

DESIGNING THE ELECRAFT KH1: FROM VISION TO REALITY

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N6KR





Special thanks to:

Rob Capon, W3DX (field operations)

Fred, KT5X (SOTA logging concepts)

Steve, WG0AT (field testing)

Rich Heineck, AC7MA (KH1 PCBs)



“If there is a place,
and you can get to
it, you must **operate**
from there.”

Adrian Weiss,
WORSP



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THE INVISIBLE ~~RIG~~ STATION:

- INTEGRATION
- MINIATURIZATION
- ALL-TERRAIN UI
- FIELD LOGGING
- ANTENNAS



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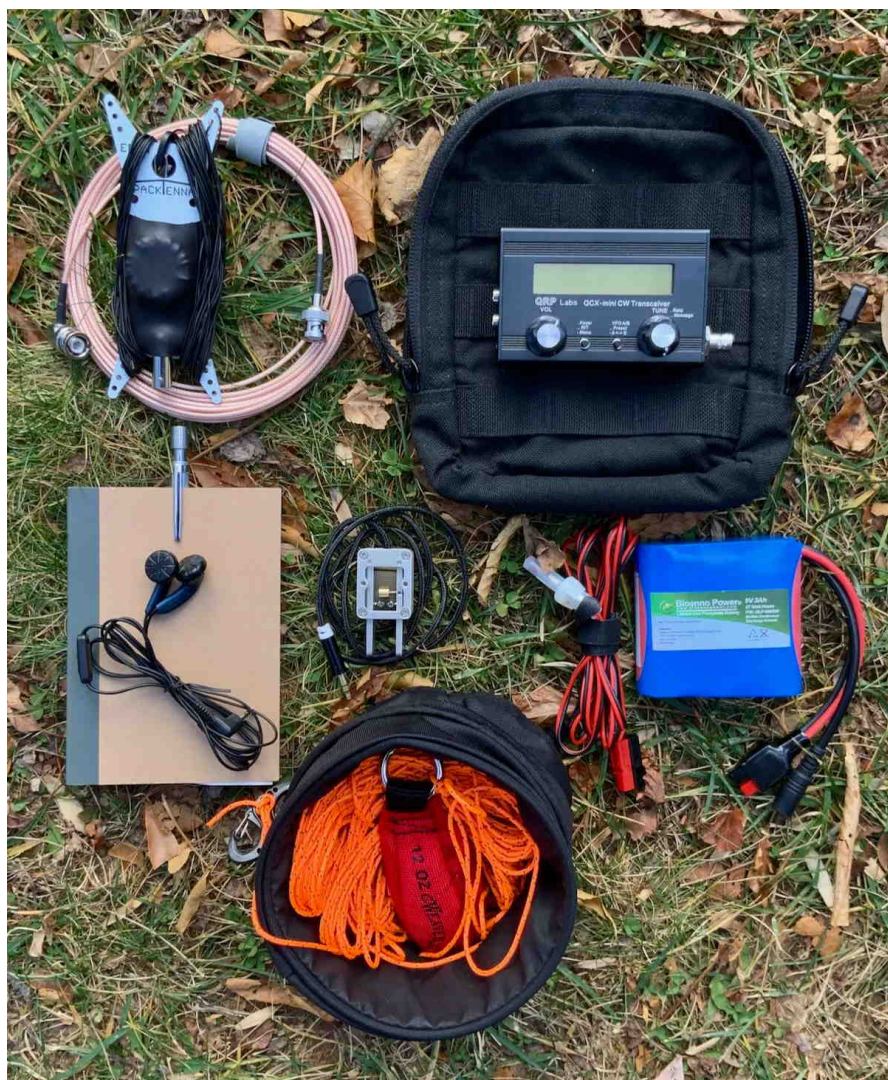
COUNTEREXAMPLES

The following collections of portable gear show what is often taken on a field outing.

(The objective of the KH1 is to eliminate 90% of it. The result is a pocket-sized, 5-band CW station with ATU, battery, whip, paddle and folding log tray.)



————— **E L E C R A F T** —————







CW HTs



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Why hand-held? There isn't always a place to sit:

- Ants, spiders, ticks
- Puddles, mud, snow
- Tall weeds and thorns
- Sharp rocks



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Why CW?

- High S/N ratio vs. SSB
- Used for majority of HF SOTA contacts; popular for POTA
- Vs. data modes: simpler UI
 - and no computer needed



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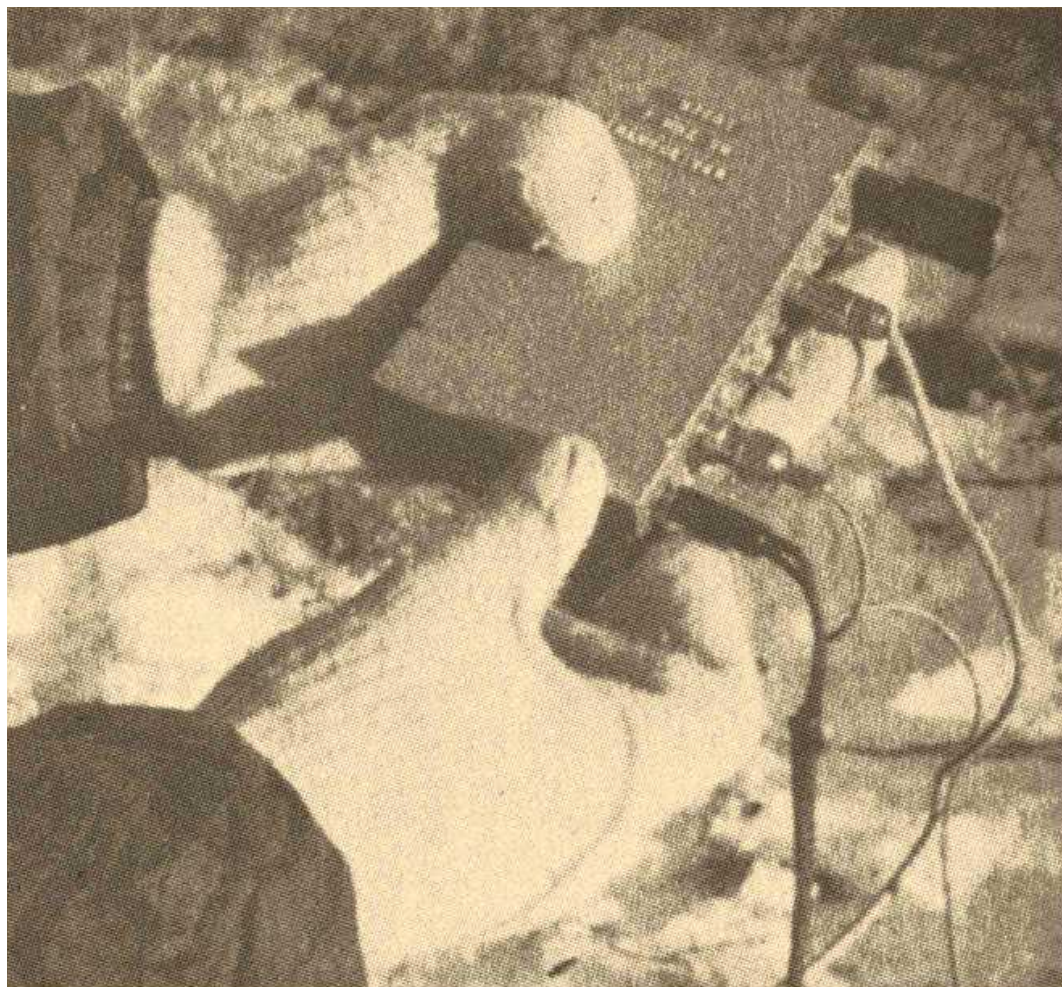


CW HTs

The following slides show examples of CW HTs that provided inspiration for the refinements embodied in the KH1.



————— **E L E C R A F T** —————



Micro- Mountaineer, W7ZOI, 1970

40 m, 0.5 watts,
pushbutton key,
crystal control



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Koala, N6KR,
1995

40 m, 0.5 watts,
alkaline 9V x2,
keyer, VCXO



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Elecraft
KX1,
2003



KX1

40/20 m

Up to 4 watts

Angled paddle

DDS synthesizer

Narrow-range ATU



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Elecraft KX2, 2016



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KX2: 1.5 x 2.8 x 5.8”
22 oz. with battery

80-10 m + SWL, SDR

All modes

2.6 Ah battery/charger

Wide-range ATU

Built-in Mic

Side-mounted paddle



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KX2 in
Action,
Sierra
Buttes



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KH1

(H = Hand-Held)



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KH1 Form-Factor:

HT size & weight

Paddle plugs in
between knobs

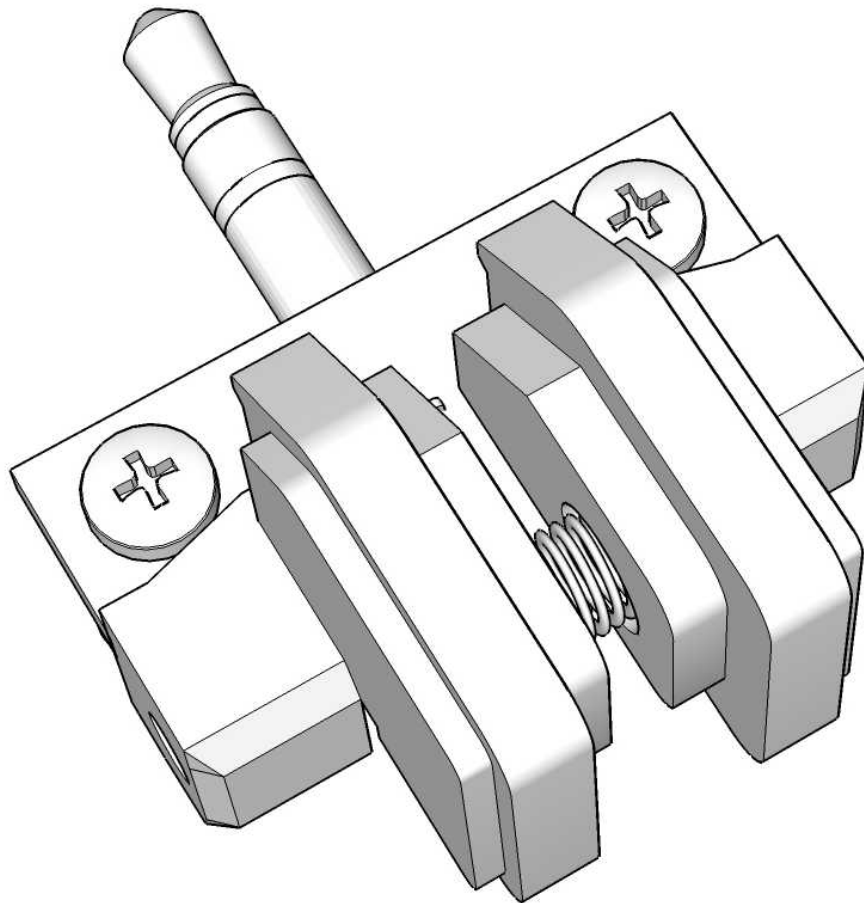


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1.2 x 2.3 x 4.4”
12 oz. with battery

- 40/30/20/17/15 m + SWL
- Low-current superhet
- CW (+SSB cross-mode)
- 2.6 Ah battery / charger
- Medium-range ATU
- Bottom-mounted paddle
- Built-in whip loading coil



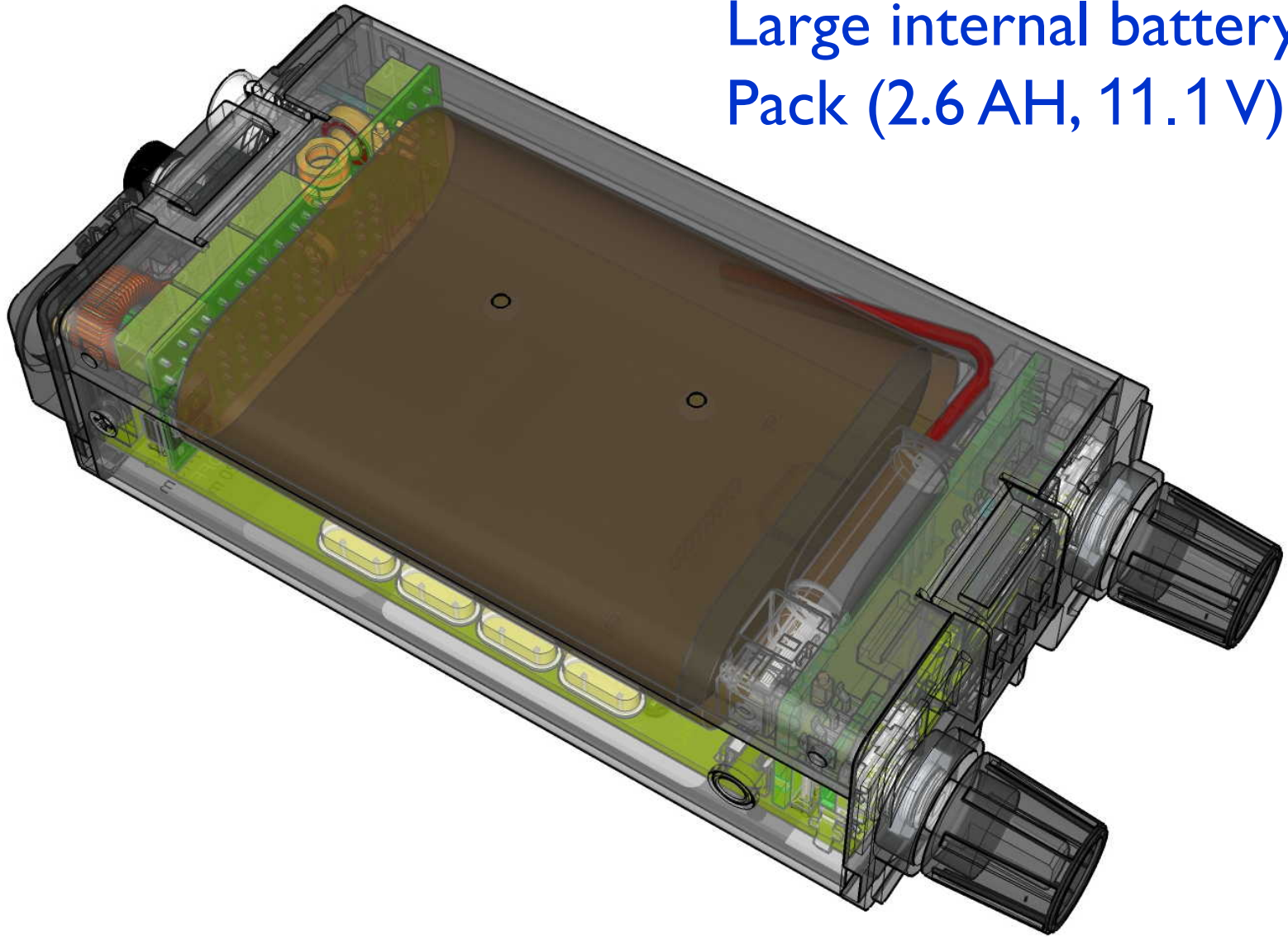
Plug-in keyer paddle

- Ultralight
- Flips down for storage/transport
- Adjustable contact spacing & stop distance



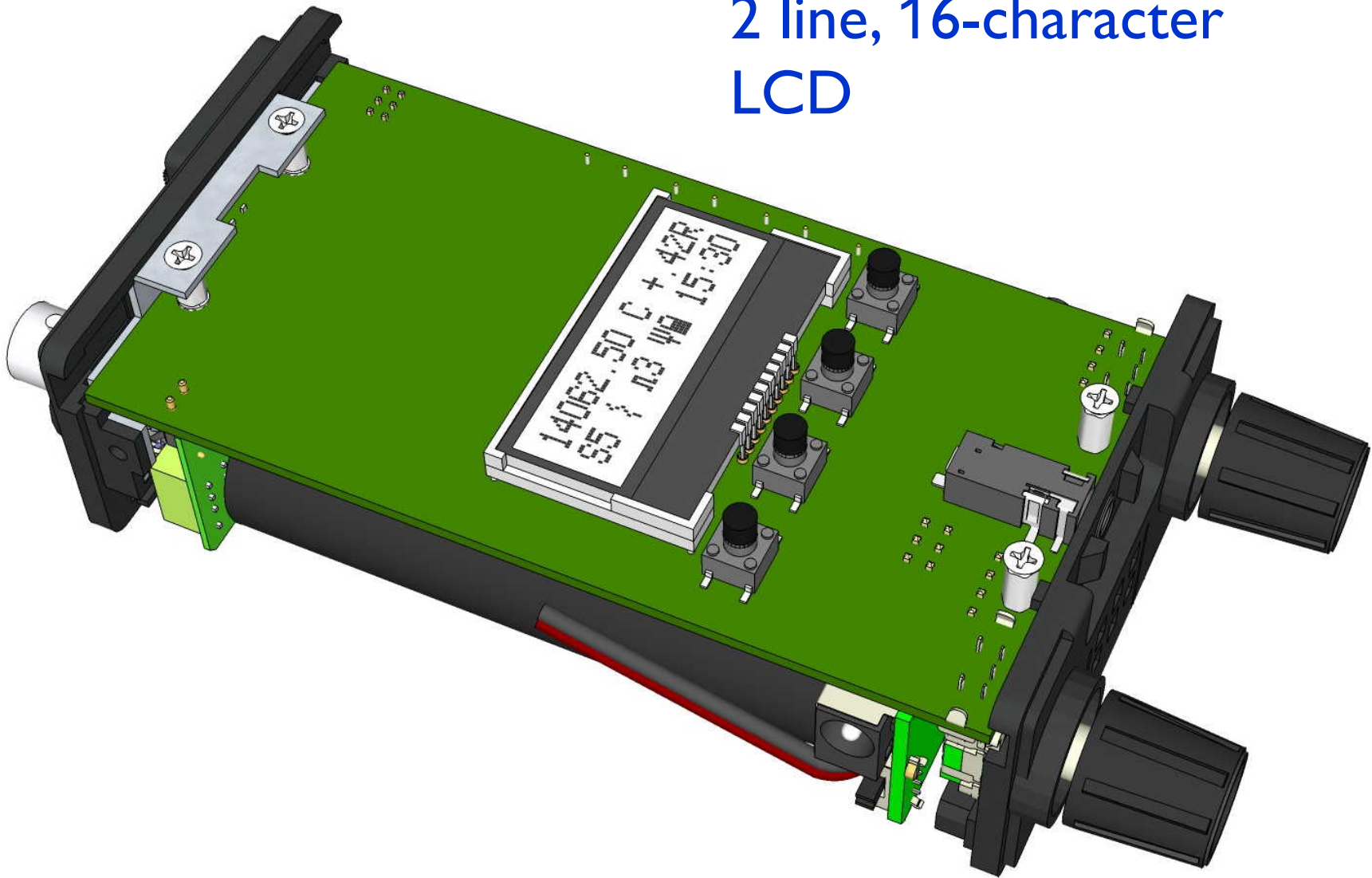
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Large internal battery
Pack (2.6 AH, 11.1 V)

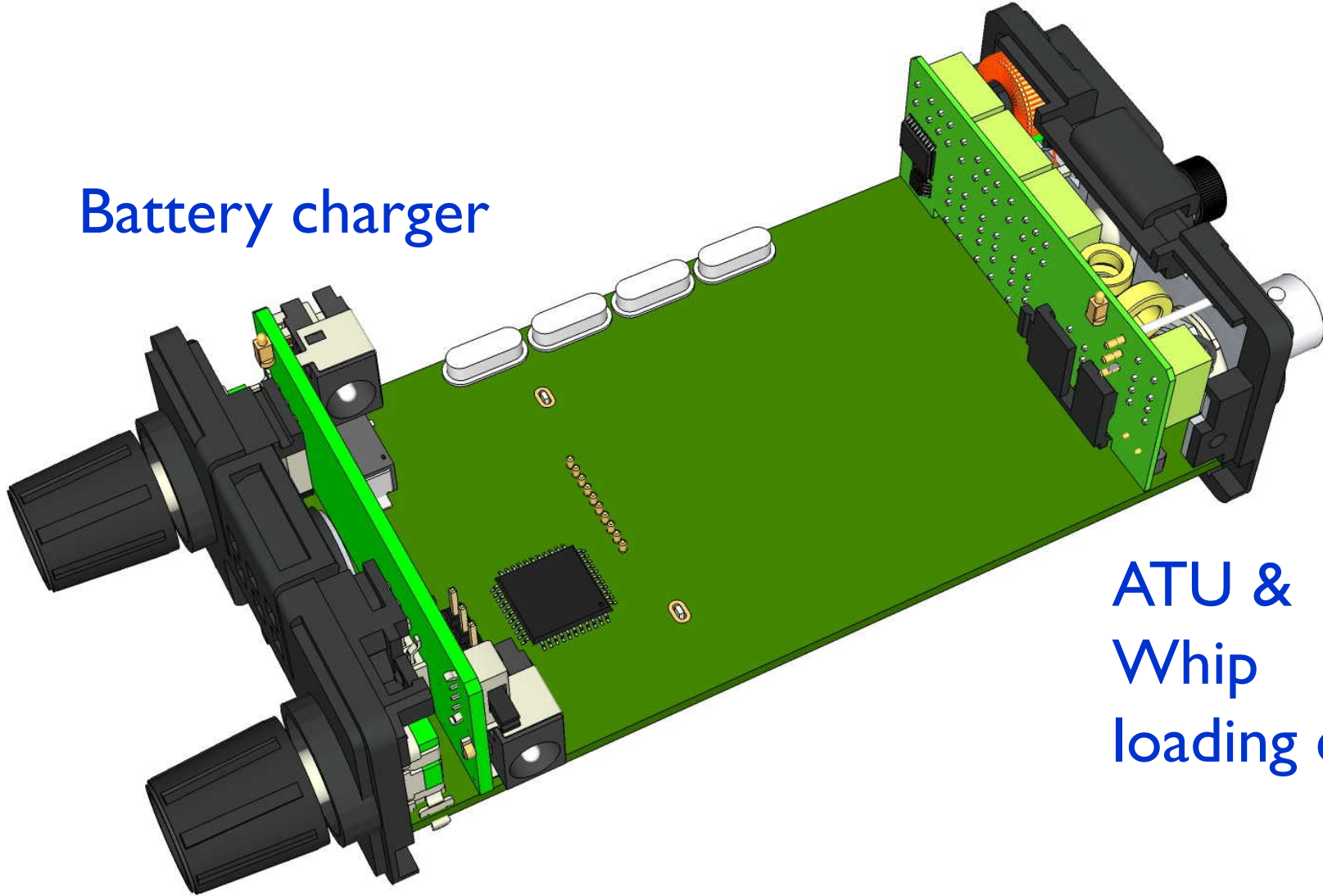


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2 line, 16-character
LCD



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Battery charger

ATU &
Whip
loading coil



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FEATURES FOR FIELD OPS:

- Quick keyer speed change
- 6 messages; 50Kb log (EEPROM)
- Speaker or phones
- Scan/mini-pan for signal searching
- RIT and XIT



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Close-up of
normal
operating
display

4-switch UI
is intuitive,
easy to use





LOGGING

Portable/SOTA operators have created many clever schemes for paper logging.

A major KH1 design goal was to optimize the paper log for small size and easy of use. A real-time clock and electronic logging (to EEPROM) are also provided.



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Very early KH1
logging concept



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Another logging idea,
lacking in elegance



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Log tray:

120 QSOs

Mini-pen

+RTC, CW

Decoder,

& large

EEPROM



Log tray
stored:

Protects
front panel
Operation
still possible



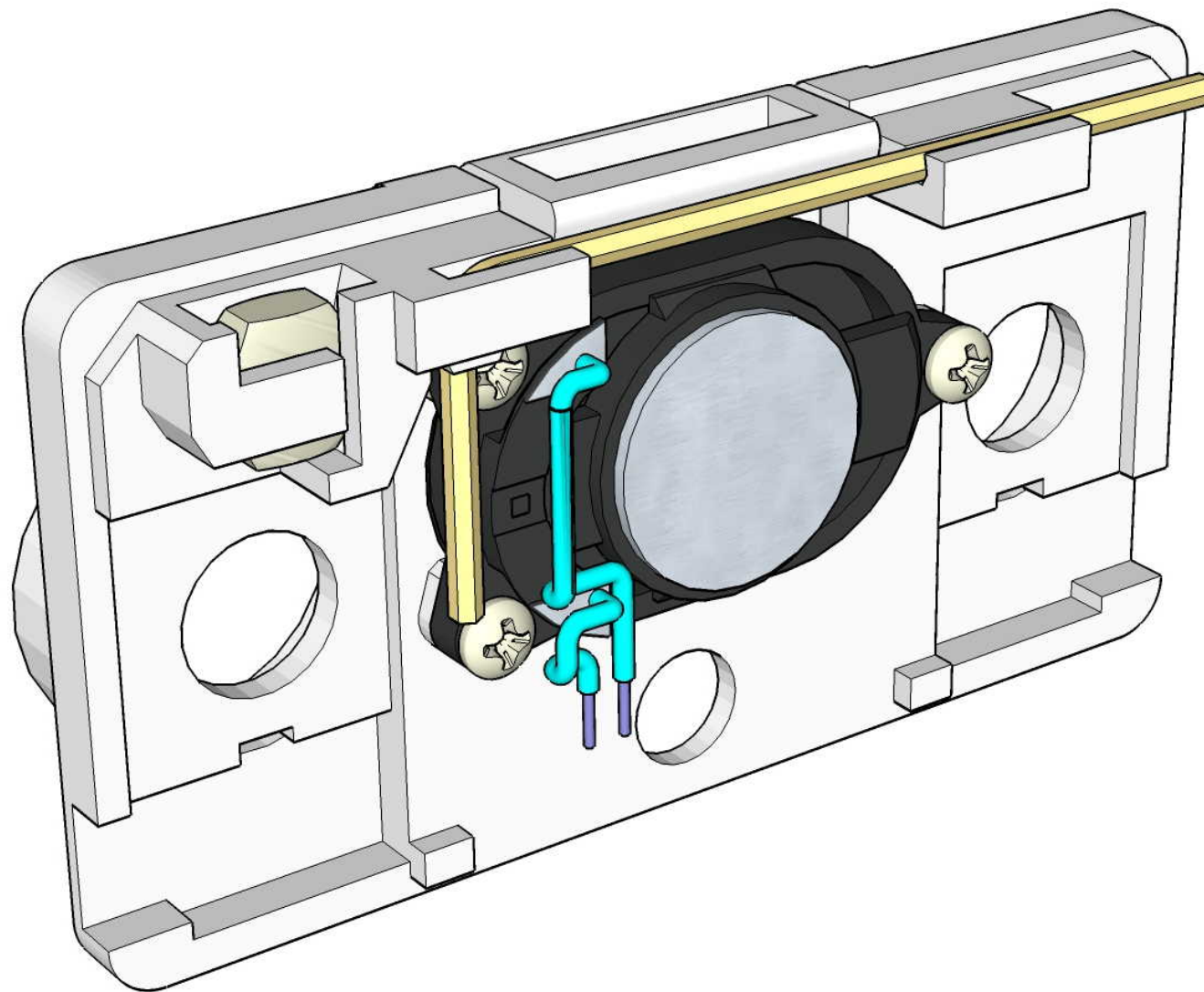
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3D MODELING / PRINTING



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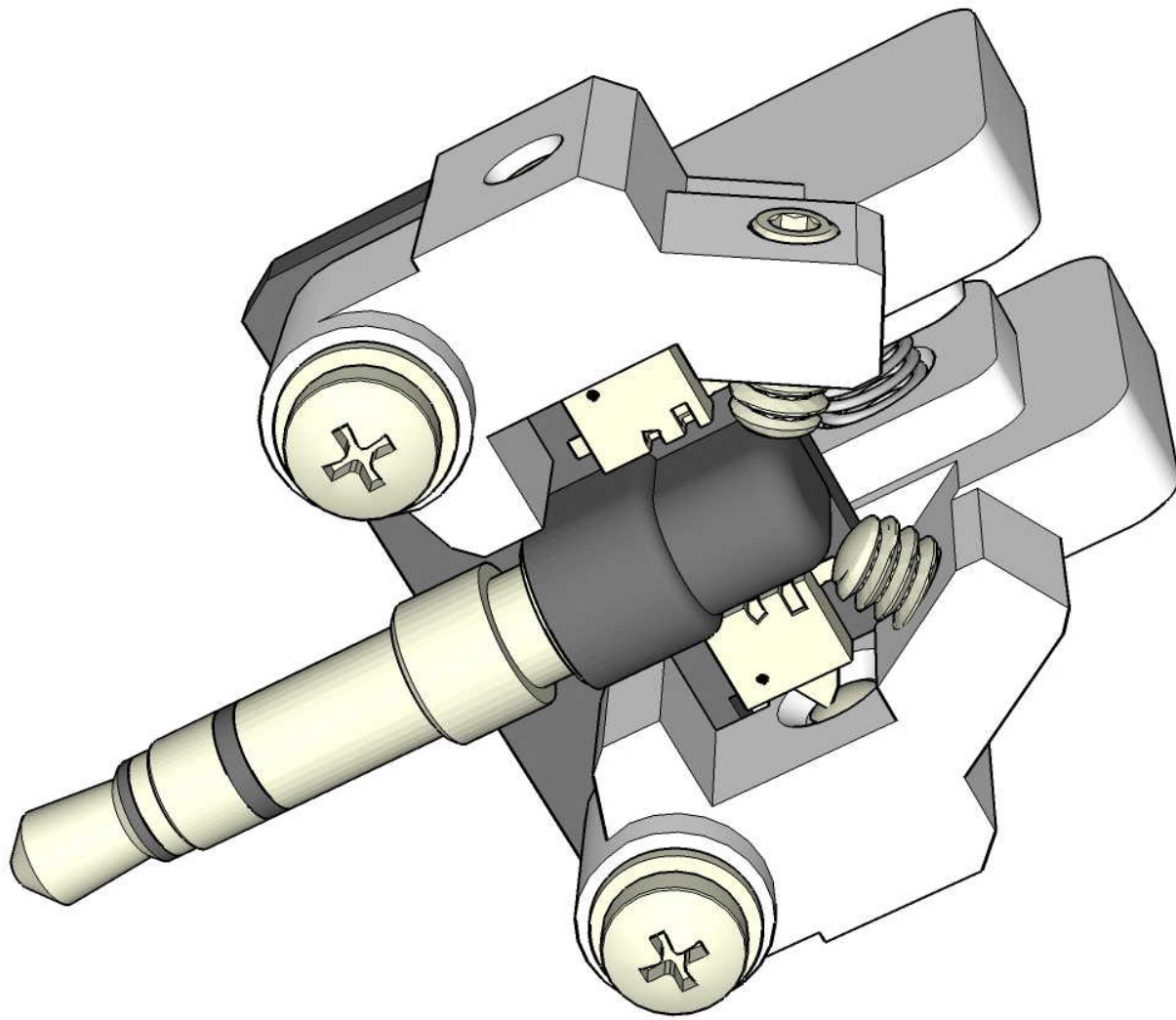


Most KH1
3D-printed
parts serve
multiple
functions

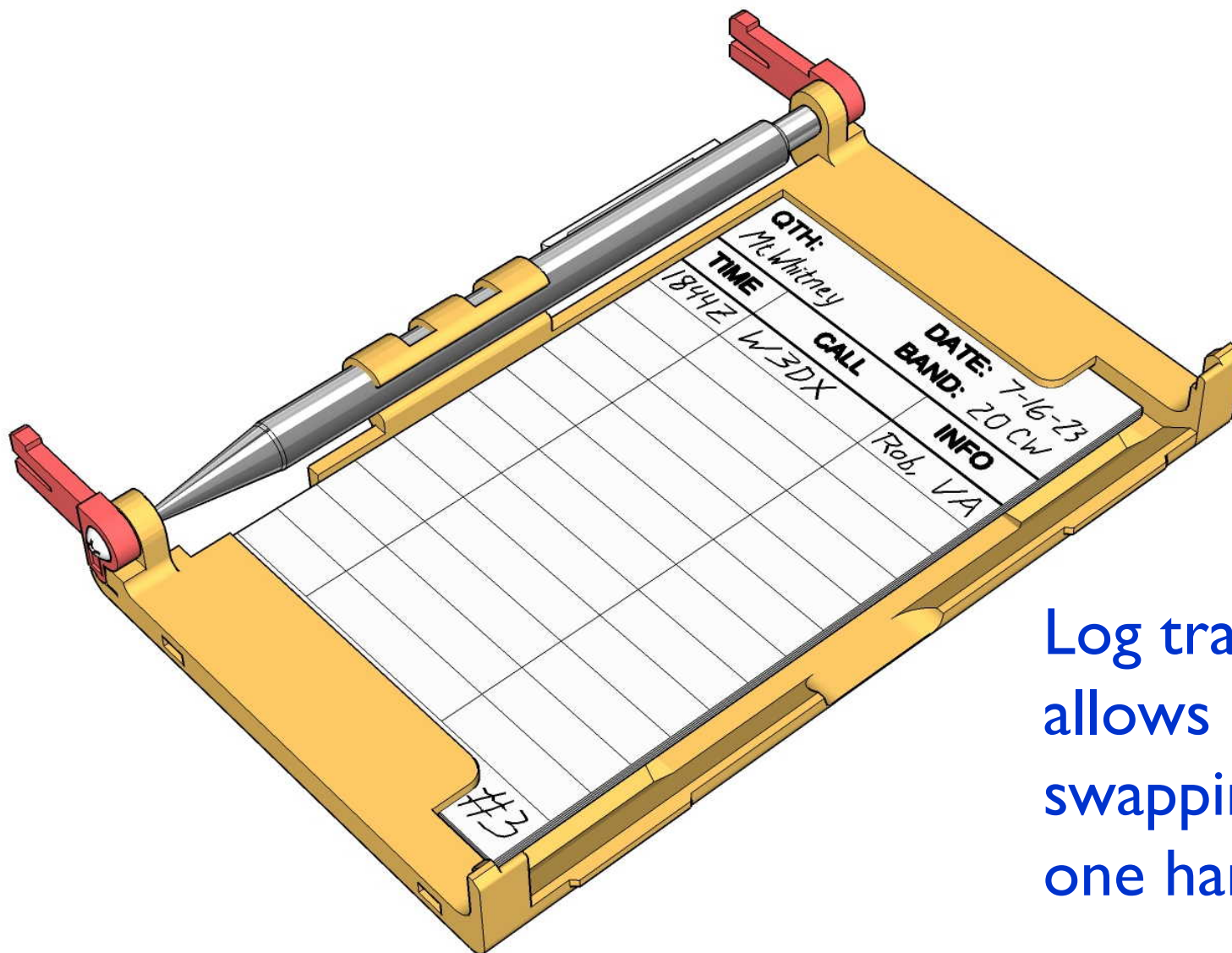
The lower
end panel
holds the
speaker,
paddle
wrench, and
spare
ground nut



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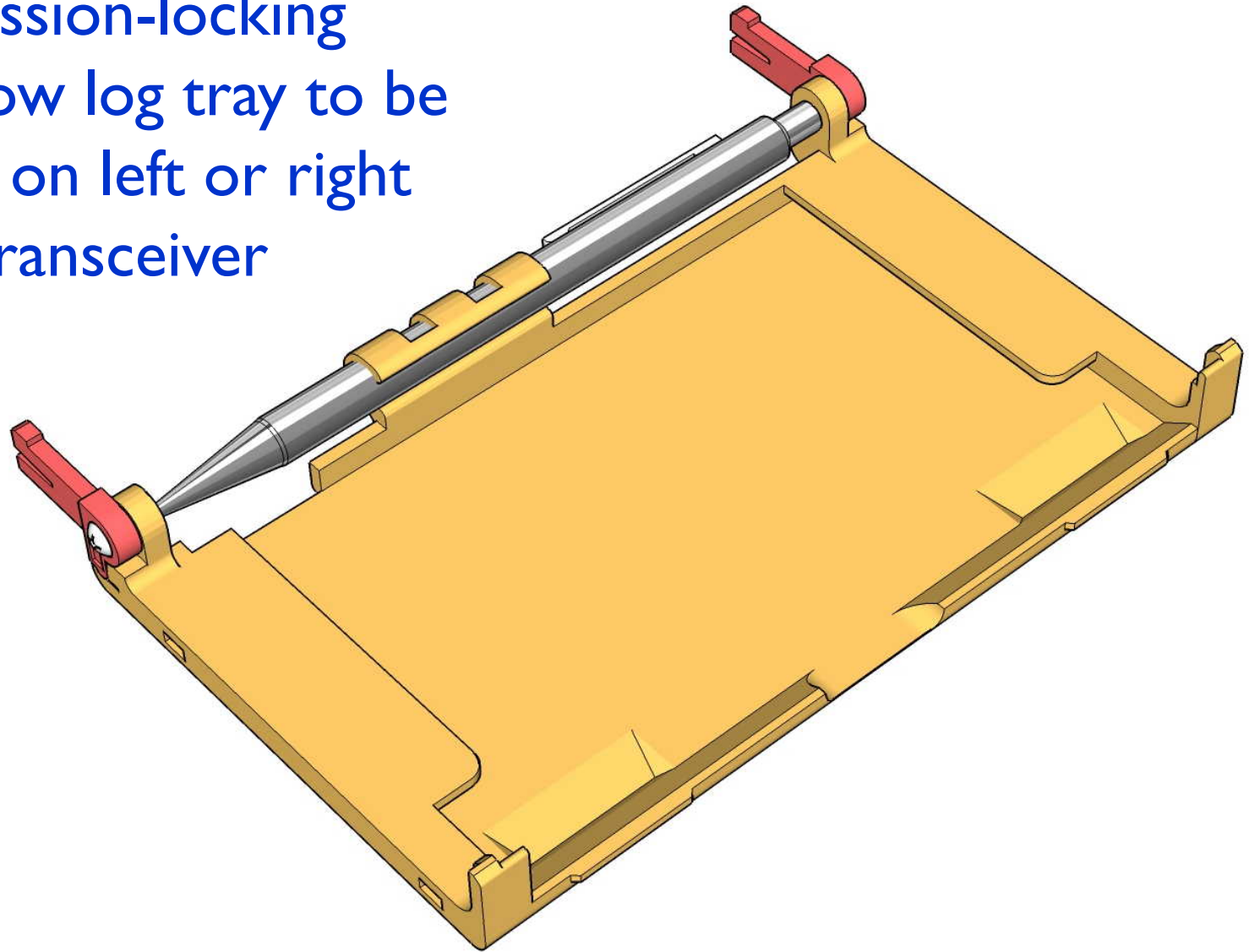


Log tray design
allows log sheet
swapping with
one hand



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Compression-locking
arms allow log tray to be
installed on left or right
side of transceiver



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ES20 custom
carrying case –
also designed
using 3D
modeling



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ANTENNAS

Many portable antenna solutions are possible, as illustrated by the following images.

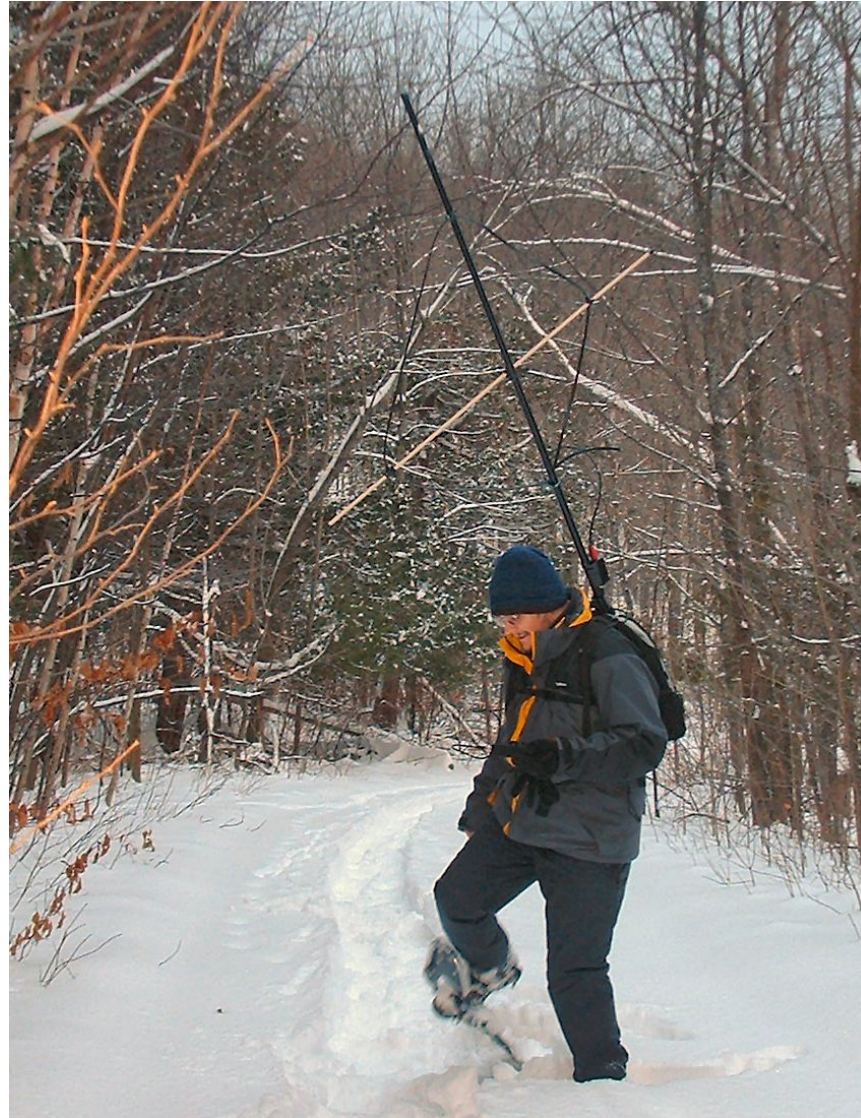
The KH1 works with BNC-fitted whips or other conventional antennas. But it also has a built-in loading coil covering 20/17/15 meters with a 48" ultralight telescoping whip that collapses to only 6". The whip can be clipped to the side of the radio during transport.



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Elecraft BNC-fitted whips

< AX1

< AX2



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KX2 with
AX1 20/17 m
whip



2 Ant. connectors:
BNC & whip post

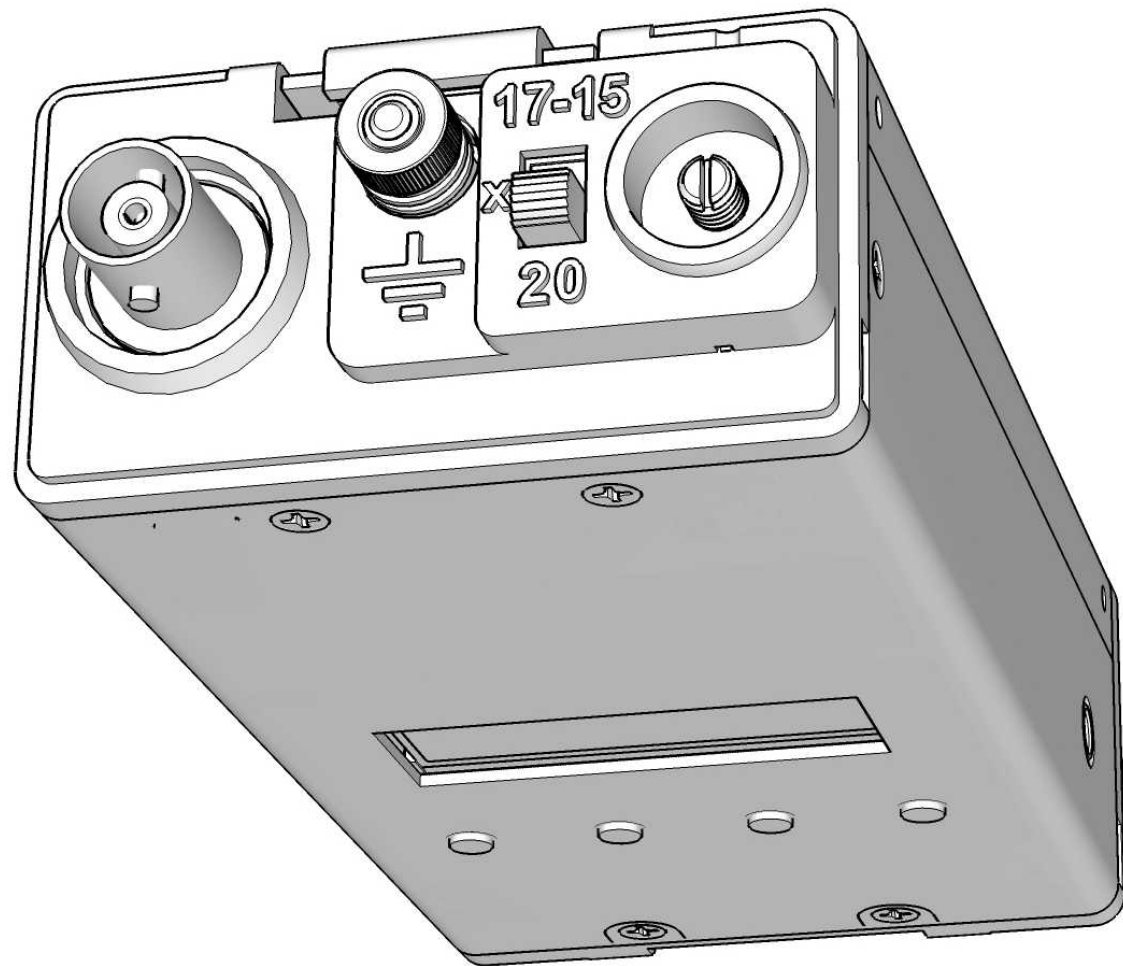
Built-in loading coil
for 20/17/15 m

ATU works with
BNC and whip

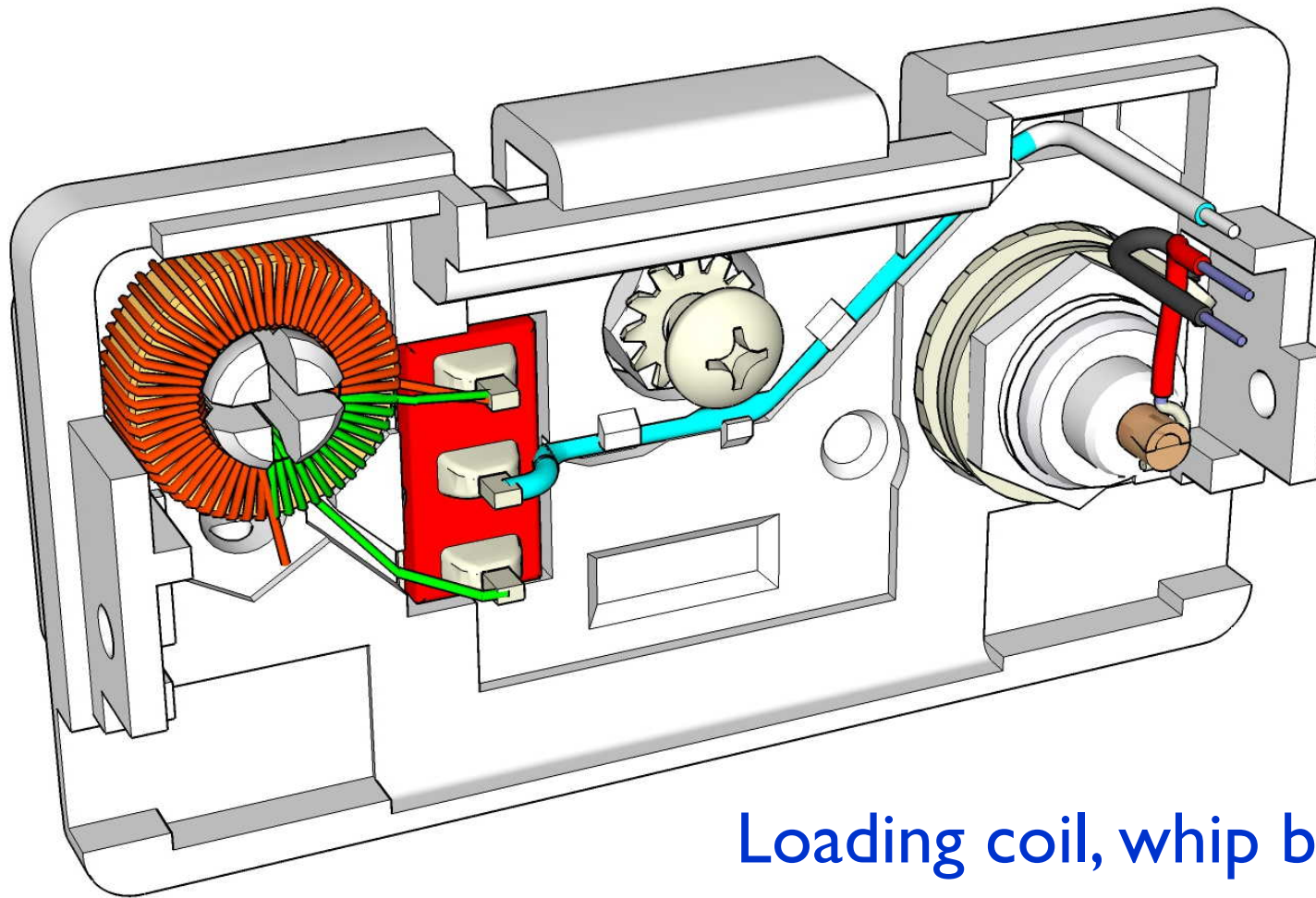
Whip clips to side



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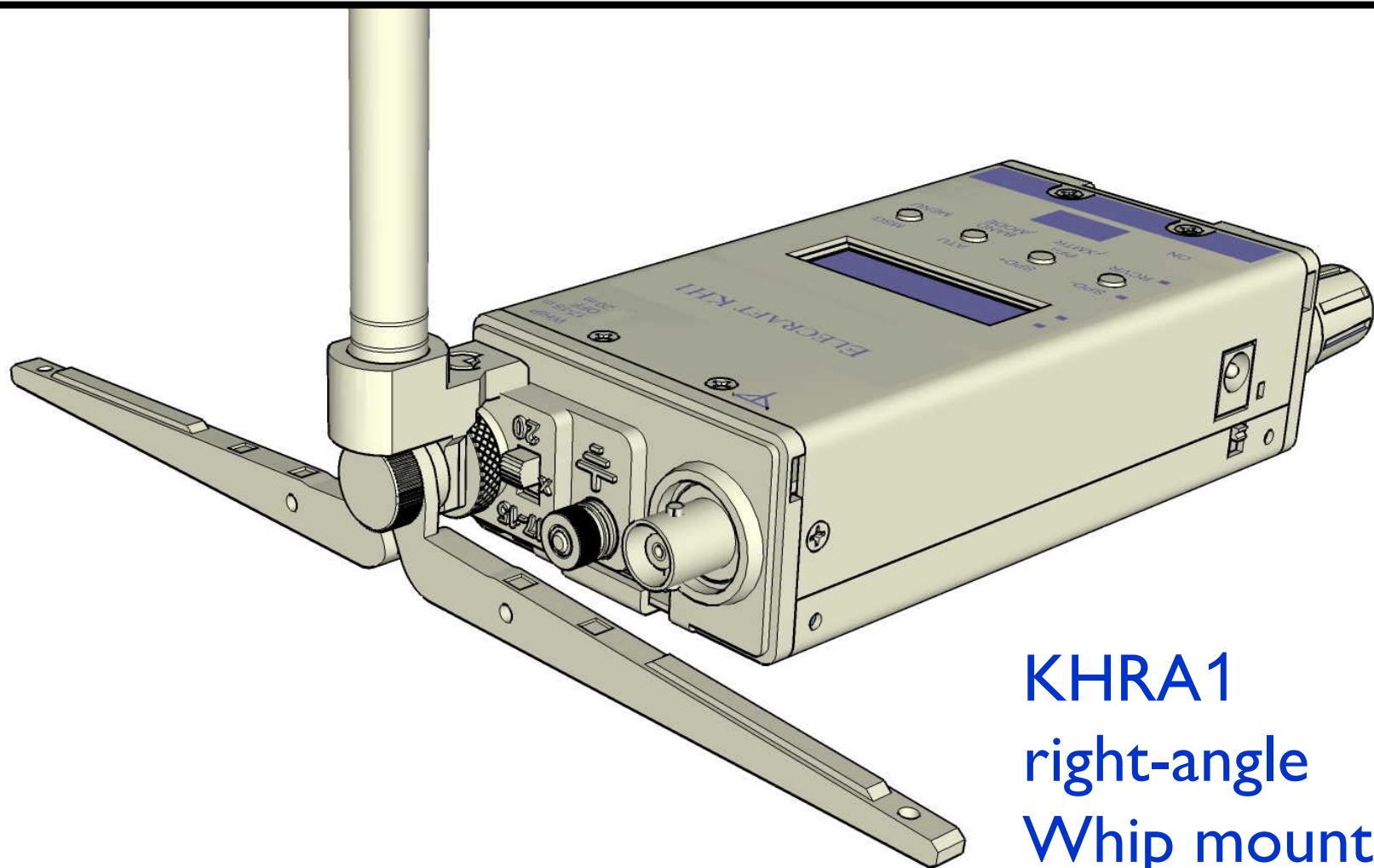
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Loading coil, whip band switch,
ground screw, and BNC



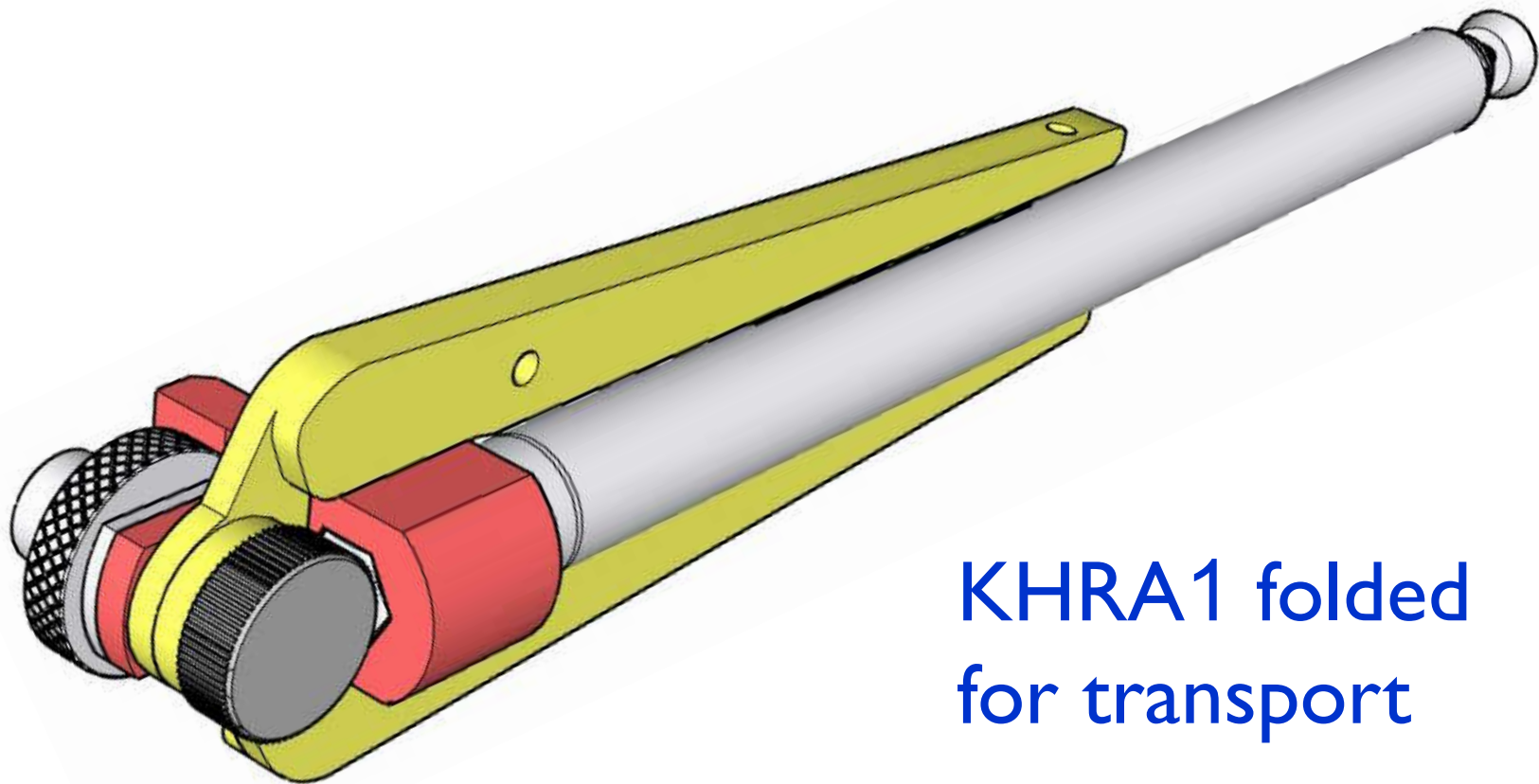
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KHRA1
right-angle
Whip mount



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KHRA1 folded
for transport



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Making contacts with a whip:

- Always use a counterpoise wire
- Work louder stations first
- Take advantage of contests (CWT, WPX, CQ DX, ARRL DX, etc.)



————— **E L E C R A F T** —————



Steve (WG0AT),
Santa Cruz with
early production
KH1



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