ie one in the Cub, and three in the Robins) carry the necessary Third Party Liability cover.

1.9 THE TUGMASTER

The post of Tugmaster is similar to that of an Instructor Group Leader. The Tugmaster is selected in agreement with the CFI and the Flying Committee and the position is held for an unspecified period of time. The Tugmaster is responsible to the CFI, Flying Committee, Manager and Committee of Management for the safe and economic operation of the tug aircraft. Other aspects include:

- 1.9.1 Selecting and training suitable members to become tug pilots.
- 1.9.2 Monitoring and recording the performance of established tug pilots.
- 1.9.3 Studying the economics of the tug operation so as to be able to point out to the Committee of Management likely trends and the advantages of alternative aircraft types.
- 1.9.4 Involvement in any Committee decisions about the tug fleet.

1.9.5 Monitoring the maintenance of the tug aircraft together with the Operations Manager and make recommendations accordingly.

1.9.6 Communicating with pilots about incidents of poor airmanship or deviation from operating procedures. Should such incidents be repeated, arranging for a briefing, debriefing, check flight or in extremis removing that pilot from the authorised tug pilots list.

1.9.7 From time to time disputes arise between tug pilots and other pilots (both glider and tug) and although these should be settled in the first instance between the parties involved, the Tugmaster should be informed of any problems in case a trend is indicated. Disputes and any problems or criticisms should initially be passed to the Tugmaster, and if not resolved should be passed up the management chain; i.e. first the CFI then Manager or Flying Committee and eventually to the Committee of Management.

1.10 THE STAFF TUG PILOT (STP)

It is accepted that the STP often takes the job to gain flying hours but this has to be balanced against the need for LGS members to remain in current tug practice. On the STP's duty days, the STP has priority on the No 1 tug until 6 pm and the rostered member tug pilot has priority for the No 2 tug until this time. If only one tug is required for that day then the STP is expected to share some of the flying (about 1/3) with the member pilot. The STP is not expected to work weekends, bank holidays or after 6 pm and is not allowed to put his name on the weekend rota. However if there is a demand for a tug pilot and no member is available then the STP is allowed to fly, and complete 6 tows before a member is permitted to take that tug over. It is usually possible for the STP to have a week off during the summer whilst the annual Lasham Competition is taking place if he wishes to do so. Specific duties are as follows:

1.10.1 First thing each morning of duty, total the hours each tug has done, record them in the office and inform the Aircraft Maintenance Staff.

1.10.2 Work out, in liaison with the Aircraft Maintenance Staff, the most sensible order of the use of the tugs taking into account on going repairs, hours to the next check and operational considerations. If possible, one of the Robins should be No 1 as all tug pilots are Robin qualified, while, as far as possible, the Cub should be lowest priority for weekends and evenings due to its noise footprint.

1.10.3 DI the first two tugs on the priority list. The member tug pilot should DI the third tug so that if the No 1 or 2 tug becomes u/s, or there is a sudden demand, time is not lost.

1.10.4 When weather prevents flying and the tugs have been inspected, use the time to clean the tugs, both inside and out, progress repairs in consultation with the Aircraft Maintenance Staff, fill tugs with fuel and oil, ensure fuel and oil areas are clean, tidy, stocked with log sheets, paper etc, make up new ropes, repair old ropes and generally display initiative to improve things connected with the tug operation.

1.10.5 Ensure that there are sufficient ropes at all times. Liaise with the Operations Manager to ensure stocks of rings, rope, weak links etc. are re-ordered when necessary.

1.10.6 Ensure that the tug order displayed on the tug notice board is kept up to date at all times.

1.10.7 When evening trial flights are taking place ensure there are sufficient tugs ready for the start of flying (normally 6 pm).

1.10.8 Keep the Tugmaster and Operations Manager informed of all tug operational matters. In the case of flying matters the CFI should be kept informed. At all times the STP is accountable to the Operations Manager, followed by the Tugmaster, CFI or Manager.

1.10.9 At least once a week, check the fuel level in the large underground fuel storage tank and check stocks of engine oil. Inform the Operations Manager and ensure stocks are re-ordered when required.

1.10.10 Ensure that the oil shed is kept clean and tidy, stocked with cleaning materials and that sufficient fuel and aerotow log sheets are available.

1.10.11 When practical, supervise the delivery of new stocks of fuel ensuring contamination checks and correct quantities before delivery.

1.11 ALLOCATION OF TUGS TO PILOTS – ROTA SYSTEM

Rotas are displayed on the tug notice board for allocation of tugs at various times (see Annex H for example forms). Blank rota sheets are put up on the penultimate Saturday of the month for one month ahead. A list of the Rota display times is shown on the Tug Notice Board. Pilots who put their names on the rota are making a commitment to turn up, and if for any reason they cannot make the slots they should make every effort to arrange a substitute. In case of real difficulty, please inform the Lasham office as soon as possible. In particular, do not remove your name from the rota on the day unless you have arranged another pilot to cover or have informed the office.

1.11.1 Weekend and Bank Holiday Rota Tug 1 & 2

During the summer and winter a monthly rota is put up on the tug pilots' notice board allowing pilots to book slots for the No 1 and 2 priority tugs. During the first week's display of a new rota pilots may book not more than two slots for the No.1 or No. 2 tug, either peak or off-peak times. After the first week of display, pilots may book up to two more for non-peak duties. The peak slots are those which start at 11:00, 12:30 and 14:00. Please ensure that off peak slots are filled as well as peak slots so that everyone carries out their fair share of getting tugs out, washing them and putting them away.

1.11.2 Weekend and Bank Holiday Rota Tug 3 & 4

During the summer months a rota is put up for the No 3 & 4 tugs. Two slots can be booked in addition to slots booked in accordance with para. 1.11.1. There are two slots available starting at 10:30 and 13:30.

1.11.3 Weekday Rota Summer

During the week, excluding bank holidays, a rota will be put up for member tug pilots to fly the No 2 priority tug. The pilot should DI the No 3 tug and be ready to fly the No 2 tug by 09:30. The STP has priority throughout the day but if only one tug is needed it is expected that the STP will share some of the flying with the member pilots. Pilots are allowed to book two slots per month and are required to be available until 18:00.

1.11.4 Weekday Rota Winter

During the winter, excluding bank holidays, a member tug pilot is required to fly the No 1 tug, to be ready to launch by 09:00 and to continue until flying finishes. Pilots are allowed to book two slots per month.

1.11.5 Allocation of Tug Aircraft

Pilots must fly the appropriate aircraft according to the priority order on the priority list unless the aircraft is unserviceable at the time. Pilots should not fly a different aircraft from that specified on the list unless they are not qualified for the first priority tug. In this case the pilot must take the next aircraft on the priority list. In the event of unserviceability, the priority list is automatically adjusted accordingly, and should be changed on the notice board in the Brown Elephant by a member of staff.

1.11.6 Pilots & Tugs Not on the Rota – Flying Priorities

The essence is that glider pilots wanting aerotows should not be kept waiting, particularly if it is soarable. However this must be balanced against starting and using tugs unnecessarily which is costly. The rota system is a means to this end, and not an end in itself; like all tug operations it is for the benefit of the glider pilots. Therefore, at times of high demand for aerotows, tugs lower in the priority than those flown on the rota should be brought into use one by one in accordance with the priority list, and flown by pilots not on booked rota slots. Pilots who have slots on that day should not displace other pilots who wish to fly these other tugs unless no other pilots are available and gliders are ready to be aerotowed.

1.11.7 Number of Consecutive Tows

Where the rota does not apply, any tug pilot who has done 6 consecutive tows in the tug concerned should hand the aircraft over if requested to do so by another tug pilot who has not flown that day.

1.11.8 Slackening of Demand for Tows

On occasions when several tugs have been brought out, but demand has slackened, the tugs should be used in the order on the priority list and the other tugs parked. Tugs should not be used unnecessarily and if only one tug is needed the two pilots on the rota should share the flying using the No 1 tug. Pilots whose names are on the rota have priority over those whose names are not, and those pilots on the rota for the No 3 & 4 tugs have no claim to fly the No 1 & 2 tugs.

1.11.9 Grid Launching

During a grid launch, rule 1.11.7 will not apply and the pilot on the rota who is flying the tug at the start of the grid launch will continue to fly that tug until grid

launching has finished. This is to ensure that the grid is launched in the shortest possible time.

1.12 BI-ANNUAL CHECKS FOR TUG PILOTS (LTBCF) - OUTLINE

Every tug pilot is required to have a Lasham Towing Bi-annual Check Flight. The purpose of this flight is to improve flight safety, pilot standards, airmanship and efficiency of the aerotowing operation. A list is kept on the notice board displaying pilot qualifications and dates when checks are due. Whilst the LTBCF should be treated as a training exercise anyone not reaching the required standard will be required to undertake re-training, possibly at a power flying club. Further details of LTBCFs are contained in Chapter 4 and a current list of check pilots in Annex G. The LTBCF is a requirement separate from the JAR Biennial Flight Review; the two, however, may be combined provided the Lasham check pilot has the necessary JAR qualifications.

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CHAPTER 2

TECHNICAL AND TECHNICAL ASPECTS OF TUG OPERATIONS

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2. TECHNICAL AND TECHNICAL ASPECTS OF TUG OPERATIONS

This chapter contains material which concerns technical aspects, including maintenance, replenishment, turnaround and some aspects of flying operations which have a substantial technical or engineering bearing, such as engine handling after release, and overheating during the climb. Additional technical and operational guidance may be found in the Tug Operations Useful Information File in the Brown Elephant.

2.1 DAILY INSPECTION/CHECK A

The Air Navigation Order (ANO) makes a Daily Inspection (DI) a mandatory part of the maintenance schedules that exist for all aircraft. It is called the CHECK A. These checks, which tug pilots are entitled and expected to do, also have to be recorded and signed for in a DI Book kept in the aeroplane. Treat each DI as though you know there is a fault in the aircraft and your life depends on finding it. Over the year people have found fuel leaks, live magnetos, excess play in tail-planes, loose flap guides, undercarriage problems, structural cracks etc. that could well have led to an accident had they not been detected. The Annexes include a guide for the DI of each type.

2.2 RECORDING OF DEFECTS

If an aircraft develops a defect, first write details of the defect on the aircraft's tug log sheet and put a more detailed account in the DI book. Use words that will be understood by other pilots and hangar staff, words are cheap, misunderstandings are not. Please write legibly, comments like "Flaps U/S" is not an adequate description, it could mean one of many defects; describe the symptoms in detail. During midweek working hours take the aircraft to the tug hangar, unless the defect is minor, and tows are needed and there is no replacement tug the fault should then be reported to the Operations Manager who will arrange with the Aircraft Maintenance Staff to rectify the fault. Outside normal working hours, if the defect is such that the aircraft is safe to fly, brief the next pilot on handover. If the defect makes the tug unsafe to fly, ensure an additional obvious notice is put in the cockpit (the log sheet will eventually be taken back to the office so you can't depend on that). Inform a senior member of staff (CFI, Operations Manager, Tugmaster or Manager) and finally put the tug either into or outside the hangar ready for repair. Do not leave this for someone else to do; safety depends on **YOU** acting responsibly. The essence is that there should be no possibility of another pilot climbing in and flying a tug in ignorance of the defect that you have found. After weekend operations, the Aircraft Maintenance Staff will check all DI books on a Monday morning and action any snags.

2.3 REFUELLING

When taxiing up to the pump, ensure you do not blow stones into the tug hangar and pull the tug towards the peritrack before restarting even if the tug hangar doors are closed the Aircraft Maintenance Staff get very narked if you blow stones and dust at them, in addition they may have covers and cowlings off and the debris could do real damage to other aircraft. At another site an accident occurred when a car passing behind a tug being refuelled caught the rope and pulled the aircraft into the fuel pump. To avoid a similar incident at Lasham, pilots must jettison the rope after stopping at the fuel pump and then pull the rope clear of the peritrack as soon as they are out of the aircraft. Also, with tailwheel aircraft such as the Cub and Pawnee, the rope can get caught in the tailwheel assembly when you are turning the aircraft by

hand before taxiing away. If this happens and you don't notice it, the first evidence may be a loss of directional control when taxiing; if you've put a lot of power on you could taxi into something before you can stop.

2.3.1 Use of Fuel

Fuel drawn must be correctly logged on the fuel log sheet which is kept in the oil store alongside the fuel pump. It is vital the correct aircraft is recorded and the whole entry is legible, including your name. Once a fuel log sheet is full, please return it to the office. At Lasham we use 100 Octane Low Lead Aviation Gasoline (AVGAS 100LL).

2.3.2 Octane Ratings

180 HP Lycoming engines are considered to be high compression motors at 8.5:1 and must only be run on 100LL, not 80/87. At high power, lower octane fuel will cause detonation (knocking or dieseling) in the cylinders instead of controlled burning, and will severely damage an engine. If you are refuelling away from Lasham, remember that Avgas is available in 4 colour coded grades, 100LL BLUE, 100 GREEN, 80 and 80/87 RED, 115 PURPLE.

2.3.3 Fuel Drain Checks

When checking the fuel for water, get used to looking for the blue colour of 100LL, any other colour could mean problems or danger.

2.4 OIL

Every time a tug is refuelled, the oil must be checked. For those tugs fitted with 180 HP engines the oil is kept at the 8 quarts level (which is full), those with 235 and 260 HP engines the level is kept at 10 quarts (max is 12 quarts). If one quart will fit in without over filling then a quart should be added to keep the quantity at the required level at all times. Ensure the dipstick is not put on the ground or allowed to come in contact with any dirt whilst topping up the engine, and always wipe the dipstick before putting it back in the engine. Do not over tighten the dipstick, firm hand tight is all that is needed. Other than for running in new or refurbished engines, Aeroshell 80W or 100W oil is used (the "W" denotes detergent) (100 in the summer 80 in the winter). The oil is kept in 45 gal drums in the oil store adjacent to the fuel pump, it can be assumed that the drum with the hand pump screwed in to it is the detergent oil in use at the time.

2.4.1 Use of Straight Oil

When engines are being run in (which is normally for 50 hrs) they are run on **STRAIGHT OIL**, that is, oil without detergent (determined by the fact that there are no letters after the numbers i.e. 80 or 100). When required this oil will also be found in the oil store, clearly marked and usually in a 5 gal drum. Tugs using straight oil will be marked in the cockpit and/or on the cowling or oil flap. Never mix straight and normal oils, as the engine will take longer to run in since the detergent that is designed to prevent wear will have been introduced.

2.5 KEYS – TUG HANGAR, FUEL PUMP AND OIL STORE

The Oil Store is locked using a combination type padlock, with the combination ***. The Fuel Pump is padlocked and the key is kept in the oil store. There is additional security for the fuel pump by the use of a time switch. The time switch is adjusted for the time of year and the hours of operation, however it should be noted that the time

switch is affected if there is a power cut at any time. The Operations Manager should be informed at any time that the power goes off unexpectedly during normal operating hours. The Oil Store and Fuel Pump must be kept locked over night and it is the responsibility of the last pilot to fly a tug to ensure this is carried out. They should also ensure that the hangar is locked and the area left tidy with the washing hose, earth lead and fuel hose stowed where they are not likely to be run over or damaged. If access is required to the tug hangar reference should be made to the Operations Manager, Tugmaster or Manager (a key is held in the office). When locking the tug hangar ensure that all chains and bolts are in place.

2.6 MOVING AIRCRAFT BY HAND

Care must be taken when moving aircraft by hand, not only so that they are not pushed into things or damaged by people pushing on the wrong places, but also **PROPELLERS MUST BE TREATED AS LIVE EVEN THOUGH THE SWITCHES ARE OFF**. It is better to push on the wing tips or fuselage than pull on the prop, only do the latter as a last resort and make sure it does not turn (see also section 2.8 on live mags). In the case of the Robins, a pin does not hold in the nose-wheel handle so be careful if you are pulling on the handle; if it comes out you may fall heavily on your back. **ALSO WITH THE ROBINS IF THE NOSE LEG IS FULLY UP IT IS NOT POSSIBLE TO STEER**; it will be necessary to press down on the nose to disengage the centring mechanism. All aircraft must be pulled clear of stony ground before starting, since stone damage to props is expensive to repair.

2.6.1 Putting Aircraft Away

Aircraft **MUST ALWAYS** be refuelled, topped up with oil and washed **PROPERLY** before they are put away on **ALL** occasions. Any occasions where it is not possible to adhere to this rule must be reported to the Tugmaster.

The following rules should be observed at all times:

2.6.1.1 The last person to fly the aircraft is responsible for putting it away.

2.6.1.2 Where a tug has been left out on the airfield in case demand requires its use, it is expected that all available tug pilots should help clean and put away all the tugs. This cannot be used as an excuse for not washing them.

2.6.1.3 Care must be taken when moving the aircraft in and out of the hangar to avoid any chance of hangar rash! In the case of the Cub and the Pawnee it is best to rotate the aircraft around the hangar doors, rather than try to pull them straight in.

2.6.1.4 On most occasions at least two people are required when pulling tugs in and out of the hangar.

2.7 AEROTOW ROPES

As we go to print a complete rope costs £70, so we must look after them. The staff will make up new ropes as necessary and there should be adequate ropes available at all times. Ropes are kept hanging up just inside the hangar, serviceable ropes on the left u/s ropes on the right. Spare ropes are kept in the Control Van, Fire Truck and

Pawnee Hopper. Tug pilots are expected to monitor the condition of the ropes in use and make repairs where necessary. Ropes should not be discarded without reference to the Operations Manager or Tugmaster, and advice and tuition on repairing and splicing of rope is available from staff members and the Tugmaster.

2.7.1 Rope Length

The longer the rope, the less chance of a “tug-upset” (the uncontrollable nose down pitch due to tail-plane stall induced by the glider climbing too high behind the tug). An ideal length is 170 feet; in use this can be safely reduced to 160 feet through re-splicing. Currently, ropes are made up at 175 feet so they can be reduced in length by up to 15 feet before an extra rope must be spliced in. A quick check of rope length can be made when refuelling, a full-length rope will reach to the grass on the far side of the peritrack (when disconnected from the tug naturally). There are also marks on the peritrack outside the clubhouse for use when making ropes up.

2.7.1.1 Long Tows & Retrieves

This is covered more fully in Chapter 6 (see para 6.3.2), which recommends using a double length rope for long cross country tows.

2.7.2 Rope Checks

Tug pilots are responsible for an initial check on the rope they are using. The pilot who carries out the aircraft DI should check the first rope in use. The following checks should be made:

2.7.2.1 Tug End – Rings & Weak Links

At the tug end there should be a single ring connected directly to a weak link (on some occasions there may be a Tost or Ottfur type link as some visiting tugs may be fitted with this type of release, in this case it is acceptable to use the **LARGE** ring in our releases). Check that the rings and the links are free of cracks. Check that the weak link is fitted with 2 **YELLOW** staples (1100 lb breaking strain) which are intact.

2.7.2.2 Main Rope & Splices

Check the rope is free from knots and has no frayed areas paying particular attention to the splices.

2.7.2.3 Glider End – Tost Rings & Weak Link

For the glider end only TOST LN65091 ring sets are allowed. Check both rings for cracks and distortion. The rings are attached to the rope via a MITTY type weak link the same as the tug end except this should be fitted with 2 **RED** staples (900 lb breaking strain). This should also be checked for cracks and distortion.

2.8 MOVING THE PROPELLER BY HAND

The vital rule is: **ALWAYS TREAT PROPELLERS AS LIVE AT ALL TIMES OR YOU MAY BE MAIMED OR KILLED**. Over the years at Lasham we have had several occasions where engines have been found to have live ignition with both switches ‘OFF’, due to faults in the ignition switches or other parts of the ignition circuit. Remember aero engine ignition systems are designed so that the ignition fails **LIVE**, therefore even with the switches off the ignition system may be live. At Lasham we

have had a number of occasions of live mags with one serious injury and several near misses. Perhaps people have survived the near misses by remembering the rule! See para 2.16.1 on live mags.

2.8.1 Turning Engines Over By Hand

In general it is **NOT** necessary to turn the Lycoming engines fitted to our tugs by hand. If you feel turning the engine is required, turning it backwards will not allow the impulse to work and will reduce the chance of the engine firing, however there may be occasions when turning the engine forwards is required. When turning the engine ensure the following checks have been carried out:

BRAKES – ON
MIXTURE – CUT OFF
MAGS – OFF
THROTTLE - CLOSED

Remember always treat the propeller as LIVE and follow the procedures set out in para 2.8.2 the engine might just fire if turned!

2.8.2 Technique for Swinging Propellers

Remove any loose clothing, particularly scarves and hats, which might get sucked into the rotating prop. Stand well in front of the propeller with your weight balanced away from it, so that if it fires you will move away from the prop disc and not towards it. Put your hand on the prop about a quarter of the way in from the tip without wrapping your fingers over the trailing edge. As you turn the propeller ensure that you arm moves down and away from the prop arc.

2.8.3 Starting By Hand Swinging

Before attempting to start the engine by hand ensure the following:

- There is a competent person in the cockpit, fully briefed on the procedures.
- The aircraft is on flat, non-slippery ground.
- Push the aircraft to try the brakes, if in any doubt use chocks.

Before trying to start the engine, always get a feel for it by turning it over a few times with the mags switched off. This will be needed to “suck in”. Then confirm “CONTACT” with the person in the cockpit, and swing with the LEFT mag only switched on. Until you gain experience, step back after each swing and always pause before reaching back for the prop. In general it should not be necessary to swing propellers at Lasham and with four blade propellers fitted to most of our tugs this is not a task for the inexperienced. There is no requirement for tug pilots to learn how to hand swing propellers, and on occasions when it is required if in doubt find an experienced person to swing the prop for you.

2.9 WASHING – WINDSCREENS AND AIRFRAMES

Flying with dirty windscreens in the crowded skies over Lasham increases the risk of a mid-air collision, particularly if flying into sun. Tugs must not be flown with dirty windscreens, and if a pilot needs to stop to clean the windscreen he should do so, regardless of the length of the queue. All tug windscreens are made of Perspex and should ideally be cleaned with Perspex cleaner. Experience with silicone based spray polishes such as Sparkle has shown that provided the spray is first spread gently over the screen and allowed to soak into the dirt then they are very effective provided they

are polished off with a clean cloth. Silicone-based polishes should however be kept away from all other parts of the airframe. Pilots should take every opportunity to wash the tugs and wipe off oil from underneath the aircraft. Dirt, insects and exhaust emissions all degrade the performance of the tugs and increase the effects of corrosion. Hoses have been provided by the fuel pump and cleaning materials are kept in the oil store for these tasks.

2.10 COUNTERS FOR ENGINE RUNNING TIME

Record the engine counter reading shown in the middle of the rpm gauge at the start and end of each day's flying on the aircraft log sheet. The counter readings are a great help in sorting out missing or other problem log sheets so please fill them in.

2.11 FLIGHT MANUAL LIMITATIONS

Advice, recommended practices and legal requirements are to be found mixed together in various publications relevant to towing. Documents such as the Air Navigation Order, Air Pilot, CAA and BGA Information Circulars, BGA Laws and Rules along with the aircraft Flight Manual and Operating Handbook all contain valuable information, some of which is mandatory either to the conduct of the flight or the maintenance of the aircraft and its equipment. Unfortunately, some of the information is contradictory. Whenever possible stick to the Flight Manual as this forms part of the C of A and has been approved by the CAA. The aircraft must be operated within the limitations given in the Flight Manual (i.e. airframe & engine limitations such as V_{ne} , V_{ra} , V_m , V_{flap} , $V_{min\ tow}$, rpm, oil temp/pressure, CHT etc) for the C of A and therefore the insurance to be valid (unless a given limit was exceeded as a result of a plausible course of action following a malfunction or emergency). Flight manuals are available for reading and are kept in the office.

2.12 ENGINE COSTS

At the time of printing, a Lycoming 180 hp engine costs £14,000 to buy new or about £10,000 to overhaul an existing engine. At Lasham it has been rare to exceed 2000 hrs before needing an engine overhaul, and often cylinders require replacing at around 1000 hrs, which cost around £1000 each. With sums as large as these involved, it is vital that pilots take the utmost care of the engines from start up to shut down. This is one of the main reasons poor engine handling will not be tolerated.

2.13 COLD STARTS

The following applies to the first start of the day all year around and to every start when the engine is cold during the winter months. Before turning the engine over with the starter, pilots should give 4 primes with the throttle and then turn the engine over with the starter. If the engine does not fire after about 4 rotations give the engine 4 more primes and try again.

2.14 RADIOS IN TUGS

Radio switches and controls are deliberately small for low weight and minimal space requirements, so operate them gently - we have had some pulled off! Inevitably their small size makes these controls easily broken and vulnerable to mishandling. The radios are designed for aircraft use and so should be okay to be on during start up and shut down; after all, at some airfields you have to ask Air Traffic for start clearance and you can't do this without radio! However, some people say that radios last longer if you turn them off during engine start and stopping since the aircraft electrical system may

produce an uneven voltage while the alternator runs up or down; at Lasham there is no evidence either way so it's your choice. All tug pilots must hold an R/T licence, and no new tug pilots will be accepted without one. Useful frequencies are displayed in Annex J.

2.15 WARMING UP

As soon as an engine responds to the throttle and the oil pressure is satisfactory, i.e. not too high and not too low, the aircraft may be taxied onto the airfield ready to run up. It may seem surprising but it is actually bad practice to try too hard to 'warm up' an air-cooled engine (liquid cooled engines are different). In their engine manuals, Lycoming stress that adequate cooling and even cylinder temperatures are only provided by the forward speed of the aircraft and that ground running should be kept to a minimum using only a maximum of 1000 to 1200 rpm. Lycoming also suggest taking off as soon as the engine responds to the throttle without faltering, rather than waiting for a set oil temperature on the gauge. The reason for this advice is to avoid local hot spots developing in cylinder walls that can wear the cylinder and its piston. In practice this means that, at normal ambient temperatures, an aircraft that has been taxied out and run up is going to be warm enough for take off. It does not mean that in the dead of winter you can take off safely straight away, use common sense and when it's cold, warm the engine for longer. Where an aircraft has stood alongside the aerotow point, run it at 1000-1200 rpm until the CHT is nearing 125°C before commencing a take off; idling at too low an rpm can cause plug oiling.

2.16 ENGINE RUN-UPS

Position the aircraft on the airfield on short grass well away from any stones. Check the nose is into wind to aid cooling, make sure that the prop-wash will not affect anyone else, and check that the way ahead is clear just in case the brakes fail. First check both mags are working by switching each mag off in turn with the engine at idle (this is done because if the engine was to stop at anything above idle there is a risk of shock loading the engine, and on our tugs this could also cause damage to the silencers which are very expensive). Then increase the rpm to 1800, check that there is a mag drop and the rpm recovers to its original figure with no rough running, the carb heat should also be checked in the same way.

2.16.1 Live Mags

If, on switching off one mag during the mag check at 1800 rpm, there is a lack of any mag drop at all this indicates not that the remaining mag circuit is in perfect health but that the mag you just switched off is still live. Twin mag engines are designed to run better when both plugs are firing in each cylinder because the burning of the fuel/air mixture is more even. With only one mag firing per cylinder, the flame front will spread through the cylinder in a less symmetrical way, the engine will be less efficient, and the rpm will drop slightly from the normal two mag rpm. If you are in any doubt about a possible live mag, throttle fully back, allow the rpm to decay to a minimum, and shut down by turning off both mags rather than using the fuel cut. Never switch on again as the rpm is decaying since this causes shock loading of the crankshaft; always allow the engine to stop and then restart from scratch. This procedure will always show a live mag since the engine will continue to idle with both switches off. A live mag should ground an aircraft, since if you lost part of the prop or suffered severe engine damage (broken conrod, etc) in flight you have to be able to stop the engine very quickly before vibration causes more damage. Your survival may depend on how quickly you turn the mags off, since in extreme

cases engines have vibrated clean out of their mountings, leaving the airframe with a rather aft C of G! You can stop an engine by leaning the mixture fully, but this takes longer than switching off the mags.

2.16.2 Mag Drop

Accept mag drops of up to 125 rpm; rough running is a worse problem than the magnitude of the actual rpm drop itself. Plug oiling (due, for instance, to running at idle rpm) can cause both greater drops and rough running. To burn off any oil increase to a max of 2200 (the maximum allowable on the ground) and then try the mags again at 1800. On older engines you may find one mag is giving a drop of around 250 rpm accompanied with rough running and in this case it is worth trying increasing the rpm to 2200 and leaning the mixture until the revs start to decrease; at this point pause, then go back to full rich, reduce to 1800 and try the mag again. At these higher rpms, make sure that the aircraft does not move forward against the brakes, or in the case of the Cub, does not tend to nose over. Also, check that the slipstream is not a hazard to anything or anyone behind you.

2.16.3 Carb Heat Check

Applying full carb heat at the mag check rpm should cause a drop of between 50 and 200 rpm with a full recovery as you go back to cold air. No drop might mean that the carb heat is permanently ON, with consequent loss of power, particularly on take off.

2.16.4 Idling RPM

The last part of the run up is to check that the idling rpm is between 500 and 700 and that the engine does not tend to stop with the throttle closed. Because this check is usually done before the engine has reached its normal operating temp the tick-over may well be slow, this is acceptable whereas over 800 rpm would need adjustment before flight as it would lead to prolonged landing runs and fast taxiing.

2.17 TAKEOFF

Do not just ram the throttle fully forward, advance it forward gradually taking about 3-4 seconds to apply full power (this is particularly important on the Pawnee where bad throttle handling will damage the engine). Poor throttle handling will not be tolerated. During the ground run check for good oil pressure and expected rpm. With a fixed-pitch prop, rpm at a given speed equates to power.

2.18 CLIMB

Climbs while towing should normally be carried out at full throttle. The engine has a full power mixture enrichment jet that provides an over-rich mixture to help cool the exhaust valves, this is brought into use by the last 10% of the throttle movement and there is the danger that if you reduce power you may shut this jet off, making things worse for the engine. Lycoming say there is no advantage in climbing at reduced power. The enrichment jet also greatly reduces the possibility of carburettor icing while it is in operation; some say it eliminates it but in severe icing conditions there must be a possibility of it occurring, at least upstream of the point at which the enriched mixture is injected into the carb venturi. Monitor the CHT, which must not exceed 260°C (500°F). The oil temp must also be watched carefully, it must not exceed 118°C (240°F), see para 2.20. As oil is progressively overheated, it loses a lot

of its lubricating qualities and engine bearings can be damaged. Use of the mixture control to lean the mixture is not normally recommended above 75% power. However when doing a high or long tow it is acceptable to lean an engine even at full throttle. **Do not attempt to lean an engine to gain extra rpm.**

2.19 THE RED OPERATING BAND ON 180 HP LYCOMING ENGINES

The Lycoming 180HP Engine comes in many versions, each of which can be fitted with a variety of different propellers. Unfortunately tests and bitter experience have shown that certain combinations of engines and propellers interact between 2150 and 2350 rpm. This interaction is caused by the engine being a high compression design with 4 big cylinders; each firing stroke transmits a healthy punch to the crankshaft, which flexes in torsion and develops a significant torsional vibration in the speed range quoted. This vibration is picked up by the propeller which translates it into a point of maximum vibration about 10 inches in from the propeller tip, this has caused fatigue failure and loss of individual blade tips in flight resulting in severe engine vibration, emergency engine shutdowns and forced landings into fields. The engine/propeller combination most at risk is the hollow crankshaft A2A and A3A series engines fitted with a fixed pitch metal propeller. Fortunately at Lasham we have pursued a policy of solid crank A4A engines, and wooden four-blade propellers. At the time of printing, there is no red band restriction on any of our tugs. However most other clubs still operate the hollow cranks, so be aware if we have a visiting tug on site.

2.20 ACTIONS IF AN ENGINE OVERHEATS

In hot weather, the tug pilot may notice either the cylinder head temperature or the oil temperature reaching the red line. If this happens, speed up the tow by 5 to 10 knots. If this fails to halt the temperature rise try reducing rpm by 50-100 and if this fails, wave off the glider and land. After landing, check the following:

2.20.1 Oil

Allow about 5 mins for the oil to drain into the sump, then check the contents and top up if necessary. If anyone tries to tell you that engines run cooler with less oil than full because the oil will be going through the oil cooler more often ignore them, we have tried it and full engines run cooler. It is also bad airmanship to deliberately run with low oil, you are closer to losing oil pressure and/or damaging the engine in the event of high oil consumption or an oil leak developing.

2.20.2 Oil Cooler

Check it is not clogged with leaves or insects and the cowling around it is in good order.

2.20.3 Engine Baffles

Check for loose baffles and missing edging strips inside the engine bay. The baffles direct the cooling air inside the cowlings and if they don't work properly you get overheating. We had a problem in the past with a Cub that lost a large part of the engine baffles and this went unnoticed until a spell of hot weather caused the engine to overheat. Even then it needed comparison with our other Cub to understand what had happened.

2.20.4 Silencers

This has been a recurrent problem on the Cub. Loose baffles inside the silencer or distortion of the main tubing can increase the air resistance to exhaust gases. The back pressure on the exhaust manifold causes a loss of power and sometimes engine overheating, which in the worst case has prevented the aircraft sustaining level flight.

2.20.5 Carb Air Intake

Check that the air filter is secure and not clogged, that the hot air ducting is in order, and that hot air is shutting off, as it should.

2.20.6 Oil Consumption

Engines using more than a quart of oil for 20 tows probably have worn piston rings. During the power stroke, this allows some hot gases to blow into the crankcase, thus heating the engine oil. Worn rings also let oil into the combustion chamber during the induction stroke, and this oil is then turned into carbon in the cylinder which in turn can cause pre-ignition, detonation (knocking or dieseling), and so further overheating and possibly damage to the cylinder and valves. There is also a power loss due to the lost gases, so monitor rate of climb to ensure that it is adequate, but throttle back if the engine shakes or knocks.

2.21 AFTER RELEASE – ENGINE HANDLING

Careful and correct engine handling during this phase of flight is absolutely critical. If one pilot out of our total numbers starts doing it wrong then they will wreck an engine on their own; it is essential that no one thinks they can do it their way and it will not matter. The problem facing the pilot is how to cool the cylinders slowly because if the throttle is simply closed at the end of the climb and the nose pushed down increasing the airspeed before long a cylinder will crack.

2.21.1 This Is What Always Happens

By the top of the climb the exhaust valve and its seat will be glowing red-hot and the seat will have expanded as much as it can in the cylinder. Some of the stress of this expansion is relieved by the fact that the cylinder will also have heated up and expanded. As the glider releases the pilot has two choices, either to handle the engine carefully or to demonstrate his poor airmanship to those watching and listening on the ground.

2.21.2 This Is What Happens When Things Are Mishandled

The glider pulls off; the tug pilot shuts the throttle and then dives quickly away. Inside the engine the valve seats are still red and expanded but the outside of each cylinder is now being rapidly cooled by the increasing airflow. This cooling is aided by the fact there is now no heat from combustion being fed to the cylinder walls. Cooling makes the cylinders try to contract but they cannot shrink around the exhaust valve seat which being of dense steel takes longer to cool and contract. Within an inch of the exhaust valve seat is either of the spark plug holes and the stresses of having a hot expanded seat in a cool cylinder are sufficient to cause a crack to occur between the valve and a plug. It's a bit like banging a nail into a bit of wood (the cylinder), if the nail (the seat) is too big and too near the end (the plughole) the wood splits.

2.21.3 This Is What Happens When Things Are Handled Well

The glider releases, the tug pilot begins a turn, reducing power just enough to prevent overspeeding the engine. This is a throttle reduction of only about half an inch. Subsequently, power is reduced in several small stages in order to keep the rpm from increasing while speed is gradually increased. Take at least 15 seconds and preferably 20 before stabilising at 2300 rpm for the descent if a four-blade prop is fitted, and 2150 rpm for a two-blade prop. If conditions make a turn inadvisable (such as proximity of gliders), adopt the same technique of a slow power reduction and a slow increase in speed, the tug may climb a little at first but this is acceptable and definitely preferable to cracked cylinders. Inside the engine, the valve seats are hot but now the pilot is also keeping as much power as possible in the engine, rather than just throttling back, the cylinders are cooling and contracting, but are not doing so too quickly. The heat from partial power is enough to keep the cylinders from cooling too rapidly while allowing the exhaust valve and its seat to cool. In addition, the airspeed is not being allowed to rise as fast as before and so the outside of the cylinder is not being subjected to such rapid cooling. It is generally accepted that this cooling from the peak temperatures actually occurs quite quickly, probably within the first 10 seconds of the descent. Therefore, if you take 15 seconds to throttle back from full power to 2350 rpm and do not let the speed build up too fast you are handling the engine correctly. Try counting 15 seconds in flight; it is longer than most people think! Using this technique also prevents the propeller driving the engine which is to be avoided as much as possible as it causes the rings to wear the piston ring grooves, causing low compression and higher oil consumption.

2.22 WHAT TO DO IF YOU HAVE AN ACCIDENT

If a tug is damaged in your charge you are considered responsible and you must not continue to fly tugs until given authorisation to do so by the Tugmaster or CFI. Similarly if a glider is involved in an accident where the outcome was, or could have been, affected by the actions of the tug pilot that pilot should also check with the CFI etc that he can continue towing. Report the incident at once to the Tugmaster, CFI, Operations Manager or Manager who may well require a written statement of the event. In accidents involving serious damage or personal injury the aircraft must not be moved without permission from the CAA; the Manager or CFI will contact them. In less serious cases, move the aircraft into or outside the tug hangar, writing up the defect or damage in the normal way in the DI book, log sheet, and on an additional notice in the cockpit so that another pilot does not inadvertently fly the aircraft in ignorance of the defect or damage.

CHAPTER 3

THE AEROTOW

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3. THE AEROTOW

3.1 GENERAL

The purpose of the tow is to launch the glider in a safe, cost-effective, and productive way on what may be a soaring, training or trial flight. Whatever the type of flight, the tow should be as helpful as possible to the glider pilot and should not be regarded merely as a way of gaining height. The aerotow should provide what the glider pilot needs. For a two-seater training flight this could mean plenty of turns for training and staying near the airfield, whereas a water filled Nimbus needs adequate speed, a minimum number of turns, and dropping in lift even if it is a fair way (within reason) from the airfield. It is up to the tug pilot to use his skill and his gliding experience to meet each individual need.

3.2 LOGGING THE TOW

Accurate and readable tug logs are essential, they provide the only check on the launch height and an important cross check on the accuracy of the ground log and that it was being kept at all. The glider pilot's name should be passed over the radio and entered on the log. The rule is simple: the tug pilot should not take off without writing the glider pilot's name on the tug log.

3.3 TOWS FOR BADGE OR RECORD ATTEMPTS

3.3.1 Silver C Distance

Silver C distance release heights are complicated by the FAI/IGC 1:100 rule. For a straight goal Silver distance, if the angle between departure (normally, release from tow) and landing is steeper than 1:100, the claim is invalid even though 50 km has been flown. Since Lasham airfield is 620 ft AMSL, out-landings will normally be on lower ground; the worst case is a bare 50 km, landing at Sea Level and in this case the 1:100 rule would invalidate the flight for Silver if release was higher than 1020 ft above Lasham! Bicester airfield is 81 km away and 270 ft AMSL, this is a much better situation and a tow to 2300 ft above Lasham is still okay (just). Old Sarum as a goal is much more critical, at only 54 km and 280 ft AMSL, a tow higher than 1430 ft above Lasham will invalidate the claim. In a North-westerly one route is to Parham, releasing upwind of Popham (BGA TP 'POP', the M3/A303 junction) for 59 km, the critical release height for this is 1430 ft and as it is some way from Lasham, the glider must be dropped in lift (it lands at Popham airfield if it falls out of the sky). The moral to all this is that you must find out if there is a limiting height for release, and don't go above it. However it is up to the glider pilot to inform the tug pilot.

3.3.2 Gold, Diamonds or Records

For Gold, Diamond or record attempts the tug pilot may be asked to go to a specific higher altitude, in this case the glider pilot may expect the tug to level off at this altitude and speed up a little before he releases. If the point of release is to be used as a departure point (i.e. a start line with Official Observers is not in use), it is important not to exceed 3280 ft (1000 m) above Lasham, since if this is done, for closed circuit distance claims the pilot will be penalised on his distance flown and for speed claims the flight will be invalid. It is equally important to fly the tow so that the pilot can release in the place that has been declared; you will normally be asked to go to a specific place such as

'overhead', 'the clubhouse', 'Southwood Farm' (BGA TP 'LA1'), or even 'Alton Station' (BGA TP 'ALT'). A pilot declaring a 500 km out and return to, for instance, the BGA Rotherham ('ROT') turning point, needs a departure point well South of the airfield (e.g. Southwood Farm or Alton); if you drop him overhead or even worse to the North, his diamond claim will fail because his distance will be less than the magic 500 km.

3.3.3 Logging Release

When a tug pilot is told the launch is for a badge or record attempt, he should put the following in the remarks column of the log sheet:

- the exact release height above Lasham
- precisely where the glider was released
- the exact time of release
- his signature

THE STANDARD TOW

3.4 PRE-TAKEOFF

The tug should line up in front of the glider. Avoid taxiing near the winch cables and keep your prop-wash away from gliders and people as far as possible, particularly if you are warming up at 1000 rpm or more. As you taxi past the glider look at the glider and make sure it appears to be ready for the launch (tail dolly off, brakes closed etc.). Next go through the checks, many pilots shorten their checklist after the first couple of tows and provided this is a conscious decision it is okay. Pay particular attention to the fuel state and trim position and anything that may have been moved such as carb heat or the canopy latch. A reasonable check to use after your first take off is FFTCC, Fuel, Flaps, Trim, Carb heat, Canopy. Having decided on a shortened list, stick to it. The most senseless accident you could have is running out of fuel so to avoid this and to establish a clear rule: -

NO TUG WILL TAKE OFF UNLESS IT HAS AT LEAST 5 GALLONS OF FUEL ON BOARD AND, WHERE THERE IS MORE THAN ONE MAIN FUEL TANK, AT LEAST SOME FUEL IN EACH MAIN TANK.

Before your first take off each day move your hand from the throttle to the "Cable Release" to help make the emergency procedure instinctive. In a non-radio tug the tug pilot has discretion whether to operate without a forward signaller. Normal launch R/T procedure on 129.9 is not to reply to the usual expected transmissions of pilot's name, 'up slack' and 'all out' but if you are in doubt about anything, ASK. The tug pilot may be the most experienced pilot at the launch point, if he is unhappy about any aspect of the launch he must not hesitate to stop all flying until things are put right. Watch out for things like deteriorating weather, inexperienced signallers, pilots trying to take off with airbrakes still out (although some gliders may have the brakes out on the ground run to help aileron effectiveness), or runners on the wrong wing in crosswinds. Remember the tug pilot is commander of the combination so if it goes wrong you may be held responsible.

3.5 TAKING UP SLACK

When 'take up slack' is given, check that the glider's airbrakes are closed, the airfield ahead is clear, and that no winch launch is in progress. The flashing lights on the control vehicle come on once the 'up slack' signal lights are started and as the winch responds to the signal its flashing lights will also come on, indicating that the cable is moving. Once either of these signal lights is flashing the tug must not take off although it is okay for the tug to slowly take up slack once the winch-launched glider is climbing. Do not move before 'all out' or a 'who is going first fumble' may be caused. If the winch suffers an actual cable break, **DO NOT ATTEMPT TO TAKE OFF UNTIL THE RUNWAY HAS BEEN CHECKED AND IS DEFINITELY CLEAR OF ANY CABLE.** Once you get the 'up slack' signal the tug should move forward at walking speed. As the slack comes out of the rope the inertia of the moving tug will start the glider rolling; try to use this on gliders with nose skids to help get the glider moving while checking for the 'all out' signal. On gliders with belly hooks try and avoid snatching the glider as it may over-run the cable and the rope may come out of the back release. Remember it should take four to five seconds to open the throttle fully and there is no need to ram the throttle open.

3.6 THE TAKEOFF

BE ABSOLUTELY CERTAIN ABOUT THE 'ALL OUT' SIGNAL. We have had one accident where the tug pilot was not given 'all out' but started the take off; we must never repeat this. Take four to five seconds to apply full power, this is good engine handling and lessens the chances of a rich cut due to overfuelling. During the roll check for normal rpm and oil pressure while there is still time to stop if there is a problem. Check that the acceleration seems normal and that there are no unusual noises or handling which could be due, for instance, to binding brakes, a flat tyre, or loose panels. It is vital to keep straight during the take off and large control deflections may have to be used at times, particularly in a crosswind (see below) or if the glider pilot allows the glider to become off-centre.

3.6.1 Rope Breaks

If the rope breaks at this stage, it is the tug pilot's responsibility to ensure the glider does not run into the back of the tug. With heavy ballasted gliders, particularly two-seaters, there is considerable rope stretch as you initially move forward and ropes have broken at this early stage. If this does happen, you may see the glider slowing in the mirror. Continue rolling forward and then abandon the take off only when you are sure the glider cannot run into the back of you. If the break takes place at higher speeds, continue with the take off and do a low level circuit.

3.6.2 Crosswind Takeoffs

New tug pilots are sometimes surprised by the amount of rudder needed in a crosswind. For example, if you think about a take off with a wind from the left, 4 distinct control movements are involved:

- First, right rudder to overcome the weathercocking effects at the start of the roll (i.e. the side pressure on the fin & rudder due to the crosswind, which tries to turn you into the crosswind).
- Once moving forward, rudder back to the centre as the pull of the glider on the rope tends to keep the tug straight.

- If the glider drifts downwind as it lifts off (a common event), the tug tail is pulled downwind and you will need right rudder again to keep straight.
- As soon as the tug leaves the ground it too will start drifting downwind and some bank has to be applied to take up the appropriate drift angle so as to track straight over the ground.

3.6.3 Use of Wheelbrakes

Early in the roll you may need the wheelbrakes to keep straight. Soon, the prop-wash and airspeed will give you directional control through the rudder and the brakes will not be needed again. However, if you leave your feet even lightly on the brakes on a hot calm day you may not get airborne with a heavy glider. Make a positive movement off the brakes as soon as possible and then keep your heels on the floor.

3.6.4 Check in the Mirror

As you accelerate towards unstick, the glider will already be airborne. Have a quick check in the mirror to ensure that its position is normal (not too high) and that its airbrakes are in. If you see anything abnormal at this stage release the glider immediately and continue the take off if it is safe to do so and carry out a circuit and landing. The glider will have enough room to land ahead and if you continue the take off it will not run into the tug. Remember never take a problem into the air if it can be avoided.

3.6.5 Transition into the Climb

Once the tug leaves the ground, smoothly transition to the full climb, aiming to stabilise at the correct climb speed for the glider and the conditions. Do not wait until the ASI is indicating the towing speed before pitching nose-up into the climb, this will lead to overshooting the correct speed, leading to further nose up pitch to regain it; this excessive pitch change makes it more difficult for the glider to follow you. Try to make the transition from the acceleration phase to the climb as smooth as possible, without rapid pitch changes. This is particularly important in the Regent because of its higher unstick speed and initial acceleration once airborne.

3.6.6 Stop Signal and Abandoning the Takeoff

If you are given a stop signal or you decide to abandon the take off for any reason **first release the glider** and then continue to roll down the runway **without** decelerating. **DO NOT TAKEOFF IF YOU HAVE BEEN GIVEN A STOP SIGNAL** as the signal may have been given because it is not safe to continue (e.g. something wrong with the tug, winch cable in the air etc). Once you are sure the glider cannot roll into the back of the tug you can throttle back and apply the brakes.

3.7 THE CLIMB-OUT

Note the general points mentioned in 3.1 and pick a route that avoids the noise sensitive areas described in Section 5, at least below 2000 ft. The tow should also give the glider pilot a feel for the sky and the tug pilot must look for lift. Once above about 700 ft you should be trying to fly under clouds and avoiding the smooth blue gaps. In tugs, as in gliders looking for lift, you often find the accompanying sink but this is all the more information for the glider pilot. Sometimes the lift may be too

narrow for the tug to circle in without excessive angles of bank, in this case it is best to circle in and out of the upwind side of the thermal, as long as it is not too turbulent and it is improving your rate of climb. Gliders may already be circling in the thermal that you have found. In this case, never try to join them, but either circle around the outside of the thermal well away from the gliders or route away from the thermal and return when nearer the likely release height. If you know that you have an inexperienced pilot on the back, keep turns gentle but try and either be in lift or abeam lift at release height. Even experienced pilots may not want a tow full of manoeuvring, so don't overdo trying to circle in lift. It is important that the tow should be smooth and free of any moments of concern for the glider pilot. To ensure this is the case use the following guidelines for every flight:

- Keep all turns shallow and make the first turn into wind (if there is a crosswind) to keep the glider within gliding range of the airfield at all times.
- Do not fly over trees or any areas low down where an engine failure would risk the tug. If the tug is safe, the glider must be too.
- Avoid known areas of turbulence whilst low, noise sensitive areas when higher.
- Do not fly directly into the glare of the sun, and if possible arrange turns away from the sun. If you cannot avoid turning through the direction of the sun, transit quickly through this heading.
- Do not 'chase the airspeed' such that the tug is forever changing its attitude. In turbulence the airspeed will vary naturally and the best flying technique is to fly a **constant pitch attitude**.
- Do not fly too slowly for glass gliders with water.

3.7.1 Gliders Going Into Low Tow

If the tug needs nearly full down elevator, stick forward, the glider has gone into the low tow position. When this happens, maintain the correct airspeed by using quite a lot of forward pressure on the stick and then re-trim. You will not be able to see the glider in the mirror unless he is laterally displaced as well. The rate of climb and forward stick pressure tells you it is still there and has not released. The tug will climb in a slightly less nose up attitude with a glider in the low tow position but normal towing speeds should be used. Be careful if the glider releases without moving into high tow first, so as not to descend into it; releasing while in low tow is most undesirable because it can be very difficult for the tug pilot to tell if the glider has released. If this happens to you, note the fact in the log and make sure the pilot is briefed not to do it again. If during low tow training flights the stick briefly touches the forward stop, this can be accepted. However, if the glider continues to descend to an excessively low position, the nose of the tug will be pulled up and the airspeed will decrease which may eventually result in a roll to the left induced by engine torque. If you ever reach this stage, release the glider, centralise the stick, but do not chop the throttle, as you must avoid the glider below you.

3.8 RELEASE

Priorities are Lookout, Check the Glider has really gone, Confirm Flap up, and Turn if clear to do so. These are expanded below:

3.8.1 Tug Procedures

Ensure you have arranged your flight path so that, after release, you can return to the airfield quickly and without using a lot of fuel; the only exceptions are in order to place gliders in lift where there isn't any closer in, and for pre-briefed release points where, if they are sufficiently far from the airfield, the glider pilot may be invited to pay more. With training two-seaters, early solo pilots, and in poor visibility, position so that the airfield can be clearly seen as you come up to release and is not too far away. As you feel the glider release, use the mirror to ensure it really has gone and to establish which way it has turned. Never descend if you are in any doubt as to whether the glider has released or not.

3.8.1.1 Flap Position Check

It is a wise precaution as you accelerate after release to develop the habit of a quick look at the wing trailing edge to double-check that the flaps are really up before you exceed flap speed on the descent. Occasionally you may have deliberately left half flap down for the tow, such as when towing slow gliders, or you may have been distracted at the time when you normally retract the flap. In any case, a positive check like this is good airmanship and at the same time improves your visual scan as you turn and descend.

3.8.2 Glider Pilot's Actions

Glider pilots should be trained to release and execute a positive climbing turn so that the tug pilot can clearly see that they have gone by looking in the mirror. If the pilot does not do this, e.g. just pulls off and then makes it difficult for you to see the glider, make a note on the log sheet and ask an instructor to debrief the pilot on this failing. Some pilots pull off so unobtrusively that you have to continue climbing, searching for the glider in the mirror, before finally deciding that the glider has gone and starting to throttle back; this costs the club money and the pilot must be debriefed to be kinder to tug pilots. If in doubt, an increased rate of climb may be a clue as to whether the glider has pulled off.

3.9 THE DESCENT

The start of the descent is a critical point in the flight, and it is vital that lookout is good and engine handling, immaculate. Lookout needs no explanation. The skies above Lasham are often very crowded. The last time a Lasham tug collided with a glider was in the 1980s (both landed safely); make sure there isn't another one. The importance of engine handling is explained in detail in Para 2.21.3; be sure you understand it. If you do not handle the engine correctly you will damage it. During the descent, after the 15-20 second cooling period, set 2300 rpm - this should keep the CHT over 150°C, and also prevent the propeller from driving the engine (this wears the piston ring grooves, which can result in broken rings and damaged cylinders). Finally, position yourself for joining the circuit in such a way that unnecessary turns and changes of power are avoided.

3.9.1 Carb Heat

In humid conditions in the UK below a temperature of +10°C, carb icing is possible so use carb heat on the descent. Carb icing is insidious, it builds up in the throat of the carb and when you call for power it just is not there. Because of the pressure fall in the carb venturi, you can get carb icing at ambient temperatures well in excess of freezing. The carb heat control is there to be used!

3.9.2 Descent Speed

The most used descent speed is just short of either the rough air speed (V_{ra}) or the maximum manoeuvre speed (V_m), whichever is the lower. For individual types, see the notes in the Annexes. Once over V_m , the aircraft is not cleared for the use of more than one-third control deflection, which may not be enough for collision avoidance. To avoid collisions, avoid knotting the rope, and to minimise the chances of airframe damage or panels vibrating, slower is safer; remember tugs are rarely new aircraft!

3.9.3 General

Pilots are expected not to waste time or fuel, nor to mishandle the aeroplane. Neither overspeeding nor overcooling the engine, the well executed descent will continue directly to the base leg, the exact position of which will vary according to the wind and other circuit traffic, then on to a straight final with wings level from a safe height, into a smooth landing. Expect a descent from 2000 ft to take about three minutes, time yourself, and if you are taking longer, find out why and take the necessary action.

3.10 JOINING THE CIRCUIT

Normally, plan to join the circuit to the North of the airfield, although when gliders are being released to the South, rejoining on a southerly base leg is acceptable. Reduction of rpm below 2300 may be necessary to slow down to flap speed while maintaining the descent on the base leg. Decide where you are going to join the circuit.

3.10.1 Track over the ground

Try to make the path from the point of release to the circuit a smooth descent using low angles of bank to give you the best view for lookout and so improve collision avoidance. Spiralling or side-slipping down followed by powering around the circuit are not acceptable practices. Consider too what would happen if the engine failed, position yourself so either the airfield or a good field is always available to you.

3.10.2 Main Circuit Operations

There are two main options. You can join the circuit at the upwind end, close in and under the glider circuit traffic. The alternative is to stay higher than the glider traffic which will mean going wider to avoid the traffic and a high base leg about half a mile out. Either high or low pattern is acceptable, although the higher circuit carries less risk of collision because you will be above any gliders in the circuit and also since the close-in lower tug circuit means that gliders will be descending through your level and may not see you underneath. Also with the low pattern you will have to use power to fly level until finals, and it will use more fuel and take more time than a well-judged descent transitioning smoothly into a high base leg. If you have to fly a close-in downwind leg, aim to be 500 ft when passing the clubhouse and flying level until the base leg, then slowly descending so you start your 180 degree turn onto finals at 400 ft and are level again lined up on finals by a minimum of 200 ft.

3.10.3 Checks

Downwind checks must be done before every landing; pilots have various personal preferences for these and any series of checks that includes FUEL,

HARNESS and BRAKES OFF, is acceptable. The repetitive nature of tug flying makes it easy to forget these checks especially during a long session.

3.10.4 Base Leg

Use the base leg to reduce your speed to below flap limiting then put down half flap, and go to full flap for finals at a position appropriate to your height.

3.11 THE FINAL APPROACH

Tugs should have a straight final approach that begins behind the perimeter track at a minimum height of 200 feet. If you are high sideslip but kick it out with a good margin before round out. On runway 27 do not descend into the gap in the trees behind the road, as there will be a danger of the rope hitting any traffic. On any of the cross runways ensure you cross the perimeter track by at least 200 feet to ensure the rope cannot hit people or traffic. Have a final very careful look for other tugs and gliders and if there is a conflict, give way to gliders and land on the other side, up the field, or go around. Trainee glider pilots often look up to tug pilots as 'role models', and any shoddy airmanship or showy flying may have dire consequences elsewhere. Remember the adage about 'old pilots **or** bold pilots'. If you have been using carb heat, go back to cold air on finals. This returns the engine to filtered air, which is important in the dusty air near the ground. It will also give you more power if needed for a go-around.

3.11.1 Trailing Ropes

Tug pilots must accept responsibility for their trailing rope and it must not be allowed to hit anyone or anything, regardless of whether the obstacle concerned has any right to be where it is. Watch out for cars at the West End, some stop, some don't! Operating on the medium and short runways you have to be particularly careful and may have to deliberately land well up the field and then taxi back. We have had ropes damage cars parked by the trailer park North of the medium runway threshold. Think of what would happen if it were a person and not a car. Although the rope only hangs down about 50 ft or so, at approach speeds the aircraft may be descending. You need a margin for the end of the rope to clear any object on the ground so the tug needs to pass over it at a minimum of 150 ft. Any incidents involving trailing ropes will result in the pilot being immediately suspended from towing pending investigation by the Tugmaster.

3.11.2 Specific Hazards

On the short runway operating to the North (34), the approach must be offset so as not to overfly the warehouse on short finals. On the main runway operating uphill (09), be aware of the power lines in the undershoot area.

3.12 LANDING

Lasham landing areas tend to be long and narrow. This makes it difficult at times to maintain a sensible wing span distance on either side from nearby gliders. However, provided the following guidelines are used, it should be possible to operate safely even at the busiest times.

3.12.1 Tug Landing Strip

Always try to land on the grass about a couple of wingspans in, parallel to the runway. Glider pilots should think of this as the tug strip. No landing run should

involve crossing a runway edge at speed. Be very careful every time you taxi across a runway edge, look first and then go across slowly at 45degrees.

3.12.2 Obstructions

Never land towards parked gliders or similar obstructions and allow for movement of people crossing the airfield and gliders being moved or towed. Assume the brakes may fail, there has got to be somewhere ahead where the tug can go without causing an incident.

3.12.3 Formation Landings

Never land in formation with another tug or glider.

3.12.4 Turning at the End of the Landing Run

You can land on the left or right of other aircraft but remember the same may be happening to you. Do not turn at the end of the landing run; keep going straight until nearly back to the launch point. Before and during turning, check for landing aircraft.

3.12.5 Aerotowing from the Grass

When aerotowing is taking place from the grass, touchdown as far into the airfield as conditions allow using light braking and slowing to walking pace before crossing the intermediate runways. When aerotowing from the runway do not use the brakes harshly during landing, taxiing back is a lot cheaper than repairing brakes.

3.12.6 Crossing Runway Edges

If you slightly misjudge a landing and look like crossing a runway edge faster than walking pace always do it with NO BRAKES applied. This reduces the load on the nose leg oleo on tricycle types, giving better propeller clearance; it also reduces the risk of nosing over in tail-draggers.

3.13 BALKED APPROACHES

There are basically two go-around situations. The first is the traditional go-around from short finals, the other is where it is necessary to orbit or S-turn on base leg or at the start of the final approach to avoid getting into a situation where a lower go-around is inevitable. Neither is without risk and good lookout is essential. Depending on the geometry of the conflicting aircraft or gliders, it may be better to change your landing area, either by landing on the other side of the runway, or up the field.

3.13.1 Go-around From Finals

The vital thing in this case is that the tug maintains its approach heading while starting to climb. Once abeam the launch point, angle away from the runway by about 15 degrees making sure it is clear to turn, this will ensure separation from any winch cables which may be in the air. Be aware there may be a winch cable in the air or gliders hangar flying. Use full power to climb whilst staying under the flap limiting speed. Raise the landing flap to half, and climb to about 500 ft before turning onto the downwind leg.

3.13.2 Orbits and S-Turns

Unless you are behind the normal glider base leg, orbits and S-turns are to be avoided whenever possible as the collision risk is increased. If an orbit seems

sensible, be really thorough with your lookout before starting the turn, and only use a small angle of bank so that you can keep checking for other traffic. Orbits and S-turns should be flown with half flap, check the ball is centralised all the time as low turns, especially in strong winds, produce apparent sensations of slipping and skidding. Watch the flap limiting speed.

NON-STANDARD TOWS

3.14 TOWING SLOW GLIDERS

The minimum towing speed given in the Flight Manual for a Robin Regent or a Pawnee is 60 kts, and for a Super Cub, 55 mph (48 kts). These Flight Manual speeds are calculated so that in the event of a sudden engine failure, you have enough margin over the stall to have time to lower the nose before encountering additional handling difficulties, and at normal ambient temperatures the engine should not overheat during the tow. Both aspects are improved by towing at higher speeds and with glass gliders and water ballast this is no problem. However, the wooden 'golden oldies' don't like high tow speeds, which may make them difficult to handle and may be close to or over their max aerotow speed. Therefore, use the Super Cub for the slowest gliders; half flap reduces ground run but does not help the climb. After the Super Cub, use a Robin and leave half flap down for the tow; remember to clean up after release or you will exceed the flap limit speed. Develop the habit of looking at the flap on the wings as you accelerate after release; this may save you from embarrassment one day! On tow at slow speeds, monitor the oil and cylinder head temperatures carefully for possible overheating. Also bear in mind that if you have an engine failure, because you are already slow, you may have little time to react to prevent a stall even at the 'legal' minimum speeds. In addition, the high nose attitude reduces view ahead and below so it is advisable to weave the nose more than at higher speeds to ensure that you are not flying towards another machine at the same height.

3.15 DUAL TOWS

Dual tows are allowed within the limit of the combined weights of the two gliders. Details are found in the BGA publication on dual tows and in the Flight Manuals of each tug; these documents are held in the office. The tug pilot has a responsibility for the safe and legal conduct of the flight, and so these documents should be consulted before starting any dual tows. Lasham charges each glider pilot two thirds of the normal cost of the tow. The following is an outline guide to dual towing, but it is not intended as a comprehensive set of instructions.

3.15.1 Authorisation

Before setting up a dual tow, authorisation must be obtained from the Tugmaster, CFI, or Operations Manager.

3.15.2 Wind and Turbulence

No dual tows in cross winds over 5 kts, or in turbulence or strong winds.

3.15.3 Ropes

A dual towrope is kept made up in the Hangar.

3.15.4 Positioning on the Ground

Lay the ropes out on the ground at an angle of about 30 degrees either side of the tug. Check once the gliders are hooked up that the long rope is clear of the forward glider. Conventionally the glider on the short rope is on the right hand side. Position the gliders to minimise any slack in the ropes.

3.15.5 Pilots

The more experienced pilot flies on the long rope and is responsible for ensuring that his rope stays clear of the other glider.

3.15.6 Radio

If all three machines have radio, use a common frequency, note callsigns, and do an R/T check before take off. Any problems can then be called on the R/T but bear in mind that use of R/T to a glider pilot under a high workload may be a complicating factor and you may not get a reply.

3.15.7 Signalling

You need three ground signallers, one for each glider (who also may hold the wings level), and a forward signaller who is the 'master signaller' and can be clearly seen by the tug pilot (the forward signaller can be dispensed with when signals are passed by R/T). The short rope wingtip holder and signaller (if different) have to be on the outside wingtip (normally, the starboard one) for safety. As the tug moves slowly forward, the glider signallers signal normally and give 'all out' once their rope is tight, but the forward signaller gives the tug pilot 'all out' only when he sees **both** glider signallers giving 'all out'. In a large field, if you can't find a third signaller, the more experienced glider pilot on the long rope can transmit 'all out' to the tug by radio. This may be better in any case in a field if the wing holders and signallers are not gliding people.

3.15.8 Position on Tow - Left/Right or Low/High

The BGA notes suggest that the gliders stay in high tow but take up positions displaced left and right on either side of the tug. We have found it more successful to have the gliders go into high and low tow behind the tug, short rope high and long rope low. The advantage is that, for the short rope glider, the tow is virtually normal and requires no new flying techniques such as flying out to the right for long periods. Also, the low tow is a very comfortable position for long cross-country tows. Regardless of the method chosen, it is vital that the pilots involved are fully briefed on the procedure that is going to be used; if in doubt use the Lasham low/high method.

3.15.9 After Takeoff

After take off, the gliders initially retain their small lateral offsets from the tug, normally short rope right and long rope left. The tug will continue straight ahead without turning. At an agreed height, usually about 300 ft, the forward glider gradually goes across into a normal high tow position behind the tug. Using this as a cue the long rope glider then goes into low tow in line behind the tug. Only when the gliders are in line behind the tug can it turn. Roll into all turns as gradually as possible, and use less bank than usual, to make it easier for those behind you. Even if they are experienced, they may be tired at the end of the day after a long soaring flight.

3.15.10 Release

At the release point, the forward glider releases first and does a positive climbing turn so that the tug pilot can see in his mirror that he has gone. The lower glider then comes into high tow so that the tug pilot can see him, and releases with another positive climbing turn, normally turning the opposite way from the first glider unless he can see that he is well clear.

3.15.11 After Release

The slower the tug descends after release, the less chance there is of the ropes tangling. Remember that you will need a larger height margin than normal to clear obstacles on the approach.

3.15.12 General

Dual tows usually go well while the tug is climbing but some glider pilots have little experience of long, level, cross country tows, especially in the low tow position. More dual instruction on the use of airbrakes on tow, and descending on tow, will be an advantage. It may well be worth setting up a training flight involving circling the airfield level at, say, 1500 ft, before letting some pilots go on a dual tow away from the airfield.

EMERGENCIES

3.16 SIGNALS

Tug pilots must know how to signal the glider to release and how to let the glider pilot know that his airbrakes are open. It is also important to recognise when a glider is signalling that he cannot release. These three signals can be practised and are included in the training. However these are by no means the only emergencies likely to be encountered and the following, after first covering these three signals, offers advice on how some other problems and emergency situations could be handled. Do not forget how useful the radio can be in most emergency situations.

3.16.1 The Wave Off

The signal for this from the tug to the glider is the deliberate slow rocking of the tug's wings using about 30 degrees of bank each side. On seeing this, the glider must release. Use slow, deliberate control movements that cannot be mistaken for smaller amplitude bank oscillations sometimes met in turbulence. If the tug emergency is severe enough, such as an engine failure, don't signal, just release the glider and get on with dealing with the emergency.

3.16.2 Glider Airbrakes Open

Glider airbrakes can come open in turbulence, or on take off or if the pilot fails to lock them properly. If this happens the tug pilot will first notice a poor rate of climb and may wonder if there is anything wrong with the tug, a check on the engine gauges should confirm everything is okay at the tug end. A check in the mirror will then show the glider's brakes fully open. In this situation the tug pilot MUST use the following procedure:

- Continue trying to climb at the correct airspeed. Try calling the glider on the radio.

- Consider whether to signal to the glider that his brakes are open by rapid side to side movement of the rudder, use at least half the available travel and take particular care to keep the wings level, while giving this signal. The secondary effect of yaw is roll and this is particularly noticeable in aircraft with significant dihedral. There is a real danger that if this signal is not done well, it can look like a wave off to a glider pilot and this mistake could lead to an accident. Because of this danger, provided the tug is at least maintaining height, there is a good case for not giving this signal until either there are landable fields below, or the tug is approaching overhead the airfield. Remember the signal is the rapid movement of the rudder and NOT the yawing of the tug.
- If you are below 1000 ft, tow the glider back to the airfield, continue trying to climb but circle the airfield such that the glider can easily reach it after release even with the brakes open. Keep repeating the rudder signal to the glider pilot.
- If the brakes stay out, repeat the signal from time to time. Most 180 hp tugs can climb even when the glider brakes are open, but if the tug is at risk, wave off the glider, if the situation worsens release it.

3.16.3 Glider Cannot Release

When a glider has release problems it will fly out to the left side of the tug and rock its wings (i.e. bank first one way and then the other). This is not an emergency requiring instant action. In Australia for example, they train glider pilots to descend and land on tow, so do not rush to release the glider, appraise the situation first.

- Tow the glider back to the airfield.
- Is the glider lower than the tug? If it is and you release the rope from the tug end, there is a danger of it going over the glider wing or breaking the canopy. Only release when the tug is lower than the glider.
- Do not release when the cable is taut, reduce power a little first, check the glider is high in the mirror then pull the release. Check the glider is flying normally before returning to the airfield. Make a call on the radio to inform the launch point controller of the problem.

3.17 SERIOUS TUG EMERGENCIES

Should a serious emergency occur whilst towing, it is most likely that the tug pilot's first action should be to **IMMEDIATELY RELEASE THE GLIDER**. Do not waste the time it takes to do a wave off if it might compromise the tug's safety. Emergencies are probably going to be related to either engine, airframe, instruments or weather. Remember **Rule One: FLY THE AEROPLANE**. Then make a plan assuming the emergency will continue whilst if necessary carrying out any vital actions. Pilots should have drills and some pre-considered strategies to help them cope with problems in any of these areas. The following notes are to help you develop your thinking about what you would do in any of these emergency situations.

3.18 ENGINE-RELATED EMERGENCIES

3.18.1 Total Power Loss

Fly the aeroplane at the best glide speed. Change fuel tanks, electric fuel pump on. Check the mixture, carb heat and magnetos. Try pumping the throttle a few times. Make a Mayday call to Lasham so that they can send help. Once committed to a dead stick landing, mags off, fuel off, and if you have the height to do this safely, slow down briefly to stop the prop if you want the aeroplane to glide better. Tighten your straps and stow any loose articles such as the log sheet, if there is time. Drop the rope and if all you can reach is a field too small to land in, land in it anyway, and aim for the softest looking part of the far hedge.

3.18.2 Serious Engine Vibration

Propellers can shed tips and so become unbalanced, and if a conrod breaks in the engine this will also cause severe vibration. As you definitely do not want the engine to shake out of the airframe, the only action open to you is to quickly turn the mags off, slow the aircraft until the prop stops, and carry out a forced landing.

3.18.3 Rough Running

Less dramatic rough running may be the result of contaminated or low fuel, ignition faults or carb icing. You might have inadvertently knocked the fuel cock, mixture lever, or mag switch. Try changing fuel tanks, try carb heat and keep the engine developing at least the power to stay level. Other things to try are the mixture control and turning each mag off in turn.

3.19 AIRFRAME-RELATED EMERGENCIES

Use the radio to inform those on the ground of your problems, advice or a chase aircraft may help.

3.19.1 Flaps, Landing Configuration

If possible it is probably best not to use flap unless you think it is necessary. Use flaps with caution in case you run out of trim, half flap may be okay but avoid full flap. An unusual rolling moment on lowering flap should alert you to the possibility of asymmetric flap; in this case immediately stop the flap travel, look at the flaps and, if needed, put the flap up again, making sure that you don't stall. In any event, test your proposed landing configuration at height by cautiously reducing to threshold speed before using it near the ground, stopping any further speed reduction if you encounter any problems. Land into the clearest part of the airfield at no less than the speed that you have tested at height. If the aircraft will only fly properly at one speed, then keep that speed right down to the ground. If things have not got quite that bad but you are concerned in some way about the airframe, then fly the aircraft slowly with minimum manoeuvring down to a flapless or half flap landing, using a higher threshold speed than normal.

3.19.2 Problems in Control

In the case of problems in pitch control, try using the trimmer, and bear in mind that changes of power and flap also give effects in pitch (remember the DC10 that lost all its primary control surfaces but was crash-landed successfully using

control through secondary effects of power and flap). Problems in lateral control may be helped by judicious applications of rudder but be careful not to induce a spin, particularly in the Regent, which drops a wing at the stall.

3.20 ASI FAILURE

Air Speed Indicator failures are not unknown in tug operations, mostly through water or bugs in the tubing. If this happens, fly by attitude. If you have a glider on tow, keep climbing and if you are not happy to go to 2000 ft, wave him off near the airfield. Fly the approach with some power and use normal landing configuration. If you feel the ASI is suspect it can be checked by stalling the aircraft. Land faster than usual well up the field.

3.21 WEATHER-RELATED PROBLEMS

3.21.1 Poor Visibility

Deteriorating visibility caused by low cloud, rain, fog, or snow demands prompt action. More light aircraft fatalities are caused by poor weather than all the other reasons added together. If the deterioration is general do not delay a decision to land, even into a field if the airfield cannot be reached. Turn on the Turn and Slip (if fitted) if you think you are about to lose visual reference and take up a safe escape heading. If the deterioration is localised and will blow through with the wind, provided it is not too near sunset fly upwind into good weather and hold off at endurance speed without flap (i.e. minimum power) until the airfield has cleared, watching the fuel and staying within range of other airfields or large fields. Popham, Odiham, Blackbushe, Farnborough, or Thruxton should be borne in mind. If you have to land in really heavy rain, hail, sleet or snow, the windscreen will be obscured and you will have to look out sideways to judge your height for landing. This is not as difficult as it sounds; instructors in the rear seat of Tigers and Harvards do it all the time. The major problem is often not the landing, but seeing obstacles ahead so it is best to land well into the airfield with a slightly higher threshold speed than normal.

3.21.2 Strong Winds

Strong winds generate turbulence in the bottom layers of the atmosphere, particularly in the lee of vertical features such as lines of trees, buildings, hills etc. Turbulence can make an approach difficult. In these conditions aim to land well into the airfield as far away from downwind of trees and buildings as possible to avoid the curl-over and turbulence that they generate. Land as near into wind as possible, use plenty of power on the approach, use no more than half flap, and add 10-20 knots to the normal approach speed to counter the wind gradient and help keep control. Threshold speed (V_{ref}) needs to be higher than normal (say +10 kts) since in effect it is the energy needed to round out, but by the time you are rounding out you should be through all the wind gradient and the majority of the turbulence. If badly rolled by turbulence, apply full power, ease the stick slightly back and convert the roll into a climbing turn. In extremis, use rudder as well as aileron to pick up a dropped wing, but only if you have a safe margin over the stall. Where you land is important, it may be better to finish your landing roll downwind of the hangar so you taxi in almost into wind rather than landing closer and having to risk turning across the wind, something it may not be possible to do due to the wind's side force on the fin and rudder.

3.22 OTHER AIRCRAFT- WINGTIP VORTICES

In 1978, several Lasham gliders were damaged when a K13 on approach entered a wing tip vortex, which had been generated by a Boeing 727, which had taken off shortly before. The K13 lost lateral control at a height of about 50 feet and eventually crashed into several parked gliders at a very high bank angle; miraculously no one was killed. Like turbulence, the problem is that you (generally) cannot see a tip vortex. Vortices are continuously shed at the wing tips of all aircraft, and they vary in intensity in accordance with the lift being generated, which for an aircraft not pulling 'G' will be in proportion to its weight. The vortex is relatively small in diameter, typically 20-30 feet, and the 'worst case' is where the aircraft under threat has a span matching the vortex diameter; large-span aircraft are therefore not at risk but small-span aircraft are. In strong winds, turbulence near the ground breaks up the vortices and the condition of maximum risk is with calm or slack wind conditions, particularly with a slight crosswind. At winds of over 9 knots, the vortex risk is greatly reduced (no recorded accidents in the UK at the time of printing), and the maximum risk is with winds under 6 knots. The reason for increased risk in a crosswind is that the vortices, once generated, spread outwards and downwards, and so the upwind vortex from a large aircraft taking off in a slack crosswind will tend to stay in the vicinity of the runway until it finally decays, its outward drift being cancelled out by the crosswind. You cannot rely on the rapid rate of roll of the aircraft under threat, since the vortex rolling moment if you are just in the wrong place, i.e. inadvertently right in the middle of the vortex, can easily overpower even fighter aircraft, let alone light aircraft like our tugs. Examples include the two-man crew of a Piper Comanche who were killed at Carlisle Airport in the 1970s taking off immediately after an Argosy which had a weight of only 82,000 lb, and in 1982 a Hawk landed upside down at the MoD airfield at Bedford having approached after a Britannia at 140,000 lb had carried out a touch-and-go (the Hawk crew survived). A rule of thumb is to wait for one minute for each 100,000 lb for the aircraft generating the vortex, before taking off, or approaching behind where it was. The ATC aircraft operate at Lasham to a maximum of about 150,000 lb so 1.5 minutes is a good time to remember for operations on the airfield. This section is intended to make you aware of the hazards and ensure that the earlier Lasham incident is not forgotten.

CHAPTER 4

TRAINING AND TYPE CONVERSIONS

Contents

Para Subject

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- 4.14 BI-ANNUAL CHECK FLIGHTS (BCF)

4. TRAINING AND TYPE CONVERSIONS

4.1 TRAINING SCHEDULE - GENERAL

This training schedule is designed to be used for all pilots converting to Lasham tugs, regardless of their previous experience. Training and solo flying is done at the pilot's expense unless it can be legitimately combined with towing with no extra flight time. The requirements to start tug pilot training are given in Chapter 1, particularly para 1.4. It should be possible for the experienced pilot to demonstrate his competence right from the start of the flying exercises but it is accepted that instruction will be necessary for those pilots who only have the minimum amount of PI power hours. For this reason no set amount of hours apply to the training schedule. Normally the Tugmaster will allocate one of the check pilots (Annex G) to fly with a new tug pilot, with a different one for each of the two phases of training.

4.1.1 Solo Flying

The intention is to first train the new pilot to safely fly the aircraft solo without a glider on the back. The pilot can then build up solo time at his own pace. Before anyone flies a Lasham tug solo he should have a signature in his logbook as cleared to fly the type (see also para 1.5). The new pilot must become familiar with the aircraft type before starting to tow gliders.

4.1.2 Logging Training Flights

The pilot giving type conversion training should log the time as P1 and the trainee should log the time as P/UT. In the case of more experienced pilots where they can demonstrate they can competently fly the aircraft even the first flight could be considered a check flight. In this case the pilot enters the flight as P1/US and the check pilot signs the remarks column as an indication of a satisfactory check.

4.1.3 Aircraft Type

Normally, training will be carried out on the Robin except in the case of experienced pilots (para 4.8).

4.1.4 Oral Questions

The last part of this training schedule includes questions concerned with operating procedures and knowledge of the aircraft type. Before being allowed to go solo towing, the pilot should be able to answer most of these and similar questions. These questions, which concentrate on things a pilot needs to know in flight, are not intended as a pass or fail exam, they are more to show where extra knowledge could be useful.

4.1.5 Training Proforma

Please fill in a copy of the type conversion proforma shown in Annex A, and have the copy with you during the training sessions.

4.2 INITIAL TRAINING AND TYPE CHECKS - GENERAL

For type conversion, the Annex A training proforma lists the specific items to be covered during training. As you complete the exercises, the instructor will initial the right hand columns.

4.3 NEW TUG PILOTS

Once the exercises listed at Annex A have been performed to the check pilot's satisfaction, the trainee may be cleared for solo flying. Trainees new to the type will then be expected to do **10 full stop** landings spread over 3 separate days before going on to towing training. Trainees should pick days with different wind directions and should DI and refuel the aircraft. At this time, the trainee should be shown how to lay out towropes ready for the next stage, which is towing training.

4.4 TOWING TRAINING

Pilots new to tugging should ride in the right seat for about 6 tows, with the check pilot flying and explaining what he is doing. Then the trainee moves into the left seat and carries out a minimum of 6 tows with a check pilot before being allowed to carry out a solo tow. Use the towing conversion proforma shown at Annex B. A co-operative glider instructor will be required on some tows in order to allow the trainee to show competence at the exercises which are tabulated in Annex B.

4.5 LIST OF QUESTIONS

Both current and new tug pilots should be able to answer the following questions. Trainers should go through this list of questions with new tug pilots to ensure all points have been covered during training.

1. What speeds are going to be used in the various stages of a tow?
2. What is the minimum fuel load for take off?
3. When do you use hot air?
4. How can poor engine handling cause a mag drop?
5. Are you expecting to use the mixture control during tug flying?
6. Why is it important to trim the aircraft?
7. How will a glider let you know he cannot release?
8. Why cut out rope knots?
9. In which direction should you make the first turn after take off?
10. What 3 actions should a tug pilot take when he notices the glider's brakes are open?
11. Describe where our noise sensitive areas are.
12. What should you do if the engine stops at 500 feet?
13. Describe a sensible go-around procedure.
14. In a strong wind what is the most critical part of tug operations? What precautions would you take?
15. In deteriorating weather conditions, who makes the decision to stop flying?
16. What should you do if the glider pulls off during the take off roll?
17. How and when do you wave off a glider? When is it best to use the emergency rope release?
18. What is most important, saving time, fuel, or the engine?
19. What is meant by Max Manoeuvring Speed and what control restrictions apply above it?
20. Should you land on the left or right of another tug?
21. Why is it so important to monitor and understand what is happening in the engine in the climb?
22. How do you handle the engine at the point of release?
23. How do you avoid the trailing rope hitting anyone?
24. What authorisation do you need for the various types of flights you may make in our aircraft?

4.6 TUG TYPES

At the time of printing, we have the following tug aircraft:

- 3 Robin Regent DR400-180Rs
- 1 Piper Super Cub with a 180 hp engine
- 1 Piper Pawnee C with a 260 hp engine

4.7 INITIAL TRAINING

New tug pilots will be trained only on the Regent. For pilots already experienced in towing, see para 4.8.

4.7.1 Conversion to Type

Read the brief type notes in this manual and read the Flight Manual for the type, which is held in the office. The type notes are for information; the Flight Manual is the definitive CAA-approved document although it will not contain detailed Lasham procedures. Have a photocopy of Annex A ready so that it can be filled in as exercises are completed. Use the DI notes to inspect the type at a quiet time. Arrange with check pilots listed at Annex G to do the type conversion. If you have no previous experience on the type, then the conversion starts on specific training flights without towing. As much training as is needed is carried out until the pilot can demonstrate consistently good performance at all the exercises listed in Annex A and until your instructor is prepared to sign this form and your logbook as okay for solo. The next step is to do some solo flying; the minimum is to fly 6 full stop landings, the first 2 of which should be observed. Pilots who are not tug pilots must do at least 10 landings on 3 different days.

4.7.2 Conversion to Towing

Once the solo flying on type has been completed, photocopy the page containing Annex B and one of the check pilots will fly with you while you convert to towing gliders. At this stage you should consult with the check pilot and you may put your name on the rota; however times when grid launching is likely to be carried out should be avoided as training is not to be carried out at this time. When this is completed to a satisfactory standard you will be cleared for solo aerotowing. Check pilots should then initial the conversion to towing form Annex B (which should be returned to the Tugmaster for record purposes), and also sign the pilot's logbook.

4.8 ALREADY EXPERIENCED TUG PILOTS

This applies to tug pilots with 200 hours or more Group A P1 time joining from other clubs. If they already have towing experience on the first type they wish to fly, they can be initially checked out to tow at Lasham by carrying out a BCF, followed by some dual towing as necessary to familiarise the pilot with Lasham procedures. If they have not flown the Robin or Cub then proceed as at para 4.7. This may involve some non-tow flying as well as the necessary tows depending on experience but these pilots do not have to do the solo flying if they show competency on type.

4.9 CONVERTING TO OTHER TUG TYPES

Continue on the type used for initial training until 150 incident free tows have been completed (50 for experienced tug pilots joining from other clubs). Pilots can then convert to the Super Cub or Robin. Conversion to the Pawnee will then follow at the

Tugmaster's discretion, which will depend on experience but will require a minimum of 50 tows in the Cub.

4.9.1 Experienced Pilots – Second Type

If you already have 5 hours P1 on type (or 2 hours towing) at another club, you can have a check flight whilst towing. If there are no gliders to tow, you may opt for a check without towing, and check pilots can allow pilots who fly well with the type to go on to solo aerotowing.

4.10 CONVERTING TO THE ROBIN REGENT

Read the notes on the type in Annex C and read the Flight Manual held in the office. Although an apparently simple aeroplane to DI, there are some less obvious points that check pilots should cover; things like the right amount of play in the flaps, the u/c oleos, cowling/starter clearance, canopy slides etc. As the Regent has a wing drop at the stall, the conversion will include stalls from turns and in the approach configuration. The Regent is rather under-flapped (i.e. full flap produces little drag) and speed control on the approach will be covered. As Regents have finer pitch 4 blade props than other types they are easy to over rev, engine handling is an important part of the checkout.

4.10.1 Following the Dual Checkout

For pilots without previous experience on type, the checkout is followed by solo flying, at least 6 full stop landings (2 of which must be observed), followed by a check towing gliders. The pilot's log book is then signed as okay to tow with the type, the form at Annex B is completed and the Authorised Tug Pilots Sheet on the notice board will be updated in time.

4.11 CONVERTING TO THE SUPER CUB

Read the notes on the type in Annex E to this guide, and read the Flight Manual held in the office. The flying training will usually begin with non-tow flying especially if it is also a conversion to tail-draggers and will concentrate on ground handling, especially take off and landing technique. These must include crosswind landings, which can be done on an inactive part of the airfield, recovery from bounced landings, and 'wheeler' landings. Checkout leads to solo flying, paperwork, etc as for the Regent in para 4.10.1.

4.12 CONVERTING TO THE PAWNEE

Read the notes on the type in Annex F to this guide, and read the Flight Manual held in the office. This is followed by a briefing by one of the check pilots and where considered necessary a check flight will be carried out in the Super Cub. Once the briefing is complete the pilot should carry out some taxiing to get used to the feel of the aircraft and the attitude on the ground. This is followed by a flight of at least 30 mins, which should include general handling and stalling both clean, and with flap. On return, a number of full stop landings should be made which the check pilot must observe. Once the pilot is showing competency and feels happy he is allowed to start towing, a minimum of 6 landings must be carried out. Paper work is completed as at para 4.10.1.

4.13 TOUCH AND GOES

It must be noted that throughout the training and at any time there after touch and goes are not to be carried out except when one of the check pilots listed at Annex G is on board the aircraft. This is to ensure that there is no possibility of pilots continuing a take off when a winch wire is in the air. Therefore all solo landings must be full stop and full take off checks must be carried out before departing.

4.14 LASHAM TOWING BI-ANNUAL CHECK FLIGHTS (LTBCF)

The LTBCF should be treated as an opportunity to learn and to brush up on any points you wish to cover (see para 1.12). LTBCFs are carried out by those pilots listed at Annex G and will take about 35 mins.

4.14.1 LTBCF Syllabus

The content of the check flight may take the form of those exercises listed at Annex K or at the check pilots discretion. The LTBCF must however include the following:

- At least one tow - points to note will be lookout, engine handling, circuit procedures, descent technique, noise abatement procedures, etc.
- Engine failure after take off (EFATO).
- Engine failure/fire at altitude (above 1700 feet).
- Stalling both clean and with flap.
- Go-around from finals or base leg.
- One of the written papers at Annex L (should be carried out orally and used to bring out any points for discussion).

Anyone not reaching the required standard should refer to para 1.12 and in some cases where it is felt wise check pilots may validate the candidate for only one year. Once the flight has been completed and the ground exam taken the form at Annex K is signed and returned to the Tugmaster. This is kept on record and the list on the tug notice board updated.

4.14.2 LTBCF Validity

The LTBCF is valid for two years providing that at least 50 tows have been carried out at Lasham in the preceding 12 months. If your check is not current you should not fly Lasham's tugs (except at the discretion of the Tugmaster CFI or Operations Manager). LTBCFs are to be carried out in the three months preceding the due date, and will be valid for two years from the due date.

CHAPTER 5

NOISE ABATEMENT PROCEDURES

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- 5.12 MAP OF NOISE-SENSITIVE LOCATIONS

5. NOISE ABATEMENT PROCEDURES

5.1 THE NEED FOR NOISE ABATEMENT

Lasham, as a matter of policy, wishes to be as good a neighbour as it can to the people living around the airfield. We also wish to minimise the complaints about tug noise that we receive, mainly by telephone, on busy weekends. We do not operate the noisiest aircraft which fly in this area, those are civil and military helicopters and the occasional military fast jet but we do operate for long periods of time at lower noise intensity. Our 'good neighbour' policy is to minimise the effects of noise from the aircraft within our control, that is motor gliders, visiting aircraft, and particularly tugs, since, unlike motor gliders and visiting aircraft, they operate almost all the time we are flying. We manage this in various ways, firstly by limiting the first aerotow times (Para 1.1.7), and secondly by defining areas which tugs should try and avoid whilst towing. These areas are shown on the map which follows, and avoid-areas have been defined rather than set flight paths. A rigidly-defined flight path would not be able to take account of the varying winds, the location of thermals, position of the sun, and the differing speeds and rates of climb that are an inevitable result of the many different combinations of tug and glider. Furthermore, our neighbours living under such a rigid flight path would have a legitimate cause for complaint.

5.2 TUG TYPES

With the exception of the Super Cub all the tugs are fitted with 4 blade propellers and silencers. They also have good rates of climb, which make them the quietest tug available to us at this time. The total investment in hush kitting our tugs is over £20,000 and the upkeep of them is also costly. It is likely that in the future we may well have to spend more money as improvements are approved. These methods reduce engine power, but this is a price worth paying for better relations with our neighbours. It shows that we are serious about the matter, despite being well within existing CAA and European standards for aircraft noise.

5.3 PILOT'S KNOWLEDGE

New tug pilots must realise that Lasham takes the problem of tug noise very seriously. Every pilot has to be concerned about the noise the tug is making and arrange each flight so as it produces the minimum possible disturbance to the people below. Every tug pilot must be able to point out the Noise Sensitive Areas, and on every flight tug pilots have to plan their routes taking these areas into account.

5.4 MET CONDITIONS – SLACK WINDS AND INVERSIONS

Tug pilots have to be particularly concerned when there is little wind as sound travels furthest and the tug/glider combination is lower leaving the airfield vicinity. A low inversion makes things worse since sound tends to be reflected off the inversion and that part of the noise, which would normally travel upwards, can be reflected back towards the ground.

5.5 NATURE AND DIRECTION OF AIRCRAFT NOISE

Aircraft noise is principally created from the engine exhaust and from propellers, mainly the tips (or rotors in the case of helicopters); at the speeds that we fly, airframe noise is small. Fine-pitch props produce more noise than coarse-pitch varieties and once the prop tips go supersonic the noise increases by several orders of magnitude. Fortunately no Lasham tug has a supersonic prop but if you have heard

a Harvard or a 230 hp Rallye Minerva you will know what one sounds like. Prop noise is propagated in line with the prop disc and its frequency is related to prop rpm and the number of blades. The direction, amount, and frequency of exhaust noise depends on the engine rpm, the rate that cylinders fire, and the efficiency of any silencer; thus two-strokes create a higher pitched noise than four-strokes because for a given rpm they fire at twice the rate and the six cylinder engines of some tugs such as Pawnees also produce higher frequency noise than four cylinder tugs. Measurements made at Lasham on a number of motor gliders and tugs by scientists from Farnborough showed that all of our tugs and motor gliders were well within the legal noise limits for light aircraft (measured in decibels on the so-called 'A-weighted' scale, or 'dB(A)'), but that most aircraft have specific directions in which their noise is greatest, normally slightly ahead and abeam. Thus from the ground you may also notice that quite small changes in heading, 20 to 30 degrees often brings a noticeable change to the perceived noise. Because of the prop noise propagated in the direction of the wing tips, if you turn so that a noise-sensitive area is at the centre of the turn, it will receive the prop noise for all of the time of the turn. This can be more irritating than a short peak of noise during a straight overflight.

5.6 FLIGHT PATHS FOR TOWING

Towing flight paths as you climb out should not be directly towards or over the more noise sensitive areas, and there should be several small changes of heading but the overall flight path should cover as much ground as possible. Turns should avoid pointing the lower wingtip at a noise-sensitive area. Never 'avoid' an area by flying close around it, even up to a mile away. This is no help at all, in fact by subjecting those below to the noise for longer it is probably worse than overflying. Fortunately it is possible to plan routes that minimise the effects of tug noise and this no doubt explains why we are able to do so many tows with few complaints. The map shows that the SW sector between Bentworth and Burkhams House is the least populated area and should be used whenever the wind direction allows. Make every effort to keep the noise close to the airfield particularly during quiet periods such as early mornings, late evenings or when the winch is not in operation. If high tows are required for reasons other than soaring, try to tow over areas which have not been over flown during the normal towing of the day. Vary the towing patterns as much as possible.

5.7 HEIGHT

Noise is propagated in three dimensions away from its source, and its intensity attenuates in proportion to the surface area of a sphere as it expands away from its centre. The volume of noise perceived at a given distance is therefore inversely proportional to the cube of the distance away from its source; distance, in this case the height of the tug aircraft, is a very powerful noise reducer, but also bear in mind that the higher you are, the larger the area over which the noise is spread. Remember that on weekend afternoons, local residents may want a quiet time in their gardens and **any** noise may annoy them. Nevertheless, when above 2000 ft you have more freedom of manoeuvre, and above 2500 ft on high tows, you can make straight overflights of the noise-sensitive areas (an overflight may be less obtrusive than a turn round an area). To put these heights into perspective, UK air law allows straight overflights by light aircraft at heights down to 500 ft as long as you are within range of a landable field in case of engine failure.

5.8 AFTER RELEASE

Part of the careful engine handling needed after release is that in an effort to cool the engine gradually for the first 20 seconds, you must not over-speed it and allow the rpm to increase. This, combined with the Doppler Effect as you increase speed for the descent, can be very irritating to people on the ground.

5.9 DESCENT

On the descent keep the noise down by planning your flight path and height appropriately. Do not descend a long way from the airfield and then power you way back to the airfield. If you need to increase power in the circuit before finals, you are judging things badly.

5.10 PRIORITIES

Flight safety, saving the engine and noise abatement all take precedence over saving time or fuel or, worst of all, you trying to prove you are the Ace of the Base.

5.11 NOISE SENSITIVE LOCATION

The following is a list of noise sensitive locations. Tug pilots are expected to learn them and have to be shown them as part of their training. Also note their locations on the map on the following page. Distances and bearings listed in the table are in kilometres from the airfield centre, and bearings are in degrees with respect to the grid on the 1:50,000 OS Map (in effect, degrees true).

<u>NORTH WEST SECTOR</u>			<u>NORTH EAST SECTOR</u>		
Place	Pop.	Km & bearing from LAS	Place	Pop.	Km & bearing from LAS
Herriard Village (crossroads)	50	2.0 340°	Houses at Powntley Copse	80	3.2 080°
Herriard Grange area	10	2.7 315°	Weston Patrick Village	120	3.6 020°
Ellisfield Village & Manor	250	4.5 305°	Upton Grey Village	320	5.5 025°
<u>SOUTH WEST SECTOR</u>			<u>SOUTH EAST SECTOR</u>		
Place	Pop.	Km & bearing from LAS	Place	Pop.	Km & bearing from LAS
Lasham Village	130	1.0 190°			
Burkham House & Houses to the NE	25	2.3 255°	Shalden Village	180	2.3 125°
Bentworth Village NE end)	2.8 200°	Alton & Holybourne (1991 Census)	16,650	7.0 135°
Bentworth Village SW end) 360	4.7 200°			
) total				
)				

Bradley Village	140	4.2 245°			
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Some villages are rather spread out, Ellisfield and Bentworth are examples; Ellisfield has houses over about 2.5 km in a shape like an inverted capital 'L', whereas houses at Bentworth are along a 2 km line towards Medstead.

Please avoid over flying Avenue Farm at the North West corner of the airfield at all times except where flight safety would be compromised.

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CHAPTER 6

CROSS-COUNTRY AND FIELD RETRIEVES

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Para Subject

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- 6.3 GENERAL CROSS COUNTRY TOWING PROCEDURES
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- 6.5 TOWING NON LASHAM GLIDERS AWAY FROM LASHAM
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RETRIEVES FROM FIELDS

- 6.7 FIELD RETRIEVES - GENERAL
- 6.8 PILOT QUALIFICATIONS FOR FIELD RETRIEVES
- 6.9 FIELD RETRIEVES - PROCEDURES

6. CROSS-COUNTRY AND FIELD RETRIEVES

6.1 AUTHORISATION FOR CROSS-COUNTRY FLYING

Before any powered aircraft taking off from Lasham (other than ATC aviation movements) is flown away from the local area, the pilot must fill in the Powered Aircraft Movements Book which is kept in the Clubhouse. Booking In and Out in the Movements Book is both a Club and a legal requirement. The book was started after a non-Lasham light aircraft departing from Lasham was involved in a fatal accident and the emergency services were not alerted because there was no record of the pilot's intentions. The book is also checked regularly by Inspectors from HM Customs and Excise.

6.1.1 Lasham Tugs

In the case of Lasham tugs, authorisation for all cross-country flights must be given by the Tugmaster, CFI, or Operations Manager, and should be signed as such in the Movements Book. If these staff members are not available, then authority for the flight may be given by the Senior Instructor on the airfield. This instructor may not be a power pilot but will be in a position to advise on whether the tug can be released from Lasham activities, and on the weather and the time of sunset. In extremis, where time is of the essence such as to get a glider back before dark, verbal permission can also be given but make absolutely sure what you are being permitted to do before you depart. Those authorising a cross-country flight should expect to remain at Lasham to satisfy themselves of the flight's safe return. Both the tug pilot and those authorising a flight should be satisfied on the following points:

1. The pilot satisfies the relevant conditions and is in current flying practice on the aircraft type.
2. The tug can be released from the airfield. Local tows have priority, particularly when it is soarable or if they are needed to fulfil booked flights.
3. The weather is suitable, the last landing time is known and the flight can be completed in time.
4. Prior permission for a landing has been obtained from any other airfield concerned.
5. Royal Flights and relevant NOTAMs have been considered, and a sensible flight plan has been drawn up taking account of Airways, Control Zones, Danger Areas, etc. The route should also be written in the Movements Book along with the number of persons on board
6. The pilot is aware that he must sign the movements book on return.

6.2 CROSS-COUNTRY NON-TOW FLYING

This enables tug pilots to stay in cross-country practice, and is carried out at the pilot's expense. Authorisation for flight away from the local area is required (refer to

para 6.1). Consider taking a glider pilot with you in order to increase his experience of map reading and navigation.

6.3 GENERAL CROSS-COUNTRY TOWING PROCEDURES

It has to be remembered that glider pilots are rarely taught cross-country aerotowing, some may never have tried flying a glider level on tow and may never have been towed faster than the normal climb speed. Some may not even be aware that careful use of the airbrakes is needed should the tug have to descend on tow, although this is now taught to new glider pilots as part of aerotow checks. A careful briefing of any inexperienced glider pilot is therefore essential, particularly if from another club.

The safe conduct of the flight is always the responsibility of the tug pilot.

6.3.1 Radio

Radios should generally be available, and should always be used in case a problem develops on a long tow. The use of 129.9 MHz is recommended.

6.3.2 Rope Length

A long rope should be used for cross-country retrieves; it can be the difference between success and failure. The glider pilot may become fatigued on a long tow or may already be fatigued after a long soaring flight. A long rope allows the glider a greater flight envelope with respect to the tug, before any handling difficulties arise. On some occasions it may be advisable to tie or shackle two ropes together for long retrieves. Tie with a reef knot, and if using a shackle, make sure the pin is screwed fully in and is tight, if in doubt use a short length of locking wire to make sure that the pin cannot rotate out in flight.

6.3.3 Height

Height is safety for the glider (and tug) so climb as quickly as possible, within reason, to about 1500 feet. Then, if possible, set up a rate of climb of 50 feet/min which will help keep the rope tight and make it less tiring for the glider pilot. As only gradual descents are possible whilst towing, descending for clouds or airways ahead has to be started several miles in advance.

6.3.4 Flying Technique

On cross-country tows smooth flying with only slow changes of pitch attitude and power takes priority over maintaining an exact height. The glider pilot may be fatigued after a long soaring flight and the tug pilot should make it as easy as possible for him.

6.3.5 Navigation

Newly cross-country qualified tug pilots must either be accompanied by an experienced pilot on their first retrieve or have acted as navigator on a previous retrieve. In poor visibility or rough air the work load of maintaining a lookout, holding a constant speed, and navigating with the nose high attitude that goes with towing is quite challenging and competent assistance can help ensure a safe and successful outcome of the flight.

6.3.6 Changes of Plan

We have had problems in the past when a tug pilot has retrieved a glider and has returned for another without this being cleared by those on the ground at

Lasham. We want to retain flexibility, but be aware of the problems this can cause, especially in non-radio aircraft. We do not want to take overdue action unnecessarily; keep Lasham informed of what you are doing.

6.4 INITIAL CROSS-COUNTRY TOWING AUTHORISATION

Once you have done a minimum of 250 tows, you can obtain an initial cross-country towing authorisation from the Tugmaster. This will involve a two-part test, described below. Success in passing these two tests will be indicated by an entry 'cleared for cross country towing from airfields' signed in the pilot's logbook:

PART 1 Preparing a flight plan, using a latest edition map, for a typical cross-country tug activity. For instance, a midweek flight towing a Discus back to within glide range of Nympsfield, and then going on to Enstone to pick up a Ka6 to be towed to Lasham; assume there will be a Royal Flight from Lyneham to Northolt about an hour after your most likely departure time from Lasham, the wind is 270/15 and sunset is at 21:00.

PART 2 An oral test covering the following questions:

1. Which tug to take?
2. Can you or should you take a passenger?
3. How many ropes are you going to take what rope length are you going to use, is it legal?
4. What factors have to be considered before seeking authorisation for the flight? How do you book out, do you have to book in?
5. Which airfields are open to non-radio aircraft? What is a correct non-radio joining procedure?
6. Describe the R/T procedure you would use for a retrieve from, say, Shoreham. How much fuel do tugs use on these flights?
7. What speeds are you going to tow at, how will you know if this is too fast or too slow?
8. What briefing are you going to give the glider pilot if this is his first ever cross-country tow?

6.5 TOWING NON-LASHAM GLIDERS AWAY FROM LASHAM

Authorisation is required for the flight as in 6.1 and cross-country towing clearance as in 6.4. First agree where the glider will release and work out the charge on the current price per kilometre basis, try and collect the money before the flight. Release will normally be at a good height within easy gliding range of the glider's destination. If the pilot cannot pay, write his name and address clearly on the log so the office can issue the bill correctly. Failure to do this means you become responsible for the cost of the flight. Agree the route, R/T frequency, towing speeds and the wave-off point before take-off. If the glider does not release, continue to his destination airfield. If necessary, use two normal ropes tied together unless the flight is short such as towing to the clubs at Odiham, Farnborough or Parham.

6.6 CROSS-COUNTRY RETRIEVES FROM OTHER AIRFIELDS

If you wish to do a cross country retrieve involving an away landing at another airfield, including other gliding sites, authorisation is required for the flight as in 6.1 and cross-country towing clearance as in 6.4. If more than one pilot wishes to fly the retrieve, priority will be given to pilots who have done their share of the local tows on the same day.

RETRIEVES FROM FIELDS

6.7 FIELD RETRIEVES - GENERAL

Authorisation is required for the flight as in 6.1 and cross-country towing clearance as in 6.4 and in addition, pilots must have clearance for field landings in tugs signed in their logbook by the Tugmaster having completed the Field Retrieve Course (see Annex M). The authorisation list kept on the tug notice board should also indicate that you are cleared for field retrieves.

6.7.1 Choice of Tug Type

Whenever possible the Pawnee followed by the Super Cub will be used for a field retrieve. The Robin Regent will not be used for field retrieves because of its lack of effective flaps and consequent higher threshold speed, longer landing run and poor prop clearance. If the Pawnee and Super Cub are not available, consult the CFI or Tugmaster.

6.7.2 Pilot Qualifications

These are listed below and authorisation to carry out field retrieves is reviewed every March, currency and experience being taken into consideration. If necessary some refresher training will be carried out before being re-instated to the field retrieve list. Note: if you do not do an above average amount of flying, the field retrieve qualification will lapse.

6.8 PILOT QUALIFICATIONS FOR FIELD RETRIEVES

Once the pilot has the initial Cross Country Rating, 3 years towing experience, and suitable cross-country and field landing experience in gliders (preferably be a Field Landing Instructor on the motor glider), he may be asked if he wishes to undertake the field retrieve course. Only pilots who show above average ability and have completed a large amount of flying in the past two years in both tugs and gliders will be invited on the course. Before attending, the pilot should read some of the excellent chapters covering glider field landings in various gliding books. Success in passing these tests will be indicated by an entry 'cleared for field retrieves' signed in the pilot's logbook. Having obtained the ratings to carry out field retrieves the requirements listed in 6.1 apply to each individual flight.

6.9 FIELD RETRIEVE PROCEDURES

These are covered fully in Annex M which covers the field retrieve notes and syllabus for the field retrieve course.

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