MSA-126
„A comfortable Magnetic Loop Antenna for 40m/30m/20m"

25.06.2023 Messe Friedrichshafen

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Overview

- Project Timeline

- Software-Architecture

- Kit

- Next Steps

Project Timeline

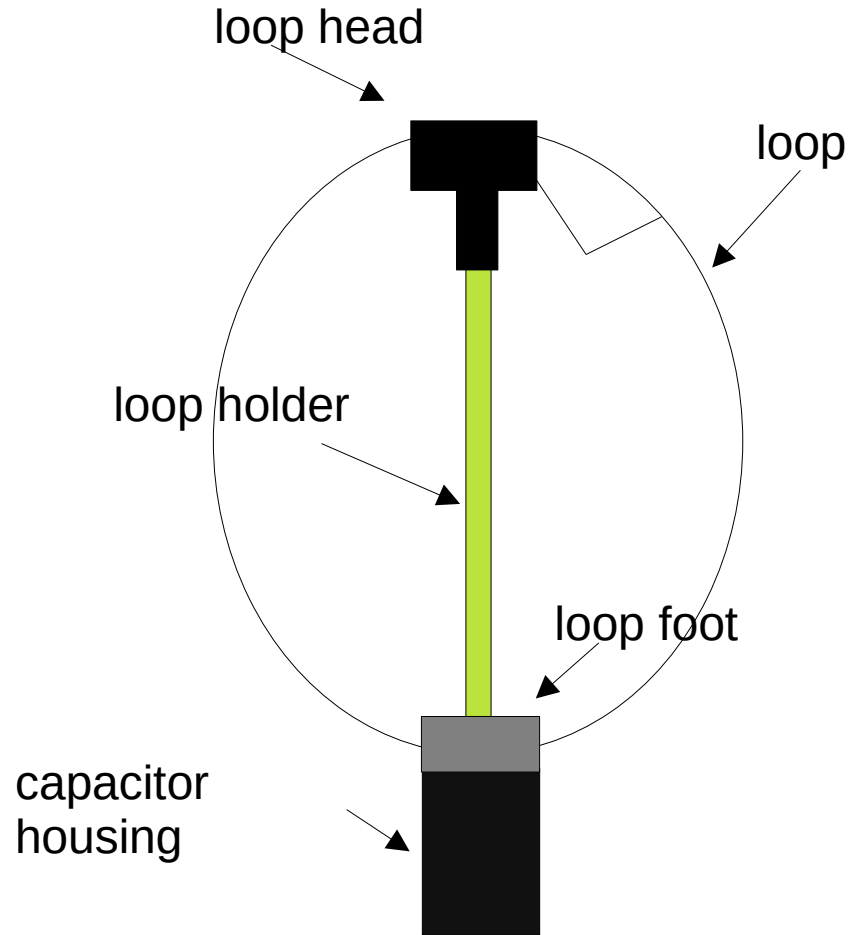- approx. **2019**, **QRP** Loop **5W**, built with parts from the part box

Project Timeline

- approx. **2019**, **QRP** Loop **5W**, built with parts from the part box
- **Desire** for
  - more power (**100W**)
  - **Remote Control for Tuning**
  - As much bands as possible
  - **transportable** and **efficient**
  - „Nice Weather Antenna" (no permanent Installation)
- **2020** *Basic Concept*, (HW Version 1, SW Version 1)

Basic Concept

- Loop made from *Aluminium*, 2-parts, screwed togather
- **Butterfly Capacitor** in the housing
- *Housing* also provides **mechanical stability** for the loop
- Material: *Wood*, *Aluminium*, *Acryl*
- Driven by a *stepper motor*
- Microcontroller used in the remote control and in the motor control device
- Power is provided over the communication line
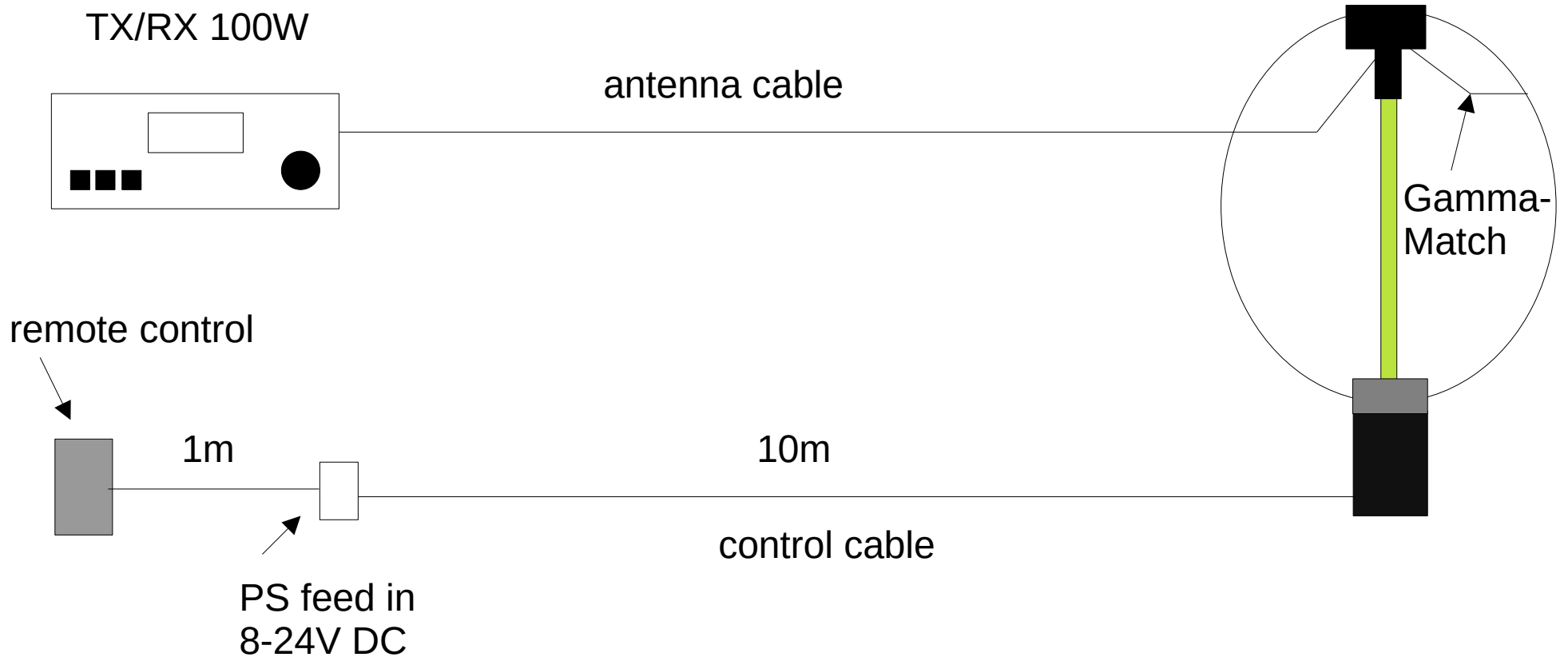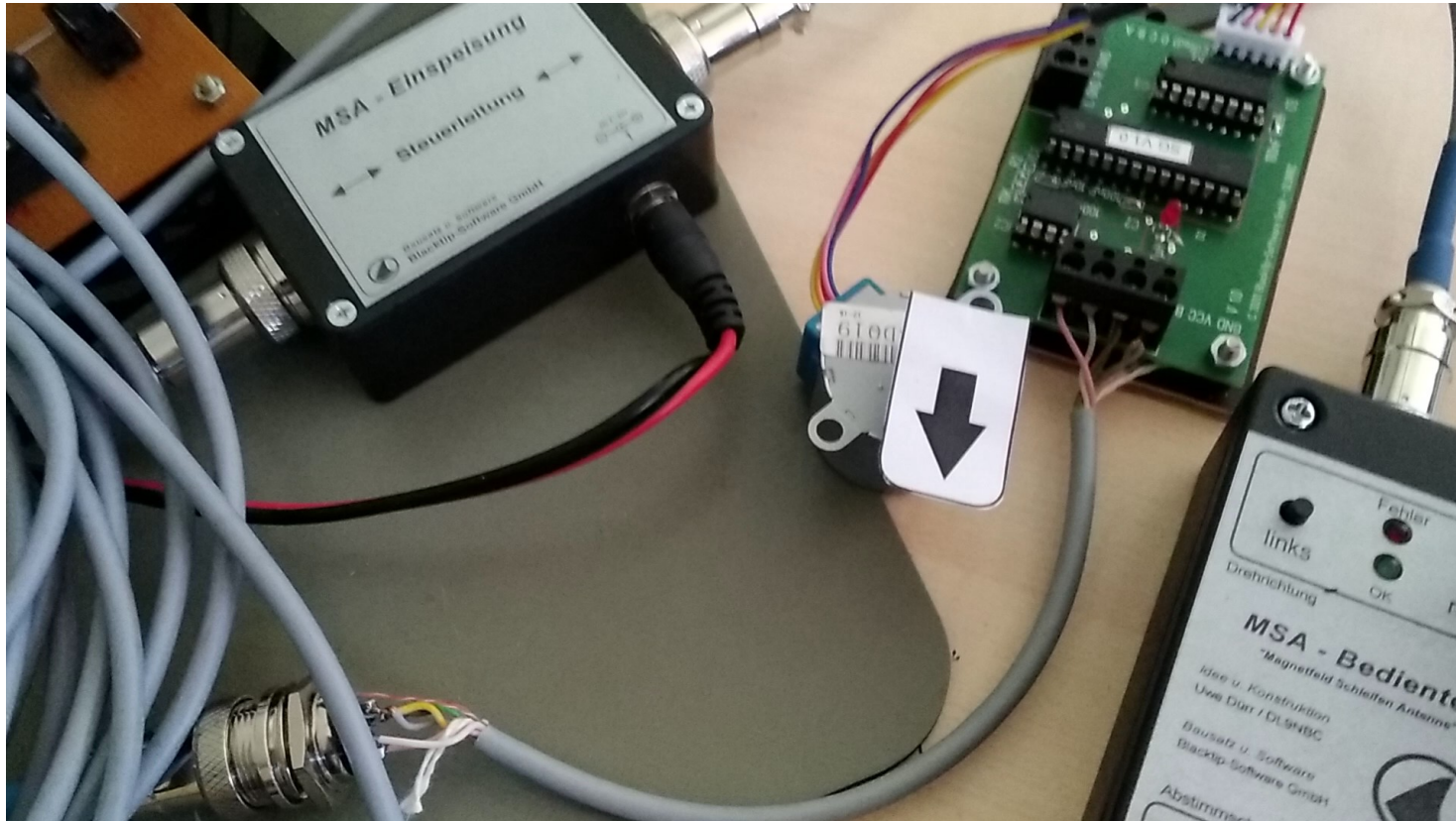- Fieldbus communication RS485, using a proprietary protocol

Basic Concept

loop head

loop

loop holder

loop foot

capacitor
housing

MSA95

Basic Concept for Control

TX/RX 100W

antenna cable

Gamma-
Match

remote control

1m

10m

PS feed in
8-24V DC

control cable

Remote Control

http://www.blacktip-software.de/msa126/mp4/antrieb_v1.mp4

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Secondary Capacitor
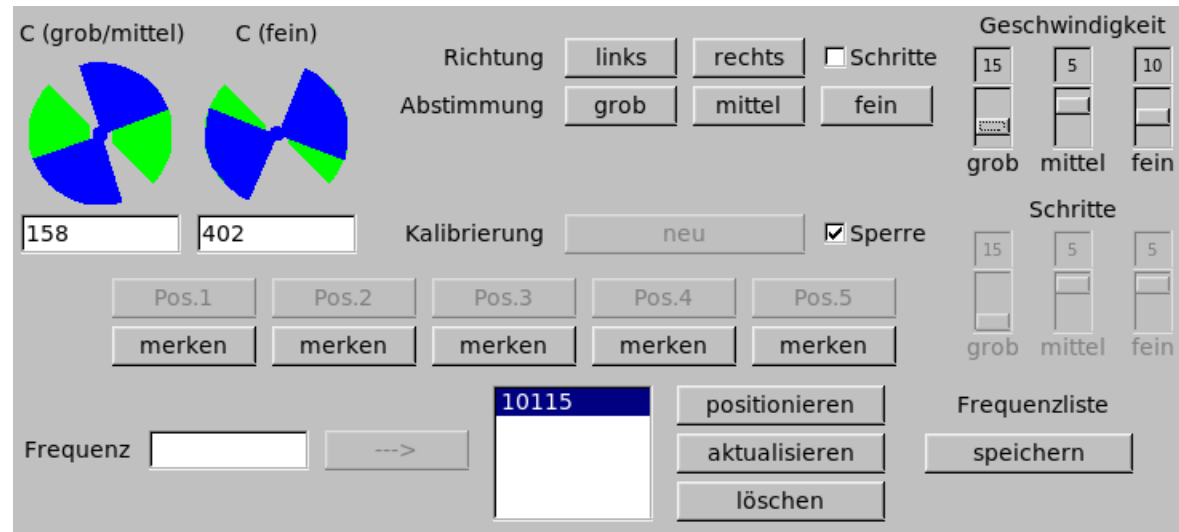
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- approx. **2022** *absolute positioning*, *Remote Contro*l *GUI App*, SW Version 2,3,4,5,6,...

Absolute Positioning

- Rotation angle of the capacitors restricted to 90 degree

- Implemented without end switch (calibration)

- Store and recall of capacitor settings (5 settings)

- Semi automatic tuning

PC App

- Application with GUI

- Can be connected as an alternative for the remote control unit

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Uncounted detail changes in the construction

and of course more wishes, e.g. fully automated tuning process and vfo based tuning

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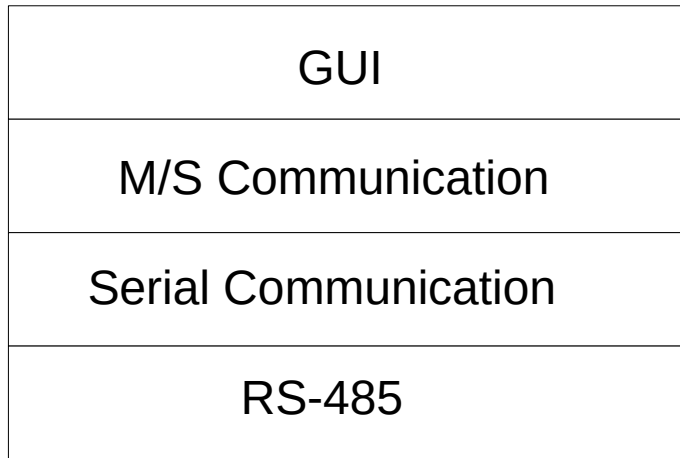
Software-Architecture 1.0

- „Master/Slave"
  - Remote Control Unit = „Master" (M)
  - Control Device = „Slave" (S)
- „Master" sends a command, the „Slave" receives it and executes the command, in addition sends an acknowledge or non-acknowledge back
- All communication starts with a message from the „Master"
- „Master" is implemented as firmware within the remote control unit or as a software layer within the PC application
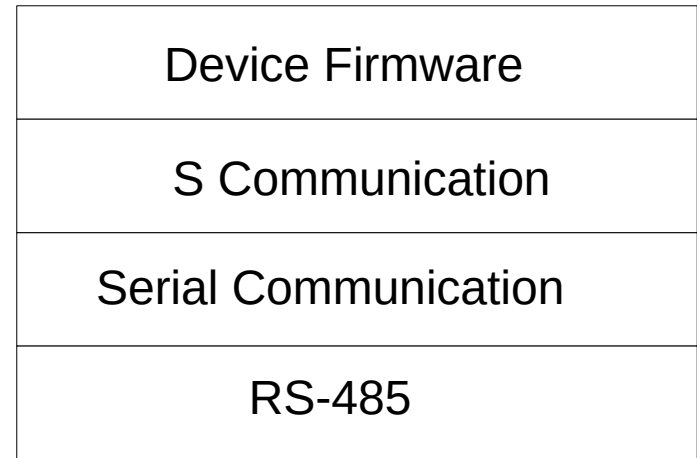
Master/Slave (M/S)

- Advantage
  - Easy to implement, good for a dedicated device
- Disadvantage
  - Non flexible, if used in a multiprogram environment

Master/Slave on the PC

PC-App

GUI
M/S Communication
Serial Communication
RS-485

Control device MSA Antenna

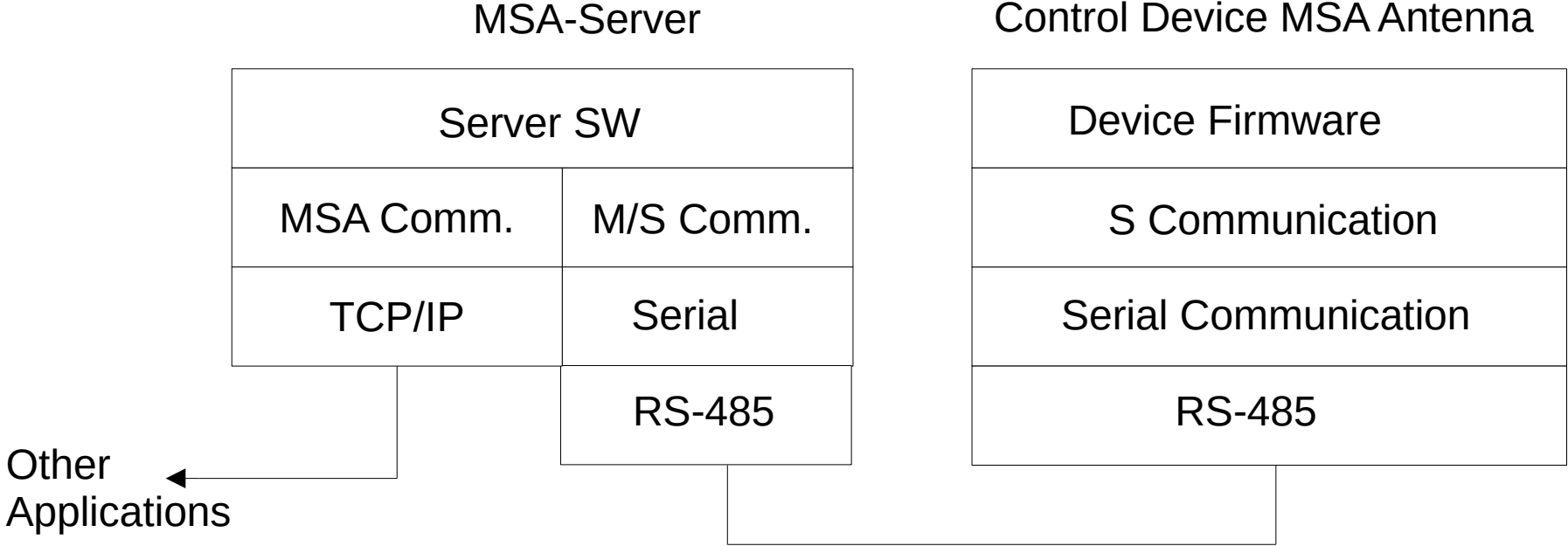| Device Firmware |
| --- |
| S Communication |
| Serial Communication |
| RS-485 |

Other applications on the PC can not access the device!!

„Revolution"

- „Master"/"Slave" (M/S) on the **PC** replaced by a „Client/Server" (C/S) system

- **Multiple** applications on the **PC** can now communicate with the *MSA Antenna* using a *Server-Process* as a proxy

- This is a requirement to implement new features

Client/Server on the PC

MSA-Server

Control Device MSA Antenna

Server SW		Device Firmware
MSA Comm.	M/S Comm.	S Communication
TCP/IP	Serial	Serial Communication
	RS-485	RS-485

Other
Applications

MSA Protocol

- Communications Protocol for Applications

- Uses TCP/IP

  - Applications can be remote now

- The *MSA-Server* acts as a proxy and provides arbitration to the control device in the antenna

- the protocol supports events as well

  This is the **Software-Architecture 2.0.**

Applications (Client)

- GUI for operating the *MSA Antenna*
- Capacitor Visualization
- Command Program (Shell)
- Rig-Control

Why the effort?

- Applications are now possible which use the **CAT**(*Computer Aided Transceiver*) interface of modern transceivers and also use the **MSA Protocol** to tune the antenna

- **CAT** allows access to the *VFO* und *VSWR meter,* so the following features can be implemented

  - *Automatic retuning of the antenna based on the selected VFO frequency (Tuning Database maintained by the MSA Server plus interpolation)*

  - *Automatic Tuning*

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Kit

- Was also a design goal (reproducible)

- The antenna is much more complex as expected, lots of parts

- Some build stages require background experience, so some components need to be supplied in assembled state

Kit

- Kit builder need to
  - assemble capacitors and the coupling
  - assemble the PCB with parts
  - Make the cable and mount plugs

also

- Mounting and calibration
- Bending of sheet metal
- Some drilling

State

- Kit development still ongoing

- A CNC Machine for producing some parts needs to be assembled

- For update see: https://www.blacktip-software.de/msa126/

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- What next

What Next

- Main focus is currently
  - Automatic Tuning
  - Transparent tuning during RX operation

.-.-. ...-.- - ..-

Thank You.

For more questions: ud@blacktip-software.de