

DRAFT 1.21 The Camelback Handbook ARRL June VHF QSO Party Guide

Table of Contents	Page
Background	2
Planning	3
Packing, Loading and Repacking	4
AC Power	5
Baseband	6
Kitchen	7
Six Meters	10
Two Meters	13
222 MHz	15
432 MHz	18
Microwaves and LASER	19
Safety	22
Tower Guy Knots	23

Background

The Packrats have operated the June VHF QSO Party for decades, as a multi-operator event with gear operational on as many VHF, UHF and microwave bands as possible. Operations included setup in Hilltown, on private property, Spruce Knob WV, mountain tops in mid-PA, and since the early 1990's the club has operated from atop Camelback, a geological monolith that juts up in the Pocono range to a height of 2200' above sea level and is located in Big Pocono State Park, adjacent to Tannersville, PA. Traditionally, the event is scheduled for the second full weekend in June.

The unique advantage of this location is that we are able to drive to the mountain in an average of 100 minutes from most locations in the Philadelphia suburban area; there is a paved road to the top, a large parking lot, and bathroom facilities, running water and electricity available on site. This is one of the highest elevations in the eastern part of Pennsylvania with excellent horizons in all directions. There are a limited amount of commercial radio towers, and usually there is no significant interference, except for 902/903 MHz, where a good cavity filter keeps the receiver happy. As with any outdoor mountaintop facility, potential hazards are the weather, ants and ticks, deer, and the rare, but present bears.

This handbook was created through the joint effort of many who have come before us, current club members, and for the preservation of what has become to be known as "*The Packrat Way*." It is intended to be a living document, subject to revision, as quality improvement is a regular part of VHF contesting. Take the best of what worked one year and tweak it to make things more effective and efficient for the next year. Incorporate lessons learned. Modify plans to make the most of available equipment, operators, conditions and supporting roles.

We have entered the Multi-operator Unlimited class for as long as anyone can remember. Stations are set-up for operation on bands 50MHz through 24 and 47GHz if there is available gear. Small LASER communicators have also made their debut. The intent is to make as many QSOs in as many grids as possible and on as many bands as possible. Competition has been with several other Multi-Unlimited clubs, including the Mt. Greylock Expeditionary Force (MGEF) and their W2SZ station; K5QE in Texas; K8GP from Spruce Knob and Maryland and K3YTL, on a nearby mountaintop in the Poconos.

The anticipation of a successful event is some of the glue that connects the membership. The actual event is an activity that is memorialized in photos and movies, scores in QST, and experiences that last for years in the memory of the participants. Could you imagine a VHF club that did not have a big role in the ARRL June QSO Party?

Planning

Planning for the W3CCX ARRL June VHF QSO Party operation on Camelback starts at least a year in advance. There is the assessment of the operation in the previous year, with a punch list of items to be maintained, changed or improved. There is the permit from the Parks Department. Power availability needs to be assured, and of course, we bribe the weatherman to bring us great conditions and some Es, aurora and troposcatter conditions. Commitment is needed from the membership to support the event, with a minimum of 20 and up to 60 folks involved, as there are a lot of moving parts to a successful weekend. Dedicated club members and friends of the Packrats put in their vacation day requests early in advance for the Friday and Monday before and after the event, and try to work their schedules so that there are no conflicts for this king of VHF weekends.

Selecting and maintaining a chairperson or co-chairs is the responsibility of the club officers and board of directors. Many members who have assumed responsibility and leadership roles for the event have maintained them for decades. Considering the potential for scheduling conflicts, health and family events, it is essential that the duties and responsibilities are shared with more than one person to assure that there is back-up for the essential functions. In recent years, the chairpersons have had the major responsibilities of recruiting band captains, running planning meetings, and being present on the mountain for the full event to assure smooth operation. Commitment is needed from the membership to support the event, with a minimum of 20 and up to 60 folks involved, as there are a lot of moving parts to a successful weekend. Dedicated club members and friends of the Pack Rats put in their vacation day requests early in advance for the Friday and Monday before and after the event, and try to work their schedules so that there are no conflicts for this king of VHF weekends. Band captains have the responsibility of having working gear for their designated frequencies and considerable advanced engineering is needed to assure that the rigs are functional, relatively clean and QRM-free, and compatible with the computer network. Teams of operators also need to be established so that operation can be maintained steadily over the 33 hours of the activity. Spare parts, rigs and amps as back-ups are needed in case there are unforeseen problems. The stations will be set-up in the rental vans.

It is also useful to seek ideas from other multi-operator groups and to take measure of the competition. Once terrestrial operations have maxed out with big power, big antennas and crack operators and loggers, attention needs to be paid to strategies to increase QSO numbers and multipliers. Weak signal CW is often overlooked as a source of both long haul QSOs and multipliers. Meteor Scatter is a popular mode and schedules need to be arranged and operation times and frequencies need to be announced. Rovers are a welcome source of contacts and multipliers, and their coordination frequencies and routes need to be carefully followed for best results. Moonbounce (EME) is another mode that has enabled many stations to add to their grid counts. Using 6m and 2m, with the ground-reflection enhancement on moonrise and moonset can be very valuable. Use of the WSJT modes for EME and terrestrial operation can net several additional grids and contacts. Operators have to be experienced with these modes and computers loaded with the appropriate software and proper interfaces need to be provided.

Having an accurate count of participants is necessary for the development of the menu and purchase of food for the weekend. Advance reservations for hotel rooms near the mountain is advisable, as the nearby Pocono Raceway often holds their big race weekend at the same time of the June VHF QSO party, and they block out all available rooms for the racers and fans. Currently we use The Chateau 1-800-245-5900

<http://www.chateausort.com/> at the base of the mountain, using AARP rates and sharing a room. There are other motels closer to the highway in Tannersville. If rental trucks are needed to house the stations, they also must be reserved in a timely fashion to assure their availability. We have been renting two large trucks from Steele's Hardware (570) 629-3406 www.steeles-hardware.com/ in Tannersville for station operation. We have rented a large truck and trailer closer to Ottsville, where the towers and antennas are stored, for proximity in loading. The trailer is used for kitchen item storage including the large coolers and drinks for the weekend.

Packing and Loading for the Mountain and Repacking and Unloading Monday

Those in charge of food and drink will generally have done most all of their shopping and loading of the food trailer and club coolers in the week prior to the weekend. Ice is purchased on the way to the mountain, or in Tannersville. Additional items can always be obtained there locally at both Steele's Hardware or the large supermarket across the street from it. One large rental truck and trailer is driven to Cotner Trailers www.cotnertrailers.com/ in Ottsville, where almost all of the large Packrat contesting items are stored. A group of 10-12 members is needed to load the tower bases, towers, antennas, power lines, coaxial cables, AC conditioner, power distribution gear, guy ropes, guy and ground stakes, electric jackhammer into the truck for safe transport. The tower bases and tower sections are loaded on the bottom. The long antennas are tied to the wooden wall racks with twine. A large ball of twine and knife/scissors to cut lengths is needed. Many large barrels of equipment require the use of a moving dolly and many hands to assist in getting the items up the ramp into the truck. All crew should be wearing good work gloves to avoid cuts and scratches. Currently the rotors are serviced and stored at K3IUV's QTH and arrangements must also be made to have them transported to the mountain. Antennas used for microwave bands 903 through 3456 are in K1DS garage and must be picked up by the team going to the mountain if K1DS is roving for the weekend. The computers and the network are currently maintained by K3JJZ and stored in a warehouse. See Baseband section for details. K3JJZ has been packing these with assistance and delivering them to the mountain and taking them back on Monday.

Most team captains have already made arrangements for the electronics to be transported in their own vehicles. One special item is the K3IPM tower trailer which we use for 222. The trailer and the tower on it weigh about 500 pounds. The registration and license plate is from Florida and we (K1DS) have the registration card. It is stored at the property of Joe Silverman K3VEQ very close to the Lansdale entrance to the NE Expressway. It has a standard 2" ball hitch and a standard 4-in-line tow light connector. The rotor cage and thrust bearing must be removed for transport and kept inside the tow vehicle. The stabilizer poles and wood planks need to be secured with bungee cords or stowed in the tow vehicle. A Packrat with a vehicle capable of towing this trailer must be assigned to bring it to the mountain early Friday and return it on Monday. Joe can be reached to make arrangements at one of these two numbers: home-215-368-2554 or shop-215-362-1491.

If you are coming up to Camelback, please think of bringing the following: Clothing for cold, cool, warm and hot weather as up at 2200' things are quite variable both day and night; include a hat and sunglasses
Rain gear, camera, personal toolkit, especially if you are there on Friday and Monday to assist with set-up and take-down. Proper wrenches and WORK GLOVES are essential
Personal toiletry kit, medications, insect/tick spray & first aid items if needed
Your LASER communicator

Sleeping bag, mat, flashlight and tent (or sleep in car?) if staying overnight
Some donation to defray food and drink costs

Equally as important to packing, loading and set-up is take-down, repacking and unloading on Monday morning. There are often a few Packrats who do not operate the contest who are available to assist those who stayed on the mountain for the whole weekend. The power and cables should be disconnected and then one-by-one the towers are lowered, antennas disconnected and all items are repacked for transport back to Cotner or their respective homes. Care is taken to keep all trash and tape and cable ties in a garbage bin and the area is policed several times before final departure. Care is taken to roll cables and then they are taped with tab ends for storage. Tower sections are disassembled; the pins or bolts are placed back in storage bins and everything is loaded back into the main transport truck. The rental trucks from Steele's are returned to their lot after they are swept clean. Many of the crew will drive as a caravan back to Cotner to unload. Other Packrats are needed to assist in unloading, and time coordination of the arrival of the caravan and truck is needed.

AC Power

In recent years, AC power has been supplied through a line connecting to the ranger cabin on the mountain top. When the group had ventured to other spots without AC power, multiple gas-powered generators were used. The connector for the power is a 3-way 220VAC that mates to the connector on the cabin. There is a combination lock on the socket and the code is maintained by a select few members who are familiar with the AC power set-up. In 2007, 250' of 00 cable was added to complete the run from the ranger cabin to the operation site, as the previous connection was part of a small seasonal snack shack that was demolished. There are additional reels of large cable that form a distribution grid to each of the three operations trucks and to the dining and kitchen area. Each of the local panels has a 220VAC and several 110VAC outlets. Each band captain will still need to bring power trips and multi-tap outlets for the multiple items at each station that need power. Despite running kilowatt stations at the bottom four bands, and several hundred watts in the microwave station, there has not been significant voltage sag. A ground fault was discovered at the feed inside the ranger station and fixed in 2011. An AC constant voltage transformer is used in the microwave shack for security of the stability of the power where changes might cause the most difficulty.

As early as possible on the Friday of the contest weekend, a skilled and knowledgeable Packrat needs to set up the AC network for power distribution and when done, complete the connection to the ranger station. AC power is needed early in the afternoon to power the electric jackhammer for driving rods as anchors for the towers and their guy ropes as well as ground rods.

There is a plan to add additional connectors to make the set-up even easier and eliminate the "bugs" that are used with a wrench and tape to connect the power line runs.

Baseband

The Ethernet is affectionately known as baseband and it has been part of the setup since 2008 when the logging computers were linked and we began to use a network that gave us real-time logging, frequency recording of the bottom 4 band stations, a gab line, and real-time scoring. K3JJZ and KB3GJT were instrumental in setting up and maintain the network during the weekend. Each operating station had a computer and flat screen. The computers had UPS units to guard against sudden power loss and data loss. Connections between the network were done with fiber-optic cable.

A series of computers, routers, cables, keyboards, flat screens and associated gear has been assembled and stored in the capable care of K3JJZ. The current logging program is Writelog (which is licensed to the club) and a training session for all operators and loggers was accomplished at a club meeting and was repeated prior to the contest while on the mountain. Additional sessions will be held to train new operators and refresh others to make logging go smoothly during the weekend and to easily retrieve results at the end of the contest.

The club will supply all of the computers to be used for logging during this contest.

The computers are low end Pentium types which use Windows XP pro as their operating system.

Each computer has a current version of the Writelog logging program installed.

The logging file design and the call look-up files will be preloaded on each computer.

The 6m computer will also have the software for WSJT loaded on it. If the 2m band captain desires it we can load the software on that computer as well.

Under no circumstance is a computer not owned and tested by the club to be attached to the network.

The computers can be made available to the individual band captains prior to the contest in order to test rig interfacing. Band captains should advise baseband captains if they require a working sound card, USB ports, and DB9 serial ports

All club supplied computers will be password protected and only a baseband captain or his designee will know the password and be able to start the computer up.

This means that if you unplug the computer after it has been set up at the operating position by a baseband captain, you will need to contact a baseband captain to restart the computer and assure that the proper files are loaded

Writelog keeps Zulu time but the actual computer time that shows in the task bar on the bottom of the screen should be local time. Writelog will convert it to Zulu as contacts are made.

A baseband captain or designee will set the local time on each computer.

A detailed list of the computers and accessories owned by the club is contained in the inventory managed by K3IUUV. This changes in detail as additional computers are added to inventory and the older ones are stripped for parts. This inventory is stored at the business location of Keystone Pharmaceutical Buying

Group located at 2200 Michener St. Ste-10, Philadelphia, PA, 19115. The contact is Mr. Mel Brodsky CEO who can be reached on his cell phone at 267-784-4518. This business location is only available on weekdays from 9:00 am till 4:00 pm. Computers and peripheral equipment is testing starting in the March before the contest. This testing is done at the business location described above.

Once the band captain has positioned the computer with the rest of the equipment, the baseband captain will connect each computer to the network and start the computer, set the time, and assure that each station is in contact with the server.

It is the responsibility of the band captain to see that individual operators are trained in the use of Writelog. Baseband captains will be available for consultation. In case of logging or computing problems contact a baseband captain.

*******When the contest is over DO NOT SHUT THE COMPUTER DOWN*******

A baseband captain will copy the final file from each unit and power down each computer. Data files will be forwarded from baseband captain to K3TUF for review and final log submission to ARRL.

The current setup which we have been using for years, allows the machine to sleep when not being used. Movement of mouse or depressing the space bar wakes it up. My intent was to put password on machine at power-up and not require it to wake the machine. History tells us we have gotten in trouble when a computer has been unplugged and restarted with a cold boot. If that happens I have no objection in being summoned to restart a computer. All band captains will have my cell phone # and the distance from the motel to mountaintop can't be more than 10 min.

Mountain Kitchen

OBJECTIVE: To establish and operate a field kitchen to feed the crew (20 to 30 people) for the W3CCX annual Field Day – June VHF Contest and other large group events such as a large extended regional emergency.

EQUIPMENT: While most cooking can be done using common household pot and pans, a few special accessories make the operation easier. With a few exceptions, I try not to use electric appliances; I supply most of the following from my personal collection. A few additional items come from Al Shepard N3ITT

At least 2 Coleman type propane camp stoves.

A griddle for the top of one stove

Large pot 3 gallon minimum like a pasta cooker.

Larger pot 5-6 gallon size is really handy for stews

PACKRATS have a kitchen sink and hot water heater – makes clean up much easier with hot water

Coffee maker (Like Mr. Coffee and filters) also a larger 25 cup or larger coffee maker or a couple of stovetop percolators.

Tea kettle

Refrigeration – This can be ice chests. The ice chest must have dedicated applications keeping dry goods, cool good like produce, perishable like milk, eggs, butter and beverages in separate chests save a lot of ice and spoilage. If there is a camper with refrigerator available make good use of that for the perishables not for cold beverages.

Charcoal Grill with proper utensils and supplies

Frying pans -10 to 12 inch is great and a smaller on for that short order breakfast

Large and half size steam table trays and foils to cover them (more on this later)

Utensils – spatulas of assorted sizes, cooking and serving spoons – solid and slotted -including some of the big commercial sizes, ladles – at least one #8 (about 1 cup) for soups and a #4 (1/2 cup) for gravies etc.

Don't forget the propane and connections for stoves and the hot water heater 2 - 20 pound bottles (like you use at home) with a third as a spare

Kitchen lighting: I have a Propane lantern that mounts on a standpipe on a 20 pound propane tank.

Shelter – The Club has a 10 x 20 Canopy with removable sides for the dining area. To ease the limited space under the canopy, it is best if the kitchen can be sheltered separately. We have use a separate canopy, the awning of a camper or a dedicated truck for the kitchen and food serving areas

MEAL PLANNING – Over the years the PACKRATS have gotten spoiled with the varied of meals prepared for each outing. Rather than do a meal by meal menu – here are some food preparation ideas and guidelines

First rule for supplying food – you will never please everyone with every meal – KEEP IT SIMPLE, TASTY, NUTRITIOUS

Second Rule – keep an eye on the weather and be prepared for last minute adjustments for weather appropriate meals

Food preparation for any meal takes time. For instance, to serve a breakfast you need at least a 2 hours lead time to cook up bacon, sausage and other entrees and have them ready for the group. This is the easiest meal as they usually do not arrive as a group but rather straggle in as they awaken and SMELL THE COFFEE. For other meals there is usually a large first wave then a few stragglers. At breakfast this makes it possible to cook eggs as they like them or a plate of French toast. I personally do not like hotcakes as they are to hard to keep warm and the camp stoves do not heat even enough to cook large batches. Cooking hotcakes ahead never works but French toast keeps well in the steam table trays along with the bacon and sausage, fried potatoes or other goodies. For toast I supply a toaster for breakfast and snacks.

Keeping food warm is always a challenge – we have found that a large steam table tray of water on a camp stove with half tray inside does a wonderful job of keeping food hot until served - even on a cold

and windy morning – just keep an eye on the water level in the big tray so it does not boil dry. Keep the fire low under the tray and it will last a whole meal time. The large tray will last for several days. The small trays can be reused if not too messy from the meal. Put bacon, sausage and other greasy food on a layer of paper towels or old bread to soak up the grease.

I vary meals dependent on the type of activities at the time. For set up and tear down I try to have “grab and go lunch” type foods, like burgers, hotdogs, cold salads and relishes. For tear down breakfast I prepare egg sandwiches with the meat prepared the night before. It is pop them on a muffin and away they go.

Main meals are lunches and suppers during the actual operations. All main meals usually include a tossed salad and bread and butter of some variety. A few meal suggestions:

Corned beef and cabbage with potatoes and carrots

Pot roast, with potatoes and carrots. Really big pot needed

Beef stew

Spaghetti, meat sauce, meatballs (have some meatless sauce too)

Chili

If you have a covered grill like a Weber you can do things like chicken parmesan or macaroni and cheese, vegetable like string bean casserole and even attempt baking biscuits or breakfast buns.

Do plan to have plenty of snack foods, like chips, salsa, cookies, nuts and plenty of beverages, soda and bottled water – (At least 50% bottled water) Plan too on others supplying their favorite beverages so a second ice chest needs to be available

W3CCX 6 Meter Station

During the past three contests, the 6 Meter station has consisted of the follow major components:

- ICOM IC-746 transceiver
- Swan 6 Meter Power Amp
- Ham IV rotator
- Pair of 5 element Yagi antennas and phasing harness

The IC-746 is owned by KB1JEY. It is powered by a 25 watt MFJ-4225 Mighty Mite switching power supply, also furnished by KB1JEY

The Swan power amp is owned by Gary WA1YHO, who is not currently a Pack Rat but is a friend of Bob W2SJ. It is on indefinite loan to the Pack Rats for use in the June contest and is returned to W2SJ for safe-keeping between contests. When the Swan failed towards the end of the 2009 contest, Bruce WA3YUE repaired and refurbished it. Bruce is currently modifying the Swan to create a true “stand-by” mode. The Swan model is the "Swan Mark 6B 50-54 MHz Linear Amplifier". The specs are 2000 Watts PEP Input in SSB Mode, 1000 Watts DC input on CW AM or RTTY with 100 watts of drive. The amp is built around a pair of Eimac 3-400Z grounded grid triodes [no spares if they fail up on the mountain]. The Mark 6B comes with a matching power supply that is placed on the floor of the truck. Last year, John K3MD brought a 12 VDC muffin fan that we put on top of the Swan above the tubes for additional cooling.

KB1JEY also donated a green Rubbermaid tub to better protect Swan amplifier during storage and transportation to the mountain. Stored with the amplifier is the instruction manual (KB1JEY owns a duplicate copy), a W2SJ-created home-made interface between the IC-746 and the Swan, and a piece of coax to be used with an RF power meter.

The Pack Rats also own a back-up Henry power amp, purchased from Mike WB2RVX, which can be used on either 2 or 6 meters.

The 6 meter Yagi antennas are owned by the Pack Rats and stored at the lock-up. They were designed by WA1YHO to be spaced 10' vertically. Booms are marked with element spacing.

Several years ago, the Ham IV rotator [#6 – Red] was sent by W2SJ at his expense to Norm's Rotor Service to be refurbished. Until 2011, the rotator, control box, control cable, phasing harness, and RG-8 style feed-line was stored in a green Rubbermaid tub at W2SJ's QTH between contests. After the 2011 contest, the Rubbermaid tub was placed in the custody of Bert K3IUV along with the other club rotators.

The Six Meter station usually shares a rental truck with the baseband (LAN) station. In 2011, the club experimented with putting 6 meters, 2 meters and 222 MHz in the same rental truck. There were problems with coordinating between 432 MHz and other bands. So the plan for 2012 is to go back to

putting 432 MHz in the same rental truck as 2 meters and 222 MHz. The two large rental trucks used for the lower 4 band operating positions will be parked “back to back” so that the 6 and 2 meter operators will be in “shouting” distance [or a very short walk away].

Every year there is a discussion of how to set up the antennas and towers. For 2012, KB1JEY recommends that W3CCX continue to use both Yagi antennas and at least three tower sections. The reason for the 30’ of tower is to further move the RF radiation from the operating positions and to help prevent rotational interference with the 2 meter antennas.

The 6 meter band captain should also arrange for the following radio and computer station accessories:

- CIV interface cable and extension to send operating frequency to WriteLog
- Set of key paddles
- MFJ-434 voice keyer
- PTT foot pedal
- Headset
- Headphones and “Y” adapter for logger
- Bird 43 watt meter
- Rigrunner or similar multiple PowerPole tap strip
- Rigblaster or similar digital interface for WSJT operation
- Surge suppressor outlet strip and grounded extension cords
- Battery-backup UPS for the computer

During the past three contests, the band captain has borrowed a suitable Bird watt meter element from K3IUU.

Every band captain should also pack:

- Pens and pads
- 120 VAC incandescent clip lights
- Flashlights
- Laminated grid square map and band allocation chart
- Pack Rat membership folding card
- Coaxial cable adapter kit
- VOM and hand tools
- Scotch 33 electrical tape
- Duct tape, utility knife, and bungee cords
- Wire ties
- Snacks
- Folding canvas sport chairs
- Poncho [it always rains]
- Mosquito repellent
- 2 meter mobile and HT FM rigs for coordination to and from the mountain

The 6 meter band captain should request that the baseband captain install WSJT software on the computer supplied for this band. If the club supplies new tables for 2012, some thought should be given to providing a shelf above the transceiver and power amp. There was some discussion into equipping the stations with shelves that would clip to the rails on the sides of the truck.

In 2011, N3YMS donated six upholstered stacking chairs, which are stored at KB1JEY's QTH. Two of those chairs are used at the 6 meter station and the remainder is available to other stations.

The 6m station should be scheduled for operators for the entire 33 hours of the contest, as this band can yield significant contacts and grid multipliers all weekend, depending on conditions. Typically, contest-savvy and capable operators are teamed up with loggers in shifts of three hours. Contact rates can run as high as 200+/hour when the band is open. It has been a usual practice to keep on one frequency (50.133) and call CQ and run the callers, as we have a significant signal on that band. If conditions permit, there may be DX worked in the below 50.125 MHz DX window, using SSB and below 50.110 using CW. If there is significant Es, expect to have 200+ multipliers and more than 1000 QSOs on this band. Other multi-ops on the East Coast have had these numbers also, and the key is continued operating and calling CQ while watching for band conditions. If there is Aurora, CW is the better mode. High Speed meteor scatter using FSK441 and the WSJT modes with an experienced operator during the night adds to a competitive score. Many of the MS contacts are scheduled in advance of the weekend by sending out requests for skeds on the VHF Contesting reflector. We have not tried EME on 6m, but that mode is a useful possibility.

For stations that are worked in a 500 mile radius, they should be encouraged to make contact with us on the 2m band and higher by passing them to the 2m operator/logger using the gab line.

W3CCX 2 Meter Station

The following inventory from 2011 was supplied by Nick N3YMS

QUANTITY	BRAND	MODEL	MAIN ITEMS
1	ICOM	IC756proIII	main transceiver
1	ICOM	ic756proii	backup transceiver
1	DEMI	144/28 lp	main transverter
1	DEMI	144/28 hp	backup transverter
1	HENRY	2002a	1000 watt main power amp
1	MIRAGE	b5016g	160 watt backup power amp
1	tx rx sys	11-37-01	2m bandpass filter
2	Bird	model 43	watt meters
5	Bird	5w 25w 500w +	watt meter slugs
1	Astron	rs-35	main power supply
1	Astron	rs-20	backup power supply
1			transceiver power & rf cabling
1			transverter power & rf cabling
1			power amp power & rf cabling
2	CDE	ham VI	rotors main & backup
2			100 ft rotor cables
2	M ²	2M5WL	main antennas
1	M ²		2 port 2m power divider
2			antenna phasing cables
1			hardline to power divider cable
2		RG-214	100 ft antenna cables for vertical antenna
2	Mckay		headsets
1			footswitch
1		3CX800A7	3cx800a7 spare tube for henry amp
1			roll 3m 130c sealing tape
5			rolls 3m 1700 tape
1			bag of 8 in wire ties
1			instruction /service manual for above equipment
3		5/8 rope	100 ft lengths of 5/8 double braded rope
			TOOLS / TEST EQUIPMENT
1	IFR	1200s	service monitor
1			solder station
1			solder gun
1			hand tool set
1			test cable set

1			CW key
---	--	--	--------

			FROM PACKRATS INVENTORY
1	Henry	6 & 2	Spare KW amplifier w/built-in supply
1	Rohn	25 tilt base	tilt base plate for tower
2	Rohn	25g	tower sections
1	Rohn	25g top section	tower top section
1			antenna mast marked for 2m
100ft	Andrews	LDF 5-50	100 ft 7/8 hardline w N connectors
1			5 element 2m antenna for vertical

The two meter station is the other work-horse operating spot and should be staffed throughout the entire weekend with a contest-savvy operator and logger. It is possible to have 800+ QSOs on this band if there is good activity and any tropo, Aurora or Es openings, and between 50-100 grids. The usual practice has been to operate on a frequency near 144.180, calling CQ and working the callers. It may also be important to periodically scan the band to see if there are other pockets of activity, especially if there is significant CW activity on the lower part of the band. Please note that a CW key and keyer should be available, or the use of keyboard Morse. CW is also most useful if there is Au conditions. High speed Meteor Scatter is also popular on this band at night and toward dawn when the most meteors enter the atmosphere. Pre-arranged skeds are the norm for 2m MS. EME on 2m using the WSJT MAP-65 program is also a possibility, depending on the moon position for the weekend.

It is key to have stations passed up the bands from 2 meters. Points are higher per QSO on 222 and up. Communication between stations is generally through the gab line on Writelog, but to increase passing ease, the 2 meter and 222 and 432 stations are arranged in the same truck so that ops and loggers can cue each other to the stations being sent to the next higher band. It is also an important function of the 2m station to keep track of rovers and to be sure to pass them UP the bands first, before sending them down to 6m. With all of the stations linked onto the network, it should be easy to tell the caller exactly where the other operators are calling on the higher bands.

W3CCX 222MHz Station

The 222 contest station at the mountain is similar to a contest station used anywhere with three major considerations.

The first and most important consideration: There are very strong RF signals on the mountain that can severely overload the receiver. To deal with this it is essential that a good bandpass filter be used in front of the receiver. For the 2010 and 2011 stations we used a 222 MHz bandpass cavity filter provided by Paul Sokoloff, WA3GFZ. Without this filter the 222MHz receiver was completely blanked by the 2 meter station's transmitter.

The second consideration: There are usually three stations operating at the same time in the truck. If everyone used the loudspeakers in their radios no one would be able to hear the weak signals that are so essential in contesting. This means that you should use headphones and make sure that the loudspeaker in your radio is turned off.

The third consideration: There is a networked logging system used. This logging system allows all stations to view the frequency of any of the other stations on the mountain so that they can pass your operating frequency to the station they are working so that station can work you next. The way that the operating frequency gets on the network is by linking your transceiver to the logging computer through an RS-232 interface. The transceiver you chose should have a method of connecting to an RS-232 port.

Station Basics: Now for the usual things that a contest station needs, these are a transceiver that covers the band, a power supply for that transceiver, a microphone, a code key or set of paddles, a linear power amplifier for the band, an antenna, a tower to mount the antenna, feedline, and an antenna rotator.

The Transceiver: Since there limited options of commercial transceivers made that operate SSB or CW for the 222 MHz band (ICOM IC375 and Yaesu FT736R) the "transceiver" for this station will probably consist of an HF transceiver and a transverter. For the 2010 and 2011 contests the station has consisted of an Elecraft K3 transceiver and a Downeast Microwave 222 MHz transverter.

The Power Supply: Since many modern transceivers and transverters operate from 13.8 VDC a reliable regulated power supply is required. An Astron RS-35 was used for the 2010 and 2011 stations. A way of distributing the DC power is also required; this was accomplished by using a West Mountain Rig Runner.

The Microphone: Almost any type of microphone can be used for the station. It is often beneficial to use a headset with a boom microphone as this leaves both hands free for logging or tuning especially if a foot switch or VOX is used to key the radio. For the 2010 and 2011 contests a Creative Labs headset and a Heil footswitch were used. A voice keyer is also helpful to save your voice and to keep the noise level down in the truck. The voice keyer used for 2010 and 2011 was built into to the transceiver.

Morse Code: Interfacing a code key or a set of paddles to the transceiver is usually straight forward.

The Power Amplifier

Generally speaking the station should run as much RF output power as possible. Since most transverters put out less than 50 watts a linear power amplifier should be used. For the 2010 and 2011 contests the

222 MHz station ran 300 W. For the 2010 contest an AM6154 amplifier supplied by WA2OMY was used. For the 2011 contest a solid state homebrew amplifier supplied by KA3WXV was used.

It is important to know the drive requirements for the amplifier in use. Over driving the amplifier will at best produce a distorted signal and at worst cause the amplifier to fail. The AM6154 amplifiers usually require about 5 watts of drive. The solid state amplifier used in 2011 required only 0.25 watts of drive. Almost all transverters produce much more power than is required to drive the amplifier. It is recommended that either an attenuator be used on the output of the transverter or the input sensitivity controls of the transverter be adjusted to limit the output power of the transverter to a level appropriate to the drive requirements of the amplifier in use. It is not recommended that the drive be set using the front panel controls on the transceiver as there are likely to be operators using the station who are not familiar with the set up and may turn knobs. For the 2010 contest the transverter input attenuator was set so that the transverter produced a maximum of 5 watts. For the 2011 contest the transverter was set to produce 25 watts and a 20dB attenuator was placed between the output of the transverter and the input of the amplifier.

Amplifiers draw a lot of power from the AC supply. For this reason it is preferred that the power amplifier be set up to run from 240 volts rather than 120 volts. The use of 120 volt amplifier causes large currents to flow in the neutral leg of the power system and can cause large voltage fluctuations on the 120 volt circuits.

Interfacing the amplifier to the station should be worked out before getting to the mountain. For the 2010 contest an interface box was built by KA3FQS to connect the control lines to the AM6154 to the transceiver and the transverter. This control box accepts the keyline from the transceiver and controls the antenna relay on the amplifier. The antenna relay has a set of DC contacts that drive another relay in the interface box that controls the bias for the amplifier and provides a PTT signal to the transverter. This box requires an external 28 VDC supply. The solid state amplifier used in 2011 has a sequencer built into it that accepts the keyline from the transceiver and provides a keyline for the transverter.

Antenna, Tower, Feedline, and Rotator

For the 2010 and 2011 contests the 222 station has had the use of a trailer mounted crank up tower owned by Stan Smith, K3IPM. Mounted on top of this tower was a club supplied Yaesu rotator and a 12 foot aluminum mast. The antenna was a single long boom M² 23 element 222 antenna supplied by the club. Assembling and erecting the antenna system requires a portable hand drill to turn the winch, a set of sockets and ratchet and a generous supply of black electrical tape. Raising the tower in an easy and safe manner requires 5 people. The feed line was 7/8" Heliac provided by the club. This feed line is about 50' too short so a 50' extension of 1/2" Heliac was used to run into the truck. Three ropes and 5/8" x 4' stakes are used in addition to the aluminum support poles supplied with the trailer.

FM: Frequently the microwave station will use 223 FM to coordinate contacts on the microwave bands. It is best if the 222 band captain works out details for the FM station with the microwave band captain before the contest.

Miscellaneous items: There are a few other incidentals that are important to have such as power meters, short extension cords, and a desk light. For power meters the Bird 43 with elements appropriate to the

power and frequency work well. Having two power meters is recommended so that the drive to the amplifier can be monitored as well as the output to the antenna. While there are outlets galore in the truck they are mostly located in one place. For this reason short extension cords and power strips are useful to have. The contest runs through the night so it is necessary to have light at your operating position. A cheap desk light will do the trick. Finally there are no outside lights at the site and plenty of trip hazards on the ground so it is important to have a reliable flashlight.

Operating: The action on 222 is mostly derived from moving contacts up from 2m, so that communication between these stations is vital. It is also the handoff to 432, so that is also a critical part of operating this band. As a multi-op station, it is good to select a calling frequency close to 222.100 +/-15 KHz. Once established there, some tuning around for other calling stations may be useful, but the operator should be using a voice keyer or CW memory keyer for calling CQ and rotating the beam frequently. There is much to be gained by a capable CW operator on this band. It is possible to make 200-300 QSOs on this band and almost 50 multipliers. Use of FM can be valuable for adding contacts using 223.5 and a vertically polarized beam attached to the same mast as the horizontal beam. Many mobile, walkie-talkie or other stations with only FM mode for this band can add to the numbers. This may also be a good spot for a newcomer to watch and become a logger and familiarize themselves with the entire contest operating procedures.

2010 equipment list for 222 MHz June Contest station

Transceiver	Elecraft K3	KA3FQS
Transverter	Downeast Microwave	KA3FQS
Headset	Creative Labs	KA3FQS
Power Supply (12V)	Astron RS35	KA3FQS
Foot switch	Heil	KA3FQS
Cavity Filter	222MHz Bandpass	WA3GFZ
Amplifier interface	Purpose built	KA3FQS
Amplifier	Am6154	WA2OMY
Power Supply (28V)	Astron	KA3WXV
Power meters	Bird 43	KA3FQS
Feedline (extension)	½" Heliax	KA3FQS

2011 equipment list for 222 MHz June Contest station

Transceiver	Elecraft K3	KA3FQS
Transverter	Downeast Microwave	KA3FQS
FM Transceiver	Alinco DR235	KA3FQS
Headset	Creative Labs	KA3FQS
Power Supply (12V)	Astron RS35	KA3FQS
Footswitch	Heil	KA3FQS
Cavity Filter	222MHz Bandpass	WA3GFZ
Amplifier interface	in amplifier	KA3WXV
Amplifier	Purpose built solid state	KA3WXV
FM Amplifier	Mirage C2512	KA3FQS
Power meters	Bird 43	KA3FQS
Feedline (extension)	½" Heliax	KA3FQS

W3CCX 432MHz Station

Much of the information regarding 222MHz is applicable to 432 MHz operation. It is the station that can call CQ using SSB or CW. It accepts the passes up from 222 and then guides the contacts to the microwave bands, depending on the capability of the caller's gear.

A multiband transceiver, operating on 28MHz coupled to a 432 transverter forms the base of the station. In 2011, a Henry KW amplifier, supplied by WA2OMY was used in conjunction with the station. The full set-up is tested on the bench at home prior to being transported to the mountain. For 2012 we have a DEMI transverter supplied by Nick N3YMS, and the amplifier from WA2OMY. There is a cavity filter to keep unwanted signals from the receiver and to keep the transmitted signal clean.

This band also needs a Voice and CW memory keyer, pair of headphones and Y adapter, small lamp for night operation, power meters and power supplies and cabling.

The antenna is a stack of 4 long yagis and a 4-way splitter with phasing harness. The antennas were at one time mounted in an H-frame array, but for the past several years, a better pattern has been obtained by mounting these antennas on one mast. The longest club mast needs to be employed in order to have the optimum spacing between the beams. Three pieces of Rohn tower are used for 30' height. The process is to first locate the tower base with the tilt-over plate and drive rods into the ground at angles to firmly position the base. Assemble the tower sections, now using the 2 sizes of pins with keepers. This replaces the bolts, washers and nuts to add efficiency in set-up and tear-down. The rotor is mounted in the tower after it has been tested for full rotation. The mast is then added to the rotor, using a short 4' ladder to support the top-end of the tower during assembly. Prior to mounting the antennas, the 4-way splitter and phasing harness should be located to assure a good "fit" of all the pieces. The four antennas are then mounted to the mast and aligned to be parallel. The direction of the antennas once the tower is erected should be noted, and the mast oriented to the rotor and control box. If the antennas are pointed uphill, that is EAST. Prior to tightening all the clamps and bolts, make sure the control box has been set to east. Attach the large hardline (1-1/2") to the extension of the coax from the rotor loop. Use Scotch 33 tape to cover each of the coax connectors to keep them watertight for the weekend. Fold over a small tab at the end of the tape to enable easy removal on Monday morning. Use cable ties and/or tape to secure the coax and rotor cable to the tower. Make sure there is plenty of slack on the rotor loop.

Once the assembly is ready to be hoisted into position, get three pieces of guy rope and secure them to each of the legs by the top part of the top section. Position three stakes to serve as anchors for the guy ropes at 120 degree intervals that match the tower leg positions. All the crew should be involved in pushing the tower up and having at least 1 person on each down-side guy and 2 on the up-side guy to pull the guy and assist in tower erection. The guys should be properly tied to the stakes after assuring that the tower is vertical, using a level or plumb-bob. The bolt or pin should be placed in the base to lock that down. There are battery-powered blinking lights that will be attached to the guys for night visibility and safety. An empty soda can should be placed upside on the top of each of the stakes to keep the sharp edges protected. Point the rotor to approximately 177° and listen for the W3CCX beacon. It should peak at this setting. Make adjustments to the control box meter as needed.

Operating

The action on 432 is mostly derived from moving contacts up from 222, so that communication between these stations is vital. It is also the handoff to microwaves, so that is also a critical part of operating this band. As a multi-op station, it is good to select a calling frequency close to 432.100 +/-15 KHz. Once established there, some tuning around for other calling stations may be useful, but the operator should be using a voice keyer or CW memory keyer for calling CQ and rotating the beam frequently. There is much to be gained by a capable CW operator on this band. It is possible to make 200-300 QSOs on this band and almost 50 multipliers. Use of FM can be valuable for adding contacts using 446.000 and a vertically polarized beam attached to the same mast as the horizontal beam. Many mobile, walkie-talkie or other stations with only FM mode for this band can add to the numbers. This may also be a good spot for a newcomer to watch and become a logger and familiarize themselves with the entire contest operating procedures.

W3CCX Microwaves and LASER

Over the years we have operated on bands from 903 through 47GHz plus LASER. Generally one or two club members have supplied all of the station gear for the bands, and generally three or four people have operated the gear. WA3NUF had supplied much of the station in the past, followed by KB3XG who had the honors for many years. For the past two years, the 903, 1296 and 24GHz stations were supplied and operated by K1DS, while WA3GFZ supplied and operated bands 2G, 3G, 5G and 10G. WA3RLT has also assisted in the microwave shack for several years and in 2011 he assembled and transported all the WA3GFZ gear, in Paul's absence. The microwave bands are the icing on the cake, as they count for the highest points per QSO, and generally take some of the most patient operating skill and digital techniques to complete QSOs. While many single and multi-op stations have microwave gear, the source for the largest number of QSOs and multipliers often comes from rovers who are equipped for many bands. Keeping track of the rovers and having a reliable liaison station and frequency is most helpful. It is often necessary to have a calling station send CW dashes while the frequencies are tuned and the antennas rocked. Having a coordination band and frequency can be a dilemma, as the main station may be busy chasing other contacts, and a multi-op cannot have two stations operating on the same band. A recent opportunity to use 60m as the coordinating band is being explored.

Most all of the contacts are generated from "passes" from the lower bands (esp 432) and there are many rovers who can easily find us on the microwaves if we keep 903 or 1296 on a designated frequency and listen there and periodically call CQ. With the addition of SDR capability, it is also possible to watch the microwave spectrum to see when other stations pop up and to catch them for a contact.

For the past few years K1DS has provided the 903 and 1296 gear and WA3GFZ has provided the 2G through 10G gear. Antennas for bands 903 through 3456 were supplied by K1DS, while the dishes for 5G and 10G were supplied by WA3GFZ. K1DS also has a 24GHz set-up in his rover van complete with dish antenna. Coax cables of LMR600 and rotor loops of flexi LMR400 were supplied by NR6CA and are stored in K1DS garage. Rotors were supplied at times by K1DS and WA3GFZ, but in 2011 we used club rotors. The aluminum crank-up tower and a wooden base were used for 903 and 1296, while a 20' Rohn tower was used for the other bands. Stations were set up in a 27' truck that was at the topmost part of the hill, with the front of the truck facing slightly east of north. The antennas are assembled after the proper tower sections are moved close. Rotors are mounted in the towers and all cabling can then be done. Once

completed, the towers can be raised and they are secured with their guys. Stations are then set-up and tested on receive with the beacons.

Both phone and CW are used and operators capable of sending and receiving code are important. The action is slow for the first few hours, except for rovers, and it is key to catch them on 903 or 1296 and then move them higher. There is often a bottle-neck at 2304 where it becomes a little harder to make contact, and even more time is needed to coordinate for the higher bands. The essential need is good coordination, and this might be accomplished with a spare rig and antenna on 432 that hopefully will not interfere with the main station, or perhaps even 60m has become a potential solution. Keep the gear and power supplies cooled with fans. A receive filter for 903 is very useful.

All gear should be fully tested and operational weeks before the contest. All power supplies, interfaces, cables auto-keyers, amplifiers, coax cables and adapters should be inventoried and assembled and double checked. A power meter and dummy load is essential. Testing return loss (VSWR) is also useful, especially in the wet mountain conditions. Checking propagation and alignment of the antennas on the microwaves using the beacons is helpful.

Activity is steady throughout the day and evening and usually slows by 1AM Saturday night. Activity picks up again and there is often enhancement in the early morning hours. Sunday is busy all day, especially trying to work all the Packrats who activate their home stations in addition to general increased microwave activity as the 6 & 2 meter bands slow down. Accurate logging helps. Having lists of the rover plans and schedules helps alert all operators to their direction and capabilities. Listening, calling CQ and *watching the gab-line* for stations passed from the lower 4 bands is key to making a substantial number of contacts on the microwave bands. Having strong and sensitive stations on 903 and 1296 is essential to be able to accurately point to other stations and move them to 2.3GHz and higher. Using voice and CW is mandatory on these bands as signals are often weak. Having a sharp receive filter is a must, as the cell-tower interference will kill 903 operations without it. The W3CCX beacons are usually easily heard on the mountain, and are a great resource for calibrating the rotor controls. Much of the action takes place on 903.100 +/- 10KHz and 1296.100 +/- 10KHz, with scheduled contacts moved up to .120 or .130 if the calling frequencies are busy.

As with other bands, all the microwave gear should be checked out and assembled prior to the contest. Having a thorough checklist of components and cables is beneficial. Traditionally the microwave truck has been on the highest spot of the mountain with the open end of the truck facing downhill, to ease any need for visual contact with the rest of the gang. Prior to positioning the truck, the bases for the aluminum crank-up tower and one Rohn tower base are positioned so that the rear tires of the truck can be driven over them for base stability. For 2010 and 2011, one table supported 902 & 1296 on the north side of the van while 2 tables supported the rest of the gear on the south side. The aluminum tower was on the north side and the Rohn on the south.

The club also has a number of low-power transverters and some with higher power output, constructed and donated to the club by NR6CA. They can be distributed to rovers for use, or can be used by other Packrats on bands 2.3GHz and up to add contacts on these bands. Small log-periodic antennas may be used for these units.

LASER communication has added another set of contacts to the logs. For the past several years, K3IUU has captained the position and all Packrats with LASER communicators are asked to bring their tested units to the mountain. Logging these contacts is essential. It is the hope that in the future it will be possible to add another multiplier using these units, as FN20 & FN10 are nearby and some sites are line-of-sight. Use of million candlepower sealed beam spotlights may be able to aid in spotting, along with spotting scopes on the transmit LASER and the use of reflector material at the receiving end. Using the higher-power green lasers may also be of benefit.

902/903 MHz

IC-891 2m transceiver	Club donation from NR6CA
Demi 903 transverter + preamp	K1DS
900 MHz cavity filter	K1DS or N3EXA
SSPA 120W (needs 24VDC)	K1DS
Key, memory keyer, cabling, relays	K1DS
LMR-600 and LMR400 rotor loop	Club donation from NR6CA
Yaesu 800DXA rotor & cable	K1DS
903 33 el loop yagi	K1DS
12VDC 35A Astron + PowerPoles	K1DS
24VDC 12A switcher	KB1JEY or K3TUF

1296 MHz

IC-891 2m transceiver	Club donation from NR6CA
Demi 1296 transverter + preamp	K1DS
Demi 120W SSPA	K1DS
Key, memory keyer, cabling, relays	K1DS
LMR-600 and LMR400 rotor loop	Club donation from NR6CA
1296 55 el loop yagi	KB3XG
Fan, small to keep PS cool	K1DS

2304-3456-5760-10368 & higher

Transceiver	WA3GFZ
Transverters	WA3GFZ
SSPAs	WA3GFZ
Power Supplies	WA3GFZ
2304 "blowtorch" loop yagi	K1DS
3456 "blowtorch" loop yagi	K1DS
LMR600 + LMR400 rotor loops	Donated to club NR6CA
Yaesu 1000 Rotor & cable & control box	WA3GFZ
5760 & 10G dishes and feeds & cables	WA3GFZ
Digital software and computer for SDR Receive	WA3GFZ
Low power microwave source	WA3GFZ
AC Line Conditioner	Club
24G and 47G	depends on who has working gear
LASER Communicators	All members

Safety

Safety cannot be stressed enough. There are many potential hazards in this type of operation and care must be given to the planning and execution to avoid loss and injury. There should be adequate cell-phone coverage to make an emergency call to the rangers, police, ambulance and fire department, should their services be needed. A stocked and checked first-aid kit should be made available, as well as a fire-extinguisher.

This is the great outdoors. There are deer, skinks, hawks, bears, turkeys, bugs and ticks that all present various hazards while driving or perhaps visiting the more distant latrine. Obey the speed limits both up and down the mountain roadway. Walk in pairs if you are going a distance off the top of the mountain.

Weather can also be a serious factor, and you need to be prepared for hot sun, high humidity, cold weather, wind, rain and lightning. Bring many types of clothing to be comfortable in any of these settings. If there is severe weather storming, especially lightning, **ALL STATIONS WILL BE SHUT DOWN AND ANTENNA FEEDLINES DISCONNECTED AND GROUNDED IF POSSIBLE.** Winds can take down the towers and antennas if they are not properly erected and secure, so be sure that keepers are properly placed, knots are properly tied and stakes are properly driven. There are safety warning lights attached to the guys for nighttime. Soda cans should be placed over the tops of the stakes to prevent contact with sharp edges. Always wear work gloves when doing mechanical work. Safety goggles are appropriate if specialized activities will generate any flying debris. The user of the electric jackhammer must be trained in its use.

Prevent accidents by anticipating what can happen before it does. Use the proper tool for the job. We have a tower tool to more easily join and align tower sections and to separate them when needed. Make sure there is enough manpower to lift and lower towers. Anticipate where cables need to be loosened or attached, and where antennas need to be pointing in the process.

The rental trucks need to be secured with their parking brakes and windows kept closed. AC lines should be protected from the wet weather. Cooking equipment needs to be protected from contact with the participants. Gas cylinders are present for cooking and hot water generation and need to be protected. Additional notes should be added to this section if there are additional safety concerns detected.

EMERGENCY CONTACT NUMBERS:

Ranger: 570-894-8336 Big Pocono State Park Tobyhanna, PA 18466-0387 Manager: William Friese

Police: [Pocono Twp Police Dept](#) (570) 629-7323 Highway 611, Tannersville, PA 18372

Ambulance Squad: **Central Pocono Ambulance Association** (570) 629-2620 Rr 611, Tannersville, PA 18372

Fire Department: Pocono Township Vol Fire Co. 570 629-0930 PO Box 350 Rt. 611 Tannersville, Pa. 18372

Tower Guy Knots

The knot used to attach the guy rope to the top of the tower is the bowline pictured below.



This is best done in the following method: make a small loop in the guy about 3 feet from the end, then pass the end around a tower leg, bring the end through the loop, then underneath the long end of the guy and finally back through the loop. This does not allow the guy to slip.

<http://www.youtube.com/watch?v=YXRnPES0Qec>

At the ground end, after the steel stake has been driven well into the ground with about 12 inches exposed, we fasten the guy in the following method. Make one overhand loop knot about 6 feet from the end of the rope. Pass the end of the rope around the ground stake and back up through the loop. Pull the end downward to tighten to desired tension, and finish by placing a half-hitch or two to hold the desired setting. You can also see a demo at <http://youtu.be/hVbo6vVaS0>

