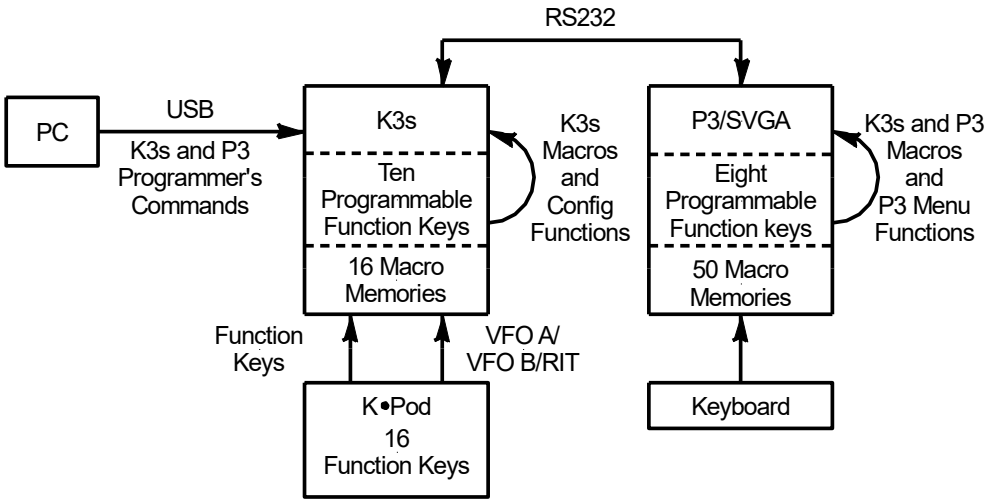
ELECRAFT MACRO PROGRAMMING

PDF Version

Fred Cady – KE7X



K3s, K3, KX3

and

P3/SVGA, PX3 and K•Pod

Elecraft Macro Programming

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Fred has been licensed since 1959, holding an amateur extra class license. His calls over the years have been WA2GHN, KC4USM, ZL3ADY, KE7X/YV5, KE7X/YV7, KE7X/6Y5, 6Y9A, 3D2XA, and C6AKX. He is an avid CW contester and a member of the world-record holding contest group Team Vertical.

http://www.ke7x.com

Revision 1.4

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Preface

The Elecraft line of transceivers, including the K3, K3S, KX3, and KX2, and all accessories like the P3 and PX3 panadapters and the KPA500 amplifier and KAT500 tuner are designed to be updated from time-to-time as new firmware becomes available to provide new features and improve old. Your radio or accessory is connected to a computer through a serial data interface (RS232 or USB) and a utility program, free from Elecraft, is used. By providing this feature Elecraft software engineers programmed the microcontroller to be able to accept a stream of commands from the serial data interface. A sub-set of these *Programmer's Commands* allows an external computer program to directly control the radio.

A happy consequence of this design is that you can use these Programmer's Commands to create customized features which enhance your personal operating experience. Each feature is created by writing a sequence of these commands, called a macro, which is stored in the transceiver (or panadapter). Then, simply by tapping or holding a front panel switch or K•Pod button, you can change the radio's behavior on the fly.

This book will give you the information and background to write macros to accomplish your operating needs. Chapter 1 describes the hardware features of the K3S/K3 and KX3 macro capabilities. (Although the KX2 has a programmable function key and can accept Programmer's Commands, at the time this is written it does not have the ability to store and subsequently execute a macro.) Chapter 2, *The Basics of Programmer's Commands*, shows the Programmer's Commands used in macros for the K3S/K3 and KX3 and P3 and PX3 panadapters. Chapter 3, *Programmable Function Keys and Macros*, helps you understand how to develop your own macros and Chapter 4, *Writing Macros – Some Rules of the Road*, provides guidelines that are critical to writing macros that produce expected and consistent results. Chapter 5, *The Elecraft K•Pod*, describes the optional Elecraft radio control unit – the K•Pod. Chapter 6, *Macro Examples*, provides more than 100 macro examples.

Thanks go to many for support, reading, and suggesting improvements for this project. These include VE3YT Vic, KN1CBR Ed, VA7DZ Eric, and VE3CFK Chet.

Updates and Errata

This edition of *Elecraft Macro Programming* has been published with the understanding that from time-to-time new features and new Programmer's Commands are added to the firmware. As new information about new features becomes available, and as the inevitable errors are discovered, updates and corrections will be posted on the http://www.ke7x.com website. These will be freely available as pdf files on the website.

Chapter 1. Introduction

1.1 Elecraft Programmability

The Elecraft K3S, K3, KX3, KX2, and their major accessories have a rich history of continuous improvement through an active firmware development program that continues long after the introduction of the product. Firmware upgrades are accomplished by receiving a coded file from the Elecraft website and then transferring it to the radios, amplifiers, and tuners using a PC-based or Mac-based software program called a Utility. If you are unfamiliar with this process or do not know how to use the Utility for your radio, please refer to your owner's manuals or the appropriate KE7X Elecraft book listed in Appendix A.

This kind of radio programming, or re-programming, uses the radio's (or panadapter's) serial port to make a connection to an Elecraft Utility program running on your PC or MAC. The Elecraft Utility programs available are shown in Table 1-1, and there are different versions of each utility for Windows computers and for Macs.

A happy consequence of this type of architecture is that each device is able to accept customized commands to set up and control the transceiver or panadapter to your specifications. This is done by sending *Programmer's Commands* to the device.

Table 1-1. Elecraft utility programs.

Elecraft Component	Utility Program
KX3 Transceiver	KX3 Utility
KXPA100 Amplifier	KXPA100 Utility
K3S/K3 Transceiver	K3 Utility
KPA500 Amplifier	KPA Utility
KAT500 Tuner	KAT500 Utility
P3 Panadapter	P3 Utility
K144XV Two Meter Transverter	K144XV Utility
XG3 Signal Source	XG3 Utility
W2 Wattmeter	W2 Utility
W1 Wattmeter	W1 Software
KRC2 band Decoder	KRC2 Config Utility

1.2 How do I get Started?

Elecraft Macro Programming – K3S, K3, KX3 and P3/SVGA, PX3 and K•Pod is designed to help you use the programming capability of Elecraft transceivers and panadapters to control their operations.

This chapter defines basic terms and reviews the programming capabilities of the K3S/K3[1], the KX3 and the KX2[2] and the P3 and PX3 panadapters (Figure 1-6 – Figure 1-10). Each of the transceivers and panadapters has programmable function keys to execute the macros (sequences of Programmer's Commands) that you will learn to write. These keys are reviewed in this chapter. This material is a summary of the various Owners Manuals and if you are comfortable with all this for your transceiver you may skip ahead to Chapter 2, *The Basics of Programmer's Commands*, page 16.

Chapter 2 contains the nitty-gritty details of the Programmer's Commands you will be using to create macros. It summarizes the Programmer's Reference manuals for the transceivers and panadapters. The Programmer's Commands are listed in convenient functionally organized tables and images of the K3S/K3, KX3 and KX2 key tap and hold codes are given. You will refer to these tables and images often as you are writing your macros. Initially you should skim through the chapter (but do try some of the examples) to become familiar with the material for future reference.

Chapter 3, *Programmable Function Keys and Macros*, page 48, is key to learning how to write and use macros to control your transceiver and/or panadapter. Carefully work through the chapter to learn how to use the Utility programs to develop and test macros and to write them to macro storage locations. Examples are given for four different types of macros you can write. Assigning macros to programmable function keys is reviewed.

Chapter 4, *Writing Macros – Some Rules of the Road*, page 72 also gives critical guidelines for writing macros that produce an expected and consistent result.

Chapter 5, *The Elecraft K•Pod*, page 82 shows how to use the K•Pod to expand the function key capabilities of the K3S/K3.

Chapter 6, *Macro Examples*, page 96, gives a variety of K3S/K3, KX3, K•Pod, P3 and PX3 macros.

Appendix B, *Per-Band, Per-Mode Configurations,* page 165, lists transceiver parameters that are stored on a per-band, -mode, -antenna, and –receiver basis. You need to take these into account when writing macros. Appendix C, *Command Parameter Quick Reference Tables*, page 167, summarizes frequently used command parameters and repeats the K3S/K3 and KX3 switch tap and hold numbers.

1.3 Programmer's Commands

Each of the Elecraft transceivers, panadapters, amplifiers, and tuners accept *Programmer's Commands* that are sent from an external device, like a computer, as shown in Figure 2-1. Table 1-2 shows the programmer's manuals for all Elecraft components. We won't list all the

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[1] The K3S and K3 are identical in terms of their macro programming abilities.

[2] Although the KX2 has programmable function keys and can accept Programmer's Commands from an external source, it cannot store macros to be executed like the K3S/K3 and KX3.

commands that are given in all these manuals because you can easily download them from the Elecraft website. We will, however, give many programming examples in the following chapters. Before diving into a programming project, you should download – and read – the Programming Manual for your device.

Table 1-2. Elecraft programmer's manuals.

Elecraft Component	Programmer's Manual
K3, K3S, KX3, KX2	*Elecraft K3S, K3, KX3 and KX2 Programmer's Reference*
KPA500 Amplifier	*Elecraft KPA500 Programmer's Reference*
KAT500 Tuner	*Elecraft KAT500 Automatic Antenna Tuner Serial Command Reference*
P3	*Elecraft P3 Programmer's Reference*
KXPA100	*Elecraft KXPA100 Amplifier Serial Command Reference*
PX3	*Elecraft PX3 Programmer's Reference*

The Programmer's Commands are used to create *macros*, or sequences of commands, that can be used to control the radio. The development and use of macros is the main focus of this book. Programmer's Commands are used also in PC-based applications such as logging programs, such as N1MM+ and WriteLog, radio control programs, such as Ham Radio Deluxe and DXLab, and the Elecraft Utility programs.

Chapter 2 describes the basics of Programmer's Commands for the K3S/K3, KX3, and KX2, and the P3 and PX3 panadapters.

1.4 Macros

A *macro* contains one or more (typically a sequence) of Programmer's Commands and may be up to 120 characters. Macros are created and then stored in a K3S, K3, or KX3 using a Utility program. Although the KX2 also can be controlled externally with Programmer's Commands, at this time it is not capable of storing macros. Macros can be stored also in a P3 (with an optional SVGA adapter) and in a PX3 using an attached keyboard.

Macros are activated by tapping or holding a programmable function key that you assign to the macro. In general, more macros can be stored than can be activated by available function keys, although adding the optional K•Pod to the K3S/K3 allows 16 macros to be accessed. A P3 with the optional SVGA adapter and a PX3 can store and access 50 macros with an attached keyboard.

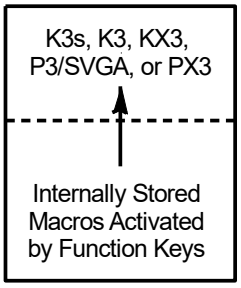

Figure 1-1. Internally stored macros controlling a K-line component.

1.5 Programmable Architectures

Figure 1-6 – Figure 1-10 show the programmable architectures of the K3S, K3, KX3 and KX2 transceivers and the P3/SVGA and PX3 panadapters.

Components

PC: Programs running on your computer, such as the Elecraft Utilities and other radio controlling programs, send Programmer's Commands to the radios and panadapters. In addition to externally controlling the radio, Programmer's Commands can be stored in the macro storage locations to allow you to control the transceiver by simply tapping or holding a button. The radio Utility programs are used to program the macro storage locations in each radio.

K3S, K3, KX3 Macro Memories: Each radio has storage for macros, which are programmed with the radio's Utility and activated by function keys. Macro 1 – Macro 8 can be activated by any of the 10 function keys in the K3S and K3 (M1 – M4 and M1 – M4 and PF1 and PF2), or two function keys, PF1 or PF2, in the KX3. The KX2 does not have macro memories. Its PFn key can only activate menu functions. Macro 1 – Macro 16 in a K3S and K3 can be activated by the K•Pod's 16 function keys F1 – F8 and F1 – F8. Each macro may be 120 characters.

K3S, K3, KX3, and KX2 Programmable Function Keys:[3] Each radio has dedicated programmable function keys as shown in Table 1-3 – Table 1-6. When held, these keys activate a programmed function that can either provide a short cut to a configuration menu item or can activate a stored macro as described above. The K3S and K3 have eight other keys that serve either as a CW or SSB message memory or may be programmed as a function key. The KX2 PFn keys can only act as a shortcut to menu items.

K•Pod: An optional K•Pod can be attached to a K3S or K3. Eight function keys can be held or tapped to activate up to 16 macros stored in macro memory. Holding F1 – F8 activates Macro 1 – Macro 8 and tapping F1 – F8 activates Macro 9 – Macro 16. Note that the K•Pod does not store macros itself; it can only activate macros stored in the K3S/K3.

[3] M1 denotes a key that is tapped and M4 one that is held more than ½ second.

P3 Programmable Function Keys: In a P3 without an SVGA adapter, eight function keys FN1 – FN4 and FN5 – FN8 can activate only P3 menu functions. By adding the SVGA optional board, 50 macro memories may contain P3 and K3S/K3 Programmer's Commands. Each macro may have up to 124 characters. The first eight, Macro 1 – Macro 8, can be activated by the eight P3 function keys. Macro 9 – Macro 49 can be activated from an attached keyboard. See *P3 and PX3 Programmable* Function Keys, page 68.

PX3 programmable Function Keys: Eight function keys can activate PX3 menu functions or the first eight macros. Macro 9 – Macro 49 can be activated from an attached keyboard. Each macro can have up to 124 characters. Additional hardware, i.e. an SVGA adapter, is not needed in the PX3.

P3 and PX3 Keyboard: The attached keyboard is used in the P3/SVGA and PX3 text mode. Macros are programmed and activated with the keyboard.

1.5.1 K3S, K3, and P3

Figure 1-2 – Figure 1-7 show the K3S and K3 programming architectures. There are 10 programmable function keys available in the K3S and K3 (Table 1-3). The M1 – M4 and M1 – M4 keys in the K3S and K3 can be programmed to activate a programmed function or to send a CW or SSB (when the optional DVR is present) message. When an M-key is programmed to activate a programmed function, the CW or SSB message associated with that key will not be played.[4]

Figure 1-2 and Figure 1-3 show the K3S and K3 programmability. There are 16 macro memories (programmed using the K3 Utility, see *Developing and Testing Macros*, page 51) and there are 10 function keys that can be programmed to execute any of the first eight of the 16 available macros.

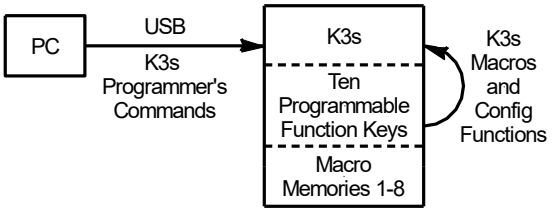

Figure 1-2. K3S programming.

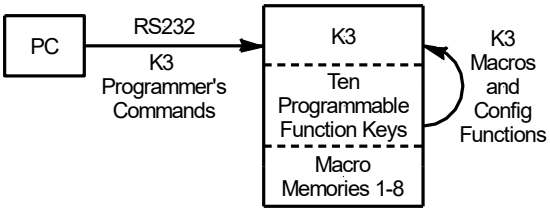

Figure 1-3. K3 programming.

Figure 1-4 and Figure 1-5 show the addition of the Elecraft K•Pod to the K3S and K3. Now, all 16 macro memories are available. The K•Pod has eight function keys that can be tapped or held to activate up to 16 macros stored in the K3S or K3 (Table 1-4). See *The Elecraft K•Pod*, page 82.

[4] The P3/SVGA and PX3 each have storage for 50 messages and 50 macros. See *P3 and PX3 Programmable Function Keys*, page 60 and your P3 and PX3 Owner's manual.

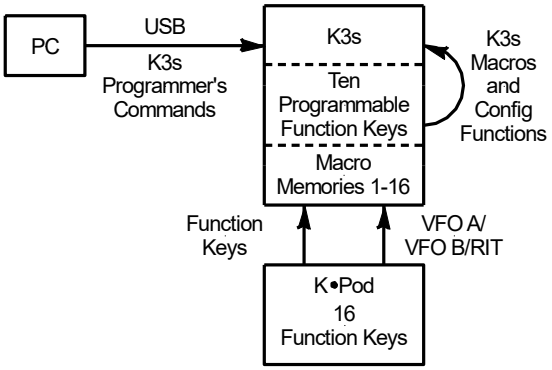

Figure 1-4. K3s and K•Pod programming.

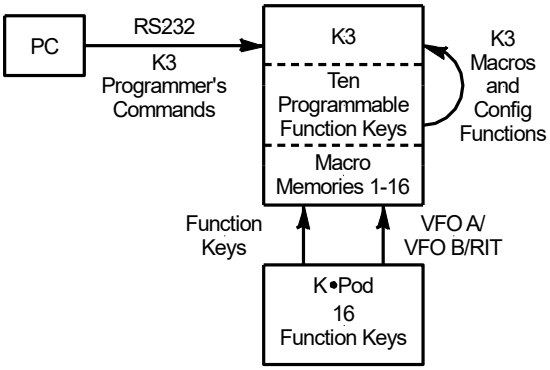

Figure 1-5. K3 and K•Pod programming.

Figure 1-6 shows the addition of the P3 panadapter with the optional SVGA adapter to the K3s and Figure 1-7 to the K3. The P3/SVGA offers storage for 50 macros that are programmed and executed using a keyboard attached to the P3/SVGA.

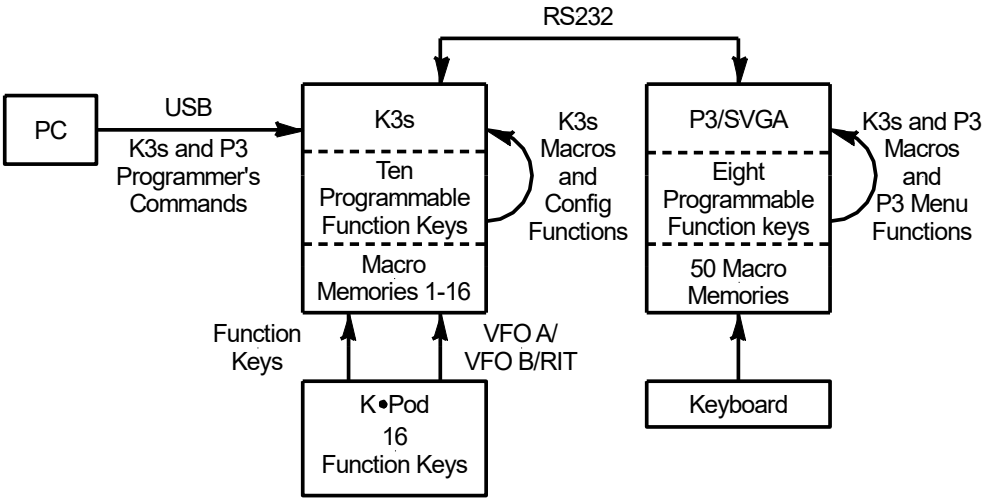

Figure 1-6. K3s, K•Pod, and P3 programming.

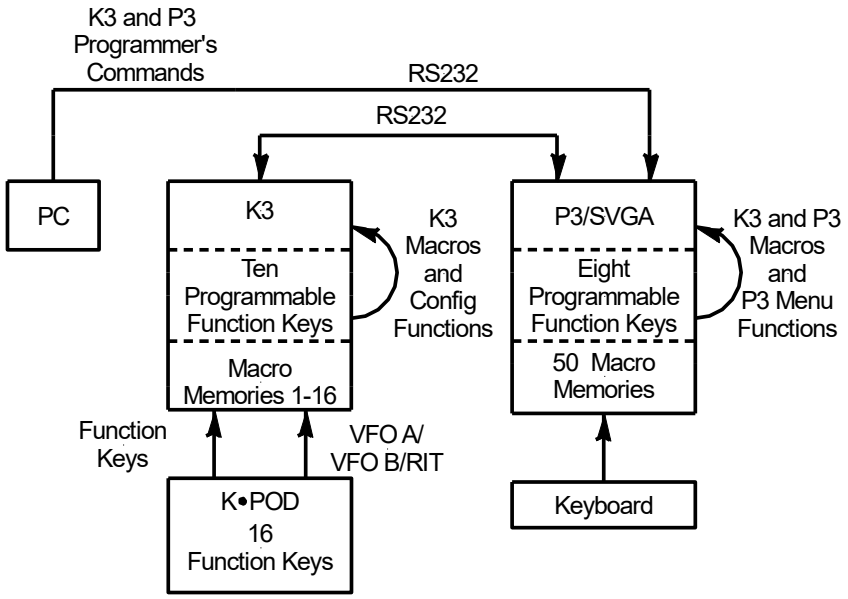

Figure 1-7. K3 and P3 programming.

Table 1-3. K3s and K3 programmable function keys.

K3s/K3 Key	Tap Function	Hold Function
RIT/PF1	RIT toggle on and off	Activate programmed function
XIT/PF2	XIT toggle on and off	Activate programmed function
M1 – M4 M1 – M4	Send stored CW or SSB message OR Activate programmed function	Send repeated stored CW or SSB message OR Activate programmed function

Table 1-4. K•POD programmable function keys.

K•POD	Tap Function	Hold Function
F1 – F8	Activate stored macro 9 – 16	
F1 – F8		Activate stored macro 1 – 8

1.5.2 The KX3, PX3, and KX2

Figure 1-8 shows the KX3 and Figure 1-9 the KX3 and PX3 programming architectures. The KX3 has storage for 8 macros. The KX3's PF1 and PF2 keys are programmable and can activate a shortcut to a menu item or more complex functions (macros). At the time this is written, only PF1 and PF2 in the KX3 can activate macros. A future firmware release may allow more keys to be used for these useful functions.

Adding the PX3 to the KX3 provides storage for an additional 50 macros. These are programmed and executed using a keyboard attached to the KX3.

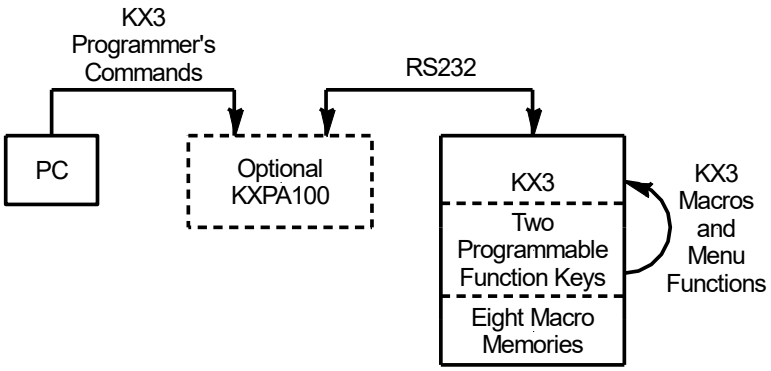

Figure 1-8. KX3 programming.

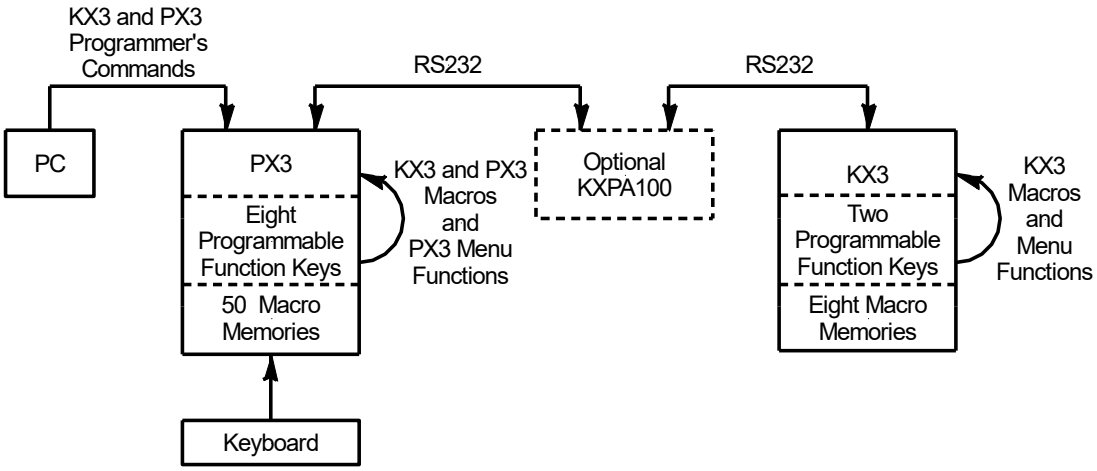

Figure 1-9. KX3 and PX3 programming.

Table 1-5. KX3 programmable function keys.

KX3 Key	Tap Function	Hold Function
RIT/PF1	RIT toggle on and off	Activate programmed function or Macro 1 – Macro 8
XIT/PF2	XIT toggle on and off	Activate programmed function or Macro 1 – Macro 8

The KX2, shown in Figure 1-10, at present does not have any macro storage; however, it can accept Programmer's Commands from an external controller. It has one function key, PFn, which can be used as a shortcut to four menu functions by holding PFn and then tapping 1, 2, 3, or 4.

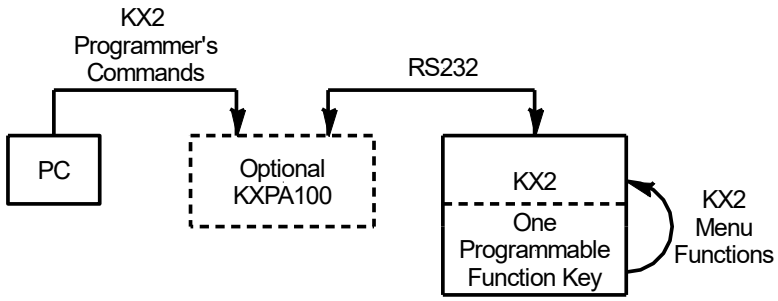

Figure 1-10. KX2 programming.

Table 1-6. KX2 programmable function key.

KX2 Key	Tap Function	Hold Function (followed by 1, 2, 3, or 4)
ATU/PFn	Activate the ATU	Activate programmed menu function

1.5.3 The P3, P3/SVGA[5], and the PX3 Panadapters

The P3 and PX3 each have eight programmable function keys activated by tapping FN1 – FN4 and holding FN5 – FN8. These can be programmed to active P3 and PX3 menu functions. A P3 with an optional SVGA adapter can use these function keys for P3 menu functions or to activate eight of 50 macros stored in the SVGA adapter. The SVGA adapter must be installed and a keyboard is used to program these macros. See *P3 and PX3 Programmable Function Keys*, page 68. The PX3's 50 macro storage capability is built-in. No additional optional hardware, other than a keyboard, is needed.

[5] P3/SVGA = a P3 panadapter with the optional SVGA display board.

The P3 SVGA display option allows an external, high-resolution monitor to display the P3 panadapter display.

The P3/SVGA and the PX3 allow an external keyboard to be attached to use the panadapter as a terminal for data modes. In addition to transmitting and displaying received CW, RTTY and PSK signals, storage for 50, 124-character macros is provided. The keyboard is used to program the 50 macros instead of a Utility[6] like the K3S or KX3. Eight of these can be activated by the programmable function keys. Macro 9 – Macro 50 can be activated from the attached keyboard.

> **Note:** Macros stored in and executed by the P3/SVGA and PX3 can contain both K3/P3 and KX3/PX3 Programmer's Commands. Macros stored in the K3S/K3 or KX3 can execute only K3 or KX3 Programmer's Commands. See *Mixing Transceiver and Panadapter Commands*, page 62.

Table 1-7. P3/SVGA and PX3 function keys.

P3/SVGA and PX3 Key	Function
Tap F1 – F4	Activate programmed menu function or Macro 1 – Macro 8.
Hold F5 – F8	Activate programmed menu function or Macro 1 – Macro 8.
Attached Keyboard	Activate Macro 1 – Macro 50.

[6] The P3/PX3 Utility can be used to test macros. It is not used to save macros in the P3 or PX3.

1.6 Programmable Function Keys

Table 1-8 summarizes the function keys that can serve as short cuts to menu items or can activate macros.

Table 1-8. Programmable function keys. [7]

	Function Keys to Activate Menu Items and Macros						
	K3s, K3	**K•Pod**	**KX3**	**KX2**	**P3**	**P3/SVGA, PX3**	**Keyboard**
Menu Items				**PFn (followed by 1, 2, 3, or 4)**	FN1 – FN4, FN5 – FN8		
Macro 1	PF1, PF2 M1 – M4, M1 – M4	F1	PF1, PF2			FN1 – FN4, FN5 – FN8	Ctrl-, Alt-, Ctrl-Alt-, Or F-Key
Macro 2		F2					
Macro 3		F3					
Macro 4		F4					
Macro 5		F5					
Macro 6		F6					
Macro 7		F7					
Macro 8		F8					
Macro 9		F1					
Macro 10		F2					
Macro 11		F3					
Macro 12		F4					
Macro 13		F5					
Macro 14		F6					
Macro 15		F7					
Macro 16		F8					
Macro 17 – Macro 50							

[7] Fn is a tapped function key, Fn is a held (more than ½ second) function key.

1.6.1 Using a Function Key as a Shortcut to a Menu Item

K3S or K3 Function Keys

To assign a programmable function key or memory key as a shortcut to a menu item, from either the menu or config menu:

1. Tap MENU or hold CONFIG and tune VFO B to the menu item needed.
2. Next, hold PF1, or PF2, or tap M1 – M4, or hold M1 – M4. The VFO B display area will show the key that you have chosen, plus ***SET***.

To use the shortcut to the menu item, simply tap or hold the key you programmed.

Tapping M1 – M4 and holding M1 – M4 is also used for message play if they are not being used as a programmable function key. To cancel a programmable function key assignment and restore its previously stored message,

1. Switch to CW mode.
2. Tap REC.
3. Then tap or hold the buffer you would like to restore (M1 – M4).
4. Then tap REC again.

Once you have done this, the function key is restored to playing messages.

Exercise

Program a tap of M1 to be a shortcut to the ***CONFIG:SPKR+PH*** menu.

> Hold CONFIG and tune VFO B to ***SPKR+PH.*** Tap M1, then tap MENU.
>
> Now, tapping M1 toggles (or alternates) between having the speaker on or off when the phones are plugged in.

Exercise

Whoops! M1 already contains has a CW message. Restore it and then make holding PF1 to be the shortcut to the ***CONFIG:SPKR+PH*** menu.

> Switch to CW mode. Tap REC and then tap M1 and then tap REC again. Hold CONFIG and tune VFO B to ***SPKR+PH.*** Hold PF1, then tap MENU.[8]

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[8] Holding PF1 is widely used for toggling ***SPKR+PH***.

KX3 or KX2 Function Keys

You can assign a KX3 programmable function key as a shortcut to a menu item. There are two KX3 keys (at present) that are activated by holding buttons PF1 and PF2 and one KX2 key – PFn.

1. Hold MENU and tune VFO B to the menu item of interest.
2. Next, hold PF1 or PF2 in the KX3 or PFn and tap 1, 2, 3, or 4 in the KX2 to program that key to the selected menu item. The VFO B display area will show the key that you have chosen, ***PF1***, ***PF2***, or ***PFn*** and the word ***SET***, indicating the function key has been set.

To use the shortcut to the menu item, hold the button you programmed. When a programmable function key is used for a macro function as described in Chapter 3, it cannot be used as a menu shortcut.

You cannot erase a programmable function key but you can write over it with a new function.

Exercise

Program the KX2 PFn 1 to be a shortcut to the ***BKLIGHT*** menu item.

Hold MENU and tune VFO B to ***BKLIGHT.*** Hold PFn and tap 1 to store the shortcut and then tap DISP.

Exercise

What happens when you hold PFn and tap 1 after programming it as a shortcut to the ***BKLIGHT*** menu?

BKLIGHT toggles between ***OFF*** and ***On.***

Exercise

Program the KX3 PF2 to toggle the Dual-Watch Receiver on and off.

Hold MENU and tune VFO B to ***DUAL RX.*** Hold PF2 and then tap DISP.

P3 or PX3 Function Keys

There are eight programmable function keys, FN1 – FN8. FN1 – FN4 are activated by tapping and FN5 – FN8 by holding. Most of the P3 and PX3 Menu functions can be programmed to be activated by a function key. See the *P3 or PX3 Owner's Manual* or a KE7X K3S, K3 or KX-Line book. See Appendix A, *KE7X Elecraft Books.*

1. If the programmable switch labels are not displayed, hold LABELS to display them so you can see the effect of the programming.
2. Tap MENU and rotate SELECT ∅ to the menu function needed.
3. BEFORE tapping SELECT ∅ again, tap or hold the function key FN1 – FN8 to program it.
4. Tap MENU to exit the menu.

Exercise

Program FN3 to set the span to 100 kHz.

1. Tap SPAN and rotate SELECT ∅ to set Span = 100.
2. Tap MENU and rotate SELECT ∅ to the **Span Set** menu.
3. Tap FN3. Tap MENU to exit. FN3 will automatically be assigned the label SPAN 100.

1.7 Key to Symbols and Text Style

The following symbols and text styles denote various functions and controls.

RX ANT	A switch to *tap* to control the function lettered on the switch.
B SET	Holding this switch controls the function lettered in yellow underneath the switch. *Hold* the switch for ½ second to activate. Think of holding as a long press. You do not need to continue to hold the switch while adjusting the function the switch activates.
CONFIG:KPA3	A configuration menu item accessed by holding the CONFIG key.
MENU***:MIC SEL***	A main menu item accessed by tapping the MENU key.
MAIN	A display on the VFO A or VFO B LCD display area.
ANT 1	A display icon on the LCD display area.
SPEED ∅	Front Panel knob that you rotate to set the value.
Execute	This is a programmer's term that indicates a sequence of computer instructions will be performed.

1.8 More Information

Elecraft Website: The Elecraft website (http://www.elecraft.com) contains a wide variety of information about all Elecraft products, including all manuals, schematics, builders' resources, tech notes, and magazine reviews.

A particularly useful site to visit periodically is the *Mods & Notes* link on the Elecraft home page. Modifications and application notes for the K3S family will be found there.

Email List or Reflector: Browse to the Elecraft home page and then click on *email List (Reflector)*. Click on *Elecraft email List Guidelines* and take them to heart if you subscribe and post to the reflector. A great deal of information (along with some noise) flows to subscribers.

Searchable Web Archives: Frequently, your questions have been answered already. If you browse to the *email List (Reflector)* on the Elecraft website, you will have several choices of archive search engines.

KE7X Website: http://www.ke7x.com contains errata sheets for all KE7X Elecraft books and a gold mine of K3S, K3, and KX3 information.

Chapter 2. The Basics of Programmer's Commands

This chapter contains the nitty-gritty details of the Programmer's Commands you will be using to create macros. It is a summary of the Programmer's Reference manuals for the transceivers and panadapters. The Programmer's Commands are listed in convenient functionally organized tables and images of the K3S/K3, KX3 and KX2 key tap and hold codes are given. Appendix C, *Command Parameter Quick Reference Tables,* page 167 repeats these tables for convenient reference. You will refer to these tables often as you are writing your macros. Initially you should at least skim through this chapter to become familiar with the material for future reference.

2.1 Programmer's Command Format

The Programmer's Command format is usually one or more letters or figures preceded by a Command Prefix and terminated by a semi-colon (;). The Command Prefix allows us to use a mixture of different device commands in a single macro. For example, a macro stored and executed by the P3 can contain P3 commands (the prefix is #) and K3S/K3 commands (no prefix).

A macro is a sequence of Programmer's Commands.

Do not put a space after the terminating semi-colon and the next command.

Commands sent to the component are classified as either *sets*, which transfer information to the component, or *gets*, which retrieve information from the component. Get commands cannot be used for macros but are used by PC software such as logger programs.

Commands may be either lower- or upper-case.

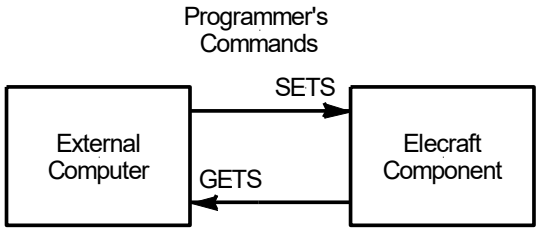

Figure 2-1. External computer controlling an Elecraft component.

2.2 K3S, K3, KX3, and KX2 Command Set Overview

2.2.1 Set Commands

Set commands use two or three characters, optional data fields, and a terminating semi-colon (;). Set commands are sent to the K-Line component to set some value or function within the component.

Set Examples

KS020;	Set the keyer speed to 20 wpm. The **020** is the data field.
DV1;	Turn diversity mode and the Sub receiver on. The data value **1** turns diversity and the Sub receiver on. The data value **0** turns diversity off and leaves the Sub on.
DVS;	Toggles diversity and the Sub receiver on and off.
#DSM0;	Set the display mode on the P3 or PX3 to spectrum only (**1** sets spectrum + waterfall).

2.2.2 VFO B and Sub Receiver Commands

Some commands target VFO B (and the Sub receiver, in the case of the K3S/K3) if (**$**) is added after the command. Examples include **AG$**, **RG$**, **MD$**, **BW$, LK$**. This is indicated in the reference section by a $ in the command title. (Some commands target VFO B explicitly and thus do not need the '$', including **FB**, **UPB**, **DNB**, and **DB**.)

If the VFOs are linked (see **LN**), commands that affect the VFO A frequency also change VFO B. These include **FA**, **UP**, **DN**, **RU**, **RD**, and **RC**.

In Diversity mode, **BW** and **MD** match the VFO B/Sub receiver filter bandwidth and mode settings, respectively, to the Main receiver.

2.2.3 KX3 and KX2 Commands

The KX3 and KX2 accept all K3S/K3 commands although some have no functional effect on the KX3.

2.3 Programmer's Commands Table

Table 2-1 shows Programmer's Commands for the K3S/K3, KX3 and KX2. At the time this is written you cannot store and execute macros in the KX2.

Table 2-2, page 22 gives an alphabetical listing for these Programmer's Commands which is handy to look up commands when you are trying to understand somebody else's macro design.

Table 2-1. K3s/K3 and KX3 Programmer's Command set used in macros.

Description	Name	Use in macros
Antenna Control		
Main antenna selection.	AN	**ANn;** n=**1** for antenna 1, **2** for antenna 2.
Receive Antenna	AR	**ARn; 0**=off, **1**=on.
Audio Control		
Main and Sub audio gain.	AG, AG$	**AGnnn; AG$nnn;** where nnn = **000 – 255.**
CW APF on/off.	AP	**APn; 0**=off, **1**=on; only if ***CONFIG:DUAL PB*** = ***APF***.
Mic Gain.	MG	**MGxxx;** where xxx = **000 – 060**.
Monitor level for CW, SSB, or DATA.	ML	**MLxxx;** where xxx = **000 – 060**.
Noise blanker on/off.	NB, NB$	**NBn;** Main noise blanker; **NB$n;** Sub noise blanker; n = **0** (off), **1** (on).
DSP and IF noise blanker level	NL, NL$	See *Noise Blanker*, page 41
Preamp control.	PA, PA$	**PAn;** and **PA$n;** set the Main and Sub receiver preamps. n = **0** (off), **1** (preamp 1 on), **2** (preamp2 on).
Main and Sub receiver attenuator control	RA, RA$	**RAnn;** or **RA$nn;** where nn = **00** (off) or **01** (on). See *Receive Attenuator*, page 41.
Main and Sub receiver RF gain setting.	RG, RG$	**RGnnn;** or **RG$nnn;** where nnn = **000** – **250**. For a KX3, **250** = -0 dB, **190** = -60 dB.
Squelch level.	SQ, SQ$	**SQnnn;** or **SQ$nnn;** where nnn = **000** – **029**. See *Squelch Level*, page 41.
Display Controls		
VFO B display write. VFO B display mode.	DB	**DBn;** where n is an ASCII character sent to VFO B. **DBnn;** where nn is the display mode. See *VFO B Display Write and Mode Commands*, page 27.
Filtering Controls		
CW APF on/off.	AP	**APn; 0**=off, **1**=on; only if ***CONFIG:DUAL PB*** = ***APF***.
Set filter bandwidth.	BW, BW$	**BWxxxx; BW$xxxx;** xxxx is **0** – **9999** bandwidth in 10 Hz steps. See Table 2-5, page 27.
IF shift.	IS	**IS*nnnn;** where * is a space and nnnn is the AF center frequency in Hz. **IS 9999;** centers the VFO A passband (does not center VFO B passband unless in diversity mode).

Noise blanker on/off.	NB, NB$	**NBn;** Main noise blanker; **NB$n** Sub noise blanker; n = **0** (off), **1** (on).
DSP and ID noise blanker level	NL, NL$	See *Noise Blanker*, page 41.
Frequency and VFO Controls		
Set VFO A and VFO B band.	BN, BN$	**BNnn; BN$nn;** See Table 2-4, page 27. (At the time this is written, BN$ has not been implemented.)
VFO A and VFO B move down	DN, DNB	**DNn; DNBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
VFO A frequency.	FA	**FAggmmmkkkhhh; FBggmmmkkkhhh;** where gg is gigahertz, mmm is MHz, kkk kHz, hhh is Hz. Example: **FA00014160000;** sets VFO A to 14.160 kHz.
VFO B frequency.	FB	
Cancel split mode.	FR	**FR0;** cancels split mode. Not allowed when transmitting.
Transmit VFO select/ activate split mode.	FT	**FTn;** where **0**=VFO A, **1**=VFO B. **FT1;** activates split. Not allowed when transmitting.
VFO A or VFO B lock.	LK, LK$	**LKn;** lock VFO A. **LK$n;** lock VFO B; n = **0** unlock, **1** lock.
Link VFO A and VFO B.	LN	**LN0;** unlink VFOs. **LN1;** link VFOs.
Memory channel.	MC	**MCnnn;** where nnn is **000** – **099**. See *Memory Channel*, page 31.
RIT/XIT clear.	RC	**RC;** set RIT and XIT to zero.
RIT down.	RD	**RD;** moves RIT and XIT offset down one step, depending on the ***VFO FST*** setting.
Absolute RIT/XIT offset.	RO	**ROsnnnn;** where s is **+** or **-,** nnnn = **0000** – **9999** Hz.
RIT on/off.	RT	**RTn;** where n = **0** (off) or **1** (on).
RIT up.	RU	**RU;** moves RIT and XIT offset up one step, depending on the ***VFO FST*** setting.
VFO A and VFO B move up.	UP, UPB	**UPn; UPBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
XIT on/off.	XT	**XTn;** where n = **0** (off) or **1** (on).
Keys and Menu Function Controls		
Move Menu entry/Parameter Down	DN, DNB	When in a MAIN or CONFIG menu (K3s/K3) or MAIN menu (KX3/KX2), **DN;** moves the menu parameter down and **DNB;** the menu entry down. See *UP and DN Commands*, page 42.
Select a menu entry.	MN	**MNnnn;** See *Menu Selection*, page 33.

Menu parameter set.	MP	**MPnnn;** See *Menu Selection*, page 33.
Switch tap and hold emulation.	SWT, SWH	**SWTnn;** tap function. **SWHnn;** hold function. See *Switch Tap and Hold Emulation*, page 28.
VFO A and VFO B move up.	UP, UPB	**UPn; UPBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
K•Pod Controls		
Control switchable outputs.	KPOUT	**KPOUTnON; KPOUTnOFF;** n = **1 – 3.** See *The Elecraft K•Pod*, page 82.
Control LEDs.	KPLED	**KPLEDnON; KPLEDnOFF;** n = **1 – 4** or **R** for D1 – D3 to show the state of the rocker switch.
Memory Control		
Memory channel.	MC	**MCnnn;** where nnn is **000** – **099**. See *Memory Channel*, page 31.
Miscellaneous Controls		
Main antenna selection.	AN	**ANn;** n=**1** for antenna 1, **2** for antenna 2.
Baud rate set.	BR	**BRn;** n=**0** (4800), **1** (9600), **2** (19200), **3** (38400).
Delay	DE	**DEnnn;** where nnn is **001 – 255** giving the time delay in 10 ms increments. See *Generating a Delay*, page 43.
Keyer speed.	KS	**KSnnn;** where nnn = **008** to **050** wpm.
Text to terminal.	TT	**TTn;** where n = **1** to enable decoded ASCII text to be routed to a PC; n = **0** disables this.
Mode Controls		
Data submode.	DT	When in DATA mode, **DTn;** sets the data submode. See *Operating Mode*, page 32. Not allowed when transmitting.
Diversity mode in K3s/K3.	DV	**DVn;** where n=**0** (diversity off) and **1** (diversity on). **DV1;** turns Sub and diversity on. **DV0;** turns diversity off and leaves Sub on. **DVS;** toggles diversity and Sub on and off; **SB0;** turns the Sub receiver and diversity off.
ESSB mode.	ES	**ESn;** where n=**0** (ESSB off) and **1** (ESSB on).
VFO A and VFO B mode	MD, MD$	**MDn;** or **MD$n;** where n=**1** – **9**. See *Operating Mode*, page 32.
Receiver Controls		
Main and Sub audio gain.	AG, AG$	**AGnnn; AG$nnn;** where nnn = **000** – **255**.
Main antenna selection.	AN	**ANn;** n=**1** for antenna 1, **2** for antenna 2.
CW APF on/off.	AP	**APn; 0**=off, **1**=on; only if ***CONFIG:DUAL PB*** = ***APF***.
Cancel split mode.	FR	**FR0;** cancels split mode. **FT1;** activates split.

		Not allowed when transmitting.
AGC time constant.	GT	**GT002;** is fast, **GT004;** is slow AGC.
IF shift.	IS	**IS*nnnn;** where * is a space and nnnn is the AF center frequency in Hz. **IS 9999;** centers the VFO A passband (does not center VFO B passband unless in diversity mode).
Memory channel.	MC	**MCnnn;** where nnn is **000** – **099**. See *Memory Channel*, page 31.
Monitor level for CW, SSB, or DATA.	ML	**MLxxx;** where xxx = **000** – **060**.
Noise blanker on/off.	NB, NB$	**NBn;** Main noise blanker; **NB$n** Sub noise blanker; n = **0** (off), **1** (on).
DSP and ID noise blanker level	NL, NL$	See *Noise Blanker*, page 41.
Preamp control.	PA, PA$	**PAn;** and **PA$n;** set the Main and Sub receiver preamps; n = **0** (off), **1** (preamp 1 on), **2** (preamp2 on).
Main and Sub receiver attenuator control	RA, RA$	**RAnn;** or **RA$nn;** where nn = **00** (off) or **01** (on). See *Receive Attenuator*, page 41.
Main and Sub receiver RF gain setting.	RG, RG$	**RGnnn;** or **RG$nnn;** where nnn = **000** – **250**. For a KX3, **250** = -0 dB, **190** = -60 dB.
Set to receive mode.	RX	**RX;** Terminates transmit in all modes.
Sub receiver or dual watch (KX3) on/off.	SB	**SBn;** where n = **0** (off) or **1** (on). **SB0;** turns the Sub receiver and diversity off (K3).
Squelch level.	SQ, SQ$	**SQnnn;** or **SQ$nnn;** where nnn = **000** – **029**. See *Squelch Level*, page 41.
RIT/XIT Controls		
RIT/XIT clear.	RC	**RC;** set RIT and XIT to zero.
RIT down.	RD	**RD;** moves RIT and XIT offset down one step, depending on the ***VFO FST*** setting.
Absolute RIT/XIT offset.	RO	**ROsnnnn;** where s is **+** or **-,** nnnn = **0000** – **9999** Hz.
RIT on/off.	RT	**RTn;** where n = **0** (off) or **1** (on).
RIT up.	RU	**RU;** moves RIT and XIT offset up one step, depending on the ***VFO FST*** setting.
XIT on/off.	XT	**XTn;** where n = **0** (off) or **1** (on).
Transmitter Controls		
Main antenna selection.	AN	**ANn;** n=**1** for antenna 1, **2** for antenna 2.
Speech compression.	CP	**CPxxx;** xxx = **000** – **040** speech compression level.
Cancel split mode.	FR	**FR0;** cancels split mode. Not allowed when transmitting.

Transmit VFO select.	FT	**FTn;** where **0**=VFO A, **1**=VFO B. **FT1;** activates split. Not allowed when transmitting.
Keyer speed.	KS	**KSnnn;** where nnn = **008** to **050** wpm.
CW or CW-to-data keying from text.	KY	**KY*[text];** where ***** is normally a space and [text] is **0** to **24** characters. See *KY Command*, page 30.
Mic Gain.	MG	**MGxxx;** where xxx = **000** – **060**.
Output power level.	PC	**PCnnn;** where nnn = **000** – **012** or **000** – **110**.
Power on/off.	PS	See *Power On/Off Control*, page 41.
Transmit equalization.	TE	**TEabcdefgh;** where a – h are 3-digit character values each with a range of **-16** to **+16**.
Enter transmit mode.	TX	**TX;** Initiate transmit in all modes.
VOX on/off	VX	**VXn;** where **0**=off, **1**=on.

Table 2-2 repeats Programmer's Commands for the K3s/K3 and KX3 alphabetically. At the time this is written, you cannot store and execute macros in the KX2. Table 2-2 is repeated in Appendix C, page 167 for quick reference.

Table 2-2. K3s/K3 and KX3 programmer's command set used in macros.

Description	Name	Use in macros
Main and Sub audio gain.	AG, AG$	**AGnnn; AG$nnn;** where nnn = **000 – 255.**
Main antenna selection.	AN	**ANn;** n=**1** for antenna 1, **2** for antenna 2.
CW APF on/off.	AP	**APn; 0**=off, **1**=on; only if ***CONFIG:DUAL PB*** = ***APF***.
Receive Antenna	AR	**ARn; 0**=off, **1**=on.
Set VFO A and VFO B band.	BN, BN$	**BNnn; BN$nn;** See Table 2-4, page 27. (At the time this is written, BN$ has not been implemented.)
Baud rate set.	BR	**BRn;** n=**0** (4800), **1** (9600), **2** (19200), **3** (38400).
Set filter bandwidth.	BW, BW$	**BWxxxx; BW$xxxx;** xxxx is **0** – **9999** bandwidth in 10 Hz steps. See Table 2-5, page 27.
Speech compression.	CP	**CPxxx;** xxx = **000** – **040** speech compression level.

VFO B display write. VFO B display mode.	DB	**DBn;** where n is an ASCII character sent to VFO B. **DBnn;** where nn is the display mode. See *VFO B Display Write and Mode Commands*, page 27.
Delay	DE	**DEnnn;** where nnn is **001 – 255** giving the time delay in 10 ms increments. See *Generating a Delay*, page 43.
VFO A and VFO B move down	DN, DNB	**DNn; DNBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
Move Menu entry/Parameter Down	DN, DNB	When in a MAIN or CONFIG menu (K3s/K3) or MAIN menu (KX3/KX2), **DN;** moves the menu parameter down and **DNB;** the menu entry down. See *UP and DN Commands*, page 42.
Data submode.	DT	When in DATA mode, **DTn;** sets the data submode. See *Operating Mode*, page 32. Not allowed when transmitting.
Diversity mode in K3s/K3.	DV	**DVn;** where n=**0** (diversity off) and **1** (diversity on). **DV1;** turns Sub and diversity on. **DV0;** turns diversity off and leaves Sub on. **DVS;** toggles diversity and SUB on and off. **SB0;** turns the Sub receiver and diversity off.
ESSB mode.	ES	**ESn;** where n=**0** (ESSB off) and **1** (ESSB on).
VFO A frequency.	FA	**FAggmmmkkkhhh; FBggmmmkkkhhh;** where gg is gigahertz, mmm is MHz, kkk kHz, hhh is Hz. Example: **FA00014160000;** sets VFO A to 14.160 kHz.
Cancel split mode.	FR	**FR0;** cancels split mode. Not allowed when transmitting.
Transmit VFO select/ activate split mode.	FT	**FTn;** where **0**=VFO A, **1**=VFO B. **FT1;** activates split. Not allowed when transmitting.
AGC time constant.	GT	**GT002;** is fast, **GT004;** is slow AGC.
IF shift.	IS	**IS*nnnn;** where ***** is a space and nnnn is the AF center frequency in Hz. **IS 9999;** centers the VFO A passband (does not center VFO B passband unless in diversity mode).
Control LEDs.	KPLED	**KPLEDnON; KPLEDnOFF;** n = **1 – 4** or **R** for D1 – D3 to show the state of the rocker switch.
Control switchable outputs.	KPOUT	**KPOUTnON; KPOUTnOFF;** n = **1 – 3.** See *The Elecraft K•Pod*, page 82.
Keyer speed.	KS	**KSnnn;** where nnn = **008** to **050** wpm.

CW or CW-to-data keying from text.	KY	**KY*[text];** where * is normally a space and [text] is **0** to **24** characters. See *KY Command*, page 30.
VFO A or VFO B lock.	LK, LK$	**LKn;** lock VFO A. **LK$n;** lock VFO B; n = **0** unlock, **1** lock.
Link VFO A and VFO B.	LN	**LN0;** unlink VFOs. **LN1;** link VFOs.
Memory channel.	MC	**MCnnn;** where nnn is **000** – **099**. See *Memory Channel*, page 31.
VFO A and VFO B mode	MD, MD$	**MDn;** or **MD$n;** where n=**1** – **9**. See *Operating Mode*, page 32.
Mic Gain.	MG	**MGxxx;** where xxx = **000** – **060**.
Monitor level for CW, SSB, or DATA.	ML	**MLxxx;** where xxx = **000 – 060**.
Select a menu entry.	MN	**MNnnn;** See *Menu Selection*, page 33.
Menu parameter set.	MP	**MPnnn;** See *Menu Selection*, page 33.
Noise blanker on/off.	NB, NB$	**NBn;** Main noise blanker; **NB$n** Sub noise blanker; n = **0** (off), **1** (on).
DSP and IF noise blanker level	NL, NL$	See *Noise Blanker*, page 41
Preamp control.	PA, PA$	**PAn;** and **PA$n;** set the Main and Sub receiver preamps; n = **0** (off), **1** (preamp 1 on), **2** (preamp2 on).
Output power level.	PC	**PCnnn;** where nnn = **000** – **012** or **000** – **110**.
Power on/off.	PS	See *Power On/Off Control*, page 41.
Main and Sub receiver attenuator control	RA, RA$	**RAnn;** or **RA$nn;** where nn = **00** (off) or **01** (on). See *Receive Attenuator*, page 41.
RIT/XIT clear.	RC	**RC;** set RIT and XIT to zero.
RIT down.	RD	**RD;** moves RIT and XIT offset down one step, depending on the ***VFO FST*** setting.
Main and Sub receiver RF gain setting.	RG, RG$	**RGnnn;** or **RG$nnn;** where nnn = **000** – **250**. For a KX3, **250** = -0 dB, **190** = -60 dB.
RIT on/off.	RT	**RTn;** where n = **0** (off) or **1** (on).
RIT up.	RU	**RU;** moves RIT and XIT offset up one step, depending on the ***VFO FST*** setting.
Set to receive mode.	RX	**RX;** Terminates transmit in all modes.
Sub receiver or dual watch (KX3) on/off.	SB	**SBn;** where n = **0** (off) or **1** (on).
Squelch level.	SQ, SQ$	**SQnnn;** or **SQ$nnn;** where nnn = **000** – **029**. See *Squelch Level*, page 41.
Switch tap and hold emulation.	SWT, SWH	**SWTnn;** tap function. **SWHnn;** hold function. See *Switch Tap and Hold Emulation*, page 28.

Transmit equalization.	TE	**TEabcdefgh;** where a – h are 3-digit character values each with a range of **-16** to **+16**.
Text to terminal.	TT	**TTn;** where n = **1** to enable decoded ASCII text to be routed to a PC; n = **0** disables this.
Enter transmit mode.	TX	**TX;** Initiate transmit in all modes.
VFO A and VFO B move up.	UP, UPB	**UPn; UPBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
VOX on/off	VX	**VXn;** where **0**=off, **1**=on.
XIT on/off.	XT	**XTn;** where n = **0** (off) or **1** (on).
Add new Programmer's Commands below when they become available.		

2.3.1 Get Commands

Get commands request information from the K-Line component, and they often follow a Set in order to verify that the set operation has been executed.[9] A Get command is identical to the corresponding Set command, but with no data. The data format of the response is usually the same as the Set command's format.

If a Get command is encountered in a macro, the response is sent to any device attached to the serial or USB port just as if a computer had requested it. The **IF;** command, which gets general transceiver information including VFO A and B frequencies, is used by SteppIR antenna controllers to tune the antenna.

Get commands are useful only in external application programs that can take actions based on the return of the command. We won't be using get commands in macros because macro processing does not have a way to interpret information that is returned. Get commands are used widely in external PC-based control programs.

[9] The lack of this vital synchronization mechanism will plague us as we start to write complex macros. We discuss this further in *Writing Macros – Some Rules of the Road*, page 52.

Get Examples

KS; Get the current keyer speed. The K3S, K3 or KX3 responds with **KS020;.**

DV; Get the current diversity mode. The K3S or K3 returns **DV0;** or **DV1;.**

#DSM; Get the current P3 display mode. The P3 or PX3 returns **DSM0;** or **DSM1;.**

Table 2-3. Get commands are normally not used in macros.

Description	Name	Information[10]
ATU network values.	AK	AKaabbcc;
Bargraph read.	BG	BGnnx;
CW sidetone pitch.	CW	CWxx;
I.F. center frequency.	FI	Finnnn;
Icons and status.	IC	ICabcde;
Transceiver ID.	ID	IDnnnn;
Transceiver information.	IF	IF[f]*****+yyyyrx*00tmvspbd1*;
Option module query.	OM	OM [10]
Actual power output.	PO	POnnn;
Firmware revision.	RV	RVxNN.NN;
QSK delay.	SD	SDnnnn;
S-meter read.	SM	SMnnnn;
High resolution S-meter read.	SMH	SMHnnn;
Text count.	TB	TBtrrs;
Transmit query.	TQ	TQn;
VOX state.	VX	VXn;
XFIL number.	XF	XFn;

[10] See the *Elecraft K3S/K3/KX3/KX2 Programmer's Reference* for operation details.

Table 2-4. Band numbers.[11]

BNnn;	Band	BNnn;	Band	BNnn;	Band	BNnn;	Band	BNnn;	Band
BN00;	160 m	BN05;	20 m	BN10;	6 m	BN15;	Reserved	BN20;	Xvtr #5
BN01;	80 m	BN06;	17 m	BN11;	Reserved	BN16;	Xvtr #1	BN21;	Xvtr #6
BN02;	60 m	BN07;	15 m	BN12;	Reserved	BN17;	Xvtr #2	BN22;	Xvtr #7
BN03;	40 m	BN08;	12 m	BN13;	Reserved	BN18;	Xvtr #3	BN23;	Xvtr #8
BN04;	30 m	BN09;	10 m	BN14;	Reserved	BN19;	Xvtr #4	BN24;	Xvtr #9

Table 2-5. Set filter bandwidth parameter.[12]

Filter Bandwidth	BWxxxx;
Hz	xxxx
50	0005
100	0010
200	0020
250	0025
400	0040
1 kHz	0100
1.8 kHz	0180
2.2 kHz	0220

2.3.2 VFO B Display Write and Mode Commands

There are two SET formats with different functions – writing text characters to the display and setting the display mode.

DBn; where n is an ASCII character to send to VFO B, entering at the right end of the display and scrolling left as additional characters are entered. VFO B displays only uppercase alphanumeric characters.

DBnn; where nn is one of the available VFO B alternate display modes. See Table 2-6.

[11] See also Table C-3, page 151.

[12] See also Table C-4, page 151.

Table 2-6. VFO B display modes.[13]

DBnn;	K3S/K3	KX3	KX2
DB00;	Normal	Normal	Normal
DB01;	Time	Time	Time
DB02;	Date	Supply voltage	Supply or battery voltage
DB03;	RIT/XIT offset	Battery voltage	N/A
DB04;	Supply voltage	Supply current	Supply current
DB05;	Supply current	PA temperature PA.I = KX3 PA.X = KXPA100	PA temperature PA.I = KX2 PA.X = KXPA100
DB06;	PA Heatsink temperature	OSC temperature	N/A
DB07;	Front panel temperature	AFV	AFV
DB08;	PLL1 voltage[14]	dBV	dBV
DB09;	PLL2 voltage[14]		Amp-Hours
DB10;	AFV[14]		
DB11;	dBV[14]		

Exercise

Send the text “HELP” to the VFO B display.

DBH;DBE;DBL;DBP;

2.3.3 Switch Tap and Hold Emulation

Many of the macros used to control the radio simply emulate a sequence of physical switch taps and holds.

The switch tap command is **SWTnn;** and switch hold is **SWHnn**; where **nn** is determined from Figure 2-2 for the K3S/K3, Figure 2-3 for the KX3 and Figure 2-4 for the KX2. Figure 2-2 and Figure 2-3 are repeated in Appendix C, page 177 for quick reference.

Some switch tap and hold functions have associated Programmer’s Commands that can accomplish the tap and hold function. For example **SWH13;** in the K3S/K3 and **SWH25;** in the KX3 toggle[15] split mode operation. If you had a macro in which you wanted to activate split and

[13] See also Table C-5, page 152.

[14] ***CONFIG:TECH MODE*** must be ***ON***.

[15] Each time you hold the switch, split turns off if it is on and on if it is off.

the radio was already in split mode, executing the macro would turn split off. A better solution is to use the **FT1;** command to set VFO B to be the transmit VFO and turn split on. Then you would use **FR0;** to turn split off in another macro.

Figure 2-2. K3s and K3 switch codes.[16]

Figure 2-3. KX3 switch codes.[17]

[16] See also Figure C-1, page 155.

[17] See also Figure C-2, page 103.

Figure 2-4. KX2 switch codes.

K3S/K3 Switch Tap and Hold Examples

SWT13; Tap the A>B switch to equalize VFO B to VFO A.

SWT13;SWT13; Double tap the A>B switch to transfer all VFO A to VFO B.

SWH13; Hold the SPLIT switch to enter split mode.

2.3.4 KY Command

The KY command is used to key the radio and send a message in CW or DATA mode. The format is **KY*[text];** where * is normally a blank and **[text]** is 0 to 24 characters. If * is a **W** (for "wait"), processing of any following host commands will be delayed until the current message has been sent. This is useful when a **KY** command is followed by other commands that may have side-effects, e.g., **KS** (keyer speed).

Keyboard characters are mapped to CW "prosigns" and special characters can be inserted anywhere in the **KY** command text. See Table 2-7.

Table 2-7. KY command special characters.[18]

Character	CW Prosign or special behavior
(	KN
+	AR
=	BT
%	AS
*	SK
!	VE
<	Puts the K3S/K3 into TX TEST mode, until a '>' character is received
>	Returns the K3S/K3 to TX NORM mode
@	In CW mode, this character normally terminates any CW message (via KY or manual send). However, tapping 2 in ***CONFIG:CW WGHT*** changes '@' to the 'at' prosign sign as used in e-mail addresses. This is the newest Morse Code character; it can be remembered as the prosign 'AC' (as in "the At Character").
^D	(EOT, ASCII 04) Quickly terminates transmission; use with CW-to-DATA.

Exercise

Send the following text to be transmitted in CW TX Test mode and then return to transmit mode. "CQ CQ DE KE7X"

Set the K3S/K3 in CW mode. In the K3 Utility *Command Tester/K3 Macros* window type <**KY CQ CQ DE KE7X>;** in the data *K3 Command* box. The command is sent when you type the ;.

2.3.5 Memory Channel

MCnnn; where **nnn** selects a memory # (or channel). Regular memories are ***000-099***.

Exercise

Recall the contents of regular memory 010.

In the K3 Utility *Command Tester/K3 Macros* window type **MC010;** in the data *K3 Command* box.

[18] See also Table C-6, page 153.

For the K3S/K3 only, if ***CONFIG:MEM0-9*** = ***BAND SEL***, then memories ***000-009*** (these are Quick memories) will recall the last-used VFO frequencies in the target band, not fixed frequencies

Per-band memories store your favorite frequencies for the current operating band. When on a band you can retrieve the memories by tapping M1 – M4.

Exercise

Using the switch tap command recall the contents of the M1 per-band memory.

In the K3 Utility *Command Tester/K3 Macros* window type **SWT23;SWT21;** in the data *K3 Command* box. This taps M>V and then M1.

You can also change to a band and recall a per-band memory using the **MCnnn;** command; **nnn** is given by:

nnn = 100 + bandNum * 4 + Mn – 1.

For bandNum, see **BN**, Table 2-4.

Mn is 1 - 4, (to denote tapping M1 – M4).

Notes:

1. A SET is ignored if the target memory is invalid.
2. Switching to any regular memory (000-099) updates the K3S/K3 default V>M and M>V memory number; this is not the case when switching to Per-Band Quick memories (M1 – M4).
3. Switching to any memory tagged with '*' as the first character in its label enables channel-hop scanning (see K3S/K3/KX3/KX2 Owner's manual).

Exercise

Use the MC command to change to 20 meters and recall the contents of the M1 per-band memory.

nnn = 100 + 5 * 4 + 0 = 120.

In the K3 Utility *Command Tester/K3 Macros* window type **MC120;** in the data *K3 Command* box.

2.3.6 Operating Mode and Data Sub-Mode

MDn; or **MD$n;** chooses the operating mode for VFO A (MDn;) or VFO B (MD$n;) where **n** is shown in Table 2-8.

DTn; sets the DATA sub-mode where **n** is shown in Table 2-8, page 33; not allowed when transmitting.

Notes:

1. In *Diversity Mode* (K3S/K3 only) (accessed by holding SUB or executing a SWH48; command or **DV1;**), sending **MDn;** sets both Main and Sub-mode to **n**. Sending **DTn;** matches the sub receiver's mode to the main receiver's.
2. DATA and DATA-REV select the data submode that was last in effect on the present band. (To set data submode, use **DT**.) The norm/rev conditions for the K3S/K3 data sub-modes are handled in two pairs at present: DATA A/PSK D, and AFSK A/FSK D. E.g., if the radio is set up for DATA A mode, alternating between **MD6;** and **MD9;** will cause both DATA A and PSK D to be set to the same normal/reverse condition.

Table 2-8. Operating modes and data sub-modes.[19]

n	Mode	n	Mode		n	Mode	
1	LSB	6	DATA		9	DATA-REV	
2	USB	6	**DTn**	**Sub-mode**	9	**DTn**	**Sub-mode**
3	CW	6	0	DATA A	9	0	DATA A
4	FM	6	1	AFSK A	9	1	AFSK A
5	AM	6	2	FSK D	9	2	FSK D
7	CW-REV	6	3	PSK D	9	3	PSK D

Exercise

Set the operating mode to DATA and the sub-mode to FSK D.

MD6;DT2;

2.3.7 Menu Selection

MN Command

The **MNnnn;** command gives you access to the K3S/K3 MAIN and CONFIG menus and the KX3/KX2 MAIN menus just as if you had tapped or held MAIN or held CONFIG and turned VFO B to reach the desired menu item. The parameter **nnn** is given in Table 2-9. (Table 2-10, page 38 shows a numerically sorted list.) **MN255;** exits a menu, just like tapping MAIN.

> **Hint:** Before diving into a macro programming project you should review all of the menu and configuration choices for your K3S/K3 or KX3. You will find them in your Owner's Manual or KE7X book.

Some menu items toggle when accessed by a programmable function key or an MN command in a macro. These are marked with a [T] in Table 2-9 and Table 2-10.

[19] See also Table C-7, page 153.

MP Command

MPnnn; sets a menu parameter. For example, sending **MN074;** activates the ***AGC THR*** menu[20]. Following this command with **MP020;** sets ***AGC THR*** to ***20***.

Using MN and MP in Macros

Not all menus can be accessed by the MN. Those that can are shown in Table 2-9 and Table 2-10. Further, only the menus marked "‡" can use the **MPnnn;** command to set a parameter value. For a menu function that cannot use this, you must use the **UP;**, **UPB;**, and **DN;** and **DNB;** commands to change the parameter one up or down value.

To determine a numeric menu entry's parameter values (nnn), first, go into the menu manually and set the parameter to specific values of interest. Then type "**MP;**" in the command test box at the top of the *Command Tester* screen in the K3, KX3 or KX2 Utility to see the associated **nnn** value. See *Macros that Enter a Menu and set a Parameter*, page 55.

[20] ***CONFIG:TECH MODE*** must be ***ON***. Menus in Table 2-9 and Table 2-10 that require ***TECH MODE*** to be on are marked [TM].

Table 2-9. K3S, K3, KX3, and KX2 menu selections (menu sort).

Entries marked ™ must have *TECH MODE On.*

Entries marked ‡ can be accessed by the MPnnn; command.

Entries marked T can be toggled by a programmable function key or a macro. See *Types of Macros,* page 53.

Shaded entries are not available.

Entry	nnn	K3S	KX3	KX2
2M MODE	147		‡	
2 TONE™	013			
ACC2 IO	141		‡	
AGC DCY	108			
ADC REF™	034			
AF GAIN	095			
AF LIM	047		‡	‡
AFSK TX	107	T		
AFV TIM™	014			
AFX MD	105	‡	‡	‡
AGC-F	061			
AGC HLD	020			
AGC MD	128		‡	‡
AGC PLS™	099	T		
AGC SLP™	017			
AGC SPD	129		‡	‡
AGC-S™	037			
AGC THR™	074	‡	‡	‡
ALARM	000		‡	
ALT MD	149			
AM MODE	126		‡	‡
AMP HRS	151			
ANTIVOX	011			
ANT.X SW	157			
ATTEN	117	‡		
ATU DATA	112		‡	‡
ATU MD	023		‡	‡
AUTOINF	045	T	‡	‡
AUTOOFF	133		‡	‡
AUX 1	160			
AUX 2	161			
BAT CHG	137		‡	
BAT MIN	024		‡	‡
BKLIGHT	138		‡	‡
BND MAP	076		‡	
COR LVL	139		‡	‡
CW IAMB	001	T	‡	‡
CW KEY1	120		‡	‡
CW KEY2	121		‡	‡
CW PADL	006	T		
CW QRQ	112	T		
CWT	150			
CW WGHT	012		‡	‡
DATE	029			
DATE MD	030	T		
DDS FRQ™	031			
DIGOUT1	019	‡		
DUAL PB	115	T		
DUAL RX	140		‡	‡
EXIT MENU	255			
EXT ALC™	022			
FLx BW	038			
FLx FRQ	039			
FLxGN	040			
FLxON	041			
FLTX MD	042			
FM DEV	021		‡	
FM MODE	018	T	‡	
FP TEMP	043			

Entry	nnn	K3S	KX3	KX2
FSK POL	044	T		
KAT3	023	‡		
KBPF3	046	T		
KDVR3	036	T		
KIO3	033			
KPA3	055	‡		
KRC2	049			
KRX3	050			
KXIO2	158			
KXV3	051			
LCD ADJ	002	‡		
LCD BRT	003	‡		
LED BRT	004	‡		
LED BRT	145		‡	‡
LCD TST	052	T	T	T
LIN OUT	032	‡		
L-MIX-R	111	‡		
LOGGING	162		[21]	T
MACRO	110			
MEM 0-9	102			
MIC BIAS	135		‡	‡
MIC BTN	082	T	‡	‡
MIC+LIN	015			
MIC SEL	053			
MSG RPT	005	‡	‡	‡
NB SAVE	054	T		
PA MODE	146		‡	‡
PA TEMP	056	‡		
PB CTRL	109			
PBT SSB	144		‡	
PITCH	148			‡

[21] As of 10/13/2017 LOGGING is available only on the KX2. It may become available on the KX3 in the future.

Entry	nnn	K3S	KX3	KX2
PREAMP	136		‡	
PREAMP2	118			
PTT KEY	103			
PTT RLS	075			
PWR SET	081	T		
REF CAL™	062			
RF GAIN	155			‡
RFI DET	035	T		
RIT CLR	100	T		
RPT OFS	007	‡	‡	
RS232	057			
RTC ADJ	159			
RX EQ	008			
RX IQ	123		‡	‡
RX ISO	124		‡	
RX NR	143		‡	‡
RXSBNUL	125		‡	‡
RX SHFT	142		‡	
RX XFIL	134		‡	
SIG RMV™	106			
SMTR MD	060	T	‡	‡
SMTR OF	065			
SMTR SC	066			
SMTR PK	067			
SPKR+PH	097	T		
SPLT SV	068	T		
SPKRS	069	T		
SQ MAIN	063			
SQ SUB	064			
SUB AF	080	T		
SW TEST™	070			
SW TONE	071	T	‡	‡
SYNC DT	059			
TECH MD	072	T	‡	‡

Entry	nnn	K3S	KX3	KX2
TIME	073			
TTY LTR	077			
TUN PWR	058	‡	‡	‡
TX ALC™	078	T		
TX BIAS	130			
TX CMP	154			‡
TXCRNUL	132		‡	‡
TX DLY	016		‡	‡
TX DVR	113			
TX ESSB	096		‡	
TX EQ	009			
TX GAIN	131			
TX GATE	101		‡	‡
TX INH™	025	T		
TX MON	114	T		
TXGN	079			
TXG VCE™	027			
TXSBNUL	127		‡	‡
VCO MD	083	‡		
VFO B>A	098			
VFO CRS	104		‡	‡
VFO CTS	084		‡	
VFO FST	085			
VFO IND	086	T		
VFO LNK	116	T		
VFO NR	119		‡	
VFO OFS	087		‡	
VOX DLY	153			
VOX GN	010		‡	‡
VOX INH	122		‡	‡
VOX MD	152			
WMTR™	088		‡	‡
XIT	156			
XVx ADR	094			
XVx IF	091			

Entry	nnn	K3S	KX3	KX2
XVx OFS	093			
XVx ON	089			
XVx PWR	092			
XVx RF	090			

Table 2-10. K3S, K3, KX3 and KX2 menu selections (numeric sort).

Entries marked ™ must have *TECH MODE On.*

Entries marked ‡ can be accessed by the MPnnn; command.

Entries marked T can be toggled by a programmable function key or a macro. See *Types of Macros,* page 53.

Shaded entries are not available.

Entry	nnn	K3S	KX3	KX2
ALARM	000		‡	
CW IAMB	001	T	‡	‡
LCD ADJ	002	‡		
LCD BRT	003	‡		
LED BRT	004	‡		
MSG RPT	005	‡	‡	‡
CW PADL	006	T		
RPT OFS	007	‡	‡	
RX EQ	008			
TX EQ	009			
VOX GN	010		‡	‡
ANTIVOX	011			
CW WGHT	012		‡	‡
2 TONE™	013			
AFV TIM™	014			
MIC+LIN	015			
TX DLY	016		‡	‡
AGC SLP™	017			
FM MODE	018	T	‡	
DIGOUT1	019	‡		
AGC HLD	020			
FM DEV	021		‡	
EXT ALC™	022			
ATU MD	023		‡	‡
KAT3	023	‡		
BAT MIN	024		‡	‡
TX INH	025	T		
TXG VCE™	027			
DATE	029			
DATE MD	030	T		
DDS FRQ™	031			
LIN OUT	032	‡		
KIO3	033			
ADC REF™	034			
RFI DET	035	T		
KDVR3	036	T		
AGC-S™	037			
FLx BW	038			
FLx FRQ	039			
FLxGN	040			
FLxON	041			
FLTX MD	042			
FP TEMP	043			
FSK POL	044	T		
AUTOINF	045	T	‡	‡
KBPF3	046	T		
AF LIM	047		‡	‡
KRC2	049			
KRX3	050			
KXV3	051			
LCD TST	052	T	T	T
MIC SEL	053			
NB SAVE	054	T		
KPA3	055	‡		
PA TEMP	056	‡		
RS232	057			
TUN PWR	058	‡	‡	‡
SYNC DT	059			
SMTR MD	060	T	‡	‡
AGC-F	061			

Entry	nnn	K3S	KX3	KX2
REF CAL™	062			
SQ MAIN	063			
SQ SUB	064			
SMTR OF	065			
SMTR SC	066			
SMTR PK	067			
SPLT SV	068	T		
SPKRS	069	T		
SW TEST™	070			
SW TONE	071	T	‡	‡
TECH MD	072	T	‡	‡
TIME	073			
AGC THR™	074	‡	‡	‡
PTT RLS	075			
BND MAP	076		‡	
TTY LTR	077			
TX ALC™	078	T		
TXGN	079			
SUB AF	080	T		
PWR SET	081	T		
MIC BTN	082	T	‡	‡
VCO MD	083	‡		
VFO CTS	084		‡	
VFO FST	085			
VFO IND	086	T		
VFO OFS	087		‡	
WMTR	088		‡	‡
XVx ON	089			
XVx RF	090			
XVx IF	091			
XVx PWR	092			
XVx OFS	093			
XVx ADR	094			

Entry	nnn	K3S	KX3	KX2
AF GAIN	095			
TX ESSB	096		‡	
SPKR+PH	097	T		
VFO B>A	098			
AGC PLS	099	T		
RIT CLR	100	T		
TX GATE	101		‡	‡
MEM 0-9	102			
PTT KEY	103			
VFO CRS	104		‡	‡
AFX MD	105	‡	‡	‡
SIG RMV	106			
AFSK TX	107	T		
AGC DCY	108			
PB CTRL	109			
MACRO	110			
L-MIX-R	111	‡		
CW QRQ	112	T		
ATU DATA	112		‡	‡
TX DVR	113			
TX MON	114	T		
DUAL PB	115	T		
VFO LNK	116	T		
ATTEN	117	‡		
PREAMP2	118			
VFO NR	119		‡	
CW KEY1	120		‡	‡
CW KEY2	121		‡	‡
VOX INH	122		‡	‡
RX IQ	123		‡	‡
RX ISO	124		‡	
RXSBNUL	125		‡	‡

Entry	nnn	K3S	KX3	KX2
AM MODE	126		‡	‡
TXSBNUL	127		‡	‡
AGC MD	128		‡	‡
AGC SPD	129		‡	‡
TX BIAS	130			
TX GAIN	131			
TXCRNUL	132		‡	‡
AUTOOFF	133		‡	‡
RX XFIL	134		‡	
MIC BIAS	135		‡	‡
PREAMP	136		‡	
BAT CHG	137		‡	
BKLIGHT	138		‡	‡
COR LVL	139		‡	‡
DUAL RX	140		‡	‡
ACC2 IO	141		‡	
RX SHFT	142		‡	
RX NR	143		‡	‡
PBT SSB	144		‡	
LED BRT	145		‡	‡
PA MODE	146		‡	‡
2M MODE	147		‡	
PITCH	148			‡
ALT MD	149			
CWT	150			
AMP HRS	151			
VOX MD	152			
VOX DLY	153			
TX CMP	154			‡
RF GAIN	155			‡
XIT	156			
ANT.X SW	157			
KXIO2	158			
RTC ADJ	159			

Entry	nnn	K3S	KX3	KX2
AUX 1	160			
AUX 2	161			
LOGGING	162		[22]	T
EXIT MENU	255			

[22] As of 10/13/2017 LOGGING is available only on the KX2. It may become available on the KX3 in the future.

2.3.8 Noise Blanker

Noise Blanker On/Off:

NBn; or **NB$n;** where n is **0** (off) or **1** (on)[23].

NB0; always turns the noise blanker off, overriding any non-zero **NLddii;** settings.

Noise Blanker Level:

NLddii; or **NL$ddii;** where **dd** is the DSP NB level (00-21), and **ii** is the IF NB level (00-21, K3S/K3 only).

Notes:

1. For the K3S/K3 DSP or IF blanker, **00** effectively turns that blanker off, even if the noise blanker is turned on with a **NB1;** command.
2. For the K3S/K3 DSP blanker, **01** = setting t1-1, **02** = t1-2, etc. For the IF blanker, **01** = NAR1, **02** = NAR2, etc.
3. For the KX3/KX2 DSP blanker, **01** = level 1, etc.

2.3.9 Power On/Off Control

Note: **PS0** turns the transceiver off, but this removes power, so **PS1;** ***cannot*** be used to turn it on. To turn power on, the K3S/K3 POWER_ON line (pin 8 of the Accessory I/O connector – also called the ACC connector) must be pulled low by an external device, or it can be turned on manually using the power switch.

2.3.10 Squelch Level

SQnnn; or **SQ$nnn;** where **nnn** is **000-029**. If the K3S/K3 ***CONFIG:SQ MAIN*** menu entry is set to a numeric value (**0-29**), then **SQ** and **SQ$** apply to Main and Sub receivers and the Sub RF/SQL ∅ pot on the K3S/K3 controls Sub RF gain. If ***SQ MAIN*** is set to **=SUB POT**, then **SQ** and **SQ$** are linked (either applies to *both* receivers), and the Sub RF/SQL ∅ pot controls squelch for both receivers. In this case, the Main RF gain pot controls RF gain for both Main and Sub.

2.3.11 Receive Attenuator

RAnn; or **RA$nn;**

For the K3/KX3/KX2 **nn** is **00** (attenuator off) or **01** (attenuator on, -10 dB).

For the K3S the RA command uses dB values (**RA00/05/10/15;**).

Notes:

1. 5 and 15 dB attenuator settings only apply to the K3S Main RX. The Sub RX attenuator is 10 dB, even in the K3S and the Sub RX format is **RA00/10;**.
2. For the K3S, **RA01;** can also be used to select 10 dB for backward compatibility.

---

[23] Remember that the $ signifies a VFO B parameter or command.

3. **(**K3S/K3): The Main receiver's attenuator on/off condition is saved per-RX ANT state. The Sub receiver's attenuator setting is not.
4. (K3S only): The user's desired Main receiver attenuator on level is saved per-band (5, 10, or 15 dB).

Normally the user sets this using menu entry ***MAIN:ATTEN*** (a long hold of the ATT switch function is a shortcut into this menu entry). A host application or macro can directly set this per-band attenuator on value using **RA**, while simultaneously turning the attenuator on, without going into ***MAIN:ATTEN***. Only nonzero values (**RA05/10/15**) will update the menu parameter. **RA00;** turns the attenuator off without updating the menu parameter.

2.3.12 UP and DN Commands

UP; or **UPB;** or **UPn;** or **UPBn;** where **n** is an optional VFO change specification. **UP;** and **UPn;** **move** VFO A up. **UPB;** and **UPBn;** move VFO B up.

DN; or **DNB;** or **DNn;** or **DNBn;** where **n** is an optional VFO change specification. **DN;** and **DNn;** move VFO A down. **DNB;** and **DNBn;** move VFO B down.

The VFO displacement, **n,** is given in Table 2-11.

If the VFOs are linked (non-split), **UP;**, **DN;**, **UPn;** and **DNn;** set VFO B to the same frequency as VFO A.

Table 2-11. VFO displacement.[24]

N	VFO Displacement
Blank	10 Hz
0	1 Hz
1	10 Hz
2	20 Hz
3	50 Hz
4	1 kHz
5	2 kHz
6	3 kHz
7	5 kHz
8	100 Hz
9	200 Hz

UP; and **DN;** also apply to all settings adjusted when in a menu using VFO A/B, including NB, NR, manual notch, pitch, and text decode . For example, if you were in the text decode menu, an

[24] See also Table C-8, page 154.

UPB; command is the same as rotating VFO B. (It also still applies to the menu.) It does NOT apply to special displays controlled by VFO B (use **UPB;** or **DNB**;) or to settings controlled by the small encoders.

> **Note:** When using successive DN; or UP; commands in a macro, it may be necessary to add a short delay between them to allow sufficient time for the VFO to change before the next command. See *Generating a Delay* below and *Turn on P3/SVGA Data Mode and Activate Text Decoding*, page 162.

Exercise

Write a macro that double taps the K3 A>B switch and then moves VFO B up 5 kHz.

SWT13;SWT13;UPB7;

Exercise

Write a macro that double taps the KX3 A>B switch and then moves VFO B up 5 kHz.

SWT25;SWT25;UPB7;

2.3.13 Generating a Delay

A problem with trying to understand how to write macros that achieve a consistent and reliable result is that we do not know how the multiprocessor systems implement macro processing. One potential problem is that there may be no synchronization mechanism to account for differences in the execution time of different Programmer's Commands. The Programmer's Reference Manual tells us that the K3 will typically respond in less than 10 ms with worst-case latency of around 100 ms except for band changes that may take up to 500 ms. Some commands cannot be safely handled when the transceiver is in a busy state, such as transmit, or a limited-access state such as ***b SEt***.

Thus, you may find that a sequence of some Programmer's Commands, when embedded in a macro, may not work as they do when executed singly. You may need to insert a short delay in the string of commands to allow it to finish executing before going on to the next command. See *Writing Macros – Some Rules of the Road*, page 72.

DEnnn;

The delay is given by nnn (001 – 255) in steps of milliseconds (10 – 2,550 ms.). **DE001;** is not recommended because the actual delay it generates may be less than 10 ms.

The DE command delay is handled in the background so it suspends only the execution of control command processing. There's no impact on normal radio operation. It also won't affect the P3, which has its own private dialog with the radio.

2.4 P3/PX3 Command Set Overview

Table 2-12 show the P3 and PX3 Programmer's Commands that can be used in macros. The P3 and PX3 command prefix is "#" to distinguish it from K3 and KX3 commands. Shaded entries are not available for that panadapter. Table 2-12 is repeated in Appendix C, page 178, for quick reference.

Table 2-12. P3 and PX3 programmer's commands.

Description	Name	P3	PX3	Use in Macro
Averaging time	#AVG			**#AVGnn;** nn = **00** (averaging off) or **02 – 20** 10 ms refresh periods.
Beacon interval	#BCI			**#BCInnnn;** nnnn is the beacon interval time in seconds **1 – 3600**.
Beacon location	#BCL			**#BCLnn;** nn is the text memory location to send in beacon mode, **01 – 50**.
Beacon on/off	#BCN			**#BCNn;** n is **1** (on), **2** (off).
Baud rate	BR, #BR			**#BRn;** or **#BRn;** n is **0** (4800), **1** (9600), **2** (19200), **3** (38400). **BRn;** changes the transceiver, **#BRn;** changes the panadapter.
Calibrate signal	#CAL			**#CALn;** n is **0** (off) or **1** (on).
Center frequency	#CTF			**#CTFsggmmmkkkhhh;** s is **+** or **space**; **ggmmmkkkhhh** is the center frequency in Hz. #**CTF 0** sets the center frequency to the VFO A frequency.[25]
Display mode	#DSM			**#DSMn;** n is **0** (spectrum only), **1** (spectrum + waterfall), **2** (spectrum + Tx Monitor option meters), **3** (spectrum + waterfall + meters).
Display mode	#DSM			**#DSMn;** n is **0** (spectrum only), **1** (spectrum + waterfall).
Function key execute	#FNX			**#FNXn;** n is **1 – 8** to execute FN1 – FN8.
Display font	#FON			**#FONn;** n is **0** (5x7 pixels), **1** (7x11), **2** (9x14).
Fixed auto-adjust mode	#FXA			**#FXAn;** n is **0** (full screen), **1** (half screen), **2** (slide), **3** (static) to specify how far the P3/PX3 display moves when VFO A is tuned off screen in fixed-tune mode.
Fixed or tracking select	#FXT			**#FXTn;** n is **0** (Fixed VFO – Tuned Spectrum/tracking), **1** (Fixed Spectrum – Tuned VFO/Fixed-Tune) mode.
Labels on/off	#LBL			**#LBLn;** n is **0** (labels off) or **1** (labels on).

[25] gg = GHz, mmm = MHz, kkk = kHz, hhh = Hz.

Marker adjust	#MAA, #MBA	[26]		**#MAAsn; #MBAsn;** s is **+** to increment, **–** to decrement. See Table 2-11, page 42 for marker displacement in Hz. **#MAAsn; #MBAsn;** s is **+** to increment, **–** to decrement as shown in Table 2-13, page 47 based on the current span and mode.
Marker A frequency	#MFA			**#MFAsggmmmkkkhhh;** s is **+** or **space**; ggmmmkkkhhh is the marker frequency in Hz. **0** sets the marker frequency to the VFO A frequency.[25]
Marker B frequency	#MFB			**#MFBsggmmmkkkhhh;** s is **+** or **space**; ggmmmkkkhhh is the marker frequency in Hz. **0** sets the marker frequency to the VFO A frequency. [25]
Marker A on/off	#MKA			**#MKAn;** n is **0** (marker off) or **1** (marker on).
Marker B on/off	#MKB			**#MKBn;** n is **0** (marker off) or **1** (marker on).
MSD screen shot	#MSS	[26]		**#MSS;** Creates a bitmap copy of the LCD screen (screen shot) and saves it to the MSD flash drive (thumb drive, flash memory stick). Each time the screen shot is performed, a new file is created. Filenames use a numeric format in which the first 3 characters are "PX3" followed by a 5 digit number, i.e. PX300009.BMP **Note: while the PX3 is busy saving a screen shot, other commands will be received but not processed.**
Noise blanker on/off	#NB			**#NBn;** n is **0** (off) or **1** (on).
Noise blanker level	#NBL			**#NBLnn;** nn sets the level **1** (least) – **15** (most) aggressive.
Peak mode on/off	#PKM			**#PKMn;** n is **0** (off) or **1** (on).
Power status/control	#PS			**#PSn;** n = **1** turns P3/PX3 on; **0** turns it off but removes power so **PS1;** cannot turn it on unless the power-on jumper is in the always on position.
Pass through	#PT			**#PT;** Sets the PX3 to pass-through mode, that is, the panadapter operation ceases and all data received on either RS232 port is passed through immediately to the other RS232 port without delay or modification. This command is used by *PX3 Utility* when downloading new firmware to the KX3 transceiver. Pass-through mode ends automatically 20 seconds after the last RS232 activity.
QSY to current	#QSY			**#QSYn;** n = **1** (QSY), **0** (undo QSY).

[26] As of 3/2017 implemented for the PX3 only. This may be available in future versions of P3 firmware.

marker				
Relative center frequency	#RCF			**#RCFsnnnnnn;** s is **+** or **-**, nnnnnn is the offset in Hz.
Reference level	#REF			**#REFsnnn;** s is **+/-** and n reference level in dBm **-170 – +010**.
Reset	#RST			**#RST;** force power-on reset.
Scale	#SCL			**#SCLnnn;** nnn is the difference in dB between the top and bottom of the spectrum screen **010 – 080**.
Span mode	#SPM			**#SPMn;** n is **0** (continuous) **1** (stepped).
Span	#SPN			**#SPNmmkkkh;** sets span width in 100 Hz units; **000020 – 002000** = 2 kHz – 200 kHz.
SVGA waterfall bias	#SVWB			**#SVWBnn;** nn is **1** – **99** corresponding to 0.1 – 9.9.
SVGA data on/off	#SVDT			**#SVDTn;** n is **0** (off) or **1** (on).
SVGA enable	#SVEN			**#SVENn;** n is **0** (off) or **1** (on).
SVGA font	#SVFN			**#SVFNn;** n is **0 – 3**; 3 is the largest font.
SVGA fill on/off	#SVFL			**#SVFLn; n** is **0** (off) or **1** (on).
SVGA resolution	#SVRS			**#SVRSn;** n is **0 – 4.** See the P3/SVGA manual for details.
Text transmit hang time	#TXH			**#TXHnnnnn;** nnnn is **00000 – 90000** milliseconds to keep the KX2 transmitting after the last keyboard character is sent.
Text transmit mode.	#TXM			**#TXMnn;** nn is **00** (enter key), **01** (^R/^T toggle), or **03** (space key).
VFO B cursor on/off	#VFB			**#VFBn;** n is **0** (off) or **1** (on). Note: When in split, VFO B cursor is always on.
Waterfall average on/off	#WFA			**#WFAn;** n is **0** (off) or **1** (on).
Waterfall color	#WFC			**#WFCn;** n is **0** (gray scale) of **1** (color).
Waterfall markers on/off	#WFM			**#WFMn;** n is **0** (off) or **1** (on).

Table 2-13. PX3 automatic marker adjust steps.

USB, LSB, AM & FM	
Span kHz	**Step Hz**
<5	10
2 – 9.99	20
10 – 49.9	50
50 – 99.1	100
100 – 200	200
CW & Data	
<5	2
2 – 9.99	10
10 – 49.9	20
50 – 99.1	50
100 – 200	100

Chapter 3. Programmable Function Keys and Macros

The material in this chapter is key to learning how to write and use macros to control your transceiver and/or panadapter. Carefully work through the chapter to learn how to use the Utility programs to develop and test macros and to write them to macro storage locations. Examples are given for four different types of macros you can write. Assigning macros to programmable function keys is reviewed.

Programmable function keys can be set to quickly access menu functions in the transceivers and panadapters. You can program them to perform complex functions such as setting the radio into split mode and offsetting VFO B a few kilohertz up the band in preparation for chasing a DX station operating split. The P3 SVGA option and the PX3 can do this also, plus you can assign K3S/K3 and P3/PX3 macros to an attached keyboard and thus need not use programmable function keys.

Macros use the K3 and KX3[27] commands described in the *Elecraft K3s, K3, KX3 and KX2 Programmer's Reference*, reviewed in Chapter 2.2, page 16. Similarly, the P3 and PX3 commands are described in the *Elecraft P3 (or) PX3 Programmer's Reference*. You will need to study these manuals to become a proficient macro programmer. Also, the help files in the K3 and P3 Utility programs are a great resource. Chapter 2.4, *P3/PX3 Command Set Overview,* page 44 summarizes the P3 and PX3 Programmer's Commands.

3.1 Using the K3 and KX3 Utility

The K3[28] and KX3 utility programs are must-have programs used to update new firmware versions and perform other useful chores such as saving and restoring configuration files, configuring crystal filters, calibrating transmitter gains, editing the power-on banner, and editing CW memories. The Utilities also contain a terminal program that allows you to send and receive CW, RTTY, and PSK. A key feature of the Utilities is a command tester screen that allows us to develop and test macros and then to write them to the 16 macro memories in the K3S/K3 and the eight memories in the KX3.

Figure 3-1 and Figure 3-2 show the K3S/K3 command test window and the macro memory edit and store window. The KX3 Utility has two similar windows except only the first eight macros can be stored in the KX3 macro memories. When developing a macro you test it in the *Command Tester/K3 Macro* (or *KX3 Macro*) window. When you are satisfied that you have the correct commands for what you want to do, you use the *Edit Command Tester/K3 Macro* window to enter and then save the macros in the K3S/K3 or KX3 macro storage memory.

[27] At the time this is written, the KX2 does not have macro storage and execution capability. It may become available in future firmware upgrades.

[28] The K3S and K3 use the same utility program.

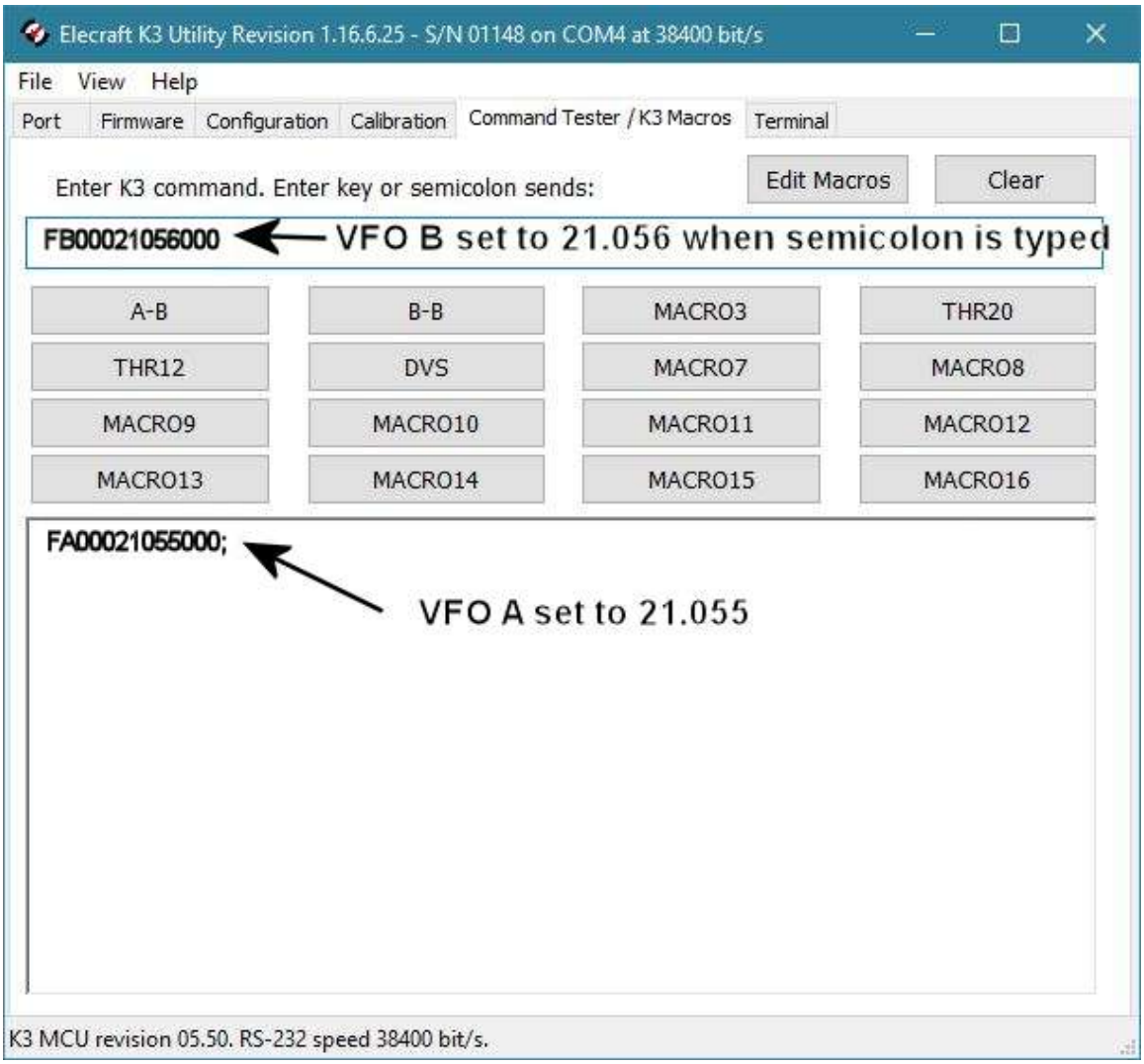

Figure 3-1. K3 command test window.

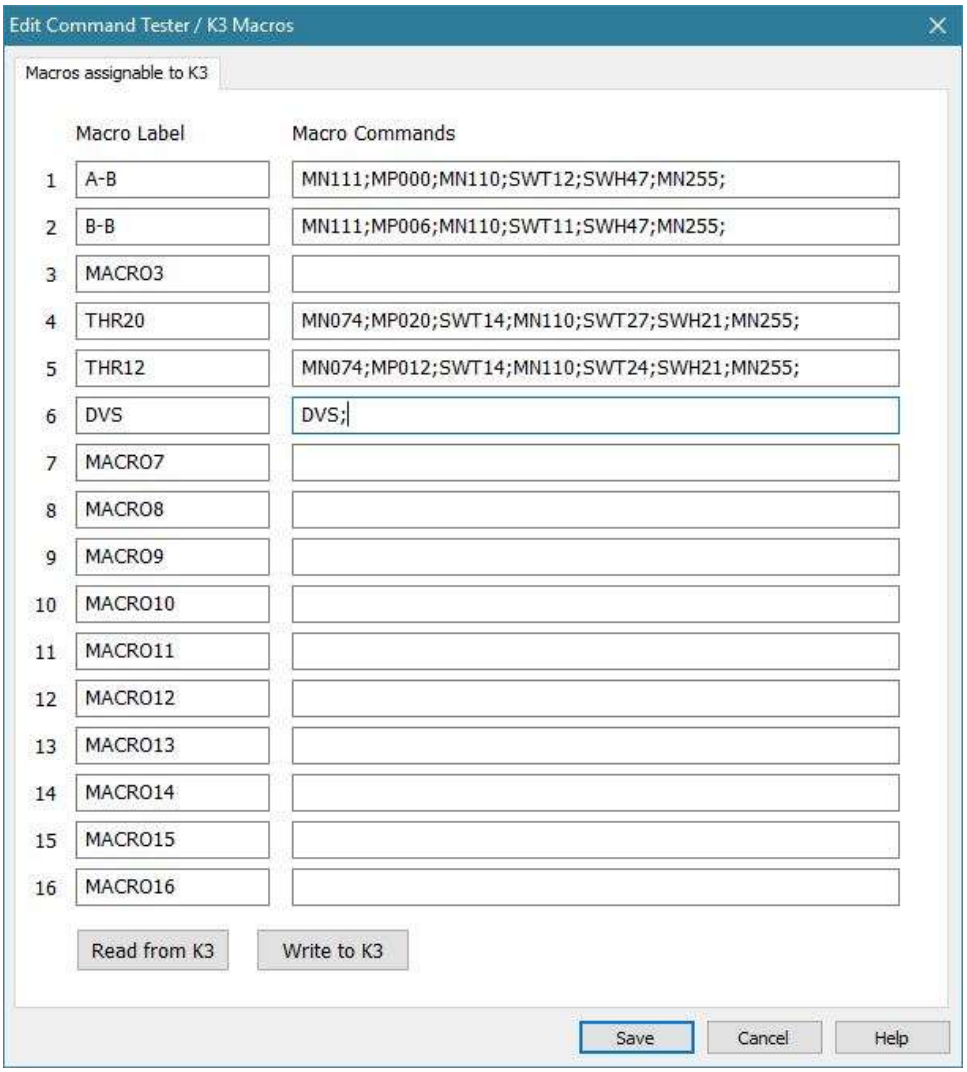

Figure 3-2. K3 macro edit/store window.

3.2 Using the P3 and PX3 Utility

Figure 3-3 shows the Command Tester window for the P3 and PX3 Utility. The Utilities are useful for developing and testing macros that you will save and execute using a keyboard (see *P3/SVGA and PX3 Macros*, page 68). Although clicking on the *Edit Macros* button will take you to a screen similar to Figure 3-2, you cannot save any macros in either the P3 or PX3.

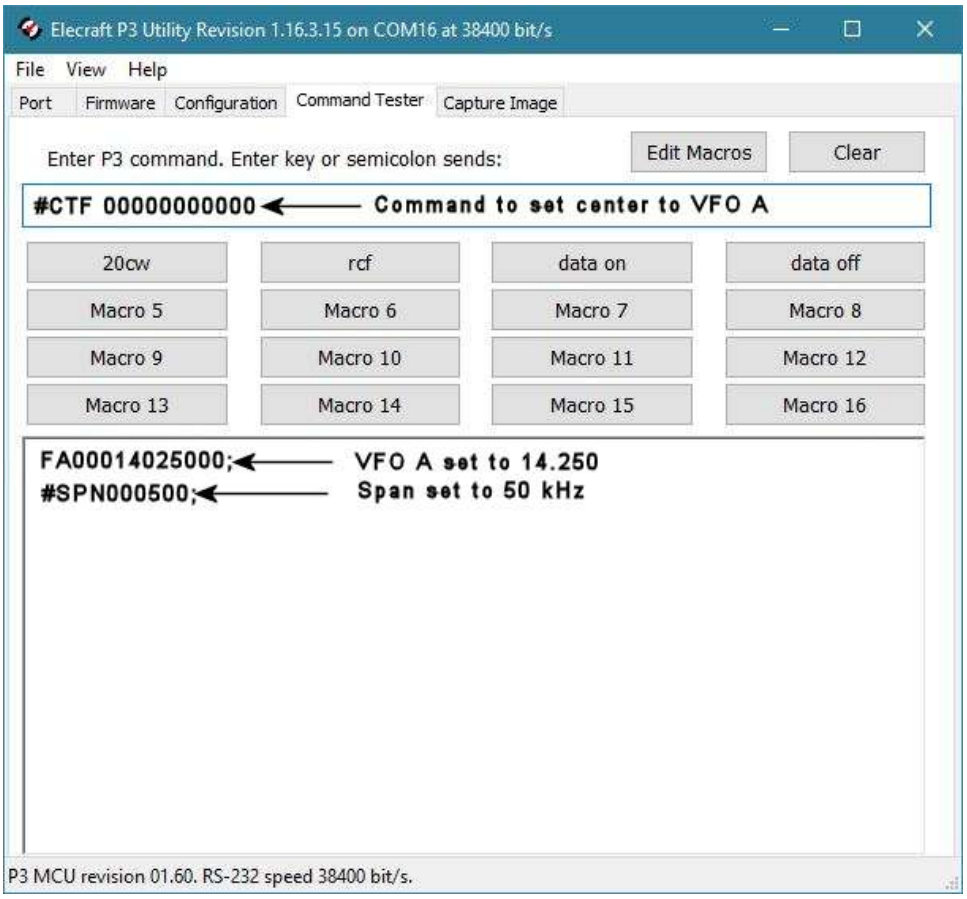

Figure 3-3. P3 and PX3 utility.

3.3 Developing and Testing Macros

Let us now look at how we use the Utility to develop and test a macro.

Assume you have tuned around and come across a DX station who is running split and working station 5 – 10 kHz up from its transmit frequency. Assuming VFO A is on the DX station, here is how you can program a macro to enable the K3s/K3 PF2 key to enter split mode with VFO B initially up 5 kHz from VFO A.

Referring to Table 2-1, starting on page 18, the following commands are used:

SWT13;	Tap the A>B switch to transfer the VFO A frequency to VFO B. In the macro we will double tap this switch to transfer all VFO A settings to VFO B.
UPB7;	Move VFO B up 5 kHz.
FT1;	Activate split mode. (We could also use SWH13, which emulates holding the SPLIT switch, but if we are already in split mode, SWH13 would take us out.

1. Test the Programmer's Commands.
    a. Run the K3 Utility program.
    b. Click on *Command Tester/K3 Macros* tab.
    c. Type each of the commands given above and verify the result. The K3S/K3 should enter split mode with VFO B up 5 kHz from VFO A.
2. Edit and assign macro.
    a. Click on the *Edit Macros* button.
    b. Assign Macro 8 to this function. In *Macro Label 8*, type in the label SPLIT. This will be the label that flashes in the VFO B area when we execute the macro by holding one of the PF keys. Labels must be seven or fewer characters.
    c. In the *Macro Commands* field, type in

        SWT13;SWT13;UPB7;FT1;

    d. Click on *Write to K3*.
    e. Click on *Save*.[29]
    f. Click on *Cancel* to return to the *Command Tester* window.
3. Before programming a function key on the K3, test the macro with the Command Tester.
    a. Click on the Macro 8 button now labeled *SPLIT*.
    b. If it doesn't perform properly, go back to the editor.
4. To program your K3S/K3 to hold PF2 for this macro,
    a. Enter the ***CONFIG:MACRO x*** menu and tap 8 (if ***MACRO 8*** is not currently displayed).
    b. Hold PF2 to program it to execute ***MACRO 8***.

Exercise

Program PF1 to put the KX3 into CW mode and set both VFO A and VFO B to 14.025.00 MHz.

The following commands are used:

FA00014025000;	Set VFO A to 14.025.000 MHz.
MD3;	Set CW mode.
SWT25;	Emulate tapping A>B.

1. Run the KX3 Utility program.
2. Click on the *Command Tester/KX3 Macros* tab.
3. Click on the *Edit Macros* tab.

Assign ***MACRO 3*** to this function.

---

[29] This saves the macros in the Utility. The previous step saved them in the K3S/K3.

1. In the *Macro Label* field for MACRO 3, type GOTO 20. This will be the label that flashes in the VFO B area when we execute the macro by pushing one of the PF keys. Labels must be seven or fewer characters.
2. In the *Macro Commands* field, type in:

   FA00014025000;MD3;SWT25;[30]
3. Click on *Write Macros 1-8 to KX3.*
4. Click on *Save*.

Before programming a function key on the KX3, test the macro with the Command Tester.

1. Click on the button labeled GOTO 20.
2. If the macro does not perform properly, review the Programmer's Commands.

Hint: After sending new macros to the transceiver and saving them in the Utility, it is good practice to save the transceiver's configuration, using the Configuration tab in the Utility, so all macros can be restored at once if one or some become corrupted in the transceiver.

3.4 Types of Macros

The Programmer's Commands used in macros control the K3S/K3 or KX3 in five ways:

1. **SWTnn;** and **SWHnn;** commands that emulate tapping or holding a front panel switch.
2. Direct control of a resource such as **AN1;**, which selects ANT 1.
3. Commands that enter a configuration menu, such as **MN129;**, which allows you to enter and set the ***AGC SLP*** setting.
4. **MPnn;** commands that set a menu parameter after entering the menu with a **MNnnn;** command.
5. Entering a menu with a **MNnnn;** command and using **UP;** and **DN;** commands to set a parameter.

Figure 2-2, page 29 and Figure 2-3, page 29, show the key codes for the K3S/K3 and KX3 switch tap and hold commands.

Table 2-1, page 18, shows all Programmer's Commands that can be used in macros for the K3S/K3 and KX3 transceivers and Table 2-12, page 44, shows commands for the P3 and PX3 panadapters. Only Set commands are given.

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[30] The order of the commands is important. The frequency selection must be made before changing the mode. See *Order of Programmer's Commands*, page 56.

Table 2-9, page 35, shows the commands that access the K3S/K3 and KX3 menus and also identifies those that can be set using an **MPnnn;** command.

3.4.1 Macros that Emulate a Sequence of Switch Taps and Holds

Many of the activities you perform by tapping or holding a sequence of front panel switch taps and holds can be conglomerated into a macro and activated by pressing or holding one programmable function switch, or pressing a key on a keyboard attached to a panadapter, or tapping or holding a K•Pod switch.[31] For example, double tapping A>B and then holding SPLIT can be easily executed in a macro. To develop one of these types of macro:

1. Write down the sequence of taps and holds you use.

   Tap A>B, A>B, hold SPLIT.

2. Note that the K3S/K3 and KX3 switch codes are different.
3. Using Figure 2-2 or Figure 2-3, convert the switch taps and holds to their programmer's command equivalent.

   SWT13;SWT13;SWH13; (for the K3S/K3)

4. Use the Utility to test that your sequence of commands performs as needed and then write the macro to the K3S/K3 or KX3. See *Using the K3 and KX3 Utility*, page 48.
5. Assign the macro to a function key. For example to program your K3S/K3 to hold PF2 for this macro,
   a. Enter the ***CONFIG:MACRO x*** menu and tap 8 (if ***MACRO 8*** is not currently displayed).
   b. Hold PF2 to program it to execute ***MACRO 8***.

   See *Assigning a Programmable Function Key to a* Macro, page 59.

Exercise

The commands shown above are for the K3S/K3. How do you change them to control a KX3?

The switch tap and hold codes must be changed to SWT25;SWT25;SWH25;

Switch tap and hold commands were developed to provide functions where dedicated two-letter commands have not been developed. Using them may cause unexpected results in your macros. See *Timing and Synchronization,* page 75.

3.4.2 Macros Using Direct Control Commands

The direct control commands shown in Table 2-1, page 18, and Table 2-12, page 44, affect different functional areas of the transceivers and panadapters. Pick the functional area you want to control and

[31] See Chapter 5, page 80.

investigate the commands available to that area by consulting Table 2-1. For example, let's add commands to turn RIT and XIT off to the commands shown above to enter split mode.

In Table 2-1 there are a group of commands that control the RIT and XIT. We see that **RT0;** and **XT0;** will turn RIT and XIT off. We can add these two commands to the command sequence shown in step 3 above.

RT0;XT0;SWT13;SWT13;SWH13;

Use the Utility to test and edit the macro and assign it to a function key as shown in steps 4 and 5 above.

3.4.3 Macros that Enter a Menu and set a Parameter

When you manually enter a configuration menu by tapping MENU or holding CONFIG and rotating VFO B, the menu is shown in the VFO B display area and the current setting (the parameter) in the VFO A area. You then rotate VFO A to set the menu parameter. Although in theory you could do this in a macro with switch taps and holds and changing VFO A and VFO B up and down, the macro has no way to know what the current setting is and how much to change the parameter up or down.

The **MNnnn;** and **MPnnn;** commands allow us to enter a specific menu and to set a specific parameter value. The trick is knowing what parameter to set. Fortunately the Utility program's *Command Tester* screen allows us to find this out.

Finding a Menu Parameter

The K3S/K3 ***CONFIG:L-MIX-R*** menu allows you to choose audio mixing for the Main (usually left) or Sub (usually right) receivers. To be able to use these on the fly, say while you are contesting in Single-Op Two VFO (SO2V) mode, it will be useful to program function keys with macros to set the audio mix desired. The **MN** command allows you to select the ***L-MIX-R*** menu and **MP** allows you to set the parameter. Here is how to do that for the ***L-MIX-R*** menu.

1. Turn the Sub receiver on.
2. Run the K3 Utility program.
3. Click on *Command Tester/K3 Macros* tab.
4. Referring to Table 2-9, page 35, find the **MNnnn;** command to enter the ***L-MIX-R*** menu (**MN111;**).
5. While in Table 2-9 check to see if the menu selection command is marked with a ‡, indicating that you can use the **MPnnn;** command to read and set a parameter. If it is, you can continue with the following steps. Otherwise, another strategy for setting the menu parameter must be chosen. See *Setting a Menu Parameter when the MPnn; Command cannot be Used*, page 57.
6. In the *Enter K3 command. Enter key or semicolon sends:* window, type **MN111;**. You should see **MN111;** in the response window and ***L-MIX-R*** and the current parameter setting in VFO B and VFO A display areas.
7. On your K3S/K3, rotate VFO A to choose the ***L-MIX-R*** combination desired, say ***Ab Ab***.
8. Now type **MP;**. You should see **MP003;** in the response window.
9. Enter the **MN255;** command to exit the menu.

This process shows us that the **MN111;** is the proper command to enter the ***L-MIX-R*** menu (see Table 2-9) and that **MP003;** is the parameter for the ***Ab Ab*** mix. The final command that is needed for this macro is **MN255;**, which leaves the menu selection. Table 8-1 shows the macros to select the nine possible audio mixes.

Table 3-1. Macros for the L-MIX-R configuration menu.

L-MIX-R	**Left Channel**	**Right Channel**	**Macro**
A b	Just Main	Just Sub	MN111;MP000;MN255;
A Ab	Just Main	Mix Main and Sub	MN111;MP001;MN255;
Ab b	Mix of Main and Sub	Just Sub	MN111;MP002;MN255;
Ab Ab	Mix of Main and Sub	Mix of Main and Sub	MN111;MP003;MN255;
Ab A	Mix of Main and Sub	Just Main	MN111;MP004;MN255;
b Ab	Just Sub	Mix of Main and Sub	MN111;MP005;MN255;
b b	Just Sub	Just Sub	MN111;MP006;MN255;
b A	Just Sub	Just Main	MN111;MP007;MN255;
A A	Just Main	Just Main	MN111;MP008;MN255;

Exercise

Find the **MNnnn;** and **MPnnn;** commands for a macro to set the K3S/K3 ***AGC THR*** to ***020***.

From Table 2-9 the menu command for ***AGC THR*** is **MN074;** and the **MPnnn;** command can be used to set the parameter.

1. Enter **MN074;** in the *Command Tester* window of the Utility. (***TECH MODE*** must be ***On***.)
2. ***AGC THR*** should show in VFO B and the current parameter in VFO A.
3. Rotate VFO A to ***020***.
4. Type **MP;**.
5. The return should show **MP020;**.

3.4.4 Setting a Menu Parameter when the MPnn; Command cannot be Used

Table 2-9, page 35, shows which of the menus that can be entered for the K3S/K3 and the KX3 and indicates which of them can use the **MPnn;** command to set a parameter. These are marked by ‡. Unfortunately, many of the menu parameters cannot be set in this way and so we must adopt another strategy.

Some menu items have only two states or settings. Thus, each time you enter the menu and send a **UP;** or **DN;** command, the menu item will toggle.

Menu selections shown in Table 2-9, page 35 and Table 2-10, page 38 for which this strategy works are marked with a [T].

Note that this technique allows you to only toggle the value; you cannot specify its new value, nor determine its present value.

Exercise

Write a macro that toggles the K3S/K3 SPKR+PH menu each time you execute it.

MN097;UP;MN255;

Exercise

Assign PF1 so that it toggles the K3S/K3 SPKR+PH menu each time you hold it.[32]

Hold CONFIG and rotate VFO B to SPKR+PH.

Hold PF1.

Tap MENU.

Exercise

Write a macro that toggles linking VFO A and VFO B each time you execute it.

MN116;UP;MN255;

---

[32] Interestingly, many operators have chosen to dedicate PF1 to this function to easily turn the speakers on and off.

Some macros might take you to a menu item. You can then rotate VFO A manually to make your selection and then exit manually.

Exercise

Write a macro that enters the ***AGC THR*** menu.

MN074;

When ***AGC THR*** is displayed, rotate VFO A to select a new value and then tap MENU to exit.

A third solution to this problem is to enter the menu and then to use the VFO A **UP;** and **DN;** commands (see *UP and DN Commands*, page 42) to set the parameter to the lower or upper limit of the parameter and then to change up or down the correct number of times to set the parameter.

Exercise

Develop a macro to set the ***AGC SLP*** parameter to ***010***.

Table 2-1, page 18 shows that **MN017;** enters the ***AGC SLP*** menu but that the **MPnnn;** command cannot be used to set the parameter.[33]

1. In the Utility *Command Tester* screen type **MN017;** to enter the ***AGC SLP*** menu.

   The strategy we use sets the ***SLP*** parameter to either its highest value by issuing a series of **UP;** commands or to its lowest value using **DN;** commands. You must use enough **UP;** or **DN;** commands to force it to the highest or lowest value. It does not matter if you issue too many because the parameter will go only to its final value. Now, as you will be in a known state, you can issue the correct number of **UP;** or **DN;** commands to set the value desired.

2. The maximum ***SLP*** parameter is ***015*** and the minimum is ***000*** so enter 15 **UP;** commands to set it to ***015***. You should see ***015*** displayed. It doesn't hurt to enter more **UP;** commands than necessary.

3. Now enter 5 **DN;** commands. VFO A should show ***010***.

4. Enter **MN255;** to exit the menu.

5. The complete macro is:

   MN017;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;DN;DN;DN;DN;DN;MN255;

---

[33] ***TECH MODE*** must be ***On***.

Note: When using successive DN; or UP; commands in a macro, it may be necessary to add a short delay (DEnnn;) between them to allow sufficient time for the VFO to change before the next command. See *Generating a Delay*, page 43 and *Timing and Synchronization*, page 75.

Exercise

Rewrite the macro above to set ***SLP*** to ***010*** using **DN;** and then **UP;** commands.

The complete macro is:

MN017;DN;DN;DN;DN;DN;DN;DN;DN;DN;DN;DN;DN;DN;DN;UP;UP;UP;UP;UP;UP;UP;UP;UP;UP;MN255;

3.5 Assigning a Programmable Function Key to a Macro

After developing, testing, and debugging a macro and saving it in the macro storage as shown in the previous sections, a programmable function is assigned to execute the macro.

To program your K3S/K3 or KX3 to use a programmable function key for a macro that is saved in ***MACRO 3***,

1. After writing the macros to the K3S/K3 or KX3 using the Utility as described above, enter the K3S/K3 or KX3 ***MACRO x*** menu and tap 3 (if ***MACRO 3*** is not currently displayed).
2. Hold or tap the chosen function key, for example M1, to program it to execute ***MACRO 3.***
3. You should see ***M1 SET*** displayed in the VFO B area.

Now, holding M1 will display the macro's name while it is being executed.

3.6 Macro Sequencing or Recursion

A clever Elecraft user discovered that activating a macro by holding a PF key can reprogram that key to perform another macro[34]. The concept is this:

1. Program a macro, say ***MACRO 7***, and assign it to a function key, say ***PF2***, to perform the first of sequence of commands. End the macro definition by assigning ***PF2*** to the next macro command sequence, say ***MACRO 8***.
2. Program ***MACRO 8*** to do the second sequence of commands and end it by assigning ***PF2*** to perform ***MACRO 7***.

---

[34] This concept harks back to the bad old days of self-modifying program code. While being very clever and allowing more code to be crunched into limited memory, it was abandoned when modern programming practices and more memory became available.

Here is how it would work to use the KX3 PF2 to listen to the DX station on the dual-watch receiver (VFO B) and search the pile-up and transmit using VFO A with the first hold of PF2 and to turn the dual-watch receiver off and switch back to normal operations with the second hold of PF2.

Referring to Figure 2-3, page 29 and Table 2-1, page 18, we identify the following commands to be assigned to ***MACRO 7***:

SWT25;SWT25;	Double tap the A>B switch to transfer all VFO A to VFO B.
FT0;	Set transmit on VFO A.
SB1;	Set dual-watch receiver on.
UP7;	Move VFO A up 5 kHz.
MN110;	Enter the KX3 ***MACRO x*** menu (equivalent to holding MENU and rotating VFO B to ***MACRO x***).
SWT33;	Tap the 8 switch.
SWH26;	Hold PF2. (This assigns PF2 to the commands in ***MACRO 8***.)
MN255;	Exit menu mode.

Now, program ***MACRO 8*** to do the second sequence of commands and end it by assigning ***PF2*** to perform ***MACRO 7***.

SWT25;SWT25;	Double tap the A>B switch to transfer all VFO A to VFO B.
FT0;	Set transmit on VFO A.
SB0;	Set dual-watch receiver off.
MN110;	Enter the KX3 ***MACRO x*** menu.
SWT32;	Tap the 7 switch.
SWH26;	Hold PF2. (This assigns PF2 to the commands in MACRO 7.)
MN255;	Exit menu mode.

Send the macros to the KX3 using the KX3 utility as described in *Developing and Testing Macros* above and then enter the ***MACRO 7*** menu and hold PF2 to assign it to enter Split mode. The next PF2 hold will take us out of Split. Subsequent holds toggle back and forth.

Exercise

What changes must be made to Macro 7 and Macro 8 to allow them to work on a K3S/K3 in split mode using VFO A to listen to the DX and VFO B to search the pile-up and transmit?

SWT25; should change to SWT13;

FT0; should be FT1; to transmit on VFO B and enter split mode.

UP7; should be UPB7; to move VFO B up 5 kHz.

SWT33; should be SWT34; to tap the 8 switch.

SWH26; should be SWH47; to hold PF2.

SWT32; should be SWT33; to tap the 7 switch.

3.6.1 Using a K•Pod Key for Macro Sequencing

Unfortunately, the useful macro sequencing shown above is not allowed directly in the K•Pod because each of its function keys is dedicated to one specific macro. You are not allowed to change that definition. However, you can assign to one of the K•Pod macro positions a third macro which toggles the PF2 key. That macro can be in any K•Pod position 1 – 16. In the example above, the macro sequence using positions 7 and 8 would then be toggled by the macro executed by the K•Pod. For example,

SWH47; Hold PF2

can be assigned to Macro 16, which is activated by tapping the K•Pod F8 switch. See *Using the K•Pod*, page 84.

The first two macros (Macro 7 and Macro 8 in this example) must be in macro positions 1 – 8 and you must assign the function key (in this case PF2) to Macro 7. The third macro can be in any of the 16 macro storage locations in the K3S/K3.

3.7 Mixing Transceiver and Panadapter Commands

A single macro sequence of Programmer's Commands can control both the transceiver and its panadapter. That is, K3S/K3 and P3 commands, or KX3 and PX3 commands, can be in the same macro.

Mixing both K3S/K3 and P3 or KX3 and PX3 commands can only be used in P3/SVGA or PX3 macros. P3 and PX3 commands cannot be used in K3S/K3 or KX3 macros.

Table 3-2. Mixing transceiver and panadapter commands.

	Programmer's Commands			
Macro Location	**K3s/K3**	**P3**	**KX3**	**PX3**
K3 Macros	X			
P3/SVGA Macros	X	X		
KX3 Macros			X	
PX3 Macros			X	X

Exercise

The split macro on page 51 sets up the transceiver for chasing a DX station operating split up 5 – 10 kHz from its operating frequency. Add P3 (or PX3) commands to that macro to set the span to 10 kHz and offset the center frequency 4.900 kHz up from the VFO A frequency.

Referring to Table 2-12, the following P3 or PX3 commands will be used:

#SPN000100; Set the span to 10 kHz.

#CTF 00000000000; Set the center frequency equal to VFO A.

#RCF+004900; Shift the center frequency up 4.900 kHz. (We choose 4.900 instead of 5.000 kHz so that the DX frequency stays visible on the P3 or PX3 screen).

Setting split is accomplished as before:

SWT13; Tap the A>B switch to transfer the VFO A frequency to VFO B. In the macro we will double tap this switch to transfer all VFO A to VFO B.

UPB7; Move VFO B up 5 kHz.

FT1; Activate split mode.

The complete macro is:

SWT13;SWT13;UPB7;FT1;#SPN000100;#CTF 00000000000;#RCF+004900;

Test the macro using the P3 or PX3 Utility program and then save it as a P3/SVGA or PX3 macro as shown in *P3/SVGA and PX3 Macros*, page 68.

Exercise

What changes do you make for the K3S/K3 macro in the exercise above to make it work for a KX3?

Change SWT13; to SWT25;

3.7.1 KE7X's Favorite P3/PX3 Macros

The ability to mix K3 and KX3 with P3 and PX3 Programmer's Commands is very useful as it allows you to set up both the transceiver and the panadapter for your favorite operating modes. Unfortunately this can only be done in a macro stored in a P3/SVGA or PX3, and (normally) executed by a key on the attached keyboard. You can, however, execute a panadapter macro using one of its function keys, thereby eliminating the need for a keyboard to be attached to the P3 or PX3.

P3 Macro 8, page 158, *P3 Macro 7*, page 159 and *P3 Macro 6,* page 159 show three examples. *P3 Macro 8* sets up for my favorite operating band and mode, 20 meter CW, and sets the P3 center frequency to 14.025 and the span to 50 kHz. If I see and tune to a DX station working split, *P3 Macro 7* enters split mode and changes the display so that the DX station is at the left edge of the screen and a 10 kHz span shows the pileup. *P3 Macro 6* exits split mode and returns the display to be centered on 14.025 with a 50 kHz span.

3.8 Saving and Restoring Macros

At the time this is written, the Windows version of the K3 Utility[35] and the K•Pod Utility store all macros in the Windows Registry. This makes them a bit difficult to extract without entering the Registry Editor, called *RegEdit*, a Windows Utility. Generally, using *RegEdit* is not recommended since unintended changes can cause Windows problems. Elecraft recommends, instead, that you simply copy/paste the individual macros out of the K3 Utility --> Macro editor into a flat file for transport or for saving them. Unfortunately, at present with Windows, there is no way to easily move macros from one machine to another or to save and restore them to different files. On the bright side, we might expect the K3 Utility to be upgraded to be able to save and restore the macros in a user named file.

If you really want to save various versions of your K3 macros using the RegEdit method, as you might when setting up the K•Pod for different operating conditions (see *Suggestions for K•Pod Macros*, page 93), contact Elecraft Customer Service[36] for detailed instructions.

The Mac and Linux versions of the K3 Utility and the K•Pod Utilities, however, use a different method for saving the macros. All of the macros, window positions, port names, etc are stored in a plain text "preferences" file. This file is located in the *Users/your_user_name/Library/Preferences folder on the Mac,* and in */home/UserName/* on Linux. The Library folder is hidden on the Mac, however. A quick way to get there is to click the "Go" menu in Finder and press the "option" key. The Library folder will then appear in the Go menu.

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[35] Firmware version 1.16.7.25.

[36] k3support@elecraft.com, 831 763-4211

On Mac/Linux platforms, the K-Pod Utility preferences file is named "*KPodUtilPrefs*" on the Mac and "*_KPodUtilPrefs*" on Linux. The preferences file can be moved to another computer, but it ***must*** be in the same folder on the other computer.

3.8.1 PX3 Macro and Text Message Export/Import

Starting with PX3 firmware revision 1.48, the PX3 supports keyboard macro and text message import and export using a USB memory stick/flash drive plugged into the USB port on the left side of the unit. Macros and text messages may be exported, modified, and then imported. This feature allows easy sharing of macros, which are numbered 1 – 50, and text messages, numbered 51 – 100, between multiple PX3's as well as their custom editing using a PC. A simple worksheet can be used to create the hexadecimal key code when creating new macros and messages.[37]

Exporting Macros and Messages

1. Insert a USB thumb drive or flash drive into the USB port on the left side of the PX3. Make sure the letter *M* appears in the upper right hand portion of the screen.
2. Tap MENU and using SELECT ∅, select *MSD Menu*.
3. Tap SELECT ∅ to enter the sub-menu and rotate to select *XportMacr*.
4. Tapping SELECT ∅ will start the export. Once the macros have been exported, the message *Macros exported* will be displayed in the upper right corner of the screen.

Importing Macros and Messages

1. Insert a USB thumb drive or flash drive into the USB port on the left side of the PX3. Make sure the letter *M* appears in the upper right hand portion of the screen.
2. Tap MENU and using SELECT ∅, select *MSD Menu*.
3. Tap SELECT ∅ to enter the sub-menu and rotate to select *XimprtMacr*.
4. Tapping SELECT ∅ will start the import. Once the macros have been imported, the message *Macros imported* will be displayed in the upper right corner of the screen.

Macro File Format

The exported macros/text messages are written to a file on the memory stick called PX3MACROS.TXT. Only macros/messages that are defined are written out to the file. Each line constitutes one macro or message. Fields within the line are delimited with commas (,). Lines that begin with the '#' (pound) character are ignored. This permits comments and other text to be added.

number, key code, ……. macro or message ……..

number: 1 – 100

The number determines if the entry is for macro or a text message. Valid macro numbers are 1 - 50 while valid text message numbers are 51 - 100.

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[37] As of 3/2017 this feature is implemented only for the PX3. This may be available in future versions of P3 firmware.

NOTE: specifying the number of an existing macro/message will overwrite that location when imported.

key code:

The key code is a special 8 digit hexadecimal number built up using a key code and optional key modifiers. Special key code modifiers (Alt, Ctrl, etc.) can be added to the base key code if needed. For example, the F1 base key code is 0x3A . Adding the Alt modifier of 0x200 results in a key code of 0x23A for “Alt-F1”.

…macro or message…:

Up to 94 characters are allowed for text messages or macros.

Table 3-3. 8 Hex digit key code format.

		Numlock	**GUI**	**Caps/Shift**	**Ctrl/Alt**	**Key Code**	
0x0	0x0	0x0, 0x1	0x0, 0x1	0x0, 0x1	0x0, 0x1, 0x2, 0x3	0xnn	0xmm
		0x1 = Numlock	0x1 = GUI	0x1 = Shift or Caps Lock	0x1 = Ctrl, 0x2 = Alt, 0x3 = Ctrl-Alt	See Table 3-4	

Exercise

Edit a saved PX3MACROS.TXT file so that text message 53 is “Thanks for the QSO, 73” and the recall message key is alt-t.

From Table 3-4 the key code for “t” is 0x17 and the modifier code for Alt from Table 3-3 is 0x2.
The line to be added to the file is:

53,00000217,Thanks for the QSO, 73

Exercise

Edit a saved PX3MACROS.TXT file so that macro 2 set the PX3 center frequency to VFO A and the span to 1000 Hz. The macro recall key is to be Ctrl-F1.

From Table 3-4 the key code for F1 is 0x3A and the modifier code for Ctrl from Table 3-3 is 0x1.
The line to be added to the file is:

2,0000013A,#ctf 00000000000;#spn000010;

Table 3-4. Keyboard key codes.

Key Code	Keyboard key
0x04	A, a
0x05	B, b
0x06	C, c
0x07	D, d
0x08	E, d
0x09	F, f
0x0A	G, g
0x0B	H, h
0x0C	I, i
0x0D	J, j
0x0E	K, k
0x0F	L, l
0x10	M, m
0x11	N, n
0x12	O, o
0x13	P, p
0x14	Q, q
0x15	R, r
0x16	S, s
0x17	T, t
0x18	U, u
0x19	V, v
0x1A	W, w
0x1B	X, x
0x1C	Y, y
0x1D	Z, z
0x1E	1, !
0x1F	2, @
0x20	3, #
0x21	4, $
0x22	5, %
0x23	6, ^
0x24	7, &
0x25	8, *
0x26	9, (
0x27	0,)
0x2D	-, _
0x29	Esc N/A
0x2A	Del N/A
0x2B	Tab N/A
0x2C	Space N/A
0x2D	-, _
0x2E	=, +
0x2F	[, {
0x30	], }
0x31	\, |
0x32	~
0x33	;, :
0x34	‘, “
0x35	`
0x36	,, <
0x37	., >
0x38	/, ?
0x39	
0x3A	F1
0x3B	F2
0x3C	F3
0x3D	F4
0x3E	F5
0x3F	F6
0x40	F7
0x41	F8
0x42	F9
0x43	F10
0x44	F11
0x45	F12
0x46	PrtScr N/A
0x47	
0x48	Pause N/A
0x49	Insert N/A
0x4A	Home N/A
0x4B	PgUp N/A
0x4C	Del N/A
0x4D	End N/A
0x4E	PgDn N/A
0x4F	Rt Arrow N/A
0x50	Lft Arrow N/A
0x51	Dwn Arrow N/A
0x52	Up Arrow N/A
0x53	
0x54	KeyPad /
0x55	KeyPad *
0x56	KeyPad -
0x57	KeyPad +
0x58	KeyPad Enter N/A
0x59	KeyPad 1
0x5A	KeyPad 2
0x5B	KeyPad 3
0x5C	KeyPad 4
0x5D	KeyPad 5
0x5E	KeyPad 6
0x5F	KeyPad 7

0x60	KeyPad 8
0x61	KeyPad 9

0x62	KeyPad 0
0x63	KeyPad .

3.9 P3 and PX3 Programmable Function Keys

There are eight programmable function keys, FN1 – FN8. FN1 – FN4 are activated by tapping and FN5 – FN8 by holding. Most of the P3 and PX3 MENU functions can be programmed to be activated by a function key. See the *P3 or PX3 Owner's Manual* or a KE7X Elecraft book.

P3 or PX3 Function Keys, page 13, shows how to use a P3 or PX3 function key as a shortcut to a menu function. These function keys can also execute macros.

Function Key Labels

Hold LABELS to toggle the function key label display at the bottom of the display. You can program each of the eight function keys to activate a Menu function or execute a macro. The labels are replaced by decoded text when text decoding is active on the PX3, but the function key can still be activated by tapping or holding the key.

P3/SVGA and PX3 Macros

There is storage for up to 50 macros in the P3/SVGA and PX3. Macros are entered from the attached keyboard. The P3/SVGA data mode and the PX3 text mode must be enabled.

To enable the P3/SVGA data mode:

1. Tap MENU and rotate SELECT ∅ to the **SVGA menu** and tap SELECT ∅.
2. Rotate SELECT ∅ to **SVGA data** and tap SELECT ∅ to turn on the data windows.

To enable the PX3 text mode:

1. Successively hold LABELS until the Receive and Transmit Data Windows are displayed.

Typing Ctrl-Alt-M enters the Macro editing window. There are 50, 124 character macro memories.

Macros stored in locations 1 – 8 can be executed by selecting them in the P3/SVGA or PX3 **Macro n** menu and they can be assigned to any of the FN1 – FN8 function keys.

Macros 9 – 50 can only be executed from the P3/SVGA or PX3 keyboard.

1. Press Ctrl-Alt-M to enter the macro memory editing window.
2. Press the ↑ and ↓ arrow keys to find an empty macro buffer, one that is no longer needed, or one that you would like to edit. Here we choose mem: 2.

Up/Dn to move, ENTER to select mem:2 key:<empty>

3. Press Enter to select the indicated memory.

Press the key to assign, ^C clears, ENTER no change

4. Press the key you want to use to recall this message. You may choose a keyboard function key (F1 – F12), or any Alt-, Ctrl- or Alt-Ctrl-key combination. If the key chosen is not displayed, it is in use already for some other memory and you must choose another key. You will not be able to move to the next editing stage until you have chosen a valid recall key. Here we choose F1.

Enter text, press ENTER when done, CTRL-C to clear mem:1 key: F1

5. Type up to 124 characters for the macro. This macro changes VFO A's frequency to 14.070 and sets the mode to PSK.

Enter text, press ENTER when done, CTRL-C to clear mem:1 key: F1
FA00014070000;MD6;DT3;

6. When finished press Enter to save the message and start editing the next macro memory location.
7. Press Esc to exit the memory editing.

To activate the macro from the keyboard, simply type the key assigned to the macro in step 4.

This macro example contains only K3S/K3 or KX3 Programmer's Commands. *Mixing Transceiver and Panadapter Commands*, above, shows that transceiver and panadapter commands can be used in a macro.

Programming a P3/PX3 Function Key for a Macro

After programming a K3S/K3 or P3/PX3 macro as shown in *P3/SVGA and PX3 Macros*, page 68, you can assign up to eight macros to the FN1 – FN8 function keys.

1. Tap MENU to enter the P3/PX3 menu selection from normal operation.
2. Rotate SELECT ∅ to display **SVGA menu** in the P3 or the **Text Menu** in the PX3.
3. Tap SELECT ∅ to choose it.
4. Rotate SELECT ∅ to select **Macro 1** – **Macro 8**.
5. Tap or hold the function key to assign to this macro.

6. Tap MENU.

When labels are displayed, you will see **Macro n** as the macro label.

Using a Programmed Function Key

1. Function keys may be used even if their labels are not displayed.
2. Tap or hold the function key.
3. Rotate the SELECT ∅ knob if a Menu selection needs to be made and then either tap/hold the function key to exit or tap MENU to back up to the Menu selection level.
4. If the Menu function is activated by tapping, simply tap the function key to select the feature desired.

Erasing a Function Key

1. Go to the **FN Erase** menu selection and then tap or hold the function key to be erased.

3.10 Keyboard and Macro Storage Alternatives

3.10.1 The Genovation Keypad

An alternative to a keyboard, at least for activating P3/SVGA or PX3 macros and message memories, is a keypad that can plug into a P3/SVGA or PX3 and act as a keyboard. Hearing about experiments on the Elecraft Reflector, Dave, NK7Z, developed a way to use the Genovation CP48USBHID 48-key keypad in place of the P3/SVGA/PX3 keyboard. It allows you to tap a single key to execute a P3/SVGA or PX3 macro. It won't allow you to operate in the digital text modes like you can with a full keyboard but if the P3/SVGA or PX3 is in data or text mode, the keypad can send pre-programmed messages up to 120 characters long. His website describes his approach and lessons learned in detail.[38]

To use the Genovation Keypad:

1. Read the information on NK7Z's website.[38]
2. Download Genovation software tools from their website.
3. Change the ID of the keypad to a non-media keypad.[39]
4. As NK7Z suggests, program each of the keypad keys with the function key trigger code – F1 – F12, or any Alt-, Ctrl- or Alt-Ctrl-key combination – used to activate stored macros and messages.
5. Using a keyboard attached to the P3/SVGA or PX3, program your macros as shown in *P3/SVGA and PX3 Macros*, page 68. You can also program message memories that can be triggered by a keypad key.[40]

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[38] http://nk7z.net/adding-an-external-keypad-to-the-k3/

[39] The P3/SVGA and PX3 cannot use a multimedia keyboard.

[40] See your P3 or PX3 Owner's manual.

a. When choosing a trigger code, choose the one that you preprogrammed into the keypad key you want to use to activate the macro.

b. Be sure to type ESC after you are finished so that you leave the edit macro mode.

6. Replace the keyboard with the keypad.
7. Tap any of the Genovation keys to send its pre-programmed trigger code to the P3/SVGA or PX3.

    a. If you are using the keypad to trigger message memories, the P3/SVGA must be in data mode and the PX3 must be in text mode (see page 68).

Other USB keypads, such as X-keys[41], may be used as well. The key requirement is that the keypad must be identified as a non-multimedia keyboard.

3.10.2 The QRPworks SideKar

Other alternatives to using a keyboard or a keypad and the macro storage capabilities of the P3 or PX3 are the K-Board and SideKar available from QRPworks.[42] These devices connect between the K3s, KX3 or KX2 serial port and an external keyboard. The K-Board serves as a storage device capable of storing and accessing 200 macros and messages. The SideKar is similar and adds an LCD screen and logging capabilities. In essence, the SideKar replaces a PC running a Utility program and is thus very useful for portable operations. Some of its features include:

- 40 or 80 character LCD display.
- Uses an external USB keyboard (wired or wireless).
- View decoded CW, RTTY, and PSK modes.
- Send CW, RTTY or PSK with the keyboard or paddle.
- Contains a built-in, 1000 QSO logger.
- Can create and store 20, 80 character messages or macros. (K-Board can store 200 messages/macros.)
- Operates from external 8 – 15 Vdc. A 9 Vdc battery holder is available.
- A Message Management Utility for PCs or Macs is available.

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41 http://xkeys.com/xkeys.php

42 http://www.qrpworks.com.

Chapter 4. Writing Macros – Some Rules of the Road

Chapter 2 and Chapter 3 have shown us the details of the Programmer's Commands and how to use them when writing macros. Before starting a programming project there are a number of caveats, presented here as Rules of the Road, to consider.

Elecraft's *Programmable Architectures*, reviewed in Chapter 1.5, allows Elecraft firmware writers to update the firmware code that defines how our radios and panadapters operate. By adding the capability for us to store sequences of these Programmer's Commands in macros to be executed at the tap of a switch, Elecraft has given us the capability to customize our operation to our own specifications.

It is important to understand that Chapter 1.5 doesn't tell us the whole story. Each transceiver and panadapter has multiple processors working together to create the whole system. We don't have the details of how the system operates as a whole to be able to understand how, and when, and by which processor Programmer's Commands are executed. Nor do we know how they may depend upon one another. Without this understanding we may find that a macro of Programmer's Commands may not produce the result we expect due to conflicts in processing order, interdependencies, and timing.

The sections below give us some "rules of the road" to help us avoid some of the more common situations that cause incorrect or inconsistent results when executing a macro.

4.1 Order of Programmer's Commands

The successful execution of a macro can depend on the order of the commands in the macro. One reason for this is that many operating parameters are saved on a per-band, per-mode, per-antenna, or per-VFO/receiver basis. See Appendix B, *Per-Band, Per-Mode Configurations,* page 165. For example, Mode (SSB, CW, DATA, AM, FM), is saved on each band. If you were to execute this macro

```
MD2;MD$2;FT1;FA00014170000;FB00014175000;
```

to enter USB and split modes on 14.170 plus five, you might find that *sometimes* the macro has to be executed twice before the mode changes. The reason for this is that the mode changes are done on the band you are currently on first and then the frequency/band change is done.

Appendix B, *Per-Band, Per-Mode Configurations*, page 165, shows configurations that are saved on a per-band, per-mode, per-antenna, and per-VFO/receiver basis. Some are saved on more than one basis. For example, the ATU can be on or off on a per-band and per-antenna basis or the main and Sub receiver's filter width can be different, depending on the operation mode (CW, SSB, etc.). Rule 1, then, is:

Rule 1: Inspect Appendix B, *Per-Band, Per-Mode Configurations*, page 165 to see the per-dependencies for each configuration you wish to change. Make sure you set the dependencies (band, mode, antenna, receiver) *before* making changes to the configuration or parameter.

Rule 2: If erratic behavior persists, try changing the order of the commands in the macro or repeating commands.

Exercise

Fix the macro above so it will perform as expected.

FA00014170000;FB00014175000;MD2;MD$2;FT1

Exercise

Write a macro that will turn the ATU on when on 20 meters and antenna 1 and off when on antenna 2.

BN05;AN1;MN023;MP002;MN255;AN2;MN023;MP001;MN255;

Exercise

Write a macro that will change to 80 meters, set the main receiver's noise blanker off and the Sub receiver's noise blanker on.

BN01;NB0;NB$1;

4.2 Command Syntax

Programmer's Commands are one or more letters, preceded by a command prefix, followed by numbers defining the parameter, and terminated by a semi-colon (;). Some (IS, KY, RO) require a space or other character between the command and the parameter. VFO A and VFO B frequency specifications (FA and FB) 11-digit numbers (ggmmmkkkhhh, where gg = GHz, mmm = MHz, kkk = kHz, and hhh = Hz).

P3 and PX3 commands use the # character as a command prefix. Frequency specifications are similar to the K3 and KX3 except that they require a + or space character preceding the 11-digit frequency.

A sequence of commands terminated by a semi-colon is a macro.

Make sure there are no space characters between the semi-colon and the next command.

Rule 3: Check your command syntax carefully**.**

Exercise

The FA0014025000; command is supposed to set VFO A to 14.025 MHz. Why doesn't it?.

Not enough digits in the frequency. It should be FA000140250000;.

4.3 Menu Toggling Functions

Most of the Programmer's Commands shown in Table 2-1 and Table 2-2 allow you to explicitly set a condition or parameter to a value. Likewise, many of the Menu selections shown in Table 2-9 and Table 2-10 (those marked by ‡) allow you to follow a **MNnnn;** command with an **MPnnn;** command to set an explicit value also. *Macros that Enter a Menu and set a Parameter*, page 55, shows how to set an explicit value in these menus.

However, many of the Menus in Table 2-9 and Table 2-10 (those marked with ^{T}) are toggling menus.[43] You enter the menu with a **MNnnn;** command and follow it with an **UP;** or **DN;** command to toggle the parameter. Because the state of the parameter at the end of the macro execution depends on its state before the macro is executed, the macro cannot be written to set the toggling menu to a specified setting; it merely toggles it to its opposite state.

Exercise

What does the following macro do?

MN116;DN;MN255;

It toggles the linking of VFO A and VFO B.

4.4 Switch Toggling Functions

Many operating characteristics can be set by tapping or holding switches. Some switches perform an operation and achieve a fixed result. For example, tapping A>B (SWT13) achieves the specific result of transferring the frequency in VFO A to VFO B. Conversely, holding SPLIT (SWH13) toggles between split on and split off. Thus, SWH13 (SWH25 in the KX3) used in a macro toggles split mode so sometimes split will be on and sometimes off, depending on its state when you execute the macro. Table 4-1 shows other toggling switch functions.

It may be better in these cases to use a Programmer's Command or menu instead of a switch tap or hold because they allow you to deterministically set the state to get the outcome you wish. Thus, in the split example, use **FT1;** (enter split mode) and **FR0;** (unsplit).

[43] Toggling means that the value of a parameter or control flips back and forth between two states each time the command is executed. A programmable function key can be assigned to a menu that toggles, as shown in *Using a Function Key as a Shortcut to a Menu Item*, page 15.

Table 4-1. Toggling switch parameters.

Switch	Switch Action	Command or Menu Alternative	Menu Parameter
ATU	Toggles ATU on/off.	KAT3 (ATU MD – KX3) MN023;	MP001; (***bYP***) MP002; (***Auto***)
LOCK	Toggle VFO LOCK on/off.	**LK0;** Unlock VFO A **LK1;** Lock VFO A **LK$0;** Unlock VFO B **LK$1;** Lock VFO B	
SPLIT	Toggle between Split and unsplit.	**FT1;** Use VFO B, activate split **FR0;** Cancel split	
RIT	Toggle between RIT on/off.	**RT0;** RIT off **RT1;** RIT on	
XIT	Toggle between XIT on/off.	**XT0;** XIT off **XT1;** XT on	
MODE	Tapping switches to the next mode.	**MDnn; MD$nn;** selects specific mode.	
ANT	Tapping toggles between ANT 1 and ANT 2 for the Main receiver.	**AN1;** and **AN2;** select each.	
RX ANT	When Sub is on, holding toggles between ***MAIN*** and ***AUX*** for the Sub receiver.	No equivalent.	

Rule 4: Wherever possible, avoid using switch taps or holds or toggling menus in macros where you want a defined state outcome. Use, instead, a command that leaves the parameter in a defined state.

4.5 Timing and Synchronization

A problem with trying to understand how to write macros that achieve a consistent and reliable result is that we do not know how the multiprocessor systems implement macro processing. One potential problem is that there may be no synchronization mechanism to account for differences in the execution time of different Programmer's Commands. The Programmer's Reference Manual tells us that the K3 will typically respond in less than 10 ms with worst-case latency of around 100 ms except for band changes that may take up to 500 ms. Some commands cannot be safely handled when the transceiver is in a busy state, such as transmit, or a limited-access state such as ***b SEt***.

Macros cannot use GET commands to ensure the Programmer's Command has taken effect before proceeding to the next command the way external control programs can. The problem is

further complicated when commands are executed on different parts of the system, i.e. the K3S and the P3 or KX3 and PX3.

K3S/K3 firmware version 5.60 gives us a command (**DEnnn;** see *Generating a Delay*, page 43), that will generate a short delay. The delay command is handled in the background so it suspends only execution of control command processing. There's no impact on normal radio operation. It also won't affect the P3, which has its own private dialog with the radio. It may be that macro processing and interactions between commands is still more complex than can be solved by delaying one command relative to another. Nevertheless, a command that implements a delay is useful to help synchronize a succession of commands or allow us to do more troubleshooting.

When and Where You Should use a Delay

Depending on where they are in the command sequence, commands that change frequencies or bands or certain switch taps and holds may not execute reliably or may cause following commands to not execute. By adding a delay after these, the commands that follow can be executed properly. Here is a strategy for adding delays:

- Identify a command that is not executing correctly and look for "problematic" commands preceding it that may benefit by adding a delay. For example, a simple macro like

  SWT13;SWT13; (double tap A>B)

  transfers VFO A to VFO reliably. When SWH58; is added to normalize VFO A before transferring to VFO B,

  SWH58;SWT13;SWT13;

  VFO B filter is not normalized. Adding a delay after the SWH58; fixes the problem.

  SWH58;DE255;SWT13;SWT13;

- Determine the amount of delay needed by starting with the maximum – DE255;. Then try lower values by reducing the delay by a factor of two for each trial. You will soon zero in on a delay that no longer works. Now increase the delay by a ¼ step, which will likely work. See Table 4-2.

Table 4-2. Finding a delay.

Delay Command	Delay (ms)	Macro Works?
DE255;	2,550	Yes
DE128;	1,280	Yes
DE064;	64	No
DE096;	96	Yes

4.5.1 Commands that Seem to need a Delay

Table 4-3 shows some Programmer's Commands where a delay is needed to produce a consistent and expected result. There may be others.

Table 4-3. Programmer's Commands needing delays.

Command	Problem Command Sequence		Problem	Potential Solution	
SWH58;	SWH58; SWT13; SWT13;	Normalize VFO A filter; transfer all to VFO B.	VFO B not normalized .	SWH58;DE064; SWT13;SWT13;	A delay is needed after the switch hold.
SWH58;	SWT11; SWH58; SWT11;	Swap A<>B; normalize VFO A filter; swap A<>B back.	Second VFO swap not done.	SWT11;SWH58; DE096;SWT11;	Delay needed after the switch.
MC001;	MC001; SWT13; MC001; SWH41;	Recall memory 01 and start scan.	Recalls the memory but doesn't start the scan.	MC001;SWT13; MC001;DE002;SW H41;	A short delay is needed.
DNB;	SWH40;DNB; DNB;DNB; DNB;SWT40;	Turn off text decoding.	Doesn't reliably execute four DNB; commands	SWH40;DNB; DE016; DNB; DE016;DNB; DE016;DNB; SWT40;	Moving VFO B down needs a short delay.[44]

Rule 5: If erratic behavior is seen, try adding a delay command.

Exercise

Write a macro to normalize VFO A filter and transfer all filter data and VFO A frequency to VFO B.

SWH58;DE096;SWT13;SWT13;

The execution of the SWH58 command seems to collide with the first SWT13; adding delay seems to fix it.

[44] Curiously, the DN; command to move VFO A doesn't need a delay to execute reliably.

4.5.2 Switch Emulation and Command Alternatives

"The switch emulation commands (SWT/SWH) were always intended as a backup method in cases where dedicated two-letter commands hadn't yet been written. Given that SWT/SWH trigger switch events as if they were coming from the front panel, interactions with other in-line commands are inevitable."[45]

It is always better to use a two-letter command when one is available instead of a switch tap or hold. Appendix D, page 181, summarize K3 and KX3 switch tap and hold commands that can be achieved with another Programmer's Command. Unfortunately, not all SWT and SWH commands have equivalent two-letter commands.

Rule 6: Use a two-letter command instead of a switch tap or hold emulation whenever possible.

4.6 Other Hints

- If VFOs are linked (**LN1;**), commands that affect the VFO A frequency also change VFO B. These include **FA, UP, DN, RU, RD**, and **RC**.
- In diversity mode (**DVn;**), **BWnnnn;, MDnn;** and **DTn;** match VFO B filter bandwidth and Sub receiver mode to VFO A. **IS nnnn;** also shifts the VFO B filter center. Turn on diversity (**DV1;**), make the changes to VFO A, and then turn diversity and the Sub receiver off (**SB0;**). See *CW mode VFO A, VFO B all bands*, page 116.

Exercise

Write a macro that will set both VFO A and VFO B filters to 500 Hz bandwidth centered on the passband.

DV1;BW0050;IS 9999;SB0;

- The switch commands for the reverse switch on the K3 (**SWT12;)** and KX3 (**SWH25;)** apply to swapping repeater input/output frequencies in FM mode only.
- When making changes to VFO B filter, if possible, swap A/B (**SWT11;** or **SWT24;**) , make changes to VFO A, and then swap back.

[45] Information from Wayne, N6KR, in email 1/3/2017.

Exercise

Write a macro that will set VFO B filter to 500 Hz bandwidth centered on the passband.

SWT11;BW0050;IS 9999;SWT11;

- If you are using a K•Pod to execute macros, remember that holding F1 – F8 executes Macro 1 – Macro 8 and tapping F1 – F8 executes Macro 9 – Macro 16. See Chapter 5, page 82. A hold is > 0.5 second.
- When testing macros using the K3s/P3 or KX3/PX3/KXPA100 systems, if a macro doesn't work as expected, remove intervening peripherals to simplify. For example, connect the KX3 Utility directly to the KX3 without wiring up the KXPA100 and PX3. If it works, then add back the PX3 and confirm the macros works. Ditto the KXPA100. In this way, you can eliminate RS232 traffic to confirm the macro actually works.[46]
- Beware the use of "COM port concentrators". These software solutions consolidate multiple COM ports in the Windows OS so that multiple programs can each access the radio, including any macros being run. This is accomplished by sending commands to the radio as they arrive at different times. This may well impact what your intended macro actually does. For this reason, Elecraft Customer Service recommends that macros not be run with COM port concentrators that allow multiple programs to be run at the same time.[46]

4.7 Programmer's Commands Anomalies

Command	Operation
IS 9999;	Not implemented for VFO B unless in diversity mode.
DV;	No diversity in KX3.
LN;	VFOs not linked in KX3.
ANn;	Antenna selection only for Main receiver.
BN$nn;	Not implemented for VFO B.
XTn;	XIT disabled in QRQ CW mode.

4.8 Start Small and Work Up

Because there may be complex interactions between Programmer's Commands, particularly without an ability to synchronize execution times, it is best when writing a complex macro

[46] Thanks David Shoaf, Elecraft Customer Service for these two hints.

program to start small and test each component part individually before combining them in a complex macro.

Use the K3 or KX3 Utility Command Tester to confirm expected macro behaviors.

For example, take the CLEANUP macro from page 99. The complete macro is:

	Normalize transceiver.	
Group	**K3s/K3**	
1	FT0;	Transmit on VFO A.
	SB0;	Sub receiver off.
2	SWH58;	Normalize VFO A bandwidth and center.
	SWT13;SWT13;	Transfer VFO A to VFO B.
3	RT0;XT0;	Set RIT and XIT off.
	LK0;LK$0;	Unlock VFO A and VFO B.
	DB00;	Set normal VFO B display.
4	FT0;SB0;SWH58;SWT13;SWT13;SWT13;RT0;XT0;LK0;LK$0;DB00;	

We can identify three “logical” groupings of commands – 1, 2, and 3. Our testing and development strategy will be to use the Utility program to test each of the commands separately and then to gradually add each group, testing as we go. For each test, we must try a set of different initial conditions to check that the group works properly. For example, to test group 1, a logical set of initial conditions would be to set the transceiver in split mode with the Sub receiver on. You should also test it with split mode off and the Sub receiver on and off. Try as many combinations as you can think of.

To test group 2 we start with the command sequence

SWH58;SWT13;SWT13;

whose goal is to normalize and center the VFO A filter and then transfer the filter settings and frequency to VFO B. Testing will show that VFO B filter is not normalized. It seems that we have to add a delay after the SWH58; as shown in *When and Where You Should use a Delay*, page 76, to reliably normalize VFO B filter.

Test group 3 and then start combining the groups, repeating the testing conditions used for each group.

In the end, you should reach group 4 with a fully working macro.

Rule 7: Start small; test each component separately; apply Rules to fix unexpected behaviors, and continue testing as components are added.

4.9 Sometimes Stuff Doesn't Happen

Finally, the programming needed to process macros is complex. There are many real-time-system constraints such as what the transceiver is doing at the moment, processing time for an individual command, and synchronization of multiple processors to be considered. A simple macro such as

SWH33;SWT25;SWT25; Normalize KX3 VFO A and VFO B

may work fine until embedded in a more complex macro. You may have to resort to breaking complex macros into smaller elements to be executed separately.

Rule 8: Some commands, while they may work fine in isolation, simply do not seem to produce consistent results reliably when in a longer macro sequence of commands. Consider breaking complex macros into separate elements.

4.10 Rules of the Road Summary

Rule 1: Inspect Appendix B, *Per-Band, Per-Mode Configurations*, page 165 to see the per-dependencies for each configuration you wish to change. Make sure you set the dependencies (band, mode, antenna, receiver) *before* making changes to the configuration or parameter.

Rule 2: If erratic behavior persists, try changing the order of the commands in the macro or repeating commands.

Rule 3: Check your command syntax carefully

Rule 4: Wherever possible, avoid using switch taps or holds or toggling menus in macros where you want a defined state outcome. Use, instead, a command that leaves the parameter in a defined state.

Rule 5: If erratic behavior is seen, try adding a delay command.

Rule 6: Use a two-letter command instead of a switch tap or hold emulation whenever possible.

Rule 7: Start small; test each component separately; apply Rules to fix unexpected behaviors, and continue testing as components are added.

Rule 8: Some commands, while they may work fine in isolation, simply do not seem to produce consistent results reliably when in a longer macro sequence of commands. Consider breaking complex macros into separate elements.

Chapter 5. The Elecraft K•Pod

Figure 5-1. K•Pod

The K•Pod is a heavy, free spinning knob that can be attached to a K3S/K3. It has a rocker switch to control VFO A, VFO B, or the RIT/XIT offset. It has eight switches that can be tapped or held to activate 16 macros stored in the K3S/K3 plus three switchable auxiliary outputs that can switch to ground up to 50 V dc at 100 mA. There are four LEDs that can be controlled by K3S/K3 Programmer's Commands as shown in Table 5-2.

Table 5-1. K•POD function Keys.

	K•POD F1 – F8, F1 – F8							
Tapping	F1	F2	F3	F4	F5	F6	F7	F8
	Macro 9	Macro 10	Macro 11	Macro 12	Macro 13	Macro 14	Macro 15	Macro 16
Holding	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**
	Macro 1	Macro 2	Macro 3	Macro 4	Macro 5	Macro 6	Macro 7	Macro 8

Table 5-2. K3S/K3 K•Pod programmer's commands.

K•Pod Controls		
Control switchable outputs.	KPOUT	**KPOUTnON; KPOUTnOFF;** n = **1 – 3.**

Control LEDs.	KPLED	**KPLEDnON; KPLEDnOFF;** n = **1 – 4** or **R** for D1 – D3 to show state of the rocker switch.

Table 5-3. K•Pod D1 – D4 indicators.

	D1	D2	D3	D4
KPLEDRON;	VFO A	VFO B	RIT/XIT	**KPLED4ON/OFF;**
KPLEDROFF;	**KPLEDnON/OFF;**			

5.1 K•Pod Cables

Figure 5-2 shows the cable connections of the K•Pod.

9 – 15 VDC: A female 5.5 mm OD x 2.1 mm ID coaxial cable to RCA plug is supplied with the K•Pod. The K•Pod requires 50 mA, which can be supplied by the switched, 12 VDC output on the back panel of the K3S/K3.

USB: This USB port is connected to a computer using the supplied USB A-to-B cable. You should connect this only when updating the K•Pod firmware. See *Updating K•Pod Firmware*, page 91.

RADIO: The K•Pod connects to the data connector on the bottom right side of the K3S/K3. The supplied K3xS/K3 Data Cable is 30" and uses 6P6C connectors. Do not use the similar standard RJ12 cable unless you remove the pin 1 connection. See your K•Pod Owner's manual, Appendix B.

The RADIO connection can also supply power to the K•Pod. Late model K3S radios can power the K•Pod directly. Early model K3S and K3 radios must have a simple modification done as shown in your K•Pod Owner's manual, Appendix A.

AUX OUT: This 3.5 mm, TRRS jack provides three switched outputs controlled by K3S/K3 Programmer's Commands. See *Auxiliary Outputs*, page 88.

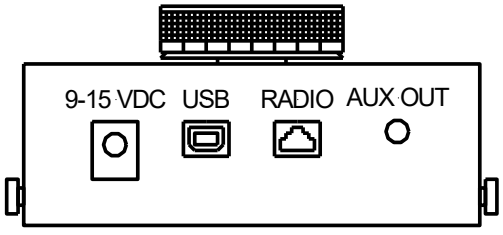

Figure 5-2. K•Pod cable connections.

5.2 Using the K•Pod

5.2.1 Function Keys

The K•Pod does not store any K3S/K3 macros. It merely provides more function keys that can execute any of the 16 macros stored in the K3S/K3. Further, the keys are not programmable like the K3S/K3 programmable function keys that can be programmed to execute any of the first eight macros. Each of the K•Pod's tapped or held function keys can execute only its designated macro as shown in Table 5-1.

When a K•Pod function key executes a K3 macro that sends a CW or SSB (when the DVR is installed) message, tapping or holding the function key will send the programmed message.

Exercise

Write a macro so that tapping K•Pod F1 *sends* the CW message stored in the K3 M1.

Using the K3 Utility macro editor, edit Macro 9 to be SWT21;
Write the macros to the K3.

Exercise

Write a macro so that tapping K•Pod F1 *repeats* the CW message stored in the K3 M1.

Using the K3 Utility macro editor, edit Macro 9 to be SWH21;
Write the macros to the K3.

Exercise

Write a macro so that holding K•Pod F1 *sends* the CW message stored in the K3 M1.

Using the K3 Utility macro editor, edit Macro 1 to be SWT21;
Write the macros to the K3.

Exercise

Write a macro so that holding K•Pod F1 *repeats* the CW message stored in the K3 M1.[47]

Using the K3 Utility macro editor, edit Macro 1 to be SWH21;
Write the macros to the K3.

---

[47] Remember that holding the K•Pod F1 function key merely executes the macro stored in Macro 1. It is not the same as holding the K3 M1 switch.

Exercise

Assume the CW message stored in the K3 M1 is CQ and in M2 is your callsign. Write macros so that tapping K•Pod F8 repeats the CQ until a tap of F7 to sends your call.

Using the K3 Utility macro editor, edit Macro 16 to be SWH21; and Macro 15 to be SWT31;
Write the macros to the K3.

Exercise

How do you set the message repeating time delay?

Tap the K3 MENU, rotate VFO B to ***MSG RPT*** and then rotate VFO A to select the delay time in seconds.

Exercise

Write a macro to set the ***MSG RPT*** to one second.

K3s/K3	
MN005;	Access the ***MSG RPT*** menu.
MP001;	Set it to one second.
MN255;	Exit the menu.
MN005; MP001;MN255;	

5.2.2 Rocker Switch

The rocker switch below the tuning knob controls VFO A, VFO B, or the RIT/XIT offset. DXers will find it useful to use it in the VFO B position when operating split and tuning for the station the DX is working. Contesters will find it useful to use it to tune the RIT to hear those stations that call off-frequency. Note that you must turn the K3S/K3 RIT on before controlling it with the knob. This, of course, could be done with a macro executed by the K•Pod. See page 133.

When the rocker switch is in the center position to control VFO B while the VFO B display area is being used to show an alternate VFO B display (see *VFO B Display Write and Mode Commands*, page 27), the VFO B frequency will be displayed while the K•Pod is tuning.

At the time this is written, you cannot set the function of the rocker switch by executing a macro. You must mechanically set the switch.

The D1 – D3 LEDs shown the function that the rocker switch is providing when the **KPLEDRON;** Programmer's Command has been executed as shown in Table 5-3. See *D1 – D4 LEDs* below.

5.2.3 D1 – D4 LEDs

The four LEDs below the tuning knob can show which VFO the knob is tuning or can be controlled by a macro to show other status information as shown in Table 5-3. For example, you could turn them all off and have D1 lit when in split mode.

5.2.4 K•Pod Knob Tuning Rate

At the current level of K•Pod firmware (1.09) the VFO and RIT/XIT tuning rates are different than those in the K3S/K3. See Table 5-4 and Table 5-5.

Table 5-4. K•Pod VFO tuning rate.

K3S ***VFO CTS*** = ***200***	**Tuning Control**		
	Fine	**Fine**	**Coarse**
	1 Hz	**10 Hz**	**100 Hz**
K3S VFO A	200 Hz/rev	2 kHz/rev	10 kHz/rev
K•Pod VFO A	100 Hz/rev	1 kHz/rev	5 kHz/rev
K•Pod VFO A (Hold F3 on power-up)	50 Hz/rev	500 Hz/rev	2.5 kHz/rev

Table 5-5. K•Pod RIT/XIT tuning rate.

	RIT/XIT Tuning Rate
K3S OFS RIT/XIT	500 Hz/rev
K•Pod RIT/XIT	1 kHz/rev
K•Pod RIT/XIT (Hold F3 on power-up)	500 Hz/rev

5.2.5 K•Pod Tones

The K•Pod emits three very low level tones[48] when the buttons are pushed or the rocker switch activated. The tones can be muted by holding F1 during power-up. This is not a sticky setting and must be done every power-up. See Table 5-6.

[48] KE7X can hear them only when he has his hearing aids on.

Table 5-6. K•Pod beep tones.

Switch	Beep Tone Hz
F1 – F8 F1 – F8	1000
VFO A	1000
VFO B	1500
RIT	2000

Exercise

What K•Pod commands would be added to a split macro so that D1 is On in split mode?

Set split +2 kHz, Sub RX on, VFO A bandwidth 250 Hz, VFO B bandwidth 700 Hz, lock VFO A, turn K•Pod D1 on.	
K3s/K3	
SWT13;SWT13;	Transfer VFO A to VFO B.
UPB5;	Move VFO B up 2 kHz.
BW0025;	Set VFO A bandwidth 250 Hz.
BW$0070;	Set VFO B bandwidth 700 Hz.
RT0;XT0;	Turn RIT and XIT off.
SB1;	Turn Sub on.
FT1;	Transmit on VFO B, turn split on.
LK1;	Lock VFO A (optional)
Add these commands:	
KPLEDROFF;	Turn off rocker switch function LEDs.
KPLED1ON;	Turn on D1.
KPLED2OFF;	Turn off D2. (If D2 is not used for something else.)
KPLED3OFF;	Turn off D3. (If D3 is not used for something else.)
KPLED4OFF;	Turn off D4. (If D4 is not used for something else.)
SWT13;SWT13;UPB5;BW0025;BW$0070;RT0;XT0;SB1;FT1;LK1;KPLEDROFF;KPLED1ON;KPLED2OFF;KPLED3OFF;KPLED4OFF;	

Exercise

What K•Pod commands would be added to an unsplit macro so that D1 is Off when not in split mode?

Remove split, Sub RX off, VFO A bandwidth 400 Hz, VFO B = VFO A, unlock VFO A, turn off D1.	
K3s/K3	
FT0;	Transmit on VFO A.
FR0;	Cancel split mode.
SB0;	Sub receiver off.
BW0040;	Set VFO A bandwidth 400 Hz.
IS 9999;	Center VFO A bandwidth.
SWT13;SWT13;	Transfer VFO A to VFO B.
RT0;XT0;	Set RIT and XIT off.
LK0;LK$0;	Unlock VFO A and VFO B.
Add these commands:	
KPLEDROFF;	Turn off rocker switch function LEDs.
KPLED1OFF;	Turn off D1.
KPLED2OFF;	Turn off D2. (If D2 is not used for something else.)
KPLED3OFF;	Turn off D4. (If D4 is not used for something else.)
KPLED4OFF;	Turn off D4. (If D4 is not used for something else.)
FT0;FR0;SB0;BW0040;IS 9999;SWT13;SWT13;RT0;XT0;LK0;LK$0; KPLEDROFF;KPLED1OFF;KPLED2OFF;KPLED3OFF;KPLED4OFF;	

5.3 Auxiliary Outputs

The 3.5 mm TRRS jack marked AUX OUT has three auxiliary outputs that can switch up to 50 VDC at 100 mA. These are open-drain transistors similar to that shown in Figure 5-3.

The three auxiliary outputs are switched on (connected to ground) and off (open-drain connection) with the **KPOUTnON;** and **KPOUTnOFF**; commands shown in Table 5-2, page 82.

Figure 5-4 shows a circuit you should use if using an auxiliary output to switch a relay. The diode shown is called a “snubbing diode” (among other names) and works to limit a dangerous overvoltage spike that can develop when interrupting the current flowing through the relay.

Figure 5-5 shows the connections of AUX3 – AUX1 to a TRRS 3.5mm plug. As shown, you can use a TRS plug for two AUX outputs or a TS plug for one.

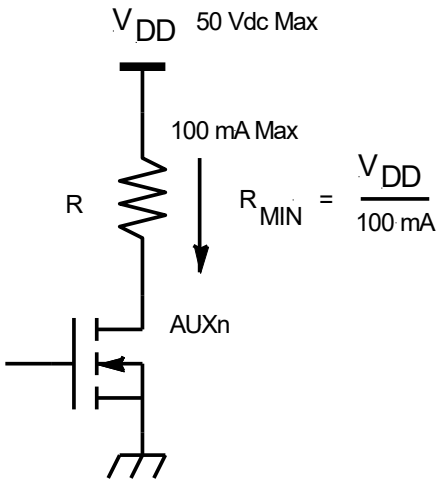

Figure 5-3. K•Pod auxiliary output.

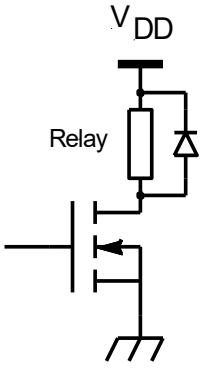

Figure 5-4. Aux output driving a relay.

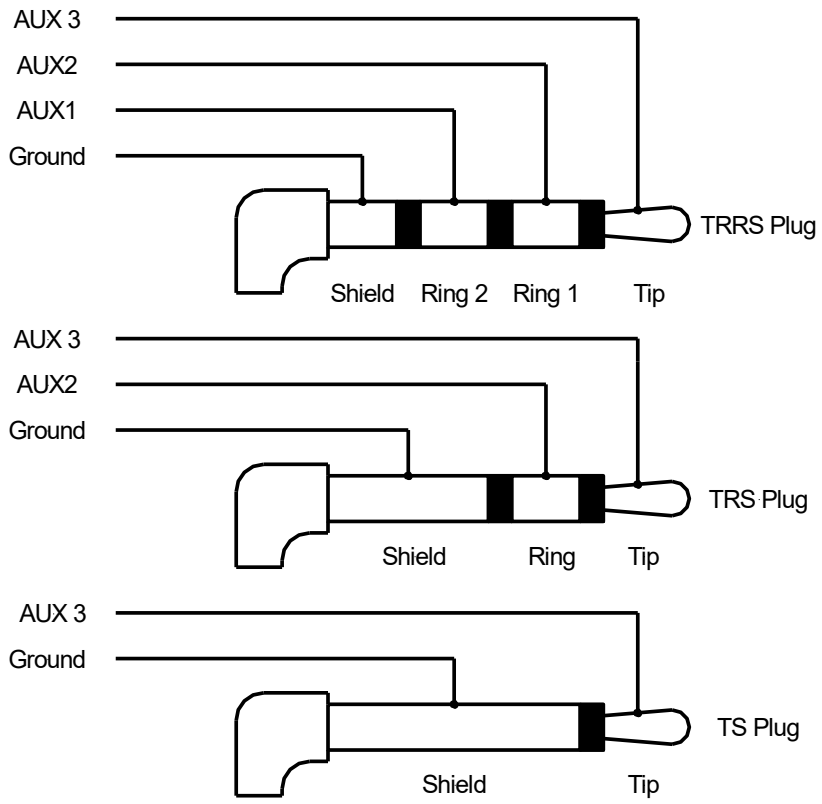

Figure 5-5. Auxiliary output plug options.

Another Digital Output

The K3S/K3 Accessory I/O ACC connector pin-11 is the DIGOUT1 pin. It can be turned ***On*** (grounded) or ***OFF*** (floating) on a per-band, per-antenna basis in the ***DIGOUT1*** CONFIG menu.

Set DIGOUT1 on.	
K3s/K3	
MN019;	Enter ***DIGOUT1*** menu.
MP001;	Set ***DIGOUT1 On***.
MN255;	Exit menu.
MN019;MP001;MN255;	
Set DIGOUT1 off.	
K3s/K3	
MN019;	Enter ***DIGOUT1*** menu.
MP000;	Set ***DIGOUT1 OFF***.
MN255;	Exit menu.
MN019;MP000;MN255;	

5.4 Updating K•Pod Firmware

The K•Pod Utility program is required to update the K•Pod firmware.

1. Disconnect the USB cable from the K•Pod and computer.
2. Install the Utility but do not run the program yet.
3. Disconnect any other cables (power and K3 cable) from the K•Pod.
4. Plug one end of the USB cable into the computer's USB port.
5. While simultaneously holding down the F1 and F4 buttons on the K•Pod, plug the USB cable into the back of the K•Pod.
6. The D4 LED on the K•Pod should blink slowly until the K•Pod has been enumerated or recognized by the PC when it should blink more quickly.
7. Start the K•Pod Utility and the *Firmware* page will be displayed showing the current version of the firmware (Figure 5-6).
8. Browse to the *Local Folder for firmware files* and click on *Copy New Files from Elecraft.*
9. Click on *Send Firmware to K-Pod* to install the new firmware.
10. Disconnect the USB cable from the K•Pod and reconnect the Radio connector and power supply to return to normal operation.

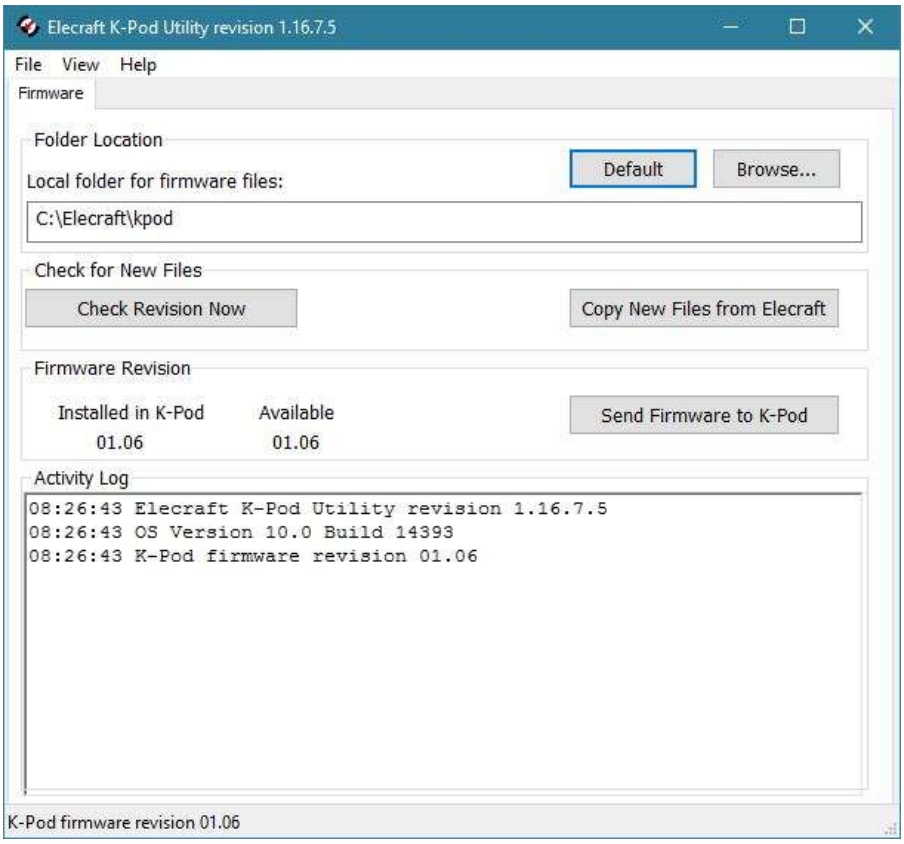

Figure 5-6. K•Pod utility.

5.5 Suggestions for K•Pod Macros

5.5.1 Single Op, 2 VFO (SO2V) Contests

Hold			Tap		
F1	Macro 1		F1	Macro 9	10CW (10 m CW SO2V contest, page 112)
F2	Macro 2	CW30 (CW 30, page 115)	F2	Macro 10	15CW (15 m CW SO2V contest, page 112)
F3	Macro 3	CW25 (CW 25, page 115)	F3	Macro 11	20CW (20 m CW SO2V contest, page 111)
F4	Macro 4	RITTGL (RIT toggle and zeroed, page 114)	F4	Macro 12	40CW (40 m CW SO2V contest, page 112)
F5	Macro 5	UNSPL1V (SO1V VFO A only, listen on VFO A and transmit on VFO A, page 114)	F5	Macro 13	80CW (80 m CW SO2V contest, page 113)
F6	Macro 6	UNSPL2V (SO2V Unsplit, listen on VFO A and VFO B, transmit on VFO A, page 114)	F6	Macro 14	160CW (160 m CW SO2V contest, page 113)
F7	Macro 7	SPL2V (SO2V Split, listen on VFO A and VFO B, transmit on VFO B, page 113)	F7	Macro 15	
F8	Macro 8	A-B (Set the L-MIX-R to a b, page 128)	F8	Macro 16	B-B (Set the L-MIX-R to b b, page 127)

5.5.2 CW DXing

Hold			Tap		
F1	Macro 1		F1	Macro 9	CWMODE (CW mode VFO A, VFO B all bands, page 116)
F2	Macro 2	CW30 (CW 30, page 115)	F2	Macro 10	160-40 (CW frequency 160-40m, page 118)
F3	Macro 3	CW25 (CW 25, page 115)	F3	Macro 11	30-17 (CW frequency 30-17m, page 118)
F4	Macro 4	RITTGL (page, 114)	F4	Macro 12	15-10 (CW frequency 15-10m, page 119)
F5	Macro 5		F5	Macro 13	
F6	Macro 6	UNSPLT (Remove split, page 107)	F6	Macro 14	
F7	Macro 7	SPLTCW (Split CW, listen on VFO A, transmit on VFO B, page 106)	F7	Macro 15	
F8	Macro 8	A-B (Set the L-MIX-R to a b, page 128)	F8	Macro 16	B-B (Set the L-MIX-R to b b, page 127)

5.5.3 SSB DXing

Hold			Tap		
F1	Macro 1	FPMIC (Mic Sel Front Panel, pg 100)	F1	Macro 9	SSBMODE (SSB mode all bands, page 117)
F2	Macro 2	RPMIC (Mic Set Rear Panel, page 100)	F2	Macro 10	160-40 (SSB frequency 160-40m, page 119)
F3	Macro 3		F3	Macro 11	20-17 (SSB frequency 20-17m, page 120)
F4	Macro 4	RITTGL (RIT toggle and zeroed, page, 114)	F4	Macro 12	15-10 (SSB frequency 15-10m, page 120)
F5	Macro 5		F5	Macro 13	
F6	Macro 6	UNSPLT (Remove split, page 107)	F6	Macro 14	
F7	Macro 7	SPLTSSB (Split SSB, listen on VFO A, transmit on VFO B, page 106)	F7	Macro 15	
F8	Macro 8	A-B (Set the L-MIX-R to a b, page 128)	F8	Macro 16	B-B (Set the L-MIX-R to b b, page 127)

Chapter 6. Macro Examples

6.1 Assigning a K3S/K3 Function Key to a Macro

After developing, testing, and debugging a macro and saving it in the macro storage as shown in the previous sections, a programmable function is assigned to execute the macro.

For example, to program your K3S/K3 or KX3 to use PF1 for a macro that is saved in ***MACRO 3***,

1. After writing the macros to the K3S/K3 or KX3 as above, enter the ***MACRO x*** menu and tap 3 (if ***MACRO 3*** is not currently displayed).
2. Hold PF1 to program it to execute ***MACRO 3.***
3. You should see ***PF1 SET*** displayed in the VFO B area.

Now, holding PF1 will display the macro's name while it is being executed.

6.2 Assigning a K•Pod Function Key to a Macro

The K•Pod's function keys are pre-assigned to Macro 1 – Macro 16 and you cannot change them. Tapping F1 – F8 activates stored macros Macro 9 – Macro 16. Holding F1 – F8 executes Macro 1 – Macro 8.

6.3 Assigning P3/SVGA and PX3 Macros

Macros are saved in the P3/SVGA and PX3 using an attached keyboard (not the P3 or PX3 Utility). You may assign up to eight that can be executed by pressing/holding FN1 – FN4, FN5 – FN8. A further forty-two macros, Macro 9 – 50 can be executed from the P3/SVGA or PX3 keyboard. See *P3 and PX3 Programmable Function Keys*, page 68.

6.4 Macro Examples

The following macro examples have been tested with a K3/P3/SVGA and a KX3/PX3. You are welcome to try them and pass them along to others. The author cannot, however, guarantee their operation in others' equipment, nor their appropriateness for any intended application. Users should always make sure they understand what each of the Programmer's Commands does and how it might work in their particular setting.

When developing and testing macros that activate the transmitter, it is a good idea (and a sign of a thoughtful operator) to put the K3S/K3 into TX Test mode or the set the KX3 power out to 0.00.

Please review *Writing Macros – Some Rules of the Road*, page 72.

Remember that macro storage is 120 characters.

Contents

6.4.1 K3S/K3 Macros

Basic Split

K3s/K3	
SWT13;SWT13;	Transfer VFO A to VFO B.
UPB5;	Move VFO B up 2 kHz. See Table 2-11, page 42 for other offsets.
SB1;	Turn Sub on (if installed).
FT1;	Turn split on to transmit on VFO B.
SWT13;SWT13;UPB5;SB1;FT1;	

Basic Unsplit

K3s/K3	
FT0;	Transmit on VFO A.
FR0;	Cancel split mode.
SB0;	Sub receiver off (if installed).
FT0;FR0;SB0;	

Mic Sel Front Panel

Set SSB mode, gain and bias manually	
K3s/K3	
MN053;	Enter ***MIC SEL*** mode.
DN;DN;	Select ***FP.***
MN255;	Exit menu.
MN053;DN;DN;MN255;	

Mic Set Rear Panel

Set SSB mode, gain and bias manually	
K3s/K3	
MN053;	Enter ***MIC SEL*** mode.
DN;DN;UP;	Select ***RP***
MN255;	Exit menu.
MN053;DN;DN;UP;MN255;	

Mic Sel Line In

Set SSB mode, gain and bias manually	
K3s/K3	
MN053;	Enter ***MIC SEL*** mode.
DN;DN;UP;UP;	Select ***LInE In.***
MN255;	Exit menu.
MN053;DN;DN;UP;UP;MN255;	

Normalize VFO A and VFO B Filters.

Assumes mode all ready set.	
K3s/K3	
SWH58;DE096;	Normalize VFO A bandwidth and center and delay
SWT13;SWT13;	Transfer VFO A to VFO B.
SWH58; DE096;SWT13;SWT13;SWT13;	

Normalize VFO A Filter

Assumes mode all ready set.	
K3s/K3	
SWH58;	Normalize VFO A bandwidth and center.
SWH58;	

Normalize VFO B Filter; don't change VFO A filter

Assumes mode all ready set.	
K3s/K3	
SWT11;	Swap A<>B
SWH58; DE096;	Normalize VFO A
SWT11;	
SWT11;SWH58; DE096;SWT11;	

Set and center VFO A filter

K3s/K3	
BW0100;	Set filter to 100 Hz. See Table 2-5, page 27 for more bandwidth codes.
IS 9999;	Center bandwidth.
BW0100;IS 9999;	

Set and center VFO B filter

K3s/K3	
SWT11;	Swap A<>B
BW$0010;	Set filter to 100 Hz. See Table 2-5, page 27 for more bandwidth codes.
IS 9999;	Center it.
SWT11;	Swap A<>B
SWT11;BW0100;IS 9999;SWT11;	

CW Single Band Set

Set CW band, mode, frequency, normalize filters, zero RIT, XIT, set AGC Fast.	
K3S/K3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	CW mode. See Table 2-8, page 33 for other mode numbers.
SWH58; DE096;	Normalize VFO A filter.
FA00014025000;[49]	Set 20 m CW freq.
SWT13;SWT13;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD3;MD$3;SWH58; DE096;FA00014025000;SWT13;SWT13;RC; GT002;	

[49] You can put the delay after the FA command also.

SSB Single Band Set

Set SSB band, mode, frequency, normalize filters, zero RIT, XIT, set AGC Slow.	
K3S/K3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD2;MD$2;	USB mode. See Table 2-8, page 33 for other mode numbers.
SWH58; DE096;	Normalize VFO A filter.
FA00014200000;	Set 20 m SSB freq.
SWT13;SWT13;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT004;	Set AGC slow.
BN05;MD2;MD$2;SWH58; DE096;FA00014200000;SWH13;SWT13;RC;GT004;	

AFSK Single Band Set

Set AFSK band, mode, frequency, normalize filters, zero RIT, XIT, set AGC Fast. You should manually set ***AFSK TX*** filter ***On***. Manually set text decode on.	
K3S/K3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	DATA mode. See Table 2-8, page 33 for other mode numbers.
DT1;DT$1;	AFSK sub-mode.
SWH58; DE096;	Normalize VFO A filter.
FA00014080000;	Set 20 m RTTY freq.
SWT13;SWT13;	Set VFO B frequency and normalize filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT1;DT$1;SWH58; DE096;FA00014080000;SWH13;SWT13;RC;GT002;	

FSK Single Band Set

Set FSK band, mode, frequency, normalize filters, zero RIT, XIT, set AGC Fast. Manually set text decode on.	
K3S/K3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	DATA mode. See Table 2-8, page 33 for other mode numbers.
DT2;DT$2;	FSK sub-mode.
SWH58; DE096;	Normalize VFO A filter.
FA00014080000;	Set 20 m RTTY freq.
SWT13;SWT13;	Set VFO B frequency and normalize filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT2;DT$2;SWH58; DE096;FA00014080000;SWH13;SWT13;RC;GT002;	

PSK Single Band Set

Set PSK band, mode, frequency, normalize filters, zero RIT, XIT, set AGC Fast. Manually set text decode on.	
K3S/K3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	DATA mode. See Table 2-8, page 33 for other mode numbers.
DT3;DT$3;	PSK sub-mode.
BW0002;	Set bandwidth 20 Hz.
IS 9999;	Center VFO A filter.
FA00014070000;	Set 20 m PSK freq.
SWT13;SWT13;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT3;DT$3;BW0002;IS 9999;FA00014070000;SWT13;SWT13;RC;GT002;	

Auto Spot

Taps auto spot. CWT must be turned on.	
K3s/K3	
SWT40;	Tap SPOT switch.
SWT40;	

Clean up.

Normalize transceiver.	
K3s/K3	
FT0;	Transmit on VFO A.
SB0;	Sub receiver off.
SWH58;DE096;	Normalize VFO A bandwidth and center.
SWT13;SWT13;	Transfer VFO A to VFO B.
RT0;XT0;	Set RIT and XIT off.
LK0;LK$0;	Unlock VFO A and VFO B.
DB00;	Set normal VFO B display.
FT0;FR0;SB0;SWH58; DE096;SWT13;SWT13;RT0;XT0;LK0;LK$0;DB00;	

Split CW, listen on VFO A, transmit on VFO B

Set split +2 kHz, Sub RX on, VFO A bandwidth 250 Hz, transmit on VFO B, VFO B bandwidth 700 Hz, lock VFO A.	
K3s/K3	
SWT13;	Transfer VFO A freq to VFO B.
BW0070;	Set bandwidth 700 Hz (will be VFO B)
IS 9999;	Center the VFO A bandwidth.
SWT11;	Swap A <> B
BW0025;	Set VFO A bandwidth 250 Hz (optional).
IS 9999;	Center the VFO A bandwidth.
UPB5;	Move VFO B up 2 kHz. See Table 2-11, page 42 for other offsets.
RT0;XT0;	Turn RIT and XIT off.
SB1;	Turn Sub on (if installed).
FT1;	Turn split on to transmit on VFO B.
LK1;	Lock VFO A (optional)
SWT13;BW0070;IS 9999;SWT11;BW0025;IS 9999;UPB5;RT0;XT0;SB1;FT1;LK1;	

Split SSB, listen on VFO A, transmit on VFO B

Set split +5 kHz, Sub RX on, no bandwidth changes, RIT, XIT off, lock VFO A.	
K3s/K3	
SWT13;SWT13;	Transfer VFO A to VFO B.
UPB7;	Move VFO B up 5 kHz. See Table 2-11, page 42 for other offsets.
RT0;XT0;	Turn RIT and XIT off.
SB1;	Turn Sub on (if installed).
FT1;	Turn split on to transmit on VFO B.
LK1;	Lock VFO A (optional)
SWT13;SWT13;UPB7;RT0;XT0;SB1;FT1;LK1;	

Remove split

Remove split, Sub RX off, normalize bandwidth, VFO B = VFO A.	
K3s/K3	
FT0;	Transmit on VFO A.
FR0;	Cancel split mode.
SB0;	Sub receiver off.
SWH58; DE096;	Normalize bandwidth.
SWT13;SWT13;	Transfer VFO A to VFO B.
RT0;XT0;	Set RIT and XIT off.
LK0;LK$0;	Unlock VFO A and VFO B.
FT0;FR0;SB0;SWH58; DE096;SWT13;SWT13;RT0;XT0;LK0;LK$0;	

Toggle between split and unsplit

Toggle between split and unsplit by holding PF2	
Uses Macro 4 and Macro 5 and PF2.	
Assign the following to Macro 4:	
K3S/K3	
	Basic Split
SWT13;SWT13;	Transfer VFO A to VFO B.
UPB5;	Move VFO B up 2 kHz. See Table 2-11, page 42 for other offsets.
SB1;	Turn Sub on (if installed).
FT1;	Turn split on to transmit on VFO B.
MN110;	Enter the ***MACRO n*** menu.
SWT27;	Tap the 5 switch.
SWH47;	Hold PF2. (This assigns PF2 to the commands in Macro 4 for the next hold.)
MN255;	Exit menu mode.
SWT13;SWT13;UPB5;MN110;SWT27;SWH47;MN255;	
Assign the following to Macro 5:	
	Basic Unsplit
FT0;	Transmit on VFO A.
FR0;	Cancel split mode.
SB0;	Sub receiver off (if installed).
MN110;	Enter the ***MACRO n*** menu.
SWT24;	Tap the 4 switch.
SWH47;	Hold PF2. (This assigns PF2 to the commands in Macro 4 for the next hold.)
MN255;	Exit menu mode.
FT0;FR0;SB0;SWH58;SWT13;SWT13;RT0;XT0;LK0;LK$0;MN110;SWT24;SWH47;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 4. Hold PF2 to program it to execute ***MACRO 4***. Each time you hold PF2 the radio switches between split and unsplit.	

Using a K•Pod button to toggle split/unsplit

Using a K•Pod button to toggle split/unsplit.	
A K•Pod button cannot directly replace the PF2 function key in the Toggle Split macro (above) but you can use a K•Pod button to activate a macro that holds PF2.	
K3s/K3	
SWH47;	Hold PF2.
Write this macro to one of the 16 in the K3s/K3 and tap or hold the corresponding K•Pod switch.	

20 m CW

Set up for 20 m CW (See also page 156.)	
K3s/K3	
BN05;	Set to 20 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
SWH58; DE096;	Normalize and center VFO A passband.
RT0;XT0;	RIT and XIT off.
GT002;	Set AGC-F
FA00014025000;	VFO A set to 14.025 MHz.
SWT13;SWT13;	VFO B set to 14.025 MHz.
BN05;MD3;MD$3;SWH58; DE096;RT0;XT0;GT002;FA00014025000;SWT13;SWT13;	

20 m SSB

Set up for 20 m SSB (See also page 156.)	
K3s/K3	
BN05;	Set to 20 meters. See Table 2-4, page 27 for other band numbers.
MD2;MD$2;	Set USB mode.
SWH58; DE096;	Normalize and center passband.
RT0;XT0;	RIT and XIT off.
GT004;	Set AGC-S
FA000141655000;	VFO A set to 14.165 MHz.
SWT13;SWT13;	VFO B set to 14.165 MHz.
BN05;MD2;MD$2;SWH58;RT0;XT0;GT004;FA00014165000;SWT13;SWT13;	

20 m RTTY

Set up for 20 m AFSK RTTY (See also page 157.)	
K3s/K3	
BN05;	Set to 20 meters. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	Set DATA mode.
DT1;DT$1;	Set AFSK sub-mode. (Use DT2;DT$2; for FSK D.)
SWH58; DE096;	Normalize and center passband.
RT0;XT0;	RIT and XIT off.
GT002;	Set AGC-F.
FA00014080000;	VFO A set to 14.080 MHz.
SWT13;SWT13;	VFO B set to 14.080 MHz.
MN053;	Enter MIC SEL menu.
DN;DN;	Reset it to front panel.
UP;UP;	Set it to Line In.
MN255;	Exit menu.
BN05;MD6;MD$6;DT1;DT$1;SWH58; DE096;RT0;XT0;GT002;FA00014080000;SWT13;SWT13;MN053;DN;DN;UP;UP;MN255;	

20 m PSK

Set up for 20 m PSK (See also page 157.)	
K3s/K3	
BN05;	Set to 20 meters. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	Set DATA mode.
DT3;DT$3;	Set PSK sub-mode.
BW0025;	Bandwidth 250 Hz.
IS 9999;	Center the passband.
RT0;XT0;	RIT and XIT off.
FA00014070000;	VFO A set to 14.070 MHz.
SWT13;SWT13;	VFO B set to 14.070 MHz.
MN053;	Enter MIC SEL menu.
DN;DN;	Reset it to front panel.
UP;UP;	Set it to Line In.
MN255;	Exit menu.
BN05;MD6;MD$6;DT3;DT$3;BW0025;IS 9999;RT0;XT0;FA00014070000;SWT13; SWT13;MN053;DN;DN;UP;UP;MN255;	

20 m CW SO2V contest

Set up for 20 m CW; Don't change filtering or other settings.	
K3s/K3	
BN05;	Set to 20 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RC;	RIT and XIT zero if turned on.
FA00014025000;	VFO A set to 14.025 MHz.
SWT13;	VFO B set to 14.025 MHz. (Don't change filters.)
BN05;MD3;MD$3;RC;FA00014025000;SWT13;	

10 m CW SO2V contest

Set up for 10 m CW; Don't change filtering or other settings.	
K3s/K3	
BN09;	Set to 10 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RC;	RIT and XIT zero if turned on.
FA00028025000;	VFO A set to 28.025 MHz.
SWT13;	VFO B set to 28.025 MHz.
BN09;MD3;MD$3;RC;FA00028025000;SWT13;	

15 m CW SO2V contest

Set up for 15 m CW; Don't change filtering or other settings.	
K3s/K3	
BN07;	Set to 15 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RC;	RIT and XIT zero if turned on.
FA00021025000;	VFO A set to 21.025 MHz.
SWT13;	VFO B set to 21.025 MHz.
BN07;MD3;MD$3;RC;FA00021025000;SWT13;	

40 m CW SO2V contest

Set up for 40 m CW; Don't change filtering or other settings.	
K3s/K3	
BN03;	Set to 40 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RC;	RIT and XIT zero if turned on.
FA00007025000;	VFO A set to 7.025 MHz.
SWT13;	VFO B set to 7.025 MHz.
BN03;MD3;MD$3;RC;FA00007025000;SWT13;	

80 m CW SO2V contest

Set up for 80 m CW; Don't change filtering or other settings.	
K3s/K3	
BN01;	Set to 80 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RC;	RIT and XIT zero if turned on.
FA00003525000;	VFO A set to 3.525 MHz.
SWT13;	VFO B set to 3.525 MHz.
BN01;MD3;MD$3;RC;FA00003525000;SWT13;	

160 m CW SO2V contest

Set up for 160 m CW; Don't change filtering or other settings.	
K3s/K3	
BN00;	Set to 160 meters. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RC;	RIT and XIT zero if turned on.
FA00001825000;	VFO A set to 1.825 MHz.
SWT13;	VFO B set to 1.825 MHz.
BN00;MD3;MD$3;RC;FA00001825000;SWT13;	

SO2V Split, listen on VFO A and VFO B, transmit on VFO B

Sub RX on, transmit on VFO B	
K3s/K3	
SB1;	Turn Sub on.
RC;	Set RIT and XIT to 0.00.
FT1;	Turn split on to transmit on VFO B.
SB1;RC;FT1;	

SO2V Unsplit, listen on VFO A and VFO B, transmit on VFO A

Sub RX on, transmit on VFO A	
K3s/K3	
SB1;	Turn Sub on. (Optional)
RC;	Set RIT and XIT to 0.00.
FT0;	Turn split off to transmit on VFO A.
SB1;RC;FT0;	

SO1V VFO A only, listen on VFO A and transmit on VFO A

Sub RX off, transmit on VFO A	
K3s/K3	
SB0;	Turn Sub off.
RC;	Set RIT and XIT to 0.00.
FT0;	Turn split off to transmit on VFO A.
SB0;RC;FT0;	

RIT toggle and zeroed

K3s/K3	
SWT45;	Toggle RIT on/off
RC;	Set RIT and XIT to 0.00.
SWT45;RC;	

RIT on and zeroed

K3s/K3	
RT1;	Set RIT on
RC;	Set RIT and XIT to 0.00.
RT1;RC;	

RIT off and zeroed

K3s/K3	
RT0;	Set RIT off
RC;	Set RIT and XIT to 0.00.
RT1;RC;	

CW 30 WPM

Set CW speed to 30 WPM	
K3s/K3	
KS030;	30 WPM
KS030;	

CW 25 WPM

Set CW speed to 25 WPM	
K3s/K3	
KS025;	25 WPM
KS025;	

CW mode VFO A, VFO B all bands

Set CW mode on all bands.	
K3s/K3	Does not set the mode for VFO B
DV1;	Turn diversity on so mode changes for both VFO A and B.
BN00;	Set 160 m. See Table 2-4, page 27 for other band numbers.
MD3;	Set CW mode VFO A.
BN01;	Set 80 m.
MD3;	Set CW mode.
BN03;	Set 40 m.
MD3;	Set CW mode.
BN04;	Set 30 m.
MD3;	Set CW mode.
BN05;	Set 20 m.
MD3;	Set CW mode.
BN06;	Set 17 m
MD3;	Set CW mode.
BN07;	Set 15 m.
MD3;	Set CW mode.
BN08;	Set 12 m.
MD3;	Set CW mode.
BN09;	Set 10 m.
MD3;	Set CW mode.
BN10;	Set 6 m
MD3;	Set CW mode.
SB0;	Turn diversity and sub receiver off.
DV1;BN00;MD3;BN01;MD3;BN03;MD3;BN04;MD3;BN05;MD3;BN06;MD3;BN07;MD3;BN08; MD3;BN09;MD3;BN10;MD3;SB0;	

SSB mode all bands, VFO A and VFO B

Set SSB mode on all bands.	
K3s/K3	
DV1;	Turn diversity on so mode changes for both VFO A and B.
BN00;	Set 160 m. See Table 2-4, page 27 for other band numbers.
MD1;	Set LSB mode.
BN01;	Set 80 m.
MD1;	Set LSB mode.
BN03;	Set 40 m.
MD1;	Set LSB mode.
BN05;	Set 20 m.
MD2;	Set USB mode.
BN06;	Set 17 m
MD2;	Set USB mode.
BN07;	Set 15 m.
MD2;	Set USB mode.
BN08;	Set 12 m.
MD2;	Set USB mode.
BN09;	Set 10 m.
MD2;	Set USB mode.
BN10;	Set 6 m
MD2;	Set USB mode.
SB0;	Turn diversity and sub receiver off.
DV1;BN00;MD1;BN01;MD1;BN03;MD1;BN05;MD2;BN06;MD2;BN07;MD2;BN08;MD2;BN09; MD2;BN10;MD2;SB0;	

CW frequency 160-40m

Set CW frequency.	
K3s/K3	Not enough macro storage characters to set the mode too, so run *CW mode VFO A*, VFO B all bands, page 116 first. Filters equalized not normalized.
FA00001825000;	Set VFO A 160m frequency.
SWT13;SWT13;	Set VFO B frequency and filter.
FA00003525000;	Set VFO A frequency 80m.
SWT13;SWT13;	Set VFO B frequency.
FA00007025000;	Set VFO A frequency 40m.
SWT13;SWT13;	Set VFO B frequency.
FA00001825000;SWT13;SWT13;FA00003525000;SWT13;SWT13;FA00007025000;SWT13; SWT13;	

CW frequency 30-17m

Set CW	
K3s/K3	Not enough macro storage characters to set the mode too, so run *CW mode VFO A*, VFO B all bands, page 116 first. Filters equalized not normalized.
FA00010100000;	Set VFO A frequency 30m.
SWT13;SWT13;	Set VFO B frequency.
FA00014025000;	Set VFO A frequency 20m.
SWT13;SWT13;	Set VFO B frequency.
FA00018070000;	Set VFO A frequency 17m.
SWT13;SWT13;	Set VFO B frequency.
FA00010100000;SWT13;SWT13;FA00014025000;SWT13;SWT13;FA00018070000;SWT13; SWT13;	

CW frequency 15-10m

Set CW	
K3s/K3	Not enough macro storage characters to set the mode too, so run *CW mode VFO A*, VFO B all bands, page 116 first. Filters equalized not normalized.
FA00021025000;	Set VFO A frequency 15m.
SWT13;SWT13;	Set VFO B frequency.
FA00024900000;	Set VFO A frequency 12m.
SWT13;SWT13;	Set VFO B frequency.
FA00028025000;	Set VFO A frequency 10m.
SWT13;SWT13;	Set VFO B frequency.
FA00021025000;SWT13;SWT13;FA00024900000;SWT13;SWT13;FA00028025000;SWT13;SWT13;	

SSB frequency 160-40m

Set SSB frequency. .	
K3s/K3	Not enough macro storage characters to set the mode too, so run SSB mode all bands, page 117 first. Filters equalized not normalized.
FA00001850000;	Set VFO A 160m frequency.
SWT13;SWT13;	Set VFO B frequency and filter.
FA00003725000;	Set VFO A frequency 80m.
SWT13;SWT13;	Set VFO B frequency.
FA00007200000;	Set VFO A frequency 40m.
SWT13;SWT13;	Set VFO B frequency.
FA00001850000;SWT13;SWT13;FA00003725000;SWT13;SWT13;FA00007200000;SWT13;SWT13;	

SSB frequency 20-17m

Set SSB 20-17m	
K3s/K3	Not enough macro storage characters to set the mode too, so run SSB mode all bands, page 117 first. Filters equalized not normalized.
FA00014225000;	Set VFO A frequency 20m.
SWT13;SWT13;	Set VFO B frequency.
FA00018140000;	Set VFO A frequency 17m.
SWT13;SWT13;	Set VFO B frequency.
FA00014225000;SWT13;SWT13;FA00018140000;SWT13;SWT13;	

SSB frequency 15-10m

Set CW	
K3s/K3	Not enough macro storage characters to set the mode too, so run SSB mode all bands, page 117 first. Filters equalized not normalized.
FA00021200000;	Set VFO A frequency 15m.
SWT13;SWT13;	Set VFO B frequency.
FA00024940000;	Set VFO A frequency 12m.
SWT13;SWT13;	Set VFO B frequency.
FA00028325000;	Set VFO A frequency 10m.
SWT13;SWT13;	Set VFO B frequency.
FA00021200000;SWT13;SWT13;FA00024940000;SWT13;SWT13;FA00028325000;SWT13; SWT13;	

AFSK DATA mode on all bands for RTTY contests

Set AFSK DATA mode on all contest bands for RTTY contests. See Table 2-4, page 27 for other band numbers. VFO A only.	
K3s/K3	
DV1;	Turn diversity on so mode changes for both VFO A and B.
BN00;	Set 160 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A. (Use DT2; for FSK.)
BN01;	Set 80 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN03;	Set 40 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN05;	Set 20 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN07;	Set 15 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN09;	Set 10 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
SB0;	Turn diversity and sub receiver off.
DV1;BN00;MD6;DT1;BN01;MD6;DT1;BN03;MD6;DT1;BN05;MD6;DT1;BN07;MD6;DT1;BN09; MD6;DT1;SB0;	

Exercise

How does the DT1; command change in above to use FSK D keying?

Change DT1; to DT2;

RTTY frequencies on all bands for RTTY contests

Set RTTY frequencies on all bands for RTTY contests (which are normally around 80 kHz above the band edge except for 160 meters. See Table 2-4, page 27 for other band numbers. VFO A only.	
K3s/K3	
BN00;	Set 160 m.
FA00001810000;	Set 1.810 frequency.
BN01;	Set 80 m.
FA00003580000;	Set 3.580 frequency.
BN03;	Set 40 m.
FA00007080000;	Set 7.080 frequency.
BN05;	Set 20 m.
FA00014080000;	Set 14.080 frequency.
BN07;	Set 15 m.
FA00021080000;	Set 21.080 frequency.
BN09;	Set 10 m.
FA00028080000;	Set 28.080 frequency.
BN00;FA00001810000;BN01;FA00003580000;BN03;FA00007080000;BN05;FA00014080000; BN07;FA00021080000;BN09;FA00028080000;	

Setting a filter bandwidth

Setting a filter bandwidth.	
K3s/K3	xxxx is 0 – 9999 in 10 Hz steps.
BW0280;	Set bandwidth VFO A to 2.8 kHz.
BW$0180;	Set bandwidth VFO B to 1.8 kHz.
BW0040;	Set bandwidth VFO A to 400 Hz.
BW$0025;	Set bandwidth VFO B to 250 Hz.

Setting a filter bandwidth for both VFO A and VFO B

Setting a filter bandwidth.	
K3s/K3	xxxx is 0 – 9999 in 10 Hz steps.
DV1;	Turn diversity on so both VFO A and B change.
BW0070;	Set bandwidth to 700 Hz.
SB0;	Turn diversity and sub receiver off.
DV1;BW0070;SB0	

Toggle VOX on and off

Toggle VOX on and off.	
K3s/K3	
SWH09;	Toggle VOX on and off.

Toggle AGC THR between 012 and 020

Toggle AGC THR between 012 and 020 by holding M1. **Note:** ***CONFIG:TECH MODE*** must be on.	
Uses Macro 4 and Macro 5 and M1.	
Assign the following to Macro 4:	
K3s/K3	
MN074;	Select the ***AGC THR*** menu.
MP020;	Set ***THR*** to ***020***;
MN255;	Exit this menu.
MN110;	Enter the ***MACRO n*** menu.
SWT27;	Tap the 5 switch.
SWH21;	Hold M1. (This assigns M1 to the commands in Macro 5 for the next hold.)
MN255;	Exit menu mode.
MN074;MP020;MN255;;MN110;SWT27;SWH21;MN255;	
Assign the following to Macro 5:	
MN074;	Select the ***AGC THR*** menu.
MP012;	Set ***THR*** to ***012***;
MN255;	Exit this menu.
MN110;	Enter the ***MACRO n*** menu.
SWT24;	Tap the 4 switch.
SWH21;	Hold M1. (This assigns M1 to the commands in Macro 4 for the next hold.)
MN255;	Exit menu mode.
MN074;MP012;MN255;;MN110;SWT24;SWH21;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 4. Hold M1 to program it to execute ***MACRO 4***. Each time you hold M1 the threshold switches between ***012*** and ***020***. **Note:** This cannot be done directly using K•Pod buttons. See *Using a K•Pod Key for Macro Sequencing*, page 61.	

Using a K•Pod button to toggle AGC THR

Using a K•Pod button to toggle AGC THR.	
A K•Pod button cannot directly replace the M1 function key in the Toggle ***THR*** macro (above) but you can use a K•Pod button to activate a macro that holds M1.	
K3s/K3	
SWH21;	Hold M1.
Write this macro to one of the 16 in the K3s/K3 and tap or hold the corresponding K•Pod switch.	

Scan memory defined in channel xx

Scan memory defined in channel xx	
First set lower and upper scan limits in VFO A and VFO B and save them in memory channel xx.	
K3s/K3	
MC0xx;	Recall memory channel xx. (Only recalls VFO A if ***VFO IND*** = ***Yes***.)
SWT13;	Put VFO B on same band as VFO A.
MC0xx;DE002;	Retrieve VFO A and B from memory channel xx.
SWH41;	Hold the SCAN switch.
MC0xx;SWT13;MC0xx;DE002;SWH41;	

Scan 20 meter CW

Uses memory channel 04	
K3s/K3	
FA00014000000;	Set VFO A freq.
FB00010060000;	Set VFO B freq.
MD3;MD$3;	Set CW mode.
SWT15;	Tap VFO > M.
SWT24;	Save in quick memory 04.
SWT23;	Tap M>V.
SWT24;	Recall quick memory 04.
SWH41;	Hold the SCAN switch.
FA00014000000;FB00010060000;MD3;MD$3;SWT15;SWT24;SWT23;SWT24;SWH41;	

Recall memory defined in channel xx

Recall memory defined in channel xx	
K3s/K3	
MC0xx;	Recall memory channel 01. (Only recalls VFO A if ***VFO IND*** = ***Yes***.)
SWT13;	Put VFO B on same band as VFO A.
MC0xx;	Retrieve VFO A and B from memory channel 01.
MC0xx;SWT13;MC0xx;	

Set DIGOUT1 on or off

Set DIGOUT1 on.	
K3s/K3	
MN019;	Enter ***DIGOUT1*** menu.
MP001;	Set ***DIGOUT1 On***.
MN255;	Exit menu.
MN019;MP001;MN255;	
Set DIGOUT1 off.	
K3s/K3	
MN019;	Enter ***DIGOUT1*** menu.
MP000;	Set ***DIGOUT1 OFF***.
MN255;	Exit menu.
MN019;MP000;MN255;	

Set DIGOUT1 on for 50 MHz and using ANT2

Set DIGOUT1 on.	
K3s/K3	
BN10;	Select 6 m.
AN2;	Select antenna 2.
MN019;	Enter ***DIGOUT1*** menu.
MP001;	Set ***DIGOUT1 On***.
MN255;	Exit menu.
BN10;AN2;MN019;MP001;MN255;	

Toggle between SPKR+PH no and yes

Hold PF1 to toggle between ***SPKR+PH no*** and ***SPKR+PH yES***	
K3s/K3	
MN097;	Enter the SPKR+PH menu.
SWH47;	Hold PF1.
MN255;	Exit the menu.
MN097;SWH45;MN255;	
See *Toggle* SPKR+PH yES/no, page 134.	

Set the L-MIX-R to b b

Set the L-MIX-R to b b	
K3s/K3	
SB1;	Sub receiver on.
MN111;	Enter ***L-MIX-R*** menu.
MP006;	Set Sub in left and right. See page 33 for more parameters.
MN255;	Exit menu.
Set K•Pod LEDs 1 – 3 off and 4 on.	
KPLED1OFF;KPLED2OFF;KPLED3OFF;	Set K•Pod LED1-3 off.
KPLED4ON;	Set K•Pod LED4 on;
SB1;MN111;MP006;MN255;KPLED1OFF;KPLED2OFF;KPLED3OFF;KPLED4ON;	

Set the L-MIX-R to a b

Set the L-MIX-R to a b; don't change sub receiver	
K3s/K3	
MN111;	Enter ***L-MIX-R*** menu.
MP000;	Set Main in left and Sub in right. See page 33 for more parameters.
MN255;	Exit menu.
Set K•Pod LEDs 2 and 3 off and 1 and 4 on.	
KPLED2OFF;KPLED3OFF;	Set K•Pod LED2-3 off.
KPLED1ON;KPLED4ON;	Set K•Pod LED1 and LED4 on;
MN111;MP000;MN255;KPLED2OFF;KPLED3OFF;KPLED1ON;KPLED4ON;	

Toggle L-MIX-R between b b and a b

Toggle L-MIX-R between b b and a b by holding M2	
Uses Macro 6 and Macro 7 and M2.	
Assign the following to Macro 6:	
K3s/K3	
SB1;	Sub receiver on.
MN111;	Enter ***L-MIX-R*** menu.
MP006;	Set Sub in left and right.
MN255;	Exit menu.
MN110;	Enter the ***MACRO n*** menu.
SWT33;	Tap the 7 switch.
SWH31;	Hold M2. (This assigns M2 to execute Macro 7 for the next hold.)
MN255;	Exit menu mode.
SB1;MN111;MP006;MN255;MN110;SWT33;SWH31;MN255;	
Assign the following to Macro 7:	
SB0;	Sub receiver off (optional).
MN111;	Enter ***L-MIX-R*** menu.
MP000;	Set Main in left and Sub in right. See page 33 for more parameters.
MN255;	Exit menu.
MN110;	Enter the ***MACRO n*** menu.
SWT29;	Tap the 6 switch.
SWH31;	Hold M2. (This assigns M2 to execute Macro 6 for the next hold.)
MN255;	Exit menu mode.
SB0;MN111;MP000;MN255;MN110;SWT29;SWH31;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 6. Hold M2 to program it to execute ***MACRO 6***. Each time you hold M2 the L-MIX-R switches between ***b b*** and ***a b***.	

Toggle power between 10 watts and 100 watts

Toggle power between 10 watts and 100 watts by holding PF2	
Uses Macro 6 and Macro 7 and PF2.	
Assign the following to Macro 6:	
K3s/K3	
PC010;	Set power to 10 watts.
MN110;	Enter the ***MACRO n*** menu.
SWT33;	Tap the 7 switch.
SWH47;	Hold PF2. (This assigns PF2 to execute Macro 7 for the next hold.)
MN255;	Exit menu mode.
PC010;MN110;SWT33;SWH47;MN255;	
Assign the following to Macro 7:	
PC100;	Set power to 100 watts.
MN110;	Enter the ***MACRO n*** menu.
SWT29;	Tap the 6 switch.
SWH47;	Hold PF2. (This assigns PF2 to execute Macro 6 for the next hold.)
MN255;	Exit menu mode.
PC100;MN110;SWT29;SWH47;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 6. Hold PF2 to program it to execute ***MACRO 6***. Each time you hold PF2 the output power toggles between 10 and 100 watts.	

Set power on all bands to the same value

The example sets the power to 100 watts. See Table 2-4, page 27 for other band numbers.	
K3s/K3/KX3	
BN00;	Set 160 m.
PC100;	Set power to 100 watts.
BN01;	Set 80 m.
PC100;	Set power to 100 watts.
BN03;	Set 40 m.
PC100;	Set power to 100 watts.
BN04;	Set 30 m.
PC100;	Set power to 100 watts.
BN05;	Set 20 m.
PC100;	Set power to 100 watts.
BN06;	Set 17 m.
PC100;	Set power to 100 watts.
BN07;	Set 15 m.
PC100;	Set power to 100 watts.
BN08;	Set 12 m.
PC100;	Set power to 100 watts.
BN09;	Set 10 m.
PC100;	Set power to 100 watts.
BN00;PC100;BN01;PC100;BN03;PC100;BN04;PC100;BN05;PC100 BN06;PC100;BN07;PC100;BN08;PC100;BN09;PC100;	

Send messages

These macros trigger sending messages stored in M1 – M4. You cannot select which bank of messages you send without looking at the K3S/K3 display, so manually hold REC to select ***BANK 1*** or ***BANK 2*** before executing this macro.

Send K3s/K3 message memories

Send K3S/K3 message memories.	
K3s/K3	
SWT21;	Send message 1.
SWH21;	Send message 1 in repeat mode.
SWT31;	Send message 2.
SWT35;	Send message 3.
SWT39;	Send message 4.
SWT21;SWT31;	Chain message 1 and message 2.

Toggle TX Test on and off

Toggle TX Test on and off.	
K3s/K3	
SWH18;	Toggle TX Test on and off.

Send call sign

Send call sign.	
K3s/K3/KX3	
KY callsign;	Send your call sign.

Send signal report

Send signal report.	
K3s/K3/KX3	
KY tu 5nn;	Send signal TU and signal report.

6.4.2 K•Pod Buttons to Execute K3 Macros

To execute K3S/K3 macros using K•Pod buttons, save the macro in Macro1 – Macro16 using the Utility (see *Using the K3 and KX3 Utility*, page 48) and then tap or hold the K•Pod button associated with that macro location.

Table 6-1. K•POD function Keys.

	K•POD F1 – F8, F1 – F8							
Tapping	F1	F2	F3	F4	F5	F6	F7	F8
	Macro 9	Macro 10	Macro 11	Macro 12	Macro 13	Macro 14	Macro 15	Macro 16
Holding	F1	F2	F3	F4	F5	F6	F7	F8
	Macro 1	Macro 2	Macro 3	Macro 4	Macro 5	Macro 6	Macro 7	Macro 8

RIT On, K•Pod D4 on

RIT On, K•Pod D4 on.	
K3s/K3	
RT1;	RIT on.
KPLED4ON;	Turn on K•POD D4.

RIT Off, K•Pod D4 off

RIT Off, K•Pod D4 off.	
K3s/K3	
RT0;	RIT off.
KPLED4OFF;	Turn off K•POD D4.

Send your call sign and 599 report using the K•Pod

Use the K•Pod to send your call sign by tapping F8 and then send the 599 report by holding F8.

Send your call sign and 599 report using the K•Pod	
K3s/K3	
Save in K3s/K3 Macro 16	
KY callsign;	Tap F8 to send. Change callsign to your call sign.
Save in K3s/K3 Macro 8.	
KY TU 5nn;	Hold F8 to send.

Toggle *SPKR+PH yES/no*

Toggle ***SPKR+PH yES/no***.	
K3s/K3	
MN097;	Enter ***SPKR+PH*** menu.
UP;	VFO A up.
MN255;	Exit menu.
Assign to a macro and then use a K•Pod key to execute.	

6.4.3 KX3 macros

Basic Split

KX3	
SWT25;SWT25;	Transfer VFO A to VFO B.
UPB5;	Move VFO B up 2 kHz. See Table 2-11, page 42 for other offsets.
SB1;	Turn Sub on.
FT1;	Turn split on to transmit on VFO B.
SWT25;SWT25;UPB5;SB1;FT1;	

Basic Unsplit

KX3	
FT0;	Transmit on VFO A.
FR0;	Cancel split mode.
SB0;	Dual receiver off.
FT0;FR0;SB0;	

Normalize VFO A Filter.

This may not work with other commands.	
KX3	
SWH33;	Normalize VFO A bandwidth and center.
SWH33;	

Set and center VFO A filter

KX3	
BW0010;	Set filter to 100 Hz. See Table 2-5, page 27 for more bandwidth codes.
IS 9999;	Center filter in bandpass.
BW0100;IS 9999;	

CW Single Band Set

Set CW band, mode, frequency, zero RIT, XIT, set AGC Fast.	
KX3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	CW mode. See Table 2-8, page 33 for other mode numbers.
FA00014025000;	Set 20 m CW freq.
SWT25;SWT25;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD3;MD$3;FA00014025000;SWT25;SWT25;RC;GT002;	

SSB Single Band Set

Set SSB band, mode, frequency, zero RIT, XIT, set AGC Slow.	
KX3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD2;MD$2;	USB mode. See Table 2-8, page 33 for other mode numbers.
FA00014200000;	Set 20 m SSB freq.
SWT25;SWT25;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT004;	Set AGC slow.
BN05;MD2;MD$2;FA00014200000;SWT25;SWT25;RC;GT004;	

AFSK Single Band Set

Set AFSK band, mode, frequency, zero RIT, XIT, set AGC Fast. You should manually set ***AFSK TX*** filter ***On***. Manually set text decode on.	
KX3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	DATA mode. See Table 2-8, page 33 for other mode numbers.
DT1;DT$1;	AFSK sub-mode.
FA00014080000;	Set 20 m RTTY freq.
SWT25;SWT25;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT1;DT$1;FA00014080000;SWT25;SWT25;RC;GT002;	

FSK Single Band Set

Set FSK band, mode, frequency, zero RIT, XIT, set AGC Fast. Manually set text decode on.	
KX3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	DATA mode. See Table 2-8, page 33 for other mode numbers.
DT2;DT$2;	FSK sub-mode.
FA00014080000;	Set 20 m RTTY freq.
SWT25;SWT25;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT2;DT$2;FA00014080000;SWT25;SWT25;RC;GT002;	

PSK Single Band Set

Set PSK band, mode, frequency, zero RIT, XIT, set AGC Fast. Manually set text decode on.	
KX3	
BN05;	20 m. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	DATA mode. See Table 2-8, page 33 for other mode numbers.
DT3;DT$3;	PSK sub-mode.
BW0002;	Set bandwidth 20 Hz.
IS 9999;	Set center of bandwidth.
FA00014070000;	Set 20 m PSK freq.
SWT25;SWT25;	Set VFO B frequency and filter.
RC;	Set RIT, XIT 0 if on.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT3;DT$3;BW0002;IS 9999;FA00014070000;SWT25;SWT25;RC;GT002;	

Auto Spot

Taps auto spot. CWT must be turned on.	
KX3	
SWT28;	Tap SPOT switch.
SWT28;	

KX3 split, transmit VFO A, listen VFO B

Set KX3 VFO B equal to VFO A, enter dual-watch mode, and move VFO A up 5 kHz. Enter split mode. (Note: Tap the OFS/B ∅ knob until the B led is lit. This allows you to tune VFO B.)	
KX3	
SWT25;SWT25;	Tap A>B twice to transfer all VFO A information to VFO B.
FT0;	Transmit using VFO A. (We were probably already transmitting on VFO A but this command makes sure so we don't transmit on the DX's frequency if we happen to have been in split mode sending on VFO B.)
LK$1;	Lock VFO B (optional)
SB1;	Activate the dual-watch receiver.
UP7;	QSY VFO A up 5 kHz.
SWT25;SWT25;FT0;LK$1;SB1;UP7;	

KX3 split, transmit VFO B, listen VFO A

Set KX3 VFO B equal to VFO A, enter dual-watch mode, and move VFO B up 5 kHz. Enter split mode. (Note: Tap the OFS/B ∅ knob until the B led is lit. This allows you to tune VFO B.)	
KX3	
SWT25;SWT25;	Tap A>B twice to transfer all VFO A information to VFO B.
FT1;	Transmit using VFO B (just to make sure we don't transmit on the DX's frequency). Enter split mode.
LK1;	Lock VFO A (optional)
SB1;	Activate the dual-watch receiver.
UPB7;	QSY VFO B up 5 kHz.
SWT25;SWT25;FT1;LK1;SB1;UPB7;	

Exit split

Set VFO B equal to VFO A and exit the dual-watch and split mode.	
KX3	
SWT25;SWT25;	Tap A>B twice to set VFO B and VFO A equal.
FT0;	Transmit using VFO A
SB0;	Turn off the dual-watch receiver
LK0;LK$0;	Unlock VFO A and VFO B
RT0;XT0;	RIT and XIT off.
SWT25;SWT25;FT0;SB0;LK0;LK$0;RT0;XT0;	

Set up for 20 m CW

Set up for 20 m CW. Filters not normalized.	
KX3	
BN05;	Set 20m band. See Table 2-4, page 27 for other band numbers.
MD3;MD$3;	Set CW mode.
RT0;XT0;	RIT and XIT off.
GT002;	Set AGC-F
FA00014025000;	VFO A set to 14.025 MHz.
SWT25;SWT25;	VFO B set to 14.025 MHz.
BN05;MD3;MD$3;RT0;XT0;GT002;FA00014025000;SWT25;SWT25;	

Set up for 20 m SSB

Set up for 20 m SSB. Filters not normalized.	
KX3	
BN05;	Set 20m band. See Table 2-4, page 27 for other band numbers.
MD2;MD$2;	Set USB mode.
RT0;XT0;	RIT and XIT off.
GT004;	Set AGC-S.
FA00014165000;	VFO A set to 14.165 MHz.
SWT25;SWT25;	VFO B set to 14.165 MHz.
BN05;MD2;MD$2;RT0;XT0;GT004;FA00014165000;SWT25;SWT25;	

Set up for 20 m RTTY

Set up for 20 m RTTY. Filters not normalized.	
KX3	
BN05;	Set 20m band. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	Set DATA mode.
DT1;DT$1;	Set AFSK sub-mode.
RT0;XT0;	RIT and XIT off.
GT002;	Set AGC-F.
FA00014080000;	VFO A set to 14.080 MHz.
SWT25;SWT25;	VFO B set to 14.080 MHz.
BN05;MD6;MD$6;DT1;DT$1;GT002;FA00014080000;SWT25;SWT25;	

Set up for 20 m PSK

Set up for 20 m PSK.	
KX3	
BN05;	Set 20m band. See Table 2-4, page 27 for other band numbers.
MD6;MD$6;	Set DATA mode.
DT3;DT$3;	Set PSK sub-mode.
BW0002;	Bandwidth 20 Hz.
IS 9999;	Center the passband.
RT0;XT0;	RIT and XIT off.
FA00014070000;	VFO A set to 14.070 MHz.
SWT25;SWT25;	Set VFO B frequency and filter.
GT002;	Set AGC fast.
BN05;MD6;MD$6;DT3;DT$3;BW0002;IS 9999;RT0;XT0;FA00014070000;SWT25;SWT25;GT002;	

Toggle AGC THR between 004 and 008

Toggle AGC THR between 8 and 4 by holding PF2. **Note:** ***CONFIG:TECH MODE*** must be on.	
Uses Macro 4 and Macro 5 and PF2.	
Assign the following to Macro 4:	
KX3	
MN074;	Select the ***AGC THR*** menu.
MP008;	Set ***THR*** to ***8***;
MN255;	Exit menu mode.
MN110;	Enter the ***MACRO n*** menu.
SWT21;	Tap the 5 switch.
SWH26;	Hold PF2. (This assigns PF2 to execute Macro 5 for the next hold.)
MN255;	Exit menu mode.
MN074;MP008;MN255;MN110;SWT21;SWH26;MN255;	
Assign the following to Macro 5:	
MN074;	Select the ***AGC THR*** menu.
MP004;	Set ***THR*** to ***4***;
MN255;	Exit menu mode.
MN110;	Enter the ***MACRO n*** menu.
SWT28;	Tap the 4 switch.
SWH26;	Hold PF2. (This assigns PF2 to execute Macro 4 for the next hold.)
MN255;	Exit menu mode.
MN074;MP004;MN255;MN110;SWT24;SWH26;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 4. Hold PF2 to program it to execute ***MACRO 4***. Each time you hold PF2 the threshold switches between ***004*** and ***008***.	

RIT toggle and zeroed

KX3	
SWT18;	Toggle RIT on/off
RC;	Set RIT and XIT to 0.00.
SWT18;RC;	

RIT on and zeroed

KX3	
RT1;	Set RIT on
RC;	Set RIT and XIT to 0.00.
RT1;RC;	

RIT off and zeroed

KX3	
RT0;	Set RIT off
RC;	Set RIT and XIT to 0.00.
RT1;RC;	

CW 30 WPM

Set CW speed to 30 WPM	
KX3	
KS030;	30 WPM
KS030;	

CW 25 WPM

Set CW speed to 25 WPM	
KX3	
KS025;	25 WPM
KS025;	

CW mode VFO A all bands

Set CW mode on all bands.	
KX3	Does not set the mode for VFO B
BN00;	Set 160 m. See Table 2-4, page 27 for other band numbers.
MD3;	Set CW mode VFO A.
BN01;	Set 80 m.
MD3;	Set CW mode.
BN03;	Set 40 m.
MD3;	Set CW mode.
BN04;	Set 30 m.
MD3;	Set CW mode.
BN05;	Set 20 m.
MD3;	Set CW mode.
BN06;	Set 17 m
MD3;	Set CW mode.
BN07;	Set 15 m.
MD3;	Set CW mode.
BN08;	Set 12 m.
MD3;	Set CW mode.
BN09;	Set 10 m.
MD3;	Set CW mode.
BN10;	Set 6 m
MD3;	Set CW mode.
BN00;MD3;BN01;MD3;BN03;MD3;BN04;MD3;BN05;MD3;BN06;MD3;BN07;MD3;BN08;MD3; BN09;MD3;BN10;MD3;	

SSB mode all bands, VFO A

Set SSB mode on all bands.	
KX3	Does not set the mode for VFO B
BN00;	Set 160 m. See Table 2-4, page 27 for other band numbers.
MD1;	Set LSB mode.
BN01;	Set 80 m.
MD1;	Set LSB mode.
BN03;	Set 40 m.
MD1;	Set LSB mode.
BN05;	Set 20 m.
MD2;	Set USB mode.
BN06;	Set 17 m
MD2;	Set USB mode.
BN07;	Set 15 m.
MD2;	Set USB mode.
BN08;	Set 12 m.
MD2;	Set USB mode.
BN09;	Set 10 m.
MD2;	Set USB mode.
BN10;	Set 6 m
MD2;	Set USB mode.
BN00;MD1;BN01;MD1;BN03;MD1;BN05;MD2;BN06;MD2;BN07;MD2;BN08;MD2;BN09;MD2; BN10;MD2;	

CW frequency 160-40m

Set CW frequency.	
KX3	Not enough macro storage characters to set the mode too, so run *CW mode VFO A*, VFO B all bands, page 116 first. Filters equalized not normalized.
FA00001825000;	Set VFO A 160m frequency.
SWT25;SWT25;	Set VFO B frequency and filter.
FA00003525000;	Set VFO A frequency 80m.
SWT25;SWT25;	Set VFO B frequency.
FA00007025000;	Set VFO A frequency 40m.
SWT25;SWT25;	Set VFO B frequency.
FA00001825000;SWT25;SWT25;FA00003525000;SWT25;SWT25;FA00007025000;SWT25; SWT25;	

CW frequency 30-17m

Set CW 30-17	
KX3	Not enough macro storage characters to set the mode too, so run *CW mode VFO A*, VFO B all bands, page 116 first. Filters equalized not normalized.
FA00010100000;	Set VFO A frequency 30m.
SWT25;SWT25;	Set VFO B frequency.
FA00014025000;	Set VFO A frequency 20m.
SWT25;SWT25;	Set VFO B frequency.
FA00018070000;	Set VFO A frequency 17m.
SWT25;SWT25;	Set VFO B frequency.
FA00010100000;SWT25;SWT25;FA00014025000;SWT25;SWT25;FA00018070000;SWT25; SWT25;	

CW frequency 15-10m

Set CW	
KX3	Not enough macro storage characters to set the mode too, so run *CW mode VFO A*, VFO B all bands, page 116 first. Filters equalized not normalized.
FA00021025000;	Set VFO A frequency 15m.
SWT25;SWT25;;	Set VFO B frequency.
FA00024900000;	Set VFO A frequency 12m.
SWT25;SWT25;	Set VFO B frequency.
FA00028025000;	Set VFO A frequency 10m.
SWT25;SWT25;	Set VFO B frequency.
FA00021025000;SWT25;SWT25;FA00024900000;SWT25;SWT25;FA00028025000;SWT25;SWT25;	

SSB frequency 160-40m

Set SSB frequency.	
KX3	Not enough macro storage characters to set the mode too, so run SSB mode all bands, page 117 first. Filters equalized not normalized.
FA00001850000;	Set VFO A 160m frequency.
SWT25;SWT25;	Set VFO B frequency and filter.
FA00003725000;	Set VFO A frequency 80m.
SWT25;SWT25;	Set VFO B frequency.
FA00007200000;	Set VFO A frequency 40m.
SWT25;SWT25;	Set VFO B frequency.
FA00001850000;SWT25;SWT25;FA00003725000;SWT25;SWT25;FA00007200000;SWT25;SWT25;	

SSB frequency 20-17m

Set SSB 20-17m	
KX3	Not enough macro storage characters to set the mode too, so run SSB mode all bands, page 117 first. Filters equalized not normalized.
FA00014225000;	Set VFO A frequency 20m.
SWT25;SWT25;	Set VFO B frequency.
FA00018140000;	Set VFO A frequency 17m.
SWT25;SWT25;	Set VFO B frequency.
FA00014225000;SWT25;SWT25;FA00018140000;SWT25;SWT25;	

SSB frequency 15-10m

Set SSB 15-10m	
KX3	Not enough macro storage characters to set the mode too, so run SSB mode all bands, page 117 first. Filters equalized not normalized.
FA00021200000;	Set VFO A frequency 15m.
SWT25;SWT25;	Set VFO B frequency.
FA00024940000;	Set VFO A frequency 12m.
SWT25;SWT25;	Set VFO B frequency.
FA00028325000;	Set VFO A frequency 10m.
SWT25;SWT25;	Set VFO B frequency.
FA00021200000;SWT25;SWT25;FA00024940000;SWT25;SWT25;FA00028325000;SWT25; SWT25;	

Set AFSK DATA mode on all bands for RTTY contests

Set AFSK DATA mode on all bands for RTTY contests. See Table 2-4, page 27 for other band numbers. VFO B not set.	
KX3	
BN00;	Set 160 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A. (Use DT2; for FSK.)
BN01;	Set 80 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN03;	Set 40 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN05;	Set 20 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN07;	Set 15 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN09;	Set 10 m.
MD6;	Set DATA mode.
DT1;	Set AFSK A.
BN00;MD6;DT1;BN01;MD6;DT1;BN03;MD6;DT1;BN05;MD6;DT1;BN07;MD6;DT1;BN09;MD6;DT1;	

Set RTTY frequencies on all bands for RTTY contests

Set RTTY frequencies on all bands for RTTY contests (which are normally around 80 kHz above the bottom of the band except for 160 meters). See Table 2-4, page 27 for other band numbers.	
KX3	
BN00;	Set 160 m.
FA00001810000;	Set 1.810 frequency.
BN01;	Set 80 m.
FA00003580000;	Set 3.580 frequency.
BN03;	Set 40 m.
FA00007080000;	Set 7.080 frequency.
BN05;	Set 20 m.
FA00014080000;	Set 14.080 frequency.
BN07;	Set 15 m.
FA00021080000;	Set 21.080 frequency.
BN09;	Set 10 m.
FA00028080000;	Set 28.080 frequency.
BN00;FA00001810000;BN01;FA00003580000;BN03;FA00007080000;BN05;FA00014080000; BN07;FA00021080000;BN09;FA00028080000;	

Set VFO B equal to VFO A

Set VFO B equal to VFO A on all bands. See Table 2-4, page 27 for other band numbers.	
KX3	
BN00;	Set 160 m.
SWT25;SWT25;	Set VFO B equal to VFO A.
BN01;	Set 80 m.
SWT25;SWT25;	Set VFO B equal to VFO A.
BN03;	Set 40 m.
SWT25;SWT25;	Set VFO B equal to VFO A.
BN05;	Set 20 m.
SWT25;SWT25;	Set VFO B equal to VFO A.
BN07;	Set 15 m.
SWT25;SWT25;	Set VFO B equal to VFO A.
BN09;	Set 10 m.
SWT25;SWT25;	Set VFO B equal to VFO A.
BN00;SWT25;SWT25;BN01;SWT25;SWT25;BN03;SWT25;SWT25;BN05;SWT25;SWT25;BN07;SWT25;SWT25;BN09;SWT25;SWT25;	

Setting a filter bandwidth

Setting a filter bandwidth.	
KX3	xxxx is 0 – 9999 in 10 Hz steps.
BW0280;	Set bandwidth VFO A to 2.8 kHz.
BW$0180;	Set bandwidth VFO B to 1.8 kHz.
BW0040;	Set bandwidth VFO A to 400 Hz.
BW$0025;	Set bandwidth VFO B to 250 Hz.

Toggle VOX on and off

Toggle VOX on and off.	
KX3	
SWH29;	Toggle VOX on and off.

Scan memory defined in channel xx

Scan memory defined in channel xx.	
First set lower and upper scan limits in VFO A and VFO B and save them in memory channel xx.	
KX3	
MC0xx;	Recall memory channel 01.
SWH10;	Hold the SCAN switch.
MC0xx;SWH10;	

Recall memory channel xx

Recall channel xx.	
KX3	
MC0xx;	Recall memory channel 01.
MC0xx;	

Toggle power between 10 watts and 100 watts

Toggle power between 10 watts and 100 watts by holding PF2. (For KXPA100 rigs.)	
Uses Macro 6 and Macro 7 and PF2.	
Assign the following to Macro 6 and label it 10W	
KX3	
PC010;	Set power to 10 watts.
MN110;	Enter the ***MACRO n*** menu.
SWT32;	Tap the 7 switch.
SWH26;	Hold PF2. (This assigns PF2 to execute Macro 7 for the next hold.)
MN255;	Exit menu mode.
PC010;MN110;SWT32;SWH26;MN255;	
Assign the following to Macro 7 and label it 100W	
PC100;	Set power to 100 watts.
MN110;	Enter the ***MACRO n*** menu.
SWT29;	Tap the 6 switch.
SWH26;	Hold PF2. (This assigns PF2 to execute Macro 6 for the next hold.)
MN255;	Exit menu mode.
PC100;MN110;SWT29;SWH26;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 6. Hold PF2 to program it to execute ***MACRO 6***. Each time you hold PF2 the output power toggles between 10 and 100 watts.	

Emulate the K3S/K3 TX TEST function on the KX3

Toggle power between 0 watts (TX TEST) and 15 watts (TX NORM) by holding PF1.	
Uses Macro 1 and Macro 2 and PF1.	
Assign the following to Macro 1, and label it TX TEST in the Utility:	
KX3	
PC000;	Set power to 0 watts.
MN110;	Enter the ***MACRO n*** menu.
SWT27;	Tap the 2 switch.
SWH18;	Hold PF1. (This assigns PF1 to execute Macro 2 for the next hold of PF1.)
MN255;	Exit menu mode.
PC000;MN110;SWT27;SWH18;MN255;	
Assign the following to Macro 2 and label it TX NORM in the Utility:	
PC015;	Set power to 15 watts. (Or PC100; for KXPA100 rigs.)
MN110;	Enter the ***MACRO n*** menu.
SWT19;	Tap the 1 switch.
SWH18;	Hold PF1. (This assigns PF1 to execute Macro 1 for the next hold of PF1.)
MN255;	Exit menu mode.
PC015;MN110;SWT19;SWH18;MN255;	
Enter the CONFIG:***MACRO x*** menu and tap 1 . Hold PF1 to program it to execute ***MACRO 1***. Each time you hold PF1 the output power toggles between 0 and 15 watts, and the VFO B display shows TX TEST and TX NORM, like on a K3S/K3**.**	

Set power on all bands to the same value

The example sets the power to 10 watts. See Table 2-4, page 27 for other band numbers.	
KX3	
BN00;	Set 160 m.
PC010;	Set power to 10 watts.
BN01;	Set 80 m.
PC010;	Set power to 10 watts.
BN03;	Set 40 m.
PC010;	Set power to 10 watts.
BN05;	Set 20 m.
PC010;	Set power to 10 watts.
BN07;	Set 15 m.
PC010;	Set power to 10 watts.
BN09;	Set 10 m.
PC010;	Set power to 10 watts.
BN00;PC010;BN01;PC010;BN03;PC010;BN05;PC010;BN07;PC010;BN09;PC010;	

Send KX3 CW message memories

Send KX3 CW message memories.	
KX3	
SWT11;SWT19;	Tap MSG. Send message 1.
SWT11;SWH19;	Send message 1 in repeat mode.
SWT11;SWT27;	Send message 2.
SWT11;SWT20;	Send message 3.
SWT11;SWT28;	Send message 4.
SWT11;SWT21;	Send message 5.
SWT11;SWT29	Send message 6.
SWT11;SWT19;SWT27;	Chain message 1 and message 2.

Send KX3 DVR message memories

Send KX3 DVR message memories.	
KX3	
SWT11;SWT19;	Tap MSG. Send message 1.
SWT11;SWH19;	Send message 1 in repeat mode.
SWT11;SWT27;	Send message 2.

Send call sign

Send call sign.	
KX3	
KY callsign;	Send your call sign.

Send signal report

Send signal report.	
KX3	
KY tu 5nn;	Send signal TU and signal report.

Turn KX3 battery charger on

Turn KX3 battery charger on.	
KX3	
MN137;	Enter ***BAT CHG*** menu.
Choose one of the charging times below.	
MP001;	***CHG OFF***.
MP002;	***4 Hr***.
MP003;	***8 Hr.***
MP004;	***12 Hr.***
MP005;	***16 Hr.***
MN255;	Exit menu.
MN137;MP005;MN255; (Charge for 16 hours.)	

6.4.4 P3/SVGA and PX3 Macros

Remember that P3/SVGA and PX3 commands (# command prefix) cannot be executed in a K3S/K3 or KX3 macro. They must be in a macro saved in the P3/SVGA or PX3. However, you can include K3S/K3 and KX3 commands in these. See *Mixing Transceiver and Panadapter Commands*, page 62.

Quick set P3 or PX3 center frequency to VFO A

Quick set P3 or PX3 center frequency to VFO A.	
P3/SVGA/PX3	
#CTF 000000000000;	Set center to VFO A.

Set up for 20 m CW

Set up for 20 m CW.	
K3s/K3	Add the following commands to the *Set up for 20 CW* macro, page 109
KX3	Add the following commands to the *Set up for 20 CW* macro, page 139.
#CTF 00000000000;	Set panadapter center frequency to VFO A.
#SPN000500;	Set span to 50 kHz.
#CTF 00000000000;#SPN000500;	

Set up for 20 m SSB

Set up for 20 m SSB.	
K3s/K3	Add the following commands to the *Set up for 20 SSB* macro, page 109.
KX3	Add the following commands to the *Set up for 20 SSB* macro, page 139.
#CTF 00000000000;	Set panadapter center frequency to VFO A.
#SPN001000;	Set span to 100 kHz.
#CTF 00000000000;#SPN001000;	

Set up for 20 m RTTY

Set up for 20 m RTTY.	
K3s/K3	Add the following commands to the *Set up for 20 RTTY* macro, page 110.
KX3	Add the following commands to the *Set up for 20 RTTY* macro, page 140.
#CTF 00000000000;	Set panadapter center frequency to VFO A.
#SPN000200;	Set span to 20 kHz.
#CTF 00000000000;SPN000200;	

Set up for 20 m PSK

Set up for 20 m PSK.	
K3s/K3	Add the following commands to the *Set up for 20 PSK* macro, page 111.
KX3	Add the following commands to the *Set up for 20 PSK* macro, page 140.
#CTF 00000000000;	Set panadapter center frequency to VFO A.
#SPN000100;	Set span to 10 kHz.
#CTF 00000000000;SPN000100;	

Offset Center Frequency

P3/PX3	
#SPN000100;	Set P3 span to 10 kHz
#CTF 00000000000;	Set center frequency to VFO A.
#RCF+004900;	Shift center frequency up 4.9 kHz.
#SPN000100;#CTF 00000000000;#RCF+004900;	

P3 Macro 8

Set up for 20 m CW; set P3 center frequency and span.	
K3s/K3/P3/SVGA	
BN05;	Set band to 20 meters
MD3;MD$3;	Set CW mode.
LK0;LK$0;	Unlock VFO A, VFO B
FA00014025000;	VFO A set to 14.025 MHz.
SWH58;DE096;	Normalize and center passband VFO A
SWT13;SWT13;	Transfer VFO A to VFO B.
RT0;XT0;	RIT and XIT off.
GT002;	Set AGC-F
FT0;	Transmit VFO A.
SB0;	Turn sub receiver off.
#CTF 00000000000;	Set panadapter center frequency to VFO A.
#SPN000500;	Set span to 50 kHz.
BN05;MD3;MD$3;LK0;LK$0;FA00000000000;SWH58; DE096;SWT13;SWT13;RT0;XT0;GT002;FT0;SB0;#CTF 00000000000;#SPN000500;	
Using the P3 keyboard, assign this to Macro 8 and then use FN8 to activate it.	

P3 Macro 7

Set split +2 kHz, Sub RX on, VFO A bandwidth 200 Hz, transmit on VFO B, VFO B bandwidth 400 Hz.	
K3s/K3/P3/SVGA	
SWH58;DE096;	Normalize VFO A bandwidth
SWT13;SWT13;	Transfer VFO A to VFO B.
UPB5;	Move VFO B up 2 kHz.
RT0;XT0;	Turn RIT and XIT off.
SB1;	Turn Sub on (if installed).
FT1;	Turn split on to transmit on VFO B.
BW0020;	Set VFO A bandwidth 200 Hz.
BW$0040;	Set VFO B bandwidth 400 Hz.
#SPN000100;	Set P3 span to 10 kHz
#CTF 00000000000;	Set center frequency to VFO A.
#RCF+004900;	Shift center frequency up 4.9 kHz.
SWH58;DE096;SWT13;SWT13;UPB5;RT0;XT0;SB1;FT1;BW0020;BW$0040;#SPN000100; #CTF 00000000000;#RCF+004900;	
Using the P3 keyboard, assign this to Macro 7 and then use FN7 to activate it.	

P3 Macro 6

Remove split, Sub RX off, VFO A bandwidth 400 Hz, center P3 on 14.025.	
K3s/K3/P3/SVGA	
FT0;	Transmit on VFO A.
FR0;	Cancel split mode.
SB0;	Sub receiver off.
SWH58;	Normalize VFO A bandwidth
RT0;XT0;	Set RIT and XIT off.
LK0;LK$0;	Unlock VFO A and VFO B.
#SPN000500;	Set span to 50 kHz.
#CTF 00014025000;	Center on 14.025.
FT0;FR0;SB0;SWH58;RT0;XT0;LK0;LK$0;#SPN000500;#CTF 00014025000;	
Using the P3 keyboard, assign this to Macro 6 and then use FN6 to activate it.	

KX3 Split plus offset PX3 display

Set KX3 VFO B equal to VFO A, enter dual-watch mode, and move VFO B up 5 kHz. Enter split mode.	
KX3/PX3	
SWT25;SWT25;	Tap A>B twice to transfer all VFO A information to VFO B.
FT1;	Transmit using VFO B (just to make sure we don't transmit on the DX's frequency). Enter split mode.
LK1;	Lock VFO A (optional)
SB1;	Activate the dual-watch receiver.
UPB7;	QSY VFO B up 5 kHz.
#SPN000100;	Set PX3 span to 10 kHz
#CTF 00000000000;	Set center frequency to VFO A.
#RCF+004900;	Shift center frequency up 4.9 kHz.
SWT25;SWT25;FT1;LK1;SB1;UPB7;#SPN000100;#CTF 00000000000;#RCF+004900;	
Using the PX3 keyboard, assign this to Macro 1 – Macro 8 and then use a PX3 function key to activate it.	

Remove KX3 split, center PX3 on VFO A, set span 50 kHz

Set VFO B equal to VFO A and exit the dual-watch and split mode.	
KX3/PX3	
SWT25;SWT25;	Tap A>B twice to set VFO B and VFO A equal.
FT0;	Transmit using VFO A
SB0;	Turn off the dual-watch receiver
LK0;LK$0;	Unlock VFO A and VFO B
RT0;XT0;	RIT and XIT off.
#SPN000500;	Set span to 50 kHz.
#CTF 00000000000;	Center on VFO A.
SWT25;SWT25;#SPN000500;FT0;SB0;LK0;LK$0;RT0;XT0;#CTF 00000000000;	
Using the P3 keyboard, assign this to Macro 1 – Macro 8 and then use a P3 function key to activate it.	

Set fixed mode adjust

Set fixed mode adjust for Fixed Spectrum – Tuned VFO (Fixed Tune) mode.	
P3/SVGA/PX3	
#FXT1;	Set Fixed Spectrum – Tuned VFO (Fixed Tune) mode
#FXA0;	Adjust full screen (for contesting S&P).
#FXA1;	Adjust ½ screen (for DXing).
#FXA2;	Slide.
#FXA3;	Static.
#FXT1;#FXA0; (Set full screen adjust.)	

Marker A, Marker B on

Marker A, Marker B on.	
P3/SVGA/PX3	
#MKA1;	Marker A on.
#MKB1;	Marker B on (marker B is current marker for QSY.
#MKA1;#MKB1;	

Marker A, Marker B off

Marker A, Marker B off.	
P3/SVGA/PX3	
#MKA0;	Marker A off.
#MKB0;	Marker B off.
#MKA0;#MKB0;	

QSY to Current Marker

QSY to Current Marker.	
P3/SVGA/PX3	
#QSY1;	QSY to current marker.

Undo QSY to Current Marker

Undo QSY to Current Marker.	
P3/SVGA/PX3	
#QSY0;	Undo QSY to current marker.

Turn on P3/SVGA Data Mode and Activate Text Decoding (CW mode only)

10 Delays are needed to activate the DNB;	
K3s/K3P3/SVGA	
SWH40;	Hold the TEXT DEC switch.
DNB;DE016;DNB; DE016;DNB; DE016;DNB; DE016;	Reset to ***OFF***. (a 16 ms delay is is needed to process the DNB;.)
UPB; DE016;UPB; DE016;	Change to ***CW 5-40***.
SWT40;	Exit the Text Decode menu.
#SVEN1;	Enable SVGA display (if it wasn't before).
#SVDT1;	Turn SVGA data on (if it wasn't before).
SWH40;DNB; DE016;DNB; DE016;DNB; DE016;DNB; DE016;UPB; DE016;UPB; DE016;SWT40;#SVEN1;#SVDT1;	
If the P3/SVGA data mode is NOT turned on, this macro MUST be assigned to a P3 function key. You cannot execute P3/SVGA macros from the keyboard if SVGA data mode is off. See *P3/SVGA and PX3 Macros*, page 68.	

Turn off P3/SVGA Data Mode and Deactivate Text Decoding (CW mode only)

10 Delays are needed to activate the DNB;	
P3/SVGA	
SWH40;	Hold the TEXT DEC switch.
DNB;DE016;DNB; DE016;DNB; DE016;DNB; DE016;	Reset to ***OFF***. (a 16 ms delay is is needed to process the DNB;.)
SWT40;	Exit the Text Decode menu.
#SVDT0;	Turn SVGA data off (optional).
SWH40; DNB; DE016;DNB; DE016;DNB; DE016;DNB; SWT40;	
This turns the P3/SVGA data mode off. If you want to leave it on to continue to use the keyboard, remove the #SVDT0; command. See *P3/SVGA and PX3 Macros*, page 68.	

Toggle KX3 Text Decoding (Data modes only)

KX3/PX3	
SWH17;	Hold the TEXT switch.

Appendix A. KE7X Elecraft Books

KE7X Elecraft Books	Printed Copy	Electronic PDF Copy
The Elecraft K3S and P3	www.elecraft.com	www.lulu.com
The Elecraft KPA500 and KAT500, 2nd. Ed.	www.elecraft.com	www.lulu.com
The P3, SVGA, and TX Monitor	www.lulu.com	www.lulu.com
The Elecraft K3 and P3, 3rd. Ed.	www.lulu.com	www.lulu.com
Upgrading the Elecraft K3 with K3S Components	www.lulu.com	www.lulu.com
The Portable Elecraft KX3	www.elecraft.com	www.lulu.com
The Elecraft KX-Line – The Complete KX3 Station	www.elecraft.com	www.lulu.com
The Elecraft KXPA100, PX3 and 2M/4M Transverter, 2nd. Ed.	www.lulu.com	www.lulu.com
The Elecraft KX2 – Ultra-Portable, Handheld, HF Rig	www.lulu.com	www.lulu.com
The Elecraft KX2 Companion's Guide – The KXPA100 and KXAT100	www.lulu.com	www.lulu.com

Appendix B. Per-Band, Per-Mode Configurations

Item	Per Band	Per Mode	Per Ant	Per RX/VFO	
AGC-S, -F, -	x				
Alternate Sideband	x				
Antenna	X			x	
Attenuator	x			x	
ATU On/Off	x		x		
ATU Settings	x		x		
ATU Manual Settings	x		x		
Band Mapping In/Out	x				
CWT Tuning Aid		x			
Data Mode (AFSK, FSK D, PSK31)	x			x	
DIGOUT1	x		x		
Dual PB		x		x	
Filter Center		x		x	
Filter Hi Cut		x		x	
Filter Lo Cut		x		x	
Filter Normalization Setting		x		x	
Filter Norm 1 and Norm 2		x		x	
Filter Presets I and II		x		x	Except FM
Filter Shift		x		x	
Filter Width		x		x	
FLTX		x			
M1-M4 Frequency Memory	x				
Main RX/TX Antenna Selection	x				
Meter		x			
MIC SEL		x			
Mode (SSB, CW, DATA, AM, FM)	x			x	
MON Level	x	x			

Item	Per Band	Per Mode	Per Ant	Per RX/VFO	
Noise Blanker Setting (IF)	x			x	
Noise Blanker Setting (DSP)	x			x	
Noise Blanker On/Off	x			x	If NB SAVE = YES
Noise Reduction On/Off	x			x	
Noise Reduction Setting		x			
Normalization		x			
Output Power	x				If PWR SET = PER-BAND
PB CTRL (Pass band shift)		x		x	
Preamp	x			x	
Quick Memories	x				
RIT On/Off	x				If SPLT SV=YES
Repeater Offset	x				Also per-memory
RX ANT In/Out Selection	x				
RX EQ		x		x	
Split On/Off	x				If SPLT SV=YES
Spurious Signal Removal	x				
Sub RX Antenna Selection	x				
VFO CRS		x			
VFO Fine Tuning		x			
VFO Rate Tuning		x			
VFO Coarse Tuning		x			
VOX setting		x			
XIT On/Off	x				If SPLT SV=YES
Receiver equalization		x			
Transmitter equalization		x			
VFOs Linked status	x				

Appendix C. Command Parameter Quick Reference Tables

Table C-1. K3s/K3 and KX3 programmer's command set used in macros.

Description	Name	Use in macros
Main and Sub audio gain.	AG, AG$	**AGnnn; AG$nnn;** where nnn = **000 – 255.**
Main antenna selection.	AN	**ANn;** n=**1** for antenna 1, **2** for antenna 2.
CW APF on/off.	AP	**APn; 0**=off, **1**=on; only if ***CONFIG:DUAL PB*** = ***APF***.
Receive Antenna	AR	**ARn; 0**=off, **1**=on.
Set VFO A and VFO B band.	BN, BN$	**BNnn; BN$nn;** See Table C-3, page 173. (At the time this is written, BN$ has not been implemented.)
Baud rate set.	BR	**BRn;** n=**0** (4800), **1** (9600), **2** (19200), **3** (38400).
Set filter bandwidth.	BW, BW$	**BWxxxx; BW$xxxx;** xxxx is **0** – **9999** bandwidth in 10 Hz steps. See Table C-4, page 173.
Speech compression.	CP	**CPxxx;** xxx = **000** – **040** speech compression level.
VFO B display write. VFO B display mode.	DB	**DBn;** where n is an ASCII character sent to VFO B. **DBnn;** where nn is the display mode. See *VFO B Display Write and Mode Commands*, page 27.
Delay	DE	**DEnnn;** where nnn is **001 – 255** giving the time delay in 10 ms increments. See *Generating a Delay*, page 43.
VFO A and VFO B move down	DN, DNB	**DNn; DNBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
Move Menu entry/Parameter Down	DN, DNB	When in a MAIN or CONFIG menu (K3s/K3) or MAIN menu (KX3/KX2), **DN;** moves the menu parameter down and **DNB;** the menu entry down. See *UP and DN Commands*, page 42.
Data submode.	DT	When in DATA mode, **DTn;** sets the data submode. See *Operating Mode*, page 32.
Diversity mode in K3s/K3.	DV	**DVn;** where n=**0** (diversity off) and **1** (diversity on). **DV1;** turns Sub and diversity on. **DV0;** turns diversity off and leaves Sub on. **DVS;** toggles diversity and SUB on and off. **SB0;**

		turns the Sub receiver and diversity off.
ESSB mode.	ES	**ESn;** where n=**0** (ESSB off) and **1** (ESSB on).
VFO A frequency.	FA	**FAggmmmkkkhhh; FBggmmmkkkhhh;** where gg is gigahertz, mmm is MHz, kkk kHz, hhh is Hz. Example: **FA00014160000;** sets VFO A to 14.160 kHz.
Cancel split mode.	FR	**FR0;** cancels split mode.
Transmit VFO select/ activate split mode.	FT	**FTn;** where **0**=VFO A, **1**=VFO B. **FT1;** activates split.
AGC time constant.	GT	**GT002;** is fast, **GT004;** is slow AGC.
IF shift.	IS	**IS*nnnn;** where ***** is a space and nnnn is the AF center frequency in Hz. **IS 9999;** centers the VFO A passband (does not center VFO B passband when in ***b SEt*** mode).
Control LEDs.	KPLED	**KPLEDnON; KPLEDnOFF;** n = **1 – 4** or **R** for D1 – D3 to show the state of the rocker switch.
Control switchable outputs.	KPOUT	**KPOUTnON; KPOUTnOFF;** n = **1 – 3.** See *The Elecraft K•Pod*, page 82.
Keyer speed.	KS	**KSnnn;** where nnn = **008** to **050** wpm.
CW or CW-to-data keying from text.	KY	**KY*[text];** where ***** is normally a space and [text] is **0** to **24** characters. See *KY Command*, page 30.
VFO A or VFO B lock.	LK, LK$	**LKn;** lock VFO A. **LK$n;** lock VFO B; n = **0** unlock, **1** lock.
Link VFO A and VFO B.	LN	**LN0;** unlink VFOs. **LN1;** link VFOs.
Memory channel.	MC	**MCnnn;** where nnn is **000** – **099**. See *Memory Channel*, page 31.
VFO A and VFO B mode	MD, MD$	**MDn;** or **MD$n;** where n=**1** – **9**. See *Operating Mode*, page 32.
Mic Gain.	MG	**MGxxx;** where xxx = **000** – **060**.
Monitor level for CW, SSB, or DATA.	ML	**MLxxx;** where xxx = **000 – 060**.
Select a menu entry.	MN	**MNnnn;** See *Menu Selection*, page 33.
Menu parameter set.	MP	**MPnnn;** See *Menu Selection*, page 33.
Noise blanker on/off.	NB, NB$	**NBn;** Main noise blanker; **NB$n** Sub noise blanker; n = **0** (off), **1** (on).
DSP and IF noise blanker level	NL, NL$	See *Noise Blanker*, page 41
Preamp control.	PA, PA$	**PAn;** and **PA$n;** set the Main and Sub receiver preamps; n = **0** (off), **1** (preamp 1 on), **2** (preamp2 on).

Output power level.	PC	**PCnnn;** where nnn = **000** – **012** or **000** – **110**.
Power on/off.	PS	See *Power On/Off Control*, page 41.
Main and Sub receiver attenuator control	RA, RA$	**RAnn;** or **RA$nn;** where nn = **00** (off) or **01** (on). See *Receive Attenuator*, page 41.
RIT/XIT clear.	RC	**RC;** set RIT and XIT to zero.
RIT down.	RD	**RD;** moves RIT and XIT offset down one step, depending on the ***VFO FST*** setting.
Main and Sub receiver RF gain setting.	RG, RG$	**RGnnn;** or **RG$nnn;** where nnn = **000** – **250**. For a KX3, **250** = -0 dB, **190** = -60 dB.
RIT on/off.	RT	**RTn;** where n = **0** (off) or **1** (on).
RIT up.	RU	**RU;** moves RIT and XIT offset up one step, depending on the ***VFO FST*** setting.
Set to receive mode.	RX	**RX;** Terminates transmit in all modes.
Sub receiver or dual watch (KX3) on/off.	SB	**SBn;** where n = **0** (off) or **1** (on). **SB0;** turns the Sub receiver and diversity off (K3).
Squelch level.	SQ, SQ$	**SQnnn;** or **SQ$nnn;** where nnn = **000** – **029**. See *Squelch Level*, page 41.
Switch tap and hold emulation.	SWT, SWH	**SWTnn;** tap function. **SWHnn;** hold function. See *Switch Tap and Hold Emulation*, page 28.
Transmit equalization.	TE	**TEabcdefgh;** where a – h are 3-digit character values each with a range of **-16** to **+16**.
Text to terminal.	TT	**TTn;** where n = **1** to enable decoded ASCII text to be routed to a PC; n = **0** disables this.
Enter transmit mode.	TX	**TX;** Initiate transmit in all modes.
VFO A and VFO B move up.	UP, UPB	**UPn; UPBn;** where n defines the frequency move. See *UP and DN Commands*, page 42.
VOX on/off	VX	**VXn;** where **0**=off, **1**=on.
XIT on/off.	XT	**XTn;** where n = **0** (off) or **1** (on).
Add new Programmer's Commands below when they become available.		

Table C-2. K3S, K3, KX3, and KX2 menu selections (menu sort).

Entries marked ™ must have *TECH MODE On.*

Entries marked ‡ can be accessed by the MPnnn; command.

Entries marked ᵀ can be toggled by a programmable function key or a macro. See *Types of Macros,* page 53.

Shaded entries are not available.

Entry	nnn	K3s	KX3	KX2
2M MODE	147		‡	
2 TONE™	013			
ACC2 IO	141		‡	
AGC DCY	108			
ADC REF™	034			
AF GAIN	095			
AF LIM	047		‡	‡
AFSK TX	107	ᵀ		
AFV TIM™	014			
AFX MD	105	‡	‡	‡
AGC-F	061			
AGC HLD	020			
AGC MD	128		‡	‡
AGC PLS™	099	ᵀ		
AGC SLP™	017			
AGC SPD	129		‡	‡
AGC-S™	037			
AGC THR™	074	‡	‡	‡
ALARM	000		‡	
ALT MD	149			
AM MODE	126		‡	‡
AMP HRS	151			
ANTIVOX	011			
ANT.X SW	157			
ATTEN	117	‡		
ATU DATA	112		‡	‡
ATU MD	023		‡	‡

Entry	nnn	K3s	KX3	KX2
AUTOINF	045	ᵀ	‡	‡
AUTOOFF	133		‡	‡
AUX 1	160			
AUX 2	161			
BAT CHG	137		‡	
BAT MIN	024		‡	‡
BKLIGHT	138		‡	‡
BND MAP	076		‡	
COR LVL	139		‡	‡
CW IAMB	001	ᵀ	‡	‡
CW KEY1	120		‡	‡
CW KEY2	121		‡	‡
CW PADL	006	ᵀ		
CW QRQ	112	ᵀ		
CWT	150			
CW WGHT	012		‡	‡
DATE	029			
DATE MD	030	ᵀ		
DDS FRQ™	031			
DIGOUT1	019	‡		
DUAL PB	115	ᵀ		
DUAL RX	140		‡	‡
EXIT MENU	255			
EXT ALC™	022			
FLx BW	038			
FLx FRQ	039			
FLxGN	040			
FLxON	041			
FLTX MD	042			
FM DEV	021		‡	
FM MODE	018	ᵀ	‡	
FP TEMP	043			

Entry	nnn	K3S	KX3	KX2
FSK POL	044	T		
KAT3	023	‡		
KBPF3	046	T		
KDVR3	036	T		
KIO3	033			
KPA3	055	‡		
KRC2	049			
KRX3	050			
KXIO2	158			
KXV3	051			
LCD ADJ	002	‡		
LCD BRT	003	‡		
LED BRT	004	‡		
LED BRT	145		‡	‡
LCD TST	052	T	T	T
LIN OUT	032	‡		
L-MIX-R	111	‡		
LOGGING	162			T
MACRO	110			
MEM 0-9	102			
MIC BIAS	135		‡	‡
MIC BTN	082	T	‡	‡
MIC+LIN	015			
MIC SEL	053			
MSG RPT	005	‡	‡	‡
NB SAVE	054	T		
PA MODE	146		‡	‡
PA TEMP	056	‡		
PB CTRL	109			
PBT SSB	144		‡	
PITCH	148			‡
PREAMP	136		‡	
PREAMP2	118			
PTT KEY	103			

Entry	nnn	K3S	KX3	KX2
PTT RLS	075			
PWR SET	081	T		
REF CAL™	062			
RF GAIN	155			‡
RFI DET	035	T		
RIT CLR	100	T		
RPT OFS	007	‡	‡	
RS232	057			
RTC ADJ	159			
RX EQ	008			
RX IQ	123		‡	‡
RX ISO	124		‡	
RX NR	143		‡	‡
RXSBNUL	125		‡	‡
RX SHFT	142		‡	
RX XFIL	134		‡	
SIG RMV™	106			
SMTR MD	060	T	‡	‡
SMTR OF	065			
SMTR SC	066			
SMTR PK	067			
SPKR+PH	097	T		
SPLT SV	068	T		
SPKRS	069	T		
SQ MAIN	063			
SQ SUB	064			
SUB AF	080	T		
SW TEST™	070			
SW TONE	071	T	‡	‡
SYNC DT	059			
TECH MD	072	T	‡	‡
TIME	073			
TTY LTR	077			

Entry	nnn	K3S	KX3	KX2
TUN PWR	058	‡	‡	‡
TX ALC™	078	T		
TX BIAS	130			
TX CMP	154			‡
TXCRNUL	132		‡	‡
TX DLY	016		‡	‡
TX DVR	113			
TX ESSB	096		‡	
TX EQ	009			
TX GAIN	131			
TX GATE	101		‡	‡
TX INH™	025	T		
TX MON	114	T		
TXGN	079			
TXG VCE™	027			
TXSBNUL	127		‡	‡
VCO MD	083	‡		
VFO B>A	098			
VFO CRS	104		‡	‡
VFO CTS	084		‡	
VFO FST	085			
VFO IND	086	T		
VFO LNK	116	T		
VFO NR	119		‡	
VFO OFS	087		‡	
VOX DLY	153			
VOX GN	010		‡	‡
VOX INH	122		‡	‡
VOX MD	152			
WMTR™	088		‡	‡
XIT	156			
XVx ADR	094			
XVx IF	091			

Entry	nnn	K3S	KX3	KX2
XVx OFS	093			
XVx ON	089			
XVx PWR	092			
XVx RF	090			

Table C-3. Band numbers.

BNnn;	Band	BNnn;	Band	BNnn;	Band	BNnn;	Band	BNnn;	Band
BN00;	160 m	BN05;	20 m	BN10;	6 m	BN15;	Reserved	BN20;	Xvtr #5
BN01;	80 m	BN06;	17 m	BN11;	Reserved	BN16;	Xvtr #1	BN21;	Xvtr #6
BN02;	60 m	BN07;	15 m	BN12;	Reserved	BN17;	Xvtr #2	BN22;	Xvtr #7
BN03;	40 m	BN08;	12 m	BN13;	Reserved	BN18;	Xvtr #3	BN23;	Xvtr #8
BN04;	30 m	BN09;	10 m	BN14;	Reserved	BN19;	Xvtr #4	BN24;	Xvtr #9

Table C-4. Set filter bandwidth parameter.

Filter Bandwidth	BWxxxx;
Hz	**xxxx**
50	0005
100	0010
200	0020
250	0025
400	0040
1 kHz	0100
1.8 kHz	0180
2.2 kHz	0220

Table C-5. VFO B display modes.

DBnn;	K3s/K3	KX3	KX2
DB00;	Normal	Normal	Normal
DB01;	Time	Time	Time
DB02;	Date	Supply voltage	Supply or battery voltage
DB03;	RIT/XIT offset	Battery voltage	N/A
DB04;	Supply voltage	Supply current	Supply current
DB05;	Supply current	PA temperature PA.I = KX3 PA.X = KXPA100	PA temperature PA.I = KX2 PA.X = KXPA100
DB06;	PA Heatsink temperature	OSC temperature	N/A
DB07;	Front panel temperature	AFV	AFV
DB08;	PLL1 voltage[50]	dBV	dBV
DB09;	PLL2 voltage[14]		Amp-Hours
DB10;	AFV[14]		
DB11;	dBV[14]		

[50] ***CONFIG:TECH MODE*** must be ***ON***.

Table C-6. KY command special characters.

Character	CW Prosign or special behavior
(	KN
+	AR
=	BT
%	AS
*	SK
!	VE
<	Puts the K3S/K3 into TX TEST mode, until a '>' character is received
>	Returns the K3S/K3 to TX NORM mode
@	In CW mode, this character normally terminates any CW message (via KY or manual send). However, tapping 2 in ***CONFIG:CW WGHT*** changes '@' to the 'at' prosign sign as used in e-mail addresses. This is the newest Morse Code character; it can be remembered as the prosign 'AC' (as in "the At Character").
^D	(EOT, ASCII 04) Quickly terminates transmission; use with CW-to-DATA.

Table C-7. Operating modes and data sub-modes.

n	Mode	n	Mode		n	Mode	
1	LSB	6	DATA		9	DATA-REV	
2	USB	6	**DTn**	**Sub-mode**	9	**DTn**	**Sub-mode**
3	CW	6	0	DATA A	9	0	DATA A
4	FM	6	1	AFSK A	9	1	AFSK A
5	AM	6	2	FSK D	9	2	FSK D
7	CW-REV	6	3	PSK D	9	3	PSK D

Table C-8. VFO displacement.

N	VFO Displacement
Blank	10 Hz
0	1 Hz
1	10 Hz
2	20 Hz
3	50 Hz
4	1 kHz
5	2 kHz
6	3 kHz
7	5 kHz
8	100 Hz
9	200 Hz

Figure C-1. K3s and K3 switch codes.

Figure C-2. KX3 switch codes.

Table C-9. P3 and PX3 programmer's commands.

Description	Name	P3	PX3	Use in Macro
Averaging time	#AVG			**#AVGnn;** nn = **00** (averaging off) or **02 – 20** 10 ms refresh periods.
Beacon interval	#BCI			**#BCInnnn;** nnnn is the beacon interval time in seconds **1 – 3600**.
Beacon location	#BCL			**#BCLnn;** nn is the text memory location to send in beacon mode, **01 – 50**.
Beacon on/off	#BCN			**#BCNn;** n is **1** (on), **2** (off).
Baud rate	BR, #BR			**#BRn;** or **#BRn;** n is **0** (4800), **1** (9600), **2** (19200), **3** (38400). **BRn;** changes the transceiver, **#BRn;** changes the panadapter.
Calibrate signal	#CAL			**#CALn;** n is **0** (off) or **1** (on).
Center frequency	#CTF			**#CTFsggmmmkkkhhh;** s is **+** or **space**; **ggmmmkkkhhh** is the center frequency in Hz. #**CTF 0** sets the center frequency to the VFO A frequency.[51]
Display mode	#DSM			**#DSMn;** n is **0** (spectrum only), **1** (spectrum + waterfall), **2** (spectrum + Tx Monitor option meters), **3** (spectrum + waterfall + meters).
Display mode	#DSM			**#DSMn;** n is **0** (spectrum only), **1** (spectrum + waterfall).
Function key execute	#FNX			**#FNXn;** n is **1 – 8** to execute FN1 – FN8.
Display font	#FON			**#FONn;** n is **0** (5x7 pixels), **1** (7x11), **2** (9x14).
Fixed auto-adjust mode	#FXA			**#FXAn;** n is **0** (full screen), **1** (half screen), **2** (slide), **3** (static) to specify how far the P3/PX3 display moves when VFO A is tuned off screen in fixed-tune mode.
Fixed or tracking select	#FXT			**#FXTn;** n is **0** (Fixed VFO – Tuned Spectrum/tracking), **1** (Fixed Spectrum – Tuned VFO/Fixed-Tune) mode.
Labels on/off	#LBL			**#LBLn;** n is **0** (labels off) or **1** (labels on).
Marker adjust	#MAA, #MBA	[52]		**#MAAsn; #MBAsn;** s is **+** to increment, **–** to decrement. See Table 2-11, page 42 for marker adjustment. **#MAAsn; #MBAsn;** s is **+** to increment, **–** to decrement as shown in Table 2-13, page 47 based on the current span and mode.

[51] gg = GHz, mmm = MHz, kkk = kHz, hhh = Hz.

[52] As of 3/2017 implemented for the PX3 only. This may be available in future versions of P3 firmware.

Marker A frequency	#MFA			**#MFAsggmmmkkkhhh;** s is **+** or **space**; ggmmmkkkhhh is the marker frequency in Hz. **0** sets the marker frequency to the VFO A frequency.[25]
Marker B frequency	#MFB			**#MFBsggmmmkkkhhh;** s is **+** or **space**; ggmmmkkkhhh is the marker frequency in Hz. **0** sets the marker frequency to the VFO A frequency. [25]
Marker A on/off	#MKA			**#MKAn;** n is **0** (marker off) or **1** (marker on).
Marker B on/off	#MKB			**#MKBn;** n is **0** (marker off) or **1** (marker on).
MSD screen shot	#MSS	1		**#MSS;** Creates a bitmap copy of the LCD screen (screen shot) and saves it to the MSD flash drive (thumb drive, flash memory stick). Each time the screen shot is performed, a new file is created. Filenames use a numeric format in which the first 3 characters are "PX3" followed by a 5 digit number, i.e. PX300009.BMP **Note: while the PX3 is busy saving a screen shot, other commands will be received but not processed.**
Noise blanker on/off	#NB			**#NBn;** n is **0** (off) or **1** (on).
Noise blanker level	#NBL			**#NBLnn;** nn sets the level **1** (least) – **15** (most) aggressive.
Peak mode on/off	#PKM			**#PKMn;** n is **0** (off) or **1** (on).
Power status/control	#PS			**#PSn;** n = **1** turns P3/PX3 on; **0** turns it off but removes power so **PS1;** cannot turn it on unless the power-on jumper is in the always on position.
Pass through	#PT			**#PT;** Sets the PX3 to pass-through mode, that is, the panadapter operation ceases and all data received on either RS232 port is passed through immediately to the other RS232 port without delay or modification. This command is used by *PX3 Utility* when downloading new firmware to the KX3 transceiver. Pass-through mode ends automatically 20 seconds after the last RS232 activity.
QSY to current marker	#QSY			**#QSYn;** n = **1** (QSY), **0** (undo QSY).
Relative center frequency	#RCF			**#RCFsnnnnnn;** s is **+** or **-**, nnnnnn is the offset in Hz.
Reference level	#REF			**#REFsnnn;** s is **+/-** and n reference level in dBm **-170 – +010**.
Reset	#RST			**#RST;** force power-on reset.
Scale	#SCL			**#SCLnnn;** nnn is the difference in dB between the top

				and bottom of the spectrum screen **010 – 080**.
Span mode	#SPM			**#SPMn;** n is **0** (continuous) **1** (stepped).
Span	#SPN			**#SPNmmkkkh;** sets span width in 100 Hz units; **000020 – 002000** = 2 kHz – 200 kHz.
SVGA waterfall bias	#SVWB			**#SVWBnn;** nn is **1** – **99** corresponding to 0.1 – 9.9.
SVGA data on/off	#SVDT			**#SVDTn;** n is **0** (off) or **1** (on).
SVGA enable	#SVEN			**#SVENn;** n is **0** (off) or **1** (on).
SVGA font	#SVFN			**#SVFNn;** n is **0 – 3**; 3 is the largest font.
SVGA fill on/off	#SVFL			**#SVFLn; n** is **0** (off) or **1** (on).
SVGA resolution	#SVRS			**#SVRSn;** n is **0 – 4.** See the P3/SVGA manual for details.
Text transmit hang time	#TXH			**#TXHnnnnn;** nnnn is **00000 – 90000** milliseconds to keep the KX2 transmitting after the last keyboard character is sent.
Text transmit mode.	#TXM			**#TXMnn;** nn is **00** (enter key), **01** (^R/^T toggle), or **03** (space key).
VFO B cursor on/off	#VFB			**#VFBn;** n is **0** (off) or **1** (on). Note: When in split, VFO B cursor is always on.
Waterfall average on/off	#WFA			**#WFAn;** n is **0** (off) or **1** (on).
Waterfall color	#WFC			**#WFCn;** n is **0** (gray scale) of **1** (color).
Waterfall markers on/off	#WFM			**#WFMn;** n is **0** (off) or **1** (on).

Appendix D. Switch Tap and Hold Command Alternatives

Table D-1. K3S/K3/KX3 switch codes with command alternatives.

Switch Name	K3S/K3	KX3	Function	Command or Menu Equiv	Notes
BAND (Down)	SWT09;	SWT41;	Cycles band down and up (excluding bands mapped out)	BNnn;[53] BN$nn;	Selects a specific band. See Table C-3, page 173 for band numbers.
BAND (Up)	SWT10;	SWT08;			
QSK	SWH10;	[See DELAY]	K3: Toggles between semi- and full-QSK.	For K3, MN112; sets QRQ; MN016; sets TX Delay.	There is no equivalent command to toggle semi- and full-QSK.
MODE (Down)	SWT17;	SWT14;	Cycles through operating modes	MDnn; MD$nn; DTn;	Selects specific mode and sub-mode. See Table C-7, page 175 for Mode and Data sub-mode numbers.
MODE (UP)	SWT18;	SWT14;			
TEST	SWH18;		K3: Toggles TX Norm / TX Test	PC000;	Zero power output; TX LED not flashing.
CONFIG	SWH14;		Enters CONFIG menu. (Requires SWT14 to exit menus)	MNnnn; MPnnn; MN255;	See Table C-2, page 170.
MENU	SWT14;	SWH09;	Enters MENU.	MNnnn; MPnnn; MN255;	See Table C-2, page 170.
XMIT	SWT16;	SWT16;	Toggles transmit On / Off	TX; RX;	
DISP	SWT08;	SWT09;	Toggles VFO B Display – Freq. / display options. [Selects option previously set with VFO B knob.]	DBnn; where nn is one of the VFO B display modes.	See Table C-5, page 174.

[53] Use of the BN or FA/FB commands may or may not be better than the tap emulation. Elecraft advises that any frequency change may take as much 500 ms to execute.

ATU	SWH19;		Toggles internal ATU between ***Auto*** and ***bYP***.	MN023; MP001; (***bYP***) MP002; (***Auto***) MN255;	
ANT	SWT26;	SWH44;	Toggles Ant 1 / Ant 2	ANn;	KX3 – toggles ANT only if KXAT100 installed.
NORM	SWH58;	SWH33;	Normalizes passband settings (shift, width, and LO/HI cut)	BWnnnn; BW$nnnn; IS nnnn;	If mode is known, BW and center can be set. See Table C-4, page 173.
Speed – MIC	SWT57;	SWT34;	K3: Toggles knob function between MIC gain and CW speed	MGnnn; (000-060) KSnnn; (008-050)	KX3: In voice and Data modes, toggles meter between CMP/ALC and SWR/RF
CMP – PWR	SWT56;	SWT21; SWH34;	K3:Toggles knob function between MIC compression and TX power. KX3: SWT21 enables Keyer Mic knob to set CMP. SWH34; enables keyer Mic knob to set power.	CPnnn; (000-040) PCnnn;	
MON	SWH56;	SWH32;	K3:toggles knob function into / out of setting sidetone monitor volume. KX3: enables AF/RF knob to set monitor volume.	MLnnn; (000-060)	
FREQ ENT	SWT41;	SWT10;	Opens frequency set for VFO A (and B if linked). Set with number pad button presses, executed in K3 with SWT43; SWH11 for KX3.	FA / FB and 11 digits (frequency in Hz.)	
M>V	SWT23;	SWH08;	Recall stored memory.	MCnnn;	

RATE	SWT50;	SWT12;	K3: Selects fast / slower tuning rates (increments) 10 / 50 Hz. KX3: toggles between 1 Hz 10 Hz.	K3: MN104; (VFO CRS), MN084; (VFO FST)	
LOCK	SWH50;		Toggles lock on VFO A and VFO B in ***b SEt*** mode.	LKn; LK$n; (0 = unlock; 1 = lock)	KX3 requires 3 second hold of KHz (switch 12). Cannot be emulated. With SWH12;
SUB [Tap]	SWT48;		Toggles Sub Rx on / off [if installed].	SBn; (0 = on, 1 = off) KX3: MN140; – dual receive.	K3 sub on/off; KX3 dual watch on/off.
SUB [Hold]	SWH48;		Toggles Diversity Rx on / off [sets Sub Rx freq. and bandwidth to VFO-A's ; sets sub to AUX antenna].	DVn;	0 = Diversity off 1 = Diversity on S = Toggles Sub Rx and Diversity together.
CLR [Tap]	SWT53;	SWH35;	Clears RIT / XIT offset (to zero)	RC; (sets RIT / XIT offset to zero)	
RIT	SWT45;	SWT18;	Toggles RIT on / off (saves offset)	RTn; ROsnnnn; (s is + or -)	
XIT	SWT47;	SWT26;	Toggles XIT on / off (saves offset).	XTn;	
REC [Tap]	SWT37;	[MSG] SWH11;	Tap opens M1 – M4 [memories 1 – 6 for KX3] for CW recorded messages. Requires selecting memory number, inputting text, then tap to close.	KY*[a…z] where * is a space followed by up to 24 characters of CW or CW>DATA	
M1, M2, M3, M4 [Tap]	SWT21; SWT31; SWT35; SWT39;	SWT11 [MSG] plus SWT19[1], SWT27[2], SWT20[3], SWT28[4], SET21[5],	Plays recorded text	KY*[a…z] where * is a space followed by up to 24 characters of CW or CW>DATA	For KX3, add message number key

		or SWT29[6]			
B SET	SWH11;		Opens and closes ***b SEt***.	Incorporate $ in command	Beware of processing delays.
A>B	SWT13;	SWT25;	Sets VFO B to VFO A frequency. Two presses sets all VFO-A parameters to VFO-B.	IS*nnnn; where * is a space and nnnn is AF center frequency. in Hz.	Useful if desired passband settings are known in advance. See also BW.
SPLIT	SWH13;	SWH25;	Toggles Split mode. Sets RX frequency to VFO A; sets Tx frequency to VFO B.	FR1; (Split) FTn; [n=0 for TX on VFO A (cancel split); 1 for VFO B TX..	Note that Link also transfers all frequency-related settings to VFO B. See also RO+/-nnnn
V>M	SWT15;		K3: Sets VFO-A and VFO-B to number and label frequency memories. Second tap stores the memory.	FA / FB and 11 digits (frequency in Hz.)	For KX3 frequency memories see KX3 Owner's Manual p.17 ("Frequency Memories").
PRE	SWT24;	SWT19;	Toggles preamp on / off	PA0; PA$0; off, PA1; PA$1 preamp 1 on, PA2; PA$2; preamp 2 on.; KX3 - MN136	
ATT	SWH24;	SWT27;	Toggles attenuator on / off	RAnn; RA$nn;	For KX3 1 = on, 0 = off. For K3S, nn is value in dB. – 00/05/10/15. See *Receive Attenuator*, page 41.
AGC	SWT27;		Turns AGC on and toggles between AGC fast / slow	GTnnn; (002 is fast, 004 is slow)	See also MN061; – AGC fast for K3.

APF or DUAL PB	SWH29;	SWT20;	Toggles audio peaking filter on / off.	APn; MN115;	Early K3 label is DUAL PB. Later K3 and K3s label is APFOn K3 effect is mode dependent – APF in CW, dual passband in data. On KX3 CW only.
NB	SWT33;	SWH27;	Toggles noise blanker on / off	NBn; NB$n;	See *Noise Blanker*, page 41.
[NB] LEVEL	SWH33;	SWH27;	Sets K3:VFO B knob or KX3: AF/RF knob to adjust NB level.	NLddii; NL$ddii;	dd is DSP level (00 – 21) and ii is IF NB level for K3 (00-21). See *Noise Blanker*, page 41.
DATA MD	SWH43;	SWT17;	Changes functions of VFO-A and VFO-B knobs. B selects data mode; A selects data speed. Any button closes the function.	DTn;	See Table C-7, page 175.