

Communication

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Modern Communications

In a age where all phones are pre-tapped to some degree and a tap can legally be put on a person, meaning every phone they could or do use, staying in touch when you have gone to the mattresses can be tough. Part of being underground and hiding out is staying quiet but if you are a leader your continuing free existence may be needed to rally the troops.

CB vs Ham Transmitters

Surprisingly a well grounded CB radio with a horizontal to the ground wire antenna 264 cm (104') long suspended or sloped 5 meters from the ground gives good sky wave when the sunspot cycle is high and local/regional propagation, with the bonus that is almost impossible to trace, the downside is most of the time you range maxes out at 4-10 miles even with a good antenna. Try to buy a CB radio that can easily be modified for out of band transmission and if you have the extra cash sideband really increases the range and free channels. Better yet for the price of a very good CB you can get your hands on a used HF radio transmitter, tuner, and set up a wire stealth antenna. With a medium power HF ham radio set you could keep in contact with almost anyone within a few hundred miles a who has a shortwave receiver but your radio will have to transmit on AM mode, or have conversation with other members using HF radio gear over several thousand miles. Try to keep the transmit power set as low as possible so neighbors won't report the radio operator jamming their TV and trackers will need to search harder. Using a horizontal antenna it is nearly impossible to triangulate or trace location beyond the general region of the country the transmitter is in. To calculate antenna length of a half wave antenna wire divide 492 by your frequency in Megahertz (MHz), antenna length is measured in feet for this formula, of course you will learn that nearly everyone cheats and uses a tuner trading away transmitted watts for ease of change in band. If you are bad at morse code pre-key your transmission into a tape recorder and when the time comes run the tape with the radio on AM or Single-Side-Band mode into the mike, morse works much better at long range than voice, you can also tape and slowly decode received messages, most CB sets wont do CW or morse code mode anyway but you can hack a code keyer by wiring your code key directly into the transmit pin and looping it with a 600hz tone ocillator on mic input pin, use upper sideband setting when transmitting this way. Many shortwave radio sets will receive CB frequencies but combining the low power of legal CB radios with the short antennas on shortwave sets usually leads to short reception ranges.

^JmageIntcode.png

Frequency charts

Although the term "business band" refers to several discrete frequencies that are not grouped into a single band, the frequencies are grouped by band and listed below. They are mostly only useful for scanning the local Wal-Mart manager or Mc'key-D's drive through box but you never know what cool stuff they have wired into the system. Some businesses have already moved to store centralized digital 900mhz or higher ISM bands using systems integrated with the stores telephone switching system. What is fun is many of these frequencies are actually available in some of the two-way no-license-required radios sold at these mega stores! You actually have a somewhat legal right to annoy the store manager now.

OpSec

It is important to note that these few frequencies can be easily programmed to be monitored by any cheap scanner, it is reasonable to expect that these frequencies will be monitored by the police at any protest event if they notice us using radios. We recommend either used or inexpensive Chinese walkie talkies designed for commercial and amateur radio operations which can program thousands of frequencies, newer ones can be concealed and operated via Bluetooth or cord headsets just like the FBI.

Thanks to wikipedia.org for the table (gnu fdl)

Low-band frequencies

Mostly tow, delivery, and taxi companies use these freqs.

Name Frequency Notes

27.490 MHz Low power, itinerant
27.510 MHz Low power
27.553 MHz Low power
30.840 MHz Low power
33.120 MHz Low power
33.140 MHz Low power
33.400 MHz Low power
35.020 MHz Low power
35.040 MHz Low power, itinerant
42.980 MHz Low power
43.040 MHz Low power, itinerant

VHF frequencies

You can buy and use MURS radios in the USA without a license, these frequencies are also used by businesses, some radios can be hacked for greater transmit and receive ability.

Name Frequency Notes

Red Dot 151.625 MHz Itinerant

151.820 MHz Un-licensed Multi-Use Radio Service (MURS); 2 watts, 11.25 kHz bandwidth

151.880 MHz Un-licensed Multi-Use Radio Service (MURS); 2 watts, 11.25 kHz bandwidth

151.940 MHz Un-licensed Multi-Use Radio Service (MURS); 2 watts, 11.25 kHz bandwidth

Purple Dot 151.955 MHz

154.515 MHz

154.540 MHz

Blue Dot 154.570 MHz Un-licensed Multi-Use Radio Service (MURS); 2 watts, 20 kHz bandwidth

Green Dot 154.600 MHz Un-licensed Multi-Use Radio Service (MURS); 2 watts, 20 kHz bandwidth

UHF frequencies

Name Frequency Notes

White Dot 462.575 MHz GMRS
Black Dot 462.625 MHz GMRS
Orange Dot 462.675 MHz GMRS
Brown Dot 464.500 MHz Itinerant
Yellow Dot 464.550 MHz Itinerant
Silver Star | 467.850 MHz |

Gold Star

Red Star | 467.875 MHz
467.900 MHz |

Blue Star	467.925 MHz
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469.500 MHz Itinerant
469.550 MHz Itinerant |

FRS and GMRS

You will often hear businesses using inexpensive FRS and GPRS radios instead of commercial frequencies, these are UHF radios. Much like ignorant activists businesses and event leaders will transmit in the clear without code words. If you find a GMRS repeater and know the PL tone you have an important tool, this allows you to transmit over a large area of the city with your little walkie-talkie. GMRS is supposed to be a pay-for license service, no test, here are the freqs so you can scan these too.

Name	Lower frequency (repeater output) (MHz)	Upper frequency (repeater input) (MHz)	Motorola convention	Icom F21-GM convention	Notes
"550"	462.550	467.550	Ch. 15	Ch. 1	Use not permitted near the Canadian border. Suggested nationwide emergency and road information calling. Nationally recognized coded squelch for 675 emergency repeater operation is 141.3 Hz. Use not permitted near the Canadian border.
"575"	462.575	467.575	Ch. 16	Ch. 2	
"600"	462.600	467.600	Ch. 17	Ch. 3	
"625"	462.625	467.625	Ch. 18	Ch. 4	
"650"	462.650	467.650	Ch. 19	Ch. 5	
"675"	462.675	467.675	Ch. 20	Ch. 6	
"700"	462.700	467.700	Ch. 21	Ch. 7	
"725"	462.725	467.725	Ch. 22	Ch. 8	

This second set of frequencies shows the interstitial ranges shared with the Family Radio Service. These frequencies can only be used for simplex operations.

Name Frequency (MHz) Motorola convention Icom F21-GM convention Notes

"5625" or "FRS 1"	462.5625	Ch. 1	Ch. 9
"5875" or "FRS 2"	462.5875	Ch. 2	Ch. 10
"6125" or "FRS 3"	462.6125	Ch. 3	Ch. 11
"6375" or "FRS 4"	462.6375	Ch. 4	Ch. 12
"6625" or "FRS 5"	462.6625	Ch. 5	Ch. 13
"6875" or "FRS 6"	462.6875	Ch. 6	Ch. 14
"7125" or "FRS 7"	462.7125	Ch. 7	Ch. 15

Pocket Radio

Why not build from scratch, kit, or buy a small QRP radio and keep it in your pack. Have a regular time that a friend with a quality antenna and radio setup listens for you. You can keep in touch over hundreds or even thousands of miles using morse code and a transmitter/receiver the size of a pack of cards that is almost impossible to trace. There are many designs on the internet for building such a radio set from easy to get parts. Many QRP radio kits are made to fit an Altoid mint tin, this makes it possible with some creativity to hide a transceiver inside a normal AM/FM walkman type radio case, this disguise might mean that the pigs will return your radio if they pick you up. We have even seen radio transceiver kits smaller and lighter than paperback book for around \$100 that let you transmit SSB voice or with minor modifications RTTY data when plugged into a laptop or PDA, these have a range from hundreds to even thousands of miles with a decent wire antenna and good location.

See Backpacking for some wilderness radio tips for the wilderness fugitive.

Sat-Com

If you have a 2 meter band ham radio or something hacked for that frequency range that will do five watts, you can uplink to the amateur radio low Earth orbit communications satellite system. These radios are easy enough to find at a radio swap or online auction for under \$100. Most satellites downlink in the 440mhz band except the amateur radio transponders on the International Space Station which uplink and downlink on 2 meters saving you money on gear. So for most satellites you either need a scanner which will work in this band for receiving part of the communications or, to save weight and space, get a dual band 2 meter/440 radio, then the uplink and downlink frequencies are both in one radio. It is important that the dual bander is able to do full duplex between the bands for satellite ops. Lastly, to work most effectively, you should use a good yagi antenna to aim at the satellite; The wimpy rubber antenna on the radio you get is too weak. Some satellites require a PL tone to activate the transponder/repeater, there are kits to add this to hacked old commercial/police/fire/forestry radios but most used ham radios include this for less than the kit.

You can DIY a yagi antenna with measured and cut pieces of solid ground wire, measuring tape, or scrap aluminum arrow shafts, stuck into a shaft of wood, although there is a thing you can buy called an arrow antenna becoming popular with satellite radio backpackers but the \$5 DIY antennas are about 10% more powerful than the \$150 arrow antenna and are easier to hold if you make them on a longer pipe or pole.

If you get good with satellite it means you can have reliable communications covering a whole continent with a pocket size radio and a tiny power budget, although it only works when there is a ham satellite passing over and sometimes blackouts of an hour occur.

For worldwide communications you need some kind of computer or data device; some satellites have a data store and forward function which will store something like a satellite radio email which a friend can retrieve, another mode, digipeater beams your signal to earth stations and forwards it as an email.

There are good free open source satellite tracking programs for laptops and even the oldest PDA's, some let you print out a satellite almanac for a specified date parameter, some also compute the doppler shift live so you can tune your radio. If you have no tracking program, sweep your antenna toward the north or south and scan the known downlink freqs until you hear a OSCARS satellite beacon or voice traffic, most satellites have a regular polar orbit so it should be easy to make a repeating tracking chart.

After reviewing the satellite design and the tech involved we have determined that this is a easy mode for the pigs to direction find if they suspect you of using this to communicate. As long as they can record the downlink transmissions from the satellite and have the orbit information they can calculate your position by the Doppler shift of the uplink signal. This tech is most commonly used by the SAR satellite teams to find crashed aircraft, lost campers, and life rafts and takes several passes to pinpoint a location but even one pass gives a search area of about 100 miles, perhaps even tighter.

The the high speed of satellites leads to a Doppler shift up to +0.10Mhz on oncoming sats and up to -0.10Mhz with satellites that have already passed overhead, directly overhead they will be right on frequency. If you have no satellite information you can scan the 70cm band for downlinks between 435.00-438.00, more difficult is guessing the 2 meter input frequency, but scan 145.80-146.00 for powerful stations, you can also monitor the satellite downlink and run through the uplink band transmitting a tone and you know you are there when it comes back on 70cm.

J-pole Sat-Com Yagi Antenna

For those who know antennas here is the design for a cheap high performance j-pole yagi for the 2m/70cm sats and long range tight band hilltop to hilltop communications. The 2 meter side will be cross polarized from the 440mhz side, meaning they are crossed against each other at 90 degrees. We will list the antenna elements in the order they are found from the bottom or rear of the antenna. The driven element is a j-pole meaning the right side is twice as long as the left and bent back to the center looking like a big J, your coax cable is zip tied to the wood pole and the center wire is soldered to the tip if the J and the sheath wire is soldered to the middle of the full length piece of the wire, you can goop this up with hot glue to strengthen it after you test it. If needed, the tip of the J can be bent a little so you can stick it into your wood pole. We suggest a two foot or so tail on your antenna pole after the reflector element so you can rest the end against your stomach or belt giving you arm a rest as you hold the antenna on the satellite, many people strap their radio to the pole behind the reflector element. There are many designs with good pictures on the net.

- 2 meter band side:(3 element)

Reflector 41 inches tall - 8.5 inches forward is the driven J element a wire 58.75 inches of wire the left side bent back to the center making a 38.5 inch tall J, the parallel double wire side must space those wires one inch apart - 20 inches forward a 37.0 inch tall element

- 70cm(440mhz) band side:(six element)

Reflector element 13.5 inches - 2.5 inches forward is the driven element, 19.875 inches of wire bent back on the left side to the center for the J shape 13.0 in wide .375 or 3/8 inches between the double wires side of the J - 5.5 in forward is element-1 12.5 wide - 11.5 in forward element-2 12.0 in - 17.5 in forward element-3 12.0 in - 24.0 in forward element-4 11.0 in

Brazil SatCom Nuts

Our friends in the Amerikan DOD have launched easier to use satellites than the amature system, they are more sensitive and downlink with much more power. To use the FLTSATCOM and UFO satellites pirates typically take an ordinary 2 meter band ham radio transceiver, which operates in the 144- to 148-MHZ range, and add a frequency doubler made from coils and a varactor diode. That lets the radio stretch into the lower end of FLTSATCOM's 292- to 317-MHz uplink range(remember to do the math when setting your frequency). Another path is to hack a 220mhz band ham radio to stretch into the military band. Set the difference between uplink and downlink frequency or repeater offset to +41-MHz. Most radios are by default set to +-0.60, remember if you are using a hacked radio with a frequency doubler to set the offset to +20.5. You could also just find a military surplus air band radio transmitter at a surplus store or auction site and attach a proper antenna and ham radio linear amp as required, use a proper scanner for the receive side if there is no rx/tx frequency offset on an older set. Some radios will require setting two frequencies into memory and setting one as repeater input and one as output, verify it works by transmitting with one radio while a scanner is set to your downlink frequency, no PL tones or codes required! You will need a transciever with at least 20 watts output and a yaggi antenna cut specifically for these frequencies to use these satellites, you will also have to calculate where in the sky your satellite is, it does not move from this point as it is geostationary, so once you hear chatter you can hard mount it like a TV satellite antenna.

The lowest frequency channels are 9-127 which are 25khz wide and spaced 100 khz apart so ch#9 is 292.850Mhz uplink and 251.850 downlink and ch#10 is 292.950 up and 251.950 down, etc. This is a linear transponder so whatever frequency bandwidth you uplink with(within the capacity of the satellite) it will beam down with, don't sweat the military channel plan too much, but realize that if you blow away 500khz of on a regular basis there is a big incentive to shut you down.

It seems the FLTSATCOM and UFO satellites can't be frequency selectively turned off from the ground without disrupting the legit comms, else the US government would be actively blocking the pirates. That said, the US Department of Destruction is jealous that pirates have figured out their use of unguarded space radio transponders, if you use these assets expect your voice to be recorded, and attempts made to track you down. This is more of a danger in urban areas where easy line of sight tracking can be used, in rural areas it is more difficult and requires electronic survey aircraft sent to search you out. So science geek, since there is no movement of the satellite vs the ground they can't use the doppler tracking trick, but they can triangulate your position using one or two other satellites, some simple math, and timing the transmission arrival so dont over use this asset. These crackdowns happen every few months in Brazil where there is major CB style chatter on the overhead FLTSATCOM satellite, we have never heard of this happening in the US, UK, or Europe so far although Portugal is home to many of the transatlantic Brazil chatters who introduced the hack. So far this information is cobbled from information in news reports out of Brazil, scanner recordings from the satellite, and the US military FM 6-02.90 TACSAT field manual.

Phones

Your voice is really your fingerprint and the police can use it, with the help of modern computers, to hunt you back to the telephones you use. If you are in trouble get rid and never use again both your current cell phone and the SIM card inside, don't make calls on a residential phone, even pay phones are risky.

Taped Broadcasts

Abbie's advice on voice and video tapes is very good. Be sure to have a generic indoor background unless you need to show that you are in a certain location, a clean blue sheet is a perfect backdrop as there is no way to guess where you are and a video editor can easily make a pleasing background. Background sound is even more important on the audio of both voice and videotapes. The audio can give away your location better than the video, make sure to have good white noise or soft music covering the background and that you are taping in a quiet room, have a friend with some quality sound editing software check out the background and edit out any passing sirens, trains, or recognizable noise.

Secure SneakerNet

Files can be burned to CDs or stored in USB drives and distributed, carrier pigeon delivered, or mailed from an out of town drop box, then a GPG passphrase and signature is used to unlock operation details for secure meets and backup plans that are somewhat less likely to be compromised than without the codes.

Easy Cyphers

Solitaire Encryption and Decryption

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The algorithm generates a stream of values which are combined with the message to encrypt and decrypt it. Each value of the keystream is to be used for one value of the message, thus the keystream will need to be the same length as the message.

1. Remove all punctuation and convert the characters to the same case.
2. Convert all the characters to their natural numerical values, A = 1, B = 2, etc, Z = 26.
3. To encrypt a message, add each keystream value to its corresponding character in the plaintext, rolling over back to 1 if the resulting value exceeds 26. To decrypt, subtract each keystream value from its corresponding character in the ciphertext, rolling back up to 26 if the resulting value should be lower than 1.

Algorithm

This algorithm assumes that the user has a deck of cards and two jokers. For simplicity's sake, only two suits will be used in this example. Each card will be assigned a numerical value: the first suit of cards will be numbered from 1 to 13 (Ace through King) and the second suit will be numbered 14 through 26 in the same manner. The jokers will be assigned the values of 27 and 28. Thus, a 5 from the first suit would have the value 5 in our combined deck, the value 1 in the second suit would have the value 14 in the combined deck.

The deck will be assumed to be a circular array, meaning that should a card ever need to advance below the bottom card in the deck, it will simply rotate back to the top (in other words, the first card follows the last card).

1. Arrange the deck of cards according to a specific key. This is the most important part as anyone who knows the deck's starting value can easily generate the same values from it. How the deck is initialized is up to the recipients, shuffling the deck perfectly randomly is preferable, although there are many other methods. For this example, the deck will simply start at 1 and count up by 3's, modulo 28. Thus the starting deck will look like this:

- 1 4 7 10 13 16 19 22 25 28 3 6 9 12 15 18 21 24 27 2 5 8 11 14 17 20 23 26

2. Locate the first joker (value 27) and move it down the deck by one place, basically just exchanging with the card below it. The deck now looks like this:

- 1 4 7 10 13 16 19 22 25 28 3 6 9 12 15 18 21 24 2 27 5 8 11 14 17 20 23 26

3. Locate the second joker (value 28) and move it down the deck by two places.

- 1 4 7 10 13 16 19 22 25 3 6 28 9 12 15 18 21 24 2 27 5 8 11 14 17 20 23 26

4. Perform a triple-cut on the deck. That is, split the deck into three sections. Everything above the top joker (which, after several repetitions, may not necessarily be the first joker) and everything below the bottom joker will be exchanged. The jokers themselves, and the cards between them, are left untouched.

- 5 8 11 14 17 20 23 26 28 9 12 15 18 21 24 2 27 1 4 7 10 13 16 19 22 25 3 6

5. Observe the value of the card at the bottom of the deck, if the card is either joker let the value just be 27. Take that number of cards from the top of the deck and insert them back to the bottom of the deck just above the last card.

- 23 26 28 9 12 15 18 21 24 2 27 1 4 7 10 13 16 19 22 25 3 5 8 11 14 17 20 6

6. Note the value of the top card. Count this many places below that card and take the value of the card there. This value is the next value in the keystream, in this example it would be 11. (Note that no cards are changing places in this step, this step simply determines the value).

7. Repeat steps 2 through 6 for as many keystream values as required.

Book Code

Much less secure but quicker to use than the card cypher a book code gives the page and location of a sentence or word on a page several such instructions makes a readable message, both parties must have the exact same edition of the book. With the advent of massive book digitization this code might be easily broken in the future, and even now is not considered secure since the book you are using may be known to the police or government.

Original Communication

Living underground, like exile, can be extremely lonely, especially during the initial adjustment period when you have to reshuffle your living habits. Psychologically it becomes necessary to maintain a few close contacts with other fugitives or folks aboveground. This is also necessary if you plan to continue waging revolutionary struggle. This means communication. If you contact persons or arrange for them to contact you, be super cool. Don't rush into meetings. Stay OFF the phone! If you must, use pay phones. Have the contact person go to a prescribed booth at prescribed time. Knowing the phone number beforehand, you can call from another pay phone. The pay phone system is superior to debugging devices and voice scramblers. Even so, some pay phones, that local police suspect bookies use, are monitored.

Keep your calls short and disguise your voice a bit. If you are a contact and the call does not come as scheduled, don't panic. Perhaps the booth at the other end is occupied or the phone you are on is out of order. In New York, the latter is usually true. Wait a reasonable length of time and then go about your business. Another contact will be made. Personal rendezvous should take place at places that are not movement hangouts or heavy pig scenes. Intermediaries should be used to see if anyone was followed. Just groove on a few good spy flicks and you'll figure it all out.

Communicating to masses of people above ground is very important. It drives the MAN berserk and gives hope to comrades in the struggle. The most important message is that you are alive, in good spirits and carrying on the struggle. The communications of the Weathermen are brilliantly conceived. Develop a mailing list that you keep well hidden in case of a bust. You can devise a system of mailing stuff in envelopes (careful of fingerprints) inside larger envelopes to a trusted contact who will mail the items from another location to further camouflage your area of operation. A host of communication devices are available besides handwritten notes and typed communications. Tape recorders are excellent but better still are video-tape cassette machines. You can wear masks, do all kinds of weird theatrical stuff and send the tapes to television stations. At times you might want to risk being interviewed by a newsman, but this can be very dangerous unless you conceive a super plan and have some degree of trust in the word of the journalist. Don't forget a grand jury could be waiting for him with a six months contempt or perjury charge when he admits contact and does not answer their questions.

The only other advice is to dress warm in the winter and cool in the summer, stay high and...



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