

# ELECRAFT KIO2 PROGRAMMER'S REFERENCE

Rev. E, Feb. 3, 2004

## Change History

*Rev. E, Feb.. 3, 2004 (In conjunction with K2 MCU firmware rev. 2.04)*

- Release **2.04** K2 firmware adds **60-meter support** (requires K60XV option), **6 transverter bands** (vs. 3), **low-level transverter I/O support** (requires K60XV), and **two new scanning modes**. Most of these features are accessible via RS232 commands. See the latest **K2 Rev 2 Firmware** instruction sheet for full details.
- The **UP** and **DN** commands can now be used to scroll or change parameter values in the menu. This should be especially useful as a way to automate BFO and filter setups in **CAL FIL**. Previously, there was no way to vary the BFO or filter parameters via RS232 commands.
- Added **TQ** (transmit query) command, GET only. Returns 0 if the K2 is in receive mode, 1 if in transmit mode. This is the preferred way to check RX/TX status.
- Added **SW80** and **SW81** commands. These emulate 2-button combinations **AFIL+SPLIT** (KDSP2 notch filtering on/off) and **AFIL+REC** (KDSP2 noise reduction on/off). Displays **NOT INST** on the K2 LCD if the KDSP2 firmware revision in use does not support the command, and an all-blank display if used with a KAF2.
- Improved **RC** command (RIT Clear). This command previously had no effect during transmit. In the new firmware revision, the occurrence of an **RC** command during transmit sets a clear\_pending flag, so that the RIT/XIT offset can be cleared as soon as the K2 returns to receive mode, however briefly. The effect of the **RC** command will be delayed by some amount, varying with the keying speed and whether the operator un-keys briefly between characters. Also, an **unknown command** indication will still be returned by the K2 in this case (?;).

*Rev. D, May 15, 2002*

- The description of mode **AI2** incorrectly stated that the radio would send back an **MD** response when the mode button is pressed. The radio actually sends an **IF** response, which includes mode data.
- Release **2.02E** of the K2 firmware adds a new field to the extended form of the **PC** (power control) SET command (page PC (Power Output Level; GET/SET)). This can be used with the K2/100 to select QRP (0.1-15.0 W) or QRO (1-110 W) ranges.

## Command Set Overview

The K2 firmware provides a wide range of remote control commands<sup>1</sup>. A brief description of each command appears in Table 1, and full details can be found in the Command Reference section.

**Table 1** K2 Control Commands

Name	Description	Name	Description	Name	Description
AI	Auto-info mode	IF	General information	RD	RIT down 10 Hz
AN	Antenna selection	K2	K2 command mode	RT	RIT on/off
BG	Bargraph level	KS	Keyer speed	RU	RIT up 10 Hz
DN	VFO (or menu) down	KY	Keyboard CW	RX	Receive mode
DS	LCD text/annunciators	LK	VFO lock	SM	S-meter
FA	VFO A frequency	MD	Operating mode	SQ	Squelch level
FB	VFO B frequency	NB	Noise blanker mode	SW	Switch emulation
FR	Receive VFO selection	PA	RX preamp on/off	UP	VFO (or menu) up
FT	Transmit VFO selection	PC	Power output level	TQ	Transmit query
FW	Filter bandwidth and #	PS	Power-on status	TX	Transmit mode (SSB)
GT	AGC speed and on/off	RA	RX attenuator on/off	XT	XIT on/off
ID	Radio identification	RC	RIT/XIT offset clear		

Some commands emulate front-panel controls, so they can be used to quickly write applications that have a K2 "look and feel." The **SW** command emulates switch TAP or HOLD, including two-switch combinations, and can also directly select menu entries. The **DS** command reads the LCD, including the decimal points, annunciators, and flash/no-flash state of each annunciator.

Most of the remaining commands directly read or modify radio *parameters*, such as the VFO A and B frequencies, operating mode, keyer speed, power level, and filter bandwidth.

There is often an overlap in command functionality between emulation and parametric commands. For example, you can select the *next* operating mode using **SW** to virtually "tap" the **MODE** switch, or you directly set a *specific* mode using **MD**. Another case involves the **BG** and **SM** commands. **BG** reads the bargraph level in either receive or transmit mode, so it can retrieve the S-meter level, RF output level, or ALC level, depending on the context. The **SM** command reads only the S-meter level.

### Compatibility

Many of the K2's commands will be familiar to developers of programs that support ASCII text command sets. Modifying such programs to work well with the K2 should be easy. However, maintaining backwards compatibility also adds complexity to some data formats and control modes. Those who are trying their hand at radio control for the first time should check our web site for source code examples.

### Using a Terminal Program

K2 commands are human readable (text), which means you can experiment with them using a terminal program. When setting up the terminal program, turn on *local echo* and *local line feed* so you can see what you've sent to the K2. Type commands using lower case so you can easily distinguish K2 responses, which will be in upper case. You can enter carriage returns before or after commands to create white space. The K2 doesn't provide any text editing support, so if you make a mistake, don't hit backspace--just type a semicolon (;) and start over.

---

<sup>1</sup> K2 revision 2.01 or higher firmware and the KIO2 Aux I/O option are required for computer control of the K2. This revision of the Programmer's Reference includes updates through firmware rev. 2.01H. Also see Change History, page 1.

## ***Command Format***

Commands sent from the computer to the K2 are considered either GETs or SETs. GET commands are used by the computer to get information from the K2; the K2 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; in most cases they supply a data value. 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 two characters, optional data fields, and are terminated with a semicolon [;]. Examples:

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

Nearly every SET command that supplies a data field has a corresponding GET command, which is just the two-letter command with no data. The data format of the response (RSP) message from the K2 is usually identical to the format of the SET data. Exceptions are noted in the command descriptions.

Characters sent to the K2 can use either upper or lower case. The K2 will always respond with upper case.

## ***Extended Commands***

Some commands have an alternate data format which provides enhanced functionality. These alternate formats are referred to as **extended** commands. For details, see **K2** in the Meta-commands section.

## ***Response Time***

The K2 will respond to most commands in less than 20 milliseconds. To cover exceptions, we recommend using a timeout of 100 ms. Some commands have additional timing requirements as explained later.

## ***Polling***

Since the KIO2 provides a full-duplex interface, the computer can poll the K2 for data at any time. However, we recommend that TX-mode polling not be used unless necessary. This will prevent any problems with serial I/O that might be caused if high RF voltages are present on the K2 chassis, such as might occur if grounding is inadequate.

## ***Busy Indication***

Most SET commands cannot be safely handled when the K2 is in a *busy* state, including transmit, direct frequency entry prompting, and scanning. The K2 will respond with **?**; to disallowed commands at such times. The only SET commands that are allowed unconditionally during busy states are: **AI**, **K2**, **KS**, **KY**, **PC**, **RX**, and **SW**. In addition, **RC** (RIT clear) commands that occur during transmit will return **?**; but will still take effect, clearing the RIT/XIT offset when the K2 next returns to receive mode, however briefly. Finally, during CW message repeat intervals, **RC**, **RD**, and **RU** are all allowed (RIT clear/down/up). This is useful when listening for off-frequency callers between repeating CQ messages.

If you need to terminate one of these busy states via computer, use the following commands:

Transmit state	<b>RX;</b>
Direct Frequency Entry	<b>SW01;</b> (or any other non-digit switch)
Scanning	<b>SW01;</b> (or any other switch)

## Remote Control of Potentiometers

Keyer speed, power output, and RIT/XIT offset are controlled by their potentiometers or by the computer, whichever was changed last. The remote-control range of the speed and power pots is the same as for manual control, while the remote-controlled RIT/XIT offset pot range is +/- 9.99 kHz in 10 Hz steps.

The AF GAIN and RF GAIN controls cannot be emulated, since the signals involved are controlled directly by potentiometers, not by the microcontroller. As a partial substitute for variable RF gain, the preamp and/or attenuator can be turned on or off under computer control, providing +14, +4, 0, and -10 dB relative to both off.

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

The **AI** and **K2** commands do not affect the transceiver's configuration. Instead, these *meta commands* change the way other commands behave. During program development, both **AI** and **K2** can be left at their default values. As the program progresses, you may wish to use these commands to gain access to more advanced features.

The **AI** and **K2** commands can be sent as often as you wish. You can even use them to *bracket* one or more selected commands if you don't want to permanently change the mode. For example: **K22; FW; K20;** selects command mode **K22** just for the benefit of the **FW** command, then returns to mode **K20**. (The extended **FW** response returns XFIL number and AFIL mode.)

**AI (Auto-info mode):** The **AI** meta-command controls how and when the K2 responds to commands:

*AI0, No Auto-info:* This is the default. No radio information will be automatically reported. (You can still request specific information using GET commands.)

*AI1, Auto-Info Mode 1:* The K2 sends an **IF** (info) response within 1 second when any frequency or mode-related event occurs, either manually (at the radio itself) or via computer commands. These events include: band change, mode change, VFO movement, RIT/XIT offset change or clear, and several additional switches (A/B, REV, A=B, SPLIT, CW REV, RIT, XIT). The **IF** responses are suppressed during VFO movement. Note: putting the K2 into auto-info mode 1 (by sending **AI1;**) causes an initial **IF** response.

*AI2, Auto-Info Mode 2:* The K2 sends an appropriate response (**FA**, **FB**, **IF**, **GT**, etc.) whenever any front-panel event occurs. This applies to all of the events mentioned for mode **AI1**, as well as all potentiometer changes except AF GAIN and RF GAIN, and all switch presses<sup>2</sup>. In some cases responses are grouped; e.g., pressing switches will report the present state of several parameters, including the one related to the new event.

*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 data format of selected commands, as follows:

*K20, Normal mode:* This is the default. In this mode, command "extensions" are disabled, such as control of the audio filter by the **FW** command. This may simplify program development, and also provides greater compatibility with existing software.

*K21, Normal/rtty\_off:* Same as **K20**, except that the **MD** and **IF** commands report RTTY and RTTY-reverse modes as LSB and USB, respectively. This may be useful if your program doesn't support the K2's RTTY mode.

*K22, Extended mode:* Enables all command extensions. This is the mode we recommend for use with new application programs or programs that will be modified to function better with the K2.

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

---

<sup>2</sup> The only switch combination that causes an auto-info response is AGC OFF (**PRE/ATT** + **AGC**), and only if **AI** mode 2 or 3 is in effect, as well as **K2** mode 2 or mode 3.

## Command Reference

This section describes all K2 GET, SET and RSP (response) command formats. Unless otherwise noted, the GET format is just the two letters of the command followed by a semicolon. The format for SET and RSP data is identical unless noted. When K2 Command Mode 2 or 3 is in effect, certain commands have an **extended** format (see **Meta-commands**). Both the **basic** and **extended** formats are described in these cases.

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

SET/RSP format: **AI***n*; where *n* is 0-3. See Meta-commands for details.

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

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

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

RSP format: **BG***nn*; where <nn> is **00** (no bars) through **10** (bar 10) if the bargraph is in **DOT** mode, and **12** (no bars) through **22** (all 10 bars) if the bargraph is in **BAR** mode. Reads the S-meter level on receive. Reads the power output level or ALC level on transmit, depending on the **RF/ALC** selection. Also see **SM** command.

### *DN (Move VFO or Menu Entry/Parameter Down; SET only)*

**Basic** SET format: **DN**; (no data). Results in a fixed 10-Hz change in operating frequency or one unit scroll or parameter change in menu.

**Extended** SET format: **DN***n*; where *n* is 1 (10 Hz), 2 (20 Hz), 3 (50 Hz), or 4 (1 kHz).

### *DS (Display Read; GET only)*

GET format: **DS**; (no data). Returns everything needed to reproduce the information shown on the K2 LCD. The format of K2's response message is: **DS***tttttttaf*; where <tttttt> is the LCD text and decimal point data, <a> is annunciator data, and <f> is annunciator flash data. These fields are detailed below.

**TEXT and decimal point data:** This field contains 8 bytes, with values from 0x30 to 0xFF (hexadecimal). The first of the eight bytes is the left-most displayed character. Bit 7 (MSB) of each byte is used to indicate whether the decimal point to the *left* of each character is on (1) or off (0)<sup>3</sup>. The remaining 7 bits (b6-b0) contain an ASCII character that corresponds to the displayed character.

Some ASCII characters cannot be shown on a 7-segment display (e.g., 'X', 'M'). The K2 uses these characters as placeholders for special characters that *can* be displayed, in some cases lower-case versions of 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 2 shows all of these conversions. The table assumes that the decimal-point flag (bit 7) has been cleared from the text-field characters.

**Table 2** DS response character conversions (bit 7 cleared).

DS chr.	Convert to	DS chr.	Convert to	DS chr.	Convert to
<	L	M	N	X	C-bar
>	dash	Q	O	Z	C
@	space (blank)	V	U	[	R-bar
K	H	W	I		

<sup>3</sup> Decimal point flash status can be obtained directly; use **LK** for VFO lock, **IF** for scan on/off, and **GT** for AGC on/off.

**Annunciator 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 the 8 annunciators. Only 7 bits are needed because the VFO A state is always the opposite of VFO B state. The bits are defined as follows:

B7: Always 1	B3: 1=ATT on
B6: 1=NB on	B2: 0=VFO A selected, 1=VFO B selected
B5: 1=ANT2 selected	B1: 1=RIT on
B4: 1=PREAMP on	B0: 1=XIT on

**Annunciator flash 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 flash/non-flashed states of the 8 annunciators, providing useful status information (such as whether the transceiver is operating in SPLIT mode). The bits are defined as follows:

B7: Always 1	B3: 1=ATT flashing (not used)
B6: 1=NB flashing (LO THR)	B2: 1=active VFO flashing (SPLIT mode)
B5: 1=ANT2 flashing (not used)	B1: 1=RIT flashing (RIT/XIT range > minimum)
B4: 1=PRE flashing (not used)	B0: 1=XIT flashing (RIT/XIT range > minimum)

### ***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 first two digits (00-99 GHz) and the last digit (0-9 Hz) are ignored. If the specified frequency is in a different amateur band than the present one, the K2 will change to the new band, and will automatically report the new values of parameters that may have changed<sup>4</sup>. If the specified frequency is over 30 MHz and is within a valid transverter band (as specified by the operator using the K2's **TRN1-3** menu entries), the K2 will switch to that transverter band. If the specified frequency is one that the K2 VFO cannot be tuned to<sup>5</sup>, the K2 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.

### ***FR (RX VFO Assignment and SPLIT Cancel; GET/SET)***

SET/RSP format: **FRn**; where **n** specifies the receive/transmit VFO: 0 for VFO A and 1 for VFO B. Sending an **FR SET** command always 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 the transmit VFO is not the same as the receive VFO, the K2 will by definition be in SPLIT mode.

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

**Basic SET format**<sup>6</sup>: **FWxxxx**; where **xxxx** is 0-9999 but is ignored. The next available crystal filter is selected.

**Basic RSP format**: **FWxxxx**; where **xxxx** is the approximate bandwidth in Hz if the mode is CW. If the mode is SSB or RTTY, **xxxx** is 0000 ("narrow") when the CW filter is selected, and 2500 ("wide") if OP1 is selected.

**Extended SET format**: **FWxxxxn**; where **xxxx** is ignored, and **n** is 1-4 for selecting FL1-FL4.

**Extended RSP format**: **FWxxxxnm**; where **xxxx** is the bandwidth in Hz, **n** is the filter number, and **m** is the audio filter mode (0-2). Example: a response of **FW040031**; indicates a 400-Hz bandwidth crystal filter, filter FL3; and an audio filter mode of 1 (AF1). The range of KAF2 modes is 0-2, where 0 is OFF (2.5 kHz LPF only), 1 is AF1 (first stage of CW band-pass filter) and 2 is AF2 (second stage of CW band-pass filter).

**Note:** the audio filter mode can only be changed by using the **AFIL** switch or the equivalent **SW** switch emulation command.

<sup>4</sup> The parameters sent on band change include **IF** (includes new mode), **FA**, **FB**, **FR**, **FT**, **PA**, **RA**, **AN**, **GT**, **FW**, and **NB**.

<sup>5</sup> That is, a frequency at which the VCO would lose lock on a typical K2.

<sup>6</sup> The K2's limited support for the basic **FW** command is provided only for compatibility with existing application software. New or modified software should use the **extended** version of the command.

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

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

**Extended** SET/RSP format: **GTnnnx**; where **n** is defined as above, and **x** is 0 (AGC off) or 1 (AGC on).

### ***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 **K2** command to the transceiver; if a **K2n** response is received, the computer must be connected to a K2.

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

RSP format: **IF[f]\*\*\*\*\*+yyyyrx\*00tmvspb01\***; where the fields are defined as follows:

[f]	operating frequency, excluding any RIT/XIT offset (11 digits; see <b>FA</b> command)
*	represents a space (BLANK, or ASCII 0x20)
+	either "+" or "-" (sign of RIT/XIT offset)
yyyy	RIT/XIT offset in Hz (range is -9990 to +9990 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 K2 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</b> RSP format: always 0 <b>extended</b> RSP format: 1 if the present IF response is due to a K2 band change and 0 otherwise

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

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

SET/RSP format: **K2n**; where **n** is 0-3. See Meta-commands for details.

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

SET/RSP format: **KSnnn**; where **nnn** is 009-050 (9-50 WPM).

### ***KY (CW Keying from Text; GET/SET)***

SET format: **KY\*[text]**; where **\*** is a BLANK (ASCII hex 0x20) and **[text]** is 0 to 24 characters.

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

**Extended** RSP format: **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

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

- < puts the K2 into CW TEST mode, until a '>' character is received
- > returns the K2 to CW OPERATE mode
- @ immediately terminates any keyboard-CW transmit that was in progress

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

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

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

SET/RSP format: **MDn**; where **n** is 1 (LSB), 2 (USB), 3 (CW), 6 (RTTY), 7 (CW-REV), or 9 (RTTY-REV).

In K2 command modes 1 and 3 (**K21** and **K23**), the RSP message converts modes 6 and 7 (RTTY and RTTY-REV) to modes 1 and 2 (LSB and USB). This may be useful with existing software applications that don't handle the K2's RTTY modes correctly.

### ***NB (Noise Blanker Mode; GET/SET)***

SET format: **NBn**; where **n** is 0 or 1, but is ignored; the *next* noise blanker mode is selected.

**Basic** RSP format: **NBn**; where **n** is 0 if the blanker is **OFF**, and 1 if the blanker is in **NB1** or **NB2** modes.

**Extended** RSP format: **NBnm**; where **n** is 0, 1, or 2 (**OFF**, **NB1**, **NB2**), and **m** is the threshold (0 = **HI THR**, 1 = **LO THR**). Example: a response of **NB21**; indicates **NB2** mode and **LO THR**.

Note: Use **SW22**; to change the noise blanker threshold.

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

SET/RSP format: **PAn**; where **n** is 0 (preamp OFF) or 1 (preamp ON). Note: the preamp and attenuator can be turned on simultaneously under computer control to provide four different RF gain levels. This may be used in lieu of the industry standard "RG" command. See Remote Control of Potentiometers, and the **RA** command.

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

**Basic** SET/RSP format: **PCnnn**; where **nnn** is 000-015 or 000-150 watts depending on the POWER range.

**Extended** SET format: **PCnnnx**; where **nnn** is 000-150 (0.1-watt units) or 000-150 (1-watt units) and **x** is an optional range selector. If **x** is supplied, 0 selects the low power range, 1 selects the high-power range.

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

Notes: 1. High power range applies only to K2/100, and only if the PA menu entry is on and a high-current supply is connected. 2. A lower power limit may be in effect for 10/12-meter SSB/RTTY operation (**Po28** menu entry), and on transverter bands (menu entries **TRN1-TRN3**). 3. Use **SW** and **DS** commands to turn PA on/off in menu.

### ***PS (Transceiver Power Status; GET only)***

RSP format: **PS1**; where **1** indicates the transceiver is turned on. This is provided for compatibility with older software that uses the **PS** command to see if the transceiver is available.

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

SET/RSP format: **RAnn**; where **nn** is 00 (attenuator OFF) or 01 (attenuator ON). Also see PA command.

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

SET format: **RC**; (no data). If FINE RIT mode is enabled, sets FINE RIT offset to zero. Otherwise, sets RIT/XIT offset to zero, even if RIT and XIT are both turned off (the change will be reflected if RIT or XIT is turned on).

### ***RD (RIT Offset Down 10 Hz, or FINE RIT Offset Down One Unit; SET only)***

SET format: **RD**; (no data). If FINE RIT mode is enabled, moves the FINE RIT offset down by one unit (range is -15 to +15)<sup>7</sup>. Otherwise, moves the RIT/XIT offset down 10 Hz, even if RIT and XIT are both turned off (the change will be reflected if RIT or XIT is turned on). The RIT/XIT offset range under computer control is -9.99 to +9.99 kHz.

---

<sup>7</sup> Applies only when a narrow filter (FL2-4) is selected; no change in FINE RIT offset will occur if FL1 is selected.



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

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

### ***RU (RIT Offset Up 10 Hz, or FINE RIT Offset Up One Unit; SET only)***

Same format as the **RD** command.

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

SET format: **RX**; (no data). Used to terminate transmit and release PTT *only* when transmit was initiated using the TX command. Applies only to SSB and RTTY mode. RX/TX status read is available in the **IF** response.

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

RSP format: **SMnnnn**; where **nnnn** is 000-0015. Returns 0000 in transmit mode. (0 corresponds to no bars on the K2 bargraph, and 15 corresponds to 9 bars.) This command is only provided for compatibility with existing software. New applications should use the **BG** command, which returns a value that better matches the K2's bargraph display, and can be used in RX or TX mode.

### ***SQ (Squelch Level; GET/SET)***

SET/RSP format: **SQnnn**; where **nnn** is 000-250. For compatibility with existing software, the **SQ** parameter uses different units than the K2's **SLCH** (squelch level) menu entry. However, the resolution of the squelch setting is still the same, i.e. it is limited to bargraph levels. To set the equivalent of **SLCH OFF, 1, 2, 3, ...,** use **SQ000, SQ025, SQ050, SQ075, ....**

### ***SW (Switch Emulation and Menu Selection; SET only)***

SET format: **SWnn**; where **nn** is determined from one of the tables below. Table 3 shows the values used for normal switch tap and hold emulation. Table 4 shows the values for emulation of two-switch combinations. Table 5 shows the values for direct selection of menu entries.

After using **SW** to select a menu entry, you can use **SW05 (MENU)**, **SW21 (EDIT)**, and **SW01/SW03 (BAND+, BAND-)** to edit the menu parameter. Use the **DS** (Display read) command to obtain the values of parameters during editing (be sure to strip decimal point information where necessary).

**Table 3** SW command values for switch emulation. Numeric keypad digits (0-9) are shown in parentheses.

<b>TAP</b>				<b>HOLD</b>			
<b>Switch</b>	<b>&lt;nn&gt;</b>	<b>Switch</b>	<b>&lt;nn&gt;</b>	<b>Switch</b>	<b>&lt;nn&gt;</b>	<b>Switch</b>	<b>&lt;nn&gt;</b>
BAND+	01	A/B (2)	09	RECALL	17	REV	25
DISPLAY	02	A=B (3)	10	RF/ALC	18	SPLIT	26
BAND-	03	PRE/ATT (4)	11	STORE	19	SPOT	27
ANT 1/2	04	AGC (5)	12	TUNE	20	CW RV	28
MENU	05	XFIL (6)	13	EDIT	21	AFIL	29
NB	06	RIT (7)	14	NB LEVEL	22	PF1	30
RATE (0)	07	XIT (8)	15	LOCK	23	PF2	31
MODE (1)	08	MSG (9)	16	VOX	24	REC	32

**Table 4** SW command values for emulation of two-switch combinations.

Function	Switch Combination		<nn>
FINE RIT on/off	XFIL	RIT	33
Direct Freq. Entry	BAND+	BAND-	34
Fwd/Refl Power	DISPLAY	TUNE	35
AGC on/off	AGC	PRE/ATTN	36
XFIL/AFIL status	XFIL	AGC	37
notch fil. on/off	AFIL	SPLIT	80
noise red. on/off	AFIL	REC	81

**Table 5** SW command values for menu entry selection.

Primary Menu				Secondary Menu			
Entry	<nn>	Entry	<nn>	Entry	<nn>	Entry	<nn>
ST L	38	LCD	46	SLCH	54	RTC	62
ST P	39	GRPH	47	RATES	55	RIT	63
T-R	40	OPT	48	DOT	56	ACC	64
INP	41	ATU	49	FLY	57	AT2	65
RPT	42	RANT	50	PORT	58	PA	66
IAB	43	CAL	51	SPLT	59	TRN1	67
SSBA	44	PF1	52	Po28	60	TRN2	68
SSBC	45	PF2	53	RTTY	61	TRN3	69

***UP (Move VFO or Menu Entry/Parameter Up; SET only)***

See DN.

***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.

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

SET format: **TX**; (no data). Used to initiate transmit (in SSB and RTTY modes only) by pulling PTT low. Use the **RX** command to cancel **TX**. RX/TX status read is available in the **IF** response.

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

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