W3VC Buggy Handbook

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Contents

1 Introduction

This document is designed to introduce readers to the many joys and tribulations of being an Amateur Radio operator supporting public safety communications for the Carnegie-Mellon Spring Carnival "Buggy" races.

Of course, your main question is, "Why should I get out of my nice, warm bed at 05:30, when the sun isn't even up yet, and the wind chill factor is somewhere around 90 below zero, which may be fine for superconductivity researchers, but is suboptimal for flesh and blood, and let a radio slowly freeze to my fist?"

I don't know.

But I have a few ideas. First, public service is an important part of what Amateur Radio is all about. It's one of the reasons why the Federal government puts up with a lot of strange people who rarely wear suits and don't own TV stations (they even give us valuable RF spectrum, which people would happily pay them millions of dollars for). It's why your neighbors might not boil you in oil if your DX hunt interrupts their avid watching of Geraldo. It's also a way to fulfill a very important and often neglected part of American life, community. The same reasons apply at a more local level—Our Buggy-related public service is the main reason why we receive support and recognition from the CMU community.

It's also a lot of fun once you get used to it!

Why do buggy as opposed to some other public service? Cold as it is, it has its advantages. You can decide your participation level on a weekly basis (as opposed to most events, which are one-time and must be planned months in advance). Because practice makes perfect, our net actually has a Pittsburgh-wide reputation for professional operation, so you can learn how to do things "right." In fact, Buggy chairfolks have on occasion admitted that we form an important repository of operating knowledge that is available year after year even when their staff changes. And we're appreciated, Buggy officials have often commented on how essential we are to their operation, even to the extent of awarding us the "Spirit of Buggy" award for Sweepstakes 2003.

Two more reasons:

1. Once you get past the idea of cold, sunless risings, it's actually fun in a twisted kind of way. Buggy is a Carnegie Mellon tradition in which we have a unique way of participating.
2. We (the club and the whole Buggy endeavor) actually desperately need you.

The rest of this document looks vaguely like the following:

That's a lot of material. In a pinch, operators with previous net-operation experience can probably get by with sections 2, 3, 5, 6, and 7. Previous operators of this net should review sections 5, 6, and 7. But, let's face it, you're curious as to what we wrote, so why not read the whole document?

2 What is Buggy?

Buggy is a sport unique to Carnegie Mellon University. The basic idea is that groups of people beg, buy, or engineer vaguely torpedo-shaped vehicles (buggies) which conform to an incredibly huge and detailed set of construction and testing rules; teams of stalwart men and women push them up hills; and small people who actually fit inside them steer (including during the rocketing-madly-downhill phase of the event).

It's got something for everybody—mechanics, athletes, people who enjoy organizing, people who enjoy cold, and small people with a need for speed.

The actual buggy races are during Spring Carnival, but practice rolls ("freerolls") are held during the Fall roughly until it snows hard often and in the Spring from around when it stops snowing often. Freerolls are from sunrise until 09:00, the races themselves run from 08:00 until 12:00 on the Friday and Saturday (and Sunday, in the case of rain) during Spring Carnival.

2.1 Buggy People

Like any other religious organization, buggy has its own language. Much of it refers to individual roles, including:

Sweepstakes This is the group that organizes buggy. We primarily communicate with them about buggy-related matters.

Drivers These are the intrepid adventurers who actually fit inside and steer those contraptions. If you see petite people who look like they're wearing rock climbing gear, except with goggles, they're probably drivers.

Pushers These stalwart athletes push the buggies up the two (officially, five) hills on the course.

Mechanics Each team has one or more people involved in the design or maintenance of the buggies. In case of an accident, they immediately become vital, as only they know how to safely extract the driver from the buggy.

Chairpeople Each organization has one or more chairpeople who oversee the operation of that organization's buggy team. The sweepstakes organization itself also has a Chair, an Assistant Chair, and a Safety Chair, who coordinate the entire adventure.

Follow Car During practice sessions, each buggy or set of buggies is followed by a team-provided car or truck, containing various team officials, usually including mechanic(s). During races, there is generally a lead vehicle and a follow vehicle, both provided by Sweepstakes

Sweepers Sweepers are responsible for clearing the course of debris before rolls begin.

Barricaders Barricaders are technically responsible for directing traffic away from the course and shooing bicycles and joggers off the course. In practice, they're sometimes unmotivated, hungover, or just plain tired. There will be a section later on the care and feeding of barricaders.

Flaggers Each team provides one Transition Flagger and one Chute Flagger, who stand along the course between Panther and Monument and Monument and Chute respectively. The flaggers hold up special flags to help the buggy driver recognize where along the course they are (turns out it's hard to see the world when you're lying inside a buggy, inches from the ground), as well as being able to stop the driver if there unsafe conditions pop up further down the course. According to Sweepstakes rules, buggies may not enter the chute without a chute flagger, or the organization is subject to a severe fine.

Stop Flag A yellow flag with a black X symbol is the Sweepstakes-standardized flag instructing a buggy to stop. Teams whose buggies ignore stop flags are subject to fines from Sweepstakes.

3 How do we relate to Buggy?

While it's sometimes easy to become confused about just how we relate to the whole endeavor, the basic idea is pretty simple. *Our job is to communicate information related to public safety to and from the people in charge of the event.* That's it. Though it's sometimes difficult to keep this in mind, our job does *not* include

- Forcing various people to do their jobs.
- Setting up, taking down, or finding roadblocks.
- Directing traffic.
- Helping buggy teams improve their performance.
- Helping irate buggy teams lodge complaints.

We may do some of these on a volunteer basis, particularly under time-crunched situations such as pedestrians or traffic on the course (though we should generally attempt to arrange for them to be done the "correct" way). Most of these we should not do—it's important that we don't, because we will tangle chains of command and get people angry with us.

So what *do* we do? We participate in the Buggy Safety Net, and despite the cautionary text above, our operators are often the most alert people on a given corner, and their contact with the Sweepstakes Chairs (via net control) does give them some minute measure of authority. However, any action taken that is related to the above list *should* be relayed to net control.

However, before I dive into nitty-gritty detail about the Buggy Safety Net, I'll explain a little about amateur radio nets in general.

4 What is a Net?

4.1 Net Structure

A net is a group of licensed amateur operators convening on a frequency for communicating about something. There are public service nets, submarine-enthusiast nets, message-handling nets, university nets, USENET-member nets, and so on. While the topics may vary, there are certain common elements which you should know about:

Net Control One operator at a time is chosen to control or coordinate use of the frequency. The Net Control operator (often called "Net Control" or just "Net" for short) usually opens the net, which may involve choosing a frequency from a set or range, and usually involves some sort of announcement. Net Control usually maintains tight control over who is using the frequency at any time, by such methods as message priority or round-robin scheduling. Net Control may move the net to another frequency or delegate control to another station. Often Net Control performs housekeeping tasks such as maintaining lists of other net members or announcing the time at set intervals.

Posts Especially in public service communications, each member of a net typically occupies a fixed location or post. Their job is to convey information between the net and other occupants of that post.

Tactical callsigns Often net members identify themselves with names relevant to some net-related activity. For example, they may identify themselves by location ("Chute"), purpose ("Rover-1"), or name ("Dave"). In all cases, though, these "tactical" callsigns are used *in addition to* FCC-issued callsigns, which must be used for identification every 10 minutes and at the conclusion of a session.

4.2 Net Procedures

Opening The Net One operator, usually chosen before the net, perhaps on the basis of geographical location or rotating responsibility, establishes the net on a given frequency. For "phone" (voice) nets, this usually sounds a little like the following:

> **KA3YAI**: Is this frequency in use? This is KA3YAI. [pause]. Good morning. This is KA3YAI convening the Southwestern Pennsylvania SparcStation users' net at 07:00. This net meets every morning on the frequency of 28.310 megahertz to discuss the fine points of operating SparcStation computers. There will be a roll call to close the net. This is KA3YAI standing by for checkins.

Signing In Hopefully, other operators will join the net. This is done as follows:

> **AA4KK**: KA3YAI [release] KA3YAI this is AA4KK in Regent Square.

It is good operating practice to briefly release the push-to-talk button where I wrote [release] above. If you and another station are both signing on at the same time, the chances are good that one of you will talk at least briefly during the other's pause. In that case the pausing station should wait and try again.

If the net takes place on a repeater, there is usually a tone (called a "courtesy beep") which lets you know that the repeater heard you drop carrier. If you don't hear the tone, you may not have reached the repeater, or another station may still be transmitting.

If the net takes place on a simplex frequency, you'll just have to pause for about half a second.

Stand By After receiving some checkins, or at other times when things become hectic, Net Control will announce "Net stand by." This means that all stations should stop transmitting. If this takes place during signins, Net Control will usually acknowledge the list of stations heard so far:

> **KA3YAI**: Net stand by. Net recognizes AA4KK, JY97, and HC2NUF. Any other checkins?

But this could as easily be during another time:

KA3YAI: Net stand by. [1 minute pause]. All stations: the Red Cross representative informs me that we have a lost child. His name is Billy, he is seven years old, has blond hair, and is wearing jeans and a red shirt. Please call Net Control if you see him.

Obey Net Control In order for the net to accomplish its purpose, it is essential that everybody obey Net Control. The control station is often placed in a position with special access to information. Even if this is not the case, coordination of the frequency is very important. Net Control may delegate authority to another station in the case of an emergency, but this is the only case in which control over communication should stray from the Net Control station.

But How Do I Talk To Another Station? Good question. I'm pleased to see not *everybody* is asleep. Here are a few examples:

Chute: Net from Chute: query for Monument.
Net: Chute, go ahead.
Chute: Monument, is that really a flying saucer landing by your station?

Scaife: Net from Scaife: Permission to call Westinghouse?
Net: Go ahead, Scaife.
Scaife: Westinghouse, this is Scaife. Did you remember to bring my galoshes?

In all these cases, the initial dialogue with Net Control is to ensure that this is a convenient time for you to be talking (in other words, that your conversation won't interfere with the agreed-upon purpose of the net).

Signout Eventually, like all things, the net will end. Some nets end with a roll call. In that case, Net Control will call each station individually, to allow that station to comment or report on status at that location.

KA3YAI: This is KA3YAI operating Net Control. At this time I'll begin to close the net. When I call you, please give my call, your call, your status, and indicate that you are clear of the net.
KA3YAI: JY97 from KA3YAI.
JY97: KA3YAI, this is JY97. It's a gorgeous arid day over here. See you all tomorrow morning. JY97 is clear.

Other nets (usually those with many checkins) don't bother with signing out.

Net Closing After signouts, the Net Control station will close the net. This is done roughly as follows:

KA3YAI: This concludes today's session of the SparcStation net. We had two checkins. This net will meet tomorrow morning at 07:00 local time. This is KA3YAI returning this frequency to general amateur use at 07:15.

4.3 Nets and the FCC

In some sense, there's nothing special about a net. The fact that 10 people agree to meet every Sunday at noon on 28.450 to talk about lumber doesn't really imply much. For example, they don't "own" the frequency at that time (even if they've been meeting regularly for 10 years)—nobody does. While "good amateur practice," which the FCC encourages and sometimes vaguely enforces, would dictate that people should be aware of local nets and avoid colliding with them, it's very wrong to demand that people move off a frequency. Asking them politely will often work, but that's your only recourse, unless you're actually (not potentially) carrying emergency traffic.

There's nothing special about tactical callsigns, either. The FCC still demands that every station identify itself every 10 minutes and at the end of transmission. In a well-run net, Net Control will schedule such ID transmissions. However, it is the responsibility of every individual station to comply with all FCC rules.

And, of course, illegal transmissions are illegal regardless of net operation.

4.4 Interference

Aside from the issue of two colliding but valid uses of a frequency, there's the issue of interference in general. This falls into two categories, QRM (man-made), and QRN (natural). QRM can be either intentional or accidental. In either case the best policy is to ignore it.

4.4.1 QRM

Intentional QRM can come from a ham or non-ham who delights in causing consternation (examples include moaning, beeping, or running packet on a traditionally-voice frequency). To please this person the least, maintain your operating on the same frequency and *don't talk about the interference*. If you pretend you don't hear them, they might just believe you, in which case they have no incentive to continue. If you're actually losing messages due to the interference, Net Control should coordinate a switch to an *unannounced* backup frequency. If you can't hear anything but interference for a period of 2 minutes, you should monitor both the standard and backup frequencies.

Unintentional QRM is often much easier to deal with. For example, one morning our net was treated to the loud yawns and stretches of an individual who had gone to sleep while monitoring the frequency we were using. Unfortunately, he had forgot to disable the VOX on his rig...

More commonly, QRM comes from two mobile stations ragchewing on the frequency we're using. In this case, the best policy is to wait. If, after a while, the interference continues, mention it to Net Control, who typically has a sufficiently powerful transmitter to reach them. In our experience, this type of situation is always solved by polite requests.

Keep in mind that FM receivers lock on to the strongest signal, so even if we can all hear a distant station on our frequency, our proximity may allow us to override it within our local area. In this case interference is only a minor annoyance.

4.4.2 QRN

For our purposes, QRN is not usually a problem. Frequency Modulation (FM), which is effectively universal for handheld and mobile transmitters like ours, is fairly resistant to QRN. That is, FM receivers "lock on" to the strongest signal and ignore others. Luckily for us, the closest signal is almost always the strongest, so a handheld radio putting out a quarter watt will override somebody running 50 watts out by the airport.

AM users employ a variety of coping strategies, from patience to DSP, which we won't cover in this document.

5 Our Net

In this section I'll describe what you need to know to operate as a member of our net, the Carnegie Mellon Buggy Safety Net. You should probably read this section more than once to give things a chance to sink in.

5.1 Background Information

5.1.1 What You Need To Operate

In order to operate as a member of this net, you must possess the following:

- Eyes
- Ears
- A voice
- Appropriate clothing
- An appropriate attitude
- An alarm clock

You'll need an FCC-issued amateur radio license to operate on the net, but you're still encouraged to come to rolls if you aren't yet licensed! We can always use more help, and you'll be able to learn how our net works by shadowing a licensed operator. Getting licensed is not too difficult, it takes most people a couple days and exam sessions are available locally and even (as of 2023) online!

Having your own handheld radio (with the club's repeater frequency+squelch programmed in) is helpful, but the club generally keeps a set of 2m/70cm HTs which can be loaned out to members for buggy nets.

5.1.2 Safety Rules

This is a brief summary of safety rules. If you forget everything else, remember these.

- Keep transmissions *short*, in case somebody else has an emergency. While buggies are rolling, no transmission should be longer than 8 words ("Chute lead 1 2 3 follow clear query").
- The following are emergency conditions:
  - Buggy accidents (collisions, spin-outs)
  - Medical emergencies
  - Motorized vehicles on the course.
  - (to a lesser extent) Bikes and/or pedestrians on the course.
- Don't let anybody touch a buggy in case of an accident, except:
  - medics, of course,
  - the team's mechanic,
  - unless the situation will *clearly* get worse otherwise (example: the buggy will fall into Panther Hollow).
- Under no circumstances should you allow extraction of the driver to take place without permission from one of the following entities:
  - medics
  - a Sweepstakes Representative (Sweepstakes Safety Chair, Sweepstakes Chair, etc)
  - Net Control (representing one of the above two entities, this is rare)

  Please note that this list *does not* include representatives of the affected buggy organization.
- If there's an accident, keep unimportant people *out of the way*. You may need to yell at them to do so. **Don't get in the way yourself.**

- Meanwhile, *talk to Net Control.* Lots of people are very anxious about what's happening. You should give a 10-second status report every 30 seconds or so without being prompted. Do this even if representatives from Sweepstakes are on the scene, as others at Net Control may still be wondering what is going on. In particular, note the following in your reports:
  - Status of the driver (are they okay?)
  - Arrival of Sweepstakes officials or Medics
  - Extraction of the Driver
  - Passing of other buggies
  - Officials/Organization members leaving the scene
  - How the buggy is returning to the top of the hill

5.1.3 The Buggy Course

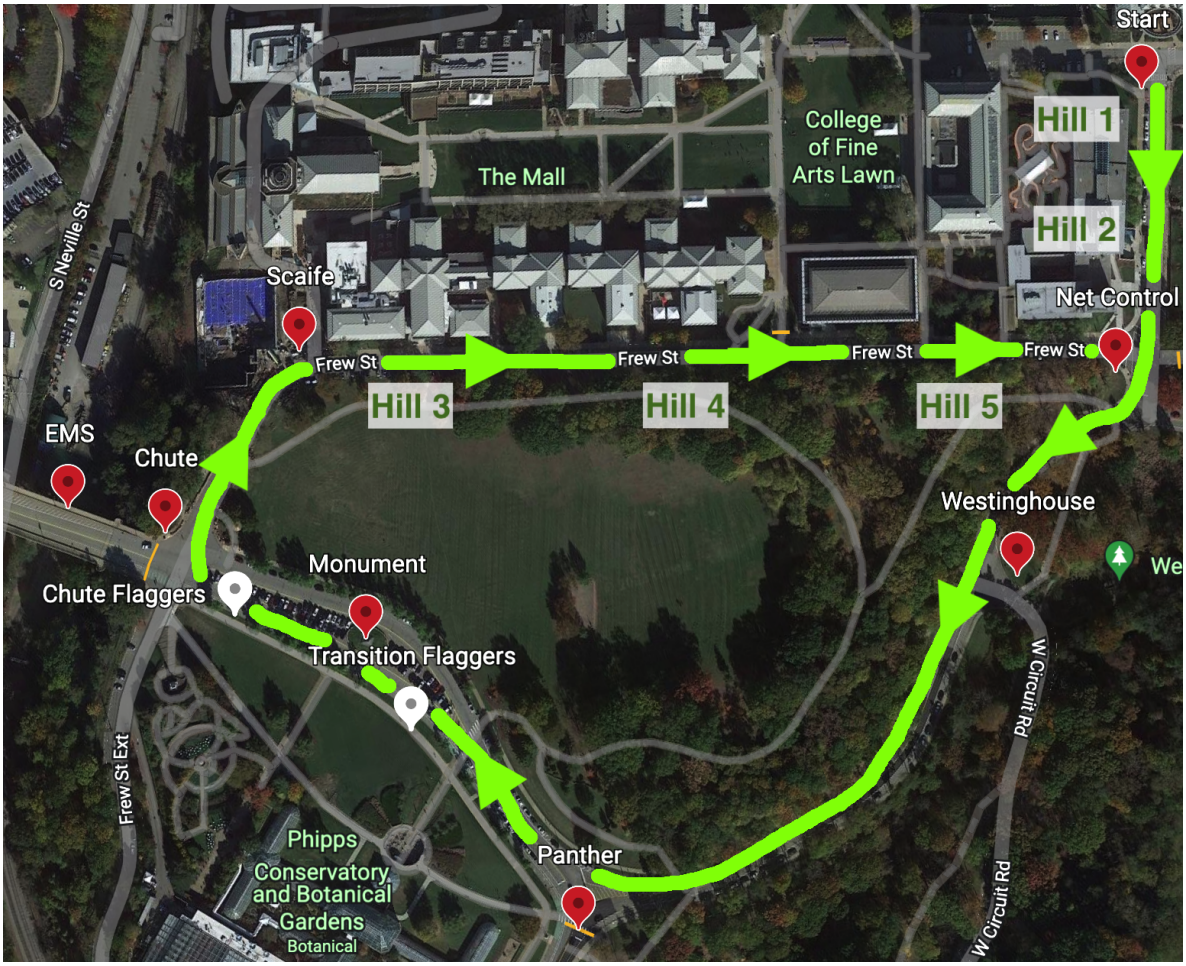

Figure 1: The Buggy Course

The buggy course is roughly circular, with an initial tangent (see Figure 1). Our operating positions are chosen to be some mixture of critical vantage points, vehicle traffic control points, and race official liaison points.

On racedays, all buggies are rolled starting at the position labelled Start, which (in front of Margaret Morrison Hall). Practice freerolls may start at that point, or (more often) at "top of hill" (where Net Control is located). The "Flaggers" are not radio positions but rather are provided by teams, and "EMS" is CMU's Emergency Medical Service, who may or may not check into the net.

Directions are most often expressed as "buggyward" (clockwise) or "anti-buggyward" (counter-clockwise). Also heard are "in the direction of buggy travel" and "against the direction of buggy travel," though these take longer to say and are easier to confuse.

Since the main function of most operating positions is to enable the race officials to track buggy progress, most positions have a reference point (when a buggy passes that point you should notify Net Control, even though convenience or your other duties may cause you to be physically standing somewhere else). If, in the below descriptions, no reference point is mentioned, it is either obvious or non-critical.

No vehicles, including emergency vehicles are to be permitted onto the course without the permission of Net Control.

Here are the possible stations, listed in buggyward order:

Start This station, located near top-of-hill, is operated only on race days and during Truck Weekend (the "dress rehearsal" weekend before Race Day).

The Start operator follows the Start official (typically the Sweepstakes Assistant Chair) and tracks their timer (alerting the remainder of the net of impending starts). Start transmits the last 10 seconds of the countdown and the pistol shot to the remainder of the net. Due to these extra transmissions, Start absolutely must have two battery packs, and should ideally have three as well as a shoulder mic.

Note that Start is very much a "shadow" position– the Start operator should follow the Starter very deliberately so that they can be reached at a moments notice. If we have enough people, it is quite likely that we will run both a "Start" and a "Shadow/Start" position, so that we always have an operator at the bottom of Hill 1 **and** someone with the starter.

Finish This station was historically staffed was a radio operator, as part of the old timing system. With the new system, this can be replaced by providing the timer officials with a scanner or radio such that they can hear traffic over the net (Finish does not need to make any transmissions).

Broadcast This station is located at the broadcast booth during Race Day, and does not call buggies as they pass. Instead it serves as a contact between the broadcasters (who are capable of making announcements around the course) and Net Control. Historically this station has been operated by one or more WRCT member(s).

TV This station is located inside the cmuTV production truck (located on the sidewalk near Hill 4) during Race Day, and does not call buggies as they pass. This station helps keep the TV producers (who are handling video feeds and such) constantly aware of what is happening on the course.

Net Control Net Control is responsible for all aspects of net operation, including liaison to (and between) Buggy officials, WRCT, Campus Police, and so on.

On Race Day, Net Control should be staffed by two people, one to actually operate the radio, and one (Assistant Net, or aNet) to talk to other people, manage information, and serve as a runner. While aNet is technically not required to hold an amateur radio license, it is common for Net and Assistant Net to switch positions during the day, so it is highly recommended that they be licensed anyways. aNet should ideally be used as a training position for operators who have not previously operated Net Control on a raceday.

Westinghouse The Westinghouse operator monitors the intersection by Westinghouse Pond and may act as liaison to the Pittsburgh Police, whose head Buggy officer generally parks there.

Panther This station is located at the near end of Panther Hollow Bridge. Buggies should be called as they pass the signpost at the center of the intersection. There should never need to be any vehicles entering the course at Panther, albeit some cars affiliated with Phipps may want to park on the road, behind the barricades.

Monument The Monument operator calls buggies as they pass the monument between Panther and Chute.

Chute This is probably the most safety-critical post we operate.

First of all, the vast majority of buggy accidents take place in the Chute, when drivers are often trying to simultaneously execute a right-angle turn and pass another buggy, while maintaining

maximum speed. Secondly, and because of this, most of the crowd danger during race day is at this post.

Though there are hay bales lining the course, people prefer to stand on or in front of them, instead of taking shelter behind them. Thus, the Chute operator needs to periodically chase people off the course, since the barricaders probably won't.

During practice rolls, cars are permitted to enter the Phipps parking lot or driveway, as the entrance to these doesn't overlap with the typical buggy routes. However, these cars should be carefully supervised by the chute barricader to ensure they stay on their approved path.

The Chute and Scaife operators have a slightly different status report than other stations: every positive status report should indicate that the course is "clear" (of all extraneous objects). Net Control will not allow buggies to roll unless Chute (and Scaife, when operating) explicitly claims that the course is clear. Chute should not call clear until all buggies have passed through the chute and are being pushed by pushers.

Scaife This station, right outside Scaife Hall (on the far end of the Chute), is useful for knowing exactly when a buggy has crossed the Chute and is being pushed up Hill 3. As noted above, when operating, Scaife is to call "clear" instead of Chute. Scaife should not call clear until all buggies have been picked up by pushers.

Chair Shadow On Race Day, an operator is assigned to shadow the Sweepstakes chair to provide information about course status, issues to be resolved, and time-to-next-heat. The Sweepstakes chair rides in the lead truck during heats. At finish, the chair generally jumps out of the truck to coordinate the next heat, before running down to start to get back into the lead truck for the next heat. This position involves a lot of running around (raceday is crowded, and it is imperative that the shadow always stay near the Chair) and requires an earpiece as it is quite loud in the trucks.

Safety Shadow On Race Day, an operator is assigned to shadow the Safety chair to provide information about course status, issues to be resolved, and time-to-next-heat. The Safety chair rides in the follow truck during heats. At finish, the Safety chair jumps out of the follow truck, runs down to start to complete drops with the just-rolled buggy, handles other safety coordination at start (this may involve them going inside teams' tents, in which case the shadow should wait directly outside the tent), and then gets back into the follow truck for the next heat. This position involves a lot of running around (raceday is crowded, and it is imperative that the shadow always stay near the Safety chair) and requires an earpiece as it is quite loud in the trucks.

and the Safety Chair (who is located in the follow truck). Shadows provide course updates to Sweepstakes, including any issues to be resolved and time to next-heat. Shadows must have earpieces as it is quite loud in the trucks.

Rover Rover, as the name suggests, is not tied to a particular location. Rovers are handy to have on any day, but are especially useful on race-day to deliver things or take over for another operator that wants a break. It is common to assign a rover position to an operator the first time they come to freerolls, allowing them to see how each position on the course works.

5.2 Course Status

In theory, the course has two states: open, and closed. "Open" is the normal state (random parts of the populace can drive or walk anywhere), and "closed" is what we strive for.

Some time before we arrive, barricaders will arrive and set up their barricades to close the source At the end of the day's events, an official will again circumnavigate the course to open it.

Note that the responsibility for opening or closing the course rests with the Buggy officials (who make the decision) and the barricaders (who implement it), not with us.

5.3 Barricaders: Care and Feeding

Many barricaders are good-natured and reasonably willing to do their job. On the other hand, especially toward the beginning of Fall freerolls, they often don't know quite what that job is and so they will often be drunk, hungover, asleep, or just simply wanting to be anywhere else.

Basically, they are supposed to make sure that nobody except buggies is on the course, and that any errant folks are politely but firmly asked to stay off the road.

In some cases, radio operators may need to supplement the barricaders especially in dealing with pedestrians trying to enter the course.

If your barricaders are absent, inform Net Control. If they're misbehaving in a manner which is a threat to safety, try talking to them about it. Otherwise, inform Net Control.

On the other hand, if one of them is freezing to death, offer to take over for a few minutes while they go inside to warm up (sadly, most of them are unable to return the favor).

5.4 Interacting With Traffic

If somebody does want to move a car, the barricader should warn them of the safety hazard they'd cause by not waiting, contact you, and wait for you to receive authorization from Net Control before allowing the car to leave. You should tell them in advance that this authorization may take a few minutes (it's up to the Buggy officials, not us, to grant it, and it often takes a while for Net to track down an official and get clearance).

Cars *must* exit in a buggyward direction unless you receive explicit authorization otherwise. Typically the car will be told to follow the next roll's follow car.

One exception is the small parking lot on the Oakland side of Phipps. Cars are allowed to park here (they're usually Phipps employees) as they are able to drive from the bridge to the parking lot without crossing the expected path of the buggies. However, they should only be allowed to go while being watched carefully by the chute barricader to make sure they don't go onto the course and the barricader should ask them to wait until there are no buggies entering the chute.

Aside from cars, you may run into stranger sorts of vehicular traffic. For example, occasionally some large truck wants to sneak in unnoticed with some multi-ton delivery (this also happens during Carnival with food concession trucks). Or perhaps Army ROTC wants to convoy trucks full of gun-toting students off into the sunrise. As opposed to other motorists, these "professionals" are usually fairly patient, especially if you're polite. Try to figure out exactly where they want to go, and how long it will take, before you contact Net Control. While you're waiting for a response, it can't hurt to explain to them that this is a safety issue and that you greatly appreciate their patience.

Politeness is very important— we're only *representatives* of *users* of the park area. We're very far from owning the place.

5.5 Police

In the course of our operations, we work somewhat loosely with both the CMU and Pittsburgh Police departments. Intersections internal to CMU may have a CMU Police car, while the borders between the park and Oakland usually have a Pittsburgh Police car (though they may arrive in unmarked cars as well). Their job is to make sure nothing bad happens; in practice, they usually either direct traffic away before it reaches us or lend their authority to the barricaders.

Sometimes they may decide to force traffic onto the course. If they do this you should encourage them not to, but *do not* do anything to aggravate them. If they insist on pushing traffic onto the course, call Net Control, who may have alternate means of resolving the situation.

Working with them is a chance to gain favorable publicity for Amateur Radio. Some of them have scanners and monitor amateur frequencies, so they may know a little about us. In fact, an increasing number of police have licenses, though I've not met any on the job so far. It's certainly appropriate to give them our frequency if they have a scanner, and it can't hurt to mention that licensing exams are local and cheap.

5.6 Interacting With Buggy Officials

Always be polite, though they may not always be. Try not to tangle their chains of command by taking too much on yourself. Remember, our job is to help them communicate, not to run Buggy.

If any sort of altercation arises, wait patiently and talk to Net Control or our representative to their organization.

On rare occasion, buggy officials will ask to talk directly to each other. This is perfectly reasonable, as long as you contact Net Control for permission, and inform them of the relevant restrictions on their

speech. Before and after allowing third party traffic, both operators must give their callsigns and the name of the individual who will be speaking.

Most importantly, make friends with them throughout the year. You're going to be spending a lot of freezing, cold mornings together - it's a lot more enjoyable if you're also friendly. Getting along with them will also mean that they trust you, and that makes everybody's life easier.

5.7 Parade Permits

The Buggy organization reserves the course through the city park organization [1] for every morning they hold free rolls. Since Buggy is officially a parade, they're issued a parade permit for each day. In theory, the club receives a copy of this parade permit, which we photocopy and distribute to everybody who is on the course. In practice, of course, this complex chain of events never happens for freerolls, and is likely to fail to happen for Race day. These permits can occasionally be useful in confrontations with rude idiots.

[1] CitiParks

6 Details of Net Operation

And now, we're done with theory. This section will be devoted to nothing but details of operation, such as how to use your radio and what to say into it.

6.1 Radio Hints

Here are a few tips on how to successfully operate a handheld radio.

6.1.1 Battery Power

You will almost certainly be running your radio on battery power. This means that you have no chance of operating successfully without charged batteries. Radio batteries take a while to charge, so plan ahead - start your radio charging the night before. It is highly recommended to have a backup battery and/or backup radio, especially on raceday.

6.1.2 Operating Your Rig

Be sure you know how to operate your handheld transciever (HT). The net is generally operated through a repeater owned by the club. Most modern radios make it very difficult to program a repeater using the front panel, so make sure to obtain and program the repeater frequency (and squelch tone!) before rolls. If you are unsure how to do so, talk to someone in the club who can help you, or borrow a club-owned radio.

Turn the radio on. If it hisses at you, adjust the squelch knob (often labeled "SQL") so that it's just on the boundary between noise and silence when nobody's transmitting. If your squelch is too low, you'll drain your batteries too quickly; if it's too high, you'll miss transmissions.

If people complain that you're clipping the beginning of your transmission, try pressing the "PTT" ("Push To Talk") button about half a second before you begin to talk. Most radios take a little while to start up their transmitters. Get a feel for the timing of your radio both on and off the repeater, and be aware that the time between pressing PTT and speaking will have to be a little bit longer on the repeater.

If it sounds like everybody else is clipping the beginnings of their transmissions, the problem may be on your end. Modern microprocessor-controlled radios often have a power-saver mode which disables the receiver most of the time. While this can save a lot of battery life in some situations, our net has fairly frequent transmissions, so this feature is likely to do more harm than good. See if you can disable it.

While you're talking into your HT, keep it one to three inches from your mouth. This keeps you from overloading the microphone. It's very important to keep your transmissions short—our frequency is busy, and somebody could be having an emergency in the middle of your monologue. If you have an emergency, feel free to break in on a long transmission—some people may hear you instead of the rambler.

Also, try to keep the end of the antenna at least two to three inches from your forehead. Keeping RF radiation (even the low levels we use) away from your body is a good habit to form.

Finally, good sense and the FCC both dictate that we use the lowest power levels that will do the job. For our purposes, we can almost always get by with the lowest power levels our rigs have.

6.2 Message Priority

Before you key up your rig, you should have some idea of how much what you're saying matters. Here is a list of most things you would want to say, in *descending* order of importance:

Emergency

Buggy Stop

Vehicle/Cyclist on Course

Radio Trouble

Calling Buggies

Vehicle Seeking To Leave Course Notice that this is not a high-priority item.

Comment / Off-Topic

Note that pedestrian situations can often be resolved by yelling at them, without the need to transmit at all.

6.3 Course Status

At the beginning and end of freerolls (and, if confusion mounts, in the middle), Net Control will call for the course status. This sounds a little like this:

> **Net**: Net time 06:15. All stations, proceeding in the direction of buggy travel, please report the course status at your location.
> **Panther**: Net from Panther: course is closed.
> **Net**: QSL, Panther.
> **Monument**: Net from Monument: course is closed.
> **Net**: QSL, Monument.
> **Chute**: Net from Chute: course is closed and clear.[2]
> **Net**: QSL, Chute.

Note that the Chute operator must report that the course is clear of all objects: buggies, cars, people, and debris. In cases where Scaife is operating, they would call clear instead of Chute. Calling "clear" entails that it is safe for the next round of buggies to begin rolling. "Clear" should not be called until all buggies have passed fully through the chute **and** are being pushed by pushers.

> **Panther**: Net from Panther: course is closed.
> **Net**: QSL, Panther. Thank you.

While they don't need to explicitly inform net that their location is clear, Panther, etc should inform net control if there is anything preventing safe free rolls at their location.

6.4 Calling Buggies

This will actually be your most frequent activity. As the first buggy passes the reference point at your location, call as follows:

> **Panther**: Panther. 1.

If buggies are close together, call them that way:

> **Panther**: Panther. 1, 2.

Call the follow car, too:

> **Panther**: Panther. 3, follow.

On race days, there will be a lead truck:

> **Monument**: Monument. Lead, 1.

In each case, you should expect an acknowledgement from Net Control:

> **Net**: QSL, Panther.

Avoid calling follow or safety cars as "car" as this is reserved for unexpected vehicles.

Use your judgment as to when you should call just one buggy in a transmission as opposed to waiting a little longer and calling more than one. The tradeoffs are:

Accuracy If buggies are far apart, delaying to call the second could mean that you don't call the first until it's reached the next station. This is bad.

Net Congestion If you try to send two messages instead of one, you have a greater probability of "doubling" (colliding) with another station. With some experience, you can judge how likely this will be given the locations of the stations and the number and locations of the buggies: you will know roughly when the next station should be calling.

[2] note: clear should only be called by Chute if there is no Scaife

6.5 Vehicles Seeking to Enter The Course

Ask the vehicle's driver where he or she wishes to leave the course *before* calling Net Control.

> **Scaife**: Net from Scaife: Vehicle requests buggyward to Net.
> **Net**: Stand by.

Some time later...

> **Net**: Scaife, you can send the vehicle after the *next* organization's follow car.
> **Scaife**: QSL, Net.

Make sure the driver understands it's absolutely necessary to stay behind the follow car and to be careful of pedestrians and buggies at the top of the hill. Call the vehicle as "extra" after you call "follow."

6.6 Objects on the Course

This situation always calls for good judgment on the part of an operator. For example, if a bicycle rides past you onto the course, traveling buggyward, and there are no buggies rolling, you probably can handle the problem locally (by yelling *politely* at either the cyclist or your barricaders). On the other hand, if a huge truck, swerving madly, exits hyperspace and proceeds anti-buggyward at 100 miles per hour, this is a major emergency.

In this case, you should immediately call a break (see below) and signal to nearby flaggers to try to stop any buggies that are still rolling.

The common case is somewhere in the middle: a car which was supposed to follow the follow car off the course instead proceeds anti-buggyward to the nearest exit. In this case, even though there is no immediate danger, you should inform Net Control of the irregularity:

> **Scaife**: Net from Scaife: car proceeding anti-buggyward toward Chute.
> **Net**: Where did *that* come from?
> **Scaife**: Looks like my barricaders were asleep.
> **Net**: Chute, where's the car?
> **Chute**: It left the course at my location. I'm closed and clear.
> **Net**: Thanks. Let's try to keep a better eye on things, ok?

6.7 ID Rounds

Let's briefly touch on a topic near and dear to the heart of the FCC (if, indeed, it has one): identification. We are required to give our FCC-issued callsigns every 10 minutes and at the end of a conversation. In theory, Net Control has a 10-minute timer running and prompts us for identification. In practice, Net is often a little busy, so some self-nominating station prompts for the prompt:

> **Scaife**: Net from Scaife.
> **Net**: Scaife, go.
> **Scaife**: ID round?
> **Net**: Good idea. Next roll is CIA. Looks like two buggies. Please identify as the first buggy passes your location. This is KB8FTA operating W3VC Net Control.
> ...
> **Panther**: Panther: 1, N7LEG.
> **Net**: QSL, Panther.

Of course, you can identify your station in any legal fashion: standard spoken English, the international phonetic alphabet, or even Morse Code (though the last is impractical with most 2-meter HT's and probably annoying besides).

Here is what a basic round might sound like during freerolls:

Net: Net Time 7am, Organization Apex, This will be an ID round, please ID as the first buggy passes your location.
Net: First buggy away, this is W3VC Net Control
Net: Second buggy away. Follow Car Away.
Panther: Panther 1, KB3ITH
Net: QSL, Panther
Chute: Chute 1, KD7ECQ
Panther: Panther, 2 Follow
Net: QSL, Chute
Net: QSL, Panther
Chute: Chute, 2 Follow
Net: QSL, Chute
Chute: Chute, Clear.
Net: QSL, Chute
Net: Net Time 7:03, Organization...

6.8 Calling Emergencies

If an emergency or other dangerous situation, your goals (in order of priority) should be:

1. Inform medical personnel of the accident.
2. Inform Net Control and other stations, so they can stop any buggies coming toward the emergency.
3. Ascertain and communicate the status of the driver, if possible.
4. After things are under control, Net Control needs to know when to resume rolls.

Let's say you're at Panther Hollow. As the second of three buggies passes you, you hear a loud noise, and the buggy stops. This sounds something like:

Panther: Panther: 1.
Net: QSL, Panther.
Chute: Chute 1.
Panther: Stop at Panther!
All other stations fall silent immediately.
Net: QSL, Panther. Please advise.
Panther: Driver 2 hit the curb. Panther 3
Net: QSL, Panther, safety is in route, please keep us informed.
Other stations may resume calling buggies, though they should stop doing so if it is clearly making trouble.
Chute: Chute: 2.

At this point the numbering often gets muddled. The most likely thing is that "downstream" stations will use numbering that makes sense to them: Chute has just called buggy #3 as if it were #2. This is likely to be confusing for Net Control, but it often actually happens.

Scaife: Scaife: 1.
Net: QSL, Chute, QSL Scaife.
Panther: Safety and EMS are on scene. Driver is okay.
Net: QSL, Panther
Scaife: Scaife: 2.
Net: QSL, Scaife
Panther: They're loading the buggy onto the follow car.
Net: QSL, Panther.
Panther: Ok, they're done. Panther: follow, safety.
Net: QSL, Panther.
Chute: Chute: follow, safety.
Net: QSL, Chute.
Scaife: Scaife: follow, safety, clear.
Net: QSL, Scaife.

Now, imagine the first buggy of three spins out and rolls over in the chute[3]. This is an emergency, so all other stations stop calling non-emergency events.

Panther: Panther: 1.
Net: QSL, Panther.
Panther: Panther: 2
Net: QSL, Panther.
Chute: Stop at Chute!
Net: QSL, Chute. Please advise.
Chute: The first buggy spun and rolled! Stand by.
Net: QSL, Chute.

At this point the Chute operator should be running toward the buggy, but watching out for buggy 2, which is probably still incoming. If you're first to reach the buggy, the first thing to do is report on the driver's status. The best thing to do is to ask them "How are you feeling?" (to see if they're conscious and alert).

Most likely a member of EMS will already be with you in the chute and will be responsible for assessing injuries. If they're delayed, try to get down so you're face to face with the driver (i.e. on your stomach) and talk to the driver. It's possible they're disoriented or scared after their crash and talking to them can help with that.

If EMS is there, let them handle talking to the driver. Your main priority should be to communicate the situation to net control.

In the meantime, nobody else should call anything but emergencies.

If appropriate, Panther and Chute should shout "Stop flags" to let the flaggers know there's been an incident and to signal the remaining buggies to stop before they enter the chute.

Chute: The driver says she's okay. EMS is talking to her now.
Net: QSL, Chute. Please keep us advised. Has the follow car reached you yet?
Chute: Nope. One buggy has passed me, though.
Net: QSL, Chute.
Chute: Ok. Follow and Safety have arrived, and they're extracting the driver. It looks like they might need a while to pick up all the wheels...
Net: QSL, Chute. This is a fine time for an ID round. Net time 07:45. All stations, proceeding in the direction of buggy travel, please identify. This is KB8FTA operating W3VC, Net Control.
...
Chute: Ok, they're done. Chute: Follow, Safety, clear.
Net: QSL, Chute.
Scaife: Scaife: follow, clear.
Net: QSL, Scaife.

Remember:

- Don't let anybody but medics touch a buggy in case of an accident (if the buggy is in danger (e.g. about to fall into Panther Hollow) then anybody may move the buggy as long as they won't cause further injury to the driver)
- Keep unimportant people *out of the way.*
- Don't get in the way yourself.
- Keep Net Control informed via short, frequent transmissions. This is **very** important. Net Control will be besieged by people wanting to know: is the driver Ok, where are the medics, where is the follow car, when can the course be cleared, how did the accident happen, when can the course be cleared, how much damage was there, how long until the course will be clear, and so on. Don't make Net Control drag each tidbit from you.

[3]During the last freerolls for Spring 1992, there were three consecutive spins in the chute.

Call "stop" for an unexpected stop - including a spin or a buggy hitting something. If there is a lot of radio traffic, you can preface your message with "break", indicating that you have an emergency message that needs to be transmitted. If you hear a break, **be quiet.** Note that the word "crash" should *never* be said over the net. Use "stop" instead.

Note that from time to time (especially during freerolls with new drivers in buggies with lots of bags tied on the back of them), a buggy will stop in the middle of the chute far short of where the Hill 3 pusher is waiting to pick it up (and the driver is holding the break while they wait). If it is clearly the case that the buggy "ran out of gas" you can either ignore it until the pusher gets to the buggy (assuming the pause was near the end of the chute) or call "pause", which prevents panic from ensuing when the buggy chairs overhear the call at the top of the hill.

Sometimes the driver will bring the buggy to a controlled stop for other reasons - e.g. their helmet slipped down or the sun is in their eyes. These situations should also be called as a "pause", though in some cases an extraction will be necessary.

If the buggy paused because of a stop flag being thrown, try to figure out why the flagger threw the stop flag and relay this information to Net Control.

In the case of a pause, the reason should always be relayed to net control so that Sweepstakes can make a decision on whether they are needed on scene. Additionally, if an extraction is required, the buggy org **must have permission from Sweepstakes**, though Sweepstakes does not necessarily have to be physically present.

6.9 Operating on Race Days

Though we spend most of our time operating for practice rolls, the top-level goal of the exercise is the official races during Spring Carnival.

There are a few important differences about operating on a race day. The first is the presence of a "lead" truck that needs to be called as "Lead" as it passes. Next is the heat timeline. Heats won't always follow one right after another like they do during freerolls, instead, they are started on a set schedule (generally 8-10 minutes "gun-to-gun"). This means we generally have a limited amount of time to do everything we need to accomplish between heats. The general timeline looks like:

- -2:00 Priority Traffic Only
- -1:00 Emergency Traffic Only
- -0:30 Net Stand By (only START should transmit at this point)
- -0:10 Start transmits the countdown
- 0:00 Gunshot (Net Control announces "buggies are rolling")
- 4:00 Heat Ends (Follow truck at finish)
- 4:15 Course Status Check/ID Round (note if you have traffic for the net during the course check, but do not transmit it until net control calls you back. If it is of priority or emergency nature, state such during the course check).
- 5:15 Resolve any outstanding traffic
- 6:00 Priority Traffic Only
- (Repeat, 8 minutes gun-to-gun)

Some other hints for operation on Race Day that we have learned through the years:

- The Chute operator will probably have to do some crowd control: people tend to stand on or in front of the hay bales between rolls, which is very unsafe during a roll. When you get the 1-minute or 30-second warning, shoo people back behind the bales.
- The astute observer will note that the heat schedule above leaves little time for things to be resolved at the end of the heat – especially if the heats fall behind and they start going 7 minutes gun to gun (or less). For this reason it is imperative that nonessential traffic (especially queries such as "What was the time for Spirit Womens B?") be kept to a minimum.
- Bring lots of extra batteries, antennas, rigs, and so on.
- Since there are a lot of people on raceday, wearing identifying clothing can be helpful. For this purpose, the club has very fashionable safety orange hats and vests.

6.10 Weather Tips

Weather is an important factor for both buggy and radio operators. If the course is wet or snowed in, the buggies just can't roll (but, since a light drizzle may end soon and dry soon after, go/no-go decisions are made by the Buggy Chairs, not by us).

When you're planning what to wear, remember that you'll be standing fairly still and that there is often substantial wind around sunrise. Both of these mean you should dress more warmly than you would think. For example, gloves are generally a very good idea to have. If you're unsure what to wear, layers are always a good idea.

Please do not call Net Control to report that it is raining. We can generally tell that for ourselves. If we get news as to what the organizers decide, we will tell you. (Note that occasionally after a drizzle Net Control may call and enquire about the condition of the course at your location)

6.11 Equipment Tips

At risk of being repetitive, I'd like to remind you to bring fully charged batteries, and spares if you have them. A full charge is pretty important—cold makes batteries work less well. If you're unsure whether your batteries are fully charged or not, ask for a spare radio - the club has loaners

6.12 Raceday

Raceday is really something special, and varies a bit year to year, but generally each operator will want to think about items on the following checklist:

- Lots of rigs (for net control, a second radio can be helpful for detecting if your transmission doubled with somebody else's transmission)
- Lots of batteries, charged, *checked*
- Extra mics, headsets, ... (ear pieces can be especially useful for hearing over the crowd)
- Cell phone
- Snacks, Water (other beverage)
- W3VC jacket/shirt
- Sunglasses. Possibly even sunscreen.
- Hat (especially if you have one of the flourescent "Emergency Communication" hats)
- cough drops (you talk a lot) and hand warmers (it gets cold)

The buggy coordinator should also send out a list of any specific things you need to know or bring on Raceday.

6.13 Closing Remarks

Buggy is many things to many people. For us, it's a mixture of learning experience, training, duty, aggravation, fun, and existential absurdity (mostly the last). Hopefully this guide will save at least a few people from being completely bewildered.

7 Operating Net Control

7.1 Opening the Net

To begin the net, first check to see that the frequency is not in use. This is mostly a formality, but it's also polite.

> This is W3VC, club station of the Carnegie Tech Radio Club. Is this frequency in use? [pause] Is this frequency in use?

Assuming there is no response:

> Attention all stations. This is W3VC, club station of the Carnegie Tech Radio Club, calling the Carnegie-Mellon Buggy Safety Net. This net meets every Saturday and Sunday during Buggy free-rolls from approximately 06:30 to 09:00 local time for the purpose of providing public-service and safety communications for Buggy. All amateurs not participating are requested to remain clear of the frequency for the duration of the net. Your assistance is greatly appreciated.

When you believe that your operators are probably at least near their posts,

> At this time we will ask all stations participating in the net to please check in with Net Control. Proceeding in the direction of buggy travel, please give Net Control's callsign, your callsign, your location, and request to enter the net. This is **(your callsign)** operating W3VC, Net Control.

As stations check in, write them down, so we can properly acknowledge the efforts of our members. When you think rolls are nearly ready to start, and as often as necessary until they do start, check the course status:

> At this time, all stations, proceeding in the direction of buggy travel, indicate the presence of barricaders, flaggers, police, medical units, and other official personnel, as well as the course status.

7.2 Closing the Net

To close the net:

> The net is now being closed. Proceeding in the direction of buggy travel, please give Net Control's callsign, your callsign, your location, the course status, and announce that you are clear of the net. Please inform your barricader to stay at their post until they are released by Sweepstakes.

When all stations have called clear:

> This has been a regular session of the Carnegie-Mellon Buggy Safety Net. The Carnegie Tech Radio Club would like to thank all stations who have checked in this morning, and those stations monitoring who so kindly remained clear of the frequency. This net will meet again at **(time/date)**. This concludes the net for today, at **(time)** local time. This is W3VC, club station of the Carnegie Tech Radio Club, now clear of the frequency.

7.3 Dealing with Interference

If there is *bad* (not merely annoying) interference, you may wish to try the following:

> This is a regular session of the Carnegie-Mellon Buggy Safety Net. This net provides safety and public service communications. All amateurs not participating in the net are requested to remain clear of the frequency if at all possible. Thanks. This is **(your callsign)** operating W3VC.

Annoying interference which doesn't cause messages to be dropped should be ignored. If you pretend you don't hear them, they might just believe you, in which case they have no incentive to continue.

7.4 Hints for Net Control

If you're Net Control, here are a few things to keep in mind:

- Ideally, the Buggy coordinator will have arranged for at least 2 operators other than yourself to show up to the hill. Listen for them to call in on the repeater. If they fail to call in and it is getting late, give them a phone call.
- You pretty much need two experienced operators–Net Control and Chute. If you end up without a second experienced operator, be sure to take a few minutes to go over (in person, not on the air) the special nature of the Chute position (remembering to call clear; notifying the medics if any other station calls a stop; other emergency procedures; extra batteries).
- The next most important posts are Panther (because the buggies aren't visible to anybody else at that point) and Scaife (to control traffic and watch parked cars), in that order. After those four positions are filled, you can fill in the any others as you see fit (Generally, Westinghouse and Monument are next). Note that you will also need a Start operator on Truck Weekend.
- Before you send everyone down the course, make sure to perform a radio check with each of them on the net frequency. Nothing is worse than discovering someone has a dead battery **after** they're already at Chute.
- Unless it is raining, don't run net control from your car. You need to stay close to the buggy chairs.

7.5 Notes on Interfacing with Sweepstakes

Running the net is generally just a matter of paying attention to what your operators are telling you, and providing information about the state of the course to the Sweepstakes Chairpeople. The things they are most concerned about are "is the course clear?" and "did a buggy just stop?"

While we are running the net we generally keep logs. Though there are sample logsheets available in the club's archives (as of 2023, Box), you are free to use whatever format is most comfortable to you. You should save the logs for a few weeks after a net, in case questions are later asked of you (e.g. EMS needs to write up an accident).

Generally, we don't care what the logs actually look like as long as they include the following:

- Time of heat/roll
- Organization
- Number of buggies
- Any stops that take place, and a basic description of the cause (blown tire, driver's goggles fogged, etc)
- Other abnormalities (car on course, ambulance called, etc)

8 Hints for the Buggy Coordinator

Generally, the Buggy coordinator has a few responsibilities (this may not be a complete list):

- Get a list of volunteers at the beginning of each semester, and a few weeks before RaceDay.
- If club budget allows, keep some cheap HTs on hand as spares / loaners (as of this writing, a workable dual-band HT can be had on Amazon for $30)
- Schedule Net Control operators and regular operators for every day freerolls are scheduled. Keep in mind that its best to schedule at least 3 (and preferably 4, in case one doesn't show) operators for normal weekends, and 5 for Truck Weekend.
- Assign positions and operators for Race Day
- Coordinate rental of Scaffolding for Net Control for Race Day. cmuTV handles this rental - ask them to order one more 2-story scaffold and pay for it appropriately.
- Ensure you are on the Sweepstakes mailing list and up-to-date with Chairmen's meetings minutes. If you feel it is necessary, attend Sweepstakes Chairmen's meetings as well.
- Informing Sweepstakes chairpeople about operating with our organization (especially things like "don't roll a buggy until we tell you its clear, please")
- Coordinate any Buggy Organization requirements through sweepstakes (e.g. Buggy Book Page, Tshirt/Buggy Book orders, etc)
- Try to coordinate with WRCT to ensure the Net Control operator can talk to them during Race Day

9 Glossary

These terms are related to radio operation in general:

AM Amplitude Modulation—encoding a signal by varying the amplitude of a carrier.

ATV Amateur Television. For our purposes, fast-scan, 440MHz NTSC video transmission.

DSP Digital Signal Processing. Feeding some signal (for our purposes, usually an audio signal) through a specialized computer, usually in order to enhance its clarity.

DX Long-distance (for example, international) communications.

doubling Two stations simultaneously transmitting on the same frequency. Doubling usually causes FM receivers (which we use) to select the stronger of the two signals ("selectivity") and AM receivers to receive some mixture of them.

FCC Federal Communications Commission—the people who issue amateur licenses.

FM Frequency Modulation—encoding a signal by varying the frequency of a carrier.

HT Handy-talkie. It turns out that some company owns the phrase "walkie-talkie". In addition, the original (military) walkie-talkies were backpack-sized; ours are noticeably more "hand-y" than that. Might also possibly stand for "hand transceiver"

QRM Man-made interference.

QRN Natural interference.

QSL I acknowledge your transmission.

RF Radio Frequency.

rig radio.

shack area of a building dedicated to amateur radio construction or operation.

VOX Voice activated switch (or something). A mechanism which begins transmitting roughly when you begin speaking, and stops transmitting roughly when you stop speaking.

The following terms are more specific to buggy, and are shamelessly stolen from the Buggy Book (a sort of "program guide" that the Sweepstakes Committee publishes every year):

buggy A three-wheeled vehicle that is built, maintained, operated, pushed, and driven by Carnegie Mellon students in preparation for the races on the first two days of Spring Carnival.

buggy team A buggy, five pushers, and a driver– usually a light, short female willing to put life and limb in jeopardy to pilot a buggy around the course.

bump & run A technique of shoving a buggy and then running to catch up to it that is used most noticeably by the hill five pushers.

capability test ("capes") A test, held on the sidewalk between the UC and the Purnell Center to check the buggy's braking system and the driver's range of vision when inside the buggy. The buggy must be able to stop within 35 feet after traveling at a speed greater than 17mph. A buggy/driver combination cannot roll the Sweepstakes course without first passing the capability test.

catcher The student who waits at the finish line to "catch" his/her organization's buggy in order to help it stop.

chairman The students who are in charge of an organization's buggy program.

chute The tight, right-hand turn halfway through the course at the end of Schenley Drive.

drop test A test of the buggy's braking system, performed after each heat on race day, and every morning before freerolls. The buggy must be able to stop within 15 feet after rolling down the sidewalk in front of the gym for 30 feet.

duct tape Adhesive tape– usually silver or grey in color– which, though not usually considered structural, is often used to hold various parts of the buggy together.

follow car Automobile that drives behind the buggies in each Sweepstakes heat. During freerolls, this contains the mechanics for an organization and the necessary tools for extracting the driver from the buggy safely. On raceday, the head judge, sweepstakes chairman, film crew, and WRCT sportscaster will ride in the lead car, while the follow car retains its safety-oriented purpose.

rollout The distance a buggy travels up Frew Street after coming down the chute before it slows down enough for the hill three pusher to being pushing it.

spin An undesirable situation in which a buggy's tires lose traction while going through the chute. This occurrence usually causes the driver to lose control of the buggy.

10 Credits

This document has existed, in some form or another, since 1992. Over the years, many generations of W3VC members have contributed to it. Following is a (possibly incomplete) list of everyone who is known to have contributed to this handbook and associated documentation (names marked with * made substantial contributions):

- Dave Eckhardt*
- Rob Siemborski*
- Michelle Mackie*
- Jeff Hutzelman
- Katherine Crawford
- Chris Tuttle
- Ben Wasserman
- Meg Richards
- Delaynie McMillan
- Anish Singhani