

# **ELECRAFT K3S/K3/KX3/KX2 PROGRAMMER'S REFERENCE**

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(For change history, see Appendix A)

## Command Set Overview

All K3S/K3/KX3/KX2 remote control commands are listed in **Table 1**. The KX3 and KX2 accept all K3 commands, though some have no functional effect on the KX3/KX2 (\*). Some commands are recognized only by the KX3 or KX2 (\*\*). For **K2** commands, see the **KIO2 Programmer's Reference**.

**Table 1** K3S/K3/KX3 Control Commands. (\*) = Not functionally applicable to KX3/KX2. (\*\*) = KX3/KX2 only. (\$) = Add '\$' for VFO B/sub RX (VFO B/dual watch for KX3/KX2).

Name	Description	Name	Description	Name	Description
!, @ *	Direct DSP control	FR	Receive VFO select	PN *	Internal use only
AG \$	AF gain	FT	TX VFO select	PO **	Power output read
AI	Auto-info mode	FW \$	Filter bandwidth and #	PS	Power-on/off control
AK **	ATU network values	GT	AGC speed and on/off	RA \$	RX attenuator on/off
AN	Antenna selection	IC	Icon and misc. status	RC	RIT/XIT offset clear
AP	CW APF on/off	ID	Radio identification	RD	RIT down
AR *	RX antenna on/off	IF	General information	RG \$	RF gain
BC **	Internal use only	IO **	Internal use only	RO	RIT/XIT offset (abs)
BG	Bargraph read	IS	IF shift	RT	RIT on/off
BN \$	Band number	K2	K2 command mode	RU	RIT up
BR	Baud rate set	K3	K3 command mode	RV	Firmware revisions
BW \$	Filter bandwidth	KE **	Internal use only	RX	Enter RX mode
CP	Speech compression	KS	Keyer speed	SB	Sub or dual watch
CW	CW sidetone pitch	KT **	Internal use only	SD	QSK delay
DB	VFO B text	KY	Keyboard CW/DATA	SM \$	S-meter
DE *	Cmd processing delay	LD	Internal use only	SMH *	High-res S-meter
DL	DSP command trace	LK \$	VFO lock (A or B)	SP *	Internal use only
DM	Internal use only	LN *	Link VFOs	SQ \$	Squelch level
DN/DNB	VFO move down	MC	Memory channel	SWT/H	Switch tap/hold
DS	VFO A text/icons	MD \$	Operating mode	TB	Buffered text
DT	Data sub-mode	MG	Mic gain	TE	TX EQ
DV *	Diversity mode	ML	Monitor level	TM *	TX meter mode
EL **	Error logging on/off	MN	Menu entry number	TQ	TX query
ER	Internal use only	MP	Menu param read/set	TT	Text-to-terminal
ES	ESSB mode	MQ **	Menu param read/set	TX	Exter TX mode
EW	Internal use only	NB \$	Noise blanker on/off	UP/UPB	VFO move up
FA	VFO A frequency	NL \$	Noise blanker level	VX	VOX state
FB	VFO B frequency	OM	Option modules	XF \$	XFIL number
FI *	I.F. center frequency	PA \$	RX preamp on/off	XL	Internal use only
FN *	Internal use only	PC	Power Control	XT	XIT on/off

Some commands emulate controls and display elements. For example, the **SWT/SWH** commands emulate switch TAP/HOLD, **MN** accesses menus, **DS**, **DB**, and **IC** read VFO A / B and icons, and **BA** and **BG** read bargraphs. Other commands directly read or modify radio parameters, such as the VFO A and B frequencies (**FA** and **FB**).

There is some overlap between emulation and parametric commands. For example, you can select the *next* operating mode using an **SWT** command to virtually "tap" the **MODE** switch, or set a *specific* mode using **MD**.

### Using K3/KX3/KX2 Utility to Test Commands

The **Command Tester** screen of the *K3/KX3/KX2 Utility* PC application can be used to try individual control commands. You can even save useful commands (or strings of commands) as named *macros* for later use. A subset of these macros can be stored in the radio's EEPROM memory, where they can be assigned to programmable function switches. See the **Command Examples** section (page 5).

## ***Command Format***

**Note:** In the remainder of this document, K3 references apply to the KX3 and KX2 as well unless otherwise noted. Commands sent from the computer to the K3 are considered either GETs or SETs. GET commands are used by the computer to get information from the K3; the K3 will then provide an appropriate response message (RSP). SET commands are sent by the computer to change the radio's configuration or initiate an event. A SET can be followed by a GET to verify the new settings, or the *auto-info* mechanism can be used for confirmation that something has changed (see **AI** in the Meta-commands section).

SET commands use 2 or 3 characters, optional data fields, and a terminating semicolon (;). Examples:

<b>KS020;</b>	Computer sets CW speed to 20 WPM (data = 020)
<b>MD1;</b>	Computer selects LSB mode (data = 1)

Many SET commands have a corresponding GET command, which is just the command letters with no data. The data format of the response message from the K3 (RSP) is usually identical to the format of the SET data. Exceptions are noted in the command descriptions.

Characters sent to the K3 can use either upper or lower case. The K3 will always respond with upper case, except when a lower-case character is a place-holder for a special symbol (e.g., the VFO B display command, **DB**).

## ***Sub Receiver/VFO B Commands (\$), Linked VFOs, and Diversity Mode***

Some commands target VFO B (and the sub RX, in the case of the K3) if (\$) is added after the command prefix. Examples include **AG\$, RG\$, MD\$, BW\$, FW\$, LK\$**. This is indicated in the reference section by a \$ in the command title. (Some commands target VFO B itself and 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. This includes **FA, UP, DN, RU, RD, and RC**. In Diversity mode, **BW, FW** and **MD** match the VFO B/sub receiver filter and mode settings, respectively, to the main receiver.

## ***Extended Commands***

Some commands have an **extended** data format which provides enhanced functionality or backward compatibility with older software applications. Such commands should be avoided in switch macros because of the need to use a *meta-command* to enable extended functionality (see **Meta-commands** section). Alternatives are available. For example, the **BW** (bandwidth) command should be used in macros rather of the legacy **FW** command, which depends on meta-command settings.

## ***Response Time***

The K3 will typically respond in less than 10 milliseconds. General worst-case latency is around 100 ms, except for commands that change bands, which can take up to 500 ms.

Since the K3 provides a full-duplex interface, the computer can send the K3 commands at any time. Continuous, fast polling (< 100 ms per poll for bar graph data in transmit mode, for example) should be carefully tested to ensure that it isn't affecting radio operation. Polling during transmit not be used unless necessary.

## ***Busy/Limited Access Indication (?;)***

Some commands cannot be safely handled when the K3 is in a *busy* state, such as transmit, or in a *limited-access* state, such as BSET or VFO A/B reverse (REV switch). If a command cannot respond due to such a condition, the K3 will return “?;”. Future firmware releases will gradually become less restrictive in this regard.

You can use the **TQ** command to see if the K3 is in transmit mode, and the icon/status command (**IC**) to check for BSET mode (byte **a**, bit **6**).

## Meta-commands: *AI*, *K2* and *K3*

*Meta-commands* change the behavior of other commands to provide automatic responses or compatibility with older application software. In general they should not be embedded in *K3* or *KX3* front-panel switch macro, as they may adversely affect software applications that control meta-command modes. The **Command Reference** section explains when to use them with specific commands.

**AI (Auto-info mode):** The **AI** meta-command can be used to enable *automatic responses* from the *K3* to a computer in response to *K3* front panel control changes by the operator. Application software may use **AI1** or **AI2** mode as an alternative to continuous polling. (Not appropriate for switch macros.)

**AI0, No Auto-info:** This is the default. The PC must poll for all radio information using GET commands; the *K3* will not send any information automatically.

**AI1, Auto-Info Mode 1:** The *K3* sends an **IF** (info) response within 1 second when any frequency or mode-related event occurs, either manually (at the radio itself) or when the PC sends commands. These events include: band change, mode change, VFO movement, RIT/XIT offset change or clear, and several additional switches (e.g., A/B, REV, A=B, SPLIT, CW REV, RIT, XIT). **IF** responses are suppressed during VFO movement. **Notes:** (1) putting the *K3* into auto-info mode 1 (by sending **AI1**;) causes an initial **IF** response. (2) The *K3* can be placed into **AI1** mode without a PC by setting *CONFIG:AUTOINF* to **AUTO 1**. The user may do this to support non-PC devices that make use of auto-info, such as a SteppIR antenna controller. Application software can check for unexpected **IF** responses and turn **AI** off if required.

**AI2, Auto-Info Mode 2:** The *K3* sends an appropriate response (**FA**, **FB**, **IF**, **GT**, **MD**, **RA**, **PC**, etc.) whenever any front-panel event occurs. This applies to all of the events mentioned for mode **AI1**, and ultimately to all rotary control changes and switch presses. At present only a subset of controls generate responses.

**AI3, Combination:** This is similar to mode **AI2** and is provided only for compatibility with existing programs.

**K2 (K2 command mode):** The **K2** meta-command modifies the set/response format of some commands. Avoid using this command in switch macros.

**K20, K2 Normal mode:** This is the default; *K2* command extensions are disabled.

**K21, K2 Normal/rtty\_off:** Same as **K20**, except that **MD** and **IF** report RTTY and RTTY-reverse modes as LSB and USB, respectively. This may be useful with programs that don't support a separate RTTY mode.

**K22, K2 Extended mode:** Enables all *K2* command extensions.

**K23, K2 Extended mode/rtty\_off:** Enables all *K2* extensions, but like **K21**, alters the **MD** and **IF** commands.

**K3 (K3 command mode):** The **K3** meta-command modifies the set/response format of some commands. Avoid using this command in switch macros.

**K30, K3 Normal mode:** This is the default; *K3* command extensions are disabled.

**K31, K3 Extended Mode:** Enables all *K3* command extensions (see, for example, **FW**). Typically, *K3* applications will place the *K3* in **K31** mode except when **K30** mode is needed due to the use of certain commands.

## Command Examples

### Macros

Macros – strings containing one or more control commands – can be used to automate K3/KX3/KX2 control sequences. **Table 2** lists some examples. See *Creating and Using Macros* (page 6) for complete instructions.

**Table 2** Sample Macros. These can be altered or combined as needed (see the **Command Reference** section).

Label	Description	Command string
SPLIT+2	CW DX split starting point: A>B twice, enter SPLIT, move VFO B up 2 kHz, RIT/XIT off	SWT13;SWT13;FT1;UPB5;RT0;XT0; <sup>1</sup>
EQ MIC1	Boost 100-Hz TX EQ band by 8 dB; others “flat”	TE+00+08+00+00+00+00+00+00;
WEAKSIG	Diversity mode, main/sub preamps on, 200-Hz bandwidth, no IF shift	DV1;PA1;PA\$1;BW0020;IS 9999;
CLEANUP	Turn off split/RIT/XIT; unlink VFOs; open squelch	FT0;RT0;XT0;LN0;SQ000;
WWV 10	30 m, AM mode, VFO A to 10.0 MHz, 3 kHz AF bandwidth (requires 6 kHz IF crystal filter)	FA00010000000;MD5;FA00010000000; BW0300; <sup>2</sup>
OLDIES	Switch to AM radio station at 1550 kHz; 4 kHz BW, attn. on, preamp off	FA00001550000;MD5;FA00001550000; BW0400;IS 9999;RA01;PA0;
LCD BRT	Set the MAIN:LCD BRT menu parameter to 6	MN003;MP005;MN255; <sup>3</sup>
MEM32	Load frequency memory #32 into VFOs A and B	MC032;
LOCKA&B	Lock both VFOs	LK1;LK\$1;
PWRTEST	Send “BT” at 100 W, 10 W, and 1 W, then restore power to 100 W (“=” embeds a BT prosign)	PC100;KYW =;PC010;KYW =; PC001;KYW =;PC100;
TUN 10W	Set power to 10 W and enter TUNE mode	PC010;SWH16;
AMP ON	Turn on an external amplifier and set K3 drive to 65 W (see CONFIG:DIGOUT1, Owner’s Manual)	MN019;MP001;MN255;PC065;
599FAST	Send “5NN” at 40 WPM, “TEST ” at 30 WPM	KS040;KYW5NN ;KS030;KYWTEST ;
MUTE AF	Set main and sub AF GAIN to zero	AG000;AG\$000;
MON OFF	Set monitor volume to zero (present mode)	ML000;
SCANNOW (K3 only)	Stores VFO A & B in per-band quick-memory M4 and starts scan (> 2 second hold starts “live” scan); VFO B frequency must be > VFO A	SWT15;SWT39;SWT23;SWT39;SWH41; <sup>4</sup>
STEPPIR	Send frequency info to a device attached to the serial port, such as an antenna controller or ATU	IF; <sup>5</sup>

<sup>1</sup> **SWT13** is a switch-emulation command that has the same effect as tapping **A>B**. **The KX3 has different SWT codes. FT1** enters split mode. The number **5** in **UPB5** is not a value in kHz, but an index into the table of step sizes (in this case 2 kHz); see the **DN** command in the command reference for full details. **RT0** and **XT0** turn off RIT and XIT.

<sup>2</sup> The first **FA** command in this macro may cause a band change. **MD** (mode) is sent after it, so the mode change will apply to the new band. The second **FA** command is only required if auto-offset-on-mode-change is in effect. (In *CONFIG: CW WGHT*, tapping **5** alternates between **VFO NOR** and **VFO OFS**. In the latter case, the VFO frequency is adjusted when switching between CW and any other mode.)

<sup>3</sup> **MN** accesses menu entries. **MP** can then be used (in some cases) to read or set the parameter value. In the LCD BRT macro, **MP005** sets **LCD BRT** to **6**. You can determine a menu entry’s parameter range by manually setting the parameter to the lowest/highest values, typing “**MP;**” each time in the command test box at the top of the **Command Tester** screen.

<sup>4</sup> This example uses per-band memory M4 (SWT39), but any of M1-M4 could be used, or quick memories 0-9 (see **SWT/SWH** command). If scanning is started with a macro, the last switch emulation command in the macro must be **SWH41 (SCAN)**.

<sup>5</sup> **IF** is a GET command (general transceiver info, including VFO A’s frequency and mode). When the K3 encounters a GET command in a macro, it sends the response to any device attached to the serial port, just as if a computer had requested it. Multiple GET commands could be placed in a macro if necessary; examples include **FA** and **FB** (VFO A and B frequencies).

## Creating and Using Macros

*K3/KX3/KX2 Utility* can be used to create and test macros. The first eight of these can be sent to the transceiver (K3 and KX3 only), where they can be assigned to any of the programmable function switches. Macros can have a length of up to 120 characters, along with a label of up to 7 characters.

Example (“SPLIT+2”): *A>B, A>B, SPLIT, VFO B up 2 kHz, RIT/XIT off*, assigned to **PF1**

To create this macro and assign it to a K3 front panel switch, you’ll need to complete all of steps 1-8 below. The instructions are similar for the KX3, except that *KX3 Utility* is used, and some SWT/SWH codes are different.

1. Run *K3 Utility*.
2. Click on the **Command Tester/K3 Macros** tab.
3. Click on the **Edit Macros** button at the top of the screen. This brings up the macro edit window.
4. In MACRO 1’s **Macro Label** field, enter the label “SPLIT+2”.
5. In the **Macro Commands** field, enter:

SWT13;SWT13;FT1;UPB5;RT0;XT0;                    (the KX3 and KX2 have different SWT/SWHxx codes)

**Note:** The number **5** in the “**UPB5**” command is not a value in kHz; it is an index into a table of step sizes. **UPB5** moves VFO B up 2 kHz, **DNB5** moves it down 2 kHz, etc. (there are similar commands for VFO A). For the full list of **UP/DN** command variations, see the **DN** (down) command (page 9).

6. Click on **Send Macros 1-8 to K3**. Exit the edit window by clicking **Save**. The macro can now be tested from within the Command Tester by clicking on its associated button. (The label won’t flash on VFO B when this is done from *K3 Utility* – only when using the assigned switch at the K3.)
7. At the **K3**, locate **CONFIG:MACRO x** menu entry. Tap ‘1’ if the menu entry label is not already “MACRO 1”.
8. Hold **PF1** to assign **PF1** to **MACRO 1**. Exit the menu.

From then on, using **PF1** will flash **SPLIT+2** and execute the above sequence.

**Important Restrictions:** (1) Macros normally only use *SET* commands, since they can’t make use of the response from a *GET*. For a very useful exception to this rule, see the last sample in **Table 2**. (2) Macros should not use *meta-commands* (like **K31**;) as this can interfere with software applications that control meta-modes. (3) Macros can be used to send direct DSP commands (see **!** and **@**, page 7), but at present this only works from *K3 Utility*, not from K3 front-panel switches.

## Simple Application Program

The pseudo-code program below displays the VFO A frequency (8 digits) while watching for the user to request a frequency change via the PC keyboard. For details on individual commands, see the **Command Reference** section.

```
VfoControlLoop
{
    SendCommand( "FA;")           // GET frequency of VFO A
    StringF = GetResponse( TIMEOUT_100MS ) // wait for response; include a timeout, just in case
    Display( StringSubset( StringF, 5, 12 ) ) // show MHz through Hz digits on PC screen
    If( KeyboardInput = "+" )     // up/down control could be a mouse click instead
        SendCommand( "UP;")     // this is a SET command that moves VFO A up
    If( KeyboardInput = "-" )
        SendCommand( "DN;")
}
```

## Command Reference

**Note:** Commands marked with a dollar sign (\$) apply to VFO B (and the sub receiver, in the case of the K3). Commands marked with an asterisk (\*) are not functionally applicable to the Elecraft KX3 or KX2, but the KX3 and KX2 will accept and reply to all K3 commands. For K2 commands, see the KIO2 Programmer's Reference.

This section describes all K3 GET, SET and RSP (response) command formats. Unless otherwise noted, the GET format is just the 2 or 3 letters of the command followed by a semicolon. The SET and RSP data formats are identical unless noted otherwise. When **K2** or **K3** extended modes are in effect (typically **K22** or **K31**), some commands have an **extended** format (see **Meta-commands**). Both **Basic** and **Extended** formats are described here.

### **! and @\*** (*Direct Main/Auxiliary DSP control*)

Elecraft releases documentation on specific DSP commands as user needs for them arise. DSP commands can cause side effects and should be used with caution. **NOTE: At present, DSP commands can not be used in combination with regular commands in K3 Utility macros. Also, they will not work as K3 switch macros.**

### **AG \$** (*AF Gain; GET/SET*)

SET/RSP format: **AGnnn**; or **AG\$nnn**; where **nnn** is 000-255.

### **AI** (*Auto-Information; GET/SET*)

SET/RSP format: **AI $n$** ; where **n** is 0-3. See Meta-commands for details. **Note:** The **AI** power-up default is normally **AI0**, corresponding to K3 menu setting **CONFIG:AUTOINF = NOR**. **AUTOINF** can also be set to **AUTO 1**, which makes the default **AI1** on power-up. This is useful for K3s controlling a StepIR antenna, etc.

### **AK** (*ATU Network Values; KX3/KX2 only, GET only*)

RSP format: **AKaabbcc**; where: **aa** = inductance IO bitmap (ASCII hex), **bb** = capacitance bitmap, and **cc** = misc relays bitmap. The **<aa>** and **<bb>** bitmaps can be equated to L and C values by looking at the KXAT3 or KXAT2 schematic. For example, a value of "01" would represent the smallest L or C value in the network. At present only bit 0 of byte **<cc>** is defined: 00 = capacitors on the antenna side; 01 = capacitors on the transmit side. If the ATU is not installed or is in one of the Lx/Cx test settings, "AK000000;" is returned. In BYP mode, on some bands L and C are set to fixed non-zero values in order to cancel the ATU's own reactance when working into a 50-ohm load. In AUTO mode, the working auto-tuned values are shown.

### **AN** (*Antenna Selection; GET/SET*)

SET/RSP format: **AN $n$** ; where **n** is 1 for antenna 1, and 2 for antenna 2.

### **AP** (*Audio Peaking Filter; GET/SET*)

SET/RSP format: **AP $n$** ; where **n** is 0 for APF OFF and 1 for APF ON. Applies to CW mode only, and only if **CONFIG:DUAL PB** is set to **APF**.

### **AR** (*RX Antenna on/off; GET/SET; K3/K3S only*)

SET/RSP format: **AR $n$** ; where **n** is 0 for RX antenna OFF and 1 for ON.

### ***BG (Bargraph Read; GET only)***

RSP format: **BGnnx**; where **nn** describes which bars are turned on and **x** (K3 only) indicates receive (**R**) or transmit (**T**). Returns S-meter level in receive (also see **SM/SMS** command), and power or ALC level in transmit. On the K3 and K3S, only, transmit metering mode can be set remotely using the **TM** command. (CWT, SWR, and CMP readings not yet available.)

K3, Receive: **nn** is **00 - 21** (CWT off) or **00 - 09** (CWT on).

K3, Transmit: **nn** is **00 - 12** (PWR) or **00 - 07** (ALC) depending on **METER** setting. Also see TM command.

K2, Receive or Transmit: **nn** is **00 - 10** (**DOT** mode) or **12 - 22** (**BAR** mode).

### ***BN \$ (Band Number; GET/SET)***

SET/RSP format: **BNnn**; where **nn** is 00-24, the present “logical” band for VFO A (use **BNSnn** for VFO B).

Also see **MC** command (memory channel set). **Note:** **BN** SET command applies only to VFO A at present.

**BN** GET works with either VFO A or B. If a band change occurs, allow 300 ms before sending other commands.

**nn** is defined as follows: **0**=160 m, **1**=80 m, **2**=60 m, **3**=40 m, **4**=30 m, **5**=20 m, **6**=17 m, **7**=15 m, **8**=12 m, **9**=10 m, **10**=6 m, **11-15** reserved for future expansion, **16**=Xvtr band #1, **17**=Xvtr band #2... **24**=Xvtr band #9.

### ***BR (Serial I/O Baud Rate; SET only)***

SET format: **BRn**; where **n** is **0** (4800 b), **1** (9600 b), **2** (19200 b), or **3** (38400 b). **Note:** The K3 firmware download utility automatically sets the K3 to 38400 baud for downloads, then restores the baud rate to the user’s selection (made using the K3’s **CONFIG:RS232** menu entry).

### ***BW \$ (Filter Bandwidth; GET/SET)***

SET/RSP format: **BWxxxx**; where **xxxx** is 0-9999, the bandwidth in 10-Hz units. May be quantized and/or range limited based on the present operating mode.

**Notes:** (1) **BW** is a derivative of the legacy **FW** command. **BW** is safer to use in switch macros, because it makes no assumptions about meta-command settings (**K2x** and **K3x**). **FW** may be preferred in applications. (2) In diversity mode, **BW** matches the sub receiver’s filter bandwidth to the main receiver’s. (3) Both **BW** and **BW\$** can be used in BSET mode (one exception: at present, **BW/BW\$** SET can’t be used in BSET mode with diversity receive in effect). (4) If a KX3/KX2 is in DUAL RX (dual watch) mode, **BW\$** returns the value for **BW**.

### ***CP (Speech Compression; GET/SET)***

SET/RSP format: **CPxxx**; where **xxx** is 000-040 (speech compression level).

### ***CW (CW Sidetone Pitch; GET only)***

RSP format: **CWxx**; where **xx** is 30-80 (sidetone pitch in 10 Hz units).



### ***DB (VFO B Display Read/Write; GET/SET; K3, KX3, and KX2 variants)***

GET format: **DB**; (no data). Returns text displayed on VFO B, including decimal points and colons if present. VFO B normally displays only uppercase alphabetic characters. **DB** returns the following lower-case characters that represent symbols: **a** (antenna), **b** (mu), **c** (slashed 0), **d** (itself), **e** (sigma), **f** (<-), **g** (->), **h** (II), **i** (left-justified "1"), **j** (delta, large), **k** (delta, small), **l** (right-justified "1"), **m** (superscript "m"), **n** (lowercase "w")

There are two SET formats with different functions:

**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. This can be used to create scrolling messages to alert the operator to something regarding the computer, send extended help text, insert a newsfeed, report a DX spot, test special characters, etc.

**DBnn**; where **nn** is one of the available VFO B alternate display modes:

**K3**: **00**=normal, **01**=time, **02**=date, **03**=RIT/XIT offset, **04**=supply voltage, **05**=supply current, **06**=PA heatsink temp, **07**=front panel temp, **08**=PLL1 voltage, **09**=PLL2 voltage, **10**=AFV, **11**=dBV.  
(Note: Modes **08** and higher require *CONFIG:TECH MD = ON*.)

**KX3**: **00**=normal, **01** = time, **02** =supply voltage, **03**=battery voltage (if KXBC3 installed), **04**=supply current, **05**=PA temp (PA.I=KX3, PA.X=KXPA100), **06**=OSC temp, **07**=AFV, **08**=dBV.

**KX2**: **00**=normal, **01** = time, **02** =supply or batt. voltage, **03**=N/A, **04**=supply current, **05**=PA temp (PA.I=KX2, PA.X=KXPA100), **06**=N/A (TBD: OSC temp), **07**=AFV, **08**=dBV, **09**=amp hours.

Note: Amp-hours display is "X.XXX AH". There's also an AMP HRS menu entry that shows the same value. CLR can be used from within this menu entry to reset the value to 0.

### ***DE (Command Processing Delay; SET only; K3/K3S only)***

SET format: **DExxx**; where **xxx** is 001-255, the delay value in 10-ms increments. This is useful in switch or K-pod macros, where a delay may be desired to allow the radio to complete a previous operation before the next command is processed. Note: **DE001** may result in a delay shorter than 10 ms, while **DE002** is guaranteed to provide a delay between 10 and 20 ms (etc.).

### ***DL (DSP Command Debug On/Off; SET only)***

SET format: **DLx**; where **x = 2** to turn DSP command debugging OFF, **3** to turn it ON. When it's ON, all commands sent from the MCU to the DSP are echoed to the K3's serial port, with a few exceptions such as during program loading. The DVR icon will flash as a reminder.

### ***DN/DNB (Move VFO A or B or a Displayed Parameter Down; SET only; also pertains to UP/UPB)***

SET format: **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. **DN**; and **DNB**; also change parameters shown on VFO B (menu or switch settings). VFO displacement, **n**: **0**=1 Hz; **1** or **not used**=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.

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

### ***DS (VFO A and Basic Icon Read; GET only)***

GET format: **DS**; (no data). Returns everything needed to reproduce the contents of the VFO A display, as well as a basic subset of the LCDs icons (also see **IC** command, which provides many more status indicators and does not require that **K31** be in effect). The format of the response message is: **DS***tttttttaf*; where *ttttttt* is the LCD text and decimal point data, *a* is icon data, and *f* is icon flash data (all 0 for the K3), or additional K3 icon data. These fields are detailed below.

**TEXT and decimal point data:** This field contains 8 bytes, with values 0x30 - 0xFF (hex). The first byte is the left-most displayed character. Bit 7 (MSB) of each byte indicates whether the decimal point to the *left* of each character is on (1) or off (0)<sup>6</sup>. The other bits contain an ASCII character that corresponds to the displayed character.

Some ASCII characters (e.g., 'X', 'M') cannot be shown on VFO A, which uses a 7-segment display. The K3 uses such characters as placeholders for special characters that *can* be displayed – in some cases lowercase versions of uppercase letters – to enhance display readability. For this reason, the characters returned by the **DS** command must sometimes be converted to other characters by the software application. **Table 3** shows all possible conversions, some not used. The table assumes the decimal-point flag (bit 7) is 0.

The menu parameters for *MAIN:RX EQ / TX EQ* consist of 8 “mini bar-graphs” with 5 possible “levels.” These show up as the following characters in the **DS** response string (level 1 through 5): ‘\_’, ‘=’, ‘>’, ‘]’, and ‘^’. To see how these should appear in a graphical application, go into RX EQ and vary one of the EQ bands over its full range.

**Table 3 DS response character conversions (bit 7 cleared).**

<b>DS chr.</b>	<b>Converts to</b>	<b>DS chr.</b>	<b>Converts to</b>	<b>DS chr.</b>	<b>Converts to</b>
<	small-caps L	M	N	Z	lowercase c
>	dash	Q	O	[	r-bar
@	space (blank)	V	U	\	lambda
K	H	W	I	]	RX/TX EQ level 4
		X	c-bar	^	RX/TX EQ level 5

**Icon data:** This field is a single byte whose value is between 0x80 and 0xFF. Bit 7 is always 1. The other 7 bits indicate the on/off states of 8 icons common to the K2 and K3. The bits are defined as follows (B7 = 0x80).

B7: Always 1	B3: 1=ATT on
B6: 1=NB on*	B2: 0=VFO A selected (always 0 for K3)
B5: 1=ANT2 selected	B1: 1=RIT on
B4: 1=PREAMP on	B0: 1=XIT on

**Icon flash data or additional K3 icons:** This field is a single byte whose value is between 0x80 and 0xFF. Bit 7 is always 1. In K3 normal mode (K30, or K2 emulation), the other 7 bits are all 0, since in general the K3 doesn't use flashing icons to indicate state. In **K3 Extended** mode (**K31**), the bits are defined as follows (B7 = 0x80):

B7: Always 1	B3: 1=CWT on
B6: 1=SUB on*	B2: 1=NR on*
B5: 1=RX ANT on	B1: 1=NTCH on
B4: 1=ATU on (in-line)	B0: 1=MAN NOTCH on

\* The **IC** command provides extended info about the K3's sub receiver (SUB on/off state, linked VFOs, band independence, diversity, sub antenna selection, sub AUX antenna source, sub NB, and sub NR). **IC** does not require the use of **K31**, which may be an advantage for some applications.

<sup>6</sup> K2 decimal point flash status can be obtained directly; use **LK** for VFO lock, **IF** for scan on/off, and **GT** for AGC on/off.

### ***DT (DATA Sub-Mode; GET/SET)***

SET/RSP format: **DTn**; where **n** is the data sub-mode last used with VFO A, whether or not DATA mode is in effect: 0 (DATA A), 1 (AFSK A), 2 (FSK D), or 3 (PSK D). See **MD** for setting data normal/reverse. In *Diversity Mode* (K3 only, accessed by sending **DV1** or via a hold of **SUB**), sending **DTn** matches the sub receiver's mode to the main receiver's. **Notes: (1) Use DT only when the transceiver is in DATA mode; otherwise, the returned value may not be valid.** (2) In AI2/3 modes, changing the data sub-mode results in both **FW** and **IS** responses. (3) The present data sub-mode is also reported as part of the **IF** command, although this requires that **K31** be in effect. Refer to the **IF** command for details.

### ***DV (Diversity Mode; GET/SET)***

SET/RSP format: **DVn**; where **n** is 0 to turn diversity mode OFF, 1 to turn it ON, and 'S' to toggle both the sub RX and diversity on/off together. K3 only; requires subreceiver. Turning the sub off also cancels diversity mode. **Also see:** **LN** (VFO A/B link) and (sub receiver on/off).

### ***EL \*\* (Error Logging; SET only; KX3/KX2 only)***

SET format: **ELn**; where **n** is 0 to turn error logging OFF, and 1 to turn it ON. When error logging is ON, the radio will report all "ERR xxx" messages and general warnings (e.g. "HiTemp->5W;") to an attached PC.

### ***ES (ESSB Mode; GET/SET)***

SET/RSP format: **ESn**; where **n** is 0 to turn ESSB mode OFF, and 1 to turn it ON. **Note: The application must place the K3 in either LSB or USB mode for the ESSB ON condition to be relevant.**

### ***FA and FB (VFO A/B Frequency; GET/SET)***

SET/RSP format: **FAxxxxxxxxxx**; or **FBxxxxxxxxxx**; where **xxxxxxxxxx** is the frequency in Hz. Example: **FA00014060000**; sets VFO A to 14060 kHz. The Hz digit is ignored if the K3 is not in FINE mode (1-Hz tuning; use **SWT49**). If the specified frequency is in a different amateur band than the present one, the K3 will change to the new band, and will automatically report the new values of parameters that may have changed<sup>7</sup>. **Notes: (1) Band changes typically take 0.5 seconds; all command handling is deferred until this process is complete.** (2) If the specified frequency is over 30 MHz and is within a valid transverter band (as specified by the operator using the K3's **XVTR** menu entries), the K3 will switch to that transverter band. If the specified frequency is outside the range of 500 kHz-30 MHz and 48-54 MHz, the K3 will switch to the amateur band closest to the requested one, and the last-used VFO A and VFO B values for that band will be retrieved. (KSYN3A extends low range to 100 kHz.)

If the VFOs are linked (non-SPLIT), **FA** also sets VFO B to the same frequency as VFO A.

### ***FI \* (I.F. Center Frequency; GET only)***

RSP format: **Finnnn**; where **nnnn** represents the last 4 digits of the K3's present I.F. center frequency in Hz. Example: If **nnnn** = 5000, the I.F. center frequency is 8215000 Hz. Intended for use with panadapters, which need to keep track of the exact I.F. center frequency as filter bandwidths and shifts are changed by the operator. Not applicable to the KX3/KX2.

### ***FR (RX VFO Assignment [K2 only] and SPLIT Cancel; GET/SET)***

SET/RSP format: **FRn**; where **n** is ignored in the K3 case because VFO A is always active for receive mode (the K3 cannot emulate the K2's VFO A/B behavior). Any **FR** SET cancels SPLIT mode.

### ***FT (TX VFO Assignment and optional SPLIT Enable; GET/SET)***

SET/RSP format: **FTn**; where **n** specifies the transmit-mode VFO assignment: 0 for VFO A, 1 for VFO B. If B (1) is selected for transmit, the K3 will enter SPLIT (except when split is N/A). Use **FR0**; to cancel SPLIT.

<sup>7</sup> The parameters sent on band change include **IF** (includes new mode), **FA**, **FB**, **FR**, **FT**, **PA**, **RA**, **AN**, **GT**, **FW**, and **NB**.

### ***FW \$ (Filter Bandwidth and Number; GET/SET)***

**NOTE:** FW is a legacy K2 command with side-effects based on the K3x and K2x meta command settings. For the KX3, KX2 and K3, use BW if possible. Also use BW in switch macros.

**K3 Extended** SET/RSP format (**K31**): **FWxxxx**; where **xxxx** is 0-9999, the bandwidth in 10-Hz units. May be quantized and/or range limited based on the present operating mode.

**Basic and K2 Extended** formats: See KIO2 Programmer's Reference (K2). In **K22** mode, direct selection of crystal filters is possible by adding a 5<sup>th</sup> digit (K2 and K3 only). However, **K31** must not be in effect, or it will override the legacy K2 behavior and only allow direct bandwidth selection. For example, you could send **K30;K22;FW00003;K20;K31**; to select filter #3 and then restore the original **K2x** and **K3x** command modes (yours may be different).

**Notes:** (1) In **AI2/3** modes, moving the physical WIDTH control results in both **FW** and **IS** responses (width and shift). (2) In diversity mode, **FW** matches the sub receiver's filter bandwidth to the main receiver's, which may result in the generation of **FA/FB/FR/FT** responses. (3) Both **FW** and **FW\$** can be used in BSET mode (one exception: at present, **FW/FW\$** SET can't be used in BSET mode with diversity receive in effect). (4) In **K22** mode, a legacy 6<sup>th</sup> digit is added to the response. It is always 0. In the K2, it indicated audio filter on/off status. (5) If a KX3/KX2 is in DUAL RX (dual watch) mode, **FW\$** returns the value for **FW**.

### ***GT (AGC Time Constant; GET/SET)***

**Basic** SET/RSP format: **GTnnn**; where **n** is 002 for fast AGC and 004 for slow AGC.

**K2 Extended** SET/RSP format (**K22**): **GTnnnx**; where **x** is 0 (AGC off) or 1 (AGC on).

**Note:** AGC time constant is stored per-mode, as is AGC on/off and VFO tuning rate.

**IC (Misc. Icons and Status; GET only)**

RSP format: **ICabcde**; where **abcde** are 8-bit ASCII characters (**Byte** in **Table 4** below) used as collections of flags (**Bit** in table). Each flag represents the status of an LCD icon and/or a specific transceiver function.

Some functions whose status is indicated by **IC** command flags can be controlled using other commands. For example, the K3 can be put into TX TEST by sending **SWH18**. The condition can be verified at any time using the **IC** command (byte **a**, bit **5**). Another example: ESSB (extended SSB) can be turned on/off using an **MN** (menu) command, followed by **SWT11**, simulating a tap of **1** on the keypad. Again, **IC** can be used to verify the present state (byte **d**, bit **5**).

The 8<sup>th</sup> bit (B7) of each byte is always 1 to ensure that control characters are not sent to the computer. The other bits are defined as shown in **Table 4**.

**Table 4** IC response fields. See notes below.

Bit	Byte				
	a (Misc)	b (Sub RX)	c (CW/DATA)	d (Voice Modes)	e (Misc)
B7	Always 1	Always 1	Always 1	Always 1	Always 1
B6	1=BSET ** 0=Normal	1=VFOs linked (VFO A tunes both) (K3 only)	1=Full QSK 0=Semi QSK	1=VOX on in voice, DATA A, AFSK A	1= 10 Hz SHIFT 0= 50 Hz SHIFT
B5	1=TX TEST 0=Normal	1=VFO A/B bands are independent	1=Dual-passband CW or APF in use	1=ESSB 0=Normal	1= AM Sync USB 0= AM Sync LSB
B4	1=mW power level (xvtr or KXV3 test) 0=normal power out	1=Diversity mode (K3 only)	1=VOX on for CW, FSK-D, or PSK-D	1=Noise gate on 0=Off	1= Main RX is squelched
B3	0=MSG bank 1 1=MSG bank 2 §	1=Sub ant. = MAIN 0=Sub ant. = AUX (K3 only)	1=Dual-tone FSK filter in use	1=AM Sync RX 0=Normal	1= Sub RX is squelched (K3 only)
B2	1=MSG is playing 0=no MSG playing	Sub RX aux source: 1=BNC (AUX RF) 0=non-TX ATU ant (K3 only)	1=Normal FSK TX polarity 0=inverted	1=FM PL tone on 0=Off	1=Sub RX NR is on, 0=Off (K3 only)
B1	1 =CONFIG:MEM0-9 = BAND SEL	1=Sub RX NB is on 0=Off (K3 only)	1=Sync DATA 0=Normal	1=(+) Rptr TX ofs	1=OFS LED is on 0=VFOB LED is on (KX3/KX2 only)
B0	Preset #: 0=I, 1=II§	1=Sub RX is on (dual watch in KX3/KX2)	1=Text-to-terminal is in effect (see <b>TT</b> )	1=(-) Rptr TX ofs	1=Fast Play in effect (KX3/KX2 only)

\* These bits are reserved for future use.

\*\* If BSET is in effect (byte **a**, bit **6**=1), the values of some other flags may change or may be invalid. The application should examine this bit first.

§ Per-mode, or per mode-group (e.g., MSG bank # is stored separately for CW/FSK-D/PSK-D and voice/DATA-A/AFSK-A).

### ***ID (Transceiver Identifier; GET only)***

RSP format: **IDnnn**; where **nnn** is 017. This command is provided only for compatibility with existing software, which may use **ID** in order to distinguish between transceivers. New or modified software should send the **K3** command to the transceiver. If a **K3n** response is then received, the computer must be connected to a K3, KX3, or KX2. The K3, KX3, and KX2 can be differentiated from each other using the **OM** command.

### ***IF (Transceiver Information; GET only)***

RSP format: **IF[f]\*\*\*\*\*+yyyyrx\*00tmvspbd1\***; where the fields are defined as follows:

[f]	Operating frequency, excluding any RIT/XIT offset (11 digits; see <b>FA</b> command format)
*	represents a space (BLANK, or ASCII 0x20)
+	either "+" or "-" (sign of RIT/XIT offset)
yyyy	RIT/XIT offset in Hz (range is -9999 to +9999 Hz when computer-controlled)
r	1 if RIT is on, 0 if off
x	1 if XIT is on, 0 if off
t	1 if the K3 is in transmit mode, 0 if receive
m	operating mode (see <b>MD</b> command)
v	receive-mode VFO selection, 0 for VFO A, 1 for VFO B
s	1 if scan is in progress, 0 otherwise
p	1 if the transceiver is in split mode, 0 otherwise
b	<b>Basic RSP format</b> : always 0; <b>K2 Extended RSP format (K22)</b> : 1 if present IF response is due to a band change; 0 otherwise
d	<b>Basic RSP format</b> : always 0; <b>K3 Extended RSP format (K31)</b> : DATA sub-mode, if applicable (0=DATA A, 1=AFSK A, 2= FSK D, 3=PSK D)

The fixed-value fields (space, 0, and 1) are provided for syntactic compatibility with existing software.

### ***IO (KX3/KX2, Internal Use Only)***

SET/RSP format: **TBD**.

### ***IS (I.F. Shift; GET/SET)***

SET/RSP format: **IS\*nnnn**; where \* must be a space (blank), and **nnnn** is the AF center frequency (Fc) in Hz. The SET value may be altered based on the present mode; a subsequent **IS GET** reports the value used. The nominal Fc (i.e., with no SHIFT) varies with mode, and in CW or DATA modes will also vary with PITCH. To center the passband, send **IS 9999**; . A subsequent **IS** read will then return the center frequency.

**Notes**: In AM-Sync mode, send **IS 1400** / **IS 1600** to shift to LSB / USB. This doesn't actually shift the AF passband; an IS get will return **IS 1500** in AM-Sync because AF Fc remains at 1500 Hz. To determine which sideband is in use for AM sync, see the **IC** command. In AI2/3 modes, moving the physical SHIFT control results in both **IS** and **FW** responses (shift and width). In diversity mode, an **IS** command also shifts the sub receiver, and FA/FB/FR/FT commands may be generated. **IS** is not applicable to FM mode or QRQ CW mode.

### ***K2 (K2 Command Mode; GET/SET)***

SET/RSP format: **K2n**; where **n** is 0-3. If non-zero, enables K2 command extensions to legacy "2-letter" commands. (These apply to the K3 as well.) In most cases the effects of the **K2** command are independent from those of the **K3** command (see below), and the two can both be non-zero at the same time. The **FW** command is an exception; see meta-commands and **FW** for details. **BW** is a non-modal version of **FW** that is preferred in switch macros and when **AI** modes aren't used.

### ***K3 \* (Command Mode; GET/SET)***

SET/RSP format: **K3n**; where **n** is 0-1. If **n** is 1, enables K3-specific command extensions to legacy “2-letter” commands. Not needed for new commands that are unique to the K3. In most cases the effects of the **K3** command are independent from those of the **K2** command (see above), and the two can both be non-zero at the same time. The **FW** command is an exception; see meta-commands and **FW** for details. **BW** is a non-modal version of **FW** that is preferred in switch macros and when **AI** modes aren’t used.

### ***KS (Keyer Speed; GET/SET)***

SET/RSP format: **KSnnn**; where **nnn** is 008-050 (8-50 WPM).

### ***KY (CW or CW-to-DATA Keying from Text; GET/SET)***

SET format: **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).

**Basic RSP format: KYn**; where **n** is 0 (CW text buffer not full) or 1 (buffer full). Also see **TB** command.

**K2 Extended RSP format (K22): KYn**; where **n** is 0 (buffer < 75% full), 1 (buffer > 75% full), or 2 (buffer completely empty AND transmit of previous string is complete).

The following keyboard characters are mapped to CW "prosigns":

( KN            + AR            = BT            % AS            \* SK            ! VE

In addition to these prosigns, these special characters can be inserted anywhere in the **KY** command text:

- < Puts the K3 into TX TEST mode, until a '>' character is received
- > Returns the K3 to TX NORM mode
- @ In CW mode, this character normally terminates any CW message (via KY or manual send), emulating the K2. However, tapping **2** in **CONFIG: CW WGHT** changes ‘@’ to a prosign: the ‘at’ 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.

### ***LK \$ (VFO Lock; GET/SET)***

SET/RSP format: **LKn**; where **n** is 0 (VFO unlocked) or 1 (locked).

### ***LN \* (Link VFOs; GET/SET)***

SET/RSP format: **LNn**; where **n** is 0 (VFOs unlinked) or 1 (linked).

### ***MC (Memory Channel; GET/SET)***

SET/RSP format: **MCnnn**; where **nnn** is the memory # (or channel). Regular memories are **000-099**. Per-band quick memories:  $nnn = 100 + \text{bandNum} * 4 + Mn - 1$ . For bandNum, see **BN**. Mn is 1 - 4, i.e. **M1-M4** tap.

**Notes:** (1) A SET is ignored if the target memory is invalid. (2) K3 only: If **CONFIG: MEM0-9 = BAND SEL**, then memories 000-009 only (“Quick memories”) will recall the last-used VFO frequencies in the target band, not fixed frequencies. (3) Switching to any regular memory (000-099) updates the K3’s default **V>M/M>V** memory number; this is not the case when switching to Per-Band Quick memories (**M1-M4**). (4) Switching to any memory tagged with ‘\*’ as the first character in its label enables channel-hop scanning (see K3/KX3/KX2 Owner’s manual).

### ***MD \$ (Operating Mode; GET/SET)***

SET/RSP format: **MDn**; or **MD\$n**; where **n** is 1 (LSB), 2 (USB), 3 (CW), 4 (FM), 5 (AM), 6 (DATA), 7 (CW-REV), or 9 (DATA-REV). **Notes:** (1) K3 only: In *Diversity Mode* (accessed by holding **SUB**), sending **MDn**; sets both main and sub mode to **n**. (2) DATA and DATA-REV select the data sub-mode that was last in effect on the present band. (To read/set data sub-mode, use **DT**.) The norm/rev conditions for the K3's 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. In K2 command modes 1 and 3 (**K21** and **K23**), the RSP message converts modes 6 and 7 (DATA and DATA-REV) to modes 1 and 2 (LSB and USB). This may be useful with existing software applications that don't handle DATA modes correctly. (3) If a KX3/KX2 is in DUAL RX (dual watch) mode, **MD\$** returns the value for **MD**. (4) FM mode does not apply to the KX2.

### ***MG (Mic Gain; GET/SET)***

SET/RSP format: **MGxxx**; where **xxx** is 000-060.

### ***ML (Monitor Level; GET/SET)***

SET/RSP format: **MLxxx**; where **xxx** is 000-060. Applies to current mode (CW sidetone, voice, or data). In voice modes, applies to MON level, even if DVR monitor level is independent (*MAIN:TX DVR*).



**MN (Menu Selection; GET/SET; K3, KX3, and KX2 variants)**

SET/RSP format: **MNnnn**; where **nnn** is shown in **Table 5 (K3)**, **Table 6 (KX3)**, or **Table 6A (KX2)**.

**MN255** is returned if the menu is not in use. **MN** commands can be sent in any order. To exit the menu, send **MN255**. To change the parameter, use **UP / DN** (or **MP** and **MQ** commands—see table notes). **IMPORTANT: TECH MD** menu entry must be set to ON to access tech-mode menu entries; otherwise **MN** will skip these entries. Use **MN072** to access the **TECH MD** menu entry. **On the KX3/KX2, tech-mode parameters are locked by default when accessed at the radio, but are automatically unlocked when accessed via the MN/MP/MQ commands.**

**Table 5 K3 MN values.** ‡ = can be read/set using **MP** command. \* = removed from K3 menu (ID number preserved for backwards compatibility). **nnn** is permanently associated with a menu entry, even if entries are moved. **md** is the data mode pertaining to a menu entry: CW, SB (LSB/USB), DT (DATA), AM, or FM. **pwr** is LP (QRP), HP (QRO), or MW (0 to 2 mW, using the KXV3 transverter I/O jacks).

Entry	nnn	Entry	nnn	Entry	nnn	Entry	nnn
ALARM	000	DATE MD	030	SMTR MD	060	XV <sub>x</sub> RF	090
IAMBIC	001	DDS FRQ	031	AGC-F	061	XV <sub>x</sub> IF	091
LCD ADJ ‡	002	LIN OUT ‡	032	REF CAL	062	XV <sub>x</sub> PWR	092
LCD BRT ‡	003	KIO3	033	SQ MAIN	063	XV <sub>x</sub> OFS	093
LED BRT ‡	004	ADC REF	034	SQ SUB	064	XV <sub>x</sub> ADR	094
MSG RPT ‡	005	RFI DET	035	SMTR OF	065	AF GAIN	095
PADDLE	006	KDVR3	036	SMTR SC	066	TX ESSB	096
RPT OFS ‡	007	AGC-S	037	SMTR PK	067	SPKR+PH	097
RX EQ	008	FL <sub>x</sub> BW	038	SPLT SV	068	VFO B->A	098
TX EQ	009	FL <sub>x</sub> FRQ	039	SPKRS	069	AGC PLS	099
VOX GN	010	FL <sub>x</sub> GN	040	SW TEST	070	RIT CLR	100
ANTIVOX	011	FL <sub>x</sub> ON	041	SW TONE	071	TX GATE	101
WEIGHT	012	FLTX <b>md</b>	042	TECH MD	072	MEM 0-9	102
2 TONE	013	FP TEMP	043	TIME	073	PTT KEY	103
AFV TIM	014	FSK POL	044	AGC THR ‡	074	VFO CRS	104
MIC+LIN	015	AUTOINF	045	PTT RLS	075	AFX MD ‡	105
TX DLY	016	KBPF3	046	BND MAP	076	SIG RMV	106
AGC SLP	017	AF LIM	047	TTY LTR	077	AFSK TX	107
FM MODE	018	KNB3 *	048	TX ALC	078	AGC DCY	108
DIGOUT1 ‡	019	KRC2 AC	049	TXGN <b>pwr</b>	079	PB CTRL	109
AGC HLD	020	KRX3	050	SUB AF	080	MACRO x	110
FM DEV	021	KXV3	051	PWR SET	081	L-MIX-R ‡	111
EXT ALC	022	LCD TST	052	MIC BTN	082	CW QRQ	112
KAT3 ‡	023	MIC SEL	053	VCO MD ‡	083	TX DVR	113
BAT MIN	024	NB SAVE	054	VFO CTS	084	TX MON	114
TX INH	025	KPA3 ‡	055	VFO FST	085	DUAL PB	115
SER NUM	026	PA TEMP	056	VFO IND	086	VFO LNK	116
TXG VCE	027	RS232	057	VFO OFS	087	ATTEN ‡	117
FW REVS	028	TUN PWR ‡	058	WMTR <b>pwr</b>	088	PREAMP2	118
DATE	029	SYNC DT	059	XV <sub>x</sub> ON	089	<b>Exit Menu</b>	255

**Table 6 KX3 MN values.** (See **Table 6A** for **KX2**.) These are the same as the K3's only if the two are functionally identical. **nnn** is permanently associated with a menu entry, even if entries are moved.

‡ = can be read/set using **MP** command (or **MQ** in the case of *TXCRNUL*). In some cases the get/set value requires interpretation, or must be bit-masked to isolate the relevant field. See **MP** command for details.

Entry	nnn	Entry	nnn	Entry	nnn	Entry	nnn
ALARM ‡	000		040		080	CW KEY1 ‡	120
CW IAMB ‡	001		041		081	CW KEY2 ‡	121
	002		042	MIC BTN ‡	082	VOX INH ‡	122
	003		043		083	RX I/Q ‡	123
	004		044	VFO CTS ‡	084	RX ISO ‡	124
MSG RPT ‡	005	AUTOINF ‡	045		085	RXSBNUL ‡	125
	006		046		086	AM MODE ‡	126
RPT OFS ‡	007	AF LIM ‡	047	VFO OFS ‡	087	TXSBNUL ‡	127
RX EQ	008		048	WATTMTR ‡	088	AGC MD ‡	128
TX EQ	009		049	XV <sub>x</sub> ON	089	AGC SPD ‡	129
VOX GN ‡	010		050	XV <sub>x</sub> RF	090	TX BIAS	130
	011		051	XV <sub>x</sub> IF	091	TX GAIN	131
CW WGHT ‡	012	LCD TST	052	XV <sub>x</sub> PWR	092	TXCRNUL ‡	132
2 TONE	013		053	XV <sub>x</sub> OFS	093	AUTOOFF ‡	133
	014		054	XV <sub>x</sub> ADR	094	RX XFIL ‡	134
	015		055		095	MICBIAS ‡	135
TX DLY ‡	016		056	TX ESSB ‡	096	PREAMP ‡	136
	017	RS232	057		097	BAT CHG ‡	137
FM MODE ‡	018	TUN PWR ‡	058		098	BKLIGHT ‡	138
	019		059		099	COR LVL ‡	139
	020	SMTR MD ‡	060		100	DUAL RX ‡	140
FM DEV ‡	021		061	TX GATE ‡	101	ACC2 IO ‡	141
	022	REF CAL	062		102	RX SHFT ‡	142
ATU MD ‡	023		063		103	RX NR ‡	143
BAT MIN ‡	024		064	VFO CRS ‡	104	PBT SSB ‡	144
	025		065	AFX MD ‡	105	LED BRT ‡	145
SER NUM	026		066		106	PA MODE ‡	146
	027		067		107	2M MODE ‡	147
FW REVS	028		068		108		
	029		069		109		
	030	SW TEST	070	MACRO x	110		
	031	SW TONE ‡	071		111		
	032	TECH MD ‡	072	ATU DATA ‡	112		
	033	TIME	073		113		
	034	AGC THR ‡	074		114		
	035		075		115		
	036	BND MAP ‡	076		116		
	037		077		117		
	038		078		118		
	039		079	VFO NR ‡	119	<b>Exit Menu</b>	255

MN

**Table 6A KX2 MN values.** \* = New KX2-specific menu entry not present in the KX3. ‡ = can be read/set using MP command (or MQ in the case of *TXCRNUL*). In some cases the get/set value requires interpretation, or must be bit-masked to isolate the relevant field. See **MP**. If the **MP** command is not available, use the **UP** and **DN** knob emulation commands to change the parameter and **DS** to read the parameter value from the VFO A display.

Entry	nnn	Entry	nnn	Entry	nnn	Entry	nnn
	000		044	WATTMTR ‡	088	TXCRNUL ‡	132
CW IAMB ‡	001	AUTOINF ‡	045	XVx ON	089	AUTOOFF ‡	133
	002		046	XVx RF	090		134
	003	AF LIM ‡	047	XVx IF	091	MICBIAS ‡	135
	004		048	XVx PWR	092		136
MSG RPT ‡	005		049	XVx OFS	093		137
	006		050		094	BKLIGHT ‡	138
	007		051		095	COR LVL ‡	139
RX EQ	008	LCD TST	052		096	DUAL RX ‡	140
TX EQ	009		053		097		141
VOX GN ‡	010		054		098		142
	011		055		099	RX NR ‡	143
CW WGHT ‡	012		056		100		144
2 TONE	013	RS232	057	TX GATE ‡	101	LED BRT ‡	145
	014	TUN PWR ‡	058		102	PA MODE ‡	146
	015		059		103		147
TX DLY ‡	016	SMTR MD ‡	060	VFO CRS ‡	104	PITCH ‡ *	148
	017		061	AFX MD ‡	105	ALT MD *	149
	018	REF CAL	062		106	CWT *	150
	019		063		107	AMP HRS *	151
	020		064		108	VOX MD *	152
	021		065		109	VOX DLY *	153
	022		066		110	TX CMP ‡ *	154
ATU MD ‡	023		067		111	RF GAIN ‡ *	155
BAT MIN ‡	024		068	ATU DATA ‡	112	XIT *	156
	025		069		113	ANT.X SW *	157
SER NUM	026	SW TEST	070		114	KXIO2 *	158
	027	SW TONE ‡	071		115	RTC ADJ *	159
FW REVS	028	TECH MD ‡	072		116	AUX 1 *	160
	029	TIME	073		117	AUX 2 *	161
	030	AGC THR ‡	074		118		
	031		075		119		
	032		076	CW KEY1 ‡	120		
	033		077	CW KEY2 ‡	121		
	034		078	VOX INH ‡	122		
	035		079	RX I/Q ‡	123		
	036		080		124		
	037		081	RXSBNUL ‡	125		
	038	MIC BTN ‡	082	AM MODE ‡	126		
	039		083	TXSBNUL ‡	127		
	040		084	AGC MD ‡	128		
	041		085	AGC SPD ‡	129		
	042		086	TX BIAS	130		
	043		087	TX GAIN	131	Exit Menu	255

## **MP (8-bit Direct Menu Parameter Access; GET/SET)**

SET/RSP format: **MPnnn**; where the useful range of **nnn** is determined by the present menu entry (255 max, or 8 bits). Only menu entries marked with ‡ in **Table 5, 6, or 6A** can be accessed with **MP**, while others will return “?” (use **UP / DN, DS, and SWT/SWH** in such cases). There is also no range checking with **MP** in most cases, so the user’s macro or application must verify the correct range.

**Details:** **MN** (described above) *accesses* menu entries. **MP** can then be used (in some cases) to *read* or *set* the parameter value. (In some cases, more than one value can be accessed for a given menu entry via the numeric keys; see menu listing in manual.)

**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 to see the associated **nnn** value.

**MP Command Special Cases (KX3 and KX2 only):** Special cases are listed below. For some menu entries, the **MP** get/set value pertains only to specific binary bit fields in the 8-bit quantity. (For **MP SETs**, the **KX2/3** protects all unrelated bit positions, so the application can’t inadvertently modify them. For **MP GETs**, the **KX2/3** masks off unused bit positions, so they will always return zero.) Where a single bit is specified in the list below, the values x/y are associated with bit values of 0/1. **Example:** To select iambic mode B for CW mode, first send **MN001**; (to select the **CW IAMB** menu entry), then send **MP128**; (since  $2^7$  is 128, this sets bit 7 of the parameter). To select iambic mode A, instead, send **MN000**; (clearing bit 7; the other bits are unaffected because of the masking mentioned previously). To read the current value, send **MP**; and look at only the value of bit 7 in the return parameter. The response would be either **MP000**; (mode A) or **MP128**; (mode B).

AGC MD: bit0=on/off

AGC SPD: bit1=slow/fast

ALARM (KX3 only): bit4=on/off

AM MODE (KX3 only): bit6=disabled/enabled

ATU DATA: bit3=SET1(0)/SET2(1)

ATU MODE: When ATU.X is in effect (KXAT100 mode), MP is GET-only.

KX2: L8/C8 do not apply to the KXAT2, which has only through L7/C7.

BND MAP (KX3 only): bit5=in/out

CW IAMB: bit7=modeA/modeB

CW KEY1: bit0=tip is dot/dash; bit1=paddle/hand-key

CW KEY2: bit4=tip is dot/dash; bit5=paddle/hand-key

DUAL RX: bit4=off/on

FM MODE (KX3 only): bit7=disabled/enabled

MIC BIAS: bit4=off/on

MIC BTN: bit0=PTT disabled/enabled; bit2=UP/DN buttons disabled/enabled

PBT SSB (KX3 only): bit7=lohicut/nor (nor=width-shift)

PREAMP (KX3 only): bit0=10dB, bit1=20dB, both=30dB

RX I/Q (KX3 only): bit2=off/on

RX SHFT (KX3 only): bit0=nor/8.0 kHz

RX XFIL (KX3 only): bit1=KXFL3 option not installed/installed

SMTR MD (KX3 only): bit7=nor (relative)/absolute

SW TONE: bits0-2=CW feedback speed in WPM; bit6=CW UI off/on; bit7=tones off/on

TECH MD: bit2=off/on

TX ESSB (KX3 only): bit0=off/on

TX GATE: bit1=off/on

VFO CRS: bits2-3=one of up to 4 coarse-tuning selections

VFO NR (KX3 only): bit5=on/off

VFO OFS (KX3 only): bit0=coarse offset control (via OFS/B knob) disabled/enabled

### ***MQ (16-bit Direct Menu Parameter Access; GET/SET; KX3/KX2 Only)***

SET/RSP format: **MQnnnnn**; where **nnnnn** is the 16-bit parameter value. Useful range is determined by the present menu entry (65535 max). Applies only to the **TXCRNUL** menu entry at present.

### ***NB \$ (Noise Blanker On/Off; GET/SET)***

SET/RSP format: **NBn**; or **NB\$n**; where **n** is 0 (**OFF**) or 1 (**ON**).

**Notes:** **NB0** always turns the noise blanker off, overriding any non-zero **NL** settings (see **NL**). In K2 extended mode, an additional '0' is appended to the **NB** response to provide legacy (K2) format compatibility.

### ***NL \$ (DSP and IF Noise Blanker Level; GET/SET)***

SET/RSP format: **NLddii**; or **NL\$ddii**; where **dd** is DSP NB level (**00-21**), and **ii** is IF NB level (**00-21, K3 only**). For the K3's DSP or IF blanker, **00** effectively turns that blanker off, even if **NB1** is in effect (see above). For the DSP blanker on the K3, **01** = setting **t1-1**, **02** = **t1-2**, etc.; for the KX3/KX2 DSP blanker, **01** = level 1, etc. For the IF blanker (K3 only), **01** = **NAR1**, **02** = **NAR2**, etc.

### ***OM (Option Module Query; GET Only; K3S, K3, KX3, and KX2 variants)***

#### **K3/K3S**

**RSP format:** **OM APXSDFfLVR--**; where any of the characters **APXSDFfLVR**, if present, indicate installed and detected option modules (see list below). The positions of the letters are fixed. If a module is not present, its letter is replaced by a dash (-). For example, if only a PA and sub receiver were installed, "**OM;**" would return "**OM -P-S-----;**". Unused dashes are reserved for future module letters and product ID.

**Option List:** The letters (and associated positions) in the **OM** string refer to the following option modules:

**A** = ATU (KAT3A), **P** = PA (KPA3A), **X** = XVTR and RX I/O (KXV3, KXV3A, or KXV3B), **S** = Sub Receiver (KRX3A), **D** = DVR (KDVR3), **F** = Band-Pass Filter module, main (KBPF3A), **f** = Band-Pass Filter module, sub (KBPF3A), **L** = Low-Noise Amplifier available on present band (preamp 2, only available on the KXV3B module), **V** = KSYN3A synthesizer (extends VFO tuning range; see note 2 below), and **R**=K3S RF board.

**Note 1:** The presence of 'R' in the string (K3S RF board) is the preferred way to identify a K3S. In this case: (1) Use the K3S format for the **RA** (receive attenuator) command; (2) poll for **OM** after each band change to 12/10/6 meters to see if the LNA (preamp 2) is enabled. (See **PA** command for information on preamp 2 use.)

**Note 2:** Presence of a KSYN3A ('V') extends VFO tuning range down to 100 kHz. However, to use frequencies below 160 meters, a KBPF3 option module is required, and the receiving antenna should be connected to RX ANT IN or XVTR IN on the KXV3B module (to bypass the high-pass filter in the T/R switch). Low-level (0.5-1 mW) transmit below 160 meters is also possible via the XVTR OUT jack. Use of frequencies below 600 meters (470 kHz) requires a KBPF3A, or a KBPF3 modified for LF use. See details on the Elecraft web site.

#### **KX3 and KX2**

**RSP format:** **OM APF---TBXI0n**; where any of the characters **APFTBXI**, if present, indicate installed and detected option modules (see list below), and **0n** (zero, not 'O') is the product identifier (**n=1 for KX2, n=2 for KX3**). The positions of the letters are fixed. If a module is not present, its letter is replaced by a dash (-). For example, if only KXAT3 antenna tuner and KXFL3 roofing filter modules were installed, "**OM;**" would return "**OM A-F-----02;**". Unused dashes are reserved for future module letters.

**Option List:** The letters (and associated positions) in the **OM** string refer to the following KX3 or KX2 option modules: **A** = ATU (KXAT3 or KXAT2), **P** = external 100-W PA (KXPA100), **F** = roofing filter (KXFL3), **T** = external 100-W ATU (KXAT100, a KXPA100 internal option), **B** = internal NiMH battery-charger/real-time clock (KXBC3), **X** = KX3-2M or KX3-4M transverter module, **I** = KXIO2 RTC I/O module.

### ***PA \$ (Receive Preamp Control; GET/SET)***

SET/RSP format: **PA***n*; or **PA***\$n*; where **n** is 0 (preamp OFF), 1 (preamp ON), or 2 (preamp 2 on the KXV3B module; requires a KXV3B option, which is standard on the K3S but an optional upgrade to the K3).

**Note 1:** The main receiver's preamp setting is saved per-RX ANT state. This is not the case for the sub receiver.

**Note 2:** Preamp 2 is available on 12/10/6 meters only, and must be enabled individually on each band using the KXV3B menu entry. If the LNA is enabled on the present band, an 'L' will appear in the OM (optional module) response. See OM for details.

**Note 3:** Preamp 2 is available for sub receiver use only if the sub is sharing the main antenna path.

### ***PC (Requested Power Output Level; GET/SET)***

Basic SET/RSP format: **PC***nnn*;

- For the K3, **nnn** is normally 000-012 (KPA3 not enabled) or 000-110 watts (KPA3 enabled). If byte **a**, bit **4** of the **IC** command response is set (indicating **CONFIG:KXV3** is set to TEST, or a transverter band with low-level I/O is selected) then the unit is hundreds of a mW, and the available range is 0.00-1.50 mW.
- For the KX3/KX2, if a KXPA100 is **not** attached, **nnn** is 000-012 on 80-20 m and 000-015 on 160/15-6 m. If a KXPA100 is attached, **nnn** is 000-110.

**K2 Extended SET format (K22): PC***nnnx*; where **nnn** is 000-120 (0.1-watt units) or 000-120 (1-watt units) and **x** controls the 100-W PA stage. In the K3, **x=0** sets **CONFIG:KPA3 MD** to **PA BYP**, and **1** sets it to **PA NOR**. In the KX3/KX2, **x=0** sets **MENU:PA MODE** to **OFF**, and **1** sets it to **ON**. See owner's manual menu descriptions.

**K2 Extended RSP format (K22): PC***nnnx*; where **nnn** is power, and **x** is 0 (low range) or 1 (high range).

Notes: (1) A lower power limit may be in effect on transverter bands (menu entries **XVTR1-9**). (3) The **MN** and **DS** command can be used to select other settings of the **KPA3 MD** menu parameter.

### ***PO \*\* (Actual Power Output Level; GET only; KX3/KX2 only)***

RSP format: **PO***nnn*; where **nnn** is the power in tenths of a watt (QRP mode) or watts (QRO mode). **Note:** The QRO case only applies if the KXPA100 amplifier enabled via **PA MODE=ON**, is connected to the KX3/KX2 via the special control cable, and the PWR level is set to 11 W or higher. The reading is approximate, as it is estimated from the KX3's or KX2's drive level. For a more accurate reading, use the KXPA100's "**^PF**;" command.

### ***PS (Transceiver Power Status; GET/SET)***

SET/RSP format: **PS***n*; where **n = 1** indicates transceiver on. Note: **PS0** turns the transceiver off, but this removes power, so **PS1 cannot** be used to turn it on. To turn power on, the K3's POWER\_ON line (aux I/O jack) must be pulled low by an external device, or it can be turned on manually using the power switch.

### ***RA \$ (Receive Attenuator Control; GET/SET)***

SET/RSP format: **RA***nn*; or **RA***\$nn*; .

For the K3/KX3/KX2, **nn** is 00 (attenuator OFF) or 01 (attenuator ON, -10 dB). For the K3S, **nn** can be the actual value in dB: 00/05/10/15 for the main receiver, and 00/10 for the sub. For backward compatibility, **RA01** can also be used to select 10 dB.

**Note 1 (K3/K3S):** The main receiver's attenuator on/off condition is saved per-RX ANT state. The sub receivers's attenuator setting is not.

**Note 2 (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 can directly set this per-band attenuator ON value using **RA**, while simultaneously turn 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.

### ***RC (RIT Clear; SET only)***

SET format: **RC**; (no data). Sets RIT/XIT offset to zero, even if RIT and XIT are both turned off (the change will be reflected when either RIT or XIT is turned on). **Note:** This command behaves differently in FINE RIT mode in the case of the K2. Refer to the KIO2 Programmer's Reference.

### ***RD (RIT Offset Down One Unit; SET only)***

SET format: **RD**; (no data). Moves the RIT/XIT offset down one step, which can be 1, 10, 20, or 50 Hz, depending the present VFO tuning rate. If the user has selected COARSE VFO tuning, **RD** moves either 20 or 50 Hz, as specified by *CONFIG:VFO FST*. The offset change occurs even if RIT and XIT are both turned off (the change will be reflected when either RIT or XIT is turned on). RIT/XIT offset range under computer control is -9.999 to +9.999 kHz. VFO step size is stored per-mode. Use the **IF** command to check the present RIT/XIT offset amount. **Note:** Both the **RD** and **RU** commands behave differently in the case of the K2 when FINE RIT mode is in effect. Refer to the KIO2 Programmer's Reference.

### ***RG \$ (RF Gain; GET/SET)***

SET/RSP format: **RGnnn**; or **RG\$nnn**; where **nnn** is 000-250. On the KX3/KX2, 250 = maximum RF gain (that is, attenuation of -0 dB), and 190 = -60 dB.

### ***RO (RIT/XIT Offset, Absolute; GET/SET)***

SET/RSP format: **ROsnnnn**; where **s** is +/- and **nnnn** is 0000-9999. **s** can also be a space in lieu of +.

### ***RT (RIT Control; GET/SET)***

SET/RSP format: **RTn**; where **n** is 0 (RIT OFF) or 1 (RIT ON). RIT is disabled in QRQ CW mode.

### ***RU (RIT Offset Up One Unit; SET only)***

See **RD** command.

### ***RV (Firmware Revisions; GET only)***

GET format: **RVx**; where **x** is M (MCU), D (Main DSP), A (Aux DSP, K3), R (DVR, K3), or F (Front Panel flash, K3).

RSP format: **RVxNN.NN** where **NN.NN** is the firmware revision, e.g. **02.37**. If a module isn't present, or an unknown module ID is requested, the revision is normally reported as **99.99**. A module that is present but malfunctioning may return revision **00.00**.

### ***RX (Receive Mode; SET only)***

SET format: **RX**; (no data). Terminates transmit in all modes, including message play and repeating messages. RX/TX status is available via the **TQ** command and is also included in the **IF** response. **Note:** **RX** is not usable in CW mode in the K2.

### ***SB \* (Sub Receiver or Dual Watch On/Off)***

SET/RSP format: **SBn**; where **n** is **0** (K3 sub receiver off, or KX3/KX2 dual watch off) or **1** (on). Also see **DV** command (diversity), which can automatically turn the sub on/off when using the **DVS** form.

### ***SD (QSK Delay, GET only)***

SET/RSP format: **SDnnnn**; where **nnnn** is the semi-break-in delay in 50-ms increments. Provided for backwards compatibility with older applications. If the K3 is in full QSK mode, SD will still read the same value even though the actual break-in delay is set to as close to 0 as possible.

### ***SM \$ (S-meter Read; GET only)***

**Basic** RSP format: **SMnnnn**; where **nnnn** is 0000-0015. Examples: S9=6; S9+20=9; S9+40=12; S9+60=15.

**K3 Extended** RSP format (**K31**): **nnnn** is 0000-0021. S9=9; S9+20=13; S9+40=17; S9+60=21.

This command can be used to obtain either the main (**SM**) or sub (**SM\$**) S-meter readings. Returns 0000 in transmit mode. Also see **BG** and **BA**, which can be used to read exact bargraph levels in both receive and transmit modes.

***SMH (High-resolution S-meter Read; GET only; K3 only at present)***

RSP format: **SMHnnn**; where **nnn** has the following approximate values vs. S-meter reading: S1, 5; S9, 40; S9+60, 100. Max possible value is about 140.

***SP (Special Functions)***

**SPG**; (KX3) returns ADC ground-reference reading, typically **SP000**.

***SQ \$ (Squelch Level; GET/SET)***

SET/RSP format: **SQnnn**; or **SQ\$nnn**; where **nnn** is 000-029. If the K3's *CONFIG:SQ MAIN* menu entry is set to a numeric value (**0-29**), then **SQ** and **SQ\$** apply to main and sub receivers, respectively, and the SUB RF/SQL pot on the K3 controls SUB RF GAIN. However, 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 as well. (Also in this case, the MAIN RF gain pot controls RF gain for both main and sub.)

**Note:** The **SQ** command in the K2 used the same format but different units.



**SWT/SWH (Switch Emulation; SET only; K3, KX3, and KX2 variants)**

SET format: **SWTnn**; (TAP functions) or **SWHnn**; (HOLD functions). **nn** is determined from **Table 7 (K3)**, **Table 8 (KX3)**, or **Table 8A (KX2)**. Switch emulation commands must sometimes be followed by a delay if successive commands expect the switch function to have been executed (example: **SWT16**; [XMIT], delay, **TQ**; [transmit status check]). Activating some switch functions results in icon or status changes that can be checked using the **IC** or **DS** commands.

**Table 7** Switch identifiers (**nn**) for the **K3** SWT/SWH command. (For the **KX3**, see **Table 8**, and for the **KX2**, **Table 8A**.) Table entries are organized similarly to the transceiver’s front panel (e.g. BAND is upper left on the K3). **Numeric keypad switches (0-9, ‘.’, ‘<-’) are shown in parentheses.** \* **DIVERSITY hold function** was implemented in K3 rev. 5.10. Prior to this, a hold of the SUB switch would link/unlink VFOs A and B. To replace the link/unlink function in 5.10 or later, menu entry CONFIG:VFO LNK was added. VFO link/unlink can also be accomplished using the **LN** command.

TAP	HOLD	nn	TAP	HOLD	nn	TAP	HOLD	nn
BAND-	VOX	09	FREQ ENT	SCAN	41	CWT (0)	TEXT Dec	40
BAND+	QSK	10	FINE	COARSE	49	AFX (<-)	DATA Md	43
MODE-	ALT	17	RATE	LOCK	50	V->M	AF REC	15
MODE+	TEST	18	SUB	DVRSTY*	48	M->V	AF PLAY	23
MENU	CONFIG	14	A/B (1)	BSET	11	M1	M1-RPT	21
XMIT	TUNE	16	REV (FM/rpt) (2)	n/a	12	M2	M2-RPT	31
RX ANT	n/a	25	A->B (3)	SPLIT	13	M3	M3-RPT	35
DISP	METER	08	PRE (4)	ATT	24	M4	M4-RPT	39
ATU Tune	ATU	19	AGC (5)	OFF	27	REC	MSG Bank	37
ANT	ANT Name	26	XFIL (6)	DUAL PB/APF	29	RIT	PF1	45
SHIFT/LO	NORM	58	NB (7)	LEVEL	33	XIT	PF2	47
WIDTH/HI	I/II	59	NR (8)	ADJ	34	CLR	n/a	53
SPD/MIC	DELAY	57	NTCH (9)	MANUAL	32			
CMP/PWR	MON	56	SPOT (‘.’)	PITCH	42			

**Table 8** Switch identifiers (**nn**) for the **KX3** SWT/SWH command. Table entries are organized similarly to the KX3’s front panel (e.g. BAND is upper left); knob functions are shown in the last row. **Numeric keypad switches (0-9, ‘.’, ‘<-’) are shown in parentheses.** **Note:** If “Fast Play” is in effect, switch emulation commands for BAND+, BAND- and FREQ ENT are blocked (both SWT and SWH). See byte (e), bit 0 of the **IC** response.

TAP	HOLD	nn	TAP	HOLD	nn	TAP	HOLD	nn	TAP	HOLD	nn
BAND+	RCL	08	PRE (1)	NR	19	MODE	ALT	14	A/B	REV (FM/rpt)	24
BAND-	STORE	41	ATTN (2)	NB	27	DATA	TEXT	17	A->B	SPLIT	25
FREQ ENT	SCAN	10	APF (3)	NTCH	20	RIT	PF1	18	XIT	PF2	26
MSG (<-)	REC	11	SPOT (4)	CWT	28	RATE	KHZ	12	DISP	MENU	09
ATU TUNE (‘.’)	ANT	44	CMP (5)	PITCH	21						
XMIT (0)	TUNE	16	DLY (6)	VOX	29						
AF/RF-SQL (7)	MON	32	PBT I/II (8)	NORM	33	KEYER/ MIC (9)	PWR	34	OFS/ B	CLR	35

**Table 8A** Switch identifiers (**nn**) for the **KX2** SWT/SWH command. **Numeric keypad switches (0-9, '.', '<-')** are shown in parentheses.

<b>TAP</b>	<b>HOLD</b>	<b>nn</b>	<b>TAP</b>	<b>HOLD</b>	<b>nn</b>	<b>TAP</b>	<b>HOLD</b>	<b>nn</b>
AF GAIN/MON (0)	NB	32	DATA	TEXT	26	MODE (‘.’)	RCL	08
PRE (/ATTN) (1)	NR	19	MSG	REC	11	BAND (<-)	STORE	14
FIL (2)	APF/AN	27	RATE	FREQ/🔒	41	A/B (6)	A>B	44
ATU* (3)	PFn	20				RIT (7)	SPLIT	18
XMIT (4)	TUNE	16				DISP (8)	MENU	09
KYR-SPT/MIC (5)	PWR	34				OFS/B (9)	CLR	35

\* = **ATU** on the KX2 is the same as **ATU TUNE** on the KX3.

### ***TB (Received Text Read/Transmit Text Count; GET only)***

RSP format: **TBtrrs**; where **t** is the count of buffered CW/data characters remaining to be sent (from **KY** packets); **rr** is the count of received CW/data characters available (00-40), and **s** is the corresponding variable-length receive text string. If no received text is available, and no transmit text to be sent, the response is **TB000**; **t** can be 0-9; if there are more than 9 characters remaining to be sent, then **t** will be 9.

**Notes:** (1) Since an RX count is provided, semicolons—which are legal for text decode in some data modes—can appear in the text string. A terminating semicolon is still provided as a check and to retain compatibility with other commands. (2) After the K3 responds to a TB command, it clears the RX count to zero and the text just read is no longer available. (3) Application software must poll with **TB**; often enough to prevent loss of incoming text.

### ***TBX (Transmitted Text Read/Text Count; GET only; KX3/KX2 only)***

RSP format: **TBtts**; where **tt** is the count of buffered CW/data characters remaining to be sent (from **KY** packets), and **s** is the corresponding variable-length transmit text string. If no transmitted text is available, the response is **TBX00**; **t** can be 00-40; if there are more than 40 characters remaining to be sent, then **tt** will be 40.

**Notes:** (1) Since a TX count is provided, semicolons—which are legal for text transmit in some data modes—can appear in the text string. A terminating semicolon is still provided as a check and to retain compatibility with other commands.

### ***TE (Transmit EQ; SET only)***

SET format: **TEabcdefgh**; where **a** through **h** are 3-character fields, each specifying a range of **-16** to **+16** dB. Values **a** through **h** correspond to EQ bands as follows: **a** = 50 Hz, **b** = 100 Hz, **c** = 200 Hz, **d** = 400 Hz, **e** = 800 Hz, **f** = 1600 Hz, **g** = 2400 Hz, **h** = 3200 Hz. **Important:** If the current transmit mode (the VFO B mode in SPLIT) is SSB, CW or DATA, **TE** applies to SSB. If the transmit mode is ESSB, AM, or FM, **TE** affects ESSB/AM/FM. The two setups are saved separately because SSB EQ is typically optimized for communications effectiveness, while ESSB/AM/FM is often optimized for fidelity. (ESSB mode is selected using the CONFIG:TX ESSB menu entry.) **Note:** If the TX EQ menu entry is displayed at the time **TE** is sent, the display will be updated accordingly.

### ***TM (Transmit Meter Mode; GET/SET; K3/K3S only)***

RSP format: **TM0**; (SWR/RF metering) or **TM1**; (CMP/ALC metering). This sets the transmit meter mode for the LCD bargraphs, as well as for the **BG** command (equivalent to using the METER switch). When **TM0** is in effect, **BG** returns the RF level. When **TM1** is in effect, **BG** returns the ALC level.

### ***TQ (Transmit Query; GET only)***

RSP format: **TQ0**; (receive mode) or **TQ1**; (transmit mode). This is the preferred way to check RX/TX status since it requires far fewer bytes than an **IF** response. **Note:** **TQ1** will be returned even during pseudo-transmit conditions such as TX TEST or when the radio is “pre-armed” for CW transmit via XMIT or PTT. This is because such states may turn on the K3’s KEY OUT line, activating down-stream relays (on amplifiers, transverters, etc.).

### ***TT (Text to Terminal; SET only)***

**Note:** **TB** (text buffer read) provides a more reliable means of implementing a CW/data terminal. **TB** *must* be used rather than **TT** if a P3 panadapter is attached between the computer and K3.

SET format: **TTn**; where **n** is 1 to enable decoded text to be routed to a PC (ASCII). **n=0** disables this. (There’s no GET command for **TT**, but its status can be checked using the **IC** command: byte **c**, bit **0**.) When the application has to send a SET command of another type, it can do without interrupting the TT stream. If it has to send a GET command, it must either suspend the text stream temporarily by sending TT0, or parse the response stream to look for the desired return data. (Returned strings are never interspersed with text data, so this can easily be done.) Also see the **KY <text>**; command for sending ASCII data as CW, RTTY, or PSK31.

***TX (Transmit Mode; SET only)***

SET format: **TX**; (no data). Same as activating PTT or using the XMIT switch. Applies to all modes except direct data, i.e. FSK-D and PSK-D. (In these cases, just hit the paddle, send a message, or use a KY<text> packet. To avoid problems with existing applications, the **TX** command is ignored in these modes.) Use the **RX** command to cancel **TX** (some special considerations apply; see **RX**). RX/TX status is available via **TQ** and is also included in the **IF** response.

***UP/UPB (Move VFO A or B or Displayed Parameter Up; SET only)***

See **DN/DNB**.

***VX (VOX State; GET/SET on K3, GET only on KX2 and KX3)***

SET/RSP format: **VXn**; where **n** is **0** (VOX off) or **1** (VOX on). Applies only to present mode only (voice/data, or CW). In CW mode, VOX refers to “hit-the-key transmit,” i.e. the user doesn’t have to assert the **XMIT** switch or the PTT input first. In voice/data modes, VOX refers to voice-operated-relay, which also doesn’t require **XMIT** or PTT. **KX2 only**: In SSB mode, the VOX state returned by **VX** applies only to the external mic, whether currently plugged in or not. VOX cannot be used with the internal mic.

***XF \$ (XFIL Number; GET only)***

RSP format: **XF<sub>n</sub>**; where **n** is the present XFIL selection (1-5) for the target receiver. In the **K3**, the XFIL selection refers to crystal filters. In the **KX3**, the XFIL selection refers to the analog I/Q filters on the KXFL3 module. The **KX2** has only DSP filters, so **XF** always returns **XF1**; .

***XT (XIT Control; GET/SET)***

SET/RSP format: **XTn**; where **n** is **0** (XIT OFF) or **1** (XIT ON). XIT is disabled in QRQ CW mode.

## Appendix A: Change History [Applicable MCU revisions shown in brackets]

**Note:** Prior to revision D1 this document applied only to the K3. For earlier change history, see rev C14.

D1, 1-18-2012 [K3, rev 4.48; KX3, rev 0.58]

- Document now pertains to both the K3 and KX3. Asterisks in Table 1 now show K3 commands that are not functionally applicable to the KX3. (For K2 commands, refer to the KIO2 Programmer's Reference.)
- **SWT/SWH**, **MN**, and **OM** descriptions updated to show differences between K3 and KX3.

D2, 1-19-2012 [K3, rev 4.48; KX3, rev 0.59]

- **KXAT3** menu entry back to **MN023**.
- **XMIT/TUNE** switch on KX3 remapped to match the K3's **SWT/SWH** code (13). This allows KX3 Utility's TX GAIN cal function work without being rewritten.

D5, 3-20-2012 [K3, rev 4.48; KX3, rev 0.80]

- **DB** command is different for the KX3.
- **RG** response is different for the KX3.
- **MQ** command added for the KX3 (16-bit menu parameter access)
- **SPG** command added (KX3 ground-reference check).
- **SMH** command added (K3 high-resolution S-meter; to be added to the KX3 later)

D8, 4-5-2012 [K3, rev 4.48; KX3, rev 0.91]

- **PO** command added to the KX3 (reads actual power output during transmit).
- **EL** command added to the KX3 (turns run-time error logging on/off). Error logging, when ON, reports "ERR xxx" and other events to the attached PC, unsolicited.

D9, 4-12-2012 [K3, rev 4.48; KX3, rev 0.92]

- Added RX SHFT menu entry to KX3's **MN** command ID list.

D10, 4-17-2012 [K3, rev 4.48; KX3, rev 0.92]

- Corrected **NL** command description, including note about the KX3 noise blanker, which does not yet use the **NL** command.

E2, 5-7-2012 [K3, rev 4.50; KX3, rev 0.99]

- [KX3] The **MN** command table now reflects all of the KX3 menu parameters accessible via **MP** and **MQ**.
- [KX3] The **MP** command now has a full list of menu entries for which the **MP** get/set parameters reference only a subset of the 8 bits. Semantics and examples for these parameters are provided.

E3, 7-12-2012 [K3, rev 4.51; KX3, rev 1.10]

- [KX3] Added RX NR to **MN** table.

E4, 9-18-2012 [K3, rev 4.51; KX3, rev 1.20]

- [KX3] Added internal-only commands **BC** and **KT** to command table (documented elsewhere).

E5, 1-3-2013 [K3, rev 4.51; KX3, rev 1.35]

- [KX3] Added bit to **IC** command to show state of OFS/VFOB LEDs. See byte (e) bit (1).

E6, 2-26-2013 [K3, rev 4.62; KX3, rev 1.38]

- [KX3] Added MACRO menu function to **MN** table.

E8, 4-15-2013 [K3, rev 4.66; KX3, rev 1.42]

- [KX3] Added LED BRT to **MN** table (MN145).

E9, 7-30-2013 [K3, rev 4.66; KX3, rev 1.54]

- [KX3] Added PA MODE to **MN** table (MN146).

E10, 10-7-2013 [K3, rev 4.66; KX3, rev 1.70]

- [K3 and KX3] Clarified the effect meta-mode “**K22**” on the **PC** command (power control). In the long form of the **PC** set command (PCnnnx;), **x** controls the parameter of the KPA3 MD or PA MODE menu entry (K3 and KX3, respectively). This allows the **PC** command to place the 100-W stage in-line or bypass it (applies to the K3/100 or KX3+KXPA100).
- [KX3] Added 2M MODE menu entry to **MN** table (**MN147**).

E11, 10-24-2013 [K3, rev 4.68; KX3, rev 1.72]

- [K3 and KX3] The **SW** commands for the “REV” switch on both radios only apply to swapping repeater input/output frequencies in FM mode (**SWT12** in the K3 and **SWH24** in the KX3). These **SW** commands have no effect in modes other than FM. This is now noted in the **SW** tables for both transceivers.

E12, 2-20-2014 [K3, rev 4.83; KX3, rev 1.92]

- [KX3] Added ‘T’ and ‘X’ identifiers to the **OM** (option module detect) response, indicating the KXAT100 and KX3-2M modules, respectively, were detected.
- [KX3] Added **KE** command (for Elecraft internal use only).
- [KX3] Clarified **PO** command usage and imitations in QRO mode (with KXPA100). This command was not working in QRO mode prior to rev. 1.92.
- [KX3] Clarified **NL** command usage. No change in functionality.
- [KX3] For the ATU.X MD menu entry (KXAT100 status), the **MP** command is GET-only. The host application can change the mode by sending an appropriate command to the KXPA100 instead of the KX3.

E13, 3-21-2014 [K3, rev 4.84; KX3, rev 1.94]

- [K3 and KX3] Added special-case LCD characters m and n to **DB** command.

E14, 4-3-2014 [K3, rev 4.84; KX3, rev 1.95]

- [KX3] Added TX DLY to KX3’s **MN** function list (#016). This matches the K3’s TX DLY entry.

E15, 5-12-2014 [KX3, rev 2.01]

- [KX3] Added KX3-4M module to **OM** response list (for character ‘X’).

E16, 6-26-2014 [KX3, rev. 2.11]

- [KX3] If KX3 is in “Fast Play” message mode: (1) bit 0 of byte (e) is set in the **IC** response; (2) the **SWT** emulation commands for **BAND+**, **BAND-**, and **FREQ ENT** are blocked, returning “?”.

E17, 10-6-2014 [KX3, rev. 2.25]

- [KX3] When the KX3 is in **DUAL RX** mode (dual watch), it internally sets VFO B to the same mode and bandwidth as VFO A. In order to provide matching filter bandwidth displays on an attached PX3, the **BWS**, **FWS**, and **MDS** commands return the values for VFO A, not VFO B, in the dual-watch case. All other **S** commands, as well as **FB**, still pertain to VFO B itself. Host applications that use these must determine whether dual-watch mode is in effect, using either an **SB** or **IC** command.

E18, 2-20-2015 [K3, rev. 5.12]

- [K3] In **DV** command: (1) Described **DVS** command variant, which toggles both diversity *and* sub RX on/off together. (2) Removed note about the K3’s SUB switch having three functions. VFO linking is now accomplished via the **CONFIG:VFO LNK** menu entry (see below), so the SUB switch has only two functions: sub RX on/off (tap) and diversity on/off (hold).
- [K3] Added **CONFIG:VFO LNK** menu entry to the **MN** table for the K3 (#116). This is provided as a way of linking the VFOs now that the original **LINK** switch function (hold of the SUB switch) has been removed in favor of having a hold enter diversity mode. The **LN** and **SB** host commands are unaffected.

E19, 3-31-2015 [K3, rev. 5.20]

- [K3] The **CONFIG:KNB3** menu entry has been removed; it is not needed since a **KNB3** is required for operation and has no parametric adjustments. This is flagged (\*) in the **MN** command list. The associated ID number (048) will be reserved for compatibility with K3s running older firmware.
- [K3] If a new synthesizer is in use (**KSYN3A**), the lower limit for the **FA** and **FB** commands is 100 kHz rather than 490 kHz. (If a **KSYN3A** is not installed, an **FA** or **FB** command that sets a frequency below 490 kHz will result in exactly 490 kHz.) **Use of the range below 1.6 MHz requires a KBPF3 RF band-pass filter option. To obtain good sensitivity, the RX ANT IN or XVTR IN jacks on the KXV3 option should be used, since these bypass the high-pass filter in the T/R switch.** Transmit below 1.6 MHz (including the 600-meter band, ~0.472 MHz) is possible at ~0.5 mW by setting the **CONFIG:KXV3** menu entry to **TEST** and taking the TX output from the **XVTR OUT** jack. In this case an external amplifier would be required (not supplied by Elecraft), and the **XVTR IN** jack would be used for receive.

\*\*\*\*\* FIRST K3S/K3/KX3 VERSION OF PROGRAMMER’S REFERENCE \*\*\*\*\*

F1, 3-31-2015 [K3S/K3, rev. 5.26]

- [K3/K3S] Added **ATTEN** and **PREAMP2** menu entries to the **MN** table. **ATTEN**, which is also accessible via the **MP** command, has values of 5/10/15 dB in the case of the K3S; it is fixed at 10 dB for the K3. **PREAMP2** enables the built-in low-noise-amplifier on the **KXV3B** module. It only applies if a **KXV3B** module is installed (not the original **KXV3**), and only on 12/10/6 meters.
- [K3/K3S] The **PA** command now supports preamp 2 get/set (12/10/6 m only; requires **KXV3B**).

F2, 7-24-2015 [K3S/K3, rev. 5.33]

- [K3/K3S] The **UP/UPB** and **DN/DNB** commands can now be used to adjust most displayed parameters controlled by VFO A or B, respectively, including NB or NR level, manual notch pitch, sidetone pitch, data mode, and text decode. (Menus can also be controlled using **UP/UPB** and **DN/DNB**, as before.) Up/down

commands *cannot* be used to select VFO B special displays (use **DB** for this), or to adjust parameters controlled by the function encoders.

- [K3S] The **RA** (attenuator) command now has GET/SET values of RA00/05/10/15 (dB) in the K3S case. See related operating notes in the **RA** command description. Use **OM** to detect the K3S (see **OM**).
- [K3/K3S] The **OM** (option module) command can now be used to detect the following: preamp 2 (LNA) availability on the present band ('L'); the KSYN3A synthesizer ('V'), which extends VFO tuning range; and presence of the K3S RF board ('R'), which is the preferred way to identify a K3S transceiver. See **OM** and **PA** commands.

F5, 12-4-2015 [KX3, all firmware revisions]

- [KX3] **AK** command (ATU relay values) documented.

F6, 1-8-2016 [K3/K3S, rev. 5.46 or later]

- [KX3] **TX** command (start transmit) does not apply to FSK-D and PSK-D modes. See command description for details.

F7, 3-4-2016 [KX3, rev. 2.52]

- Correction to "599FAST" macro on pg. 5.
- [KX3] **TBX** command documented.
- PC command description improved; now covers both K3 and KX3.

F8, 5-25-2016 [KX2, rev. 2.60]

- [KX2] Command changes pertaining to the KX2. See: **DB** (special displays, including amp hours mode); **MN** (menu entries, shown in table 6A); **MP** (menu parameter get/set); **OM** (option module list and transceiver ID); **SW** (switch IDs, table 8A); **VX** (VOX mode).

F9, 5-25-2016 [KX2, rev. 2.68]

- [KX2] AM MODE menu command added to **MN** table for KX2 (ID = 126). FM mode does not apply to the KX2 (**MD** command).

G1, 3-16-2017 [K3/K3S, rev. 5.58]

- **VX SET** (VOX on/off) command added.
- **AR GET/SET** (RX antenna on/off) command added.

G2, 4-2-2017 [KX3 rev. 2.74, KX2 rev. 2.73]

- Added ATU DATA menu entry to **MN** tables for KX3 and KX2 (ID = 112).
- In **MP** command, ATU DATA access mask is bit 3 (for SET0/SET1).

G3, 11-14-2017 [K3/K3S, rev. 5.62 or later]

- [K3/K3S] **TM** command added. Sets the transmit metering mode (SWR/RF or CMP/ALC) for both the LCD bargraphs and for the **BG** command.



- [K3/K3S] **DE** command added. Inserts a command processing delay of about 10 to 2550 ms. This is useful in switch or K-pod macros, where a delay may be desired to allow the radio to complete a previous operation before the next command is processed.