ELECRAFT K4 PROGRAMMER'S REFERENCE

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Introduction

This manual describes all K4 remote-control commands. These can be used by computer application developers to emulate the K4's front panel controls, or by operators who wish to customize K4 or K-Pod switch functions.

Since the transceiver supports fast digital I/O over Ethernet, it can provide Streaming Data, including dB/bin data for software panadapter emulation, IQ for demodulation and programs like Skimmer, and receive/transmit digitized audio.

The K4 executes a superset of the commands from the K3/K3S transceiver and P3 panadapter. Some commands support both a new K4 format as well as the legacy K3/K3S or P3 format. Some commands also have a new *toggle* or *increment/decrement* SET variation to simplify front-panel switch emulation. All variations are described in the Command Reference sections.

Multiple remote-control clients are supported via the Ethernet and USB ports (see Multiple Client Support). Each client can independently poll the K4 to obtain information needed to support its own user interface. Auto-Info (AI) mode is also provided to broadcast radio control changes to all clients. See Polling vs. Auto-Info (AI).

Protocol and Syntax

K4 Remote control commands are human-readable, providing an advantage for developers as well as operators who wish to create their own macros (strings of commands). Software applications can interact with the radio by polling with GET commands, or they may be designed to respond to automatically generated responses resulting from control changes.

Command Groups

Commands are divided into three groups:

Radio Commands	band, mode, audio, RF, and other operational settings
Menu Access Commands	menu entry names, parameters, and default values
Display Commands	panadapter, waterfall, and external monitor settings
Remote Access Commands	used to configure and control a K4 used as a server

Within each group are SET and GET commands. Response commands (RESP) from the K4 occur in reply to GETs, and can also be generated automatically following control changes at the radio. Responses use the same format as SET commands.

Polling vs. Auto-Info (AI)

Many computer software applications *poll* for data of interest by using GET commands. Typically only a small subset of K4 commands is used for a given application.

An alternative is to place the K4 into one of its AI (auto-info) modes. In this case, every control change at the radio (due to either local or remote control by any client) will generate a corresponding RESP (GET response) automatically. The application can use all or a subset of these responses to update its interface. See the **AI** command.

Syntax

Commands have a 2-, 3-, or 4-letter prefix followed by one or more parameters. Parameters can be comprised of numeric fields, letters, or a combination of these. All commands are terminated by a semicolon (;). Commands may use upper or lower case alphabetic characters. The only command that differentiates between the two is the CW/DATA text-send command (KY <text>), when used in PSK mode.

A dollar sign symbol ($) after a command prefix modifies a command to target VFO B/sub receiver. Applicable commands are so identified in the Command Reference.

SET commands have a prefix and usually 1 or more parameters. (All SET commands have corresponding GET commands and vice-versa unless otherwise noted.) SET examples:

AN3;   selects ATU (KAT4) antenna 3
FA7100;   sets VFO A to 7100 kHz (FA/FB support multiple numeric formats)
MD$3;   selects CW mode for VFO B/sub RX

GET commands use only the prefix; the response to a GET (RESP) uses the SET format.
Examples:
AN;   returns ANx; where x is the currently selected ATU antenna
MD;   returns MDx; where x is the current operating mode for VFO A/main RX
MD$;   returns MD$x; where x is the current operating mode for VFO B/sub RX

TOGGLE/INCR-DECR commands are special variants of SET commands. Examples:
RA/;   turns VFO A/main RX attenuator on if it was off and vice-versa
BN$+;   selects the next-highest band for VFO B/sub RX

K4 switch emulation commands (SW) simulate the use of switches on the K4's front panel.
2-digit IDs specify the function without the need to differentiate between tap and hold. Examples:
SW56;   simulates tapping the K4's NR switch

K3 switch emulation commands (SWT/SWH) support a subset of K3/K3S switches that have
matching K4 functions. These are provided for compatibility with existing applications. Example:
SWT16;   simulates tapping the K4's XMIT switch (identical to SWT16 on the K3/K3S).

Meta commands (K2, K3, K4) affect behavior of certain individual commands and the overall
protocol, again for backward compatibility. Refer to the command reference for details.

Display commands are preceded by a **#** symbol to differentiate them from current or future radio
control commands. Some of these are backward-compatible with P3 panadapter commands.

Error Checking

If a GET or SET command is received that cannot be parsed, the radio will echo the command
followed by "?" and a semicolon terminator. If a command is correctly formed but a parameter is
out of range, a GET response is echoed that shows the current valid setting.

Multiple Client Support

A K4 may be controlled by multiple clients simultaneously, including other K4s or software applications
running on computers or mobile devices. Connections can be established through the two virtual COM
ports (USB-B connector), the RS232 port (DE9 connector), or over Ethernet.

The radio's built-in server maintains the latest radio state information (band, mode, etc.). Each client can poll for the subset of information it needs to maintain its UI. Clients using older software may use K2 or K3 "meta modes" as well as legacy command formats. Clients can also individually turn on auto-information mode (see **AI** command) when desired. In this case, any change in radio state caused by a client or at the radio itself is then broadcast to all clients via AI responses.

Several commands are provided to configure and control a K4 used as a radio server, i.e. a remote K4. See Remote Access Commands.

Streaming Data

The K4 provides three kinds of streaming data: digital audio (two outgoing channels for receive, one incoming channel for transmit), dB/bin (for reproducing panadapter data), and raw IQ (to support external demodulation, text decode, etc. – pending). Each data stream is enabled by connecting to a specific port over Ethernet. Once the connection is established, data flows continuously.

Example applications and details on streaming data protocols are available on request.

Using Commands in K4 Front-Panel Switch Macros

One or more K4 remote-control commands can be concatenated together to form *macros* that perform user-defined functions. These can then be executed directly from the front panel. For example, the sequence:

    FA14085;MD6;DT2;PC070H;

puts the radio on a common 20 meter RTTY "watering hole" frequency, selects data mode and FSK-D data submode, then sets power output to 70 watts.

Macros can be edited from the front panel and assigned to programmable switches on the radio itself or on the Elecraft K-Pod controller. To create/edit macros, tap Fn, then hold MACROS.

Command Reference

Commands are listed in alphanumeric order. If a command can target VFO B/sub RX separately, it is so identified by a **$** symbol. This symbol must be added to the command only when targeting VFO B/sub RX. For VFO A/main RX it must be omitted.

All SET commands have a corresponding GET command and vice-versa unless otherwise noted.

[Pending] in a command's heading indicates that implementation is planned or in progress.

Radio Commands

AB (VFO Copy/Swap/Init; SET only)

> **SET format:** ABn; where n=0 (FA>FB), 1 (FB>FA), 2 (FA/FB swap), 3 (all A>B), 4 (all B>A), 5 (all A/B). Cases 0-2 copy or swap only VFO frequency. Cases 3-5 copy or swap all VFO parameters. Some limitations apply. For example, RX antennas are only copied or swapped if the VFOs are on different bands.

ACM / ACS (Antenna Configuration: RX Antenna Access Mask)

> This command controls which antenna selections are in the rotation for the main and sub antenna switches (RX ANT, SUB ANT). It only applies when MAIN:ANT CFG or SUB:ANT CFG is set to USE SUBSET.

> **SET/RESP format:** ACMzabcdefg; (for Main) ACSzabcdefg; (for Sub)
> where z is 0 (USE SUBSET) / 1 (DISPLAY ALL)
> where a is enable ANT1
> where b is enable ANT2
> where c is enable ANT3
> where d is enable RX1
> where e is enable RX2
> where f is enable =TX ANT
> where g is enable =OPP TX ANT

> **EX:** ACM01001110;
> Sets Main RX ANT CFG checkboxes for ANT1, RX1, RX2 and =TX ANT only.

ACT (Antenna Configuration: TX Antenna Access Mask)
> This command controls which transmit/ATU antenna selections are in the rotation for the antenna switch (ANT).

SET/RESP format: ACTzabc;

        where z is enable ALL 0 / 1
        where a is enable TX ANT1
        where b is enable TX ANT2
        where c is enable TX ANT3

  EX: ACT0110;
      Sets TX ANT CFG checkboxes for ANT1 and ANT2 only.

ACN (Antenna Configuration: Antenna Name)

SET/RESP format: ACNnsssss; where n is 1 to 5, where sssss is the antenna label (1 to 6 characters).
EX: ACN1DIPOLE; sets ANT1 name to DIPOLE.
NOTE: Send ACNn~; to clear any custom antenna name for ANTn. It will then acquire its default label (ANT1, ANT2, etc.). See ACM/ACS command for full list of default names.

AF (Audio Feedback Tones)

SET format: AFn; where n=0 cancels any AF tone sequence, 1 is a simple switch beep (high pitch), and 2 = hi/lo error tone.

AG$ (AF Gain)

SET/RESP format: AG$nnn; where n is 000-060.
TOGGLE format: AG/ toggles between last gain value and 0. (To emulate receiver mute, send AG0; to mute and AG/; to restore previous level.)
INCR/DECR format: AG+; and AG-; or AG+nnn; AG-nnn;
NOTE: When the SUB AF knob is assigned to balance control via the **BL** command, the **AG$** command (sub RX AF gain) returns the same value as **AG** (main RX AF gain).

AI (Auto-Info)

SET/RESP format, AI mode: AIn; where n is the auto-info mode:
      0 = Auto info off
      1 = VFO, RIT, and certain other control changes generate periodic "IF;" responses
      2 = All control changes generate periodic responses
      3 = N/A (reserved for future use)
      4 = Immediate notification of changes not made by client (see **NOTE1**)
      5 = Immediate notification of all changes (see **NOTE1**)
SET/RESP format, AI Delay: AIDxxx; where xxx is the delay in ms (60 to 999) to be used

in AI1 and AI2 modes. Default is 500 ms.

NOTE1: Excessive traffic can potentially overflow serial port buffers in immediate AI modes (AI4 and AI5).
NOTE2: AI mode is per-client.

AL (AF Limiter)

SET/RESP format: ALnn; where nn is 01-30 (level set). Sets level of AF limiter used when AGC is off (see GT command). Typical value is 20.

NOTE: IF n < 10, the response will be ALn;.

AN (TX Antenna)

SET/RESP format: ANn; where n is 1 to 3 for KAT4 ANT1/2/3 (ANT2 and ANT3 are not available if the ATU isn't installed.) Sets the transmitter antenna on HF-6 meters only (see note below). This is also the receive antenna for either receiver (main or sub) when sharing the transmit antenna. Also see **AR** and **AT** commands.

TOGGLE format: AN/; alternates between the two most recently used TX antennas.

NOTE: This command does not pertain to transverter antennas. For external transverters, XVTR IN and XVTR OUT are used, while for an internal transverter, ANT4 is used.

AP$ (APF)

SET/RESP format: AP$mb; where m = 0 (off) or 1 (on); b = 0 (narrow, 30 Hz), 1 (wide, 50 Hz) or 2 (wide, 150 Hz). Only applies in CW mode.

TOGGLE format: AP/; toggles mode between off/on
INCR/DECR format: AP+; select next bandwidth. AP-; select previous bandwidth.

AR$ (RX Antenna)

SET/RESP format: AR$n; where n is:

0 = Disconnected (all RX RF sources disconnected from target RX)
1 = EXT. XVTR IN / RX ANT IN2 (external transverter IN jack)
2 = RX USES TX ANT (the antenna currently selected for the transmitter)
3 = INT. XVTR IN (internal transverter IN)

4 = RX ANT IN1 (receive antenna)
5 = ATU RX ANT1 (see NOTE1)
6 = ATU RX ANT2 (see NOTE1)
7 = ATU RX ANT3 (see NOTE1)

This command selects the RX antenna for HF-6 only (see NOTE2).

TOGGLE format: AR$/; alternates between the two most recently used RX antennas.

NOTE1: If there is no KAT4 ATU installed, then selections 5, 6, and 7 are invalid. Substitute AR2 for these cases (RX uses TX antenna, which is always ANT1).
NOTE2: This command does not pertain to transverter antennas. For external transverters, XVTR IN and XVTR OUT are used, while for an internal transverter, ANT4 is used.

AT (ATU Mode)

SET/RESP format: ATn; where n is 0 (NOT INST--see NOTE), 1 (BYPASS), or 2 (AUTO). Pertains to the current band and antenna.
TOGGLE format: AT/; alternates between ATU in and bypassed.
NOTE: An **AT0** command should not be sent under normal circumstances; the K4 will automatically ascertain whether a KAT4 ATU module is installed.

BG (Bar Graph Read; GET only)

RESP format: BGnnx; where nn is always 00 and x is 0 (RX) or 1 (TX). Provided for K3 compatibility.

BI (Band Independence for VFO B)

SET/RESP format: BIn; where n=1 allows VFO B to be set to a different band from VFO A.

BL (Balance)

This command specifies whether the SUB AF knob controls sub receiver audio gain or left/right audio balance. In the latter case, the command also specifies the portion of audio to route to the left and right channels. When the knob is used as a balance control, nominal audio gain for both receivers is controlled by the MAIN AF knob (labeled "AF"). The **BL** command then scales how much of the main receiver audio goes to the left channel, and how much of the sub receiver audio goes to the right channel. If the sub

receiver is off, it controls how much main RX audio goes to left and right.

> **SET/RESP format:**   BLm+nn;   where m is balance mode on/off (0/1) and
> +nn is +/- 50 (-50 = full left gain, +50 = full right gain)
> **TOGGLE format:** BL/; toggles balance mode on/off.
> **SHORT format:**   BL1; (on)   BL0; (off)   BL~; (normalize, 50/50).

> **NOTE:** When the SUB AF knob is assigned to balance control (i.e., **BL1+nn**), the **AG$** command (sub RX AF gain) returns the same value as **AG** (main RX AF gain).

BN$ (Band Number)

> **SET/RESP format:**   BN$nn; where nn is the band number:
> 00 = 160 m ...10 = 6 m; 16-25 = transverter bands
> (11-15 reserved for future HF bands)
> **INCR/DECR format:** BN$+; or BN$-; increments or decrements current band.
> **TOGGLE format:** BN$/; alternates between the two most-recently used bands.
> **BAND STACK format:** BN$^; or BN$>; recalls next band stack register.

> **NOTE:** VFO B band changes require VFO B Different Band set to YES.
> **NOTE:** The **XV** command can also be used for transverter band selection.

BR (Serial Port Baud Rate)

> **SET/RESP formats:**
> BRpbbbbbb; sets port p's baud rate, where p is 0-2 (see port info below)
> BRbbbbbb; set all ports to the specified rate
> **GET formats:** BRp; gets port p's baud rate. (BR; gets the baud rate of the last port explicitly targeted by BRp;. It may return details for port 0 or 2 if requested from another source.) Port 2 is the RS232 port. Ports 0 and 1 are the two virtual com ports associated with the USB-B jack. Baud rate (bbbbbb) can range from 004800 to 115200 baud.

BS (BSET)

> **SET/RESP format:** BSn; where n is 0 (bset off) or 1 (bset on).

BW$ (Bandwidth)

> **SET/RESP format:** BW$nnnn; where nnnn is filter bandwidth x10 Hz.

CC (Remote Client Count) – see Remote Access Commands section

CP (Speech Compression)

    SET/RESP format: CPnnn; where nnn is 000-030. Applies only to SSB modes.

CW (CW Pitch)

    SET/RESP format: CWnn; where nn is sidetone pitch x10 Hz (25-95).

DA (Digital Audio Control)

    GET format: DA;

    RESP format:
        DA0;   (idle)
        DAPWnnnnn; (waiting to auto-repeat)
            where nnnnn is wait time remaining in ms to auto-repeat

        DARMnnnnnttttt; (recording voice message from microphone)
            where nnnnn is current length in ms (0 to 90 sec)
            where ttttt is max recording length in ms (90 sec)

        DARSnnnnnttttt; (af recording from speakers)
            where nnnnn is current position in ms (0 to 90 sec)
            where ttttt is max position in ms (90 sec max once recording buffer full)

        DAPMnnnnnttttttmsc; (playing recording to microphone, transmit)
            where nnnnn is current position in ms (0 to 90 sec)
            where ttttt is max position in ms (90 sec max once recording buffer full)
            where m is af playback mode (A = MAIN ONLY, B = SUB ONLY, 0 = BOTH)
            where s is current recording session (recording 1, recording 2, etc.)
            where c is 1 if current recording session is the last recorded session
            NOTE: if playback mode is 'M' a voice message is being transmitted
            NOTE: if playback mode is 'A, B or 0' af recording is being transmitted

        DAPSnnnnnttttttmsc; (playing af recording to speakers, listen)
            where nnnnn is current position in ms (0 to 90 sec)
            where ttttt is max position in ms (90 sec max once recording buffer full)
            where m is af playback mode (A = MAIN ONLY, B = SUB ONLY, 0 = BOTH)
            where s is current recording session (recording 1, recording 2, etc.)

where c is 1 if current recording session is the last recorded session

SET format:

DA0;   stop any digital audio action (stop transmitting, stop recording, etc.)

DARC;   clear recording buffers
>   **NOTE:** see DAME to erase saved voice messages

DARM; start recording voice message from microphone (90 second max)

DARS;   start af recording

DAPMnnnnn; play last recorded voice message through transmitter
>   where nnnnn is offset in ms

DAMEm; erase voice message
>   where m is 1 to 8 (BANK 1 = 1 to 4 | BANK 2 = 5 to 8)

DAMSm; save last recorded voice message
>   where m is 1 to 8 (BANK 1 = 1 to 4 | BANK 2 = 5 to 8)

DAMPmnnnnn; play voice message and repeat (optional)
>   where m is message index 1 to 8
>   where nnnnn is optional to specify message repeat interval in ms
>   **NOTE**: Repeat interval of 1 will use Message Repeat Interval from Menu

DAPSnnnnnm; start playback af recording to speakers
>   where nnnnn (optional) is offset in ms
>   where m (optional) is playback mode: 0, A, B (NORMAL, MAIN, SUB))

DAPJnnnnn; af recording playback jump
>   where nnnnn can have multiple meanings
>>   0: jump to last af recording session
>>   1 to 9: jump to recording session id
>>   >: jump to next recording
>>   <: jump to prev recording
>>   Ex: DAPJ3; jump to 3rd recording
>>   Ex: DAPJ<; jump to prev recording
>>
>>   2 chars or more: jump in specified ms
>>   Ex: DAPJ-500; rewind 500ms
>>   Ex: DAPJ500;   fast-forward 500ms

DB$ (Audio dBV meter read)

RESP format: DB$snnnn; where s is +/- and nnnn is 0-9999, representing audio signal level for the main or sub RX ($) in 10ths of a dB. Useful for MDS measurements (see Elecraft XG3 user manual for method).
SET format: DB$0; (sets new 0 dB reference level for target receiver).

NOTE: Even though measured dB values are independent of the AF GAIN setting, AGC must be turned off to make the dBV reading accurate for signals above AGC threshold. Use **GT** to turn off AGC. Use **AL** to limit audio signal strength when AGC is off.

DE (Command Processing Delay; SET only)

SET format: DEnnn where n can be 001 to 999 (ms * 10), i.e. up to 9.99 seconds (TBD).

DM (DTMF; SET only)

SET format: DMn where n = 0-9, A-D, *, or #. Applies to FM mode only.

DN/DNB (VFO Move Down; SET only)

SET format: DN; (move VFO A down one unit, based on the current VFO step size) or DNB; (same for VFO B). Also see **UP/UPB** and **RU/RD** (RIT offset up/down).
TBD: Support for K3 variants.

DO (DIGOUT1 State)

SET/RESP format: DOn; where n = 0/1 (DIGOUT1 ON [0V] or OFF [floating]) for the present band (and present TX antenna [ANT1/2/3] for HF-6 m).

DIGOUT1 is pin 11 of the ACC jack. It is saved per-band/per-TX-antenna on the HF-6 m, and per-band on transverter bands.

DR$ (Data Rate)

SET/RESP format: DR$r; where <r> is the baud rate identifier:
AFSK-A, FSK-D: 0=45 baud, 1=75 baud; PSK-D: 0=31 baud, 1=63 baud.

DT$ (Data Sub-Mode)

SET/RESP format: DT$n; where n is the data sub-mode set or last used, whether or not DATA mode is in effect: 0 (DATA A), 1 (AFSK A), 2 (FSK D), or 3 (PSK D). DATA A is typically used for FT8 and other PC software-controlled audio data modes. AFSK A sets up the correct offsets for use with PC RTTY decoders, and the K4's RTTY RX decoder can also be used. FSK D and PSK D can be used with both internal K4 decode and encode; refer to the operating manual for details.

NOTES: (1) If **DT** is used when the transceiver is not in DATA mode, the returned value may not be valid. (2) See **MD** command for data normal/reverse information. (3) In *Diversity Mode*, sending **DTn** (main RX data mode) matches the sub receiver's mode to the main receiver's.

DV (Diversity Mode)

SET/RESP format: DVn; where n is 1 to turn diversity mode ON, and 0 otherwise.

NOTES: (1) Turning on diversity mode also turns on the sub receiver if it was off. (Requires K4D or K4HD model.) (2) When diversity mode is turned on, VFO A's band, mode, filter, and other settings are copied to VFO B. VFO B's frequency can still be different from VFO A, allowing it to be used as the transmit frequency in SPLIT mode. (3) An alternate toggle command **DV\;** exists that also toggles the subrx if turning diversity on causes the sub rx to also turn on.

DW (TX DATA Bandwidth)

SET/RESP format: DWnn; where nn is the TX DATA bandwidth in 100 Hz units, 20-40 (2.0-4.0 kHz).

EC (Echo Command to RS232 Port for KPA1500 control, etc.; SET only)

SET format: EC*ssss; where * is normally a blank for text mode
and ssss is text command to send to RS232 port.
Ex: EC BN05; (will send "BN05;" to RS232 port)

ECxssss;   where x is any non-blank character, indicating hex mode,
and ssss is valid ASCII-hex binary data of any length.
Ex: ECx46413B; (will send ascii FA; to RS232 port)

EXAMPLES: Here the EC command is used to swap between ANT1 and ANT2 on a KPA1500, or swap the the amp between OPER and STBY:

EC ^AN0;
EC ^BPT18;

NOTE: To prevent any conflict with unknown data being sent by external devices, all incoming data on the RS232 port will be ignored after sending an EC set command until the radio is restarted.

EE (EE Init)

Resets the archive radio state, configuration and menu settings while preserving calibrations, dvr voice macros, cw macros, quick memories, general memories and antenna configuration.

SET format: EE0; (wait for EE0; response, then restart the radio using PS8;)

ER (Error Reporting)

SET format: ERn; where n is 0 (error code only) or 1 (error code and error string).
RESP format: ERn; where n is the current mode of ER command.
AI RESP: ERnn; where nn is the error code. (ER0; mode)
           ERnn:sss; where nn is the error code and sss is the error string. (ER1; mode).

NOTE: AI2 or higher must be in effect to receive error messages.

The full list of error codes appears in the *K4 Built-In Operating Manual*, which can be accessed using any browser. This document is available on the Elecraft website.

ES (TX SSB/ESSB Mode and Bandwidth)

SET/RESP format: ESnbb; where n = 0 (SSB TX) or 1 (ESSB TX) and bb is the SSB or ESSB TX bandwidth in 100 Hz units, 30-45 (3.0-4.5 kHz).

Alternate GET/RESP Format: ESn; where n is 0 (SSB) or 1 (ESSB)

FA (VFO A Frequency)

SET format: FAn...; where n can have 1 to 11 digits. Frequency range is 100 kHz to 54 MHz. Digit count affects interpretation: 1 or 2 digits: n = MHz (e.g., "FA7;" = 7 MHz); 3 to 5 digits: n = kHz; 6+ digits: n = Hz.
RESP format: FAnnnnnnnnnnn; (frequency in Hz).

FB (VFO B Frequency)

See FA command for format.

FC$ (Center Panadapter for target VFO)

SET format: FC; or FC$; will center the panadapter on the target VFO.
ALT SET format: FC+250; centers the panadapter on the target VFO with the specified offset in Hz.

FI$ (IF Center Frequency)

SET/RESP format: FIn… where n… is 1 to 11 digits. Supports same formats as FA/FB. Sets center frequency for panadapter and/or IQ data streaming.

FP$ (Filter Preset)

SET/RESP format: FP$n; where n is 1-3. Selects filter preset n for current mode.
NOTE: Make sure operating mode is selected first, since presets are saved per-mode.
SHORT format: FP~; (normalize)

FR (Receive Function)

SET/RESP format: FRn;   where n is a decimal digit. Cancels SPLIT if applicable.
NOTE: This command is provided for K3 compatibility. It is equivalent to FT0.

FT (Split)

SET/RESP format: FTn; where n = 0 (SPLIT off) or 1 (SPLIT on).
TOGGLE format: FT/; alternates between SPLIT on and off.

FX (Audio Effects)

SET/RESP format: FXn; where n is 0=0ff, 1=delay (sim stereo), 2=pitch-map.

NOTES: (1) If the sub receiver is on (**SB** command), normal stereo audio effects do not apply. (2) The K3 doesn't support pitchmap mode. Instead, it has a "BIN" mode that is not available on the K4. BIN on the K3 does simple binaural phase inversion, like the toggle switch on some headsets.

GT$ (AGC Mode)

    SET/RESP format: GT$n; where n is 0=0ff, 1=slow AGC, 2=fast AGC.
    K3 SET/RESP format: GTnnn; where n is 002 for fast AGC and 004 for slow AGC.
    K2 Extended SET/RSP format (K22): GTnnnx; where x is 0 (AGC off) or 1 (AGC on).
    TOGGLE format: GT$/; alternates between AGC on and off.

    NOTE: When AGC is OFF, the AF limiter must be set to a level that protects the operator's ears from strong signals. See **AL** command. AGC cannot be turned off if NR or autoNotch are in effect.

HD (HDR Module Mode) [Pending]

    TBD.

ID (Radio Identification)

    SET/RESP format in K41 mode: IDs; where string s is "0" (default) or the user's ID text from the status display (typically a call sign). If the string is changed via an ID command, it will appear in the radio's status/ID area after a reboot of the radio.
    RESP format in K40 mode: ID017;   (GET only; for K3 compatibility).

IF (Basic Radio Information; GET only)

    Provided for K3 compatibility (K22/K31 meta-mode variant).

    RESP format: IF[f]*****+yyyyrx*00tm0spbd1*; 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 K4 is in transmit mode, 0 if receive
    m operating mode (see MD command)
    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.

IN (TX Inhibit Status) ** CURRENTLY APPLIES IN AI MODES, ONLY; NO GET COMMAND **

    RESP format: INn; where n is 1 for inhibited and 0 for not inhibited.

IP (IP Address)

    RESP format: IPV4:aaa.bbb.ccc.ddd;   where aaa-ddd are the fields of the transceiver's assigned IP address.

IS$ (IF Center Pitch)

    SET/RESP format: IS$nnnn; where nnnn = **pitch (x10 Hz)**. IS9xxx sets per-mode default.
    K3 SET/RESP format: IS nnnn; where nnnn = **pitch (Hz)**. IS 9xxx sets per-mode default.

    NOTE: This command is named "IS" (IF Shift) for legacy compatibility reasons. It is actually an *AF* center-pitch setting command on the K4 and other Elecraft transceivers.

K2 and **K3** (Meta Commands)

    Provided for backward compatibility with legacy host pc software.

    K22; meta-mode affects the following command responses:
        FW$; IF; KY; NB$; PC;

    K31; meta-mode affects the following command responses:
        DS; IF; SM$;

K4 (Meta Command)

    SET/RESP format: K4n; where n = 0 (basic K4 mode) or 1 (advanced K4 mode). A **K4;** GET command can be used to determine whether a K4 is connected to the host application.

    NOTE: K4n; SET command turns off K2; meta-mode and changes K3 meta-mode

K41; meta-mode affects the following command responses:
DS; GT$; ID; IF; IS$; NB$; PA$; PC; RA$; SM$; VT$;

KP (Keyer Paddle and Weight Setup)

SET/RESP format: KPionnn; where i = iambic keying mode (A/B), o = paddle orientation (N/R), and nnn = keying weight (090-125). Weight value should be constrained to multiples of 5, i.e. 90, 95, 100, 105, 110, 115, 120, 125, and displayed in the setter as a fixed-point ratio, e.g. 0.90 to 1.25.

KS (Keyer Speed)

SET/RESP format: KSnnn; where nnn is the keyer speed, from 8 to 100 WPM.

KY (CW/DATA Message Text)

SET format: KY*[text]; where * is normally a BLANK and [text] is 0 to 60 characters. If * is an R (for "repeat"), the last message will repeat after a delay set up in MENU:Message Repeat Interval. If * is a W (for "wait"), processing of any following host commands will be delayed until the current message has been sent. This is useful when a KY command is followed by other commands that may have side-effects, e.g., KS (keyer speed).
RESP format: KYn; where n is 0 (CW text buffer not full) or 1 (buffer full).

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

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

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

<	Puts the K3 into TX TEST mode, until a '>' character is received
>	Returns the K3 to TX NORM mode
@	In CW mode, this character terminates any CW message
|	Quickly terminates TX in FSK/PSK modes (EOT on built-in keyboard)

KZ (Remote Paddle) – see [Remote Access Commands](#) section

LB (LPA Bias Calibration)

SET format: LB1;   starts bias calibration (takes 10 to 60 seconds).
GET format: LB;   returns: 1 = busy, 2 = last cal attempt failed,
                                 0 = not busy; last attempt succeeded

NOTE: This command, which is done at the factory, calibrates the bias setting for the 10 watt PA (also known as the "LPA"). In the rare case that bias calibration data are lost, this command can be used. To see if the bias is already correct: (1) put the K4 into SSB mode, (2) set mic gain to 0, (3) tap the status area (date/time/etc), then select "All Param", (4) tap XMIT; (5) note the LPA current value. Total LPA current in this case is just the bias current plus about 0.2 A. Since per-device bias is about 0.4 A, the LPA total current reading is typically 0.2 + (0.4 x 2) = 1 amp, +/- 0.1 amp. If the current is significantly below this, chances are either the bias needs to be recalibrated or there's a problem with the LPA module.

Once an LB1 command is received, the K4 will automatically emit a GET response of either 0 or 2 when bias calibration completes. It is also possible to poll during calibration, which will return LB1 as long as calibration is still in progress. **THE OPERATOR SHOULD NOT ADJUST ANY RADIO CONTROLS OR TRANSMIT DURING LPA BIAS CALIBRATION**.

LI (Line Input)

    SET/RESP format: LIuuullls; where:
            <uuu> = line in level, USB-B   0-??? (actual range TBD)
            <lll> = line in level, line in jack   0-???
            <s> = line in source   0 = Sound card (USB-B), 1 = LINE IN jack
    SET ONLY extensions:
            LInnns; (set level and source)
            LInnn; (set level for current source)
            LIs; (set source)

    NOTE: In voice modes, audio from the specified line in source is only enabled if the mic-input command (**MI**) is configured for LINE IN, FRONT+LINE, or REAR+LINE. Disabled in CW, PSK-D, and FSK-D modes.

LK$ (VFO Lock)

    SET/RESP format: LK$n; where n = 0 (unlock) or 1 (lock).
    TOGGLE format: LK$/;

LN (VFO Link)

SET/RESP format: LNn; where n = 0 (VFOs not linked) or 1 (VFOs linked; turns on link icon to the left of the VFO B numeric display). When the VFOs are linked, VFO A controls both VFOs. If VFO B is offset from VFO A, the offset amount will be preserved as VFO A is tuned.

LO (Line Out)

SET/RESP format: LOlllrrrm; where:
      <lll> = left line level   0-040 (actual range TBD)
      <rrr> = right line level   0-040
      <m> = mode   0 = Right channel is independent
                                 1 = Right channel uses Left channel value

NOTES: (1) Line out audio is always available at both the LINE OUT jack (analog AF out) and the sound card interface. (2) The CODEC on the AFIO allows Windows PCs to independently adjust L/R audio *in* (PC perspective). This is a K4-only feature (the CODEC on the KIO3 didn't allow independent adjustment). If the operator is using Windows to control this, they can specify R=L feature in the LINE IN UI (<m> = 1 above).

LOG (Log diagnostic data)

SET format: Insert flash drive. Send LOG;   (wait for LOG1 response; typ. 5 - 30 s).
Response: LOG0; = failure due to missing flash drive, wrong flash drive format.
LOG1 = success.

MA$ (Mode Alternates; GET only)

This command is only needed by applications that are attempting to functionally emulate the K4's mode-select button group. It returns a set of bit flags that shows what *alternate modes* were last selected for each *primary mode* for the current VFO. "Alternate Modes" refers to one of: CW normal/reverse, USB/LSB, DATA-A normal/reverse, etc. These are tracked so that the MODE button group can be labeled with the correct per-VFO/per-band mode selections.

RESP format: MAxx; where xx is an ASCII-hex value whose bits are defined as follows:

    b0   0 = CW normal, 1 = CW reverse
    b1   0 = LSB, 1 = USB (default is LSB for 160/80/40 m, USB for other bands)

b2	0 = DATA-A normal, 1 = DATA-A reverse
b3	0 = AFSK-A normal, 1 = AFSK-A reverse
b4	0 = FSK-D normal, 1 = FSK-D reverse
b5	0 = PSK-D normal, 1 = PSK-D reverse
b6	0 (reserved for future use)
b7	0 (reserved for future use)

MB (Message Bank) [Pending]

TBD

MC (Memory Channel) [Pending]

TBD

MD$ (Operating Mode)

SET/RESP format: MD$n; where 0=N/A, 1=LSB, 2=USB, 3=CW, 4=FM, 5=AM, 6=DATA, 7=CW REV, 8=N/A, 9=DATA REV. Also see **DT** (DATA sub-mode). Applications that recreate the K4's mode-select button group should also use the **MA** command.
TOGGLE format: MD$/; alternates between two most recently used modes.
INCR/DECR format: MD$+; and MD$-; cycle through the operating modes (SSB, CW, AM, FM, DATA).

MO (Menu Open)
ME (Menu Parameter)
MEDF (Menu Definition)

See [Menu Access Commands](#).

MG (Mic Gain)

SET/RESP format: MGxxx; where <xxx> is 000-080. For mic input selection, see **MI**. For mic preamp configuration, use **MS** (Mic Setup).

MI (Mic Input Select)

SET/RESP format: MIn; where: <n> = 0 (front mic), 1 (rear mic), 2 (LINE in see **LI** cmd), 3 (front mic + LINE IN), or 4 (rear mic + LINE IN). For preamp, bias, and mic button configuration, use MS (Mic Setup).

NOTE: Mic selection only applies to voice modes. In audio data modes, LINE IN is always used (audio jack or USB sound card input).

ML (Transmit Monitor Level)

SET/RESP format: MLmnnn; where m is 0 (CW), 1 (AF data), or 2 (voice), and nnn is 000-100. In CW/direct-data modes this is the sidetone/alert tone level; in voice modes, speech monitor level; in AF data modes, data monitor level.
GET format: MLm; where m is 0 (CW), 1 (AF data), or 2 (voice).
K3 SET/RESP format: MLnnn; where nnn is 0-60 and applies to the current mode (see above).

MS (Mic Setup)

SET/RESP format: MSabcde; where:

<a> = front mic preamp	0 = 0 dB, 1 = 10 dB, 2 = 20 dB	
<b> = front mic bias	0 = OFF, 1 = ON	
<c> = front mic controls	0 = UP/DN buttons disabled, 1 = UP/DN enabled	
<d> = rear mic preamp	0 = 0 dB, 1 = 14 dB	
<e> = rear mic bias	0 = OFF, 1 = ON	

SET ONLY extensions: MSAx; MSBx; MSCx; MSDx; MSEx; where: x is desired value.

MX (Main/Sub Audio Mix when Sub RX is on)

SET/RESP format: MXs; where string <s> can have only the values shown below. To maintain compatibility with terminology used on earlier products, <s> uses "A" and "B" as equivalents to "main" and "sub". Also see important NOTEs below.

<u>s</u>	**<u>Left Audio</u>**	**<u>Right Audio</u>**	**<u>Description</u>**
A.B	main	sub	Full stereo separation (default)
AB.AB	main+sub	main+sub	Equivalent to mono
A.-A	main	main, inverted polarity	Useful as a binaural effect
A.AB	main	main+sub	Hybrid setting
AB.B	main+sub	sub	"
AB.A	main+sub	main	"
B.AB	sub	main+sub	"
B.B	sub	sub	No main RX audio
B.A	sub	main	Full stereo separation, swapped
A.A	main	main	No sub RX audio

This command specifies what mix of main/sub RX audio will be sent to the left/right audio channels. This is especially useful for SO2V operation, etc. The default is "**MXA.B;**", providing full stereo separation with left audio=main and right=sub.

NOTE1: *MX only applies if the sub receiver is on, and stereo audio is being used,* i.e. stereo headphones or dual external speakers. If the sub receiver is off, but stereo audio is still in effect, then the **FX** command (audio effects) applies.

NOTE2: The **MX** command is not to be confused with the **BL** command (balance). **BL** specifies the *relative volume level of the left and right audio channels*. The **BL** setting applies regardless of how main and sub receive audio is mixed left and right (via the **MX** command). **BL** also applies even with sub off, providing comfortable listening levels for operators with different hearing sensitivity in each ear. When working with the **MX** command, at least initially, it may be helpful to normalize the balance to 50/50 (using the **BL~;** command) to avoid conflating its effect with that of the audio mix.

NA$ (Auto Notch)

SET/RESP format: NA$n; where n=0 is OFF, n=1 is ON. Only applies to SSB modes.
TOGGLE format: NA$/; turns auto-notch on if it was off and vice-versa.

NB$ (Noise Blanker)

SET/RESP format: NB$nnm; where nn is NB level (0-15) and <m> is 0/1 for off/on.
ALTERNATE format: NB$m; where m is 0/1 for off/on (no effect on level setting).
TOGGLE format: NB$/; turns the noise blanker on (at its most recent setting) if it was off and vice-versa.

NOTE: If the panadapter noise blanker is set to AUTO, it will be turned on/off in conjunction with the receiver noise blanker.

NM$ (Manual Notch)

SET/RESP format: NM$nnnnm; where nnnn is notch pitch (150-5000 Hz) and m is 0/1 for off/on. NOTE: Applies only to CW and SSB modes.
ALTERNATE format: NM$m; where m is 0/1 for on/off. (no effect on pitch setting)
TOGGLE format: NM$/; turns manual notch on if it was off and vice-versa.

NR$ (Noise Reduction)

SET/RESP format: NR$nnm; where nn = NR level (0-10) and <m> is 0/1 for off/on.

TOGGLE format: NR$/; turns noise reduction on (at its most recent setting) if it was off and vice-versa.

OM (Option Module Info; GET only)

RESP format: OM APXSHML14---; where any of the option characters, when present, indicate 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 (**-**). The letters (and associated positions) in the **OM** string refer to the following option modules:

A = ATU (KAT4)
P = PA (KPA4)
X = XVTR (additional fields will be used to ID different XVTR models)
S = SUB RX (KRX4 + 2nd KDDC4, standard in K4D model)
H = HDR MODULE (KHDR4 + KDDC4-2, standard in K4HD model)
M = K40 (or "Mini")
L = LINEAR AMP detected (generic, i.e. Elecraft KPA500 or KPA1500)
1 = KPA1500 amp detected
4 = Identifies the radio as a K4 (**S** & **4** = **K4D**; **S**, **H**, and **4** = **K4HD**)

OV$ (Overflow ADC/COR; RESP only)

RESP format: OV$nc; where n = ADC Overflow (0/1) and c = COR Relay status (0/1 for off/on).

NOTE: This command provides information that could be used by a host application to turn on an "ADC overflow" or "COR" indication. Internally, it is used as input to the K4's automatic front-end gain reduction algorithm. (To enable this automatic attenuation, menu entry "RX Auto Atten" must be set to ON; see Menu Commands.)

PA$ (Preamp)

SET/RESP format: PA$nm; where n is as shown below, and m is 0 (off) or 1 (on).
        n = 0 (off)
        n = 1 (10 dB regular preamp)
        n = 2 (160-15 m: 18 dB regular preamp; 12-6 m: 20 dB LNA)
        n = 3 (12-6 m only: 10 dB regular preamp + 20 dB LNA)
TOGGLE format: PA$/; turns the preamp on (at most recent setting) if it was off and vice-versa.

PB (DVR Message Playback)

SET/RESP format: PBn; where n is message number 1 to 8. PB0; will cancel any dvr action (recording or playback)
NOTE: This command is an alias of **DAMPm;**

PC (Power Control)

　　SET/RESP format: PCnnnr; where nnn is power output and r is the power range:
　　　　L = low power (QRP, 0.1-10.0 W); e.g., for 5.0 W, use PC050L;
　　　　H = high power (QRO, 1-110 W); e.g., for 50 W, use PC050H;
　　　　X = milliwatt range (for XVTRs, 0.1-10.0 mW).
　　ALTERNATE GET format: PCX; always returns power in the K4 format (PCnnnr) even if the default K3 legacy format was in effect.
　　NOTE: If <r> is omitted, 'L' range is assumed for both SET and get response.
　　Also see PP command (per-band power control, barefoot or with ext. amp).

PK (Port Keying Setup: PTT, KEY, FSK)

　　SET/RSP format: PKnpf;
　　GET format: PKnp;

　　where:
　　　　n = serial port number (1=USB1, 2=USB2, 3=DE9)
　　　　p = port pin type (D=DTR, R=RTS)
　　　　f = function (X=OFF, C=CW, P=PTT, F=FSK [DTR only])

　　Example: PK3DF configures DE9-DTR as a source for FSK input.

　　NOTE1: DTR and RTS signalling is "wire-ORed." This means that PTT and KEY can be obtained from multiple DTR and/or RTS lines simultaneously. Similarly, FSK data can be obtained by multiple DTR sources simultaneously.

　　NOTE2: FSK can always be applied at ACC-FSK IN. Similarly, PTT can always be applied at ACC-PTT IN as well as at the front and rear-panel PTT jacks.

PL$ (PL/CTCSS Tone Mode and Number)

　　SET/RESP format: PL$nnm; where nn = 01 to 50 (see table), and m = 0 (off) or 1 (on).

　　CTCSS TONE TABLE (Hz):
　　#01-09:　　67.0, 69.3, 71.9, 74.4, 77.0, 79.7, 82.5, 85.4, 88.5
　　#10-19:　　91.5, 94.8, 97.4, 100.0, 103.5, 107.2, 110.9, 114.8, 118.8, 123.0

#20-29:	127.3, 131.8, 136.5, 141.3, 146.2, 151.4, 156.7, 159.8, 162.2, 165.5
#30-39:	167.9, 171.3, 173.8, 177.3, 179.9, 183.5, 186.2, 189.9, 192.8, 196.6
#40-50:	199.5, 203.5, 206.5, 210.7, 218.1, 225.7, 229.1, 233.6, 241.8, 250.3, 254.1

NOTE: Tone numbers (shown as #nn above) are not standardized by the EIA/TIA; they vary by manufacturer. The K4's **PL** command uses them only as a monotonic table index.

PO (Power Output)

RESP format: POnnnn; where nnnn is current TX power output in tenths of a watt.
SET format: POn; where n is 1 for automatic delivery. 0 is to turn off automatic delivery.

Also see **TM** command, which provides real-time updates of all TX metering without polling.

PP (Per-band power; GET only)

NOTE: Only active if Per-Band Power in MENU is set to YES.
RESP format: PPbbcccmdddr;
      where: bb is band #
                ccc is "level barefoot"
                m is "barefoot power range" (L or H)
                ddd is "level amplifier"
                is "amplifier power range" (L or H)
ALTERNATE GET format: PPbb; where bb is band
ALTERNATE GET format: PP1; return all per band power levels

PS (Power On/Off/Restart Control)

SET/RESP format: PSn; where 0 = off, 8 = restart, and 88 = perform auto-update and restart. 89 = sent to a client K4 to perform auto-update and restart server K4.

NOTE: The K4 cannot be turned ON via the command interface, because the interface itself is only powered if the radio has already been turned on. However, the K4 does include a hardware /POWER_ON control line that can be pulled low briefly by an external device that in turn is under remote control.

RA$ (RX Attenuator)

SET/RESP format: RA$nnm; where nn is 0/3/6/9/12/15/18/21 (dB) and m = 0 (off), 1 (on).

INCR/DECR format: RA$+; or RA$-; increments or decrements attenuation in 3 dB steps.
TOGGLE format: RA$/; turns the attenuator on (at the most recent setting) if it was off and vice-versa.

RC$ (RIT/XIT Offset Clear; SET only)

SET format: RC$;. Clears RIT and XIT offset for VFO A or B.

NOTE: In diversity mode, RIT applied to VFO A affects both receivers since both are controlled by VFO A.

RD$ (RIT/XIT Down; SET only)

SET format: RD$n; where n (1-9999) is an RIT/XIT decrement amount in either 1 Hz or 10 Hz increments. If the RATE switch selection for the target VFO is 1 Hz, then <n> is in 1 Hz units; if the RATE selection is 10 Hz or higher, then <n> is in 10 Hz units. (This behavior is provided for backwards compatibility with the K3.) Maximum allowed RIT/XIT offset is +/- 9.999 kHz.

ALTERNATE SET format: RU$0nnnn; where 0nnnn is 000001-09999 in Hz units.

NOTE 1: If XIT is ON, it tracks the RIT offset for the transmit VFO. See **XT** command.

NOTE 2: In diversity mode, RIT applied to VFO A affects both receivers since both are controlled by VFO A.

NOTE 3: To maintain backward compatibility with earlier Elecraft products, **RD** and **RU** function as control-emulation commands. This means that if the RIT/XIT offset knob is mapped to something other than RIT (via MENU:RIT Knob Alt Function), **RD** and **RU** will manipulate the target parameter, not RIT or XIT offset. RIT/XIT offset can alternatively be changed using the **RO** command.

RE (RX EQ)

SET/RESP format, normal: REnabcdefgh; where a through h are 3-character decimal fields, each specifying a range of –16 to +16 dB. +00 is "Flat." Values a - h correspond to EQ bands as follows: a = 100 Hz, b = 200 Hz, c = 400 Hz, d = 800 Hz, e = 1200 Hz, f = 1600 Hz, g = 2400 Hz, h = 3200 Hz.
SET format, flat: REF; sets all RX EQ bands to +00.

RG$ (RF Gain)

> **SET/RESP format:** RG$-nn; where nn is 00 to 60 (-0 to -60 dB).

> **NOTE:** This is an internal DSP scalar applied ahead of all other signal processing. It does not change gain ahead of the ADC. For that purpose use the PA (preamp) or RA (receive attenuation) commands.

RL (Software Release Select)

> **SET/RESP format:** RLn; where n is
>   P (Production),
>   B (Beta),
>   F (Field Test, only available to Field Testers),
>   X (Previous Production)
> **NOTE:** This command only selects the release for a software update; it does not apply it. The PS88; command applies the selected update.

RO$ (RIT/XIT Offset)

> **SET/RESP format:** RO$snnnn; where s is +/-, and nnnn is 0-9999 Hz.

> **NOTE 1:** RO$ always returns the offset value in Hz, regardless of the tuning rate specified for the target VFO. For backwards compatibility, RD$ and RU$ change the value in either 1 Hz or 10 Hz increments depending on the selected VFO's tuning rate.

> **NOTE 2:** If XIT is ON, it tracks the RIT offset for the transmit VFO. See **XT** command.

> **NOTE 3:** In diversity mode, RIT applied to VFO A affects both receivers since both are controlled by VFO A.

RP (Repeater Offset and Mode)

> **SET/RESP** format: RPmnnnnn; where:
>   m is the repeater mode: 'S' (simplex), '+', or '-'
>   nnnnn is the repeater offset in kHz (00000 to 99999 kHz, or 99.999 MHz)

RRT (Remote Connection) – see Remote Access Commands section

RS (Remote Set) – see Remote Access Commands section

RT$ (RIT On/Off)

    SET/RESP format: RTn; where n is 0 (off) or 1 (on).
    TOGGLE format: RT$/; turns RIT on if it was off and vice-versa.

RU$ (RIT/XIT Up; SET only)

    SET format: RU$n; where n (1-9999) is the RIT/XIT increment amount in either 1 Hz or 10 Hz increments based on the RATE switch selection for the target. VFO is 1 Hz, then <n> is in 1 Hz units; if the RATE selection is 10 Hz or higher, then <n> is in 10 Hz units. (This behavior is provided for backwards compatibility with the K3.) Maximum allowed RIT/XIT offset is +/- 9.999 kHz.

    ALTERNET SET format: RU$nnnnn; where nnnnn is 000001-09999 in Hz units.

    NOTE 1: If XIT is ON, it tracks the RIT offset for the transmit VFO. See **XT** command.

    NOTE 2: In diversity mode, RIT applied to VFO A affects both receivers since both are controlled by VFO A.

    NOTE 3: To maintain backward compatibility with earlier Elecraft products, **RD** and **RU** function as control-emulation commands. This means that if the RIT/XIT offset knob is mapped to something other than RIT (via MENU:RIT Knob Alt Function), **RD** and **RU** will manipulate the target parameter, not RIT or XIT offset. RIT/XIT offset can alternatively be changed using the **RO** command.

RV (Firmware Revisions; GET only)

    GET format: RV;
    RESP format: RV.mmm-vvvv; (all modules will be returned in individual responses).
    NOTE: Module name and version is variable length. Split string fields on hyphen (-).
    NOTE: DDC/DUC will include FPGA version in version string as (m:vv)

    GET K3 compat format: RVm; where m is K3 legacy module
        RVF; / RVM; both return FP firmware version
        RVD; / RVA; both return DSP firmware version
        RVR; return DAP firmware version

RX (Go to Receive Mode; SET only)

    SET format: RX;

SB (Sub RX)

> **SET/RESP format:** SBn; where n is 0 (sub RX off) or 1 (on).
> **TOGGLE format:** SB/; turns the sub RX on if it was off and vice-versa.
>
> As on the K3, the K4's Sub RX feature allows the user to listen on both VFO A and B frequencies at the same time. On the K3 you need a KRX3 for this purpose. But on the K4, single-antenna sub RX (dual watch) is a standard feature. Adding a KRX4 provides independent dual-receive (separate antennas and BPFs for main/sub).

SC (Screen Count; count of attached monitors)

> **SET/RESP format:** SCn; where n is 1 (LCD only) or 2 (LCD plus external monitor).

SD (VOX or QSK Delay)

> **SET/RESP format:** SDxyzzz; where
>   x is 1 to turn on full CW QSK (delay = 0), or 0 to use specified QSK delay
>   y is mode for delay-setting purposes (C=CW & direct data, V=voice, D=AF data)
>   z is delay in 10-ms increments (000-255 = 0.00 to 2.55 seconds)
> **TOGGLE format:** SD/; turns VOX or QSK delay on if it was off and vice-versa.
>
> **NOTE:** K3 and KX version of SD is GET-only, applied only to CW mode, and used 50-ms increments (vs. 10 ms for the K4). See VX for vox enable. See VG and VI for VOX gain and antivox setup.

SI (System Auto Info; SET only)

Enable or disable AI4 system information / voltage reports for various modules.
NOTE: Requires AI4; or higher mode to be active for delivery.

SET format:
  SIDA1; Enable AI4 delivery of DAP info reports
  SIDD1; Enable AI4 delivery of DDC info reports
  SIDU1; Enable AI4 delivery of DUC info reports
  SIFP1; Enable AI4 delivery of FP info reports
  SIRF1; Enable AI4 delivery of RFB info reports
  SIRC1; Enable AI4 delivery of RMT connection info

SL (Remote Streaming Audio Latency)

SET/RESP format: SLn; where n is 0 to 7. Default is 3.
NOTE: In a high-latency scenario (slow or unstable connection) you may need to adjust this setting higher to account for large and/or random amounts of time jitter for a better overall listening experience.

SM$ (S-Meter; GET only)

RESP format: SM$nn; where nn is meter bars 00-42 (matches K4 bar graph).
SET format: SMn; where n is 1 (Automatically delivered when s-meter value changes.)
  NOTE: GET format is meta mode dependent and required for K4 style response.
  NOTE: SET format is not meta-mode dependent. Requires AI4 for delivery.

If K4 meta mode is not enabled (K41;), the response is a K3 backward compatible format.
RESP format: SM$nnnn; (0000-0015 range in K30;) (0000-0021 range in K31;)

SMH$ (High-Resolution S-meter; GET only)

RESP format: SMH$+nnn; where +nnn is the signal level in dBm.
SET format: SMHn; where n is 1 (Automatically delivered when s-meter value changes.)
  NOTE: GET format is meta mode dependent and required for K4 style response.
  NOTE: SET format is not meta-mode dependent. Requires AI4 for delivery.

SN (Serial Number; GET only)

RESP format: SNnnnnn;

SP (Spot & Autospot; SET only)

SET/RESP format: SPn; where n is:
        0 (spot tone off), 1 (spot on without mute), 2 (spot on with mute),
        3 (autospot).
NOTE: SP$3 is used with the sub RX. This is the only variant that applies to the sub RX.

SS (Screenshot Capture)

SET format: SSd; where d is 0 (LCD) or 1 (HDMI)
  NOTE: USB memory stick is required to save screenshot captures.

SQ$ (Squelch)

SET/RESP format: SQ$nnn; where nnn is 000-040. Typical setting is 22.

SW (K4 Front Panel Switch emulation; SET only)

SET format: SWnnn; where n is switch, knob, or button ID. n can have 1, 2 or 3 digits. See full list of switch emulation codes below. Also see SWT/SWH commands (K3/K3S switch emulation).

A->B	SW72;	
A/B	SW41;	
ADJ	SW143;	
AF PLAY	SW139;	
AF REC	SW138;	
ALT	SW148;	
ANT	SW60;	
APF	SW144;	
ATTN	SW141;	
ATU	SW158;	
ATU TUNE	SW40;	
AUTO	SW146;	
B SET	SW44;	
B->A	SW147;	
BAL	SW130;	
BANK	SW137;	
CLR	SW64;	
DIV	SW152;	
FIL	SW33;	
FILTER	SW81;	(Knob tap)
FREQ ENT	SW53;	
KEYPAD .	SW42;	(Decimal point)
KEYPAD 0	SW33;	
KEYPAD 1	SW17;	
KEYPAD 2	SW51;	
KEYPAD 3	SW18;	
KEYPAD 4	SW52;	
KEYPAD 5	SW19;	
KEYPAD 6	SW61;	
KEYPAD 7	SW32;	
KEYPAD 8	SW62;	
KEYPAD 9	SW31;	
KEYPAD BS	SW72;	(Backspace)

KEYPAD <-	SW43;	(Enter)
KHZ	SW150;	
LEVEL	SW142;	
LOCK A	SW63;	
LOCK B	SW151;	
M1	SW17;	
M1 hold	SW162;	
M2	SW51;	
M2 hold	SW163;	
M3	SW18;	
M3 hold	SW164;	
M4	SW52;	
M4 hold	SW165;	
MANUAL	SW140;	
MODE	SW43;	
MON	SW128;	
NB	SW32;	
NORM	SW129;	
NR	SW62;	
NTCH	SW31;	
PF1	SW153;	
PF2	SW154;	
PF3	SW155;	
PF4	SW156;	
PRE	SW61;	
QSK	SW134;	
RATE	SW73;	
RCL	SW34;	
REC	SW19;	
REM ANT	SW135;	
REV Dn	SW160;	(Switch press)
REV Up	SW161;	(Switch release)
RF/SQL	SW82;	(Knob tap)
RIT	SW54;	
RX ANT	SW70;	
SCAN	SW149;	
SPLIT	SW145;	
SPOT	SW42;	
STORE	SW20;	
SUB	SW83;	
SUB ANT	SW157;	

```
TEST        SW132;
TUNE        SW16;
TUNE LP     SW131;
VOX         SW50;
XIT         SW74;
XMIT        SW30;
XMTR        SW80;        (Knob tap)
```

SWT/**SWH** (K3 Switch Tap/Hold Emulation; SET only)

Some K4 switch functions will be mapped to K3/K3S equivalent SWT/SWH switch codes for backward compatibility. (List TBD.)

TA (TX Gain constant; advanced; GET only)

RESP format: TGbbxxxxyyyyzzzz;
where bb is band
where xxxx is qrp tx gain constant
where yyyy is qro tx gain constant
where zzzz is mw tx gain constant (*Always 0; TBD)

ALTERNATE GET format: TAbb; return specific band values
ALTERNATE GET format: TA1; return all band values

TB$ (Buffered Text)

GET format: TB$;
RESP format: TB$trrs; where <t> is the number of queued transmit characters still to be sent (from KY packets; up to 9, and 9 if higher than 9); <rr> is the count of available receive characters for VFO A or VFO B; and <s> is the text string itself, which can include semicolons, etc.

TD$ (Text Decode/Encode Mode)

SET/RESP format: TD$mtl; where <m> is the text-decode mode; <t> is the text-decode threshold (where applicable); and <l> is the number of received text lines to display. Per-operating-mode details below.
TOGGLE format: TD$/;

CW text decode mode: 0=off, 1=TX only (N/A at present), 2=RX 8 to 45 WPM, 3=RX 8 to 60 WPM, 4=RX 8 to 90 WPM. **CW threshold settings**: 0=AUTO, 1-9=fixed levels.

DATA text decode modes: 0=off, 1=on. **Threshold setting:** N/A.

SSB encode mode (2-tone): 0=2-TONE off, 1=on. **Threshold setting:** N/A.

TE (TX EQ)

SET/RESP format: TEabcdefgh;   where a through h are 3-character decimal fields, each specifying a range of –16 to +16 dB. +00 is "Flat." Values a - h correspond to EQ bands as follows: a = 100 Hz, b = 200 Hz, c = 400 Hz, d = 800 Hz, e = 1200 Hz, f = 1600 Hz, g = 2400 Hz, h = 3200 Hz.

TG (TX Gain constant; GET only)

RESP format: TGnnnn; where nnnn is TX gain value for current power range and band.
NOTE: See TA; command for more advanced TX Gain value responses.

TM (TX Meter Data)

Automatically delivered to clients when TX metering data changes.
AUTORESP format: TMaaabbbcccddd; where aaa is ALC (bars), bbb is CMP (dB), ccc is FWD power (watts in QRO mode, tenths of a watt in QRP mode), and ddd is SWR (1/10th units).
SET format: TMx; where x is 1 for on and 0 for off.

TQ (TX query; GET only)

GET format: TQ; or   TQX;   (see NOTE below).
RESP format: TQn; where n = 1 if the K4 is logically in transmit mode.

NOTE: If the GET query is "TQ;", then the K4 is considered to still be in transmit mode during the S-meter holdoff time (300 ms), even though receive audio can be heard. If the GET query is "TQX;", then the S-meter holdoff time is *not* considered to be part of the transmit state. This allows an application to find out more quickly when actual RF transmit has ended, which may result in a more responsive user interface (when playing DVR messages, for example).

TS (TX Test Mode)

SET/RESP format: TSn; where n is 0 (test mode off) or 1 (test mode on). If TX test mode is in effect, the "TX" icon flashes and the transceiver will not put out power, though it still keys any downstream gear. Can be used to pre-set mic gain and compression off-air

since the ALC meter functions on audio alone.
TOGGLE format: TS/; turns TX test mode on if it was off and vice-versa.

TU (TUNE)

SET/RESP format: TUn; where 0=exit, 1=tune, 2=tune LP, 3=ATU tune, 4=ATU extended search tune. This emulates the TUNE, TUNE LP, and ATU switch functions. TU3 is the equivalent of tapping ATU once; TU4 emulates a 2nd tap within 5 seconds. TU0 is returned automatically the K4 drops transmit for any reason.

TX (Go to Transmit; SET only)

SET format: TX;. Places radio in transmit mode. Exit by sending **RX**.

UP/UPB (VFO Move Up; SET only)

SET format: UP; (move VFO A up one unit based on current VFO A step size) or UPB; (same for VFO B). Also see **DN/DNB** and **RU/RD** (RIT offset up/down).
TBD: Support for K3 variants.

UT (UTC timestamp; GET only)

GET format: UTn; where in is unix timestamp in seconds.

VC (Coarse Tune Step)

SET/RESP format: VCsm; where s is step index; where m is base mode.

VG (VOX Gain)

SET/RESP format: VGmnnn; where: m = mode (V/voice, D/AF Data); nnn = 000-060. Sets VOX gain for specified mode. Also see **VX**, **VI**, and **SD**.

VI (VOX Inhibit or anti-vox)

SET/RESP format: VInnn; where nnn = 000-060. Sets VOX inhibit (anti-vox) level for voice modes. Also see **VX**, **VG**, and **SD**.

VO$ (VFO Offset)

SET/RESP format: VOsnnnnn; where <s> (sign) is + or - and nnnnn can be

00000-99999. The offset value can have from 1 to 5 digits. Offsets the target VFO by a fixed +/- amount in Hz regardless of the current VFO step size.

VT$ (VFO Tuning Step)

SET/RESP format: VT$nm; where n is 0 - 5 (0 = 1Hz, 1 = 10Hz, 2 = 100Hz, etc.); m is current mode (*see MD command).
ALT GET format: VT$Xm; where m is any mode; returns VT$nm;
TOGGLE format: VT$/; (equivalent to RATE switch tap function).
ALT TOGGLE format: VT$\; (equivalent to KHZ switch hold function).

VX (VOX On/Off)

SET/RESP format: VXmn; where m = mode (C = CW/direct data, V = voice, D = AF data), and n = 0 (OFF) or 1 (ON). Turns VOX on/off for the specified mode. In CW, PSK-D, and FSK-D modes, VOX ON means "hit-the-key" CW is enabled (live paddle). Also see **VG**, **VI**, and **SD**.
TOGGLE format: VX/; turns VOX mode on if it was off and vice-versa.

WM (Wattmeter Calibration)

SET/RESP format: WMpnnn; where: p is the power class (L = low range, H = high range, X = mW/transverter range) and nnn is the calibration value (default in all three cases is 500).

XV$ (Transverter Band Select)

SET/RESP formats: XV$nn; where nn is 01-12, corresponding to band buttons XVTR1-12.

This command is used to switch the K4 to the designated transverter bands. (The **BN** command can also be used to select transverter bands. BN11 corresponds to XVTR1, etc.) Transverter bands can be configured using the XVTR menu entries or the XVN/XVM/XVR/XVI/XVO/XVP commands (see below).

XVN, XVM, XVR, XVI, XVO, XVP (Transverter Band Setup)

SET/RESP formats:
    XVNn;   where n is the XV band to setup (1-12)
    XVMn;   where n is the XV mode (0=off, 1=external)
    XVRnnnnn; where nnnnn is the XV band lower edge in MHz (0-99999)

XVInn;   where nn is the IF band in MHz (0-53)
XVO+nnnnn; where + is +/-, and nnnnn is the offset in Hz (0-99999)
              (corrects for oscillator/multiplier chain error)
XVPnnn;   where nnn is the power output in 0.1 mW units (0.1 to 5.0)
              Example: XVP010; = 1.0 mW

These commands are used to set up the transverter band displays (XVTR1-XVTR12). Use XVN to specify the target band for the other setup commands. (MENU:XVTR… commands can also be used.) Once a transverter band has been configured, use XV$n (1-12) or BN$ (11-22) to set the radio to that band.

XT (XIT)

SET/RESP format: XTn; where n = 1 to turn XIT on. Uses same offset value as RIT of the TX VFO, whether RIT for that VFO is turned on or not.
TOGGLE format: XT/; turns XIT on if it was off and vice-versa.

Menu Access Commands

Menu access commands can be used by applications to recreate the K4's menu structure, including menu entry names and parameters (data types, ranges, current values, and default values).

MEDF (Menu Definition)

GET format: MEDFiiii; where iiii is the menu ID #. Returns menu entry name string and parameter format specifications.

ME (Menu Parameter)

This commands allows external applications to read or change menu settings.

SET/RESP format: MEiiii.nnnn; where iiii is the menu ID # and nnnn is the parameter value. All menu entries are listed below in menu/alphanumeric order.

TOGGLE format: MEiiii./; will work for menu item type BIN (binary).
INCR/DECR format: MEiiii.+; MEiiii.-; will work for menu item type DEC (decimal).

Menu Entry	ID
AF Limiter (AGC off)	0039

AGC Attack	0011
AGC Decay, Fast	0009
AGC Decay, Slow	0008
AGC Hold Time	0007
AGC Noise Pulse Reject	0013
AGC Slope	0012
AGC Threshold	0010
AutoRef Averaging	0048
AutoRef Debounce	0049
AutoRef Offset	0050
CW TX in SSB Mode	0104
DIGOUT1 (ACC jack, pin 11)	0100
Ext. Monitor Function	0070
Ext. Monitor Location	0071
Fan Speed Min	0003
FM Deviation, Tone	0089
FM Deviation, Voice	0088
FSK Dual-Tone RX Filter	0064
FSK Mark-Tone	0085
FSK Polarity	0084
IP Address	0043
KAT4 ATU Option	0004
KPA4 PA Option	0006
KRX4 2ND RX Option	0005
LCD Brightness	0036
LED Brightness	0037
Message Repeat Interval	0087
Mouse L/R Button QSY	0074
Mouse Pointer Size, Ext. Mon.	0109
Mouse Pointer Size, LCD	0107
Per-Band Power	0046
Preamp 3 (12/10/6 m)	0093
Radio Serial Number	0033
Radio Type	0034
Reference Freq	0040
RIT CLR 2nd Tap Restore	0042
RIT Knob Alt. Function	0044
RX 1.5 MHz High-Pass Fil.	0091
RX All-Mode Squelch	0106
RX Audio Mix with Sub On	0105
RX Audio Gain Boost	0113

XVTR Band <n> I.F.	0078
XVTR Band <n> Mode	0076
XVTR Band <n> Offset	0079
XVTR Band <n> Power Out	0098
XVTR Band <n> R.F.	0077
XVTR OUT Test	0075

MO (Menu Open)

This command can be used to open the menu on the K4 LCD and set it to the specified menu entry.

SET format: MOiiii;   where iiii is the menu ID # to display on screen.
TOGGLE format: MO/; toggle menu display

NOTE: MO0255; will close the menu if displayed.

Display Commands

#AR (Auto-Ref Settings)

SET/RESP format (normal): #ARaadd+oom; where:
    aa = averaging constant (1 to 20)
    dd = debounce constant (4 to 9)
    +oo = user desired offset (+/- 8)
    m   = mode (1 for on, 0 for off)
SET format (special): #ARn; where n is:
    0 = Reset auto-ref settings (avg, trg, ofs) to defaults, preserve mode
    1 = Manually apply current auto-ref level (one-shot, preserve mode)
    9 = Reset auto-ref settings (avg, trg, ofs) to defaults; force ON
    A = set autoref on (AUTO)
    M = set autoref off (MAN)
    / = Toggle AUTO/MAN (on/off)

Examples: #AR1506+001; (aa = 15, dd = 6, ooo=0, m=1)
            #AR0906+081; (aa = 9, dd = 6, ooo=8, m=1)

#AVG (Averaging)

SET/RESP format: #AVGnn; where n is 01 to 20.

#CAL$ (Panadapter Reference Level Calibration)

    SET format: #CAL$-nn; where nn is the signal level being injected, typically -73 dBm.

    NOTE: Before using #CAL for the main RX, configure as follows:
        PREAMP OFF
        ATTENUATOR OFF
        SUB RX OFF
        SPAN > 20 kHz (suggest ~40 kHz)
    When calibrating the sub receiver, make sure main RX is on a different antenna.

    Calibration example (after verifying above configuration):
        #CAL-73;   (or injection level used; pause at least 1.5 seconds for convergence)
        To stop calibration: #CAL0;
    Calibration must be done per-band. #CALoffset will be sent to clients.
    The offset is automatically applied and only reported for informational purposes.

#CUR$n; (VFO Cursor Display Mode)

    NOTE: This is alias of #VFA and #VFB. See those commands for details.

#DSM (Display Mode, LCD)
#HDSM (Display Mode, External Monitor)
    Allows toggling spectrum and waterfall.
    SET/RESP format: #DSMn; where n is
        0 (spectrum only)
        1 (spectrum + waterfall)
        2 (spectrum + power)   TBD
        3 (spectrum + waterfall + power)   TBD
    TOGGLE format: #DSM/; (toggle between 0 and 1)

#DPM (Dual Panadapter Mode, LCD)
#HDPM (Dual Panadapter Mode, External Monitor)

    SET/RESP format: #DPMn; where n is:
        0 = Single Panadapter, VFO A/main RX
        1 = Single Panadapter, VFO B/sub RX
        2 = Dual Panadapter

#FPS (Desired Panadapter Frames Per Second)

SET/RESP format: #FPSnn; where n is 1 to 30*
NOTE: *Due to possible bandwidth limitations, the desired FPS may not be available.

#FRZ (Freeze Panadapter and Waterfall)

    SET/RESP format: #FRZn; where n is 0 (run) or 1 (freeze).
    Applies to both LCD and external monitor.

#FXA (DDC Fixed Tune Mode)

    SET/RESP format: #FXAn; where n is:
        0=FULL SPAN (P3)
        1=HALF SPAN (P3)
        2=SLIDE EDGE (P3)
        3=STATIC (P3)
        4=SLIDE NEAR EDGE (P4*)

    NOTE: Applies to both LCD and external monitor.

#FXT (DDC Fixed Tune toggle)

    SET/RESP format: #FXTn; where n is 0 (track) or 1 (fixed).
    Applies to both LCD and external monitor.

#MP$ (Mini-Pan Toggle)

    SET/RESP format: #MP$n; where n is 0 (off) to 1 (display)
    TOGGLE format: #MP$/;

    NOTE: A get response value of -1 means the mini-pan can not be turned on based on current radio settings.

#NBL$ (DDC Noise Blanker Level)

    SET/RESP format: #NBL$n; where n is 0 to 14.
    Applies to both LCD and external monitor.

#NB$ (DDC Noise Blanker toggle)

    SET/RESP format: #NB$n; where n is 0 (off), 1 (on), 2 (auto)
    Applies to both LCD and external monitor.

NOTE: 2 (auto) makes PAN NB on/off follow RADIO NB on/off; levels are still independent

#PKM (Panadapter Peak Mode)
    SET/RESP format: #PKMn; where n is 0 (off) or 1 (on).
    TOGGLE format: #PKM/;

#REF$ (Panadapter Reference Level, LCD)
#HREF$ (Panadapter Reference Level, External Monitor)

    SET/RESP format: #REF$n; where n is -200 to 60.

#SCL (Panadapter Scale)

    SET/RESP format: #SCLn; where n is 10 to 150.

#SFL (Spectrum Fill)

    SET/RESP format: #SFLn; where n is 0 (none) or 1 (fill)

#SPM (Span Adjust Mode)

    RESP format: #SPM0; (Always in continuous mode)

#SPN$ (Desired Span)

    *P3 incompatibility; TBD.
    SET/RESP format: #SPN$n; where n is 6000 to 368000.
    Applies to both LCD and external monitor.
    Examples: #SPN46125; (sets span to 46.125 kHz)
                #SPN46;   (sets span to 46.000 kHz)

#WBS (Waterfall Color Range, LCD)
#HWBS (Waterfall Color Range, External Monitor)

    SET/RESP format: #WBSn; where n is 5 to 30.

#WFC$ (LCD Waterfall Color Mode)
#HWFC (Waterfall Color Mode, External Monitor)

    SET/RESP format: #WFC$n; where n is:

0 (gray)
1 (color),
2 (teal tone),
3 (blue tone),
4 (sepia tone)

#WFH (Waterfall Height, LCD)
#HWFH (Waterfall Height, External Monitor)

    SET/RESP format: #WFHnnn; where nnn is 000 to 100 percent.
    TOGGLE format: #WHF/; (toggle between 0 and last value).

#VFA (VFO A Cursor Display Mode)

    SET/RESP format: #VFAn; where n is:
        0 = OFF: VFO cursor is not displayed
        1 = ON: VFO cursor is displayed always
        2 = AUTO: VFO cursor is automatically hidden in waterfall
        3 = HIDE: Do not show VFO cursor in waterfall
    TOGGLE format: #VFA/;

#VFB (VFO B Cursor Display mode)

    SET/RESP format: #VFBn; where n is 0-3 (see #VFA, above).
    TOGGLE format: #VFB/;

Pending Display Commands

    Panadapter Frequency Control (for P3 compatibility):

        #CTF$ (*See FI$ command and FC$ command as alternative)

    Panadapter Markers:

        #MFA (Marker Frequency)
        #MFB (Marker Frequency)
        #MKA (Marker Display Mode)
        #MKB (Marker Display Mode)
        #QSY (QSY to marker, support one-level undo)

P3 Commands Not Supported

The following P3 commands are not presently supported:

    #BMP, #BR, #ER, #EW, #FNL, #FNX, #FON, #LBL, #LD, #PS, #PT, #RCF, #RST
    #RVF, #RVM, #RVS, #SVDT, #SVEN, #SVFN, #SVRS
    #TP, #XCV

Static default responses for the above will be added as required to retain backward compatibility.

Remote Access Commands

These commands are used to configure and control a K4 used as a remote server radio.

CC (Remote Client Count)

> **SET/RESP format:** CPn; where n is >= 1 if the addressed radio is a server (with n clients connected), -1 if it is a client connected to a server, and 0 otherwise.

EM (Audio Encode Mode)

> **SET/RESP format:** EMn; where n is 0-3. Sets remote audio streaming data format:
>
>   EM0 Raw (uncompressed) 32-bit signed audio format (24 bits used)
>   EM1 Raw (uncompressed) 16-bit signed audio format
>   EM2 Opus-encoded, 16-bit samples
>   EM3 Opus-encoded, 32-bit samples
>
> **NOTE:** EM3 is the default and works well in all modes. Avoid using EM0 or EM1 except on a LAN due to their high bandwidth. EM1 also has reduced dynamic range.

KZL (Remote Paddle / Key-Down Initial Delay)

> **SET/RESP format**: KZLnnnn; where nnnn is 0 to 1000 ms. Default is 80 ms.

KZF (Remote Paddle / Key Fail-Safe Timeout)

> **SET/RESP format**: KZFnn; where nn is 1 to 10 minutes. Default is 3 minutes.

KZ (Remote Paddle / Key Data Stream)

    SET format: KZssss; where ssss consists of the following elements.
        . (paddle element dit)
        - (paddle element dah)
        Pnnnn where nnnn is 0000 to 2500 ms (paddle element pause)
        Unnnn where nnnn is 0000 to 2500 ms (key element up)
        Dnnnn where nnnn is 0000 to 2500 ms (key element down)

    EX: KZ-.-.P0080–.-; (CQ from paddle with 80ms gap between C and Q
    EX: KZD0000U0090; (Single DIT from key lasting 90ms)

RRT (Remote Connection Request)

    SET format: RRTipaddress:port?password;
    EX: RRT192.168.1.100:9204?mypassword;

    To disconnect, send RRN;

RRC (Allowed Remote Connections**)**

    SET/RESP format: RRCn; where n 0 to 4 is the allowed number of remote connections.
        A setting of 0 effectively disables remote connections.
    NOTE: This must be set to 1 or higher before remote connections are allowed.

RRP (Remote Connection Password**)**

    SET/RESP format: RRPsss; where sss is your password
    EX: RRPhelloworld; will set your password to "helloworld"
    NOTE: A password must be set before remote connections are allowed.

RS (Remote Set**)**

    SET/RESP format: RSn; where n is 0 (disabled) or 1 (enabled)
    TOGGLE format: RS/;
    NOTE: This command specifies whether certain commands that normally apply only to a client radio are also applied at the server radio (if applicable). For example, the AGnnn; command normally only applies to the client. With RS1; enabled, the AGnnn; command will apply at BOTH the client and server. *(Full list of applicable commands TBD.)*
    EX: To mute the local volume on the server radio from the client, use: RS1;AG000;RS0;

Change History

Rev. A1, Sept 5, 2020: Initial release with [Radio Commands](#) only.

Rev. A2, Sept 17, 2020: Added [Menu Access Commands](#) and [Display Commands](#).

Rev. A3, Nov. 12, 2020: Command definitions updated for consistency. Added preliminary [Streaming Data](#) section.

Rev. A4, Nov. 13, 2020: Fixed broken links. Removed deprecated **AR8**/**AR$8** option (RX ANT, main=sub). Completed switch ID table (**SW** command).

Rev. B1, Dec. 21, 2020: Minor text corrections.

Rev. B2, Jan. 13, 2021: Added **VT** command definition. Added **MS** and **LI** set-only extensions. Documented calibration steps needed for **#CAL**.

Rev. B2, Jan 31, 2021: Updated **SM** command definition. Updated **SMH** command definition. Added **SS** command definition. Updated **AP** command definition. Updated **#DPM** command definition. Added **MO** command definition.

Rev. B3, Feb. 25, 2021: Added note that manual notch applies only to CW and SSB modes. Added transverter band info to **BN** command. Added **XV** command (alternative means of selecting transverter bands).

Rev. B4, Mar. 2, 2021: Updated **OM** command. Now returns a '4' to ID a K4/D/HD. Added 'M' for

K4-Mini (K4/0). Removed 'R' (KREF4 is not an option).

Rev. B5, Mar. 9, 2021: Changed field <c> definition of **MS** command: PTT button disable is no longer available.

Rev. B6, Mar. 12, 2021: Power control range in mW mode (**PC**nnnX) is now 0.1-10.0 mW. Noted that the **AN** and **AR** commands apply only to HF-6 meter antenna selections. (On transverter bands, the selections are fixed; see commands for details.)

Rev. B7, Mar. 22, 2021: Added **PL** command, including tone number to Hz conversion table. Added **RP** command (repeater offset and mode).

Rev. B8, Apr. 12, 2021: Added **DM** command (DTMF).

Rev. B9, June 5, 2021: Corrected **FT**. Added **XV** commands.

Rev. B10, June 26, 2021: In **PK** command description, noted that multiple DTR sources can be used simultaneously.

Rev. B11, July 10, 2021: Completed description of **TD** command for CW mode.

Rev. B12, July 14, 2021: Updated **SW** command values. Added list of menu entries (see **ME** command).

Rev. B13, July 21, 2021: Corrected **ES** command description; applies to both SSB and ESSB.

Rev. B14, September 15, 2021: Corrected typo in **XT** command description (**XT1** is ON). Added **DO** command (DIGOUT1 state). Added full list of current **SW** commands (via N6TV). Completed documentation of RIT control commands (**RC$**, **RD$**, and **RU$**). Removed **Pending** status from the following command descriptions: **BG** (Bar Graph Read), **DR** (Data Rate), **LI** (Line Input), **LO** (Line Out), **LK** (VFO Lock), **LN** (VFO Link), **MS** (Mic Setup), **PO** (Power Output), and **TB** (Buffered Text).

Rev. B15, October 2, 2021: Added **BL** command description (balance control).

Rev. B16, November 5, 2021: Added alternative **NB** command format (**NBm**;) and note about panadapter AUTO noise blanker mode. Clarified behavior of **ID** command. Added **VO$** command.

Rev. C1, March 1, 2022: Added toggle format to **AG** command (use AG0; and AG/; to emulate mute/unmute). Added toggle and short formats to **BL** command (balance). Added band-stack recall format to **BN** command. Added **DA** command (digital audio record/play, including DVR functions). Added **DW** command (data TX bandwidth; applies to DATA and AFSK modes). Added **#PKM/** command (toggle panadapter peak mode).

Rev. C2, March 22, 2022: Added **PB** command (DVR playback). Added **VT$** command (VFO Tune Step). Added **#CUR$** command (VFO Cursor Display Mode). Added **#VFA/#VFB** toggle commands.

Rev. C3, May 16, 2022: The following commands have been added or modified:

> **DARC;** command added (clear DAP recording buffers)
> **DR$;** command added (data rate, e.g. RTTY 45/75 and PSK31/63)

PP command GET handler added (per-band power)
OV$; getter added (ADC/COR overflow)
#SPM; getter added (span adjust mode; always returns 0)
ES0; and **ES1;** getters added to get SSB and ESSB bandwidth
   without requiring a mode change

New toggle commands:
   #DSM/; #WFH/; #MP/; #VFA/; #VFB/; #CUR$/;
   #PKM/;

Rev. C5, September 15, 2022: Added **MX** command (audio mix). Clarified **TD** command settings by operating mode. Added new **#AR** settings (auto-REF controls). Added **EC** command (echo commands and ASCII-hex-encoded text strings to RS232 port).

Rev. C6, September 28, 2022: Updated **#FPS** and **#MP** commands descriptions.

Rev. C7, October 5, 2022: Added **LB** command (LPA bias calibration).

Rev. C8, October 6, 2022: Further clarification of **LB** command. Completed **EC** command description, including examples (external peripheral control, e.g. KPA1500).

Rev. C9, October 10, 2022: Added missing menu access command (VFO Coarse Tuning).

Rev. C10, November 3, 2022: Added **TQX** variation of **TQ** command.

Rev. C11, November 9, 2022: Added **VC** command (VFO coarse tuning, per-mode).

Rev. C12, November 19, 2022: Added new menu entries (107 up).

Rev. C13, June 27, 2023: Added **RD/RU** command alternate set formats **RD0nnnn;** / **RU0nnnn;** for direct Hz adjustment. **APF** command now has 3 settings: 30/50/150 Hz.

Rev. C14, July 17, 2023: Added **AG+** and **AG-**.

Rev. C15, September 8, 2023: Added or updated the following:

   EE0; -- Reset
   LK/; -- Toggle lock
   LOG; -- Capture Diagnostic Log
   ME0112; - TX Monitor Method (Voice)
   PCX; -- Returns current power setting in PC command format (equivalent to K41;PC;)

SP$3; -- Auto Spot on SubRx
VT$/; -- Toggle tuning step
VT$\; -- Toggle tuning step
DARS; (start AF REC)
TD$/; -- Toggle Text Decode On/Off)
BN$>; -- Alternate version of BN^;
AG$+nnn; -- AF gain increment/decrement
FC-250; -- Set center frequency with specified offset
MExx./; MExx.+/-; -- Toggle menu parameter value

Rev. D2, September 27, 2024: Extensive update related to first complete beta release that supports Remote operation. Also see release notes for R36.BETA3.

Rev. D3, October 1, 2024: Moved all remote access commands (**CC, KZ, SL, RR, RS**) to separate section.

Rev. D4, November 6, 2024: **RA$-/+;** form added (attenuation increment/decrement). Added missing items to menu entry list: Ext Monitor Location (0071), Mouse Pointer Size, LCD (0107), RX Audio Gain Boost (0113), and TX Monitor Level, Remote (0114).

Rev. D5, April 23, 2025: Added brief descriptions of data submodes (see **DT**). Added note to **RD** and **RU** commands (RIT up/down) about their use for control emulation (see **NOTE 3** at either command). Noted that **AL** command (audio limiter) may return ALn rather than ALnn if the returned value is < 10. **BR** (baud rate) command port mapping is now fully described. Added EM command description (streaming audio encode mode).

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