

Advantage2

Contoured Keyboard Family



USER'S MANUAL



KB605



KB600

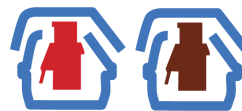
Proudly designed and hand-assembled in the USA



SmartSet™
Programming Engine



Contoured
Keyboard™



Cherry Low-Force
Mechanical Keyswitches



Mac/Windows/PC
Switchable

USER'S MANUAL

Kinesis® Advantage2™ Keyboard with SmartSet™ Programming Engine

Keyboard models covered by this manual include all US-language* model numbers beginning with KB6 (KB6##xxx)

May 2, 2019 Edition

*This manual covers features included up through the U.S. firmware version 1.0.431.us. If you have firmware version 1.0.431.uk (for United Kingdom), or 1.0.431.de (for French, German, Swedish, and other Scandinavian layouts), or 1.0.431.jp (for the Japanese model), please refer to the non-U.S. Quick Start Guides here for differences:

kinesis.com/support/advantage2-non-us-versions.

Model KB630 has selective memory locking. References in the manual to macros, v-drive, or firmware updates are not applicable to this model.

If you have an earlier version of firmware, not all features described in this manual may be supported. To download the latest firmware here:

kinesis.com/support/advantage2/#firmware-updates.

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FCC Radio Frequency Interference Statement

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Warning

To assure continued FCC compliance, the user must use only shielded interfacing cables when connecting to computer or peripheral. Also, any unauthorized changes or modifications to this equipment would void the user's authority to operate.

INDUSTRY CANADA COMPLIANCE STATEMENT

This Class B digital apparatus meets all requirements of the Canadian Interface-causing Equipment Regulations.

Cet Appareil numerique de la classe B respecte toutes les exigences du Reglement sur le material brouilleur du Canada.

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1.0 Read Me First

1.1 Health and Safety Warning

Continuous use of any keyboard may cause aches, pains, or more serious cumulative trauma disorders such as tendinitis and carpal tunnel syndrome, or other repetitive strain disorders.

- Exercise good judgement in placing reasonable limits on your keyboarding time every day.
- Follow established guidelines for computer and workstation setup (see Appendix 13.3).
- Maintain a relaxed keying posture and use a light touch to press the keys.

Keyboard is not a medical treatment

This keyboard is not a substitute for appropriate medical treatment! If any information in this guide appears to contradict your health care professional's advice, please follow your health care professional's advice.

Establish realistic expectations

- Ensure that you take reasonable rest breaks from keyboarding during the course of the day.
- At the first sign of stress-related injury from keyboard use (aching, numbness, or tingling of the arms, wrists, or hands), consult your health care professional.

No warranty of injury prevention or cure

Kinesis Corporation bases its product designs on research, proven features, and user evaluations. However, because of the complex set of factors believed to contribute to computer-related injuries, the company can make no warranty that its products will prevent or cure any ailment. Your risk of injury may be affected by workstation design, posture, time without breaks, type of work, non-work activities and individual physiology.

If you currently have an injury to your hands or arms, or have had such an injury in the past, it is important that you have realistic expectations of your keyboard. You should not expect an immediate improvement in your physical condition simply because you are using a new keyboard. Your physical trauma has built up over months or years, and it may take weeks before you notice a difference. It is normal to feel some new fatigue or discomfort as you adapt to your Kinesis keyboard.

1.2 Preserving Your Warranty Rights

Kinesis does not require any product registration to obtain warranty benefits, but you will need your purchase receipt in the event you need a warranty repair.

1.3 Quick Start Guide

If you are eager to get started, please consult the included Quick Start Guide. The Quick Start Guide can also be downloaded from the Advantage2 Resources Page. Consult this full manual for advanced features.

1.4 Read This User's Manual

Even if you don't normally read manuals or you are a long-time user of Kinesis Contoured keyboards, Kinesis strongly encourages you to review this entire manual. The Advantage2 is a fully-programmable keyboard with powerful tools and features, many of which are brand new. If you unknowingly execute a programming shortcut or key combination, you could inadvertently alter the layout of your keyboard, which could have unintended consequences for your work and might necessitate a hard reset of the keyboard.

1.5 Advanced Users: Read This Before Copying or Sharing Layout Files

Please always "eject" the v-drive before using ProgM-F1 to close the drive. It is advised NOT to copy and paste shared or manually-edited layout text files directly to the keyboard's v-drive as there is a risk that the layout file can become corrupted. It is best to copy the desired contents of a simple-text file into a pre-existing layout file. Any direct editing of layout files must be done using the U.S. English keyboard driver. Please see section Section 7, SmartSet Power User Mode, for details.

Especially if you have an early 2MB v-drive version of the Advantage2, there are important guidelines in Section 7 for preventing file corruption and possible damage to your keyboard.

2.0 Introduction to the Advantage2 Keyboard

2.1 Geometry and Key Groupings

If you are new to a Kinesis Contoured keyboard, the first thing you will notice about the Advantage2™ keyboard is its sculpted shape, designed to conform to the natural postures and shapes of your hands—which reduces the physical demands of keyboarding. This is a sharp departure from the constraints of a traditional, flat keyboard and is also much better than the flat “ergodox” copy of the Kinesis split design. While the Advantage2 looks very different from other keyboards, you’ll find that making the transition is actually quite easy because of its intuitive form factor, thoughtful key layout, and its unparalleled electronic configurability. The Advantage2 keyboard features distinctive key groupings not found on traditional or “natural style” keyboards. These key groupings shown below, will be referenced throughout this User’s Manual.

- | |
|--------------------------|
| (1) Function keys |
| (2) Keywells |
| (3) Thumb clusters |
| (4) LED Indicator Lights |

Fig 1. Advantage2 keyboard showing geometry and key groupings



Note: The Advantage2 features authentic Cherry mechanical function keys (low-force, tactile Cherry ML keyswitches).

2.2 Introduction to the SmartSet Programming Engine

Kinesis Contoured keyboards have long featured a fully-programmable architecture that allowed users to record macros, remap keys, and create custom layouts and settings. The Advantage2 utilizes Kinesis’ revolutionary SmartSet™ Programming Engine, which makes the Advantage2 even more powerful and versatile than its predecessors.

What is SmartSet?

SmartSet technology is the foundation of all current Kinesis programmable computer peripherals. The technology was implemented in our Savant Elite2 programmable USB foot pedals in 2015, then adapted for use in the Advantage2 keyboard in 2016, and ultimately to the Freestyle Edge & Pro models in 2017 & 2018. The foundation of SmartSet is using a virtual removable drive (the “ADVANTAGE2” v-drive™, named “Kinesis KB” on older models). This virtual drive exists inside the keyboard to store custom configuration settings as “simple text” files, which can be created with direct onboard programming, or using the graphical SmartSet App, or by direct editing of the simple text file from virtually any computer, all without any special drivers or software installation.

SmartSet adds powerful programming features and new ways to build, view, and share custom layouts. Because no special software is required for onboard programming or direct editing, SmartSet works in any operating system that supports USB keyboards. Virtually any key (168 top layer and embedded “keypad layer” keys) can be copied, moved, or inactivated. In addition, hundreds of heavy-duty macros (200+ characters) can be recorded on-the-fly and stored in the keyboard’s memory chip, to be assigned to one or more custom layouts and triggered by a single key or key combination. Furthermore, the no-install SmartSet App (downloadable for Windows and Mac) can reside inside the keyboard and provides graphical viewing and editing of the keyboard’s active configuration.

Basic Onboard Programming Tools

Customizing the keyboard is accomplished quickly and easily using onboard programming shortcuts. Hold the dedicated Program Key (legended “progm”) and press one of the specially-legended function keys to perform the desired customization. Details are provided in Sections 5 and 6.

Power User Tools

Advanced users can elect to activate **Power User Mode** to open the v-drive on their computer. Layouts can be viewed and edited directly, and other keyboard settings can be customized, all without the installation of any software. Each Layout is saved to a separate “.txt” file (e.g. qwerty.txt) that can be opened and viewed with any basic text-editor program, regardless of your operating system (e.g. notepad for Windows). Layouts can even be shared with other users via email (see Section 1.5 for best practices) or saved to your computer as a backup.

A “bootloader” functionality is built in to SmartSet, allowing you to update the firmware on your Advantage2 in seconds using a downloaded update (“*.upd”) file and special key combination. So you can always be up-to-date with the latest releases from Kinesis and can ensure compatibility with the newest operating system versions.

2.3 Ergonomic Design and Features

The design of the Advantage2 keyboard traces its roots to the very first Contoured™ keyboard introduced by Kinesis in 1992. When Kinesis opened in 1991, the objective was to develop a design that would use ergonomics to maximize comfort and productivity, and in the process would minimize the major health risk-factors associated with keyboarding. Every aspect of the form factor was thoroughly researched and tested.

Separate keywells for each hand

Separating alphanumeric keys into left and right keywells (Fig 2) reduces strain and stretching by positioning the arms approximately at shoulder width, with the wrists straight.

This design reduces abduction and ulnar deviation which are harmful postures that can lead to repetitive strain injuries such as carpal tunnel syndrome and tendonitis.

Integrated palm supports

Unlike most keyboards, the Advantage2 features integrated palm supports (Fig 2) and self-adhesive cushioned palm pads which are user-replaceable. Together these enhance comfort and reduce stressful extension and pressure on the wrist. The palm supports provide a place to rest the hands while they are not actively keying, though many users prefer to rest while typing to take weight off the neck and shoulders. However, you should not expect to be able to reach all the keys without rocking your hands forward at times.

Fig 2. Separate keywells & integrated palm supports



Separate thumb clusters

The left and right thumb clusters (Fig 3) feature commonly used keys such as Enter, Space, Backspace, and Delete. Modifier keys such as Control and Alt on the PC, and Command and alt Option on Macs have also been relocated to the thumb clusters. Windows users will appreciate a Windows key in the right thumb cluster. By moving these commonly used keys to the thumbs, the Advantage2 redistributes the workload from your relatively weaker and overused little fingers, to your stronger thumbs.

Fig 3. Separate thumb clusters



Vertical (orthogonal) key layout

Keys are arranged in vertical columns (Fig 4) to reflect natural motions of your fingers, and the keywells are sculpted and concave to fit the varying lengths of your fingers. This shortens reaches and reduces the time to learn touch typing for new typists.

Fig 4. Vertical keys



Concave keywells

The keywells are concave to reduce hand and finger extension. Hands rest in a natural, relaxed position, with the fingers curled down to the keys. Keycap heights are varied to match the different lengths of your fingers. A flat typing surface assumes that your fingers are all of the same length, causing longer fingers to arch up over the keys. “Flat typing”

results in extension of the muscles and tendons in your hands, which prevents your muscles from operating at maximum efficiency and causes rapid fatigue.

Fig 5. Concave keywells



Cherry low-force mechanical keyswitches — Choice of MX Brown or MX “Quiet Red”

All Advantage2 keyboards feature Cherry® MX full travel mechanical switches for all of the full-size keys and Cherry ML mechanical switches for the half-size function keys. Cherry switches are known for their reliability and durability— MX switches are rated for more than 50M keystrokes, ML switches for 20M keystrokes.

The best-selling Advantage2 model (KB600) uses Cherry “Brown” switches, a low-force, tactile switch that offers the ultimate in typing performance and comfort. Cherry first built the Brown-stem switch to Kinesis’ custom specifications in 1992, and it has since been adopted as one of the switches of choice for all of the major mechanical keyboard manufacturers, ergonomic or otherwise.

“Tactility” is a slightly elevated force around the midpoint of the stroke of the key which lets you know the switch is about to be activated. A tactile response is preferred by many ergonomists, because it cues your fingers that activation is about to occur and is thought to reduce the incidence of “bottoming out” the switch with a hard impact. The peak (tactile) force is ~55gm, following by an activation force of ~45gm.

The Advantage2 LFQ model (KB600LFQ) utilizes the Cherry “Quiet Red” switches. These switches are remarkably quiet and are thus preferred in a multi-worker environment. They also require the least effort to operate, using the same great low activation force of the Brown-stem switches (~45gm) but without the preliminary 55gm “tactile bump.”

20-degree lateral tilt design

The contour design of the Advantage2 positions your hands so that your thumbs are approximately twenty degrees higher than pinky fingers (Fig 6). This “tented” design helps to minimize stresses associated with pronation and static muscle tension, while enabling maximum keying productivity.

Fig 6. 20-degree lateral tilt



Closer placement of function keys (Cherry ML mechanical switches)

Cherry ML low-force, tactile mechanical keys switches are used in the function key row (Fig 7) for great typing feel, consistency, and long life. These keycaps are laser legended. As on all Contoured keyboards, the function keys are positioned closer to the alphanumeric keys to reduce the reach.

Fig 7. Closer function keys



Smaller footprint

By removing the traditional numeric 10-key keypad and embedding it into the right alphanumeric keywell in the Keypad layer, Kinesis was able to reduce the overall width of the Advantage2 making it much smaller (16 5/8 x 8 1/8 x 3 inches) than a traditional keyboard (Fig 8). This smaller footprint allows closer placement of any pointing device, reducing over-reach issues.

Fig 8. Smaller footprint



LED Indicator Lights

There are four blue light emitting diodes (LEDs) located near the center of the keyboard which are used to indicate the status of the keyboard. These LED Indicator Lights will illuminate individually when one of the four basic modes are active. From left to right, these modes are 1) Caps Lock, 2) Num Lock, 3) Scroll Lock, and 4) Keypad layer.

The LED Indicator Lights are also used to indicate when the keyboard has been placed into special programming mode using one of the onboard shortcuts. Certain combinations of individual LEDs will flash, either fast or slow, and either one or more times, to indicate that

the keyboard has received a valid programming command or is in a temporary programming state. Typically four flashes are used to indicate when a feature is activated, and one or two flashes signal when a feature has been deactivated.

Optional foot pedals

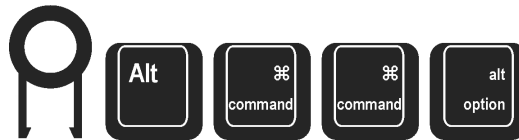
Kinesis Contoured keyboards were designed to be paired with either an optional Advantage Single Pedal (FS007RJ11) or Triple Foot Pedal (FS007TAF) to further reduce the strain put on overworked hands and fingers (see section 3.4). A pedal can be used to perform an individual keystroke or a complex macro, redistributing a portion of the workload away from your hands. A common foot pedal usage (the default for a single pedal) is to activate the embedded numeric 10-key keypad using the “keypad shift” action.

3.0 Installation and Setup

3.1 In the Box

Included are a Quick Start Guide and additional keycap(s) for the top-row thumb keys, plus a removal tool (Fig 10). The U.S. model has 4 extra keycaps to support PC and Mac Thumb Key Modes (see Section 5.3), European models have one Windows key. If you plan to change the thumb keys to PC or Mac mode, it is advisable to first install and test the keyboard first with the default thumb keycaps and actions.

Fig 10. Keycap Removal Tool & Extra Keycaps for US keyboards



3.2 Compatibility

The Advantage2 keyboard is a multimedia USB keyboard that uses generic drivers provided by the operating system, so no special drivers or software is required. Therefore it is “plug-and-play” with all operating systems that support full-featured USB keyboards.

If you experience a problem, please visit the Kinesis Advantage2 support page: kinesis-ergo.com/support/advantage2/. If the problem persists, submit a ticket: kinesis-ergo.com/support/advantage2/#ticket.

Known compatibility issues

Some interface devices that accept USB keyboards do not support multimedia keyboards such as the Advantage2. These can include some KVM (keyboard-video-mouse) switches and IP telephony devices.

If you currently use keyboard customization software (e.g., Autohotkey, Karabiner, etc.), that software may create unpredictable behavior and diminished performance when interacting with the Advantage2’s SmartSet Programming Engine.

3.3 Connecting Your Keyboard for the First Time

For now, ignore the short cable under the back tunnel that has the telephone connector (RJ11 style). It is used to connect an optional Kinesis Advantage Foot Pedal (see section 3.4).

1). Plug the Advantage2 into your computer’s USB port. A device installation notice will appear on your screen. *Note: Mac Users may be prompted with the Keyboard Setup Assistant. Follow the on-screen prompts to complete the Setup.*

2). When the auto-installation is completed, you should see a “device is ready to use” notice on your screen.

3). For maximum comfort, install the self-adhesive palm pads on the keyboard's integrated palm rests, even if you are not sure if you will keep or return the keyboard. Installing the palm pads will not affect the money-back return guarantee provided by your authorized Kinesis reseller.

3.4 Connecting an Optional Foot Pedal

If you have an Advantage foot pedal, connect it to the short cable with the land-line phone connector at the back of the keyboard, using the coupler that came with your foot pedal. The default pedal actions are shown below in Fig 9.

Fig 9. Foot Pedal Actions



**Single Pedal models act as Middle Pedal*

4.0 Getting Started

4.1 Positioning and Work Area Setup

Thanks to its split keywells, unique thumb clusters, and 20 degree lateral tilt angle, the Advantage2 forces you to adopt an optimal typing position when you place your fingers over the home row. The Advantage2 uses the conventional home row keys (ASDF / JKL;). The home row keys feature special, cupped keycaps designed let you quickly find the home row without taking your eyes off of the screen. Despite the unique architecture of the Advantage2, the finger you use to press each alphanumeric key is the same finger you would use on a traditional keyboard.

Position your fingers on the home row and relax your right thumb over the Space Key and your left thumb over Backspace. Raise your palms slightly above the palm rests while typing. This position provides the necessary mobility for your hands so that you can comfortably reach all the keys. *Note: Some users may need to move their arms slightly while typing to reach some distant keys, especially the function row keys.*

Using palm supports & palm pads

The integrated palm supports are designed to provide comfortable support for your hands while resting, though many users rest their palms while typing to relieve tension and strain in the neck and shoulders. For maximum speed, try holding your palms slightly above the palm support area while typing. Do not expect to reach all of the keys on the keyboard without moving your hands from a stationary position on the palm supports. For maximum comfort, be sure to install the self-adhesive palm pads provided with your new keyboard.

Workstation configuration

Since the Advantage2 keyboard is taller than a traditional keyboard and features integrated palm supports, it may be necessary to adjust your workstation to achieve a proper typing posture with the Advantage2. Kinesis recommends the use of an adjustable keyboard platform/tray to allow for optimal keyboard position. See Appendix 13.3 for tips to make your workspace more ergonomic.

4.2 Adaptation Guidelines

When presented with a Kinesis Contoured keyboard for the first time, many experienced typists overestimate the amount of time it will take them to adapt to the key layout. By following these guidelines you can make adaption fast and easy, regardless of your age or experience.

Adapting your “kinesthetic sense”

If you are already a touch typist, adapting to the Kinesis Contoured keyboard does not require “re-learning” to type in the traditional sense. Learning the Advantage2 layout is just about adapting your existing muscle memory or kinesthetic sense.

Typing with long fingernails

Typists with long fingernails (i.e., greater than 1/4”) may have difficulty with the curvature of the keywells.

Typical adaptation period

You will need a little time to adjust to the new shape of the Advantage2 keyboard. Laboratory studies and real-world testing show that most new users are productive (i.e., 80% of full speed) within the first few hours of starting to use an Advantage2 keyboard. Full speed is typically achieved gradually within 3-5 days but can take up to 2-4 weeks with some users for a few keys. We recommend not switching back to a traditional keyboard during this initial adaptation period as that can slow your adaptation.

Initial awkwardness, fatigue, and even discomfort is possible

Some users report awkwardness when first using a Contoured keyboard. Mild fatigue and discomfort may occur while you adjust to new typing and resting postures. If you experience severe pain, or symptoms persist for more than a few days, stop using the keyboard and see Section 4.3.

After Adaptation

Once you have adapted to the Advantage2, you should have no problem switching back to a traditional keyboard, though you may feel slow. Many users report an increase in typing speed with the Advantage2 because of the efficiencies inherent in the design and the fact that it encourages you to use proper typing form.

4.3 If You Are Injured

The Advantage2 keyboard is designed to reduce the physical stress that all keyboard users experience—whether or not they are injured. Ergonomic keyboards are not medical treatments, and no keyboard can be guaranteed to cure injuries or prevent the occurrence of injuries. Always consult your health care professional if you notice discomfort or other physical problems when you use your computer.

Have you been diagnosed with RSI or CTD?

Have you ever been diagnosed with tendinitis, carpal tunnel syndromes, or some other form of repetitive strain injury (“RSI”), or cumulative trauma disorder (“CTD”)? If so, you should use special care when using a computer, regardless of your keyboard. Even if you simply experience modest discomfort when using a traditional keyboard you should use reasonable care when typing.

To achieve the maximum ergonomic benefits when using the Advantage2 keyboard, it is important that you arrange your workstation in accordance with generally accepted ergonomic standards (see Appendix 13.3) and take frequent “micro” breaks. For individuals with existing RSI conditions it may be advisable work with your health care provider to develop an adaptation schedule.

Establish realistic expectations

If you currently have an injury to your hands or arms, or have had such an injury in the past, it is important that you have realistic expectations of the Advantage2. You should not expect an immediate improvement in your physical condition simply by switching to the Advantage2, or any ergonomic keyboard for that matter. Your physical trauma has built up over months or years, and it may take a number of weeks before you notice a difference. At first, you may feel some new fatigue or discomfort as you adapt to the Advantage2.

A keyboard is not a medical treatment!

The Advantage2 is not a medical treatment nor a substitute for appropriate medical treatment. If any information in this Manual contradicts the advice you have received from a health care professional, please follow your health care professional’s instructions.

When to begin using your new keyboard

Consider beginning to use your Advantage2 keyboard after you have taken a break from traditional keyboarding—perhaps after a weekend or a vacation, or at the very least first thing in the morning. This gives your body a chance to rest and make a fresh start. If possible, Kinesis recommends starting with the Advantage2 during a period when you are not under a lot of work related stress or pressure.

Trying to learn a new keyboard layout can be frustrating, and if you are working long hours or under a

deadline that can make matters worse. Do not overtax yourself early on, and if you have not been using a keyboard regularly, build up slowly. Even if you are symptom free, you are still susceptible to injury. Do not dramatically increase your keyboard usage without first consulting your health care professional.

If your thumbs are sensitive

The Advantage2 keyboard is designed for increased thumb usage compared to a traditional keyboard which places more strain on the little fingers. Some new Kinesis Contoured keyboard users initially experience fatigue or discomfort as their thumbs adapt to the increased workload. If you have a preexisting thumb injury, be especially careful to move your hands and arms when reaching for thumb keys and read the paragraph below about thumb-free typing option.

Guidelines for using your thumbs

Avoid stretching your thumbs to reach the furthest keys in the thumb clusters. Instead move your hands and arms slightly, being careful to stay relaxed, and keep your wrists straight. If your thumbs are especially sensitive, consider using your index fingers instead of your thumbs to activate these keys. You may want to speak with your health care professional about these options. If pain persists for more than several days, stop using the Advantage2 keyboard and contact your health care professional for advice.

Thumb-free typing options

If your thumbs are especially sensitive, your keyboard can be configured for minimal thumb use or even thumb-free typing if necessary. This approach is most effective when using a Kinesis foot pedal in conjunction with the Advantage2. Generally speaking, thumb-free typing is accomplished by remapping thumb key actions to the embedded layer, preferably accessed through an optional Kinesis foot pedal, where they can be typed with by your fingers. Personal preference will dictate the exact details of any custom layout but see Section 6.12 for instructions on how to remap keys.

5.0 Initially Configuring Your Keyboard

For most Windows users, the default QWERTY layout and Windows thumb-key mode will be optimal. However, if you use a Mac or the Dvorak layout, you will want to reconfigure your keyboard. You should start with the Basic Onboard Programming Tools, but there are additional Power User Tools available if you need them.

Basic Onboard Programming Tools

Changing layouts and thumb key modes is most easily accomplished with SmartSet Onboard Programming as described below. If you want to further tweak your layout with remapping or you want to create macros, that is also easily accomplished with Onboard Programming as detailed in Section 6.

Power User Tools

To perform more advanced customization, activate **Power User Mode** (Section 7) to open the v-drive on their computer and access any of the configuration files. From the v-drive, layouts can be viewed and edited directly, and other keyboard settings can be customized, all without the installation of any software. Since configuration files are saved in “simple text” format, they can be opened and viewed with any basic text-editor program, regardless of your operating system.

Important note: Editing these configuration files requires using the U.S. English keyboard driver.

If you are use the U.S. English keyboard driver, you may also want to try the graphical SmartSet App for Advantage2. No installation is necessary, and the App allows you to visualize and edit your customized configuration. The App may be downloaded at kinesis.com/support/advantage2.

Choice of Two Layouts and Three Thumb Key Modes

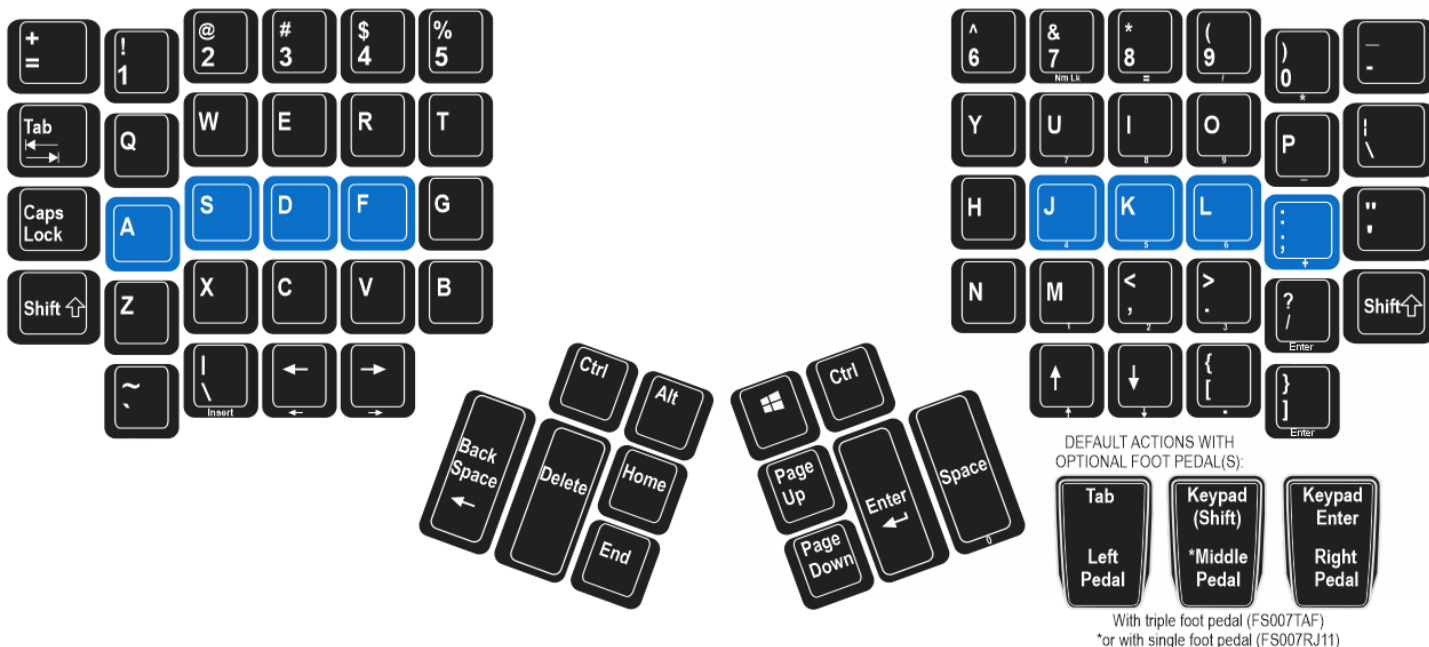
All Advantage2 keyboards come with two “onboard” layouts to choose from: the familiar QWERTY layout and the alternative Dvorak layout. The factory default layout is QWERTY, but Dvorak typists can load the Dvorak layout with a simple onboard shortcut. Each layout can be customized independently. Changing layouts is discussed in Sections 5.1 and 5.2, with advanced options (e.g. hot key layouts) in Section 7.

The three selectable Thumb Key Modes allow quick optimization of the top four thumb keys (and two other keys in Mac mode) for different operating systems (see Section 5.3).

5.1 Default QWERTY Configuration (progM + F3)

The Advantage2 uses the familiar QWERTY key layout for the vast majority of keys (Fig 11). Compared to traditional keyboards there are several changes to the location of non-letter keys to transfer the typing workload from your overworked little fingers to your stronger thumbs. Virtually all alphanumeric keys on the Advantage2 are still typed with the conventional finger, so there is no need to re-learn to type.

Fig 11. Default configuration: QWERTY Layout & Windows Thumb Key Mode



5.2 Alternate Onboard Dvorak Layout (progM + F4)

The Dvorak layout was first developed in the 1930’s by August Dvorak to reduce finger movement in order to increase typing speed and decrease errors as compared to the traditional QWERTY layout. Unlike most keyboards, every Advantage2 has an onboard Dvorak layout (Fig 12) that can be accessed using an onboard programming shortcut. Our Dvorak layout has been custom designed to fit the Advantage2’s unique architecture, and has minor differences from the generic Dvorak keyboard driver available in your operating system, which was optimized for traditional keyboards. If you prefer a different layout like Colemak, it is possible to create your own custom layout by remapping multiple keys from either the default QWERTY or Dvorak layouts (see Section 6). See the Kinesis Technical Support web pages for available layout files.

Optional QWERTY- Dvorak dual-legged keycaps

Kinesis strongly recommends against removing the alphanumeric keycaps and rearranging them into the Dvorak layout, due to the different keycap row styles used. Changing the positions of the keycaps will make it difficult for your fingers to move across the keys as the size and shape of each keycap was designed to fit a specific location in the keywell.

Kinesis recommends that Dvorak typists purchase the Advantage2 QD model (KB600QD) which features dual-legged QWERTY-Dvorak keycaps (Fig 13). Dvorak-only and QWERTY-Dvorak keycap sets may be purchased separately to upgrade any Advantage2 model.

Fig 12. Onboard Dvorak Layout, shown with Windows Thumb Key Mode

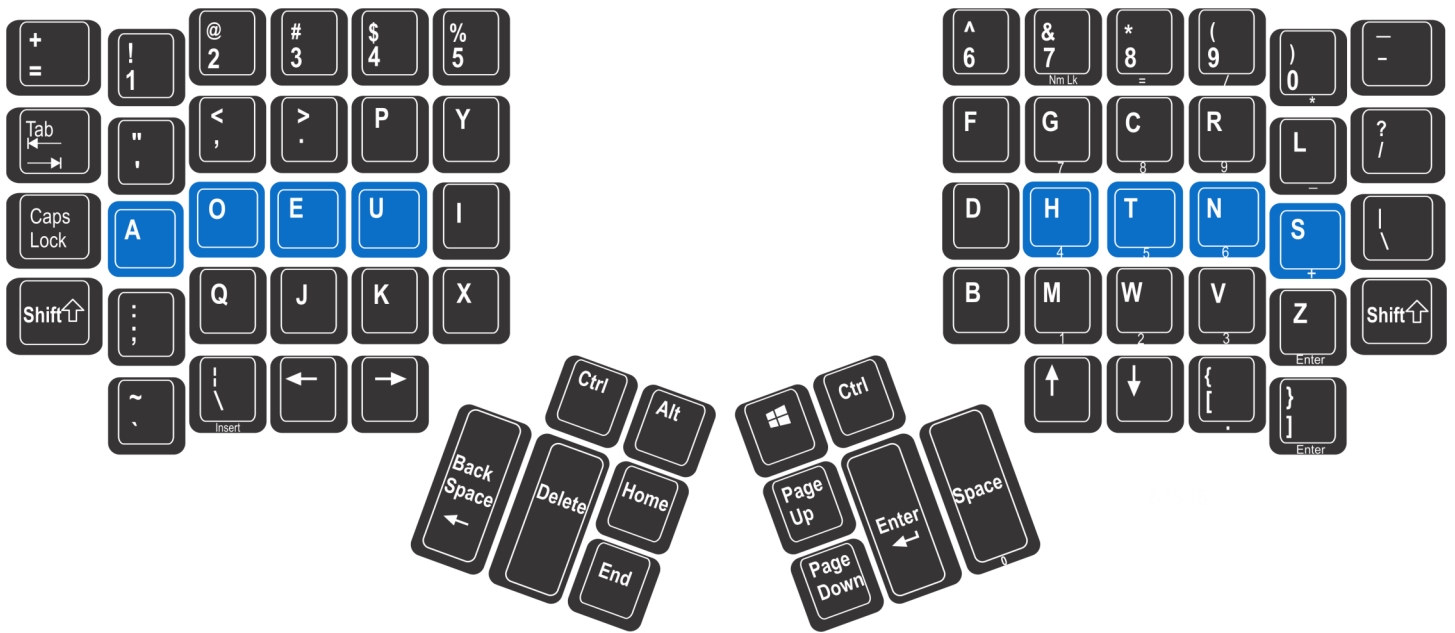


Fig 13. QWERTY-Dvorak dual-legged keycaps for Advantage2



5.3 Thumb Key Mode Selection: Windows, Mac, PC

The three pre-configured “Thumb Key Modes” optimize the four modifier keys in the thumb clusters for different operating systems. The Thumb Key Modes are Windows (the default, Fig 14), Mac (Fig 15), and PC (Fig 16). *Note: For use with non-US English language drivers, see non-US Quick Start Guides with layouts, and and non-U.S. firmware options at: kinesis.com/support/advantage2.*

Thumb key Modes are set independently for each layout and are no longer “global” settings as with early Advantage2 firmware. Using one of the Thumb Key Mode commands will erase any customization of the those keys in the active layout. A “reset” command (see Section 6.9) will reset the thumb keys to the default “Windows” mode for the active layout.

US Advantage2 keyboards are shipped with four additional keycaps corresponding to Mac and PC modes, so that the thumb key legends can match the corresponding key actions. Non-US versions ship in PC mode (their default). German (DE) & UK models ship with a Windows keycap, Swedish (SE) has Windows plus three non-thumb keycaps converting it to Danish and Norwegian, and the Japanese (JP) has an Alt keycap.

Windows Mode (Default for U.S. models & prog + F7)

The default thumb keys for U.S. keyboard models are shown in Fig 14. If you need a right Alt key but don’t want to give up the Win key above Page Up, rAlt can be remapped to your preferred location from the keypad layer of the F2 function key (see below).

Fig 14. Default thumb keys, “Win mode” (US models)

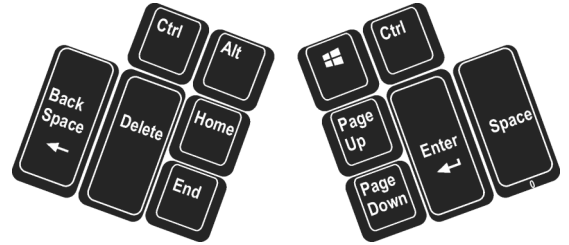


Fig 15. Mac mode thumb keys

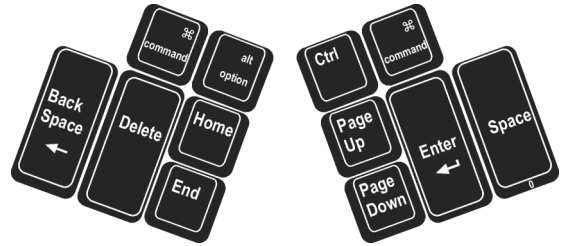
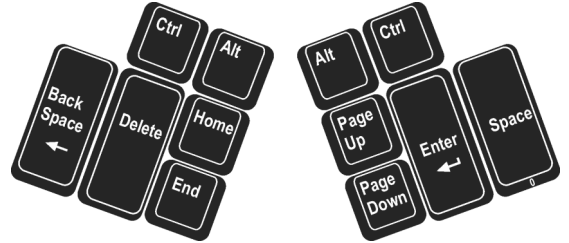


Fig 16. PC mode thumb keys



Mac Mode (progm + F5)

Activating Mac Mode changes the modifier thumb keys as shown in Fig 15. The Mac “command” action is the “Windows” action in a Windows operating system. The Mac “option” action is the same as Alt in Windows. Two additional keys change in Mac Mode:

- Scroll Lock becomes the Mac “power” key — if it is held briefly, it brings up the Shutdown menu (Windows users beware, this key action causes instant shutdown in a Windows environment),
- The “keypad equals“ key performs the Mac keypad equals action, which is not recognized in Windows.

PC Mode (progm + F6)

If you seldom use the Windows key or use non-Windows PC operating system, you may prefer PC Mode. It replaces the Windows key above PageUp with a right Alt key. If you occasionally need Win, it can be remapped to your preferred location from the keypad layer of the F1 function key (see Fig 17).

5.4 Function Keys

The Advantage2 features a function key row with 18 half-size, laser-legended mechanical keys (Fig 17). Note: Many function keys include legends for the SmartSet basic Onboard Programming shortcuts. Older models show “disable macro” on F10 but “macro speed” (including disable for speed=0) is its function with all recent firmware versions.

Fig 17. Function Keys



*kpshift must be remapped to both layers to perform a keypad shift action, in which keypad stays on only while key is pressed.

Traditional actions of function keys

When used in isolation, the function keys perform the standard actions legended on the bottom of each key face. These actions are dependent on your operating system and your active application. However, two special keys are unique to the Advantage2 and the SmartSet Programming Engine: the **Keypad Key** (“keypad”) and the **Program Key** (“progm”). The uses of these special keys are described below. Neither can be modified or reprogrammed.

Keypad Key (keypad)

The Keypad function key (legended in blue) toggles on a second “layer” of key actions, called the “keypad layer” (aka the “embedded layer”). Each layout has its own unique keypad layer where the multimedia keys, the embedded numeric 10-key, and several other bonus keys reside by default. The keypad layer can be custom programmed separately from the top layer by remapping keys and storing macros.

Program Key (progm)

The Program function key is a special shortcut key that allows users to access the Advantage2’s SmartSet “Onboard Programming” tools. Basic programming tools, as described in Section 6, are legended on the top of function row keys for easy reference.

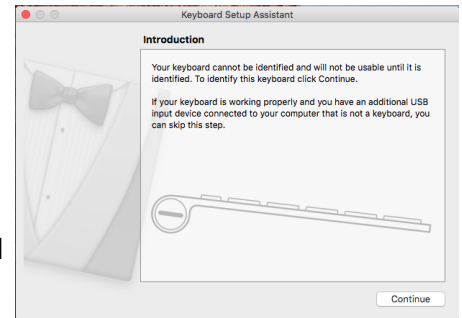
To access a tool labeled in lower case (e.g., status), just press and hold the Program Key and then tap the appropriate function key. To access a tool labeled in CAPITAL LETTERS (e.g., TONE), **press and hold both the Program key and either Shift key**, and then tap the appropriate function key. The Program Key is also

used to access the Power User Tools which are associated with certain keys that are not legended, so use the Program Key cautiously (see Section 7).

5.5 Multimedia Keys

The Advantage2 supports the six basic multimedia actions: Mute, Volume Down, Volume Up, Play/Pause, Previous Track, and Next Track. By default the six multimedia actions reside in the Keypad layer of the Function Key row (Fig 17). Volume controls are located on the right side and legended in blue. Playback controls are located on the left side and are not legended (F4-F6). Any of the multimedia keys can be copied or relocated to any location on the keyboard using onboard key remapping (see Section 6.11) or via direct editing (see Section 7.8). *Note: Multimedia keys are disabled when the v-drive is open.*

Fig 18. Mac Keyboard Setup Assistant



5.6 Mac Usage & Special Considerations

When installing the Advantage2 for the first time on a Mac computer, you will likely be prompted with the Keyboard Setup Assistant (Fig 18). Follow the on-screen prompts or simply close the window.

Mac users should configure their thumb keys for Mac-specific modifiers and install the included three Mac keycaps on the appropriate keys (Fig 15).

Regardless of the selected layout or Thumb Key Mode, certain keys on the Advantage2 keyboard will behave differently in a Mac operating environment, just like with any other PC keyboard (see Fig 19)

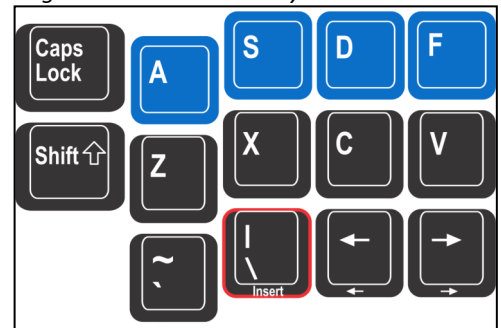
Fig 19. Comparing keys that change between Windows/PC and Mac OS X.

Advantage2 Key	PC Action (Win or PC Modes)	Mac Action
Windows (Win Mode)	Windows	Command
Backspace	Backspace	Delete
Enter	Enter	Return
Ctrl	Ctrl	Control
Alt	Alt	Alt-Option
Scroll Lock	Scroll Lock	Mac mode: shutdown, Win mode: brightness
Embedded Numeric Keypad =	Same as number row =/+	Mac mode: keypad =
\ next to left shift ("Intl key")	Language driver dependent	§
Insert (keypad action of Intl key)	Insert	Help
Num Lock (keypad action of 7& key)	Toggle Num Lock on & off	Clear

5.7 International Usage (e.g. non-U.S.)

An "International Key" is located next to the left arrow key (Fig 20, note the red-outlined key). With the US English keyboard driver, this key has the same action as the key to the right of "P," but it is normally only present on non-US traditional keyboards. The International Key action changes depending on your operating system and which language driver is active on your computer.

Fig 20. "International key"



6.0 SmartSet Basic Onboard Programming Tools

The SmartSet Programming Engine provides a number of easy-to-use productivity tools. Even those who have never used a programmable keyboard can easily learn and benefit from these. Basic Onboard Programming Tools are accessed using simple onboard shortcuts consisting of the special **Program Key** (labeled “**progm**”) and one or more keys in the function key row. Basic programming tools in the function key row have been labeled for your convenience.

6.1 Status Report (progm + Esc)

The Configuration Status Report is a handy feature which allows Advantage2 users to quickly check the current settings on their keyboard (Fig 21). This section briefly explains how to interpret the Status Report. For a detailed explanation of the features referenced below, please read Sections 7 and 8 of this Manual.

Important Note: Before running a Status Report, open a text editing program so that the keyboard can “print” the Status Report to the screen.

Fig 21. Example Status Report

```
Model> Advantage2
Firmware> 1.0.431.us (4MB), 11/14/2017
Active layout file> qwerty.txt
Thumb keys mode> win
Macro play speed> off=0, slow=1, normal=3, fast=9> 3
Status report play speed> off=0, slow=1, normal=3, fast=4> 3
Keyclick status> on
Toggle tone status> on
Stored macros> 0
Keys remapped> 0
```

Model: Indicates the model name of the keyboard.

Firmware: Indicates the current version of firmware your keyboard is running and the size of the onboard v-drive (2MB or 4MB). The original Advantage2 keyboards has 2MB v-drives, but early in 2018, production switched to 4MB v-drives (serial numbers beginning with 4xxxxA2). To update the firmware on your Advantage2 (see Section 8.0).

Active Layout File: Indicates the layout file that is currently active. The QWERTY (qwerty.txt) and Dvorak (dvorak.txt) layouts are the two factory configured options (see Section 7.5). Alternate “Hotkey” layouts can be created (see Section 7.6).

Thumb Key Mode: Indicates which of the three Thumb Key Modes are currently active, Windows (“win”), Mac, or PC (see Section 5.3).

Macro Play Speed: 0 indicates whether macro playback has been disabled, 1-9 is global speed. (see summary in Section 6.10, details in Section 7.1).

Status Report Play Speed: Indicates the current playback speed for the Status Report. If your status report doesn’t playback properly, the playback speed can be reduced from the default of speed 3 (see Section 7.11).

Keyclick Status: Indicates whether key “clicks” are enabled. (see Section 6.7).

Toggle Tone Status: Indicates whether special action “tones” are enabled (see Section 6.8).

Stored Macros: Indicates the number of custom macros that have been saved to the active layout (see Section 6.11).

Keys Remapped: Indicates the number of custom key remaps that have been saved to the active layout (see Section 6.12). *Note: The Remap count is affected by the active Thumb Key Mode. Windows Mode is set as the default, so it reports 0 additional remaps. Mac Mode has 8 remapped keys relative to Windows Mode and PC Mode has 2 remapped keys relative to Windows Mode.*

Power User Mode: Indicates when Power User Mode has been activated. When inactive, this line is not shown (see Section 7.3).

6.2 Activate QWERTY Layout (progm + F3)

Loads the “qwerty.txt” configuration file which corresponds to the default QWERTY layout (Fig 10) plus any custom remaps and/or macros that you have previously saved to this layout. *Note: This action does not change the Thumb Key Mode or other configuration settings.*

6.3 Activate Dvorak Layout (progm + F4)

Loads the “dvorak.txt” configuration file which corresponds to the default Dvorak layout (Fig 11) plus any key remaps and/or macros that you have previously saved to this layout. *Note: This action does not change the Thumb Key Mode or other configuration settings.*

6.4 Activate Mac Thumb Key Mode (progm + F5)

Activates Mac Thumb Key Mode (Figs 14 & 22). Eight additional remapped keys will appear in the Status Report and the active layout file. *Note: Any custom remaps to any of the ten Thumb Key Mode keys will be erased from the active layout but other layouts will not be affected.*

Fig 22. Keys which change with Thumb Key Modes

Left Ctrl	Left Alt	Right Windows/Command	Right Ctrl	Scroll Lock
Keypad Left Ctrl	Keypad Left Alt	Keypad Right Windows/Command	Keypad Right Ctrl	Keypad Equals

6.5 Activate PC Thumb Key Mode (progm + F6)

Activates PC Thumb Key Mode (Figs 15 & 22). Two additional remapped keys will appear in the Status Report and the active layout file. *Note: Any custom remaps to any of the ten Thumb Key Mode keys will be erased from the active layout but other layouts will not be affected.*

6.6 Activate Windows Thumb Key Mode (progm + F7)

Activates Windows Thumb Key Mode (Figs 13 & 22). Since this is the default Mode, no additional remaps will appear in the Status Report or layout files. *Note: Any custom remaps to any of the ten Thumb Key Mode keys will be erased from the active layout but other layouts will not be affected.*

6.7 Disable Key Clicks (progm + F8)

The Advantage2 is equipped with a unique feature that provides a subtle electronic “click” each time a key press is registered. The purpose of this click is to provide auditory feedback to the user regarding when a given key press has been registered by the computer to discourage “bottoming out”, which if done repeatedly can cause finger pain. Key Clicks are enabled by default but can be toggled off (and on) with progm + F8.

6.8 Disable (Enable) Special Action Tones (progm + shift + F8)

The Advantage2 provides a feedback “tone” to alert the user when they have “toggled” the keyboard into special modes such as Keypad, Num Lock, Caps Lock, Scroll Lock, and Insert. Except for Insert, the tone sounds twice when the special mode has been activated, and once when the mode has been deactivated. Special Action Tones are enabled by default but they can be toggled off (and on) with progm + shift + F8.

6.9 Soft Reset (progm + shift + F9)

Soft Reset erases all macros and remaps from the currently active layout and re-enables macro playback if it was disabled. *Note: Thumb Key Mode, Clicks/Tones and other basic settings are not affected.*

6.10 Set global Macro Playback Speed (progm + F10)

Use Progm+F10, All LEDs will flash rapidly, then a number key row key. The 0 will disable macro playback and 1-9 will to set a global playback speed. Speed 3 is the default. See Section 7.1 for speed details and setting different speeds for individual macros.

6.11 Program/Record Macro (progm + F11)

A macro is any string of characters or sequence of key actions that are triggered by a single key action. Macros are powerful productivity tools that allow users to save time and eliminate repetitive key strokes associated

with common keyboarding tasks. The Advantage2 can be programmed to playback macros by tapping either a single trigger key (a non-modifier), or by a combination of one or more modifier keys plus a trigger key. Modifier keys consist of Shift, Ctrl, Alt (“Option” on a Mac), and Windows (“Command” on a Mac).

Note: Left and right modifier keys are treated separately in triggering macros, so “lshift + a” could trigger a macro that is different than one triggered by “rshift + a.” The Program and Keypad keys cannot trigger macros. Special care is needed if a “Win” action used as the only modifier to trigger a macro (see next page).

Note: When a macro is recorded, it is only assigned to the layout (QWERTY or Dvorak or hot key layout) that was active during recording. Therefore the QWERTY and Dvorak layouts each have separate sets of macros. However, macros can be copied and pasted from one layout to another using Direct Editing (see Section 7.8).

Size limits on macros

Individual macros typically can comprise more than 200 individual keystrokes and dozens of macros can be saved to the keyboard’s onboard memory within a single layout. The size limit of a single macro is based on the coded actions stored as “tokens,” and some actions such as modifiers and non-alphanumeric keys have bigger tokens than simple letters and numbers. So if your macro has lots of modifiers or non-alphanumeric key actions, the maximum macro size may be less than 200 visible keystrokes.

If you attempt to program a macro which is too large, it will simply not play the excess key actions.

Program Macro Mode

To program a macro, open the application in which the macro will play correctly, then follow the steps below.

1. Hold prog briefly while tapping F11 to enter “Program Macro Mode.” The Num Lock LED will flash rapidly.
2. Tap a “macro trigger” key or key combination. If you use a combination, hold the modifier(s) first, then press the trigger key, then release all keys. The LED flashing will slow.
3. Type your macro contents.
4. When you are finished recording your macro, tap prog to exit Program Macro Mode.

Note: When recording a macro, any remapping you have done will be active, but macro playback will be temporarily disabled. Therefore you cannot record a macro by “playing back” an existing macro, and you cannot “daisy chain” or embed one macro within another. While recording a macro, the characters will output to the computer just as they will when it is played back after being recorded.

Every keystroke is recorded

As you record a macro, the Advantage2 records the exact keystrokes you type. If you make a mistake while recording a macro, you can use corrective keystrokes, but this will slow playback slightly and for long macros, it may also reduce the maximum macro size to below 200 characters. So if you make lots of mistakes while recording a macro, consider re-starting the recording process. Alternatively, you can fine-tune the macro using direct editing (see Section 7) or the SmartSet App.

Keystrokes only, timing delays not recorded

Macro Record Mode records only the key strokes themselves, and not any “delays” between key strokes. However, delays can be built into a macro using direct editing (see Section 7.10) or the SmartSet App.

Erasing a macro

To erase a macro in the active layout, enter Program Macro Mode, press the appropriate trigger key(s) for the macro you wish to erase, and then tap the Program Key before recording any additional keystrokes.

Other keystrokes blocked during macro playback

While a macro is being played back, all other keystrokes from the keyboard are blocked. If you are using especially long macros or want to execute a macro in rapid succession with other keystrokes, we recommend increasing your macro playback speed (see Section 7.1 or Section 7.10).

Macros triggered by modifier key locations

It is not possible to have a modifier by itself trigger a macro, even if you have remapped the modifier key to perform a non-modifier action. If you attempt to program this, it will work temporarily but when the keyboard is replugged, the macro will disappear.

Using a Windows key as the only modifier to co-trigger a macro (“win-triggered macros”)

Because of the special way in which the “Windows Key” is treated by the Windows operating system and differences between processor speed and Windows versions, experimenting with playback speed may be needed if you use lwin or rwin as the only modifier to help trigger a macro in combination with a non-modifier key. There should be no problem if Win plus another modifier are combined with a macro trigger key.

If you wish to implement a win-triggered macro, start with the default macro playback speed if you have previously changed that feature (see section 7.1). If you use onboard programming (progm+F11) and the “Start Menu” pops up and stays open when you release the windows key and the macro trigger key, tap escape once or twice to close the start menu before typing your macro contents. Then type the macro contents normally and tap Program to exit from macro programming mode.

After you have programmed your win-triggered macro, if it plays correctly, you can experiment with faster playback speeds. Section 7.8 includes several tricks for helping Win-triggered macros playback successfully, especially at high playback speeds.

6.12 Remap a Key (progm + F12)

The Advantage2 lets you create custom layouts by moving (aka “remapping”) key actions from one location on the keyboard to another. You can remap one or two critical keys or remap dozens of keys to suit your particular workflow. There are 168 unique key locations on the Advantage2 that can be reprogrammed (84 programmable keys in each of the top layer and the keypad layer, see Section 6.13). The Program Key and the Keypad key are the only keys which cannot be assigned a different function. Any other key actions that reside on the keyboard, as well as many other keyboard and mouse actions, can be assigned to one or more of those 168 key locations using SmartSet Onboard Programming or direct editing of the layout file. The keypad action (toggled or shifted) can be assigned to any remappable key using the SmartSet App or with direct editing (see Sections 7.8 and 13.1).

Program Remap Mode

To remap a key, progm+F12 enters Remap Mode. Keys are remapped in pairs: “Source Action” then the “Destination Key”. The Scroll Lock LED will initially flash rapidly prompting you to select the Source Action. Once you have selected a Source Action, the Scroll Lock LED will flash slowly until you select the Destination Key, then it will revert to rapid flashing. *Note: Remap Mode will continue until prog is tapped.*

Swapping key actions

Program Remap Mode moves one key action at a time, it does not swap keys. To swap two keys, you must program two separate remap actions.

Remapping a key action to a different layer (to or from the keypad layer)

Both the top layer and keypad layer are separately programmable. When a key is remapped, it is only remapped in the layer that was active during remapping. To remap a key from the keypad layer to the top layer, or vice versa, simply use the Keypad key to switch between layers during the remap process, between the Source action and the Destination key. The Keypad key is not recognized as a valid “source” or “destination” key so it does not interrupt Program Remap Mode.

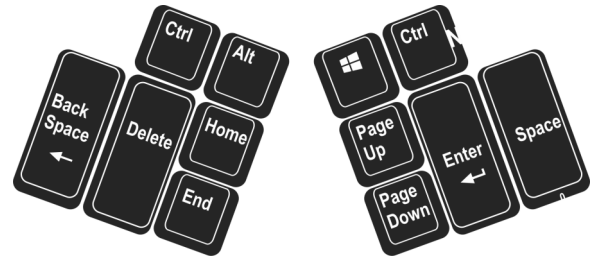
Advanced Users: Remapping Thumb Key Mode keys

It is possible to remap any of the ten variable Thumb Key Mode keys (Fig 22) to perform custom actions in each layout. However, these custom actions will be erased in the active layout if you subsequently use one of the onboard shortcuts to set Thumb Key Modes (progm + F5, F6, or F7).

For power users who would like to create custom thumb key actions and plan to switch between different operating systems, we suggest creating operating-system-specific hotkey layouts, which will allow you to custom program the thumb keys and not lose your settings when you move between layouts (Section 7.7).

Note: As with all remappings, the “source” action for the thumb keys is always the key action of the default mode (Fig 23), regardless of which Thumb Key Mode is active.

Fig 23. Default thumb keys, “Win mode”



Differences between Program Remap Mode and Program Macro Mode

The Advantage2 was designed to behave slightly differently in Remap Mode as compared to Macro Mode. During Remap Mode, the keyboard will revert to the default layout QWERTY or Dvorak (whichever is currently active) and Windows Thumb Key Mode for key all “Source” actions (Figs 11 & 12). Mac users wishing to move any of the Mac modifier key actions should refer to Figs 19 & 22 showing Mac actions of Windows-legended key.

Macro and remap conflict

It is possible to assign a remap and a macro to the same key. In that event, the macro will take priority over the remap action unless macros have been temporarily disabled via the onboard shortcut (see Section 6.10)

6.13 Keypad layer (aka the “embedded layer”)

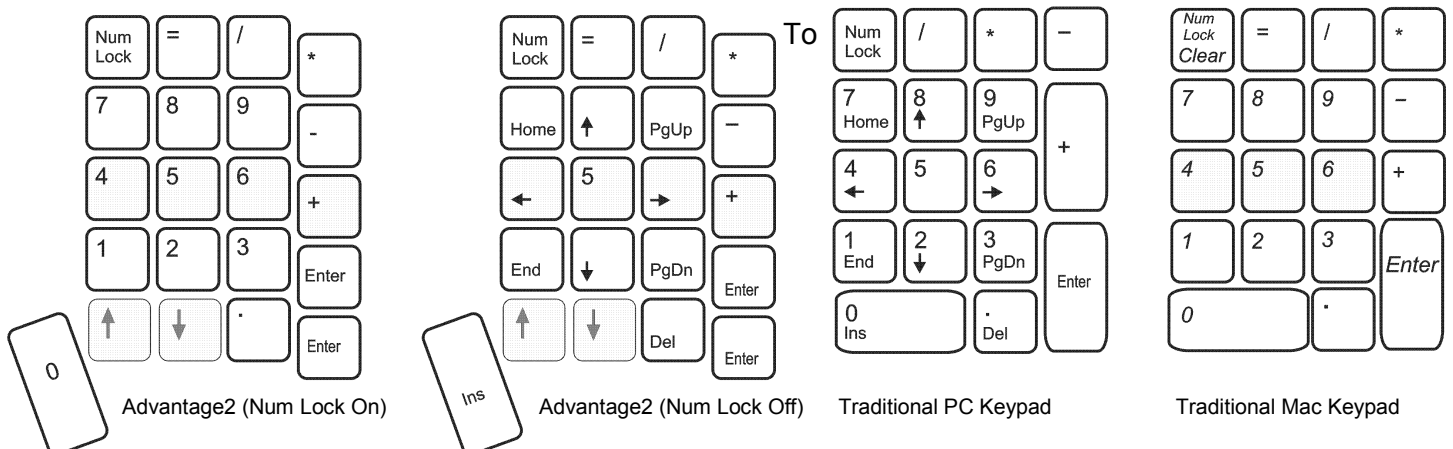
Each layout on the Advantage2 features two distinct “layers”- the top layer and the keypad layer. The top layer performs the standard key actions based each key’s primary legend. In the embedded keypad layer, many keys (mostly on the right side) have secondary actions that are reflected in a small legend printed on the front of the key. When keypad layer is activated, the right keywell features an embedded numeric 10-key when Num Lock is on, and a traditional arrow key cluster when Num Lock is off.

The keypad layer can also be custom programmed just like the top layer with remaps and macros. The keypad layer can be “toggled” on or off with the **Keypad Key**. An Advantage foot pedal can be used to temporarily “shift” the Keypad layer on by pressing and holding the appropriate foot pedal. For your convenience, the “keypad toggle” and “keypad shift” functions can also be assigned to any location on the keyboard using the SmartSet App or direct editing (see Section 7 and Appendix 13.1).

Numeric keypad actions and Num Lock

The Advantage2’s embedded 10-key is shown in Fig 24, along with traditional keypad layouts for PC and for Mac. Num Lock is a critical function to understand because it performs different functions depending on the operating system. On a desktop PC with a full-size keyboard, turning Num Lock off causes the numbers in the 10-key to perform directional actions. Some laptop PCs use Num or Num Lock to activate their embedded keypads, rather than as the traditional Num Lock action. And on Mac computers, Num Lock is not used at all. Most PC computers boot up with Num Lock active.

Fig 24. Embedded keypad differences showing Advantage2 keypad on the left, traditional PC & Mac keypads on the right.



manually turn Num Lock on or off with the Advantage2, first activate the Keypad layer and then press the 7 key in the number row which is front-legended “Nm Lk.”

7.0 SmartSet Power User Tools

In addition to the Basic Onboard Programming Tools described in Section 6, the SmartSet also has a number of Power User Tools designed for those looking to get the most out of their Advantage2 programmable keyboard. To access most of the features listed below, it is first necessary to activate “Power User Mode” using the onboard programming shortcut (see Section 7.3). Those features are denoted below with “PUM”.

Note: Power User Tools utilize functions that are not labeled on the keys and can radically change the performance of your keyboard so proceed with caution. Even those users familiar with programmable keyboards in general, or even with a previous Kinesis Contoured keyboard, should read this manual in full before attempting to access any of the Power User Tools.

7.1 Global Macro Playback Speed Adjustment (prog + F10 + {1-9 & 0})

Adjust the playback speed of your macros so you can optimize macro performance based on your specific workflow and system. There are 9 different playback speeds (Fig 25), ranging from ~50 words per minute (WPM) up to a blazing fast ~3,000 WPM, plus 0 to disable macro playback. The default playback speed is 150 WPM, which is defined as “Speed3”. Users can adjust the playback speed for all macros “globally” with a single onboard programming shortcut. *Note: If you are using a number of sophisticated macros, you may wish to set their playback speeds individually, rather than globally, for optimal performance (see Section 7.10).*

Fig 25. Macro playback speeds
(CPS=characters per second, wpm=words per minute)

Speed1	4.2 CPS	~50 WPM
Speed2	8.4 CPS	~100 WPM
Speed3 (Default)	12.5 CPS	~150 WPM
Speed4	22.7 CPS	~270 WPM
Speed5	34.2 CPS	~400 WPM
Speed6	62.5 CPS	~750 WPM
Speed7	84 CPS	~1,000 WPM
Speed8	125 CPS	~1,500 WPM
Speed9	250 CPS	~3,000 WPM

To change macro playback speed globally, prog + F10 (“macro speed”) will enter Global Macro Playback Speed Adjustment Mode. All four LED indicator lights will flash to alert you that you are in an active programming mode. Then select a playback speed by tapping a key in the number row (0 to disable macros or 1 to 9). You may need to experiment with different speeds to find the best one for your mix of macros and computing system.

Note: Global Macro Playback Speed Adjustment Mode will exit and the LEDs will stop flashing even if you to select an invalid speed setting (i.e., any key besides 1-9). Run a Status Report in a text editing screen to confirm the new playback speed.

Before attempting to adjust Global playback speed, be sure the keypad layer is not active. If you have remapped the desired number row key to another location on the keyboard, you must use the new location for speed assignment, not the default location.

7.2 Hard Reset (prog + F9 while plugging in keyboard)

A Hard Reset erases all of the remaps and macros saved to both the qwerty.txt and dvorak.txt layout files, as well as any configuration changes saved to the state.txt files (see Section 7.5). However, no other files (e.g. hot key layouts) in the “active” folder are changed or deleted by a hard reset. The keyboard will revert to the default QWERTY layout with the Windows Thumb Key Mode active.

Note: back up qwerty.txt and/or dvorak.txt files before doing a hard reset if you wish to preserve them! This can be accomplished by copying and pasting them to your computer before performing a Hard Reset. After a

hard reset, with a 4MB v-drive you can cut and paste these files back into the active folder. With a 2MB v-drive, you should copy and paste the file contents to the appropriate file on the v-drive to reduce the risk of file corruption.

To initiate a Hard Reset, hold progm+F9 while plugging the keyboard. Once all four LED Indicator Lights start to flash, release progm+F9. The LEDs will flash four times to signal that the Hard Reset is complete.

Note for earlier firmware versions: *A hard reset with earlier firmware required rctrl+F9 for this. Sometimes the Ctrl key became electronically “stuck” during reset and would cause strange keyboard behavior. To remedy that issue, tap the rctrl key and then update your firmware to the latest version (see Section 8).*

7.3 Power User Mode, “PUM” (progm + Shift + Esc)

Before accessing any of the Power User Tools described below, it is first necessary to activate Power User Mode (PUM) on the keyboard using the onboard shortcut. To do this, press and hold the Program Key and the Shift Key, and then tap the Escape Key. All four LED indicator lights will flash four times to indicate when PUM has been activated, and two times to indicate when it has been deactivated. *Note: When PUM is active, a new line on the Status Report will appear to indicate this. When it is inactive, it is not listed in the Status Report.* If you attempt to activate one of the features below without having first activated PUM, nothing will happen. Once activated, PUM will stay active until it is manually deactivated or a Hard Reset is performed.

Caution: If you accidentally tap Esc before pressing Shift, you will generate a Status Report.

7.4 Opening the “Advantage2” v-drive (progm + F1, PUM Required)

The Advantage2 contains a virtual flash drive named “Advantage2” where the keyboard’s layout files (qwerty.txt and dvorak.txt), settings (state.txt) and SmartSet App are stored. The Advantage2’s “v-drive” is normally hidden from your computer, and it is not necessary to access the v-drive for basic keyboard usage or any of the onboard programming shortcuts.

There are three reasons to access the v-drive: 1) to use the graphical SmartSet programming app, 2) to copy or “Direct Edit” a layout file (view the layout, edit existing macros/remaps, or create new macros/remaps), and 3) to perform a firmware update. There are three ways to open (aka “mount”) the v-drive.

Note: Depending on your operating system, it may take up to twelve seconds for the v-drive to appear.

(1) Onboard shortcut to open v-drive

If the keyboard is plugged in and Power User Mode is enabled, simply hold the Program Key and tap F1.

Finding the v-drive on your computer

The appearance/location of the v-drive will vary depending on your operating system. Here are some tips:

- Windows: The v-drive will usually “pop-up” automatically as a removable disk. If you do not see an AutoPlay popup, look in MY COMPUTER for a removable disk named “Advantage2”.
- Mac: The v-drive should appear on the desktop. If it does not appear on the desktop look in DEVICES for a removable disk named “Advantage2”.
- Android: Look in COMPUTER SETTINGS for a removable disk named “Advantage2”.
- Chrome: Look in FILES for a removable disk named “Advantage2”.
- Linux look in MY COMPUTER for a removable disk named “Advantage2”.

Closing the v-drive

Before closing the v-drive, be sure to save any .txt files that have been edited if you would like those changes to be implemented. **Always select “eject” (right-click the mouse in Windows) before closing the v-drive using the onboard shortcut progm + F1.** The LED indicator lights will flash two times to signal that the v-drive has been successfully closed. If you get a message from your operating system that the device is busy

and cannot eject, be sure all v-drive files are closed and click on the top level of the v-drive, then try again. If the message persists and you have a 4MB v-drive, ignore it and close the drive. After “ejecting” the v-drive, you can also unplug the keyboard to close the v-drive instead of using progmn-F1.

Mac Note: If you would prefer not to see the “Disk Not Ejected Properly” pop-up and have lots of spare time, you may elect to unmount the v-drive via the diskutil command “diskutil unmount” which can be accessed from the Terminal Application.

Manually opening v-drive on plug-in

An alternate method for opening the v-drive is to hold progmn + “print scrn” briefly while plugging in the keyboard or booting up your computer. All four LEDS will flash four times.

Always open the v-drive on boot

Power users may set the v-drive to open every time the computer is powered on. To enable this feature, open the v-drive via one of the two aforementioned methods, access the “active” folder, and open the “state.txt” file (see Section 7.5). Add the following line of case-sensitive text below the existing text and then save the file: v_drive_open_on_startup=ON. To reverse this process, simply delete this text from the state.txt file, or change “ON” to “OFF” (case sensitive). *Note: With this statement set to “ON,” the v-drive will not stay closed if you use progmn + F1. Also, when the v-drive is open, multimedia and mouse commands are not active.*

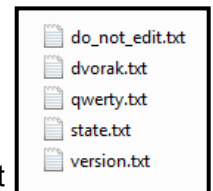
7.5 Contents of the v-drive

The v-drive contains two very important folders: “active” and “firmware.” *Note: If you have accessed the v-drive on a Windows computer and your Advantage2 was previously connected to a Mac computer, you may see some additional “hidden” folders that can be disregarded.*

Active folder

By default, the active folder contains five files (Fig 26), all of which are simple text (“.txt”), four which can be opened with any text editing program (e.g., Notepad, Microsoft Word, etc.). The “do_not_edit.txt” file is for internal keyboard use and should not be opened or edited.

Fig 26. Contents of “active” folder



1. do_not_edit.txt – This file is a temporary repository for macro fragments and is used by the firmware as a “scratch pad.” It is not user-editable and is not useful to review.
2. dvorak.txt – The dvorak.txt file contains any custom changes you have saved to the default Dvorak layout. For simplicity, the architecture was designed to only display changes (i.e., macros & remaps) saved to the default Dvorak layout. If you have activated PC or Mac Thumb Key Mode, the keyboard automatically creates and stores the appropriate remaps associated with that mode (see Section 5.3).
3. qwerty.txt – The qwerty.txt file contains any custom changes you have saved to the default QWERTY layout. For simplicity, the architecture was designed to only display changes (i.e., macros & remaps) saved to the default QWERTY layout. If the Windows Thumb Key Mode is active and no remaps or macros have been made, the file will be empty. If you have activated PC or Mac Thumb Key Mode, the keyboard automatically creates and stores the appropriate remaps associated with that mode (see Section 5.3).
4. state.txt – The state.txt file records the active settings of the keyboard (Fig 27). In general this file should not be deleted or altered, and should be used only for reference if the Status Report function is inconvenient. The state.txt file can be edited to adjust the Status Report playback speed (see Section 7.11) or to force the v-drive to open upon enumeration of the keyboard (see Section 7.4).
5. version.txt – The version.txt indicates the firmware currently installed in the keyboard. If this file is deleted it will be regenerated, but if it is edited and saved it may provide the wrong information.

Fig 27. Contents of default state.txt

```
startup_file=qwerty.txt
thumb_mode=WIN
key_click_tone=ON
toggle_tone=ON
macro_disable=OFF
macro_speed=3
power_user=false
```

Additional files in the active folder: hotkey layouts

If you have created any custom hotkey layouts (see Section 7.6) you will see additional .txt files in the active folder, one for each hotkey layout you have created.

Firmware folder

The firmware folder is empty by default and only needs to be accessed to perform a firmware update (see Section 8). However, if you download firmware updates, it is useful to store copies in this folder.

7.6 Creating Hotkey Layouts (PUM Required, prog + F2)

In addition to the onboard QWERTY (qwerty.txt) and Dvorak layouts (dvorak.txt), users can create dozens of other custom layouts called “hotkey layouts” which can be loaded with a simple onboard shortcut (aka “hotkey”) that you define. Hotkey layouts are useful for specific applications with unique workflows or if your Advantage2 is being shared with other users. Hotkey layouts are assigned to either the QWERTY or Dvorak family, and each hotkey layout has both a top layer and a keypad layer. When you create a hotkey layout using the onboard shortcut, the keyboard automatically creates a new .txt file (see naming conventions below) on the v-drive where your custom remaps and macros are stored.

To create a hotkey layout, first confirm which default layout is active, QWERTY or Dvorak. *Note: If you are in a QWERTY layout, then any hotkey layout you create will be QWERTY based, and vice versa for Dvorak.* Next, **ensure Power User Mode is enabled and the v-drive is closed.** Then hold Program and tap F2 to enter Hotkey Layout Creation Mode. The Num Lock LED will begin flashing rapidly, prompting you to select a “hotkey” that you will use to access your new hotkey layout. *Note: Only alphanumeric keys can be assigned as a hotkey.* Tap the desired hotkey and the LED will stop flashing.

Note: If you attempt to assign a hotkey layout to a key which already has a hotkey layout for that layout family (QWERTY or Dvorak), then you will lose any saved key remaps but macros will remain.

Hotkey layouts are copies of the existing layout

When you create a new hotkey layout, that hotkey layout will exactly mirror the layout that was active at the time of its creation. In other words, you are creating a duplicate layout file with a new name. If you wish to custom program a hotkey layout from scratch, immediately after creating the hotkey layout, perform a Soft Reset (prog + shift + F9) to erase the existing remaps and macros in the new hotkey layout.

Hotkey file naming conventions

Hotkey layout files are based on either the underlying QWERTY or Dvorak Layout and are named so that the hotkey assigned to trigger the layout appears before the base layout. Examples:

- A QWERTY hotkey layout assigned to trigger-key Q will be named “q_qwerty.txt”
- A Dvorak hotkey layout assigned to trigger-key 5 will be named “5_dvorak.txt”.

Only the keyboard should create and name hotkey layouts

For best results, we recommend always using the onboard shortcut (prog + F2) to create a new hotkey layout. Do not create a text file on the v-drive from your computer, do not cut and paste an external text file to the v-drive, and do not rename an existing text file so that it is hotkey accessible. Any of these actions could result in corrupt files on certain operating systems which might necessitate a Hard Reset. *Note: On some operating systems (e.g., Windows 10), it is necessary to condition a new hotkey layout via an onboard programming shortcut (Program Macro Mode, Program Remap Mode or by switching Thumb Key Mode) before attempting Direct Editing (as described in Section 7.8).*

Deleting a hotkey layout

Hotkey layout files must be deleted manually by accessing the v-drive and moving the desired files to the trash (or equivalent).

7.7 Activating a Hotkey Layout (progM + {hotkey})

Once a hotkey layout has been created, you do not need to be in Power User Mode to load it to the keyboard. Simply hold the Program Key and tap the appropriate hotkey to activate the layout.

Remember that hotkey layouts are assigned to either the QWERTY or Dvorak family. QWERTY hotkey layouts can only be accessed while in another QWERTY layout, and vice versa. As such, the same hotkey can be assigned to both a QWERTY and Dvorak hotkey layout without creating any conflict.

7.8 Direct Editing of layout files

The Advantage2 with SmartSet tools is a powerfully-programmable keyboard. Most users will find the Basic Onboard Programming Tools or the SmartSet App are adequate their needs. However, “power users” may wish to access one or more layout files in a simple text editor to directly view and edit their settings, macros and remaps. “Direct Editing” is the process of accessing the v-drive, opening a layout or the settings file (state.txt), then adding, removing or otherwise editing the “code” (text) in the file.

Note: It is critical to use the U.S. English keyboard driver when editing a SmartSet text file (see p.28).

Important precautions when direct editing

Direct editing requires special care to avoid corrupting the text files, especially with older 2MB v-drives where the layout files are “factory conditioned” to prevent problems. If you delete or paste a new file, or re-format the 2MB v-drive (which automatically creates new layout files), you will need to “condition” the layout files before direct editing. The 4MB v-drive should never need to be reformatted, but in Windows may have an occasional “scan and repair” suggested by the file manager.

It is also important to always use the “eject” option of your operating system’s file manager, design for removable drives which is how the v-drive is characterized. Normally “eject” is available if you right click on the drive. After the system says “okay to remove drive,” use progM + F1 to close the v-drive.

If you get a “drive busy” message when you try to eject, wait and check the v-drive files are closed and navigate out of v-drive folders, then try again.

Layouts and layout text files

As described in earlier sections of this Manual, each individual layout has its custom configurations (i.e., remaps and macros) stored in its own unique “.txt” file which is saved to the keyboard’s onboard memory, called the v-drive. When a user toggles between layouts, the keyboard calls up the appropriate .txt file and loads the file to establish the new active keyboard layout. Each of these individual .txt layout files can be accessed from the v-drive from inside of the “active” folder (see Sections 7.4 & 7.5).

Contents of a layout text file

Within each layout file are discrete lines of text corresponding to each individual key remap and/or macro that has been programmed to that specific layout. When you use an onboard shortcut to record a macro, remap a key, or toggle to the alternate Thumb Key Modes (PC or Mac), the keyboard writes a line of code for each of these custom actions to the corresponding layout file and saves it for future reference. Power users can access layout files to edit/delete code written by the keyboard, or write new code from scratch. For simplicity, each .txt file only displays changes to the respective default layout, either QWERTY or Dvorak. If no changes have been made with respect to the default layout, then that .txt file will be empty. *Note: Relative to Windows Mode, PC Mode features two automatically remapped keys and Mac Mode features eight such keys.*

Macros and Remaps are encoded slightly differently in the layout file (see below), but the basic syntax used to show all custom programming actions in a layout file follows this basic structure. The “>” symbol is always used to separate the physical location from the electronic action. In other words:

“Physical key location/trigger(s)” > “Electronic key actions/outputs.”

Example: To remaps the Caps Lock key to perform left ctrl:

```
[caps]>[ctrl]
```

Physical key locations defined by “Location Tokens”

There are 168 physical key locations which can be custom programmed to trigger a macro or output a different key action (two discrete layers, each with 84 full and half-size keys).

Note: Only the Program Key and the Keypad Key cannot be custom programmed.

Each of these 168 locations have been given a unique “Location Token” for custom programming. Location Tokens vary depending on whether you are programming in QWERTY or Dvorak, meaning that Dvorak typists can now program in “native” Dvorak, rather than having to translate key locations from QWERTY. The same Location Token is used, but it refers to a different position on the keyboard. In most cases, the Location Token is simply the basic, unshifted action for that key. However, certain key locations must be defined by Kinesis using a multi-character token. *Note: The prefix “kp-” is added to the token for duplicate keypad layer locations.* Location tokens are static and don’t change based on custom key remaps. See Appendix 13.1 for a map of the Location Tokens for QWERTY and Dvorak.

Electronic key actions defined by “Action Tokens”

The Advantage2 supports all of the basic keyboard actions with which you are familiar (e.g., letters, numbers, editing keys, modifiers, etc.) as well as several actions that you may not be familiar with (e.g., multimedia controls, the Windows Menu, etc.). Each of these actions has been assigned a corresponding “Action Token”. Since most Location Tokens were defined by the underlying action, they are frequently identical to that Action Token. See Appendix 13.1 for a dictionary of the Action Tokens.

Note: Action Tokens are the same for both QWERTY and Dvorak.

Using USB decimal code in lieu of Action Tokens

In many cases the appropriate USB HID decimal code (but not USB hex code) can be substituted in place of the Kinesis-defined Action Token. The USB HID code can be found in a document like the Universal Serial Bus (USB) HID Usage Tables.

Example: Remap Enter key to perform “Numeric keypad Enter” using USB decimal code 88:
[enter]>[88] or [enter]>[088].

Case sensitivity and capitalization

Location and Action Tokens are NOT case sensitive. The keyboard’s firmware will recognize both the upper and lower case version of a token. Capitalizing a token does NOT produce the capital action. For example, the code [q]>[a] and [Q]>[A] both produce a lower case “a”. Capital letters are treated by all USB keyboards as a “shifted” version of the underlying key action. See below.

Shifted actions

It should be noted that with respect to Action Tokens, there are NOT separate tokens for characters/symbols that traditionally appear as “shifted” actions. For example, the token for the 1/! key is simply [1]. There is no token for an exclamation mark since it is simply the shifted action of the 1/! key. Consequently there is no way to obtain a shifted character/symbol via remapping.

If you would like to program the keyboard to directly output a shifted character/symbol or capital letter (i.e., without manually holding Shift or Caps Lock), you will need to create a macro using either via Program Macro Mode or via Direct Editing (see Syntax Examples 6 & 7).

Remaps encoded differently than macros

Macros and remaps are encoded slightly differently but they use the same underlying Location and Action tokens. The keyboard differentiates between macro code and remap code based on the style of bracket around the token. Both the Location and Action Tokens must have the correct bracket type to be read correctly by the firmware.

Remaps use []

Remaps use square brackets and consist of a single Location Token on the left and a single Action Token on the right. This is the opposite from onboard programming where the user first taps the “source” action desired, then taps the “destination” where the action is desired.

Example: [Location Token]>[Action Token]. This example remaps the Tab key to perform Caps Lock. [tab]>[caps].

Macros use { }

Macros use curly brackets (aka “braces”) where the Location Token(s) represent the macro trigger. Macros can be triggered by a single key, as long as that key isn’t associated with one of the default modifier key locations (even if the modifier has been remapped over). Macros can also be triggered by a key-combination: one (or more) modifiers keys plus one non-modifier key. When you define a macro trigger, you are defining that trigger based on the physical location of the trigger key(s), as shown in the Map of Location Token in Appendix 13.1. A macro can consist of a variety of Action Tokens, either in sequence or in combination. Example: {Location Token 1}{Location Token 2}...>{Action Token 1}{Action Token 1}{Action Token 1}.

Accessing the layout files

As described in Section 7.3, to access any of the layout files first enter Power User Mode (progman + shift + esc), and then “mount” the v-drive to your computer (progman + F1). Then open the active folder on the v-drive to view the .txt layout configuration files. Open the layout configuration file of your choice with a plain text editing program. If you do not have access to a plain text editor, you may use a different text editing program (e.g., Microsoft Word) but be sure to select the “plain text” or “simple text” format when saving your changes to layout configuration file. It is a good idea to rename and save a backup of the layout file on your hard drive.

Listed below are commonly-available text editors for different operating systems:

- Windows: Notepad provides simple text only. Microsoft Word and other word processors can be used if you save the file plain text or simple text format.
- Mac OS X: TextEdit is the default editor. Under TextEdit “Preferences” select “plain text” as the format. Normally if you open a plain text file, it will save it in the same format by default.
- Linux: For Ubuntu the default text editor is Gedit, which is similar to Microsoft Notepad.

Important Note: You must save your changes to the layout file (typically using the “File” menu) and then “Eject,” wait for “okay to remove” message, then close to v-drive to implement your changes.

File Naming Conventions

Qwerty.txt and dvorak.txt represent the two default layouts which are accessed using the onboard shortcuts. Hotkey layouts are named with the designated hotkey preceding the layout family, either QWERTY or Dvorak. Examples:

- “a_qwerty.txt” (QWERTY hotkey layout assigned to the hotkey “a”)
- “1_dvorak.txt” (Dvorak hotkey layout assign to hotkey “1”)

Preparing the v-drive for direct editing

If you have a 2MB v-drive and you are planning to directly edit a newly created layout file without having first done any “onboard” remapping to that particular layout, please review Section 9.1 for guidelines on “conditioning” files.

Language requirement for direct editing

Your computer must use the English (US) keyboard layout to edit the layout file. Other language drivers use different codes/positions for certain keys important for programming, such as [] and { }. If you want to use direct programming to make a macro for a language other than U.S. English, it is better to first make the macro using “onboard programming.” Then you can review and edit it as needed with direct editing. However, you will need to translate certain tokens in Appendix 13.1 to get the desired output. For keys that change

between English and your desired language, type that key with both drivers to make yourself a custom language dictionary. Then use the English version of that key in the layout file. If macros are played while a different keyboard language is active than the language in which it was designed, some actions will change.

Layout files are updated only when the v-drive is closed.

Any given layout can be modified by both onboard programming commands and through direct editing. Be cautious about using both on-board programming and direct editing while the v-drive is open. If you use on-board programming while the v-drive is open and/or while the active layout file is open, be aware that on-board programming changes are not usually read from saved layout files until the v-drive is closed.

Note: If you save your edits and re-select that layout using the onboard programming shortcut (e.g. prog + F3 for the qwerty.txt layout), the recently saved edits will be implemented even though the v-drive hasn't been closed.

7.9 Basic Syntax Examples

Below are several examples of the actual syntax used to encode certain remaps and macros. This “code” can be copied and pasted into a layout file and then edited to produce a custom macro.

Remaps

Syntax Example 1: The Q key location will perform the letter “a”.

```
[q]>[a]
```

Syntax Example 2: The Right Windows key location (always the default Win Mode location) will be deactivated using the “null” token.

```
[rwin]>[null]
```

Syntax Example 3: When the keypad layer is active, the A key location will perform the “Volume Down” action.

```
[kp-a]>[vol-]
```

Macros

Longer macros can be tedious to write from scratch so onboard programming is recommended, at least as an initial step. Direct Editing can be a useful tool for creating shorter macros or fine-tuning longer macros. Take advantage of existing macros and examples where possible. *Note: Macros normally play when the trigger key is depressed, without waiting for release.*

Syntax Example 4: Pressing and holding Right Ctrl and the G key location plays the text macro “go”.

```
{rctrl}{g}>{g}{o}
```

Syntax Example 5: When the keypad layer is active, the Escape key location plays text macro “hello”.

```
{kp-escape}>{h}{e}{l}{l}{o}
```

Shifted characters

As shown below in Syntax Examples 6 and 7, the {-shift} represents the negative or downward action of pressing the shift key, while {+shift} represents the positive or upward action of releasing the shift key. Bracketing a token with {-shift} and {+shift} emulates holding down the shift key while typing the bracketed key, and then releasing the shift key to produce the equivalent shifted action of that key.

Syntax Example 6: The Pause key location plays the text macro “Hi Joy!”.

```
{pause}>{-Lshift}{h}{+Lshift}{i}{space}{-Lshift}{j}{+Lshift}{o}{y}{-Lshift}{1}{+Lshift}
```

Syntax Example 7: The F12 key location plays the text macro “1+2=3”.

```
{f12}>{1}{-Rshift}{=}{+Rshift}{2}{=}{3}
```

7.10 Advanced Macro Tools

The Advantage2 supports two advanced macro tools which can be implemented via Direct Editing to enhance macro performance and increase the likelihood obtaining the desired playback results on a particular system: 1) a faster or slower playback speed can be selected which will override the Global Macro Playback speed setting (covered in Section 7.1) and 2) one or more brief delays can be inserted into a macro.

Individual playback speed settings for macros

In Section 7.1 setting the Global Macro Playback Speed is discussed in detail. In general, most macros should be played back at the fastest possible speed to eliminate unnecessary delays. But certain macros may require a slower playback to achieve the optimal results on your computer. If that's the case, its best to lower the playback speed of problematic macro individually to ensure it functions properly. To modify a specific macro's playback speed, simply input the desired speed in braces (see Fig 23 for the nine speeds) before the characters/actions whose speed you wish to modify. Multiple speed modifiers can be included in a single macro.

Syntax Example 8. The optional left foot pedal plays back the text macro "fast slow", where the word "fast" is played at speed9 and the word "slow" is played at the speed1.

```
{lp-tab}>{speed9}{f}{a}{s}{t}{space}{speed1}{s}{l}{o}{w}
```

Adding delays to a macro

Another mechanism for optimizing macro playback is to introduce one or more internal delays between certain critical key actions. The Advantage2 supports two different delays: 125ms and 500ms (milliseconds). These delays can be used separately, or in combination, to create a delay of any length in increments of 125ms. To insert a delay, use curly brackets around the delay time and a "d" in front of the chosen increment: "{d125}" or "{d500}". *Note: Attempting to insert a delay other than 125ms or 500ms will cause an error.*

Syntax Example 9. The Volume Down key location (keypad layer) plays the "Page up" action, delays 500 ms, then plays the "home" action.

```
{vol-}>{pup}{d500}{home}
```

Syntax Example 10. The Hyphen key plays "F1" then delays one second (1000 ms = 500ms +500ms), then plays the "mute" action.

```
{hyphen}>{f1}{d500}{d500}{mute}
```

Incorrect syntax or language

If incorrect syntax or language is used in a layout configuration file, the keyboard will usually resort to the default action for that Location Token. However, in some cases pressing a key that has invalid programming may not produce any key action at all. If problems arise, remaps and macros can be erased manually by direct editing the problematic lines of "code" in the layout configuration file or by reversing any custom programming using the appropriate onboard programming shortcuts, examples below. *Note: If multiple remaps are assigned to the same Key Location, the keyboard will typically output the lowest line of code.*

Restoring a key to its original action

Enter Program Remap Mode (progm + F12) and tap the target key twice— once to set it as the Source action and once more to set it as the Destination key.

Erasing an existing macro

Press Program then F11 to enter Program Macro Mode, then tap the trigger key(s). Instead of recording macro content, simply tap the Program Key to record an "empty" macro" and exit Program Macro Mode.

"Commenting Out" language in a layout file

If you wish to temporarily disable a specific macro or remap in a given layout, it is possible to simply add an

asterisk (*) in front of the appropriate line of code in the .txt file. The asterisk will cause that macro or remap to be bypassed by the keyboard. To reactivate that macro/remap simply delete the asterisk, save the file, and close the v-drive.

Storing notes in a layout file

While it is possible to store notes and other “non-programming” text/language within a layout file, Kinesis does not recommend doing this as it may have unintended consequences. Proceed at your own risk.

Tricks for fixing win-triggered macros

As mentioned in section 6.12, macros that use a Windows key as the only modifier to help trigger a macro may need special optimization to play correctly. If you have trouble getting such a macro to play correctly at the default playback speed (speed3) or if you want it to play back at a faster speed, try one of these tricks using direct editing of the macro.

1. Place “**{d500}{escape}**” at the beginning of your macro contents

Example plays back “hello:” {rwin}{1}>{d500}{escape}{h}{e}{l}{l}{o}

2. Place “**{d500}{-rwin}{+rwin}{escape}**” at the beginning of your macro contents.

Example plays back “hello:” {rwin}{2}>{d500}{-rwin}{+rwin}{escape}{h}{e}{l}{l}{o}

Changes don't take effect immediately

Changes made to a layout file will not take effect until the .txt file is saved to the Active folder, and then the v-drive is closed/unmounted or the layout is re-selected. After “ejecting” the drive, it can be closed either by using the onboard shortcut (Progm + F1) or by re-plugging the keyboard. *Note: To implement layout changes without closing the v-drive, save the layout file and then use the onboard shortcut (e.g. Progm+F3) reload your active layout.*

7.11 Status Report Playback

By default, the Status Report plays at speed 3 which produces optimal results for the vast majority of systems. If desired, the playback speed of the Status Report can be set to a faster or slower speed (1-4), or turned off altogether (0). On some computers (particularly those using KVM switches) the Status Report may be garbled. In most cases a garbled Status Report can be addressed by simply lowering the playback speed.

Customizing Status Report playback speed

To alter the Status Report playback settings, activate Power User Mode, access the v-drive and open the “state.txt” file. Within the state.txt file there is a line of code that dictates the status report playback speed: “status_play_speed=3”.

You may edit the number at the end of the line to adjust your playback speed: 0=Off, 1=Slow, 2=Medium, 3=Normal (default), and 4=Fast. To implement your speed change, you must close the v-drive.

8.0 Firmware Updates (progm + shift + U)

The SmartSet technology in your Advantage2 allows you to update the keyboard's firmware to stay up-to-date with the latest releases from Kinesis. Your Advantage2 keyboard comes from the factory with the most up to date fully-vetted version of the firmware as of its build date but Kinesis may at times release new versions of firmware to improve performance and/or compatibility.

To determine which version of firmware is currently installed on your keyboard, open a text editing screen and run a Status Report (progm + esc). To enquire about newer versions of Advantage2 firmware please check for available updates at kinesis.com/support/advantage2, or submit a ticket to Kinesis Tech Support (see Section 10). From the Advantage2 Resources Page you can download the latest version of firmware and read the Tech Notes to learn about new features and bug fixes. *Note: If you are uncertain of*

the process or the benefits of a firmware update, open a ticket to consult with our tech support team before attempting to perform an update.

Note: Layout files should not be deleted or damaged as a result of a firmware update but Kinesis recommends backing up your layout files in the event a Hard Reset is required after a firmware update. Also, after a successful firmware update, the "update.upd" file will be deleted from the firmware folder. You may wish to keep a copy of the firmware file with its original name in the firmware folder.

To update the firmware, perform the following steps:

1. Obtain the appropriate Advantage2 firmware update (".upd" file) from Kinesis tech support or website.
2. If Power User Mode (PUM) has not been enabled, do so (progM + shift + esc). The LEDs will flash 4x.
3. Open the v-drive (progM + F1) and its "firmware" folder.
4. Copy and paste the firmware update file into the firmware folder.
5. Rename the file "update.upd." *Note: it is advisable to paste a copy with the original name here too.*
6. Optional: Eject and close the v-drive (progM + F1).
7. Initiate Firmware Update with progM + shift + u. The update normally takes 10-12 seconds, during which time the keyboard will be inactive. **IMPORTANT NOTE: DO NOT unplug or type on keyboard until done.**
8. After ~12 seconds, you can tap the Keypad key to test the keyboard. When the keypad LED illuminates, the keyboard is active again.
9. Run a Status Report to confirm the new version of firmware was successfully installed.
10. If keyboard does not wake up after 12-15 seconds, perform a Hard Reset (Right ctrl+F9 while plugging in).

9.0 Keyboard Care & Maintenance

The Advantage2 is hand-assembled in the USA by trained technicians using premium components. It is designed to last for many years with proper care and maintenance.

9.1 Keyboard stops working suddenly

If a layout or settings file has unreadable information or becomes corrupt, the keyboard may become unresponsive. If this happens, there are several user actions that can get your keyboard typing again.

Hard reset

In many cases, a hard reset will fix the problem. This will erase any changes in both QWERTY and dvorak layout files as well as change the settings in state.txt back to defaults. Hold progM + F9 briefly while plugging in the keyboard (if you purchased your keyboard prior to February 2018 and have a 2MB v-drive and haven't updated the firmware, or if you updated your keyboard with version 1.0.170, July 2017, or earlier, a hard reset requires Ctrl + F9 while plugging in).

Rescue command

If a hard reset doesn't work or you want to try to salvage one or both of the layout files, a rescue command (progM + F12 while plugging in) doesn't erase the layout and settings files, but skips reading them during startup. If the rescue command is required, normally you will want to repair or reformat the drive immediately thereafter. The rescue command is enabled in firmware versions 1.0.277 and newer.

9.2 Avoiding corrupt files on the v-drive.

There are various things that users can do that may cause corruption of files, with direct editing of files being the biggest risk. If your firmware is not 1.0.431.us or newer, you will want to update the firmware before doing any direct editing of layout files. First determine what firmware version is installed, and which size v-drive you have by running a "Status report."

With a text editing screen open, press the Program key (progM) plus Esc to generate a status report which indicates the firmware version and the v-drive size in line 2: **Firmware> 1.0.431.us (4MB), 11/14/2017.**

Maintaining a 4MB v-drive

The 4MB v-drives are formatted with a special FAT16 method which is much more resistant to file corruption than the standard Windows file-manager reformat option. Unfortunately 2MB v-drives do not support FAT16. It is very unlikely that a 4MB v-drive will ever need to be reformatted, since Windows “scan and repair” feature will fix virtually any problem that is encountered. To use this, open file manager and the v-drive, right click on the v-drive and select “Properties, Tools, Error Check, and Check.” If a scan and repair is suggested, follow the recommendation.

Conditioning the files on a 2MB v-drive

If you have deleted or pasted in new file, or formatted your 2MB v-drive, you should to “condition” your layout files prior to doing direct editing or using the Advantage2 SmartSet App. Otherwise the files and/or v-drive could become corrupt and require re-formatting. If you have not updated the firmware recently, be sure to install the latest version before doing direct editing or using the SmartSet App.

Because the Advantage2 keyboard was designed to operate in a multi-platform environment, users may occasionally experience a drive error or corrupt configuration file that necessitates “scan & repair” or reformatting of the v-drive. Please be assured that if this becomes necessary, the default configuration files will be regenerated automatically when the keyboard is replugged or the system is rebooted after a v-drive reformat. However, it is wise to always backup the contents of your v-drive on your computer’s hard drive.

Reformatting the 2MB v-drive on a PC

Before reformatting, attempt “Scan and Repair” described above in “Maintaining a 4MB v-drive.” If that is not successful, you will need to reformat your v-drive. On your PC, enable Power User Mode and open the v-

drive (prog + F1). Locate the “Advantage2” removable drive and right click on it, then select the “Format” option from the dropdown menu (Fig 28) to get to the “Format Menu” (Fig 29). **IMPORTANT: CONFIRM THE ADVANTAGE2 V-DRIVE (KINESIS-KB FOR EARLY MODELS) IS CORRECTLY LISTED IN THE HEADER TO AVOID REFORMATTING THE WRONG DRIVE!**

After confirming the Click “Start” and if prompted (Fig 28) about erasing all data, then click “OK.” The reformatting process should not take more than ~15 seconds. Replug the keyboard to regenerate the configuration files. Then condition the drive per the instructions below.

Reformatting the v-drive on a Mac

On a Mac, if your keyboard is not working, not saving layout changes or macros, and/or you can’t open the v-drive, please submit a ticket for technical support (Section 10.0).

Linux reformatting note

With Linux, if possible try to “repair” the drive before reformatting. When reformatting the v-drive in Linux, be sure to provide a new name for the drive.

Conditioning the 2MB v-drive after reformatting

If you plan to use on-board programming exclusively, no special actions are necessary after reformatting the v-drive. However, if you plan to use direct editing or the SmartSet App with your 2MB v-drive, we recommend that you first “condition” the qwerty.txt and dvorak.txt files.

With the v-drive closed, condition qwerty.txt by switching to Mac Mode (prog + F5) and then back to your preferred mode (prog + F6 for PC or prog + F7 for Win). Condition dvorak.txt by loading the file (prog + F4) and then switching to Windows Mode (prog + F7). If you normally use QWERTY, then switch back to

Fig 28. For a PC, right click on ‘Advantage2’ for format

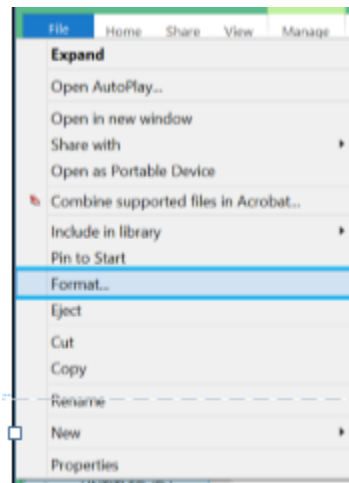
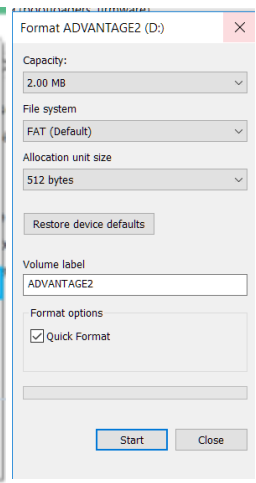


Fig 29. The PC “Format Drive” menu



that with prog + F3. Conditioning causes the keyboard to write to each layout file first, while the v-drive is closed, preventing a potentially corrupt file from being created with direct editing.

Ejecting v-drive after use

All v-drives should be “ejected” like other thumb drives before being closed. Occasionally you may see a warning that scanning and “fixing” the drive are advised. This is most likely if you open the drive and manually edit files, then close the drive without ejecting, and you should perform the brief “scan and fix” process. Normally this does not result in any loss of files or contents from the v-drive.

9.2 Cleaning Precautions

To clean your Advantage2 keyboard, use a vacuum or canned air to remove dust from the keywells. Using a water-moistened cloth to wipe the surface will help keep it looking clean. *Avoid excess moisture!*

9.3 Keycap Removal and Relocation

A keycap removal tool is provided to facilitate changing the four thumb keys when switching between Thumb Key Modes (Windows, PC, Mac). If you wish to move other keycaps, please be aware that moving a keycap to a position that requires a different keycap row style will compromise usability and comfort.

10.0 Technical Support, Repairs, & Returns

For FAQs and troubleshooting tips visit kinesis.com/support/advantage2.

Contacting Kinesis Technical Support

Kinesis offers, to the original purchaser, free technical support from trained agents based in our US headquarters. Kinesis has a commitment to deliver best-in-class customer service and we look forward to helping if you experience any problems with your Advantage2 keyboard or other Kinesis products.

For Kinesis Technical Support, please submit a ticket at kinesis.com/support/contact-a-technician.

Return Merchandise Authorizations (“RMAs”)

For any repair by Kinesis, regardless of warranty coverage, you must first contact Kinesis Technical Support to explain the problem and obtain a Return Merchandise Authorization (“RMA”) number and shipping instructions. Packages sent to Kinesis without an RMA number may be refused. Keyboards will not be repaired without information and instructions from the owner.

Repairs

Products normally should be repaired by qualified personnel only. If you wish to perform your own repairs, contact Kinesis Tech Support for advice. Unauthorized or inexpertly carried-out repairs may jeopardize the safety of the user and may invalidate your warranty.

Packaging and Shipping

In you need to ship a product back to Kinesis, use its original packaging or other suitable packaging that protects the device against impact and shock. You should insure the package with your carrier as Kinesis is not responsible for items until they are received at the Kinesis repair center.

11.0 Accessories

Kinesis offers a number of accessories designed to work with your Advantage2 to increase your comfort and productivity, or let you customize the keyboard for a unique look. Please visit kinesis.com or contact Kinesis Sales (sales@kinesis.com) to learn more.

12.0 Warranty

Kinesis Limited Warranty

Kinesis Corporation (“Kinesis”) warrants to the original retail purchaser that this Kinesis product (“Product”) is free from defects in materials and workmanship and will perform substantially in accordance with the Product documentation for three years from the date of purchase. This Warranty is not transferrable and does not apply to any software which might have been enclosed with the product, which are covered by a Kinesis License Agreement. If Product fails due to accident, abuse, inappropriate use, or normal wear, Kinesis shall have no responsibility under this Limited Warranty.

Purchaser’s Exclusive Remedies

Subject to your retailer’s return policy, during the first THREE (3) years after the date of original purchase, the exclusive remedy for a defect in this Kinesis Product shall be, at Kinesis Corporation’s option, either repair or replacement of the product. If you suspect the Product is not working properly or if you have questions about the performance of the Product, contact Kinesis Technical Support. If you wish to return the Product to Kinesis for any reason, you must obtain from Kinesis or the authorized reseller from whom you purchased, an RMA number and instructions for returning the product. You are responsible for the cost of shipping the product to Kinesis. Within the United States and Canada, Kinesis will ship products repaired or replaced under warranty to you by ground at no charge. Customer will be responsible for all duties and/or taxes on international shipments which must be prepaid. Repair parts and replacement Product will be either reconditioned or new, at Kinesis’ discretion.

Disclaimer of Other Warranties

The warranty and remedies set forth above are exclusive and in lieu of all others, whether oral or written, express or implied. Kinesis specifically disclaims any and all implied warranties, including, without limitation, warranties of merchantability and fitness for a particular purpose. No Kinesis dealer, agent, reseller, or employee is authorized to make any modification, extension, or addition to this warranty. Kinesis does not warrant that the product will meet your requirements, or that operation of the product will be uninterrupted or error-free, or that all errors will be corrected.

Limitation of Liability

Kinesis is not responsible for special, incidental, or consequential damages resulting from any breach of warranty, or under other legal theory, including but not limited to lost profits, downtime, goodwill, damage to or replacement of equipment and/or property nor any costs of recovering, reprogramming, or reproducing any program or data stored in or used with Kinesis products.

13.1 Appendix- Map of Location Tokens & Dictionary of Action Tokens

Fig 30. Location Tokens: QWERTY, top layer

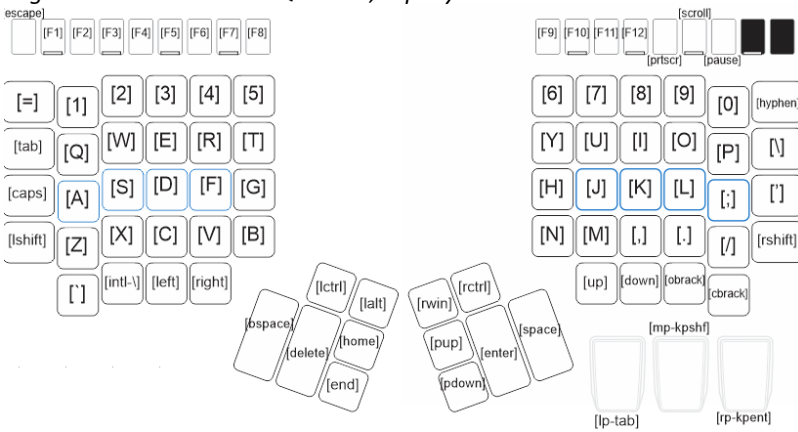


Fig 31. Location Tokens: QWERTY, keypad layer

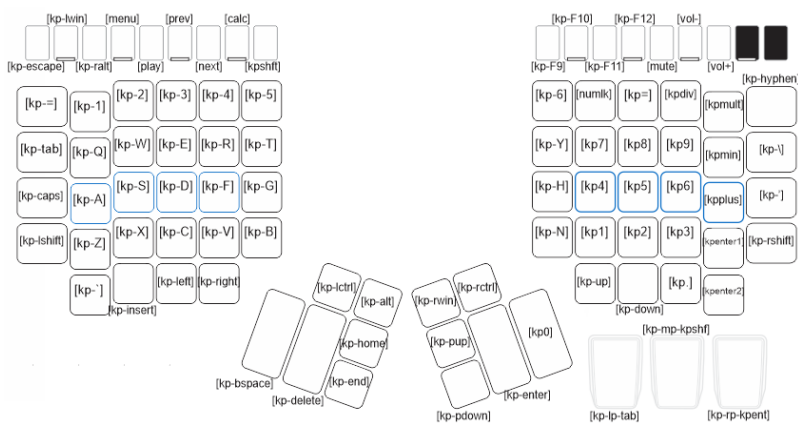


Fig 32. Location Tokens: Dvorak, top layer

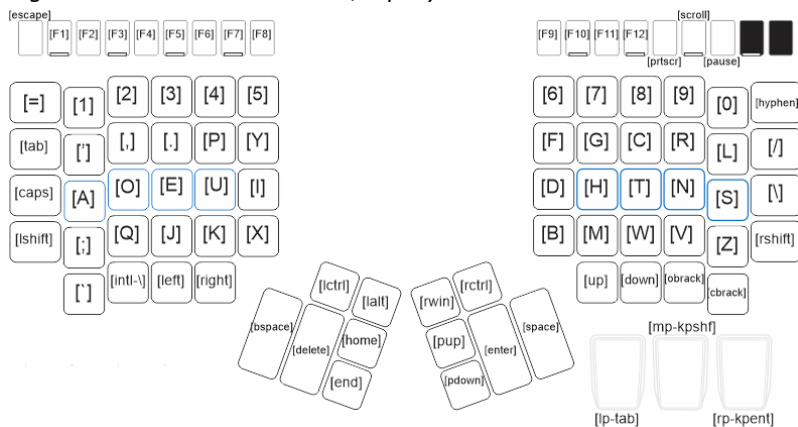
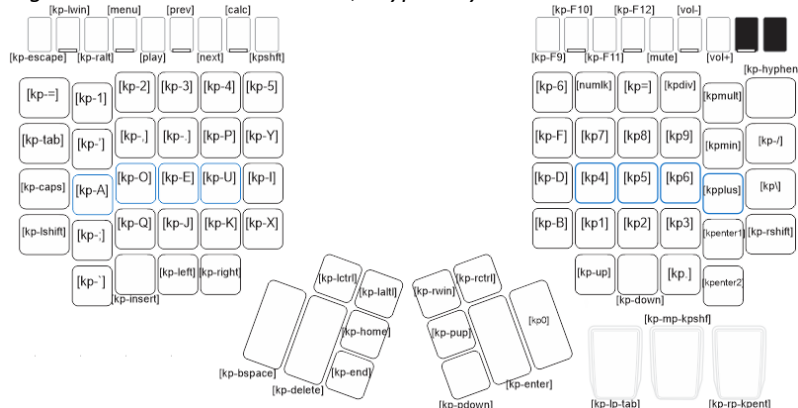


Fig 33. Location Tokens: Dvorak, keypad layer



Key Action	Token	Key Action	Token
F1—F24	F1—F24		
1!	1	8*	8
2@	2	9(9
3#	3	0)	0
4\$	4	~ (Tilde key)	`
5%	5	_ (Hyphen key)	hyphen
6^	6	=+	=
7&	7		
A	A	N	N
B	B	O	O
C	C	P	P
D	D	Q	Q
E	E	R	R
F	F	S	S
G	G	T	T
H	H	U	U
I	I	V	V
J	J	W	W
K	K	X	X
L	L	Y	Y
M	M	Z	Z
\	\	>	.
;	;	/ ?	/
‘ ’	‘	{	obrack
<	,	}	cbrack
Left Shift	lshift	Right Shift	rshift
Left Windows	lwin	Right Windows	rwin
Left Command	lwin	Right Command	rwin
Left Ctrl/Control	lctrl	Right Ctrl/Control	rctrl
Left Alt	lalt	Right Alt	ralt
Next Track	next	Mute	mute
Previous Track	prev	Volume Down	vol-
Play/Pause	play	Volume Up	vol+
Enter	enter	Page Up	pup
Tab	tab	Page Down	pdown
Space	space	Left Arrow	left
Delete	delete	Right Arrow	right
Backspace	bspace	Up Arrow	up
Insert	insert	Down Arrow	down
Home	home	End	end
Escape	escape	Calculator	calc
Print Screen	prtscr	Shutdown ²	shutdn
Scroll Lock	scroll	International Key	intl-\
Caps Lock	caps	Menu/App	menu
Pause	pause	No key action	null
“Toggle” Keypad	kptoggle	“Shift” Keypad ¹	kpshift
Keypad 0	kp0	Num Lock	numlk
Keypad 1	kp1	Keypad .	kp.
Keypad 2	kp2	Keypad = (PC)	kp=
Keypad 3	kp3	Keypad = (Mac)	kp=mac
Keypad 4	kp4	Keypad /	kpdiv
Keypad 5	kp5	Keypad +	kpplus
Keypad 6	kp6	Keypad *	kpmult
Keypad 7	kp7	Keypad -	kpmin
Keypad 8	kp8	Keypad Enter	kpenter1
Keypad 9	kp9		

1-For KPSHift to work properly, you must remap the action token to both layers
 2-Shutdown initiates immediate shutdown protocol on PC (use with caution)

Note: Tokens are NOT case sensitive

13.2 Appendix- History of the Kinesis Family Contoured of Keyboards

Development of the first Kinesis Contoured ergonomic keyboard began in 1991, and involved extensive research and collaboration with experts from the fields of medicine, ergonomics, and engineering. The guiding design principal was to provide the most effective design that would co-optimize comfort and productivity, without requiring users to re-learn how to type. Since its commercial debut in 1992 as the first letter-based ergonomic keyboard in the US, the Kinesis Contoured keyboard design has been widely recognized for providing the ultimate in keyboarding comfort and productivity. The Kinesis Contoured™ design has been imitated by others interested in paying lip-service to ergonomics, but no other keyboard addresses the major repetitive strain injury (“RSI”) risk factors associated with keyboarding like the Advantage2.

Fig 34. Early adjustable working prototype



Fig 35. First prototype used in workplace



Fig 36. Model 100, August 1992



13.3 Appendix- Ergonomic Guidelines

Ergonomics is the science of adapting tools and environments to reflect human capabilities. Ergonomists principles enhance comfort, reduce the risk of injury, and educate people how to safely use technology products. Ergonomic issues involve many aspects of the work environment and as a result no single product can be expected to provide a universal solution.

Your experiences with a Kinesis keyboard will be affected by a number of non-keyboard factors, including your stress level, the chair you sit in, and the desk and other work surfaces in your office. In fact, hand and arm injuries can result from elements of your workstation other than your keyboard.

To enhance the comfort of your work environment, Kinesis has joined with Herman Miller, Inc. to provide guidance for creating an ergonomically appropriate workspace. The following ergonomic guidelines are reprinted with the permission of Herman Miller, Inc.. These guidelines include references to ANSI (American National Standards Institute) standards. They do not constitute research conducted by Kinesis.

Introduction by Herman Miller, Inc.

The proper positioning of the furniture and equipment in your office is dictated by the size and shape of your body. To work comfortably, you must make a series of adjustments to the components around you. And remember, if you experience discomfort while working, consult a health care professional.

Adjusting Your Chair

First adjust your “seat-height”. Seat-height means the distance from the floor to the top of your chair’s seat when you are sitting in your chair. First, sit in your chair in a comfortable, upright position. Adjust your seat height up or down so that your feet rest comfortably flat on the floor and your thighs are approximately parallel to the floor. If your feet dangle slightly and the backs of your thighs press hard on the front of the seat, the chair is probably too high. If your knees are elevated and your thighs don’t touch the front of the seat, the chair is probably too low.

If you like to lean back when working, try it now. If your heels are lifted off the floor, consider lowering your chair. If your heels rise as you push off with your feet to lean back, consider loosening your chair’s tilt tension.

If you like to sit forward, try it now. If you must tuck your feet in or stick them out in front of you, consider raising your chair. If you feel the chair seat gives too much, consider tightening your chair’s tilt tension. When you have adjusted your chair, compare the position of your chair with the standard ANSI ranges.

ANSI-Recommended Seating:

- 1) Seat height should range from 16" to 20.5". This refers to how high the chair seat should be with a person's weight pressing on the cushions.
- 2) Seat depth for chairs with rectangular cushions or chairs made of hard materials should range from 15" to 17". Seat depth refers to the distance from the front edge to the back edge of the seat cushion. Seat depth can be greater if the front edge of the seat is soft or curved.
- 3) Seat width should be at least 18.2" measured across the middle of the seat. Seat width refers to the side-to-side distance across the seat cushion.
- 4) Distance between armrests should be at least 18.2" measured between the inner edges of the armrests.
- 5) The backrest should be at least 12" wide in the lower back area.

Adjusting your work surface

The proper height of the work surface is related to the clearance you have beneath it to accommodate your legs while in a seated position.

- 1) Pull up to the work surface while seated. With your feet flat on the floor, adjust the height of your work surface so that your knees do not bump the edge of the work surface or keyboard support tray (when the tray is in its working position). The tops of your thighs should not touch the underside of the work surface.
- 2) When pulled up to the work surface, your feet or knees should not bump against the back of the work surface or wall supporting the work surface.
- 3) Swivel to grasp something within easy reach on your work surface. You need enough clearance beneath your work surface to move freely. Your knees should not bump against anything under the work surface.

If the height of the work surface causes your shoulders to be raised up or hunched, consider lowering your work surface. If you must hunch over your work surface, consider raising it so that you can work in a comfortable, upright position. Check the height of your work surface against the ANSI recommendations:

- 1) Knee space should measure at least 20" from side to side under the work surface; 24" is preferred.
- 2) The underside of the work surface or keyboard tray should be higher than your knees. If your work surface cannot be raised or lowered, the clearance under the work surface should be at least 26.2".
- 3) There should be at least 12.2" of front-to-back clearance at knee height, measured from underneath the front edge of the work surface back toward the wall supporting the work surface. Taller people will need more clearance.

Adjusting your keyboard

If you are using a keyboard tray or platform, adjust the angle and height of your keyboard so that the front of the keyboard is approximately at the same height as your elbows. Your forearms should be parallel to the floor. Be careful of the following:

- 1) Are you striking the keys on your keyboard too hard? Try to remember to soften your touch.
- 2) Are your shoulders raised or hunched? Relax and lower them. If the armrests of your chair are forcing your shoulders up, consider asking to have the armrests removed. If your work surface is forcing your shoulders up, consider asking to have it lowered.
- 3) Do you keep your hands poised above the keyboard? Relax them; don't allow yourself to keep your hands frozen in one position. Remember mini-breaks.
- 4) Are you leaning against a sharply angled edge? Move back to relieve pressure on your forearms.
- 5) Are you leaning over to reach things in your workstation that could be placed closer? Do you often reach behind your body or above shoulder height to retrieve something that could be moved forward or down? Try to find an arrangement that keeps materials you frequently use within convenient reach (about 20" away for a heavy object).

Finally, listen to your body. If you think you may be more comfortable adopting a different posture or way of working, experiment! And if you are experiencing persistent discomfort or unusual sensations, see a health care professional for advice.

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