Command Set Overview

All K3S/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/KX3/KX2 Control Commands. (*) = Not functionally applicable to KX3/KX2. (**)= KX3/KX2 only. ($) = Add ‘$’ for VFO B/sub RX (VFO B/dual watch for KX3/KX2).

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

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 any K* Utility program can be used to test control commands. You can save commands (or strings of commands) as macros. A subset of these 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:

- **KS020;** Computer sets CW speed to 20 WPM (data = 020)
- **MD1;** 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 AGS, RGS, MDS, BWS, FWS, LKS. 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, RTT/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).

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
<th>Command string</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPLIT+2</td>
<td>CW DX split starting point: A&gt;B twice, enter SPLIT, move VFO B up 2 kHz, RIT/XIT off</td>
<td>SWT13;SWT13;FT1;UPB5;RT0;XT0;1</td>
</tr>
<tr>
<td>EQ MIC1</td>
<td>Boost 100-Hz TX EQ band by 8 dB; others “flat”</td>
<td>TE+00+08+00+00+00+00+00+00+00;</td>
</tr>
<tr>
<td>WEAKSIG</td>
<td>Diversity mode, main/sub preamps on, 200-Hz bandwidth, no IF shift</td>
<td>DV1;PA1;PA$1;BW0020;IS 9999;</td>
</tr>
<tr>
<td>CLEANUP</td>
<td>Turn off split/RIT/XIT; unlink VFOs; open squelch</td>
<td>FT0;RT0;XT0;L0;SQ000;</td>
</tr>
<tr>
<td>WWV 10</td>
<td>30 m, AM mode, VFO A to 10.0 MHz, 3 kHz AF bandwidth (requires 6 kHz IF crystal filter)</td>
<td>FA00010000000;MD5;FA00010000000;BW0300;2</td>
</tr>
<tr>
<td>OLDIES</td>
<td>Switch to AM radio station at 1550 kHz; 4 kHz BW, attn. on, preamp off</td>
<td>FA00001550000;MD5;FA00001550000;BW0400;IS 9999;RA01;PA0;</td>
</tr>
<tr>
<td>LCD BRT</td>
<td>Set the MAIN:LCD BRT menu parameter to 6</td>
<td>MN003;MP005;MN255;3</td>
</tr>
<tr>
<td>MEM32</td>
<td>Load frequency memory #32 into VFOs A and B</td>
<td>MC032;</td>
</tr>
<tr>
<td>LOCKA&amp;B</td>
<td>Lock both VFOs</td>
<td>LK1;LKS1;</td>
</tr>
<tr>
<td>PWRTEST</td>
<td>Send “BT” at 100 W, 10 W, and 1 W, then restore power to 100 W (“=” embeds a BT prosign)</td>
<td>PC100;KYW =;PC010;KYW =;PC001;KYW =;PC100;</td>
</tr>
<tr>
<td>TUN 10W</td>
<td>Set power to 10 W and enter TUNE mode</td>
<td>PC010;SWH16;</td>
</tr>
<tr>
<td>AMP ON</td>
<td>Turn on an external amplifier and set K3 drive to 65 W (see CONFIG: DIGOUT1, Owner’s Manual)</td>
<td>MN019;MP001;MN255;PC065;</td>
</tr>
<tr>
<td>599FAST</td>
<td>Send “5NN” at 40 WPM, “TEST” at 30 WPM</td>
<td>KS040;KYW5NN ;KS030;KYWTEST ;</td>
</tr>
<tr>
<td>MUTE AF</td>
<td>Set main and sub AF GAIN to zero</td>
<td>AG000;AG$000;</td>
</tr>
<tr>
<td>MON OFF</td>
<td>Set monitor volume to zero (present mode)</td>
<td>ML000;</td>
</tr>
<tr>
<td>SCANNOW (K3 only)</td>
<td>Stores VFO A &amp; B in per-band quick-memory M4 and starts scan (&gt; 2 second hold starts “live” scan); VFO B frequency must be &gt; VFO A</td>
<td>SWT15;SWT39;SWT23;SWT39;SWH41;4</td>
</tr>
<tr>
<td>STEPPIR</td>
<td>Send frequency info to a device attached to the serial port, such as an antenna controller or ATU</td>
<td>IF;5</td>
</tr>
</tbody>
</table>

1 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.

2 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 alternates between VFO NOR and VFO OFS. In the latter case, the VFO frequency is adjusted when switching between CW and any other mode.)

3 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.

4 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).

5 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”):  \( A>B, A>B, \text{SPLIT}, VFO \text{ B up 2 kHz, RIT/XIT off,} \) 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:

\[
\text{SWT13;SWT13;FT1;UPB5;RT0;XT0;} \quad \text{(the KX3 and KX2 have different SWT/SWHxx codes)}
\]

**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, DN5 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 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.

```cpp
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 = “+” )
        SendCommand( “UP;” ) // up/down control could be a mouse click instead
    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 K102 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 AGSnnn; where nnn is 000-255.

AI (Auto-Information; GET/SET)

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

AP (Audio Peaking Filter; GET/SET)

SET/RSP format: APn; 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: ARn; 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/SM$ 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 and CMP readings not yet available. The numeric value of SWR can be read using **SW**.)

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 **BWS** can be used in BSET mode (one exception: at present, **BW/BWS** 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, **BWS** 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=supply voltage, 03=RIT/XIT offset, 04=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: **DE**xxx; 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: **DSttttttttaf**; where **tttttttt** 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). 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.

<p>| <strong>Table 3</strong> DS response character conversions (bit 7 cleared). |</p>
<table>
<thead>
<tr>
<th>DS chr.</th>
<th>Converts to</th>
<th>DS chr.</th>
<th>Converts to</th>
<th>DS chr.</th>
<th>Converts to</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;</td>
<td>small-caps L</td>
<td>M</td>
<td>N</td>
<td>Z</td>
<td>lowercase c</td>
</tr>
<tr>
<td>&gt;</td>
<td>dash</td>
<td>Q</td>
<td>O</td>
<td>[</td>
<td>r-bar</td>
</tr>
<tr>
<td>@</td>
<td>space (blank)</td>
<td>V</td>
<td>U</td>
<td>\</td>
<td>lambda</td>
</tr>
<tr>
<td>K</td>
<td>H</td>
<td>W</td>
<td>I</td>
<td>]</td>
<td>RX/TX EQ level 4</td>
</tr>
<tr>
<td>X</td>
<td>c-bar</td>
<td></td>
<td></td>
<td>^</td>
<td>RX/TX EQ level 5</td>
</tr>
</tbody>
</table>

**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
- B6: 1=NB on*
- B5: 1=ANT2 selected
- B4: 1=PREAMP 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
- B6: 1=SUB on*
- B5: 1=RX ANT on
- B4: 1=ATU on (in-line)

* 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.

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6 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 A12/3 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: **FAxxxxxxxxxxx**; or **FBxxxxxxxxxxx**; where xxxxxxxxxxx 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. **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.

---

7 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\textsuperscript{th} 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/FWS SET can’t be used in BSET mode with diversity receive in effect). (4) In **K22** mode, a legacy 6\textsuperscript{th} 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 abcd 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 8th 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.

<table>
<thead>
<tr>
<th>Bit</th>
<th>a (Misc)</th>
<th>b (Sub RX)</th>
<th>c (CW/DATA)</th>
<th>d (Voice Modes)</th>
<th>e (Misc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7</td>
<td>Always 1</td>
<td>Always 1</td>
<td>Always 1</td>
<td>Always 1</td>
<td>Always 1</td>
</tr>
<tr>
<td>B6</td>
<td>1=BSET **0=Normal</td>
<td>1=VFOs linked (VFO A tunes both) (K3 only)</td>
<td>1=Full QSK 0=Semi QSK</td>
<td>1=VOX on in voice, DATA A, AFSK A</td>
<td>1= 10 Hz SHIFT 0= 50 Hz SHIFT</td>
</tr>
<tr>
<td>B5</td>
<td>1=TX TEST0=Normal</td>
<td>1=VFO A/B bands are independent</td>
<td>1=Dual-passband CW or APF in use</td>
<td>1=ESSB 0=Normal</td>
<td>1= AM Sync USB 0= AM Sync LSB</td>
</tr>
<tr>
<td>B4</td>
<td>1=mW power level (xvtr or KXV3 test) 0=normal power out</td>
<td>1=Diversity mode (K3 only)</td>
<td>1=VOX on for CW, FSK-D, or PSK-D</td>
<td>1=Noise gate on 0=Off</td>
<td>1= Main RX is squelched</td>
</tr>
<tr>
<td>B3</td>
<td>0=MSG bank 1 1=MSG bank 2 §</td>
<td>1=Sub ant. = MAIN 0=Sub ant. = AUX (K3 only)</td>
<td>1=Dual-tone FSK filter in use</td>
<td>1=AM Sync RX 0=Normal</td>
<td>1= Sub RX is squelched (K3 only)</td>
</tr>
<tr>
<td>B2</td>
<td>1=MSG is playing 0=no MSG playing</td>
<td>Sub RX aux source: 1=BNC (AUX RF) 0=non-TX ATU ant (K3 only)</td>
<td>1=Normal FSK TX polarity 0=inverted</td>
<td>1=FM PL tone on 0=Off</td>
<td>1=Sub RX NR is on, 0=Off (K3 only)</td>
</tr>
<tr>
<td>B1</td>
<td>1=CONFIG:MEM0-9 = BAND SEL</td>
<td>1=Sub RX NB is on 0=Off (K3 only)</td>
<td>1=Sync DATA 0=Normal</td>
<td>1=(+) Rptr TX ofs</td>
<td>1=OFS LED is on 0=VFOB LED is on (KX3/KX2 only)</td>
</tr>
<tr>
<td>B0</td>
<td>Preset #: 0=I, 1=II§</td>
<td>1=Sub RX is on (dual watch in KX3/KX2)</td>
<td>1=Text-to-terminal is in effect (see TT)</td>
<td>1=(-) Rptr TX ofs</td>
<td>1=Fast Play in effect (KX3/KX2 only)</td>
</tr>
</tbody>
</table>

* 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 **FA** 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 **MD** 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 Basic RSP format: always 0; **K2 Extended** RSP format (**K22**): 1 if present IF response is due to a band change; 0 otherwise
- d Basic RSP format: always 0; **K3 Extended** RSP format (**K31**): 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: \texttt{K3}n; where \texttt{n} is 0-1. If \texttt{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: \texttt{KS}nnn; where \texttt{nnn} is 008-050 (8-50 WPM).

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

SET format: \texttt{KY*}[^text]; where \texttt{*} is normally a BLANK and \texttt{[text]} is 0 to 24 characters. If \texttt{*} is a \texttt{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: \texttt{KYn}; where \texttt{n} is 0 (CW text buffer not full) or 1 (buffer full). Also see TB command.

K2 Extended RSP format (K22): \texttt{KYn}; where \texttt{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":

\begin{verbatim}
( KN + AR = BT % AS * SK ! VE
\end{verbatim}

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

\begin{verbatim}
< 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 \texttt{2} in \texttt{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.
\end{verbatim}

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

SET/RSP format: \texttt{LKn}; where \texttt{n} is 0 (VFO unlocked) or 1 (locked).

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

SET/RSP format: \texttt{LNn}; where \texttt{n} is 0 (VFOs unlinked) or 1 (linked).

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

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

Notes: (1) A SET is ignored if the target memory is invalid. (2) K3 only: If \texttt{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 \texttt{[V>M][M>V]} memory number; this is not the case when switching to Per-Band Quick memories (\texttt{[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: \texttt{MDn;} or \texttt{MD$\!n;} where \( n \) is 1 (LSB), 2 (USB), 3 (CW), 4 (FM), 5 (AM), 6 (DATA), 7 (CW-REV), or 9 (DATA-REV). \textbf{Notes:} (1) K3 only: In Diversity Mode (accessed by holding \texttt{SUB}), sending \texttt{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 \texttt{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 \texttt{MD6} and \texttt{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 (\texttt{K21} and \texttt{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, \texttt{MD$} returns the value for \texttt{MD}. (4) FM mode does not apply to the KX2.

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

SET/RSP format: \texttt{MGxxx;} where \( xxx \) is 000-060.

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

SET/RSP format: \texttt{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 (\texttt{MAIN:TX DVR}).
MN (Menu Selection; GET/SET; K3, KX3, and KX2 variants)

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

\textbf{MN255} is returned if the menu is not in use. \textbf{MN} commands can be sent in any order. To exit the menu, send \textbf{MN255}. To change the parameter, use \textbf{UP} / \textbf{DN} (or \textbf{MP} and \textbf{MQ} commands—see table notes). \textbf{IMPORTANT}: \textbf{TECH MD} menu entry must be set to ON to access tech-mode menu entries; otherwise \textbf{MN} will skip these entries. Use \textbf{MN072} to access the \textbf{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 \textbf{MN}/MP/MQ commands.

\begin{table}[h]
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\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline
Entry & nnn & Entry & nnn & Entry & nnn & Entry & nnn \\
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ALARM & 000 & DATE MD & 030 & SMTR MD & 060 & XVx RF & 090 \\
IAMBIC & 001 & DDS FRQ & 031 & AGC-F & 061 & XVx IF & 091 \\
LCD ADJ & \footnote{†} & LIN OUT & \footnote{†} & REF CAL & 062 & XVx PWR & 092 \\
LCD BRT & \footnote{†} & KIO3 & 033 & SQ MAIN & 063 & XVx OFS & 093 \\
LED BRT & \footnote{†} & ADC REF & 034 & SQ SUB & 064 & XVx ADR & 094 \\
MSG RPT & \footnote{†} & RFI DET & 035 & SMTR OF & 065 & AF GAIN & 095 \\
PADDLE & 006 & KDVR3 & 036 & SMTR SC & 066 & TX ESSB & 096 \\
RPT OFS & \footnote{†} & AGC-S & 037 & SMTR PK & 067 & SPKR+PH & 097 \\
RX EQ & 008 & FLx BW & 038 & SPLT SV & 068 & VFO B->A & 098 \\
TX EQ & 009 & FLx FRQ & 039 & SPKRS & 069 & AGC PLS & 099 \\
VOX GN & 010 & FLx GN & 040 & SW TEST & 070 & RIT CLR & 100 \\
ANTIVOX & 011 & FLx ON & 041 & SW TONE & 071 & TX GATE & 101 \\
WEIGHT & 012 & FLTX & \textbf{md} & 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 & \footnote{†} & 074 & VFO CRS & 104 \\
MIC+LIN & 015 & AUTOINF & 045 & PTT RLS & 075 & AFX MD & \footnote{†} & 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 & \footnote{†} & KRC2 AC & 049 & TXGN & \textbf{pwr} & 079 & PB CTRL & 109 \\
AGC HLD & 020 & KRX3 & 050 & SUB AF & 080 & MACRO x & 110 \\
FM DEV & 021 & KKV3 & 051 & PWR SET & 081 & L-MIX-R & \footnote{†} & 111 \\
EXT ALC & 022 & LCD TST & 052 & MIC BTN & 082 & CW QRQ & 112 \\
KAT3 & \footnote{†} & MIC SEL & 053 & VCO MD & \footnote{†} & 083 & TX DVR & 113 \\
BAT MIN & 024 & NB SAVE & 054 & VFO CTS & 084 & TX MON & 114 \\
TX INH & 025 & KPA3 & \footnote{†} & 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 & \footnote{†} & 117 \\
FW REVS & 028 & TUN PWR & \footnote{†} & 058 & WMTR & \textbf{pwr} & 088 & PREAMP2 & 118 \\
DATE & 029 & SYNC DT & 059 & XVx ON & 089 & Exit Menu & 255 \\
\hline
\end{tabular}
\end{table}

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

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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.

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</table>
**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:** 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:** 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 TXCRNU1 menu entry at present.

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

SET/RSP format: NB$n; or NB$s; 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: NL$dii; or NL$sddii; 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/KX3

RSP format: OM APXSDFflVLR--; where any of the characters APXSDFflVLR, 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----TBX10n; where any of the characters APFTBXL, if present, indicate installed and detected option modules (see list below), and 0n (zero, not ‘0’) 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 sn:** where n = 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: PCnn:**
- For the K3, **nn** 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, **nn** is 000-012 on 80-20 m and 000-015 on 160/15-6 m. If a KXPA100 is attached, **nn** is 000-110.

**K2 Extended SET format (K22): PCnnxx:** where **nn** 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.

**Notes:**
1. A lower power limit may be in effect on transverter bands (menu entries **XVTR1-9**).
2. 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 nn:** where **nn** 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:** **R A nn;** or **RA sn;**
- 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/KX3): The main receiver’s attenuator on/off condition is saved per-RX ANT state. The sub receivers’ 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. **RA01** 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 KI02 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 on 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 RGSnnn; 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 (SMS) 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 SQSnnn; 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 SQS apply to main and sub receivers, respectively, and the SUB RF/SQ pot on the K3 controls SUB RF GAIN. However, if SQ MAIN is set to =SUB POT, then SQ and SQS are linked (either applies to both receivers), and the SUB RF/SQ 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.

SW (SWR; GET only)
RSP format: SWnnn; where nnn is 010-999. Value is SWR in tenths of a unit, from 1.0:1 to 99.9:1. The value is updated on any transmit, but not on a band change. SW works during transmit, TUNE, and during ATU tuning.
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.

<table>
<thead>
<tr>
<th>TAP</th>
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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.

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<td>10</td>
<td>APF (3)</td>
<td>NTCH</td>
<td>20</td>
</tr>
<tr>
<td>MSG (&lt;-)</td>
<td>REC</td>
<td>11</td>
<td>SPOT (4)</td>
<td>CWT</td>
<td>28</td>
</tr>
<tr>
<td>ATU TUNE</td>
<td>ANT</td>
<td>44</td>
<td>CMP (5)</td>
<td>PITCH</td>
<td>21</td>
</tr>
<tr>
<td>XMIT (0)</td>
<td>TUNE</td>
<td>16</td>
<td>DLY (6)</td>
<td>VOX</td>
<td>29</td>
</tr>
<tr>
<td>AF/RF-SQL (7)</td>
<td>MON</td>
<td>32</td>
<td>PBT I/II (8)</td>
<td>NORM</td>
<td>33</td>
</tr>
</tbody>
</table>

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

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

* = ATU on the KX2 is the same as ATU TUNE on the KX3.
TB (Received Text Read/Transmit Text Count; GET only)

RSP format: TBttrs; 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 downstream 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: **XFn;** 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).
[KX3] Added bit to IC command to show state of OFS/VFOB LEDs. See byte (e) bit (1).

[KX3] Added MACRO menu function to MN table.

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

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

[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).

[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.

[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.

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

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

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

[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 BW$, FW$, and MDS commands return the values for VFO A, not VFO B, in the dual-watch case. All other $ 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.

[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.

[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 **************

[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).

[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.

G4, 11-28-2018 [K3/K3S, rev. 5.66; KX2 rev. 2.92; KX3 rev. 2.93]

- Added **SW** command. GET only; returns most recent transmit SWR reading.

G5, 2-20-2019 [KX2 & KX3, text corrections only]

- MN143 is not a valid menu index on the KX2 because there’s no NR menu entry. Removed MN143 from the KX2’s table. NOTE: NR can still be turned on/off on the KX2 using “SWH19;”. 