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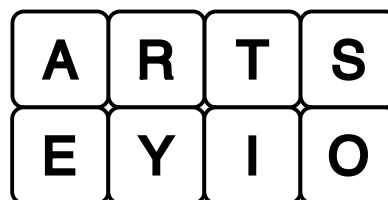
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Introduction

Have you ever wanted to be able to type with one hand? Maybe you're getting over an injury, maybe you have a disability, or maybe you just have a weird use case in mind. Typing on a regular QWERTY keyboard with one hand is awkward, and while there are some chording keyboards out there like Infogrip's BAT Keyboard, they tend to be expensive and a little hard to come by. Artsey.io is an open-source keyboard system that uses only a 2x4 set of keys. The name is also the URL of the website where you can find info about it.



Right now, getting the hardware set up is a little technical, but fairly affordable. There's a pre-built option in the \$45 Faunchpad, and if you can do some soldering, you can get a dedicated artsey.io keyboard put together for about \$20 (up to about \$60 if you go for more deluxe options). Since artsey.io goes into a keyboard's firmware, you can use it with any device that accepts input from a USB or Bluetooth keyboard. That can include:

- Desktop and laptop computers (including Windows, macOS, ChromeOS, and Linux)
- Tablets and smartphones (though you'll need Bluetooth for iPhones)
- Raspberry Pi and other single-board computers
- Many game consoles

You only need to learn about 40 combos to effectively use artsey.io, and eight of them are in the name. You'll have to put in some time practicing, but you can get the basics down in a matter of hours, hence even with the sections on hardware and such this book is pretty short. I've tried to get into technical details only as much as is necessary, but keep in mind I'm a mechanical keyboard geek and I could blather about this stuff for hours.

Pros and Cons

Artsey.io isn't for everyone, and it isn't meant to replace normal keyboards in every situation. Instead, it fills a particular niche. If you're able to use both hands to type, artsey.io is going to slow you down,¹ but there are any number of cases where it could be your best option. Or you might just find it a fun thing to mess around with. Regardless, here are the pros and cons of it as I see them.

| Pros | Cons |
|--------------------------------------|---|
| Very small footprint/highly portable | Setup is a bit technical |
| Only uses one hand | Typing is slower |
| Includes navigation and mouse keys | More effort per character |
| Easy to learn | Can <i>only</i> use one hand |
| Customizable | Combination keystrokes are more complex |

¹ People typically get up to 40 WPM with some practice, and it tops out at around 55 WPM for most.

Combos

Artsey.io is based on “combos,” where you press multiple keys at once to get a particular function. In normal typing you generally press only single keys with the occasional modifier key, and using combos has the advantage that it lets you use fewer keys overall. The tradeoff is that it’s less intuitive. It still takes time to learn how to use a QWERTY keyboard, but the letters are all right there, so that any literate person could use it to produce text, even if they were really slow at it.

Combos are a little different from the chords used in stenography. You’re still using multiple keys at once, but where steno registers a chord when you release the keys, artsey.io registers a combo as soon as you press the key(s) down. This means you need to get in the habit of confidently pressing the combination of keys you need.

Which Hand?

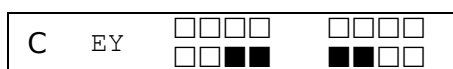
Artsey.io comes in left- and right-handed versions, which are (mostly) mirrors of each other, and need to be set up in the firmware. It’s probably better to pick one and learn it, but if you think that learning both won’t break your brain then go for it! Regardless, it’s best to have some idea before you get too far. Think about how you intend to use it:

- If you want to use it to type on your phone, which hand do you hold the phone with?
- If you want to use it at your desktop, do you want to use the mouse with your other hand?
- Do want to be able to eat while typing?

This book only covers the basic lefty and righty version of standard artsey.io. Some of the other variants change the base layer, which makes some portions of this book inaccurate to them. Don’t let that stop you if you think it’ll be better for you!

Text Conventions

When this book has letters in the `Courier New` font (the typewriter-looking one where every character is the same width) it’s referring to the keys of the base layer. We’ll also show chords with diagrams so that you can learn the shape of them, but since most of the chords are asymmetrical, we have to show both the left and right versions, like this:



In these diagrams the left-handed version of the chord is always on the left side, and (you guessed it) the right-handed version is on the right side.

For instances where you hold one key and then press one or two more, we’ll show it with the key to be held followed by an arrow, and then the key(s) to be pressed, like this:

`E→O` means you hold `E` and press `O`, which produces an equal sign (=).

We’ll explain the cases where this comes up in Lesson 7 (p. 18).

Anything to do with URLs or computer code is in `Inconsolata`, a sans serif monospace font.

Software Solutions

As I write this, artsey.io is mainly implemented as keyboard firmware. Software implementations have the advantage that you don't need any kind of specialized hardware for them.

Right now, the only software implementation of artsey.io is Nick Pederson's macro script for Karabiner-Elements, a powerful free macro app for macOS.

- github.com/nickpedersen/artsey_on_karabiner
- karabiner-elements.pqrs.org

Basic keyboards may lack the NKRO (n-key rollover) feature that lets a keyboard register an unlimited number of simultaneous keystrokes. For artsey.io this isn't *usually* a problem, but some keyboards may have trouble with its 4-key chords, which is a problem if you want to enter Z or press the space bar in artsey. Even the most basic mechanical keyboards normally have NKRO, so nabbing a cheap one from Amazon should do the trick.

Help!

Artsey.io has a small but friendly and active community Discord server; if you run into issues that's by far the best place to ask for help. I've had to ask for help a number of times, and I can literally say I wrote the book on artsey.io.

If there is anything you need for help and/or want to contribute feel free to join the Discord (link at artsey.io) and ask/comment; feedback is very welcome. For this book in particular, check out the #learning-artsey-book channel.

Hardware

As I write this, there are a few different options for artsey.io hardware, but for most of them you'll need to know a bit about DIY mechanical keyboards or enlist someone who does. If you can get a keyboard that has a 2x4 grid of keys on it somewhere and uses either QMK or ZMK open-source firmware, you'll probably be able to get it set up with artsey.io.

Here are some existing keyboards that work well for artsey.io:

- **Paintbrush:** This is an open-source keyboard design specifically made for artsey.io.¹ It has a columnar stagger that makes it more ergonomic, the PCB is reversible, and it can be wireless if you build it with a nice!nano or another ZMK-compatible microcontroller with a Pro Micro style set of contacts. You'd also need a lithium battery and a 7-pin power switch. It also has the option to include a small OLED display, which can show things like what layer you're on or the current battery level. An Australian store called KEBD is going to sell a kit, but the files to get the PCBs made are in a Github repository for anyone to use.
- **Launch Pad:** SpaceCat Design offers this affordable and flexible macro pad kit for only \$7.99. To turn the kit into a working keyboard you'll also need a Pro Micro or compatible microcontroller and 8 Cherry MX-compatible key switches with keycaps.
- **Faunchpad:** This is an 8-key macro pad from gboards.ca. The price depends on how complete of one you want to order, ranging from \$15 for a bare circuit board to \$45 for a Faunchpad that's ready to use out of the box.
- **2x4 BLE Macropad for Mechanical Switches:** The creator of the BlueMicro (another microcontroller with Bluetooth support) offers this 8-key Bluetooth macro pad kit with artsey.io firmware pre-installed through tindie.com for \$35 (plus a little extra for keycaps and switches).

There are some other boards that could work like the Namecard and AZ-Macro keyboards that Japanese hobbyists have available for sale through booth.pm. If you do 3D printing, there are designs for macropad cases on Thingiverse (thingiverse.com) that you can use as the base for a handwired macro pad suitable for artsey.io as well.

Other keyboards with the 2x4 arrangement and then some, such as the Corne, Helix, Microdox, Butterstick, FightPad, RoMac, etc. can work just fine with artsey.io, with a couple of caveats for QMK users:

- Artsey.io takes up most of the 32 kilobytes of storage space on a Pro Micro,² so it will be difficult to squeeze too much more on there. It can play nice with a full keyboard layout, but you may feel the squeeze if you want to add too many other features. There are some things you can do to reduce the size, most notably enabling LTO (Link Time Optimization), which in QMK is one of the Config Options.
- The way artsey.io is set up, it needs to be on the base layer, and then you can set it up to switch to other layers when you want to do something else.

¹ It took me a little while to notice that it's called "Paintbrush" because it's for ARTsey.

² ZMK-compatible microcontrollers have significantly more storage.

Switches

As with steno, artsey.io involves pressing multiple keys at once, so it's better to have the key switches be a bit lighter than you'd typically want on a QWERTY keyboard. Actuation force is cumulative it turns out! Lighter switches take a little getting used to—you have to wean yourself off of the habit of letting the weight of your fingers rest on the keys—but they have their benefits.

Cherry MX style key switches are the most common in mechanical keyboards, but the newer low-profile “Choc” switches from Kailh have less travel and are generally a bit better for chording (though your keyboard has to be made for the correct style of switch!).

There are some MX-style switches with lighter actuation forces; they usually have a rating in gf (gram force), where 45-70gf is typical.

- Gateron Clear (35gf)
- Hako Violet switches have progressive springs, with an actuation force of 40gf at the tactile point and 50gf at the bottom.
- Kailh Speed switches are around 50gf, but have a lower actuation point (only 1.1mm).
- You can also buy lighter springs and swap them out. A Korean company called SPRiT Designs¹ makes them as low as 12gf.

Kailh Chocs include Red Pro switches (35gf), Purpz (25gf), and gChocs (20gf), which work nicely for this kind of thing. SPRiT also makes even lighter springs for Chocs, though you'll need a different opener tool (for example thingiverse.com/thing:3097933). However, note that clicky Chocs need springs rated 25gf or higher to actually work.

Keycaps

Since artsey.io doesn't ask you to press two keys arranged vertically as often as steno, more conventional keycaps are fine, though if you're using MX switches you might still want to get some flat F10 or G20 keycaps from pimpykeyboard.com. The uniform shape of DSA and XDA keycaps also work nicely. Check out keycaps.info for charts comparing various keycap profiles.

For Chocs, there aren't all that many options for keycaps in the first place, but the basic keycaps from Kailh work fine and MBK keycaps are really excellent. mkultra.click probably has the best variety of Choc switches and keycaps.

Regardless of the keycap profile you choose, it can be helpful to use a homing keycap (which will have some kind of bump or divot depending on the style) for the **⌘** key.

¹ Their website is at spritdesigns.com. Shipping from Korea can be expensive though, and if you check their About page they have a list of vendors in other parts of the world. Also, if you do decide to swap springs, I highly recommend getting an aluminum switch opener. Note that Kailh's MX switches require a different style of opener (with two wide prongs rather than four narrow ones), though a lot of openers have both.

Firmware

If there isn't already artsey.io firmware available for the hardware you're planning to use, you'll have to set it up yourself. That isn't too hard, but it can be confusing if you're not already familiar with open-source keyboard firmware. The repositories for QMK and ZMK artsey.io software have instructions for setting it up.

- github.com/artseyio/artsey-qmk
- github.com/artseyio/zmk-artsey

ZMK requires a different build for each combination of microcontroller and keyboard, and it can be a little tricky to get into if you're a beginner, or even if you're like me and know QMK fairly well. The Actions tab of the ZMK Artsey repository has several pre-compiled firmware files that can make the whole thing much easier for you.



Wired vs. Wireless

If your keyboard uses a USB cable to connect, you can use it with most any device that will accept input from a USB keyboard. As far as your computer knows you might as well be using a full-sized keyboard. One notable thing that isn't compatible is the iPhone, which arbitrarily doesn't accept input from wired keyboards. iPads on the other hand work fine with a Lightning to USB adapter. You may want a Bluetooth keyboard regardless for the convenience though.

USB to Bluetooth adapters do exist, but they're not common. Handheld Scientific (handheldsci.com) makes one for \$39.99, though note that with QMK keyboards you can get a considerable performance improvement by adding `#define TAP_CODE_DELAY 30` to the keyboard firmware's config file.

Bluetooth Combos

The ZMK version of artsey.io includes two special combos for controlling Bluetooth functions.

| | | |
|----------------|------|---|
| Clear Profile | ASEO |  |
| Profile Select | RTYI |  |

Clear Profile is one of ZMK's standard Bluetooth control functions (specifically `BT_CLR`), which erases the currently selected pairing profile.

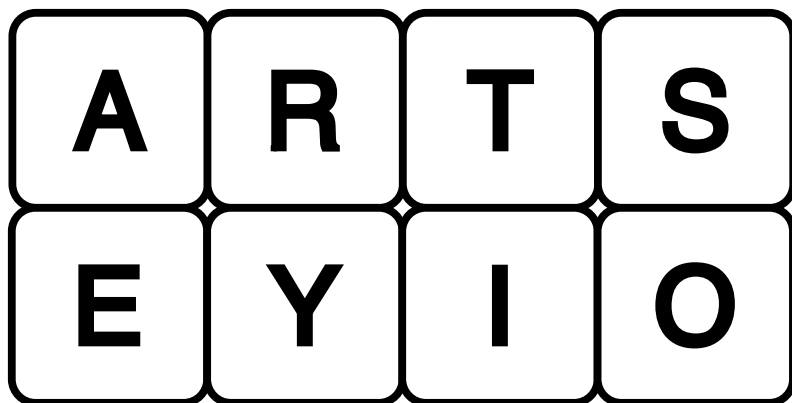
The **Profile Select** combo switches to a special toggle layer where you can select one of 6 profile slots. The profile numbers are arranged the same as the numbers 1 to 6 on the number layer (see p. 24).

| | | | |
|--|---|---|---|
| | 3 | 2 | 1 |
| | 6 | 5 | 4 |

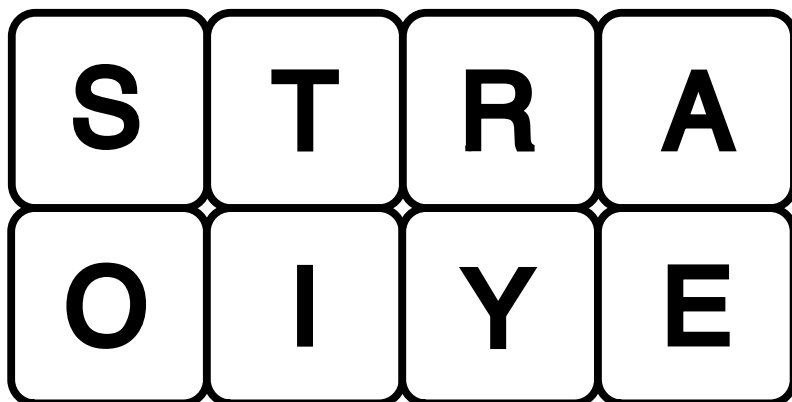
| | | | |
|---|---|---|--|
| 1 | 2 | 3 | |
| 4 | 5 | 6 | |

Lesson 1: The Eight Keys

Artsey.io is named for the eight keys it uses. In right-handed artsey.io they go:



While in left-handed artsey.io they go:



If you forget one of these keys, you can just spell your way through “artseyio” (backwards for the left-handed version). It’s kinda sorta a mnemonic!

Practice 1: artseyio

Try resting your fingers on the space between the two rows of keys. Your index finger will be sitting on **AE**, your middle finger on **RY**, and so on. You can move a finger up to press the top one, down to press the bottom one, or press in the middle to press both at once. Try typing “artseyio” a few times, and notice the timing of your keypresses, especially if you happen to do it in a way that registers as a more complex combo. Right now, don’t worry about mistakes or anything like that.

Ultimately, you want to develop enough muscle memory that you can punch in combos without thinking about it, the way you probably already do with the keys on a QWERTY keyboard. I’ve included exercises to help you practice specific keys and chords, but a lot will come down to your willingness to keep practicing. If you can afford to do your regular typing more slowly, you can put an artsey reference in front of you and go at it, or you can open a text editor and type out whatever random nonsense comes to mind. The exercises in this book are a bit more systematic and will hopefully help you get the combos down.

(Back)space

Before we get into full-on practice, a couple of useful combos. Press **EYIO** (all four keys in the bottom row) for spaces, and **RE** (the lower key for your index finger and the upper key for your middle finger) for backspace.

| | | | |
|-----------|------|---|---|
| Space | EYIO | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> |
| Backspace | RE | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> |

Now you can put spaces between words *and* erase mistakes! It's weird the things that feel like accomplishments when you're trying to learn a whole new way to do stuff.

Practice 2: Random Words

Try typing some of these words that only use single keys.

| | |
|--------|--------|
| arts | sortie |
| ears | story |
| iota | eraser |
| irate | taser |
| oyster | tears |
| rates | toy |
| ratio | years |
| sassy | yes |
| says | yeti |

If you can think of more words that use these letters go ahead and type them out!

Practice 3: Silly Phrases

These are short, nonsense phrases that come from putting the letters into an anagram generator. Go ahead and type them out, again using **EYIO** for spaces.

| | |
|-----------|------------|
| arise toy | airy toes |
| irate soy | yeti oars |
| satire yo | raise toy |
| easy riot | aye trios |
| ratio yes | iota ryes |
| syria toe | ya sortie |
| ear toys | as ye riot |

Lesson 2: Corner Combos

Next let's mix in the letters that use a combo with two keys in one of the corners, namely C, F, J, and N.

| | | | |
|---|----|---|---|
| C | EY | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> |
| F | AR | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> |
| J | TS | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> |
| N | IO | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> |

Practice 1: Cujuffin

First try typing these new letters a bunch, so that hopefully you'll be less likely to mix them up in the future.

c f j n c c j f n c n j f c
j n f f j j c n j f f n j c
f j n n j c f n j c j c f f
n n j j c c c f j n c f n f

Practice 2: Cats Fort

Hope you're ready for more single words, now using a whole 10 letters of the alphabet!

| | | | |
|----------|---------|-----------|-----------|
| acorns | crafty | frantic | near |
| cafe | erotica | injectors | nice |
| canoes | fanjets | jane | nose |
| cans | fans | janitors | notaries |
| cats | fart | jinn | octane |
| coins | factory | join | reactions |
| conifers | fiesta | jots | scenario |
| cores | foray | nastier | tonics |

Practice 3: Frantic Joeys

| | |
|----------------|-----------------|
| frantic joeys | recants if joy |
| facts joinery | if nectars joy |
| foray injects | carney if jots |
| ace fry joints | case fry joint |
| cafe joins try | scarf tine joy |
| farce join sty | fact siren joy |
| farce tin joys | scan fiery rift |
| faces join try | crayons jet if |
| acne rifts joy | cats finer joy |
| cane first joy | far insect soy |
| trances if joy | jars force tin |

Lesson 3: Middle Combos

Time for two more letters and two more combos you'll be using a lot. As you can see, to get a G you press the two top middle keys (RT), and for U you press the bottom middle keys (YI).

| | | | |
|---|----|--|--|
| G | RT | | |
| U | YI | | |

Practice 1: Outrage Rugs

| | |
|---------|---------|
| age | gears |
| ego | greasy |
| ugg | gutsy |
| go | ouster |
| guess | outrage |
| argue | rugs |
| arouse | rue |
| auger | stag |
| estuary | surge |
| gaiety | torus |

Enter and Shift

Enter and Shift are pretty important to typing, huh? No need to wait any longer to capitalize and carriage return to your heart's content!

| | | | |
|-------|------|--|--|
| Enter | AE | | |
| Shift | ERTS | | |

The **Shift** chord applies to the next character you produce with artsey.io. If you wanted to type "Gary" you would go ERTS and then RT to get a capital G, followed by A, R, Y.

Remember that the Shift key applies to every keystroke just like it would on a full-size keyboard. That means that if you press ERTS for Shift and then do the key combination for the number 5 (see p. 24), you'll get a percentage sign (%). There are a few "missing" symbols that artsey.io has tucked away like that!

Practice 2: Cats Injure Foggy

| | |
|--------------------|-------------------|
| Ace Frying Joust | Ceasing Turf Joy |
| Face Joying Rust | Carnies Foggy Jut |
| Cafe Ingots Jury | Cater Fusing Joy |
| Financiers Gut Joy | Sanctify Ore Jug |
| Farce Guys Joint | Congas Fiery Jut |
| France Yogi Just | Gastric Joey Fun |
| Conjugate Fry Is | Cats Injure Foggy |

Lesson 4: Triple Combos

Now it's time for the combos that use 3 keys, which give us the letters D, L, M, P, Q, and X.

| | | | |
|---|-----|--|--|
| D | ART | <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| L | EYI | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| | | <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| M | YIO | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| | | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
| P | EYO | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| | | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
| Q | ATS | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
| | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| X | RTS | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
| | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

Practice 1: Yodel Remix

| | | | |
|----------|----------|-----------|---------|
| adipose | darts | mistletoe | stripey |
| admixes | dimples | oldtimey | taxis |
| ailles | dopes | oryx | todays |
| apostle | doxy | paisley | topiary |
| apteryx | elixir | pirates | tropes |
| asteroid | exit | pixels | typos |
| atoms | idolatry | plasmoid | xerox |
| axel | leopard | pyrite | yams |
| axolotl | malty | rapidly | yelp |
| dairy | matrix | remix | yodel |

Practice 2: Pneumatic Manuscript

| | | | |
|------------|-------------|-------------|-------------|
| acidometry | dampers | fulminate | majestic |
| acolytes | decoupling | gasoline | manuscript |
| acronym | defluxion | genotypical | megaflops |
| adjusting | disgraceful | geodynamic | mousepad |
| amusingly | draftsmen | gnostic | nitrous |
| caltrops | emulation | imprudently | ocularist |
| captured | entropic | jalopies | oxtail |
| cilantro | exaflops | jeopardy | partying |
| cleanout | fatigued | jocularly | percolating |
| cognate | fidgety | landforms | pneumatic |
| compiler | flouting | ligaments | quagmires |
| contrails | fluxations | lodestar | remix |
| couplets | foxtail | luster | xylocane |

Lesson 5: The Remaining Letters

There are six more letters to learn, five that use two non-adjacent keys, and then Z, which calls for mashing all four keys in the top row.

| | | | |
|---|------|---------------------------------|---------------------------------|
| B | EO | <div>□□□□</div> <div>■□□■</div> | <div>□□□□</div> <div>■□□■</div> |
| H | EI | <div>□□□□</div> <div>□■□■</div> | <div>□□□□</div> <div>■□□□</div> |
| K | YO | <div>□□□□</div> <div>■□■□</div> | <div>□□□□</div> <div>□■□■</div> |
| V | RS | <div>■□■□</div> <div>□□□□</div> | <div>□■□■</div> <div>□□□□</div> |
| W | AS | <div>■□□■</div> <div>□□□□</div> | <div>■□□■</div> <div>□□□□</div> |
| Z | ARTS | <div>■□■□</div> <div>□□□□</div> | <div>■□■□</div> <div>□□□□</div> |

Practice 1: Alphabet Song

With or without musical accompaniment, try typing out the whole alphabet.

Practice 2: Zesty Zebras

| | | | |
|-----------|----------|-----------|----------|
| abhor | haters | rivets | waiver |
| airshow | hawkers | seaworthy | waterski |
| avatar | haywire | shortwave | what |
| bakery | heroes | sorbet | whisker |
| beaks | hovers | sybarite | wraiths |
| behaviors | howitzer | veto | zebras |
| earshot | obviate | vibrate | zesty |
| ethos | okra | waiter | zither |

Practice 3: Pangrams

A “pangram” is a sentence that uses every letter of the alphabet. With chord systems if you type natural English you can end up neglecting some of the less frequently used letters, so pangrams can help make sure you get all of them in. The most famous of these is:

- The quick brown fox jumps over the lazy dog

Personally, I like the sheer randomness of:

- Jackdaws love my big sphinx of quartz

Others include:

- Waltz, bad nymph, for quick jigs vex
- Glib jocks quiz nymph to vex dwarf
- Sphinx of black quartz, judge my vow
- How vexingly quick daft zebras jump
- The five boxing wizards jump quickly
- Pack my box with five dozen liquor jugs











Go ahead and type pangrams for a bit!

Practice 4: Monkeytype

Now go ahead and visit monkeytype.com and take typing tests a few times. People typically start off at around 5 WPM and can climb their way up to around 40 before too long, so don't sweat it if you're still slow. If you're on the artsey.io Discord, feel free to post a screenshot in the #pictures-and-video channel and you can get a special role to show off how you're a Relatively Fast Artsey Typist.

Lesson 6: Basic Punctuation

Now that you have the whole alphabet, it's time to get into some punctuation.

| | | | | |
|-------------------------|---|-----|---|--|
| Comma | , | AE |  |  |
| Period | . | AI |  |  |
| Apostrophe/Single Quote | ' | AEI |  |  |
| Forward Slash | / | AO |  |  |
| Exclamation Point | ! | TI |  |  |

Practice 1: Sentences with Punctuation

What follows are some sentences that use punctuation, taken from the examples in the public domain book *Punctuation: A Prime of Information About the Marks of Punctuation and Their Use Both Grammatically and Typographically* by Frederick W. Hamilton, LL.C. Feel free to pull it up on Project Gutenberg if you want more.

- He was a tall, thin, dark man.
- Sink or swim, live or die, survive or perish.
- Look, my lord! it comes!
- The prisoner, said the witness, was a sneak thief.
- I submit, gentlemen, to your judgment.
- Ha, ha, ha! That's a good joke!
- "I will go," said he, "if I can."
- This "gentleman" needs a shave.
- Angels and ministers of grace defend us!
- 'Twas ever thus.
- Moses' hat, for Moses's hat.

Get Shifty

Like on a regular keyboard, pressing Shift (ERTS) will give you different characters from most of these:

| | | |
|----------------------------|---------------|---|
| Shift + Comma (AE) | Less Than | < |
| Shift + Period (AI) | Greater Than | > |
| Shift + Single Quote (AEI) | Double Quote | " |
| Shift + Forward Slash (AO) | Question Mark | ? |

Practice 2: Your Favorite Song

Bring up the lyrics of a song you like, either online or in your head if you happen to know it well, and type them out with artsey.io. If you can't think of a song, here are some I like that have interesting lyrics:

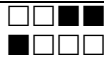
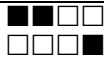



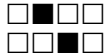
- Bad Religion, "Beyond Electric Dreams"
- Billie Eilish, "all the good girls go to hell"
- The Clash, "Rock the Casbah"
- Cradle of Filth, "Cthulhu Dawn"
- David Bowie, "Life on Mars"
- Death Grips, "Beware"
- Flobots, "Handlebars"
- Jack Garratt, "Breathe Life"
- Jonathan Coulton, "Re: Your Brains"
- Judas Priest, "Painkiller"
- LMFAO, "Sexy and I Know It"
- Metallica, "The Thing That Should Not Be"
- The Postal Service, "The District Sleeps Alone Tonight"
- White Zombie, "More Human Than Human"
- *Comedy Option:* Daft Punk, "Around the World"

Lesson 7: Special Combos

This will be the last of the regular combos, giving you the remaining modifier keys and a few other useful functions.



Those Useful Functions

- The **Escape** key has pretty much always been a contextual thing in computers, but in both Windows and macOS it has its uses here and there, most notably for canceling out of pop-ups.
- When typing the **Tab** key adds a tab stop, and elsewhere it can switch between different options.
- **Delete** erases the character to the right of the cursor (rather than to the left like Backspace).

| | | | |
|--------|------|---|---|
| Esc | ARO |  |  |
| Tab | ARTO |  |  |
| Delete | RI |  |  |


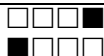

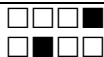

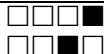
Modifier Keys

While the keys you've learned up until now will serve you well for typing, you need some more to use keyboard shortcuts for commands. Like Shift, CTRL, ALT, and GUI are all “one-shot” keys, meaning when you enter the chord, it applies the modifier to the next keystroke you enter. If you wanted to do the Copy shortcut in Windows, you'd enter `ES` for CTRL, and then `EY` for C, which is the same as holding Ctrl and then pressing C on a regular keyboard.

In Windows “**GUI**” is the Windows logo key () and in Linux it's typically a rough equivalent. In macOS (and iOS) it's the Command key () instead. That means you'll be using it a lot on Apple products,¹ though in Windows there are actually quite a few shortcuts that use it. Since GUI is a one-shot in artsey.io, if you want to just open the Start Menu in Windows, you should use Ctrl-Esc (`ES` and then `ARO`) instead.

In macOS, ALT becomes “Option,” and CTRL is still CTRL, though it's used for other, less common commands.

Modifier keys stack as well, so for example in Windows you can press `YS`, `ERTS`, and `S` to effectively press `⊞-Shift-S` to take a screenshot of a portion of your screen.

| | | | |
|------|----|---|---|
| CTRL | ES |  |  |
| GUI | YS |  |  |
| ALT | IS |  |  |

¹ macOS does let you reassign modifier keys for each keyboard, so if you prefer you could go into the system preferences and have Ctrl act as the Command key.

Practice for Windows

The available keyboard shortcuts that use modifier keys vary wildly between operating systems. Here are some you can try that will work in Windows and to a lesser extent Linux.

| | |
|----------------|-----------------------|
| CTRL-Esc | Open Start Menu |
| CTRL-C | Copy |
| CTRL-V | Paste |
| CTRL-R | Refresh |
| ⌘-D | Show/Hide Desktop |
| ⌘-I | Open Settings |
| ⌘-M | Minimize All Windows |
| ⌘-S | Open Search |
| ⌘-V | Show Clipboard |
| ALT-Tab | Switch Windows |
| ALT-Esc | Cycle Through Windows |
| CTRL-D | Delete Selected Item |
| CTRL-Shift-Esc | Open Task Manager |

Practice for macOS

macOS doesn't really use the CTRL or ALT/Option keys all that much, so you're mainly going to be concerned with the GUI/Command key.

| | |
|--------------|-------------------------------------|
| ⌘-C | Copy |
| ⌘-V | Paste |
| ⌘-M | Minimize |
| ⌘-Space | Spotlight Search |
| ⌘-Tab | Switch to Next Application |
| ⌘-Comma | Application Preferences |
| CTRL-A | Move to beginning of line/paragraph |
| CTRL-E | Move to end of line/paragraph |
| ⌘-Option-Esc | Force Quit |
| ⌘-Shift-N | Create new folder (in Finder) |
| CTRL-⌘-Space | Character Viewer (for emoji) |

Practice for Rich Text Editing

These should generally work in apps like Word, WordPad, OpenOffice, Pages, etc.

| | | |
|---------------------|-----------|-------------------|
| CTRL-B | ⌘-B | Bold |
| CTRL-I | ⌘-I | Italics |
| CTRL-U | ⌘-U | Underline |
| CTRL-E | ⌘-E | Center |
| CTRL-F | ⌘-F | Find |
| CTRL-H | ⌘-Shift-H | Find and Replace |
| CTRL-A | ⌘-A | Select All |
| CTRL-Z | ⌘-Z | Undo |
| CTRL-D/CTRL-Shift-F | ⌘-T | Show Fonts Window |

Be a Master of Locking and Unlocking

| | | | |
|------------|------|---------------------------------|---------------------------------|
| Shift Lock | RY | <div>□□■□</div> <div>□□■□</div> | <div>□■□□</div> <div>□■□□</div> |
| Caps Lock | AYIO | <div>□□□■</div> <div>■□□□</div> | <div>■□□□</div> <div>□■□■</div> |

Shift Lock is a special chord that leaves shift down, giving you capital letters and alternate symbols. You may find yourself pressing it by accident, so it's important to know that pressing `RY` turns it on and off. Also, remember that the Shift from Shift Lock affects all keystrokes, so for example in Windows if you enter CTRL-S (`ES` and then `s`) when you have Shift Lock on, you're effectively pressing Shift-CTRL-S, and your computer will try to Save As instead of the regular Save.

Caps Lock is a mode where letter keystrokes are upper-case by default and become lower case with the Shift key, but other keystrokes are unaffected. Where it used to be a physical locking switch, these days it's a system level thing that the Caps Lock keystroke turns on and off. That means if you have multiple keyboards hooked up, there's one Caps Lock state for all of them.

Lesson 8: Tap Layers

In the world of mechanical keyboards, a “layer” is a different set of definitions for what the keys do that gets activated under certain circumstances. Keyboards with fewer keys will usually have one or more “Fn” keys to let you enter keystrokes that don’t have dedicated keys, and lighting controls will often have their own layer.

Artsey.io has a set of six layers to fill in most of the keystrokes not covered by the regular chords. Four of them are “tap” layers, where you hold down a particular key that changes what the other keys do while it’s held down. One is for numbers, two are for punctuation, and one is a miscellaneous layer intended for customization.

Note: The tap layers as well as the toggle layers we’ll cover in the next lesson have a few instances where the left- and right-handed versions aren’t quite symmetrical. This is because the keystrokes themselves are directional; it wouldn’t make sense to flip the left and right arrow keys or parentheses around.

Punctuation

Holding down **E** gives you a layer with 7 different punctuation symbols.

| | | | |
|---|---|---|---|
| ' | ; | \ | ! |
| = | - | ? | |

| | | | |
|---|---|---|---|
| ! | \ | ; | ' |
| | ? | - | = |

Just like with the chord-based punctuation (p. 16), pressing the Shift chord (**E**RTS) before most of these will give you a different symbol.

| | | |
|-----------------------------------|-------------------|---|
| Shift + Accent (E →S) | Tilde | ~ |
| Shift + Semicolon (E →T) | Colon | : |
| Shift + Backslash (E →R) | Pipe ¹ | |
| Shift + Equal Sign (E →O) | Plus | + |
| Shift + Dash/Minus (E →Y) | Underscore | _ |

¹ The “pipe” character is used in Unix and DOS for some relatively advanced command line stuff (and ASCII art), and most likely won’t come up unless you need it to do one of those weirdly complicated installation procedures in Linux.

Practice 1: Sentences with Punctuation

- Write a short essay on the following topic: “What is wrong with our industrial system?”
- “The Practice of Typography.” New York: Oswald Publishing Company.
- Did he speak in an ordinary tone? or shout? or whisper?
- “I will go,” said he, “if I can.”
- He said: “I heard him cry ‘Put down that gun,’ and then I heard a shot.”

Practice 2: Dialogue

Have an excerpt from *Alice in Wonderland*, or pick out a slice of a novel you like with lots of dialogue so you have to type quotes and whatnot.

“Have some wine,” the March Hare said in an encouraging tone.
Alice looked all round the table, but there was nothing on it but tea. “I don’t see any wine,” she remarked.
“There isn’t any,” said the March Hare.
“Then it wasn’t very civil of you to offer it,” said Alice angrily.
“It wasn’t very civil of you to sit down without being invited,” said the March Hare.
“I didn’t know it was *your* table,” said Alice; “it’s laid for a great many more than three.”
“Your hair wants cutting,” said the Hatter. He had been looking at Alice for some time with great curiosity, and this was his first speech.
“You should learn not to make personal remarks,” Alice said with some severity; “it’s very rude.”
The Hatter opened his eyes very wide on hearing this; but all he *said* was, “Why is a raven like a writing-desk?”
“Come, we shall have some fun now!” thought Alice. “I’m glad they’ve begun asking riddles.—I believe I can guess that,” she added aloud.
“Do you mean that you think you can find out the answer to it?” said the March Hare.
“Exactly so,” said Alice.
“Then you should say what you mean,” the March Hare went on.
“I do,” Alice hastily replied; “at least—at least I mean what I say—that’s the same thing, you know.”
“Not the same thing a bit!” said the Hatter. “You might just as well say that ‘I see what I eat’ is the same thing as ‘I eat what I see!’”
“You might just as well say,” added the March Hare, “that ‘I like what I get’ is the same thing as ‘I get what I like!’”
“You might just as well say,” added the Dormouse, who seemed to be talking in his sleep, “that ‘I breathe when I sleep’ is the same thing as ‘I sleep when I breathe!’”
“It *is* the same thing with you,” said the Hatter, and here the conversation dropped, and the party sat silent for a minute, while Alice thought over all she could remember about ravens and writing-desks, which wasn’t much.

Practice 3: URLs

Now that you have the necessary characters, try typing some website URLs:

<http://www.google.com/>
<https://artsey.io/>
<https://github.com/artseyio>
<https://www.reddit.com/r/MechanicalKeyboards/>
<https://vektroid.bandcamp.com/album/floral-shoppe>
<https://app.inferkit.com/demo>
<https://twitter.com/drill>
https://www.youtube.com/channel/UChDkP71cJ0Hop-iRgl_8pVg
<https://www.thingiverse.com/thing:763622>
<https://www.youtube.com/watch?v=mW61VTLhNjQ>

Brackets

Holding down **A** gives you a layer with parentheses, square brackets, and curly brackets. Occasionally useful for normal writing, but essential for coding.

| | | | |
|---|---|---|--|
| } | (|) | |
| { | [|] | |

| | | | |
|--|---|---|---|
| | (|) | { |
| | [|] | } |

Practice 4: Emoticons

Before Japan exported emoji to the world¹ and they became a significant part of what the Unicode Consortium does, early internet users started making little sideways smiley faces with regular keyboard characters. In Japan they found the sideways ones confusing and devised horizontal ones, so I also included some of those, albeit just ones that don't use a bunch of wacky Unicode characters.

¯_(\ツ)_/¯

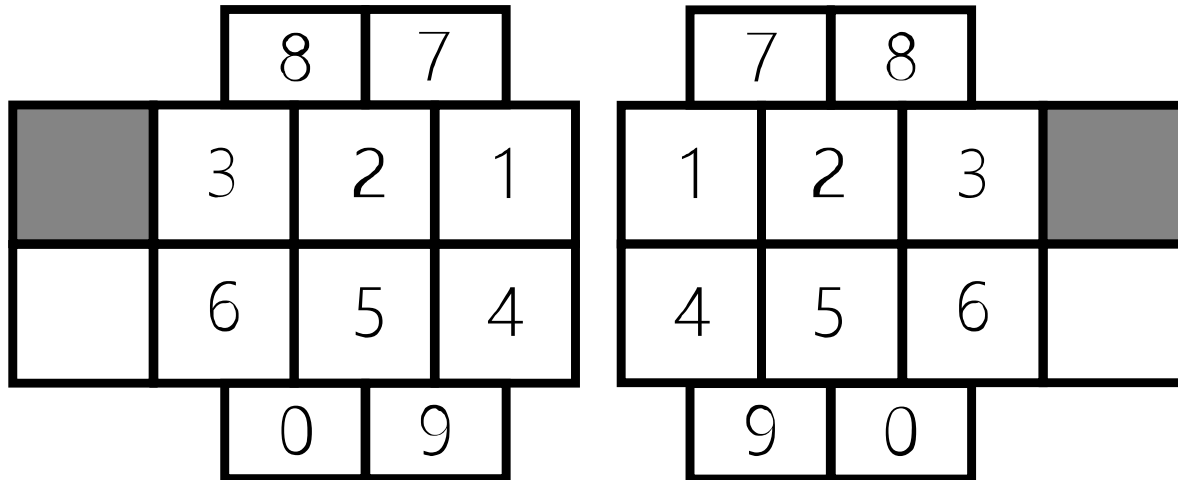
Remember that colon is Shift (**E**R**T**S) + Semicolon (**E**→**T**), and a lot of these require using Shift in general.

| | |
|------|----------|
| :) | TT TT |
| :-) | (>_<) |
| :P | (-_-)zzz |
| :(| (=_=) |
| :-O | >_> |
| :V | <_< |
| >:-) | (~_~;) |
| :/ | (=_=) |
| >:\ | m(_ _)m |
| :D | (. _.) |
| :} | (?_?) |
| [:] | q_q |

¹ “Emoji” (絵文字) literally just means “picture characters” (characters in the sense of writing) in Japanese.

Numbers

Holding **S** gives you the number layer. Since it's made to produce 10 distinct characters, it has four combos of its own, for 7, 8, 9, and 0. If you wanted to type a 7, you would hold **S**, and then press **AR** for example.



Practice 3: Random Numbers

Try practicing typing numbers with whatever strings of numbers come to mind.

| | |
|------------|------------------------|
| 1234567890 | 1776 |
| 867-5309 | 2001 |
| 69420 | 3.14159265359... |
| 42 | 24/7/365 |
| 5138008 | 2 4 8 16 32 64 128 256 |
| 1984 | 202-456-1111 |

Shifting Numbers

As far as your computer knows, when you use these you're pressing keys on the number row of a full-sized keyboard, so pressing **Shift** before one of these will get you various symbols.

| | | |
|------------------|-------------------|----|
| Shift + 1 (S→A) | Exclamation Point | ! |
| Shift + 2 (S→R) | At Sign | @ |
| Shift + 3 (S→T) | Number Sign/Hash | # |
| Shift + 4 (S→E) | Dollar Sign | \$ |
| Shift + 5 (S→Y) | Percent Sign | % |
| Shift + 6 (S→I) | Caret/Circumflex | ^ |
| Shift + 7 (S→AR) | Ampersand | & |
| Shift + 8 (S→RT) | Asterisk | * |
| Shift + 9 (S→EY) | Left Parenthesis | (|
| Shift + 0 (S→YI) | Right Parenthesis |) |

Practice 4: More Emoticons

Adding numbers and the symbols you get from shifting them into the mix opens up some more emoticons, so have another round! While you're at it maybe try making up some of your own!

| | |
|------|----------|
| :3 | =^_^= |
| =3 | (@_@) |
| ;3 | (=3=) |
| :- | <('^^')> |
| :7 | \^_^/ |
| :-# | (^_~;) |
| :-& | (^_~) |
| :\$ | (^_~) |
| 5:-) | (*_~*) |
| :@ | ^m^ |

The Custom Layer

Holding `o` activates the “Custom” layer. By default, it's set up with six potentially useful keystrokes, but as the name implies it's meant to be customized. For QMK there are instructions on modifying it in the `readme.md` file. For ZMK the instructions are in the `artsey.dtsi` file in the `zmk-artsey` repo; you just need to have an appropriate `#define` block before including the `artsey.dtsi` file.

| | | | |
|--|--------|-----------|----------|
| | Vol Up | Ins | Mute |
| | Vol Dn | Print Scr | R. Shift |

| | | | |
|----------|-----------|--------|--|
| Mute | Ins | Vol Up | |
| R. Shift | Print Scr | Vol Dn | |

Ins is the **Insert** key, which toggles between overtype and insert modes on your computer. “Overtime” means that if there are characters ahead of where the cursor is, typing will overwrite them. I mostly remember the Insert key is a thing when I press it accidentally.

Print Scr is the **Print Screen** key. It's kind of a holdover from the DOS days, but in Windows you can use it to take screenshots.

R. Shift is the righthand Shift key. It's unusual, but there are a few cases where the distinction between left and right Shift matters.

Vol(ume) Up, **Vol Down**, and **Mute** all control the system's sound output.

Lesson 9: Toggle Layers

Finally, there are two special layers that you toggle on and off with chords, the Mouse and Navigation layers. Now you can navigate with both keystrokes and a simulated mouse, all with just your trusty artsey.io keyboard!

| | | | |
|-------|-----|--|--|
| Mouse | AYT | | |
| Nav | ERI | | |

Mouse Keys

Mouse keys give you a substitute mouse using a keyboard. It's slower and less precise than using an actual mouse, but it can still come in handy.¹

BTN1 is the left mouse button (which normally selects or activates things), and **BTN2** is the right mouse button (which usually opens a contextual menu).

| | | | | | | | |
|-------------|------|---|------|------|---|------|-------------|
| Scroll Up | BTN2 | ↑ | BTN1 | BTN1 | ↑ | BTN2 | Scroll Up |
| Scroll Down | ← | ↓ | → | ← | ↓ | → | Scroll Down |

Nav Layer

Last but not least, the Nav Layer gives you arrow keys, Page Up/Down, Home, and End.


| | | | | | | | |
|------|------|---|-----|------|---|-----|------|
| PgUp | Home | ↑ | End | Home | ↑ | End | PgUp |
| PgDn | ← | ↓ | → | ← | ↓ | → | PgDn |

If you need to select text, one easier way to do it with artsey.io is to turn on Shift Lock (**RY**) and then activate the Nav Layer to use the arrow keys and such to highlight the text.

¹ Windows and macOS both let you set up mouse keys on a regular keyboard in the system settings, but as artsey.io demonstrates, it's also possible to add mouse keys functions to a keyboard in the firmware.

What's Missing?

Now that we've gone over every single keystroke in artsey.io, let's cover what it *doesn't* include.

- Function Keys
- Scroll Lock and Number Lock
- The Windows Menu Key, i.e. the one with this symbol  that is on many Windows keyboards. It opens a context menu, just like right-clicking.
- Right-side modifier keys besides Shift (Ctrl, Alt, GUI)

Other keycodes you might find useful include:

- Keycodes to directly get characters that you'd normally need to press shift for. If you write tons of dialogue (in American English), you might want to put double quotes (`DOUBLE_QUOTES` in ZMK and `KC_DOUBLE_QUOTE` in QMK) in easy reach.
- Codes specific to foreign languages, such as the keys for changing Japanese input modes and (though they're a little more complicated to implement) characters specific to other languages, allowing you to add easy access to for example Ñ.
- There are keycodes for media and web controls, plus other mouse buttons.
- It's possible to set keys up to produce keystrokes with modifier keys too, so for example in QMK you could use `LCTL(KC_C)` (or `LGUI(KC_C)` for macOS)¹ to make a key produce Ctrl-C for the Copy command.

If any of these keystrokes are important to how you use your device, you may want to modify the layout to include them. The Custom Layer (p. 25) is an ideal place to put these, though you can modify other combos and layers as well.

¹ The ZMK equivalent would be `LC(C)`, or `LG(C)` for macOS.

Appendix 1: Resources

This section has a few different resources that might be helpful if you're getting into artsey.io or combo/chording keyboards in general.

Buying Keyboard Kits and Parts

If you want to build a keyboard for artsey.io, you're going to need some specialized parts. Unless you happen to be in Tokyo and can get to Yushakobo in Ueno (yushakobo.jp), chances are you won't be able to buy them locally.¹ Instead, you pretty much have to order them online.

These are stores I'm familiar with, mostly in the U.S.; for lists of other stores around the world you can check out keebmap.xyz or shopmech.com. There are also a lot of keyboard kits and parts available on Amazon, AliExpress, eBay, and Etsy.

- Boardsource (boardsource.xyz)
- Clawsome Boards (clawboards.xyz)
- G Heavy Industries (gboards.ca)
- Keebio (keeb.io)
- Keyhive (keyhive.xyz)
- Little Keyboards (littlekeyboards.com)
- Mechboards (mechboards.co.uk)
- MKUltra (mkultra.click)
- SpaceCat Designs (spacecat.design)

In particular the things you're likely to need are:

- **Microcontroller:** A small circuit board with a USB connector and the chip that stores the firmware. The Arduino Pro Micro is the most common of these, but there are others like the Elite-C and BIT-C (which have sturdier USB-C connectors), and some keyboards support Bluetooth options like the nice!nano and BlueMicro. These support using a lithium battery and a power switch, but can connect via USB without a battery if you prefer.
- **Key Switches and Keycaps:** You'll need 8 key switches of the correct type for your keyboard, and 8 keycaps that fit your key switches.² Both are usually sold in 10-packs. Some boards support (or require) hotswap sockets that let you swap out switches on the completed keyboards.
- Depending on the design and your preferences you may also want an OLED display, screws and standoffs (usually M2 size), and adhesive rubber feet to put on the bottom. Some boards have headers to make it easier to attach a battery.
- Some boards also allow for a reset switch, which isn't necessary (you can bridge the RST and GND contacts on the microcontroller to get the same effect), but it's handy if you flash the firmware a lot.

¹ I live in the middle of Silicon Valley, and while there are some great electronic parts stores around here, I still have to get the vast majority of my keyboard parts online.

² Since there are only 8 keys, blank keycaps are generally fine, but if you have spare letter keycaps, having the keys labeled can make good training wheels. If you want to get really fancy, P.I. Engineering makes affordable relegendable keycaps.

Artcessories

These are a few things you might find handy if you get set up with artsey.io, especially if you want to use it while you're out and about.

- **Reference Card:** I highly recommend getting yourself a reference card for the combos. You'll find my reference in Appendix 2 (p. 31), and there's also a layout diagram on the artsey.io site. If you want to get extra fancy you can laminate it.
- **Carrying Case:** A lot of the keyboards that work with artsey.io are hobbyist boards with exposed components, so it's good to have a case when using them on the go. The cases for portable hard drives are excellent for storing smaller keyboards in general. A case for a 2.5" hard drive is just about right for a Paintbrush with a USB cable and maybe a folding smartphone stand.
- **Wrist Strap:** Not that you're likely to be swinging it around like a Wii Remote, but if you're using your artsey.io keyboard on the go, a wrist strap might be a good idea. A Paintbrush assembled with a bottom plate lets you put the loop of a wrist strap around one of the standoffs.

Other Chording/Combo Systems

There have been a number of chording/combo keyboard systems over the years; here are some that might be of interest if you want to learn more and maybe give some a try.

- The **Xerox Alto** was an early GUI-based computer, which Apple drew on for the Lisa and the original Macintosh. One thing it had that Apple dropped was a 5-key "keyset" that could produce any letter of the alphabet, or most any keystroke when combined with mouse buttons. Even the Alto manuals that people have posted online don't actually seem to have info on the keyset, but this document has a chart of its chords if you're curious:
billbuxton.com/input06.ChordKeyboards.pdf
- **ASETNIOP** (asetniop.com) is a combo system that uses 10 keys, one for each finger, available as a \$5 app for iPad and Android. It also supports some limited stenography, with some more complex chords that produce full words. It's faster than artsey.io, but requires both hands. g Heavy Industries (gboards.ca) has a hardware version called the Ginny.
- **Steno** is the system most court reporters and real-time captioners use today. It uses a special 23-key keyboard, and while it requires a lot more practice than other chording/combo systems, trained stenographers can achieve stunning speeds. 225 WPM is the minimum to become a court reporter, and the world record is 360! Professional machines and software can cost thousands of dollars, but the Open Steno Project (openstenoproject.org) has free software, and the community now offers a few different kinds of affordable steno keyboards. You don't have to toil for years to get up to professional speeds to benefit from steno, but it does take a few months of regular practice to get the basics down.
- **Penti** (software-lab.de/penti.html) is a touch-based one-handed keyboard system for Android, available as an .apk download (so you'd have to side-load it, which is a little more complicated). It uses five main keys, plus a special sixth key that repeats the previous keystroke.
- The **BAT Keyboard** from Infogrip (infogrip.com) is one of the few one-handed keyboards that has remained on the market. It costs \$175 and has three buttons

for the thumb and four more for the four fingers. Although it's more expensive and less portable than artsey.io, it has an excellent system that covers practically every keystroke.

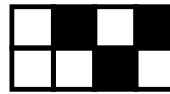
- The **Frogpad** is a more compact one-handed keyboard that makes extensive use of layers to provide all of the major keystrokes with only 20 keys. The fate of the official hardware is uncertain right now, but there are a couple unofficial versions, notably DupePad (github.com/clarkm/dupepad) a set of scripts for Windows and macOS to simulate the Frogpad, and from Japan the Froggy (yushakobo.jp/froggy), which recreates the hardware on one side of a Helix split keyboard.

Appendix 2: Combo Reference

Left

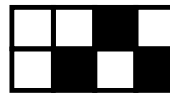
| | | | | |
|---|--|---|--|------------|
| A | | N | | Space |
| B | | O | | Enter |
| C | | P | | Backspace |
| D | | Q | | Shift |
| E | | R | | Shift Lock |
| F | | S | | Caps Lock |
| G | | T | | Esc |
| H | | U | | Alt |
| I | | V | | Ctrl |
| J | | W | | GUI |
| K | | X | | Tab |
| L | | Y | | Delete |
| M | | Z | | |
| . | | / | | |
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Mouse



| | | | |
|-------------|------|---|------|
| Scroll Up | BTN2 | ↑ | BTN1 |
| Scroll Down | ← | ↓ | → |

Nav



| | | | |
|------|------|---|-----|
| PgUp | Home | ↑ | End |
| PgDn | ← | ↓ | → |

| | | | |
|--|---|---|---|
| | 8 | 7 | |
| | 3 | 2 | 1 |
| | 6 | 5 | 4 |
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| | | | |
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| } | (|) | |
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| | | | |
|--|--------|-----------|----------|
| | Vol Up | Ins | Mute |
| | Vol Dn | Print Scr | R. Shift |

| | | | |
|---|---|---|---|
| ' | ; | \ | ! |
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Right

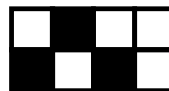
| | | | | |
|---|--|---|--|------------|
| A | | N | | Space |
| B | | O | | Enter |
| C | | P | | Backspace |
| D | | Q | | Shift |
| E | | R | | Shift Lock |
| F | | S | | Caps Lock |
| G | | T | | Esc |
| H | | U | | Alt |
| I | | V | | Ctrl |
| J | | W | | GUI |
| K | | X | | Tab |
| L | | Y | | Delete |
| M | | Z | | |
| . | | / | | |
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Mouse



| | | | |
|------|---|------|-------------|
| BTN1 | ↑ | BTN2 | Scroll Up |
| ← | ↓ | → | Scroll Down |

Nav



| | | | |
|------|---|-----|------|
| Home | ↑ | End | PgUp |
| ← | ↓ | → | PgDn |

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| | 7 | 8 | |
| 1 | 2 | 3 | |
| 4 | 5 | 6 | |
| | 9 | 0 | |

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|----------|-----------|--------|--|
| Mute | Ins | Vol Up | |
| R. Shift | Print Scr | Vol Dn | |