ELECRAFT KH1 PROGRAMMER'S REFERENCE

Rev. B2, January 30, 2026

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OVERVIEW

The KH1 supports 100% remote control. This feature is primarily intended for updating firmware, sending internal log information to a PC, and automated factory testing (see the Elecraft KH1 Alignment Manual for manual procedures). It can also be used to operate the radio using custom software, in applications ranging from “HF-Pack Lite” (radio in a pack), to SOTA self-ID via FT8 (see FT8 OPERATION), to putting the KH1 at an antenna feedpoint.

KH1 commands consist of one or two letters followed by zero or more parameters. There is some overlap with the command sets from other Elecraft transceivers, but the KH1 command set is more limited.

COMPUTER INTERFACE

The KH1 can be controlled through the KEY/DATA jack using a KXUSB cable and a terminal emulator or software application. *MENU:KEY JACK* must be set to RS232. The serial interface baud rate is 9600b (fixed).

When the KEY/DATA jack is being used for remote control, it is not available for use with a keyer paddle or hand key. However, there’s a host command (HK) that can be used to simulate CW keying, as if using a hand key. This is used during manual or factory alignment procedures, but it could be used for CW transmission, replacing the key or keyer paddle. The software application would be responsible for ASCII to CW translation and/or could provide a keying input device.

COMMAND TYPES

There are three categories of KH1 remote-control commands: UI emulation, ID/firmware load, and parametric. There's also a "help" command that lists available commands in terse form (H).

EMULATION: The EN (encoder), DS (display), HK (hand key), MN (menu), and SW (switch) commands emulate the UI, in a manner that is context-dependent, like the panel controls themselves. These commands can be used to access menu entries or emulate radio operation, in most cases providing a way to extend the radio's remote control capabilities in lieu of other specific parametric commands.

Examples: A GET of the filter number could be created using SW1H; (bring up RCVR functions) followed by DS1; (read line 1 of the display). A SET of filter number 2 could be effected by then sending SWT2;.

ID/FIRMWARE LOAD: This group includes I (rig ID), LD (firmware load), RV (firmware rev.), and SN (serial number). "I;" returns "KH1;" in the main app (upper case), while the boot loader responds to "I" with "kh1" (lower case). This allows KH1 Utility to tell whether it's talking to the boot loader or the main app. "RV;" returns "RVnn.nn;" (firmware revision). "LD;" initiates firmware loading and is only used by KH1 utility. SN can be used by anyone to get the serial number. It is used by the factory to set the serial number, which requires a non-public password.

PARAMETRIC: Commands such as AG (AF gain), MD (mode), and FA (frequency), behave like similar KX2 and KX3 commands. The FO (1-Hz frequency offset command) is a special case – see “FT8 OPERATION.” For most commands only SETs are provided. If required, a GET can be simulated by using a display read command (DS command). For example the operating frequency could be obtained by reading line 1 of the LCD.

FT8 OPERATION

The KH1 is a CW transceiver, with the addition of cross-mode SSB receive/CW transmit. However, it is possible to use the KH1 in FT8 mode, with some limitations. Transmitting in FT8 requires an external control device that sends frequency offset commands to the radio, properly timed. Receiving FT8 requires an external smart phone, tablet or computer that decodes FT8 signals via the radio's audio output.

One transmit-only application for FT8 with the KH1 is SOTA self-ID, e.g. using a third-party mechanism called SOTAmate. SOTAmate operation and use is beyond the scope of this document, but in simple terms it uses FT8 to send a "canned" message about the operator's current location (i.e., what SOTA peak they're on). A centralized server receives the messages and alerts potential "chasers." For this purpose, the KH1's FO command (1-Hz VFO offset) can be used with an external control device to send the equivalent of computer-generated FT8 tones.

Below are some general guidelines for those who wish to implement FT8 capability on the KH1, whether transmit-only or transceive.

Transmitting FT8

Since FT8 transmits one tone at a time, a class-C transmitter like that in the KH1 can be used. The KH1's **FO command** (see COMMAND LIST) can be used to move the VFO in 1-Hz increments from a base frequency. (FT8 specifies tones in 6.25-Hz increments, but quantization to the nearest 1 Hz has been proven to work as well.) Keying can be started/stopped using the **HK command**. Transmit timing (160 ms for each tone, and the time-syncronized TX window) is up to the external interface device, as is selection of where to put the VFO for FT8 use.

CAUTION: LOW POWER mode is suggested for FT8 to reduce the likelihood of the PA overheating. You can select low power mode for FT8 transmissions on the fly using the SW switch emulation command. Low power level is set to 2 W at the factory, but can be user-adjusted per-band (MENU:ADJ PWR; see owner's manual).

You can use the FO and HK commands in any mode. If an FO offset (00-98 Hz) is in effect, keying via HK1 or TUNE switch emulation outputs exactly the frequency shown on the VFO. Unlike the KH1's SSB RX/CW TX crossmode feature, when FO is in effect, there is no carrier frequency shift on TX. This shift is needed in the SSB crossmode case to ensure that SSB stations hear the KH1's signal. But when FO is used, we assume the radio is being used for FT8, not for CW-in-SSB. **NOTE:** If you do a TUNE (CW key-down) via switch emulation, you must exit via emulation of the "x" switch in the TX group, i.e. SW4T; (switch 4 tap).

Receiving FT8

An external phone/pad/computer or other device is required to decode FT8 signals via the KH1's audio output (speaker or PHONES jack). Presumably USB mode would be the best choice since that matches the mode used by most transceivers and software.

Even though SSB voice can be copied on the KH1, the crystal filter bandwidths are narrower than those typically used for copying the entire 4 kHz span occupied by FT8 signals. The external software application may need to constrain the VFO to a specific, narrow range for a given QSO.

COMMAND LIST

All commands and responses are terminated by a semicolon.

AG (AF Gain; SET only)

FORMAT: AGnn; where <nn> is 00-30
NOTE1: The AF gain value is stored separately for phones and speaker.
NOTE2: AF gain can be incremented/decremented using the ENAU/ENAD commands.

DS (Display Text; GET/SET)

FORMAT: DSls; where:
<l> = '1' (line 1, or upper row) or '2' (line 2, or lower row)
<s> = Up to 16-char string (string is returned for GET, and supplied for SET)
NOTE1: The DS SET string is flashed for about 1.5 seconds. Use subsequent DS SETs to keep the flashed string on the display longer.
NOTE2: The LCD supports 8 special characters, some of which change depending on the radio's operational context. For a GET, the host app must translate these to suitable characters within the host's display environment. For a SET, the host app must embed low-hex ASCII values for special characters that make sense in the KH1's context. List of characters and contexts TBD.

EN (Encoder Emulation; SET only)

FORMAT: ENed; where:
<e> = encoder: 'A' (AF gain) or 'V' (VFO)
<d> = direction: 'U' (up/clockwise) or 'D' (down/counter-clockwise)

FA (VFO Frequency; SET only)

FORMAT: FAf; where <f> is in 10 Hz units (e.g. 1400000 = 14000.00 kHz)

FO (1-Hz Frequency Offset; SET only)

FORMAT: FOnn; where <nn> is 00-99. Values from 00-98 are applied as positive offsets, in Hz, from the original VFO frequency; this is intended for use with FT8 transmit (see FT8 OPERATION). Sending 00-98 also puts the VFO display into 1-Hz format as a reminder that this is in effect. If <nn> = 99, the offset is removed and the display returns to the original format.

H (Help; GET only)

FORMAT: H; Responds with terse help information.

HK (Hand-Key Emulation; SET only)

FORMAT: HKm; where m == 1 for key-down, and 0 for key-up. This command is especially useful for starting and stopping transmit when sending FT8 messages.

NOTE: If you use SW to emulate TUNE (transmit key-down), exit TUNE using SW4T; ("x" switch tap) rather than HK0.

I (ID; GET only)

FORMAT: I; Responds with "KH1;".
NOTE: If the radio is in the boot loader, it responds to "I" with "kh1".

LD (Firmware Load; SET only)

FORMAT: LD; Jumps to boot loader.

LG (Log Dump; SET only)

FORMAT: LGn; where n = 0 (dump), 1 (stop), 2 (continue), 3 (erase).
LOG DUMP OUTPUT: The log dump includes the following entities:
Upper-case text (transmitted)
Lower-case test (sent by the operator in TX TEST mode, e.g. for QSO notations)
Time stamps: <CR/LF>{YYMMDD-HHMM-BBMM} (date, time, band/mode)
Message play tag: [Mn] where n is 1-6
NOTE 1: Time stamps are sent once per minute while sending.
NOTE 2: During dumps, no GET commands should be sent to the KH1, as the results will end up embedded in the log text stream. SETs are OK (e.g., LG1/LG2 to stop/continue a dump).
NOTE 3: Uppercase log text was transmitted. Lowercase log text was entered as a NOTE (i.e. after tapping MSG) or during TX TEST mode.
NOTE 4: Dump and Erase can also be accomplished using the KH1's LOGGING menu entry.

MD (Operating Mode; SET only)

FORMAT: MDn; where n = 0 (CW), 1 (LSB), 2 (USB), 4 (RTTY).
NOTE: In SSB modes, the KH1 operates cross-mode (CW transmit, SSB receive). SSB receiving operarators hear the KH1's CW at a 700 Hz pitch.

MN (Menu Open by Name; SET only)

FORMAT: MNsss; where <sss> is a short-form menu ID string. See list below. The target menu entry is unlocked if applicable. The menu can be exited by emulating a tap of the [x] field for the given menu entry. In most cases this is switch 4, so: "SW4T;".
NOTE 1: These 3-characters ID strings are also used to identify programmable switch functions in the associated PFn display fields.
NOTE 2: Some menu parameters can be changed using the **MP** command (see below).

ID	MENU ENTRY	USABLE WITH MP COMMAND
AGC	ADJ AGC V	
BFO	ADJ BFO	
BIA	ADJ BIAS	
BPF	ADJ BPF	YES

DAY	ADJ DATE	
OSC	ADJ OSCID	
PWR	ADJ PWR	YES
REF	ADJ REF	
RTC	ADJ RTC	
SMT	ADJ SMTR	
SWR	ADJ SWR	
TIM	ADJ TIME	
WTM	ADJ WMTR	
ATM	ATU MODE	
ATP	ATU PARAM	
DSP	DISP MODE	
EE	EE INIT	
F/W	FIRMWARE	
IAM	KEY IAMB	
PDL	KEY JACK	
WGT	KEY WGHT	
LOG	LOGGING	
RPT	MSG RPT	
PAN	PAN MODE	
SPN	PAN SPAN	
THR	PAN THR	
PF1	PF1 FUNC	
PF2	PF2 FUNC	
PF3	PF3 FUNC	
QSK	QSK DELAY	
CLR	RIT CLEAR	
S/N	SERIAL NR	
SWT	SW TONES	
TXT	TEXT DEC	
VBT	VBAT	
FST	VFO FAST	

MP (Menu Parameter; GET/SET)

FORMAT: MPnnn; where <nnn> is a decimal value from 0-999.
This command must be preceeded by an MN command that opens an applicable entry (it will be unlocked). These menu entries include ADJ BPF and ADJ PWR.

RV (Firmware Revision; GET only)

FORMAT: RV; Response format: "RVxx.xx;".

SN (Serial Number; GET only)

FORMAT: SN; Response format: “SNnnnnn;”.

ST (Status; GET only)

FORMAT: ST; Response format: “STnsa;” where:
<n> = # of self-test errors since power-up
<s> = “S” if this unit has an assigned serial number, otherwise “s” (lower-case)
<a> = “A” if an ATU module is found, otherwise “a” (lower-case)
NOTE: The ATU presence test is independent of the MENU:ATU MODE setting.

SW (Switch Emulation; SET only)

FORMAT: SWnt; where:
<n> = '1'-'4' (regular pushbutton switches) or '5'-'6' (encoder switches)
<t> = 'T' (tap) or 'H' (hold)
NOTE: If you emulate TUNE (key-down), exit by sending SW4T; (“x” tap), not HK0.

TXL/TXH (Transmit Limits; GET only)

FORMAT: TXLn; or TXHn; where “L” returns lower limit, “H” returns upper limit,
and <n> is 0..4 for 40..15 meters. Reponse: TXLnFFFFF; where FFFFF is limit in kHz.
NOTE: TX limits are set for the user’s country of operation at the factory.

CHANGE HISTORY

Rev. A, Oct. 9, 2023: Added **MP** command.

Rev. A1, Oct. 27, 2023: Added **ST** and **TXL**/**TXH** commands.

Rev. A2, Dec. 14, 2023: Changed short-hand notation for ADJ DATE menu entry to “DAY” (was “DAT”). Added **LG** command (log dump).

Rev. A3, June 5, 2025: Added QSK DELAY to **MN** command list.

Rev. B1, Nov. 24, 2025: Added section on FT8. Added **FO** (1-Hz frequency offset) to command list. The FO command is available in rev. 1.27 or later firmware.