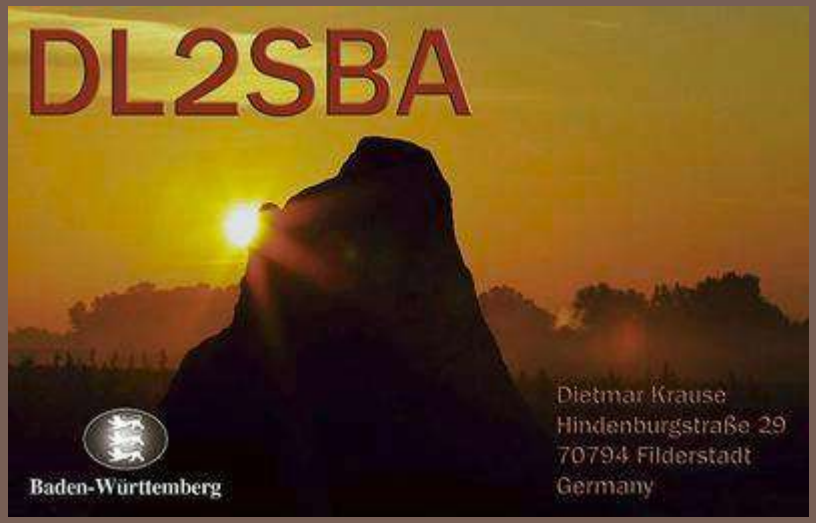



# HAMWARETUNER AT-502/AT-515 NEW FIRMWARE

01. Dec. 2012

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# hamware Tuner

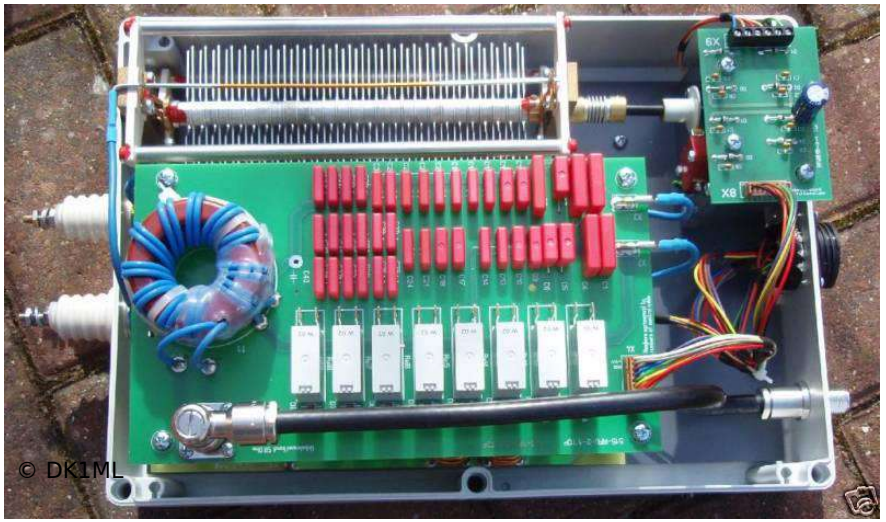


© DL5AI

AT-502

AT-515


© DL2SBA


© DK1ML

# hamware - Tuner

- AT-502 200W 160m-10m
  - Input-C 256 steps
  - Inductance 32/64 steps
  - output-C 256 steps
- AT-515 600W 160-10m
  - Input-C 256 steps
  - Inductance 32 steps
  - Output-C 200 steps (rotary capacitor)
- AT-615B/U
  - Very similar to AT-515
  - Additional control of the keying line

# New firmware - Why ?

- Original firmware hamware
  - Manual tuning via rotary encoder
  - Tuning by measuring the transmit frequency
  - Shoddy implementation

- New firmware DL2SBA
  - Manual tuning via rotary encoder
  - Tuning by reading the transceiver interface

  - Complete reimplementation with WINAVR

# New firmware for AT-502

- Tuning the tuner without transmitting by 'reading' the transceiver interface
  - → Transceiver must provide data on its own
- rotary encoders work
  - → jerkiness, skipping fixed
- Support for old (127-L) and new (64-L + antenna switch) tuner version
- 4 parameters for configuration
- Memory between bands
- Additional control outputs for 160m/80m
- Comprehensive manual for download

# New firmware for AT-515

- How AT-502

× Expansion of memory to the low bands (10kHz/160m, 15kHz/80m)

× Individual customization of control to stepper hardware possible

× Auto-recalibration for stepper configurable

× 13 parameters for configuration

# New firmware - display

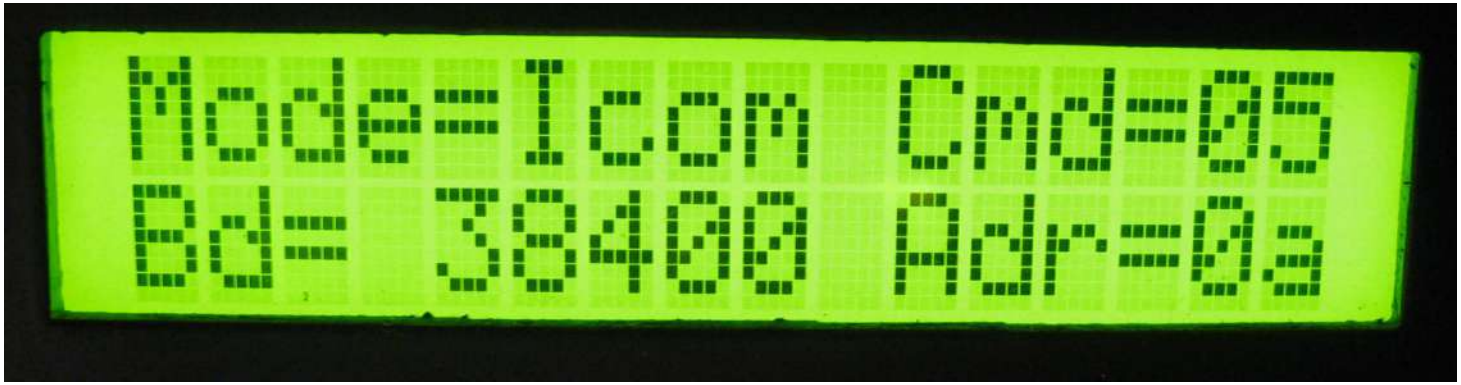
Operating mode – Kenwood, Icom
Mode – Auto, Memory, Tune stop frequency

Start frequency
input-C inductance
output-C storage
mode storage
number

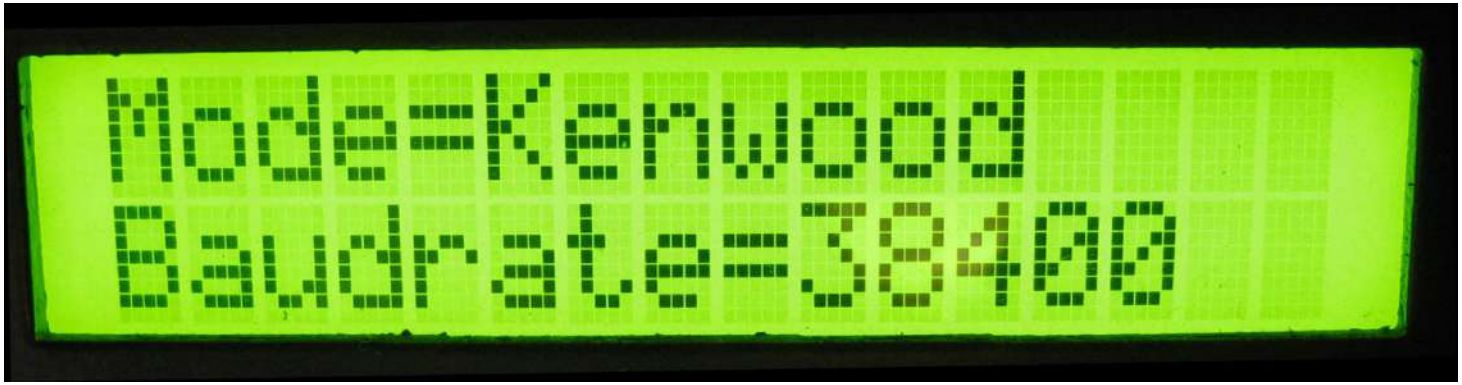


# New firmware - configuration

Parameters for ICOM:




Parameters for Kenwood / Elecraft:



# Tested transceiver

- ICOM
  - IC-756 PRO III
    - IC7400
    - IC7600
    - IC7700
    - IC706 MKII
- ELECRAFT
  - K2
  - K3
  - KX3
- Kenwood
  - TS-2000
  - TS-2000 with W4MQ Software

# Tuning - Frequency measurement

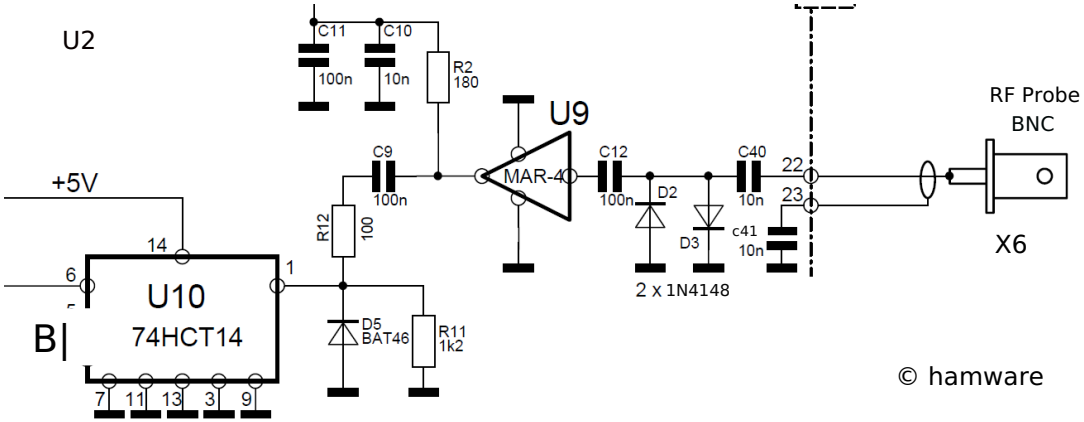
- Tap box in the transmission line

Measurement of the transmit frequency via integrated counter of the microcontroller

- Does not work reliably with SSB.

  Also not recommended in the manual ;-)

For automatic tuning you must muss be sent



# Tuning - Interface



CI-V

optional

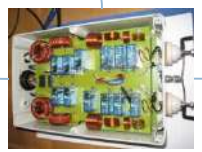
Tap

CI-V level-converter

CI-V

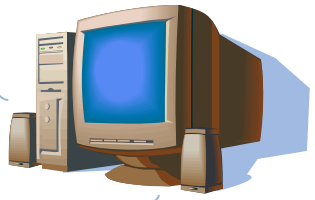
RS232
USB





CI-V





RS232

optional

Tap

RS232

RS232

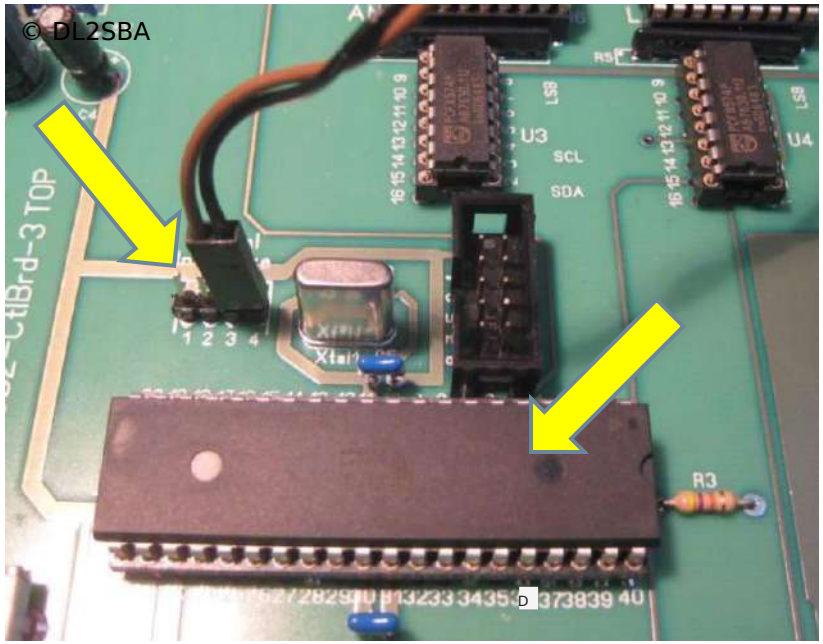






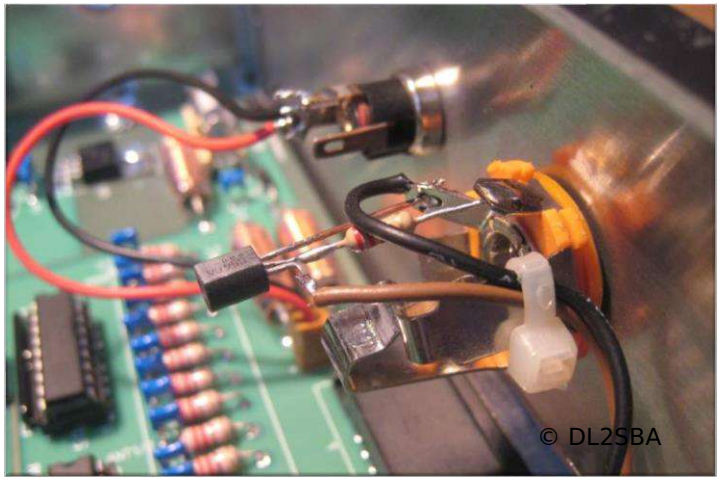
# Calibration - Interface

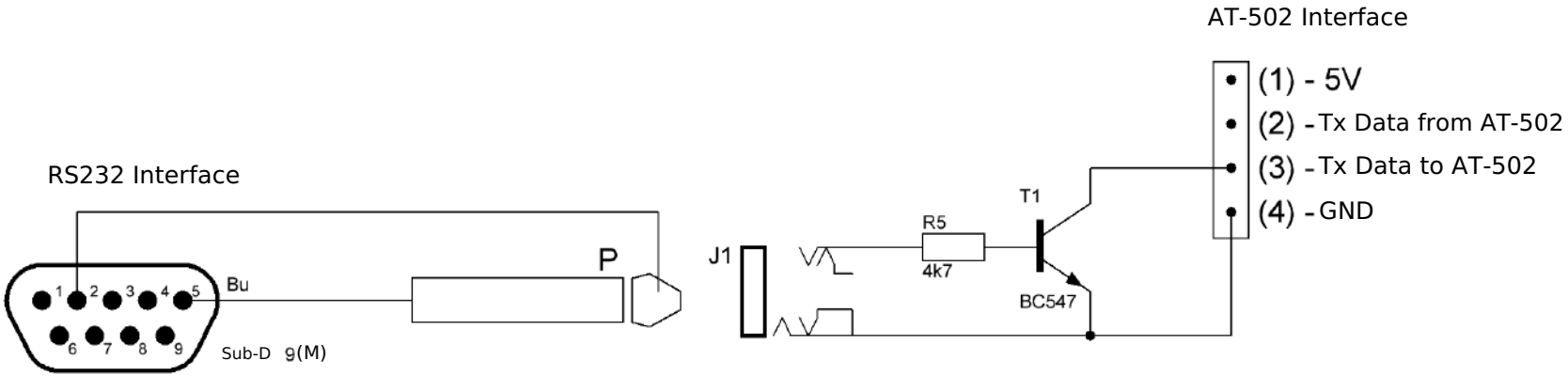
- Exchange microcontroller
- 4-pin interface already prepared on AT-5xx control unit
- TTL-compatible serial interface directly on the microcontroller
- !!! No RS-232 interface !!!



# AT-5xx – simple interface

- Only for RS-232/V.24
- Kenwood, ELECRAFT
- “Non-compliant” – but it works ☺



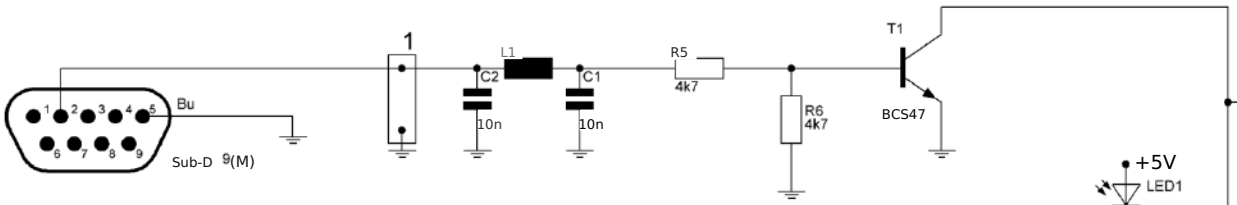



# AT-5xx - Comfort interface

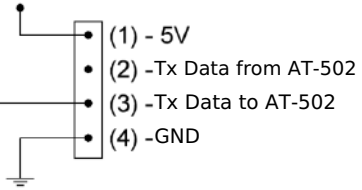
- RS232 interface
  - Kenwood + ELECRAFT
- ICOM CI-V
  - ICOM



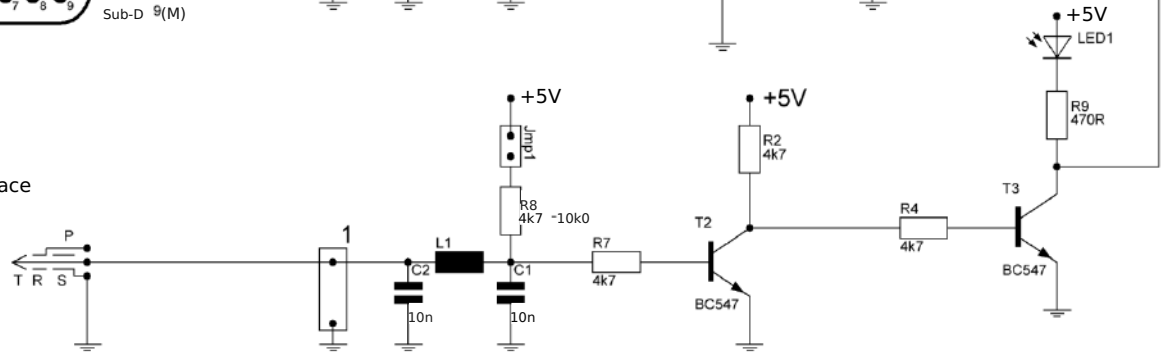

RS232 Interface




+5V AT-502 Interface



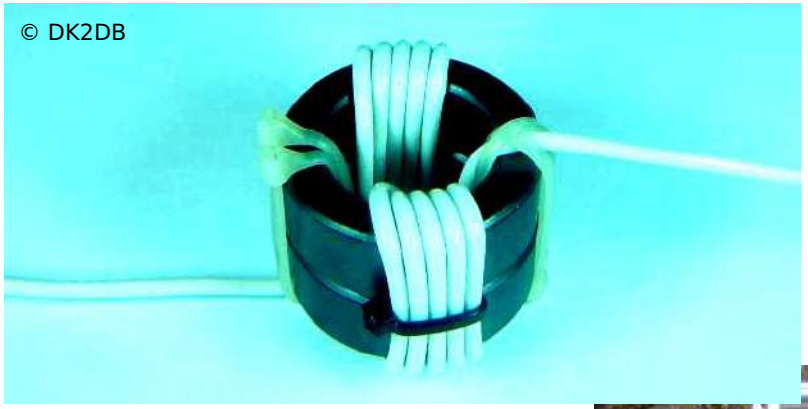

CIV-Interface

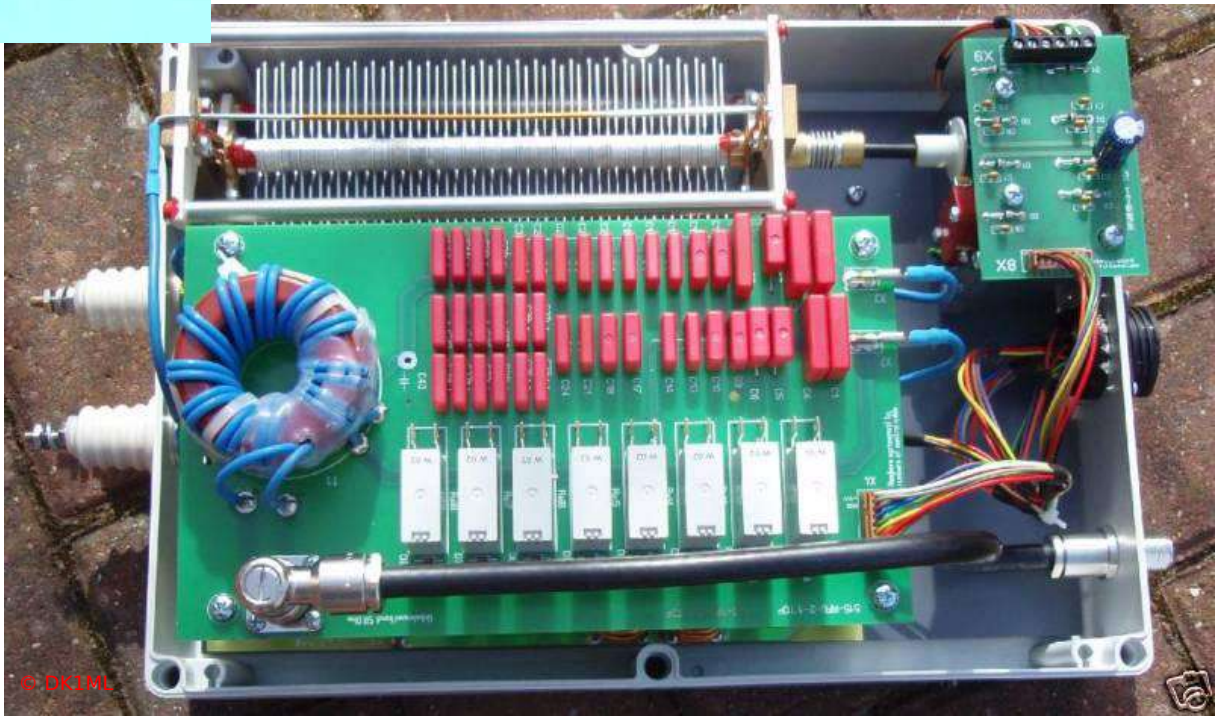


# AT-515 - Highlights

- Balun
- Mechanics
- Electrical

# AT-515 Tuner - Balun

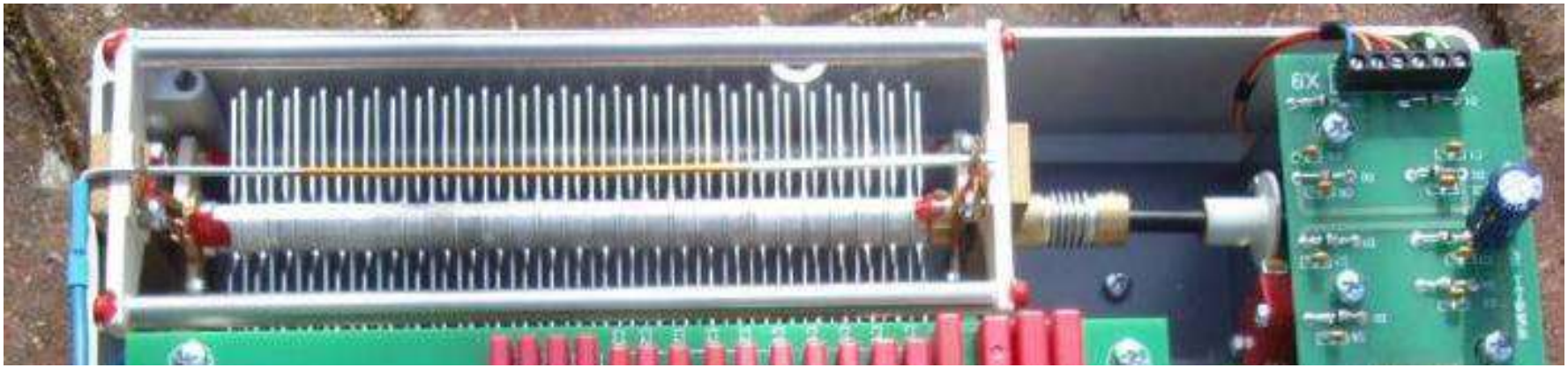


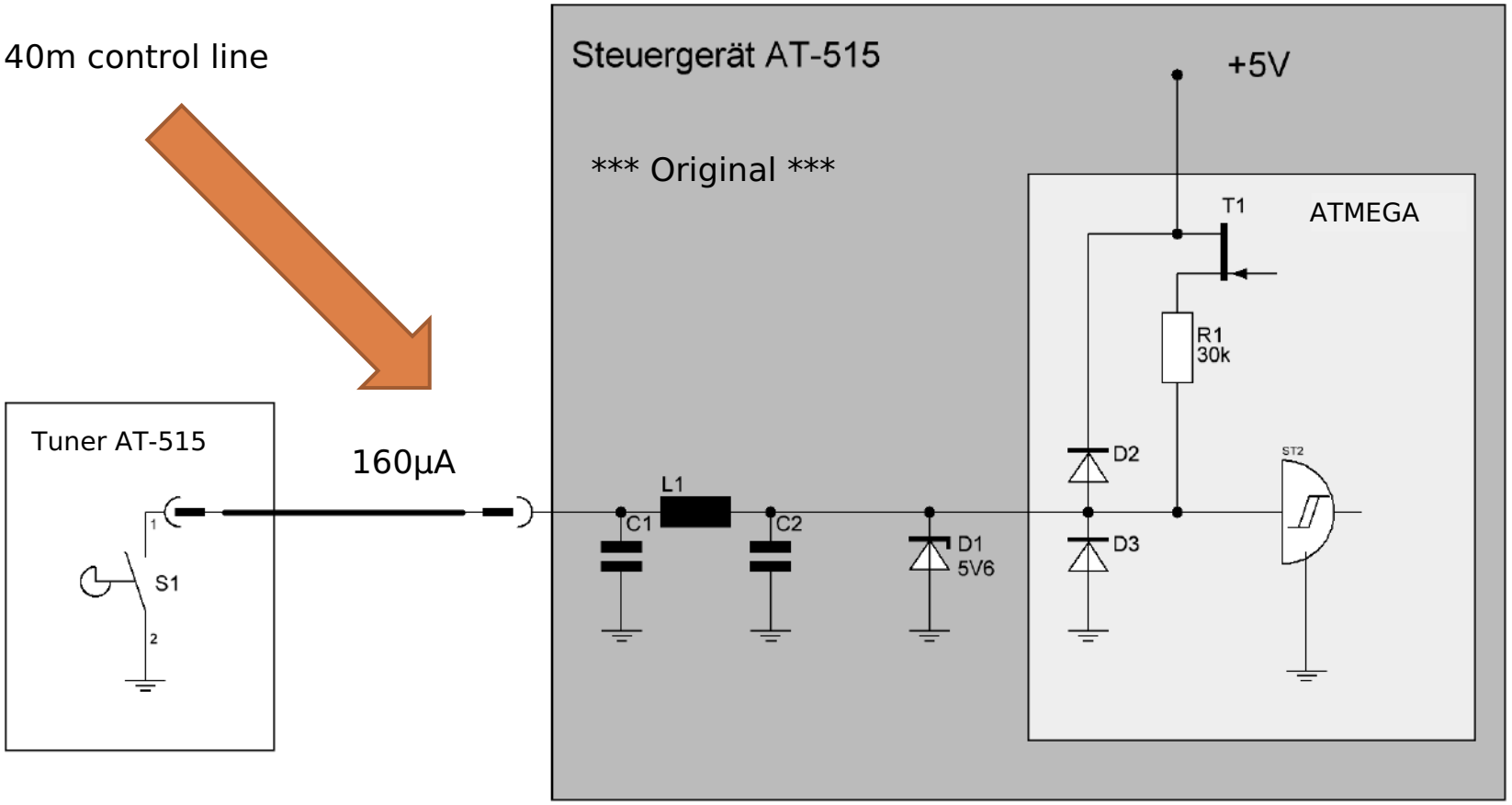



# AT-515 Tuner - Mechanics

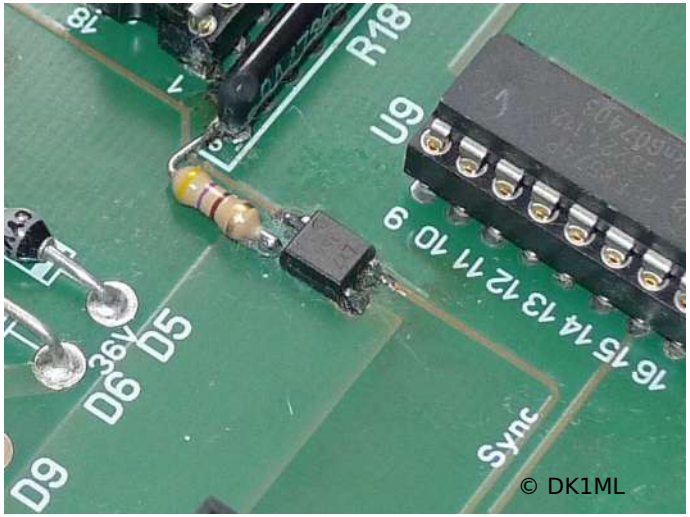
- Flexible coupling
- No idle current of the stepper - Afterrun of the CS at the slightest tension in the drive train

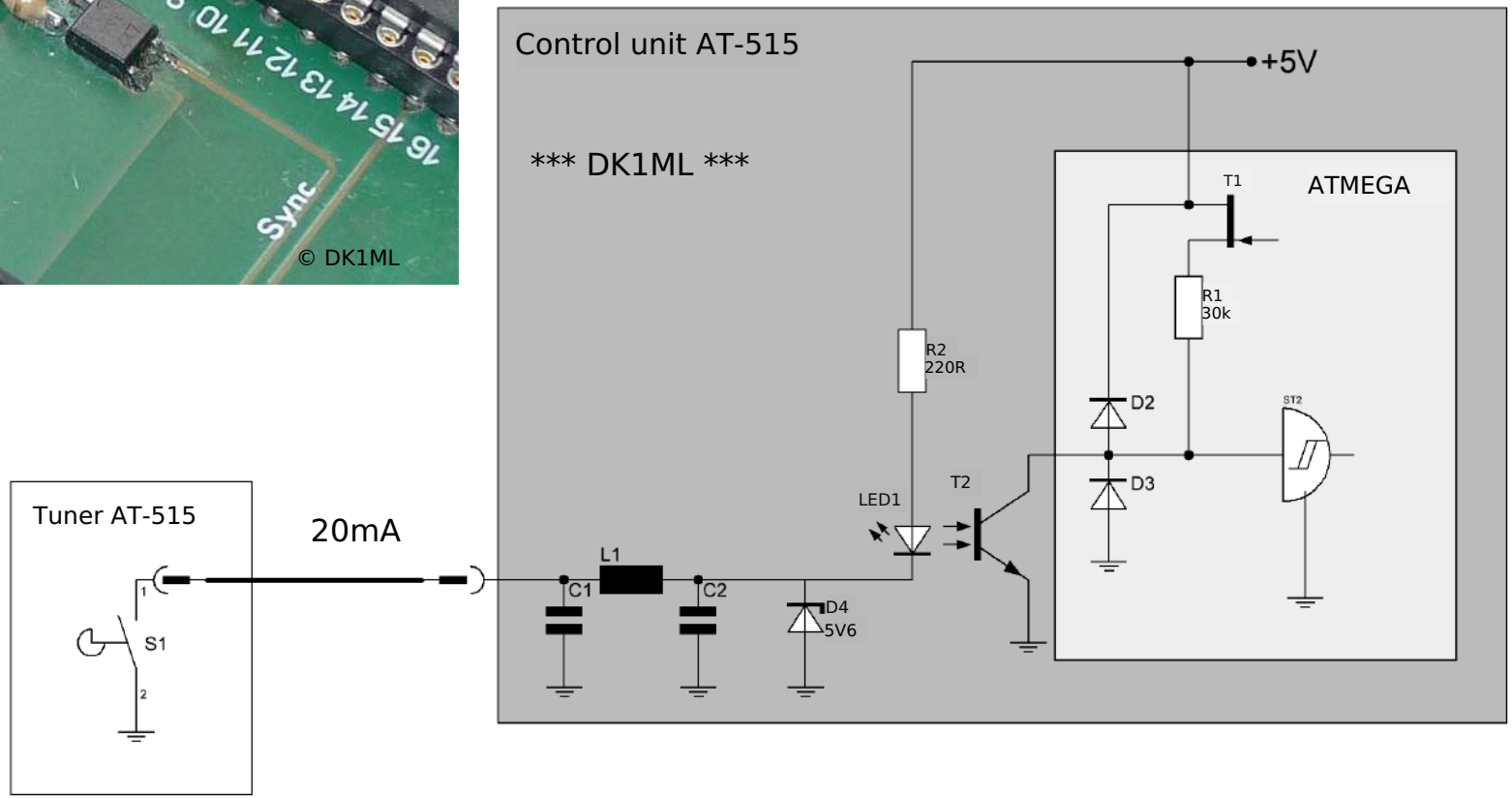


# AT-515 Tuner – Reference switch



# AT-515 Tuner – Reference switch



# Outlook

- AT-5xx
  - Active polling of Kenwood transceivers
    - Operation without logbook software possible
  - Control of a keying line to the transceiver
- AT-515
  - Expansion firmware AT-515 with additional control outputs for 160m/80m
    - Add-on Cs/Ls for "Unsuitable" antennas
- AT-615x
  - Firmware also for these control devices

# Questions



# From where?

- Order by email 15€
- On site 13€

# Links

- http://www.dl2sba.com
- http://at-502.dl2sba.com
- http://at-515.dl2sba.com
- http://www.hamware.de
- http://www.id-elektronik.de
- http://www.qrz.com/db/DL5AI
- http://www.atmel.com
- http://winavr.sourceforge.net