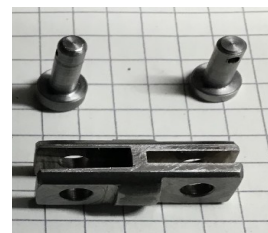


**SAM 35 TETHERED CAR INTEREST GROUP (TCIG).  
GUIDELINES FOR TETHERED CARS AT BUCKMINSTER SEPT 2023.**

Here are some guidelines and information on matters which might not be familiar to anyone who wants to make Retro/Vintage/Sport type and propeller driven tethered cars (aircars) and get involved. It will not be possible to cover all possible aspects here, just some of the main points and FAQs. It should be helpful for all SAM 35 Tethered Car Interest Group track users, and the SAM 35 Secretary Nigel Bathe at [nigel.bathe@gmail.com](mailto:nigel.bathe@gmail.com) is the contact.. It should be noted that there are 2 separate car groups using the BMFA track, the TCIG and the BTCG, the latter covering gear-driven cars only and catering generally for the faster type of cars. Many car enthusiasts with wide interests covering all types of car attend both groups' meetings. A distinct set of guidelines for BTCG operations is being compiled and will be published by them to interested parties shortly. Hugh Blowers at [h.blowers@btopenworld.com](mailto:h.blowers@btopenworld.com) is the BTCG contact.

The Buckminster track is built to the most common European size, and speeds are timed over 8 laps, representing a travelled distance of 0.5km. The actual radius from the centre of the pylon to the car centre line is 9.95m, and circle diameter is 19.90m.

The tether cables for TCIG cars are made from high spec piano wire to a specific design, to ensure safe operation within the limits set out in the table below, and have a FEMA-style connector to attach to the model, pictured here. These are NOT full International FEMA racing specification cables and are NOT suitable for such cars with their much higher speeds and stresses. We have arranged for a friendly supplier of the special TCIG Buckminster cables and the necessary connector to your car's bridle at very reasonable cost, from Pavel Pirov in Latvia. You can contact him at



[pps61@inbox.lv](mailto:pps61@inbox.lv) to buy your own cables by Paypal so that you can operate at the track at any available time, though they will be provided by organisers for formal events at the track. Each TCIG cable must be pull tested to the tension shown below before initial use from new and periodically thereafter, just like for control line aircraft lines. A lever-operated test rig is available and stationed in the timing hut at the track so that this can be fairly easily and safely done, as some of the test loads are large as you can see, even for these thinner TCIG spec cables.

**CAR CLASSES AND CABLES FOR BUCKMINSTER.**

CLASS	MAX WEIGHT		MAX SPEED		CABLE		PULL TEST	
	LBS	KG	MPH	KPH	Dmm	COLOUR	LBS	KG
1. 1.5cc	2	1	115	185	0.5	WHITE	55	25
2. 2.5cc	3	1.4	144	232	0.8	GREEN	131	59.5
3. 5.0cc	4.5	2	148	238	1.0	RED	196	89
4. 10.0cc	6.5	3	143	230	1.2	BLACK	275	125

To use the track in either an organised event or casually at other times, you will need to pay the standard BMFA Buckminster day entry fee for the site, and you must be able to prove that you have their standard flying

insurance which covers these cars. If you do not have or want BMFA membership you will need to take out the lower cost insurance only policy which can be arranged by phoning their head office. There is a special arrangement for visitors such as International modellers who do not have UK cover insurance to get temporary day cover free of charge by registering in person at the main Buckminster site office before running. Family members and spectators not running a car or using the flying field facilities are not charged the day gate entry fee.

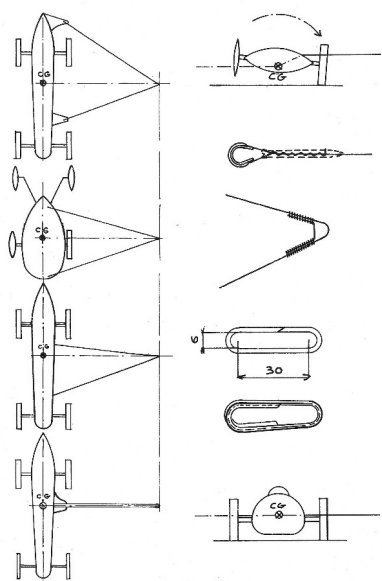
It must be stressed that single handed operation of tethered cars is not safe or allowable, you must always have a helper to man the centre pylon to "horse" your car away into its run, and this is a bit of an acquired skill for different types of car, so will require some practice. Small groups are to be encouraged, more fun. All cars should be fitted with an effective fuel (or spark ignition) shut off wherever possible for safe operation.

For aircars (propeller driven cars) where it is not possible to fit a shut off, a "smother blanket" like a heavy towel or special flag-like device must be available to stop the engine in potentially dangerous situations. Now that speeds are often reaching the 100mph mark for the faster aircars, most such cars (engine powered or electric) are already being fitted with radio controlled shut-offs with miniature onboard gear. This is to be recommended for any new aircar builds which are designed for such speeds. Do not fit large fuel tanks to aircars not equipped with a shut-off, just big enough to be able to start and complete the 8 laps with not too much more to spare is ideal, as the horser will be stranded on the centre pylon until the fuel runs out and the car stops, and other track users will be delayed.

We can not cover all aspects of car design here, but the method of attachment for the car by its bridle to the tether cable connector is a most important one. It is virtually impossible to specify bridles for all Old

Timer/Sport and Vintage tethered cars as the designs changed rapidly over the 1940s period to date. A common measurement is that the distance from the single attachment hole centre on the bridle is exactly 9 inches to the car centre line (British standard forever), and never shorter, or more than 10 inches. There are two main types of bridle: the “Pan Handle” style of mild steel (or Grade 5 titanium) bar, 2.0mm thick for 1.5/2.5cc, 2.5mm for 5cc and 3.0mm for 10cc cars. The other is the piano wire V type bridle attached to two hard points towards the front and rear parts of the car body. Make and attach these according to the car drawings that you are building from, but do ensure that the attachment hole in the bridle for the fastener pin is 4.5mm diameter for 1.5cc and 2.5cc cars, and 5.5mm for 5 and 10cc cars, and that the distance of the outer edge of this hole from the rounded end of the bridle is no more than 2.5mm for 1.5/2.5 cars and 3.0mm for the larger cars, otherwise you won’t be able to hook onto the tether line fastener pin. There is a really interesting and useful document available, the FEMA Technical regulations 2018 Rev 2, downloadable from [www.speedmodelcar.org](http://www.speedmodelcar.org), which covers bridle specs on pages 7 and 8. It covers all aspects associated with the design and running of racing cars and is well worth studying in depth, but be aware that they have 5 different engine capacity classes rather than our 4 for the TCIG on the Buckminster track, and much thicker cables (up to 2.1mm diameter) and other requirements because of the greater racing speeds and stresses.

It is essential to balance and trim your care for safe and successful running, just as for model aircraft, and the vintage diagram here from a 1950s French Vega car models brochure shows this (ignore the split connector

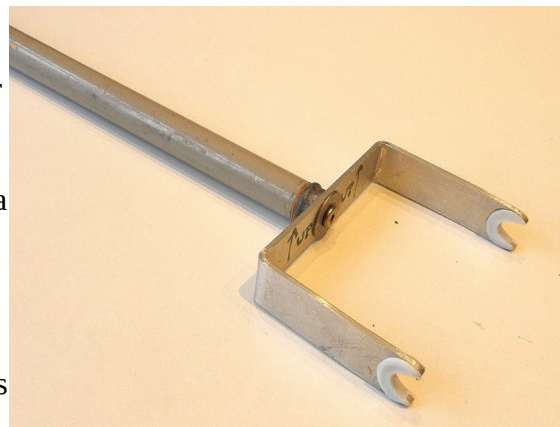


drawn, you will be using the different fastener type mentioned and shown earlier). You must ensure that all of the wheels are in meticulous and perfect alignment so that the car will track straight and definitely not into the circle, so check this carefully on a smooth, flat and level surface off the track. When suspended from the bridle attachment hole to the attachment fastener pin, the car must hang so that it is parallel to the ground, and must also hang exactly vertical from the line. Some old car plans and even some commercially manufactured cars have the bridle attachment point(s) incorrectly located, so you must ensure that all cars are checked and adjustments made by relocating wire bridle hard attachment points where necessary, or possibly relocating the position of bolted-on panhandle bridles, which may even require bending (usually upwards) to achieve the correct vertical hanging position on the line. Some ingenuity will be required to achieve this with improvised jigs, knife edge balances and string and gaffer tape, but you’re all modellers after all, so you’ll find a way.

How do you start to run your car on the track? This is easy and familiar if your car is a propeller driven aircar. Before you enter the circle, fuel up your

model to keep fuel off the track surface and give your engine a test run to get the settings (see the later section on safety aspects for doing this), then stop it, top up the fuel if necessary, enter the track and attach the tether line to your model with the approved fastener. Start up your engine, ensure that the horser at the centre pylon is ready, then after a signal just let go or give your aircar no more than a gentle push forwards, ensuring particularly that it isn’t pointing into the circle at all, then quickly get behind the safety barrier and watch your model accelerate up to speed with some gentle assistance from the horser to ensure that the tether wire doesn’t snag on the inner circle grass and get pulled off the track. This can be expensive, as sharp aircar props can nick or kink the tether cable and render it unsafe and useless, so it’s best to always have a spare one available between friends to save delay in getting a new one when this happens. If your car damages a cable provided at a SAM TCIG event beyond further safe usage as assessed by the event CD, you will be responsible for procuring and providing a replacement cable from Pavel Pirov, to save expense for other members. If you are going for a timed run, when the horser has climbed onto the pylon platform and your car is up to speed after a few laps, either raise your arm to signal to the timekeeper to start timing, or depress the digital timer start button if one is in use, and the run will be timed over 8 laps/500metres.

If you are running a twinshaft engine powered car, or one with a direct geared drive from a single shaft engine without a clutch fitted, you will need a starter push stick like the one pictured here. Make up the end from bent mild steel or medium hard aluminium of about 1 inch x 1/8” section with smooth semi-circular cut outs on the prongs to fit over your twinshaft engine’s crankcase housings or the actual rear axles on a gear driven car,



and bolt this securely to a broom handle or similar. The width between the prongs should ensure that these clear the car sides and do not foul the insides of the drive wheels. It is also possible to successfully use just a single prong stick on the inner axle, but some find the yoke type easier to use. Ensure that your engine is well set up in the pits in the designated running-up area, you will not be very successful trying to do this on the track. Use a 12v rc car type starter or a special purpose built box, or a good old fashioned starter cord on the flywheel for single shaft engines to start them to establish these settings. See the Safety section below for new guidelines on how this must be done. For twinshaft engines, it is possible to run them in with a suitable sized propeller in place of the drive wheels, and also achieve the settings under load to get close to the fastest track speed, but this has proved quite dangerous, so again see the new Safety section later. Warm the engine up briefly in the designated area only, then stop it and quickly top the fuel up if necessary before moving onto the track. You may need to give a further short test start and run when hooked onto the tether cable to make sure that the engine is still warm and ready to go, but keep all fuel off the track by using a protective towel or similar, and then when the horser is ready, give him a signal and place the push stick over the rear axles and apply downward pressure whilst starting to run forwards and vigorously push it away, to hopefully start the engine and get away. If you are using a glow engine rather than a diesel, the easiest way of operating is with an onboard automatic electronic glow igniter/timer and small lipo battery which cuts out around 15 to 20 seconds after setting, but some modellers still successfully use a twin wire lead with easily detachable connectors/croc clips attached to a battery firmly mounted on the push stick.

If you are using a car fitted with a clutch, starting will be either by cord in the flywheel groove or using a 12v aero engine starter with a special (readily available accessory) rubber wheel attachment pressed against the flywheel to turn the engine over. Getting clutch driven cars away on the track is much easier than for twinshaft and gear driven cars, as the car starts to accelerate gradually from rest after release until the clutch is no longer slipping and full speed is achieved.

### **2023 SAFETY GUIDELINES UPDATE AND RECOMMENDATIONS**

Following experience gained over the last 3 years of usage of the track by many car runners, sometimes very painfully, it is sensible and necessary to implement the following protocols covering both safety and good practice aspects for all future Buckminster car events, and this is also strongly advised for all individuals using the track outside of the formal organised events:

#### **OIL ON THE TRACK.**

This has been a constant problem, with cars being fuelled, refuelled, or engines primed whilst hooked up to the tether cable at the starting point on the track. Follow the procedure mentioned earlier of test starting and warming up the car off the track and refuelling before hooking up to the cable, and always use a protective towel or cloth if you need to prime the engine on the track before starting. Clean up any accidental fuel spills yourself as soon as it is safe to do so, to keep the track safe, clean and faster for all.

#### **TEST RUNNING OF TWINSHAFT AND GEAR DRIVEN CARS.**

We have experienced a number of unpleasantly painful injuries accidentally inflicted on car users during test running and setting up engines for achievement of high track speeds in the pits area. The very high revs being achieved by 2.5cc twinshaft engines have shown up the danger from the breaking up and flinging off of the tyres from the centre mounting discs on the type of tyres used. This has occurred with tyres from all of the main sources (RRC, Pirov, Bogdan and Redfin), and frequently happens when the engines are leaned right out under no running load, almost a shaft run, which should never be done, and also when the fuel cut out is operated, with a final screaming lean stop. Even some larger, beaded clamp style tyres on non-twinshaft engines have been observed lifting away from their wheel centres.

The practice of running twinshaft engines with an airscrew/propeller on one shaft replacing the wheel/tyre assembly has also produced a number of other accidents, particularly where the victim had been single handedly holding the car with one hand and starting the engine by flicking with the other, and then adjusting the needle valve and/or the compression screw setting for peak revs. This single-handed running will no longer be permitted at events, and even a 2 person team approach has presented some accidents too, so is no longer permissible. This practice will anyway be unnecessary with the measures to be implemented as below. For running in of these engines at home, the propeller method provides a way of doing this



with a suitable load, but the engine must be removed from the car, both wheels removed, and securely bolted to a mount and clamped in a test stand such as a B&D Workmate for safety, as per the image above. These practices are obviously not acceptable for the safety of either the individual car modeller or others, including spectators, in the pits area. Accordingly, no engine running or testing of any kind will be permitted at individual tables in the pits from here on. Not such a problem as it sounds, read on for a better approach which will not only be safer for all, but result in easy and surer achievement of near optimal engine settings under track-like load, with massively reduced risk of tyre break up.



There will be a dedicated table set up at all TCIG events in a TBD designated safe area, chosen to be the safest for pit users and spectators, where ALL running of engines on all types of tethered cars must be performed. NO engines to be run at individual tables.

There will always be a "Rolling Road" device at this table, owned by the BMFA, available for everyone to use and suitable for all twinshaft and gear driven cars, to test run engines to achieve desired track load settings. You may choose to use your own usual starting device to start your engine, the rolling road is of course not self powered, it is driven by the car's rotating driven wheels when placed into

position on the rollers. This will provide a very safe way for everyone to get a good engine setting to obviate the need for multiple test runs in the pits and on the track.

There will be yet another facility provided for starting and testing of twinshaft and gear driven cars as an alternative to the rolling road, on the rear tyre of a good old fashioned upturned bicycle, as used for decades in many countries. This will not only start engines, but provide a load on the engine when it is running, like the propeller on the rolling road. Additional load can be applied by braking the wheel as appropriate.

The provision of these two facilities will minimise queueing for a test run as well as achieving a good engine setting which will only need final fine adjustment running on the track, a very well worth improvement for all track users, with vastly improved safety of operation for all.

#### **TEST RUNNING OF PROP DRIVEN AIRCARS.**

On prop driven aircars, there have also been too many instances of injuries inflicted by high revving, sharp propellers, usually to fingers and hands when single handed test running and adjustment is being performed. For all TCIG events, test running of aircars in the pits area at individual tables will no longer be permitted, and they must be run up at or near to the dedicated table in the designated location, at a safe distance from anyone using the rolling road. It is recommended that single handed operation is not practised, and a holder/helper is always present as well as the individual starting and adjusting the engine.

As mentioned earlier, with the faster aircars now running at around the 100mph mark, they should always be fitted with a fuel shut off, probably of the compact radio controlled type, as the heavy emergency blanket will give quite a shock load when it has to be deployed. This may not be easy or possible on most vintage style aircars, when the use of the emergency blanket will apply.

Well, admittedly the above is a lot of information to take in in one go for anyone, but don't let it put you off, it may be as well to copy or print it for reference for re-reading a few times at your leisure. The new safety guidelines are not draconian, and result from the experience we have gained, much of it the hard way, and a strong wish to ensure that all track users and spectators are safe from injury. Happy building, and keep circulating.



REVISION COMPILED BY: STEVE BETNEY.  
REVIEWED BY: NIGEL BATHE, SAM SECRETARY.  
MANNY WILLIAMSON, BMFA DIRECTOR BUCKMINSTER.