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## Inhaltsverzeichnis

MEPT - a WSPR beacon

Versionsgeschichte interaktiv durchsuchen  
VisuellWikitext

Version vom 30. Juni 2009, 21:42 Uhr (Quelltext anzeigen)  
Oe1mcu (Diskussion | Beiträge)  
← Zum vorherigen Versionsunterschied

Aktuelle Version vom 1. Juli 2009, 15:48 Uhr (Quelltext anzeigen)  
Oe1mcu (Diskussion | Beiträge)  
(→MEPT SWITCH Module)

(27 dazwischenliegende Versionen desselben Benutzers werden nicht angezeigt)

Zeile 1:

[[Kategorie:Selbstbau]]

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[[Kategorie:Selbstbau]]

+ [[Kategorie:digitale\_Betriebsarten]]

+ == Vielseitige WSPR Bake für mobile und stationäre Anwendungen ==

+ MEPT = Manned Experimental Propagation Transmitter

+ Die MEPT [[WSPR]] Bake sendet für 2 Minuten die [[WSPR]] Bake und wechselt dann automatisch auf ein anderes Band. Die Zeit und den Locator holt sich die Bake vom angeschlossenen GPS Empfänger. Damit können alle Kurzwellen Amateurfunkbänder und 6m abgedeckt werden. Das Gerät ist kompakt aufgebaut und benötigt für den Betrieb keinen Computer was den Stromverbrauch signifikant senkt.

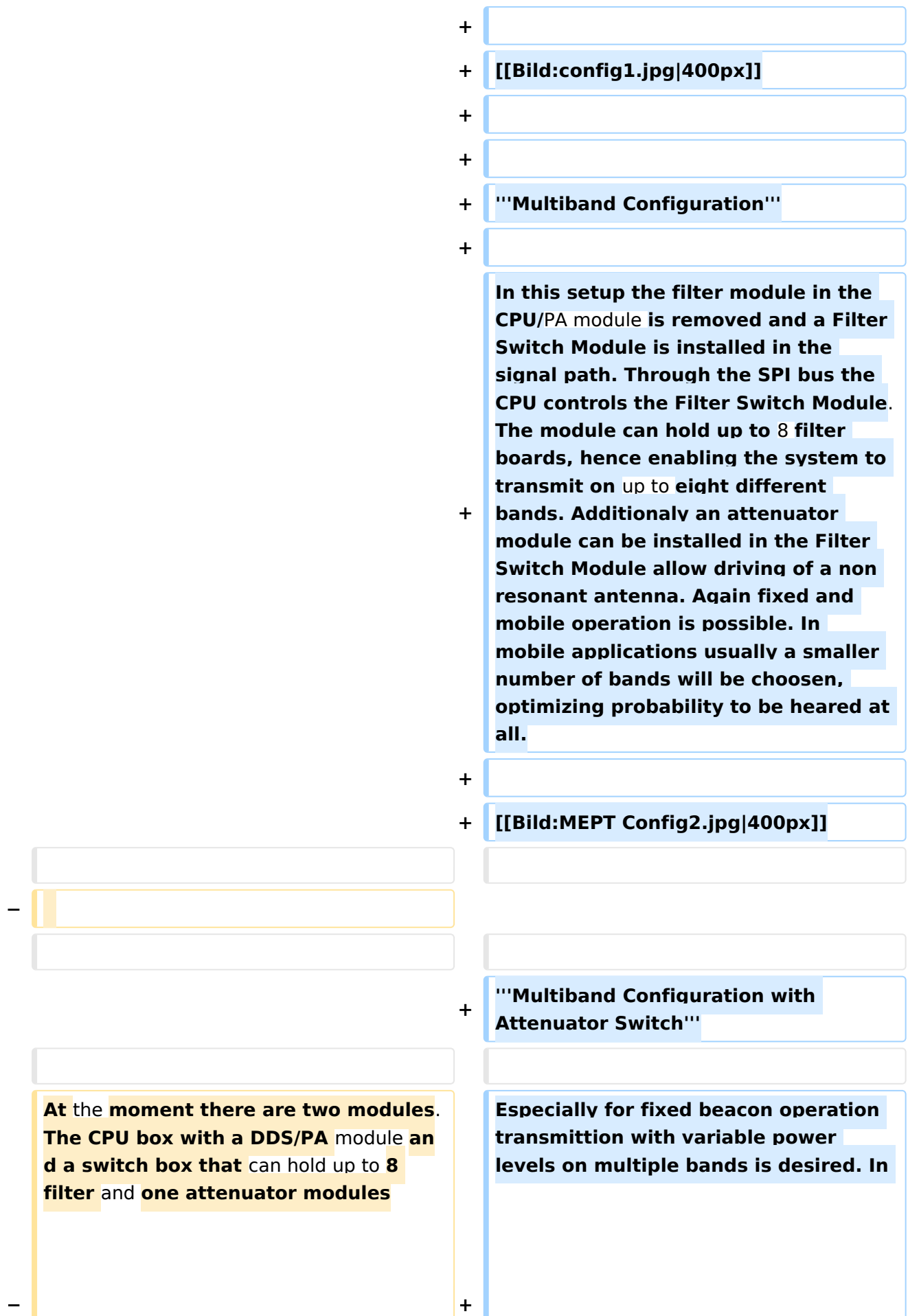
+ [[Bild:MEPT 1.jpg]]

+ Es dauerte einige Monate - aber jetzt ist es (fast) fertig.

|   |                                               |                                                                                                                   |
|---|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
|   |                                               | + Das Baken Konzept beruht auf getrennten Modulen die nach den speziellen Anforderungen kombiniert werden können. |
|   |                                               |                                                                                                                   |
|   |                                               | + == Anschlüsse: ==                                                                                               |
|   |                                               |                                                                                                                   |
| - | [[Bild:MEPT 1.jpg]] [[Bild:LCD position.jpg]] | + * "'USB interface"' für die Windows Konfigurations Software                                                     |
|   |                                               | + * "'serial interface"' zum Anschluss der GPS Maus                                                               |
|   |                                               | + * "'SPI bus"' für die Datenübermittlung zwischen den Modulen                                                    |
|   |                                               | + * "'ICSP"' zum programmieren des PIC Prozessors                                                                 |
|   |                                               |                                                                                                                   |
|   |                                               | + == Ausstattung: ==                                                                                              |
|   |                                               |                                                                                                                   |
|   |                                               | + * Windows Konfigurationssoftware                                                                                |
|   |                                               | + * Die Bake läuft unabhängig vom PC                                                                              |
|   |                                               | + * Zeit und geographische Position werden hochgenau aus dem GPS Signal gewonnen                                  |
|   |                                               | + * Unabhängige Generierung des WSPR Datensatz im Mikrocontroller der Bake                                        |
|   |                                               | + * Bis zu 8 verschiedene Filter über eine Filterschaltbox anwählbar                                              |
|   |                                               | + * Bis zu 4 Dämpfungsalieder Netzwerke durch die Abschwächer Box steuerbar                                       |
|   |                                               | + * Mehrere DDS & PA Module an einem Controller anschließbar                                                      |
|   |                                               | + * DDS & PA Modul für 1.8-50MHz mit bis zu 15W                                                                   |

|   |                                                                                                                 |   |                                                                                                                                                |
|---|-----------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                                                                                 | + | * Bänder (160m / 80m / 40m / 30m / 20m/ 17m / 15m / 12m / 10m / 6m)                                                                            |
|   |                                                                                                                 | + |                                                                                                                                                |
|   |                                                                                                                 |   |                                                                                                                                                |
|   |                                                                                                                 |   |                                                                                                                                                |
| - | It took me a couple of month - but now it's (almost) ready.                                                     | + | At the moment there are two modules. The CPU box with a DDS/PA module and a switch box that can hold up to 8 filter and one attenuator modules |
|   |                                                                                                                 |   |                                                                                                                                                |
| - | A versatile beacon concept that consists of a number modules that can be combined according to the application. | + | [[Bild:MEPT_2.jpg]]                                                                                                                            |
|   |                                                                                                                 |   |                                                                                                                                                |
| - | == Connectors: ==                                                                                               |   |                                                                                                                                                |
|   |                                                                                                                 |   |                                                                                                                                                |
| - | * ""USB interface"" to connect to a Windows application for configuration                                       | + | == MEPT SWITCH Modul ==                                                                                                                        |
| - | * ""serial interface"" to attach a GPS mouse                                                                    |   |                                                                                                                                                |
| - | * ""SPI bus"" to interconnect the modules                                                                       |   |                                                                                                                                                |
| - | * ""ICSP"" for in circuit serial programming of the PIC processor                                               |   |                                                                                                                                                |
|   |                                                                                                                 |   |                                                                                                                                                |
|   |                                                                                                                 | + | [[Bild:MEPT DDS Filter Controller v2.0.jpg thumb Controller board circuit]]                                                                    |
|   |                                                                                                                 | + | [[Bild:MEPT DDS Filter Switch v2.0.jpg thumb Switch board circuit]]                                                                            |
|   |                                                                                                                 |   |                                                                                                                                                |
| - | == Features: ==                                                                                                 |   |                                                                                                                                                |
|   |                                                                                                                 |   |                                                                                                                                                |
|   | * Configuration software for Windows                                                                            |   |                                                                                                                                                |

|   |                                                                        |   |                                                                                                                                                                                                                                                                                                                                                                        |
|---|------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| - |                                                                        | + | The switch module can hold up to 8 filter or attenuator boards. For bands from 160m to 6m elliptical low pass filters are ready. I am planning a band pass filter for 6m as the local oscillator signals are below the working frequency.                                                                                                                              |
| - | * Beacon runs independent from PC                                      | + | When used with filters there is one additional slot that can hold an attenuator for using the system on an unmatched antenna.                                                                                                                                                                                                                                          |
| - | * Time and Location can be derived from GPS signal                     | + | There will be another switch board with 4 instead of 8 positions that will be able to hold attenuator boards of the same size.                                                                                                                                                                                                                                         |
| - | * Autonomous generation of WSPR data string in local microcontroller   | + |                                                                                                                                                                                                                                                                                                                                                                        |
| - | * Up to 8 different filters selectable through filter switch box       | + |                                                                                                                                                                                                                                                                                                                                                                        |
| - | * Up to 4 Attenuator networks selectable through attenuator switch box | + | [[Bild:MEPT 8.jpg]]                                                                                                                                                                                                                                                                                                                                                    |
| - | * Multiple DDS & PA modules attachable to one controller               | + |                                                                                                                                                                                                                                                                                                                                                                        |
| - | * DDS & PA module for 1.8-50MHz with up to 15W                         | + | == MEPT CONFIGURATIONS ==                                                                                                                                                                                                                                                                                                                                              |
|   |                                                                        | + |                                                                                                                                                                                                                                                                                                                                                                        |
|   |                                                                        | + | ""BASIC Configuration""                                                                                                                                                                                                                                                                                                                                                |
|   |                                                                        | + |                                                                                                                                                                                                                                                                                                                                                                        |
|   |                                                                        | + | The beacon system can be configured in various scenarios. The most simple one is the CPU unit with the integrated PA used stand alone. In this setup a LPF filter module is installed within the CPU box. So beaconing is only possible on one band. Either fixed - with pre programmed Locator - or mobile where location information is derived from the GPS signal. |



|   |                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|--------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                              |   | <p>this configuration the multiband config is amended by a Attenuator Switch Module. This module can hold up to 4 attenuator boards and is controlled by the CPU through the SPI bus.</p>                                                                                                                                                                                                                                                              |
|   |                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| - | [[Bild:MEPT_2.jpg]]                                          | + | [[Bild:config3.jpg 400px]]                                                                                                                                                                                                                                                                                                                                                                                                                             |
|   |                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|   |                                                              | + | '''Multiband Configuration with Multiple DDS/PA Modules                                                                                                                                                                                                                                                                                                                                                                                                |
|   |                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|   |                                                              | + | <p>When running the beacon in Multiband config with a filter box with 8 boards installed, one will only reach a TX time of 12,5%. To increase the TX time to 25% (or higher) with still covering 8 bands (or more) additional DDS/PA modules with individual Filter Switch Modules can be driven from a single CPU. These signal sources can be attached to diffent antennas as shown, or through a LPF/HPF signal combiner into a single antenna.</p> |
|   |                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| - | Here you can find an overview of the possible configurations | + | [[Bild:MEPT Config4.jpg 400px]]                                                                                                                                                                                                                                                                                                                                                                                                                        |
|   |                                                              | + | <br><br>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|   |                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| - | [[MEPT CONFIGURATIONS]]                                      | + | == MEPT CPU Modul ==                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|   |                                                              | + | [[Bild:MEPT DDS CPU v6.0.jpg thumb MEPT CPU board circuit]]                                                                                                                                                                                                                                                                                                                                                                                            |
|   |                                                              | + | [[Bild:MEPT DDS Display Unit v1.0.jpg thumb MEPT Display board circuit]]                                                                                                                                                                                                                                                                                                                                                                               |
|   |                                                              | + | [[Bild:MEPT_DDS RF unit v2.1.jpg thumb MEPT DDS & PA board circuit]]                                                                                                                                                                                                                                                                                                                                                                                   |

|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
|                                                                                                                                                                                            |  |  | <b>The main module holds the CPU with USB and GPS serial interface, the master oscillator and one DDS with a 15W PA module. It can be run stand alone and accepts one filter module on the RF unit board.</b> |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
| <b>A detailed description of the individual modules can be found here</b>                                                                                                                  |  |  |                                                                                                                                                                                                               |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
|                                                                                                                                                                                            |  |  | <b>&lt;gallery&gt;</b>                                                                                                                                                                                        |
|                                                                                                                                                                                            |  |  | <b>Bild:MEPT 4.jpg Main Modul Innenansicht</b>                                                                                                                                                                |
|                                                                                                                                                                                            |  |  | <b>Bild:MEPT 5.jpg Main Modul Innenansicht</b>                                                                                                                                                                |
|                                                                                                                                                                                            |  |  | <b>Bild:MEPT 6.jpg GPS Satelliten Suche</b>                                                                                                                                                                   |
|                                                                                                                                                                                            |  |  | <b>Bild:MEPT 7.jpg Warten auf Sendeslot</b>                                                                                                                                                                   |
|                                                                                                                                                                                            |  |  | <b>Bild:MEPT 3.jpg Auf Sendung mit Frequenzanzeige</b>                                                                                                                                                        |
|                                                                                                                                                                                            |  |  | <b>&lt;/gallery&gt;</b>                                                                                                                                                                                       |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
| <b>[[MEPT CPU]]</b>                                                                                                                                                                        |  |  |                                                                                                                                                                                                               |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
| [[MEPT switch module]]                                                                                                                                                                     |  |  | [[MEPT switch module]]                                                                                                                                                                                        |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
| <b>I have a long list of improvements and additions I want to create to my beacon system. Here is a list of my plans (Although I don't know yet where to find the time to do all that)</b> |  |  | <b>Weiter Informationen: <a href="http://www.oe1i fm.at/">http://www.oe1i fm.at/</a></b>                                                                                                                      |
|                                                                                                                                                                                            |  |  |                                                                                                                                                                                                               |
| <b>[[MEPT_Development_Plan]]</b>                                                                                                                                                           |  |  |                                                                                                                                                                                                               |



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**Aktuelle Version vom 1. Juli 2009, 15:48 Uhr**

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## Vielseitige WSPR Bake für mobile und stationäre Anwendungen

MEPT = Manned Experimental Propagation Transmitter

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Es dauerte einige Monate - aber jetzt ist es (fast) fertig.

Das Baken Konzept beruht auf getrennten Modulen die nach den speziellen Anforderungen kombiniert werden können.

### Anschlüsse:

- **USB interface** für die Windows Konfigurations Software
- **serial interface** zum Anschluss der GPS Maus
- **SPI bus** für die Datenübermittlung zwischen den Modulen
- **ICSP** zum programmieren des PIC Prozessors

### Ausstattung:

- Windows Konfigurationssoftware
- Die Bake läuft unabhängig vom PC
- Zeit und geographische Position werden hochgenau aus dem GPS Signal gewonnen
- Unabhängige Generierung des WSPR Datensatz im Mikrocontroller der Bake

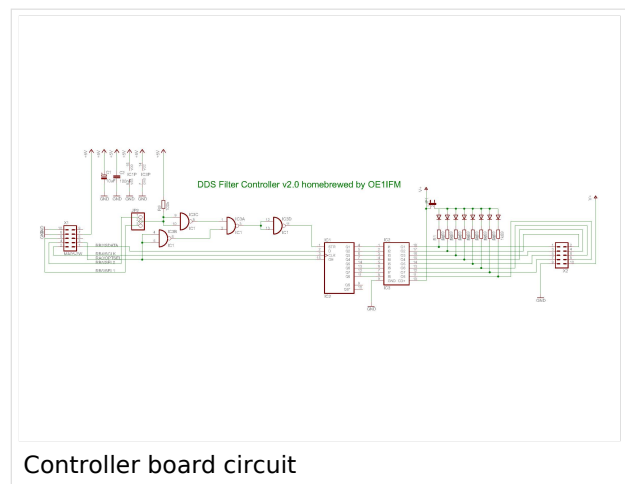
- Bis zu 8 verschiedene Filter über eine Filterschaltbox anwählbar
- Bis zu 4 Dämpfungsglieder Netzwerke durch die Abschwächer Box steuerbar
- Mehrere DDS & PA Module an einem Controller anschließen
- DDS & PA Modul für 1.8-50MHz mit bis zu 15W
- Bänder (160m / 80m / 40m / 30m / 20m/ 17m / 15m / 12m / 10m / 6m)

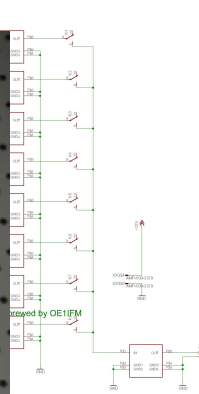
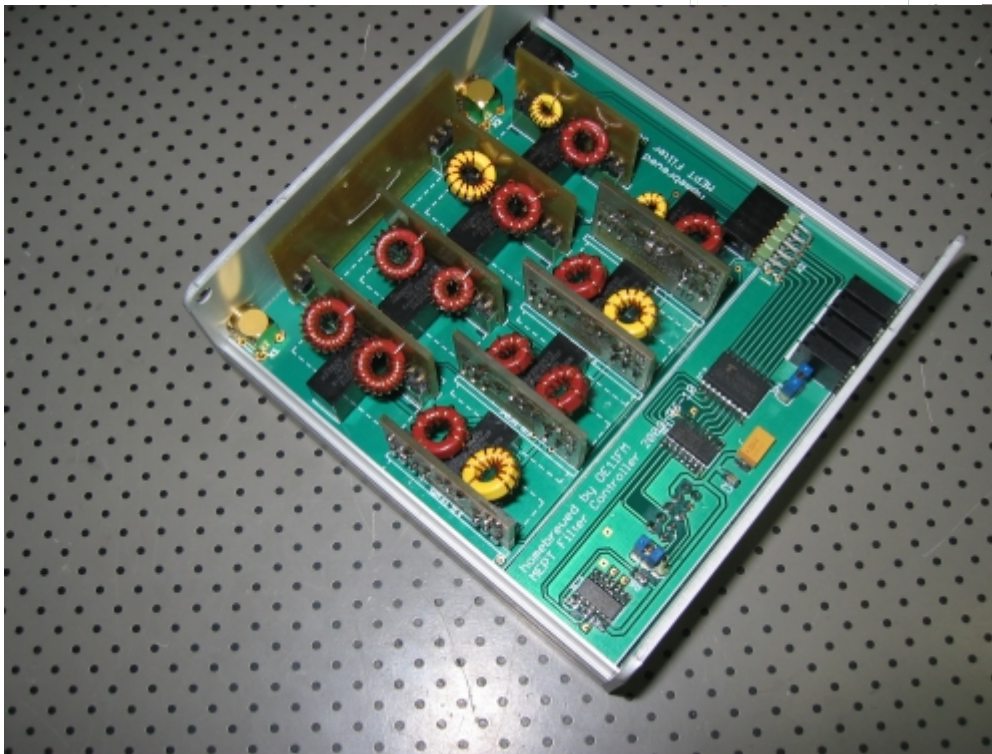
At the moment there are two modules. The CPU box with a DDS/PA module and a switch box that can hold up to 8 filter and one attenuator modules



## MEPT SWITCH Modul

The switch module can hold up to 8 filter or attenuator boards. For bands from 160m to 6m elliptical low pass filters are ready. I am planning a band pass filter for 6m as the local oscillator signals are below the working frequency. When used with filters there is one additional slot that can hold an attenuator for using the system on an unmatched antenna. There will be another switch board with 4 instead of 8 positions that will be able to hold attenuator boards of the same size.





## MEPT CONFIGURATIONS

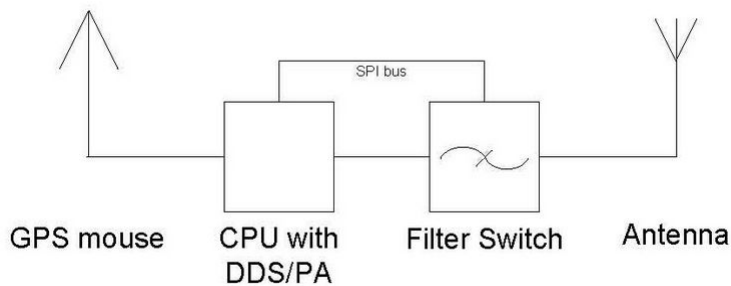
### BASIC Configuration

The beacon system can be configured in various scenarios. The most simple one is the CPU unit with the integrated PA used stand alone. In this setup a LPF filter module is installed within the CPU box. So beaconing is only possible on one band. Either fixed - with pre programmed Locator - or mobile where location information is derived from the GPS signal.

400px

### Multiband Configuration

In this setup the filter module in the CPU/PA module is removed and a Filter Switch Module is installed in the signal path. Through the SPI bus the CPU controls the Filter Switch Module. The module can hold up to 8 filter boards, hence enabling the system to transmit on up to eight different bands. Additionally an attenuator module can be installed in the Filter Switch Module allow driving of a non resonant antenna. Again fixed and mobile operation is possible. In mobile applications usually a smaller number of bands will be chosen, optimizing probability to be heard at all.



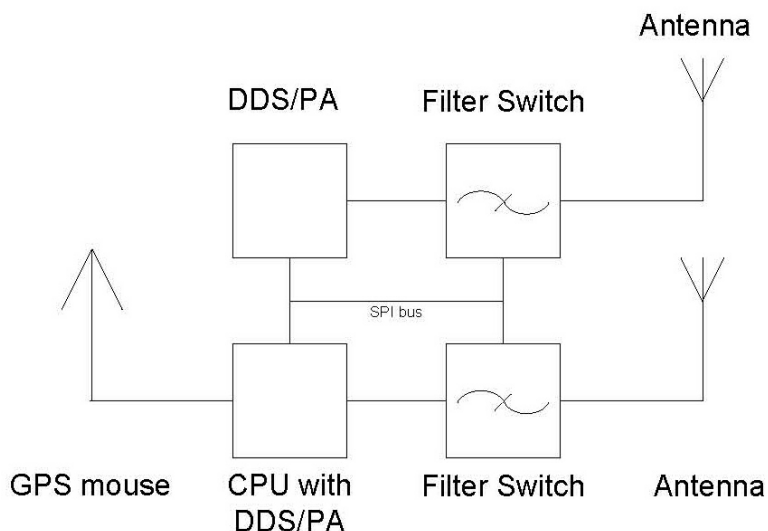
### Multiband Configuration with Attenuator Switch

Especially for fixed beacon operation transmission with variable power levels on multiple bands is desired. In this configuration the multiband config is amended by a Attenuator Switch Module. This module can hold up to 4 attenuator boards and is controlled by the CPU through the SPI bus.

400px

### Multiband Configuration with Multiple DDS/PA Modules

When running the beacon in Multiband config with a filter box with 8 boards installed, one will only reach a TX time of 12,5%. To increase the TX time to 25% (or higher) with still covering 8 bands (or more) additional DDS/PA modules with individual Filter Switch Modules can be driven from a single CPU. These signal sources can be attached to different antennas as shown, or through a LPF/HPF signal combiner into a single antenna.



### MEPT CPU Modul

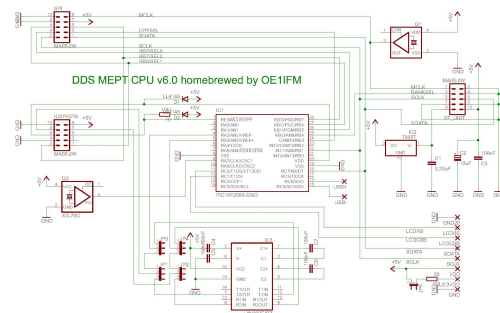
The main module holds the CPU with USB and GPS serial interface, the master oscillator and one DDS with a 15W PA module. It can be run stand alone and accepts one filter module on the RF unit board.



Main Modul  
Innenansicht



Main Modul  
Innenansicht



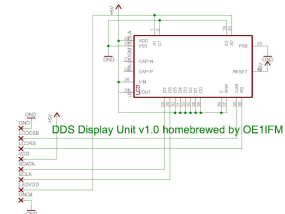
MEPT CPU board circuit



GPS Satelliten Suche



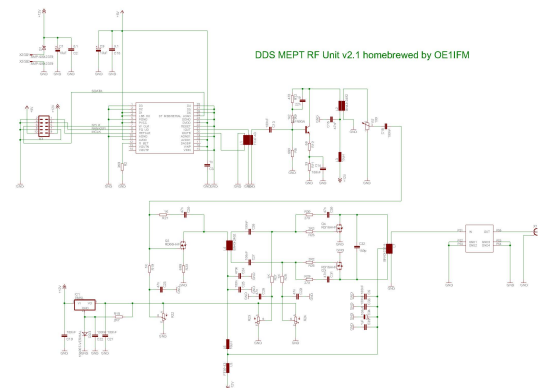
Warten auf  
Sendeslot



MEPT Display board circuit



Auf Sendung mit  
Frequenzanzeige



MEPT DDS & PA board circuit

MEPT switch module

Weiter Informationen: <http://www.oel1fm.at/>