If you can't communicate, you can't organise.
And if you can't organise, you can't fight back!
Stephen Dunifer (Free Radio Berkeley)

MAKING WAVES

Pirate radio as a
tool for activism
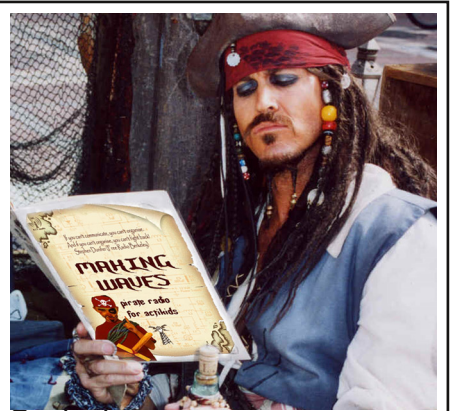
**UPDATED
International
Edition**

Foreword

Despite a healthy disregard for the law, pirate radio remains fairly uncommon as an activist tool (although there are certainly quite a few activist inspired online radio projects). This booklet aims to show that radio broadcasting practical and affordable, in the hope of inspiring more activists to make waves…

This is the second edition of the booklet and contains everything you need to know to set up and operate a pirate FM radio station as a tool for activism. First published in 2004, it was heavily plagiarised from online sources, many of which are no longer available. Most of the weblinks and suppliers mentioned in the original no longer exist, hence the need for an updated version. Additionally, much of the UK specific content has been reworked in the hope of making this edition more of an international relevent resource.

This booklet and aditional resources can be found online... https://we.riseup.net/diy/pirate-radio

Contents

Why use pirate radio?

We all know how essential the free exchange of information is when it comes to effectively organising and inspiring action. Activists use many mediums to try to get information to people. Some try working through the filters of the corporate media via newspapers or TV and radio new. Others use a variety of DIY communication mediums such as leaflets, fly-posters, subvertising, mailing lists, websites etc. All these have their pros and cons depended on the intended recipients etc.

Radio can be a very effective means of communication but all radio broadcasting is subject to licensing regulations imposed by the state. Getting a license to broadcast on the FM band is generally difficult and expensive. While any unlicensed use is illegal, pirate radio is certainly another potential tool in the activist media toolkit - with it's own advantages and disadvantages.

pros	cons
No filters or censorship	Limited range (unless you use MW or LW)
Easy access for your audience	Requires some technical competence
Can reach lots of people	Illegal – fines and/or prison
Different audience than online media	Can be very time consuming
Can be targeted at specific communities	More expensive than internet

Practical uses of pirate radio

These days, most pirate radio involves setting up a studio in someone's spare room, linking it to a remote transmitter on a tower block then going live, usually only at night or weekends. Modern day pirates often have a healthy income from club promotions and DJ fees so when their transmitters are found and confiscated, they can afford to replace them. This kind of operation is probably not sustainable for an overtly political pirate station with limited funding and no income. However, there are more imaginative and perhaps more appropriate ways for activists to use radio.

Street level

With a small transmitter powered from a battery and an antenna disguised as a placard or flagpole, you can transmit from within the crowd at a protest. This would provide a good medium for discussion, information and warnings of police movements, as well as for entertainment and music. Better than megaphones and less prone to repression than centralised sound systems, it would be especially useful at actions like big blockades with groups covering different locations or entrances around a large area. However it would be essential to advertise in advance the need to bring radios, or to seed the crowd with radios you bought with you. Sound systems on bikes could be tuned in to form one huge distributed PA system.

Hit and run.

For a decent range and a 'real' audience you will need a better location than can be found during most demos. This could be sitting on the roof of a tower block or hanging out in a car park on a hill overlooking the city. Spend a few hours pumping out loads of power and radical content all over the city and then bugger off before anyone gets round to looking for you. If you don't get into habits in terms of locations or times and you should be pretty safe - but probably a good idea to use look-outs and have an escape route planned.

Break-ins.

The idea here is to steal listeners by broadcasting over the top of another station that already has a large audience. You're taking advantage of a quality of FM broadcasting that the stronger signal tends to 'win', blotting out the weaker one completely. With a small transmitter you'll only 'win' for a short distance, but even a few hundred yards could cover a whole high density housing estate. Strength of signal is the main factor, a powerful transmitter (100-200 watts) can break in your message on the most popular channel on prime time.

This is very naughty and if you get nicked the fines or prison time will be much higher than for other radio offenses. However, there really is little chance of getting caught red handed if you keep it short. All precautions should be doubled - clear right away from the area as soon as you've finished. Avoid using the same time or broadcasting site on a regular basis. Don't boast about it to your friends or mention it on the phone etc. – you know the score! Break-ins are more common in countries where pirates have been repressed, e.g. in Germany or the Eastern Block, and are ideal for announcing demonstrations etc. or replacing the news headlines with uncensored news, or commercials with audio subverts. It could also be done from a vehicle while driving – perhaps an enjoyable and useful way to pass the time on a long journey.

Piggy back.

How about radio as an accessory to something that's already happening? Broadcasting live from the roof of a squat hosting a big convergence, party or gig (a few hundred people keeping cops out), done successfully in Amsterdam and Berlin. The political motivated pirate may find strikes and disputes offering interesting opportunities for raising awareness and mobilising support from other factories etc. You could add a bit more communication to banner drops and occupations, especially those involving tall cranes, industrial chimneys or cooling stacks (getting nicked when you come down would be a cert so use a low-cost disposable transmitter and abandon or hide it before you come down - avoiding leaving anyone's finger prints on or inside the cases etc).

Real life examples

1999 – As an accompaniment to the 'Carnival against Capitalism', Interference FM broadcast over large chunks of London from various locations on and a few days preceding June 18th. The station promoted the day of action with adverts and jingles plus an eclectic mix of music, spoken word pieces of related issues such as the state of radio, third world debt, Gerard Winstanley's famous libertarian speech and the ravages of capitalism. The DTI responded very quickly by finding and seizing the transmitters. This example clearly demonstrates that although pirates can be stopped speedily, most are left alone for long periods because they lack any political content.

2001 - During the occupation of a proposed GM test site by a Pink Castle, a 4 watt FM transmitter provided a link the local community in nearby towns. The idea was that come an eviction, GM-FM would alert supporters and bring help. The antenna was placed on a hill up a tree (disguised as a branch) and the transmitter was hidden in a hedge beneath. Powered by car batteries, (which were recharged from solar panels) somebody would have to climb the hill to swap batteries or change the tape in the walkman. A remote link up from the camp was achieved using walkie-talkies and allowed 'emergency' voice-overs to be broadcast over the recorded content.

2002 – On the first day of the COP8 Climate Talks in New Delhi, activists converged on the British International Motor Show accompanied by a solar powered sound system. Throughout the day "Drive Time NEC" , a spoof radio show, was broadcast on FM so that people arriving in their cars could tune in while they hunted for somewhere convenient to park.

2011 - During the massive anti-cuts protests of the 26th March in London, x26radio streamed and broadcast live coverage of the unfolding events direct to the streets. Those on the ground could tune in to hear interviews and reports of what was happening around the city as police chased various black blocs from one smashed-up store or bank to another.

What is needed?

At a bare minimum you need an audio source such as MP3 player, power source, transmitter and antenna. Usually, the antenna would be separate from the transmitter and connected by a coaxial cable (known as a feedline).

A slightly more elaborate system might consist of multiple audio sources with a mixer and microphone(s) which would allow mixing between recorded material and the inclusion of live audio such as somebody speaking.

Other common additions include an amplifier to increase the output power and an audio compressor / limiter which has the effect of making the transmitted audio sound louder while preventing distortion.

A block diagram of a typical radio station would look something like this:
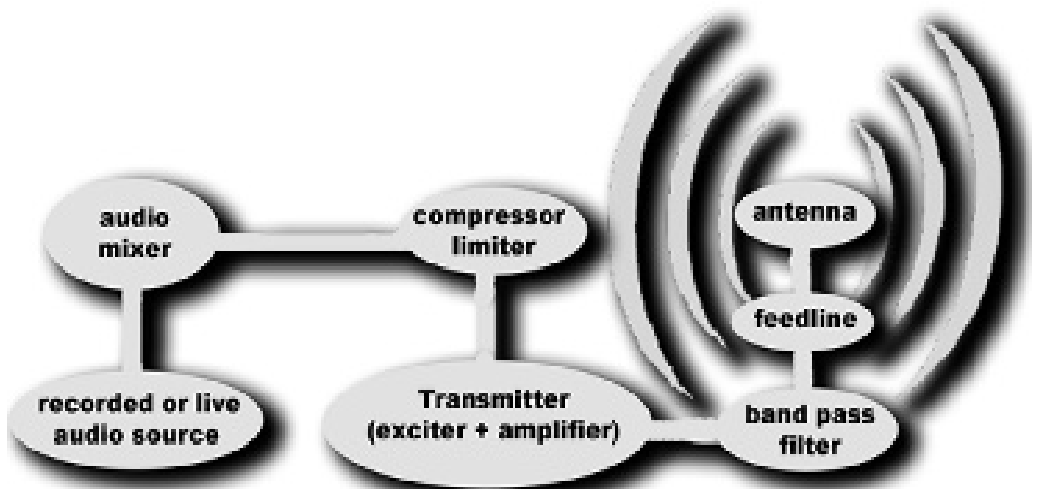
What will it cost?

Obviously it is perfectly possible to spend tens of thousands setting up a radio studio and transmitter with masts and relays etc. However, a few hundred would get you a fully functional system capable of sounding just as good. Further more, you can build a wicked little portable 12volt rig for under 100. The examples above are for brand new equipment in the form of pre-assembled kits. If you are confident with soldering, you can save up to £25 - £30 on each item by buying unassembled kits.

Either way, the kits do not include cases or power supplies. Additionally, the examples do not include the cost of antennas or audio equipment but such things need not cost anything.

Example 1: £300

hi-power city-scale stereo rig

£70 1 watt PLL exciter

£100 40 watt amplifier

£30 stereo encoder

£100 stereo compressor / limiter

Using mono instead of stereo would save about £80 in this case.

Example 2: £125

portable live-broadcast mono

£70 5 watt mono VFO exciter

£55 compressor limiter (mono)

If you use only pre-recorded and pre-processed audio you could leave out the compressor limiterto cut the cost.

The cost of getting a basic station set up is comparable with the cost of a large print run of posters, leaflets or stickers. Better still, your radio kit can be used again and again (until stolen by the authorities or other pirates) and doesn't have a use-by-date unlike much of the printed material we produce. In other words, while nowhere near as cheap as internet based mass communication, pirate radio is a very cost effective medium for activists.

Audio Sources

It's beyond the scope of this booklet to go into detail about studio equipment, mixers, turntables, and so on. Further more, there is little point in factoring in the costs for these things either - you could easily spend many hundreds or even thousands on it. However, because this stuff has become ubiquitous consumer electronics, you will probably already have something suitable or will find somebody who does.

Generally, something like an MP3 player, portable CD or even an ancient cassette walkman, would be fine for the kind of activities you are likely to get up to. Depending on your plan, you will probably find that battery life is an important factor and long play, shuffle, repeat or auto-reverse would also be very useful. For a portable set up, an old minidisk recorder (or two) could be perfect - especially those with long play and a microphone socket. The batteries last ages and just one minidisk can store five hours of content. Plug in a microphone and you can record and do live announcements!

For a studio, a computer fitted with a sound card and a microphone will do everything you need. You'll be able to record, capture, edit and mix audio. You'll also be able to download music and other audio from the net. With various plugins, you'll be able to add effects like echo and simulate a limiter compressor (although you will need a reasonably fast computer to do this kind of real-time processing). You'll also be able to produce CDs or MP3s and stream audio for internet radio.

Generally, a microphone by itself can not be considered an audio source. Microphones do not produce anywhere near the same level of signal as 'line-out' or audio outputs of other devices so require pre-amplification. Many mixers have mic pre-amps built in.

Limiter compressors

A limiter compressor is considered essential for any serious broadcasting as they prevent over modulation from causing 'splatter' which causes interference to other radio transmissions. They can also make a huge difference to the apparent strength of received signals by increasing the average modulation and masking the background hiss found in weaker signals. The limiter compressor acts as an automatic volume control and will make sure the transmitted sound is as loud as it can be, but not over modulated.
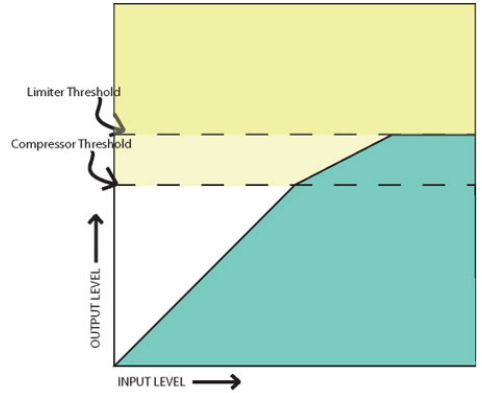
If you are broadcasting just pre-recorded music, and provided that it is all roughly at the same loudness level to start with, you should be able to adjust the volume (modulation) level on the transmitter and everything may be fine. However, if you try broadcasting live speech without a limiter compressor you will find major problems with both over and under modulation. This is because live speech can vary by up to 20 times in amplitude.
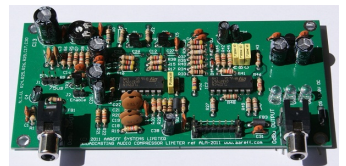
While avoiding over modulation and the associated problems by using a limiter compressor, as well as significantly improving reception, there are drawbacks. One is loss of dynamic range due to compression but that won't really affect you unless you were planning on playing classical music. More of an issue is the cost as a limiter compressor may well cost more than the transmitter. If you are pre-recording all your content or planning on having a studio, you can use a software limiter and compressor which is free.

Mono or Stereo

Opting for stereo may greatly increase the cost of your equipment. Transmitting stereo requires something called a stereo encoder, which is fitted inline between your audio source (or mixer) and the audio input of the transmitter. Some transmitters have the encoder built in. Stereo encoders start at about £35 but it is also possible to do stereo encoding in software which could be useful if you intend to use a computer as your audio source.

Mono is not only cheaper but will also provide a greater effective range compared to a stereo transmitter of the same power. Stereo uses a greater bandwidth than mono and having spread the power wider, the apparent signal will be weaker. Weak stereo signals have a lot more hiss than a mono signal.

So, if it's cheaper and more effective to use mono, why would you ever choose stereo? The answer lies in the little stereo light you see on radio receivers. Within a stereo transmission there is a 19khz signal, which tells the receiver that it is looking at a stereo transmission that needs decoding. It also tells radios with digital tuning that they have achieved accurate tuning so these radios may not bother stopping on a mono station! So, if you want people in their cars to find your station when they press scan for a quick sweep through the channels, you will need stereo. If on the other hand you are advertising a specific frequency, then you can probably rely on people managing to manually tune their radios and you can safely stick to mono. Likewise, if you are planning on doing break-in transmissions, you already know people are tuned in, so mono is fine and you need all the power you can get.

The Exciter

The exciter is the centre of your transmitter and creates the radio waves that carry your audio. It contains an oscillator, an audio input section, a FM modulation section, a RF pre-amplification stage and an RF amplified output stage and hopefuly an RF filter stage. You don't need to understand any of that.

You might hear about two types; VFO and PLL. The cheapest are the VFO (Variable Frequency Oscillator) units, because there are fewer components. However, the downside is that they can drift slightly off frequency in response to temperature or voltage changes. If you had set your transmitter to 100 MHz, you may find that it drifts down to 99.95 MHz. Most noticeable on a digital radio receiver, it will probably just mean the stereo light goes out but in the worst case scenario the sound may cut out and the listeners will have to re-tune.

More modern, complicated and expensive, the PLL (Phase Locked Loop) will not driftit will stay exactly on that frequency. You can also reset the frequency at any time and it will remain exactly on any frequency you select. A PLL transmitter is the best, but most expensive choice.

Whatever type of exciter you get, you need to get one that is powerful enough to cover your intended range or be used in conjunction with an additional amplifier.

A list of suppliers can be found towards the end of this guide.

Choosing a frequency to transmit on is not as simple as picking a nice sounding number. Unless you are deliberately aiming to wipe out another station you will need to find a clear spot that isn't used by anyone else. That's not easy, the airways are pretty crowded and in big cities you may not the only pirate looking for a gap. When you have found a possible gap, double check that it is clear at the far limits of your range. Don't just check during the day, but also evenings and at the weekend as you may find your attractive empty spot on the dial might be the jealously guarded 'property' of some jungle spinning weekend pirate.

Remember that your antenna must be tuned to the frequency you use!

Power supplies

The operating voltage of most transmitters is 12 to 16 volts DC. For mobile use car batteries are an obvious choice although lighter, safer and more portable are the lead-gel 'dry fit' batteries used in house alarms etc. These batteries can often be acquired free from places which sell and service electric wheelchairs. The smaller ones (12v 1.3Ah) are great for pocket sized 1w transmitters and cost under £10. Make sure that you fit a fuse or you'll be sorry!

It is worth noting that your transmitter will probably output more power when supplied with 15 volts rather than 12. A car battery might be 12.5 volts but the voltage will be 13.8 or even 14.4 when the engine is running.

When operating from the mains, the 13.8v DC power supplies made for CB radios are perfect for the job and pretty cheap secondhand. Some laptop power supplies may also be good assuming you can find one with a suitable voltage as most these days are rated too high, typically 19 or 20 volts.

Alternatively you could use a power supply taken from an old desktop computer. Older 'AT' power supplies which have on/off switches are

easiest to use. The more common ATX supplies found in modern computers can be used but you need to short pin 14 (green wire, power-on) to pin 16 (black wire, ground) because they don't have an on/off switch. You may also need to have something drawing power on the 5 volt side (easiest way is to leave an old hard drive connected). It is possible to modify these power supplies to provide closer to 15 volts - search online for details.

Whatever your supply, it must be able to provide sufficient current.

Here is a rough guide:

1 to 5 watt exciter = 1 to 2 amp supply

10 watt amplifier = 4 amps

20 watt amplifier = 6 amps

40 watt amplifier = 8 amps

> You should never use a so-called 'wall – wart' transformer like those used for phone chargers etc. They are very unlikely to supply sufficient current and because they are unregulated they will cause a nasty buzz.

Amplifiers

RF Amplifiers boost the low level output of your exciter (typically 1 watt or less) and boost it to a higher level (eg. 50w). More watts cost more money but this extra power will deliver better reception to your listening audience, not just due to greater range but also greater penetration into and around buildings. However, always remember that power is no substitute for getting your antenna nice and high.

The transmitter suppliers listed towards the end of this guide also supply amplifiers.

Making a case for it

If your kit consist of bare circuit boards you'll need to provide cases to protect the circuitry from physical damage and screen other electrical equipment from electro-magnetic interference while ensuring adequate airflow for cooling. Basically that means a metal box with some ventilation holes and possibly a fan. Old computer cases are plentiful but usually a little big. The traditional 'oldskool' choice for pirates used to be a metal biscuit tin. Some people even attached aluminium saucepans filled with water in order to provide heat sinks for their amps! Whatever you use, try not to leave hair or fingerprints inside ;-)

Harmonics and filters

A low pass filter will decrease harmonics, the unwanted emission of frequencies beyond 108 mhz which cause interference to TV's etc. If you are causing interference you are much more likely to attract the unwanted attention of the authorities!

You can find designs on the Internet for lowpass filters but without expensive test equipment you would have no way of knowing if something you made was actually working. While they are not horribly expensive they seem quite difficult to find so if you are not using an amplifier (or are running a portable rig at demos etc) then you may choose not to bother. Modern exciters are apparently pretty clean and often contain some kind of lowpass filter. However if you intend using plenty of power on an ongoing basis from a fixed location, you should fit a filter.

Antennas

The antenna is the most important part of your transmitter and if poorly set up it will not only give poor performance, but may also result in local interference and damage to the transmitter.

You can check if your aerial is matched to your transmitter correctly by using an S.W.R meter (sometimes built into some modern transmitters). The ideal SWR is 1:1 and most sources say that you should aim at 1.5:1 or below. Anything below 3:1 is ok, and means that at least 75% of the power reaching the end of the coax will be radiated by the antenna. If the SWR is above 3:1 then something is wrong and you should sort it out before continuing to transmit.

Commercially antennas sold for transmitting on the FM band can be quite expensive but fortunately it is really easy and cheap to make your own. There really is no point in buying one (even if you are in a hurry), just make one from scraps of copper wire, pipe, or aluminum.

The simplest antenna is the dipole but in theory it needs a Balun (BALance to UNbalance transformer) otherwise power will radiate from the coax. A Balum (or choke) can be made out of coaxial cable, search online for details. An easier alternative might be a quarterwave ground plane antenna which provides a better match to 50 ohm coax but has a higher angle of radiation (see explaination of antenna 'gain').

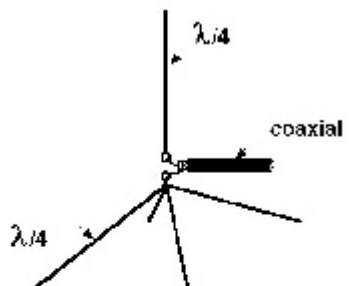1/4 wave element (inches) = 2808 / frequency (Mhz)

Slightly more complicated to build, but more efficient in use, are J Poles and Slim Jims which are also both easier to conceal. Half an hour and a couple of meters of PVC pipe and copper wire is all you need.

You can find construction details online.

http://www.pcs-electronics.com/en/guide.php?sub=antennas

http://users.marktwain.net/aschmitz/antennas/jpolecalc.html

http://www.irational.org/sic/radio/omni-aerial.html

Feedline / Coaxial cable

Unless you are going for a very minimalist portable unit with the antenna fitted directly to the transmitter, then you will need a cable to carrier the signal up to your antenna. In radio talk this is the feedline and is made from coaxial cable. You obviously need enough to reach your antenna from your transmitter but don't use more than you need as the longer the cable, the more power is lost through resistance.
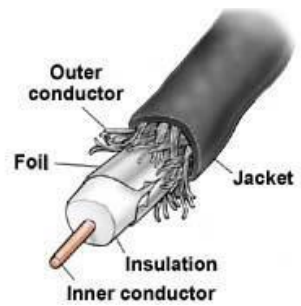
You should use 50 ohm coaxial cable, not the type used for televisions. You can use the coaxial cables (RG-58) that were used for Ethernet computer networks before CAT5 twisted pair took over but sadly it's not as easy to find as it used to be. The thicker RG-8 or UR67 is best if you need a long cable run.

Usually your coax will to be terminated in PL259 plugs to fit the SO239 sockets normally found on transmitters and antennas. Sometimes N type or BNC connectors are used, which is handy if you are recycling computer network coax.

Gain & Loss

The unit of measurent used to describe both loss or gain is decibels (dB). Gain has a positive value, loss has a negative value. Antenna gain refers to the relative increase in radiation at the maximum point expressed as a value in dB above a standard, usually a dipole. The reference is known as 0dBD (zero decibel referenced to dipole). There is a second 'reference' used in antenna gain figures but usually only by companies trying to sell on misleadingly high claims. It is known as dBi and represents the gain of an antenna compared to an imaginary isotropic antenna - one that radiates equally in all directions. It increases the antenna gain figure by 2.14dB, this being the 'gain' of a dipole over an isotropic antenna;

http://en.wikipedia.org/wiki/Antenna_gain

http://www.marcspages.co.uk/tech/antgain.htm

How far will my signal go?

Many factors dictate your range; power output (measured in watts), the type of antenna, the height and the terrain. Your signal should go as far as you can see because signal propagation at these frequencies is virtually line-of-sight. However buildings, hills, trees, background noise and other transmissions, all conspire to reduce your effective range. Obviously, getting your antenna as high as possible is very important.

A well-placed antenna could give you an effective range of a mile or two using just one watt! Increasing your power to five watts would more than double that range. Under good conditions you could expect the following effective ranges..

More power delivers better quality reception for further and gives better penetration into buildings but don't assume that 100 watts will go ten times as far as 10, it doesn't work like that. Raising your antenna height and improving the gain of your antenna system is generally a better way to increase your range than using a more powerful transmitter. If the antenna is only a few meters above the ground then its range will always be limited to a few miles and the signal will always be plagued by multipath interference, even if you pump hundreds of watts into it.

|	
1 watts _	1 to 1.5 miles
5 watts _	3 to 5 miles
10 watts _	10 miles
20 watts _	15 miles
40 watts _	20 miles
100 watts _	25 miles
300 watts _	35 miles

Broadcasting Sites

The highest locations are best. In cities, tower blocks are an ideal but obvious answer and are especially favored by commercial pirates. A further advantage is that there are usually electric sockets in the lift or heating rooms on the roof, so it's easy to get power.

To get onto the roof of a tower block you need a crowbar, or better, a key. The 'Fireman's keys' have to be standard for all blocks, so once you have one you can get onto most roofs easily. Try asking other pirates, or possibly a friendly caretaker or fireman. Or you can break the door, remove the mortise lock, get keys made up for it, then replace it.

When on the roof BE CAREFUL (sudden gusts of wind can blow you over the edge at this height!) and always wear soft shoes and keep quiet. Lots of people have been busted simply because the tenants below heard them and called the police (be aware how easy it is to get trapped). Its useful to dress like a repair person and claim to be a lift mechanic if challenged.

Any building higher than most others will do, and you can increase your height for instance by mounting your aerial on top of high, well secured scaffold pole. If your town or city has hills this could provide a good option.

You can use a piece of derelict or common land, or at night you can use parks, cemeteries or even allotments. A better option is if there are hills outside the built up area, then use a field or wood away from houses. Using a directional antenna while focus your power more efficiently towards your target audience.. This was done by Andromeda Radio, to good effect, they used to cover most of Manchester from a high hill outside, using a mere 4 watt transmitter and a hi gain directional beam antenna.
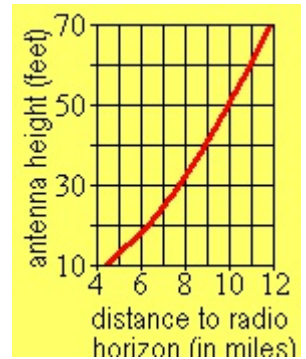
Remote link up systems

In an attempt to reduce the risk of being caught by the authorities, pirates developed ways to separate their studios from their transmitters. Transmiters can easily be located by following their signals to the source. If that place is not the studio then at least one additional step is required if anyone isto be caught.

> The cheapest way to protect the studio is to prerecord all content onto some kind of long play medium and leave it playing at the transmitter site. However the ability to 'go live' is very useful and using solely pre-recorded content may not be an option for your particular application.

Studio-to-transmitter links (STL) usually consists of another radio signal beamed to a special receiver which then feeds into the transmitter. They generally operate using a narrow focused (microwave) beam pointing directly at the receiving antenna. This means it doesn't take much power to cover a great distance and makes detection and tracking more difficult. These systems can't guarantee that a studio will escape a raid as the authorities may trace STL signals before shutting down the main transmitter. However it's possible that they may inadvertantly give advance warning if an overzealous agent unplugs the transmitter or trips an alarm before the studio location has been discovered.

The major problems hindering STL use for the newcomer has been price and availability. While all serious pirates use a STL system, they know people who can build them, you probably don't.

Some cheap off-the-shelf possibilities exist. You could try using AV audio/video senders which operate on either 1.2ghz or 2.4ghz and are easy to buy (about £35). The ones you get from high street shops are not very powerful (up to 100 meters) but you can import much more powerful units (1w / 1000 meters) from overseas vendors advertising on ebay. You could gain significant additional performance by utilising high-gain directional antennas like those available for WiFi.

> The Pink Castle's GM-FM used cheap PMR walkie talkies to link to the transmitter and enable emergency voice announcements. It was surprisingly effective but probably only useful in a limited number of scenarios. The range is well under 1km and don't expect great sound quality for music.

WIFI & Netcasting

You can cover great distances with WiFi and it is cheap. Streaming audio via the internet has become a very effective way of separating the studio from transmitters. The hardware needed is the kind of stuff you can get for free, old laptops with dud batteries, wifi cards etc. You just need something which can connect to an available open WIFI access point and start playing the specified audio stream. Since a computer is now effectively your audio source, you can avoid the expense of a hardware compressor/limiter or a stereo encoder because it can all be done by software (assuming the computer is fast enough).

You may need to use an external directional antenna to get a good connection to the nearest WiFi node. The cheapest option is to use a USB dongle a 3 or 5m extension cable and build a parabolic reflactor. Check out www.usbwifi.orcon.net.nz for low cost DIY directional hi-gain WiFi systems.

Internet radio

Having introduced the idea of using netcasting as a means of providing an almost untraceable link from a studio to the transmitter we may as well go into more detail about streaming audio online. There are thousands of internet stations – some people joke that there are more stations than listeners and that's not that much of an exaggeration. Anyway, it's cheap and easy to setup. You don't have to use loads of expensive gear like mixers and decks, just a microphone and a reasonable computer .
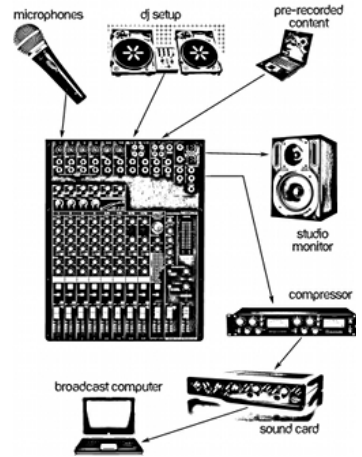
On OSX check out Nicecast. Under Window$ you could use winamp with the oddcast plugin. Additional useful plugins might include a compressor limiter and a radio scheduler plugin to enable automatic 24/7 playlist control. The commercial system 'SAM Broadcaster' (spacialaudio.com) is amazing and does everything you could possible want (windows only).

If you prefer to use open source software you won't have a problem finding streaming software. Check out icecast, MIXXX or IDJC for a start. For scheduling and automation software the choice are more limited. Search online for Sourcefabric's "Airtime" or Rivendell's radio broadcast automation solution.

As well as the client side software you need access to a streaming server. Since you will be doing political subversive radical DIY media you should have no problem persuading Indymedia to give an streaming account. However, while free, streams from Indymedia do not get listed in the station guides accessible from WinAmp, iTunes or MediaPlayer etc. so don't expect many listeners. Use of a commercial streaming server will cost money (unless you have a friend in the business). However, they really aren't expensive unless your station becomes really popular (which is very unlikely). Look online for shoutcast servers.

http://www.korokithakis.net/tutorials/icecast/

http://radio.about.com/od/createinternetradio/a/How-to-Create-Your-Own-Internet-Radio-Station.htm

Radical Content

It's easy to find plenty of music to play, just use a torrent search engine or a peer2peer file share program to find and download what you need. However, there is no point going to all the effort of setting up a pirate station if all you are going to play is music that people can already tune into elsewhere. You wouldn't be reading this if you didn't have your own ideas about what you want to broadcast, be it grassroots news reports from your community, subverts, political rants, local comedians and poets, interviews or unsigned musicians etc.

Whatever original content you are planning on producing, check out some of the radical content already available, you might find it useful for your station or simply get some ideas. Upload to the internet any good content that you produce so that other people may rebroadcast it.

Indymedia newswires can be a good source of audio from news reports and interviews to music and soundscapes. Also check out the global radio page (radio.indymedia.org) for downloadable content and links but it is mostly stuff from the USA.

A-Infos Radio Project (www.radio4all.net) was formed in 1996 by grassroots broadcasters, free radio journalists and cyber-activists to provide the means to share radio programs via the Internet for re-broadcast. It's great, new stuff almost every day!

Other places to look...

www.catalystradio.org	www.dissidentisland.org	www.underthepavement.org
www.radio4a.org.uk	www.democracynow.org	www.flashpoints.net

Suppliers of transmitter kits

Verconica (renamed AAREFF) http://www.aareff.com

This company is UK based and have been around ages. They supply not only PLL exciters, but also power amps, antennas, stereo encoders and compressor/limters etc. Prices now seem high**.**

PCS Electronics www.pcs-electronics.com

This company is based in Latvia and supply some nice kit includingboth FM and AM transmitters, amplifiers, and even TV transmitters. Their 15w FM exciter is 180 euros.

ASPiSYS http://www.aspisys.com/

These guys are based in Greece. They make a lot of useful stuff, not just for FM broadcast but also AM and TV transmitters. Their 6w kit is 250 euros.

HLLY http://www.hllytransmitter.com

This company is from China. Their prices include free shipping. 360 US dollars gets you their 30 watt transmitter with SWR and temp protection. They do an 80w amp for 140 US .

FMUSER http://hllye.com/

Another Chinese firm who seem to be trading with a very similar name as the one above. They are cheap. 70 US dollars for 5W. 180 for 10w. As I write they have a 7w transmistter for just 49 US and a 15w for 69 US!! **This is as cheap as it gets!**

I won't bother listing US suppliers but I will mention Free Radio Berkeley (www.freeradio.org), which fostering a low power broadcasting movement and challenging regulations in the US. They sell various transmitters plus output filters, dummy loads and amplifiers.

The law..

It's beyond the scope of this publication to provide details about the possible consequences of being caught for unlicensed radio broadcasts as it varies from country to country. However, to give you some idea of the potential seriousness of the offense, here is a summary of the situation in the UK.

Broadcasts are monitored to gain information such as the telephone numbers used in station operation. Search warrants can be granted allowing entry into premises and they can take anything found which appears to have been used in connection the offence. Any person who intentionally obstructs an authorised enforcement officer exercising their powers may also be guilty of an offense.

Anyone involved with pirate broadcasting, even if they allow their premises to be used, or if they advertise on a station commits an offense. The maximum penalties are unlimited fine and two years in prison. On conviction, a court may order all or any of the apparatus of the station, including record collections, portable telephones, etc. to be forfeited.

DEALING WITH COPS

Regardless of what country you are in, one piece of advice can be considered universal - **avoid saying anything to the police** - at least until you have spoken to a lawyer. You have nothing to gain by talking to the cops. Most people are convicted on evidence given voluntarily by themselves or their friends.

Remember "NO COMMENT

> *"Protest beyond the law is not a departure from democracy;*
> *it is absolutely essential to it." - Howard Zinn*

Online resources:

www.freeradio.org

www.pcs-electronics.com/ (see 'our guides')

www.barkingduck.net/ehayes/essays/pirbook.htm

www.frn.net/special/prsg/

prometheusradio.org/node/19

c6.org/archive/radio/pirate-fm.html
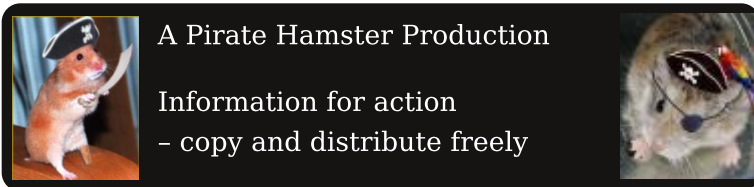
 A Pirate Hamster Production

Information for action
– copy and distribute freely