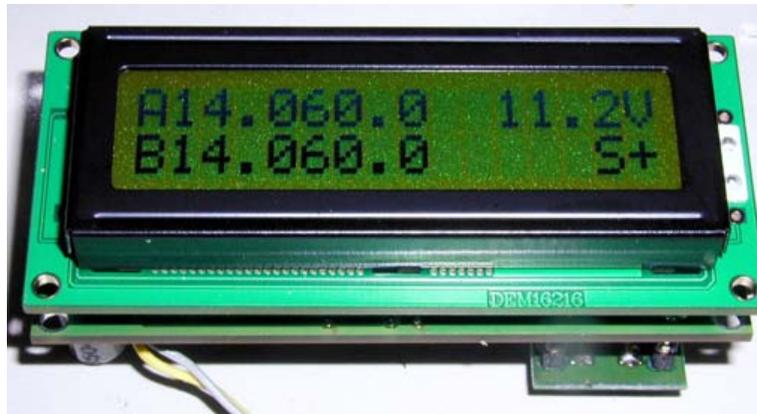




# DL-QRP-AG



## DL-QRP-AG Uni DDS

## Unpacking and Inventory

Preventing Electro-Static Discharge Damage Problems caused by Electro-Static Discharge (ESD) may be very difficult to troubleshoot because damaged components may still operate somewhat rather than fail completely. We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.

Wear a conductive wrist strap with a series 1 megohm resistor. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench. DO NOT attach a ground directly to yourself as this poses a serious shock hazard.

Make sure your soldering iron is ESD-safe and has a grounded tip

Use a grounded anti-static mat on your work bench.

## Inventory

Please do a complete Inventory using the part list. If you miss any part (this happens sometimes although we try to do our best) send us an email and we will send you the missing part (s) immediate.

## Soldering

This is hopefully not your first encounter with the soldering iron. Should it be, or if this is your first semiconductor project, you will benefit from reading the following section.

## Printed circuit (pc) boards

Most of our pc boards are two layered and the holes plated through. That means no need for soldering on the component side, - and that you shouldn't solder on the component side!. Especially beginners tend to use all too much solder. With modern pc boards, a soldering mask reduces the

space for solder.

## Solder

We suggest that you only use modern 0.5 mm electronics solder for modern pc boards with solder masks. 1 mm solder should only be used, when no soldering masks are present. The use of soldering honey, soldering water or other old fashioned soldering aids is good for soldering water piping and should not be used for pc boards. Modern electronics solder contains a core of resin, so no further soldering help (Peter: what is the english word for flussmittel???) is necessary.

Several alloys are usable. The large content of poisonous lead, means that you must follow some safety regulations. Keep your nose out of direct smoke, as the smoke has a very high lead content. For industrial use, point ventilation is used, but this is expensive.

„Environment friendly“ solder is no good. The cheapest and most used is an alloy named Sn64Pb36 containing 64% tin und 36% lead.

Alloys with 2% copper or silver melts at lower temperatures, makes soldering easier, and gives shining soldering points. Electrically it doesn't mean any difference, but it gives the home brewer some pride. Whether silver or copper makes no great difference, except in price. Hams use solder sparingly. At courses I have seen many rolls of solder, obviously inherited from grandfathers. Don't throw the old stuff away. Enclosures can be soldered with it or gutters... In kit building you should avoid it though, to avoid looking for cold solderings and solder bridges.

## Soldering irons:

Use a soldering iron with an effect of 50 to 80 W if possible. 15 or 30 W irons are only for masochists. Optimally use a soldering station with a low voltage supply and potential equalization. We use several sensitive parts, which can be damaged by insufficient grounding of the tools.

Good soldering stations have become cheap. I have had bad experiences with old soldering iron with tips fastened with M4 screws. With these, the tip is often with bad contact to the heating element and they often have a bad heating.

Tips should be modern machined versions, the oldfashioned hand forged copper or welding wire tips are insufficient.

Keep the soldering tip clean. Use a wet sponge or cloth to clean the tip regularly during work.

For pc board soldering the ideal is a 0.8 mm pencil tip. On the ground areas this should be exchanged for a hammer tip to give more heat. Only heat the soldering spot enough for making a good contact. A small vice to hold the pc board makes work easier.

A good soldering looks like this:

GOOD	BAD
ideal: the soldering point is round and concave.	Solder is put on till not room for more

Touch pc board and component with the soldering tip at the same time. After one or two seconds supply solder, and see the solder flow. Then pull the soldering tip away.

Resist the urge to fill the soldering point up with solder. Too much solder gives problems, as you will experience solder bridges on tight pc boards. All components are to be soldered as close to the pc board as possible. This isn't an esthetical question, but a high frequency need. Resistors have to lie flat against the pc board, when they aren't to be mounted standign. Capacitors also belong close to the pc board. In other word: No parts with long leads.

### Components

Resistors and capacitors are the most common parts in home brewing. This seems like a too simple theme, but there are some points to beware.

### Resistors

Both fixed and variable resistors are used in our kits. The fixed resistors kann be either carbon or metal film types. The value of the resistors is marked with colour coded rings on the resistor body. Printed numbers are only found on very old resistors. Metal film resistors are used, when there is a need for very low tolerance values. In most RF uses, carbon film types with a 5% tolerance are sufficent. If a 1% metal film resistor is needed, we will explicitly state it in the parts list. In the kits you will often find 1% resistors, even when not necessary. This stems from stocking decisions, as it makes our stock less if we gradually change to metal film resistors, even though they are a little more expensive.

The difference between metal and carbon film resistors are noted in two ways: Metal film resistors mostly have a blue body colour, and they also

have one more colour code ring because of their higher precision. Mostly means, that this isn't always true. So please measure resistors prior to soldering them, if in doubt!

Most often 0.5 W resistors are used. If a carbon film resistor is indicated, you can always use a metal film resistor instead.

Variable resistors comes as trimmers and as potentiometers. Trimmers are only adjust during trimming and are mostly put directly on the pc boards. Potentiometers are usually reachable from the outside. The most common types of trimmers are PT6LV oder PT10LV. The 6 means 6 mm diameter, the 10 means 10 mm diameter. LV means, that the trimmer is meant for horizontal mounting, that is to be adjustet from above. You will find round and square types. The standard trimmer has a 270 degrees adjustment angle. In some kits we use 10 turn precision trimmer, which are tuned over ten turns of a screw. Modern nomenclature uses the measurement unit as a decimal sign:

1R = 1 Ohm

1k = 1 kilo Ohm (kOhm)

1M = 1 MegOhm (MOhm)

2R7 = 2,7 Ohm

1k5 = 1,5 kOhm

Values follow the socalled E row, chosen for a compromise between number of values and precision. The standard E 24 row might seem too coarse, but is usually sufficient for RF electronics:

10R,12R, 15R, 18R, 22R, 27R, 33R, 39R, 47R, 56R, 68R, 82R, 100R, 120R, 150R, 180R, 220R, 270R, 330R, 390R, 470R, 560R, 680R, 820R,1k 1k2, 1k5, 1k8, 2k2, 2k7, 3k3, 4k7k, 5k6, 6k8, 8k2, 10k 12k, 15k, 18k, 22k, 27k, 33k, 47k, 56k, 68k, 82k, 100k 120k, 150k, 180k, 220k, 270k, 330k, 470k, 560k, 680k, 820k, 1M

### Capacitors

Over the last years several norms for idenfication have evolved, spreading a lot of confusion. I will try to make some clarity of this.

One method, usual in industrial types, and especially for multilayer type (these are the small cushion shaped capacitors, mostly brown or blue), gives the capacitors as powers of ten. As basic value, even for high values,

the pF (picoFarad) is used. The code consists of 3 figures, where the last figure gives the number of zeroes:

100 = 10 und 0 zeroes = 10pF  
= 10 and 1 zero = 10 0pF  
= 10 and 2 zeroes = 10 00pF = 1nF  
= 10 and 3 zeroes = 10 000pF = 10nF  
= 10 and 4 zeroes = 10 0000pF = 100nF

In another system, the decimal denominator is used as a decimal sign:

1p5 = 1,5 pF  
2n2 = 2,2 nF

In stead of the pF, you will often find a J. The J means that it is a capacitor with a 5 % tolerance. 100J means 100 pF +/- 5% and 150J means 150 pF +/- 5%.

Other tolerance denominators are:

B ±0,1pF	J ±5%
C ±0,25pF	K ±10%
D ±0,5pF	M ±20%
F ±1pF (if > 10pF then ±1%)	S -20...+50%
G ±2pF (if > 10pF then ±2%)	Y 0...+100%
H ±1,5pF	
	Z -20...+80%

Some of these are so rare, that I haven't seen them. 5% is the most common value. This is mainly used for disc capacitors.

Film capacitors usually have the µFarad as basic unit:

0,22µF = 200nF  
0,033µF = 33nF  
0,0015µF = 1,5 nF

Ceramic capacitors often have an additional colour coding, most often showing the temperature coefficient. To us the most important are a black stripe meaning NPO, a yellow meaning NP220 or a violet meaning NP750. Others exists, but are rare in practice.

The different application areas of different types of capacitors are very important to us. The basic materials of the capacitor determines primarily the Q of the capacitor. Ceramic capacitors often have a high Q, and are preferred in resonant circuits. Ceramic capacitors most often come as discs or small rectangles.

Multilayer capacitors come as NPO versions, also with a high Q. They are lacquered and their printed values aren't so easily damaged as the print on ceramic capacitors.

Most multilayer capacitors are formed as cushions. They are hard to distinguish from X7R or ZU5 bypass capacitors on their exterior. X7R and ZU5 have lesser Qs, and are good for bypass to ground, but not very good dc wise.

The most common values are between 1 and 100 nF.

Those who order capacitors (or salvage them from old devices), will have to mind which capacitor is used for which purpose. In the kits, developers and QRProject have worked this out.

## And when you don't know how to proceed?

Then you turn to me! Easiest via email to [support@qrpproject.de](mailto:support@qrpproject.de) or by telephone to(+46)/(0) 30 859 61 323 or skype QRPproject.



To give you an idea of whom you are working with, I will present myself briefly:

DL2FI, Peter, called QRPeter.  
Ham operator since 1964.

I have been a passionate home brewer and QRP operator for a long time, and it is my belief, that the best chance of ham radio is the rediscovery of home brewing. My motto: True ham radio comes from doing ham radio as it was.

Based on this belief, I founded the DL-QRP-AG, the German QRP Club, in 1997. This work

group has grown to some 2300 active members, who have developed several good devices to push the international success of QRP and home brewing. Since January 2002 I also spend much time as a local chapter head of the Berlin DARC Ham Radio Club, as I find it better to do something myself than just complain. The international QRP movement have inducted me into their QRP Hall of Fame.

I wish you much fun  
72/3 de Peter, DL2FI

The DL QRP AG universal DDS  
Design of hard and software: Andreas, DL4JAL  
Kit realization: QRPproject team

## History

When Andreas built a Miss "Mosquita" kit of DL QRP AG for his own use in 2004, he was so impressed by the efficiency of this little transceiver that he decided to increase its value by adding a modern DDS VFO. At the Jena meeting of the German QRP Club DL QRP AG he introduced his DDS-Mosquita the first time. Club members called his „Miss Mosquita“ immediate "Madam Mosquita" due to the much higher comfort it offered. At the same time the Club developers group around DK1HE just where in progress with the next Club Project, the BCR, Blue Cool Radio. The possibilities of the new Mosquita Mono Band CW transceiver looked so great that we asked Andreas to implment his Monoband DDS into the 4 Band BCR project. DK1HE and DL4JAL become a team and started to develop BCR together. After the successful completion of the work on the BCR as a kit, Andreas decided now a backtransfer of all the fine things he realized in the BCR to his Mosquita project and after a while he ended up with the now so called Universal DDS. It can be used for most existing QRP Transceiver Projects to give them the comfort and the features of a brandnew modern Transceiver

## The DL-QRP-AG UniDDS

The DL-QRP-AG UniDDS is a universally usable DDS VFO for Monoband receiver or transceiver of all sorts of type. It is available in two different variants which differ only by frequency range and current consumption. Complete electronics finds place on a board of the size of the used 2x16 LCD display-board and can be screwed directly on the Display board. The DDS itself and the Clock Generator are placed on a little daughter board. This trick makes it possible to deliver ready built up and checked DDS assemblies for those which do not believe themselves capable of the soldering work on the DDS chip.

The difference between the two versions are given by the used DDS Chip and the Clock Generators. In both versions the newest generation of DDS is used giving improved low current consumption and considerable low spurious.

An AD9834 is used with 24 MHz discreet Clock in version A. This combination enables DDS VFOs up to a maximum frequency of 10 MHz, the current we need is as low as 14 mA!

In version we use an AD9834 with 50 MHz Clock. This one enables VFOs up to 20 MHz at 25 mA current.

Common to both variants:

- Size only 80 x30x35mm including display
- All parameters in nonvolatile memory, directly programmable by a setup menu without external computer
- Freely programmable start frequency within the specified area
  - Double VFO A/B
  - RIT
  - XIT
  - SPLIT
  - Scan between adjustable corner frequencies, independently of the adjusted VFO start point.
  - Built-in electronics keyer. Change of the speed by external Potentiometer, speed shown in WPM on the display.
  - Automatic system for backlight (disconnectable)Display. As soon as the rotary encoder is touched, backlight will be switched on. Backlight will be switched off after 2 seconds after last operation.
  - 3 step rates: 10 Hz, 50 Hz, 1 kHz. Resolution of frequency display is switched over automatically according to the chosen rate.
  - Digital S metre in the display processes analogous positive AGC Voltages.
  - Optional digital power and SWR in the display if the QRP Club Micro SWR measuring head is installed.
  - Digital indication of Battery Voltage
  - Set-up menu with initial program loader and automatic generated parameter sentence for standard equipment like Mosquita, sparrow, SW+, SST and many others.

## IF Shift:

The UniDDS can be adjusted to all conceivable combinations of the sending and reception frequency within the given frequency range

Transmitter	Receiver
DDS on final frequency	DDS on final frequency = Directconversion

DDS on final frequency	DDS on final frequency - IF
DDS on final frequency	DDS on final frequency + IF
DDS on final frequency-IF	DDS on final frequency - IF
DDS on final frequency +IF	DDS on final frequency +IF

Due to this flexibility it is possible to economize some equipments by leaving out the TX Mixer.

The output level of the UniDDS is about 200 mVss. There is no Lowpassfiltre post-connected to the UniDDS, to make it as flexible as possible, so everyone has to take care to some type of filtering at the input side of his own project to keep the harmonic level low. For all QRPproject kits this has been done by QRPproject.

Set-up for standard configurations:

To make the parameter input easier for the user, the UniDDS set-up uses key number input for standard designs. The key numbers of all groups have to be added arithmetical. The sum of them can be written into the setup and the DDS controller then takes on all attitudes independently.

#### Group 1 Display

- 0 = 160m = 1,8.... MHz
- 1 = 80m = 3,5... MHz
- 2 = 40m = 7,... MHz
- 3 = 30m = 10,1... MHz
- 4 = 20m = 14,... MHz (Take care of maximum DDS-Frequency)
- 5 = 17m = 18,... MHz (Take care of maximum DDS-Frequency)
- 6 = 15m = 21,... MHz (Take care of maximum DDS-Frequency)
- 7 = 10m = 28,... MHz (Take care of maximum DDS-Frequency)

#### Group 2: VFO for RX

- 0 VFO - IF
- 8 VFO + IF (if VFO < IF)

#### Group 3: VFO for TX

- 0 Calculated Output during TX VFO +/- IF (with TX Mixer)
- 16 No Calculation VFO +/- ZF. VFO = Output Frequency

#### Gruppe 4 DDS Taktfrequenz

- 0 DDS-Clock 50Mhz (AD9834)
- 32 DDS-Clock 24Mhz (AD9833)
- 64 DDS-Clock 25Mhz (AD9833)

#### Group 5 Standard IF Filter Types

- 0 IF 3,999 Mhz (built from 4,000 MHz Xtals. Normaly the filterfrequency is about 1 kHz below the single Xtal frequency, can be adjusted later exactly.
- 128 IF 4,9145 Mhz (built from 4,9152 MHz Xtals)

An example:

I need a DDS for my 40m Mosquita transceiver, what do I need?

- |  |    |
|--|----|
| 1. 40m                                 | 2  |
| 2. VFO - IF                            | 0  |
| 3. VFO - If also in TX mode            | 0  |
| 4. DDS-Clock = 24Mhz                   | 32 |
| 5. IF Xtalfilter using 4,000 MHz Xtals | 0  |

-----  
Sum: 34  
-----

I store the number 34 into the Setup. After saving, the controler doesd an automatic reset, all parameters for my 40m Mosquita are set. My Universa DDS has become a Mosquita 40 DDS. The Display shows the 7030,00, the Initialfrequency inside the 40m band (may be changed via Setup Menue) The DDS is generating 7030-3,999=3,031 MHz which is needed to receive on 7030, if I switch to TX the DDS generates the same frequency because Mosquita is using a TX Mixer.

Fine corrections can be done in the Setup Menue. You may tune the Ckock frequency or the IF frequency if you want.

#### Using the UniDDS

All functions of the UniDDS are done by shatft-encoder, it´s internal switch and the telegrafie speed potentiometer.

If you press the shaft of the shaftencoder shortly, the internal switch causes a change of frequency rate in sequential order. Everytime you power on the UniDDs it sets the rate to 50 Hz per step. Every time you shortly press the rate switch, it will switch in the next sequential rate. Rates are: 50HZ, 1kHz, 10Hz. The choosen rate is shown in the display.

#### Main Menue

Pressing the shaftencoder switch longer the 0,5s will switch the Micropro-

cessor into menu mode:

- | Menu Item      | Function  |
|----------------|---|
| 0 break.       | leave the menu without saving   |
| 1 VFO A/B      | Change VFO A <> VFO B   |
| 2 light on/off | Backlight on /off (If Menu displays ON and you press the switch, Backlight will be switched ON!   |
| 3 light auto   | Time function for backlight. If on, backlight will be switched on automatically everytime you change the frequency. It will switch off 2 seconds after last operation.  |
| 4 scan         | A scan between frequency A and frequency B will be done. Start and End of the scan are stored in EEPROM independently from the initial frequency.   |
| 5 SETUP        | Entry of Setup menu. Pressing the shaft key during power on also enters the Setup Menu.   |
| 6 keyer        | Built in electronic keyer for iambic paddle ON/OFF (stored in EEPROM)   |
| 7 tune         | Tx switched into TUNE mode. The Display shows the SWR Digital and analog as a bar and the power digital. (Only if the Micro-SWR option is installed) SWR is shown in fine resolution between 1.0 and 2 and in coarse resolution between 2 and 9,9 |
| 8 xit1k        | DDS switched to XIT (Transmitter incremental tuning) exactly 1 kHz above the RX frequency. RX frequency is shown in display row one, TX is shown in display row 3. The display left of the frequency  |

8

changes from A/B for VFO A/B to r/x for receive and transmit. Changing the frequency now only changes the TX frequency shown in row 2 of the display.

- 9 xit2k  
Same as before, but starts with a shift of 2 kHz.
- 10rit  
Rit ON/OFF. Upper row (row 1) of display shows RX frequency, lower row shows TX frequency. When switched to rit, the RX frequency is copied to the lower row. The display designers are switched to lower case to indicate RIT mode.

Holding the shaft encoder switch during power on causes the controller to jump into setup.

### The Setup Menu:

Standard Menu step 5 brings up the Setup menu

- 0 Setup break  
End SETUP-Menu, causes restart
- 1 DDS-Clock  
If the output frequency is not exactly what it should be, the Clock frequency is not exactly what it should be. Here you can exactly adjust the clock frequency. Do this very carefully, you can misalign the DDS completely. The cursor below the numbers shows which part is changed by rotating the shaft encoder. Big steps are at the left side. Pressing the Shaft encoder switch moves the cursor. If the cursor is right of the numbers, you can choose save or cancel with the shaft encoder. Save will save the new number.
- 2 VFO-A (Hz)  
Chooses initial frequency of VFO A at power on
- 3 VFO-B (Hz)  
Chooses initial frequency of VFO B at power on

4 ZF (Hz)

Here you can choose the exactly IF. During adjustment, the DDS generates the chosen frequency, This can be very helpfully while adjusting the IF section of a receiver.

5 scan-begin

Start frequency for scan mode.

6 scan-end

End frequency for scan mode

7 S-Meter calibration (works only if positive AGC Voltage is supplied)

Point 1: Start with zero signal (Dummy load at antenna jack. Hex value of zero signal is shown in the display. pressing the shaftencoder key leads to point 2. Apply 50 uV to Antenna jack and press the shaft encoder key. Now the processor will calculate the S-Meter curve, store it and leave the menu point.

8 VFO +/- ZF

IF Shift. + adds the IF to the VFO, - subtracts the IF to the VFO

9 TX +/- ZF

On enables IF shift in TX mode also, OFF disables IF shift in TX mode

10 def. config

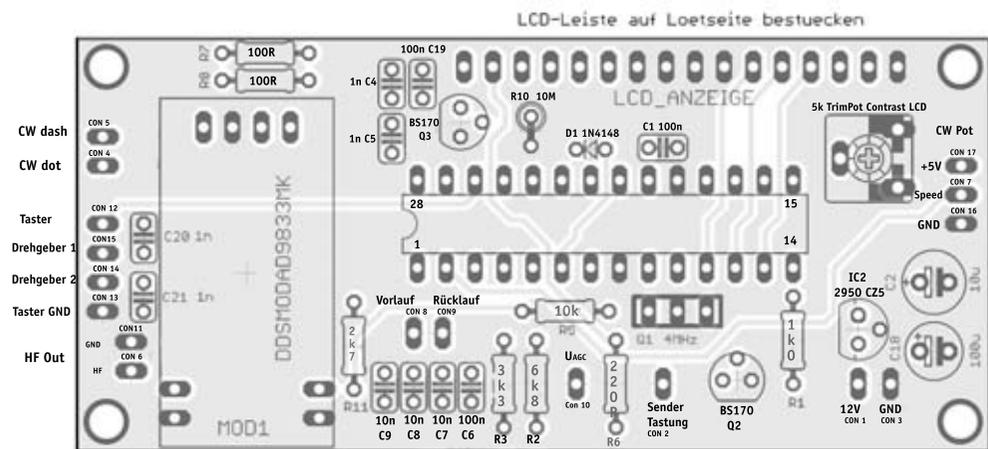
Base loader for the UniDDS. This Setup Point appears automatically at the very first power on, it can be chosen anytime you want out of the setup menu. Here you can do the complete configuration by a simple number calculated based on the description on page 7.

## Assembling the DL-QRP-AG UniDDS

Start with the controller PCB. Remember that you have to handle ESD sensitive parts, otherwise you may destroy them. Use the ESD safety set or touch a blank grounded metall everytime before you touchh a part.

Start wit the lo profile parts as ususal.

Place the PCB on your work bench as shown in the picture, begin at the upper left side.



- |         |   |         |             |
|---------|---|---------|-------------|
| [ ] R7  | 100R  | [ ] R8  | 100R        |
| [ ] C20 | 1nF (102)                                   | [ ] C21 | 1nF (102)   |
| [ ] C4  | 1nF (102)                                   | [ ] C19 | 100nF (104) |
| [ ] C5  | 1nF (102)                                   | [ ] R10 | 10Meg       |
| [ ] D1  | 1N4148                                      | [ ] C1  | 100nF (104) |
| [ ] R11 | 2k7   | [ ] C9  | 10nF (103)  |
| [ ] C8  | 10nF (103)                                  | [ ] C7  | 10nF (103)  |
| [ ] C6  | 100nF (104)                                 | [ ] R3  | 3k3         |
| [ ] R2  | 6k8   | [ ] R5  | 10k         |
| [ ] R6  | 220R  | [ ] R1  | 1k0         |
| [ ] C18 | 100uF (Attention, polarity, long Pin =Plus) |         |             |
| [ ] C2  | 10uF (Attention, polarity, long Pin =Plus)  |         |             |

Now the socket for the Microprocessor. Take care to place the notch at one end as it is shown in the picture to the left side. Press the socket towards 10

the PCB and solder 2 pins at opposite ends. Check if the socket is placed absolutely flat on the PCB. If not, resolder. If ok, solder all remaining pins.

[ ] Socket for PIC, 28 PIN

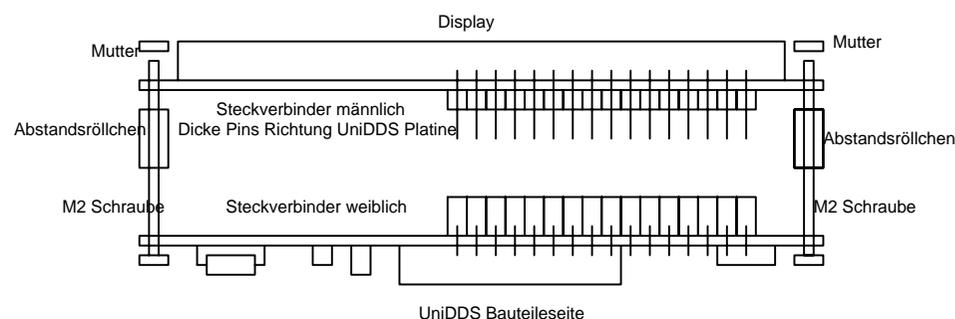
Solder now the trimmer potentiometer for the LCD contrast adjustment.

[ ] 5k PT6 Trimpot

Now the 3-Pin Ceramic Resonator Q1

[ ] Q1 4MHz

The female conector must be placed **on the solder side of the PCB**. it will be soldered on the parts side. Screw The controller PCB and the display complete together and adjust it before you solder the conector. Compare



the photograph at page 19. If PCB and Display fit exactly, solder the conector PINS.

[ ] Connector male, Display side

[ ] connector female, Controller side

Disassemble Display and controller pcb and assemble the remaining parts. Don't mix up the transistors with the integrated voltage controller in the next step, they all have the same housing (T092)

[ ] Q3 BS170 ATTENTION, Extremely ESD sensitive!!!!

[ ] Q2 BS170 ATTENTION, Extremely ESD sensitive!!!!

[ ] IC2 2950CZ5 Low Drop Voltage Regulator

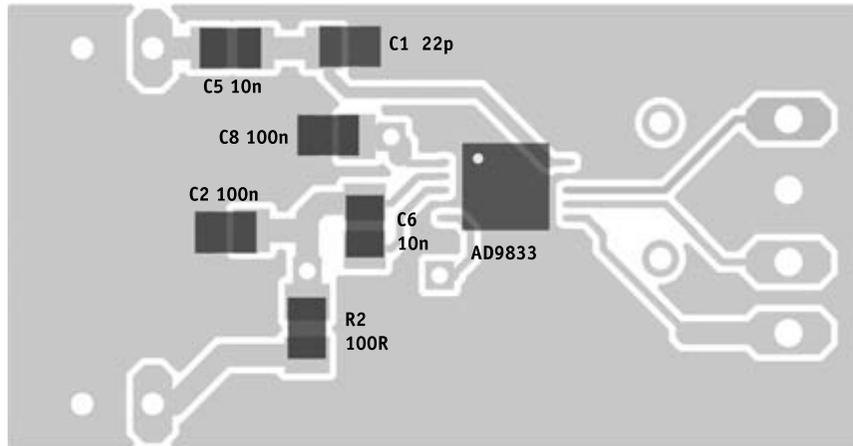
## Do NOT yet put the PIC into its socken

The DDS module itself follows. If you have got a ready assembled and tested DDS Unit from QRPproject, you may jump to the next chapter at page 13.

If you assemble the DDS by yourself, choose your Version A at this page or B at page 12

### DDS Unit Version A

Version A can be used between 1 and 10 MHz. Its heart is the integrated DDS IC AD9833. If you have no experience with SMT soldering, please read some advise how to solder SMD Start with the lower side of the PCB because it is much harder to solder the DDS chip if there are any other parts already installed. Place the PCB as shown in the drawing and start with the DDC IC.



Place it exactly above the soldering pads, white point marker shows to the upper left. Solder to opposite corners. Double check if all Pins are middle above their solder pads. All ok? If so, solder the remaining pins. No problem if some pins are soldered together!!!! If you have soldered all pins, take a piece of high quality desolder braid, put it flat on one row of pins and press the tip of your solder iron also flat on the solder braid. wait 2 seconds until you see older flowing in the braid and remove the solder braid together with the iron. Remove it just upright, if you move along the PCB you may destroy the pins of the IC. Do the same with the other row of PINS

DDS IC AD9833

Now solder the remaining parts:

- |  |  |
|--|--|
| <input type="checkbox"/> R2 100R (101) | <input type="checkbox"/> C2 100nF (104)    |
| <input type="checkbox"/> C6 10nF (103) | <input type="checkbox"/> C8 100nF (104)    |
| <input type="checkbox"/> C5 10nF (103) | <input type="checkbox"/> C1 22pF (22j,22p) |

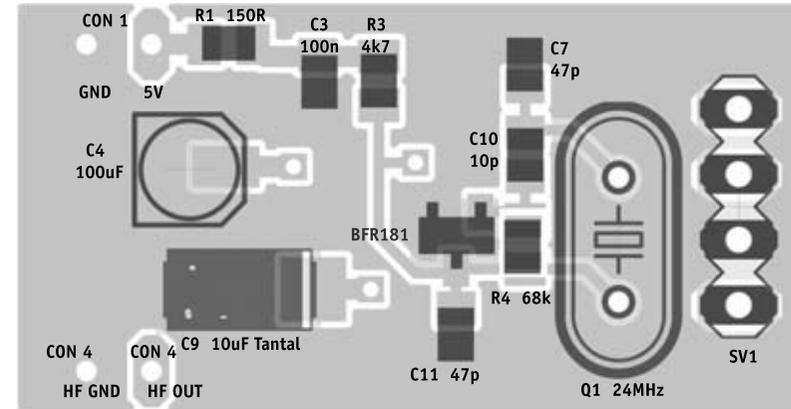
turn around the PCB and solder all parts there.

- |  |  |
|--|--|
| <input type="checkbox"/> R1 150R (151) | <input type="checkbox"/> C3 100nF(104) |
|--|--|

- |   |   |
|---|---|
| <input type="checkbox"/> R3 4k7 (473)       | <input type="checkbox"/> C7 47p (47j, 47p,) |
| <input type="checkbox"/> C10 10p (10j, 10p) | <input type="checkbox"/> R4 68k (683)       |
| <input type="checkbox"/> C11 47p /47j, 47p) | <input type="checkbox"/> C4 100uF           |
| <input type="checkbox"/> T1 BFR181          |   |

Maybe the 100uF Cap is a little bit large to fit the solder pad. If so, scratch a little bit of the solder mask left to the cap and solder it there.

- C9 10uF Tantalum (Attention, the BAR at a Tantalum Cap marks



PLUS)

Now the Xtal.

- Quartz 24 MHz

The installation of the connectors will be described later on. Your DDS Modul is ready, go on at page 13

## DDS Baugruppe version B

Version A can be used between 1 and 20 MHz. Its heart is the integrated DDS IC AD9834. If you have no experience with SMT soldering, please read some advise how to solder SMD Start with the lower side of the PCB because it is much harder to solder the DDS chip if there are any other parts allready installed. Place the PCB as shoed in the drawing and start with the DDC IC. Place it exactly above the soldering pads, white point marker shows to the upper left. Solder to opposite cornes. Double check if all Pins are middle above their solder pads. All ok? If so, solder the remaining pins. No problem if some pins are soldered together!!!! If you have soldered all pins, take a piece of high quality desolder braid, put it flat on one row of pins and press the tip of your solder iron also flat on the solder braid. wait 2 seconds until you see older flowing in the braid and remove the solder braid together with th eiron. Remove it just upright, if you move along the PCB you may destroy the pins of the IC. Do the same with the other row of PINs

[ ] DDS IC AD9834

Solder the remaining parts, start in the upper left corner:

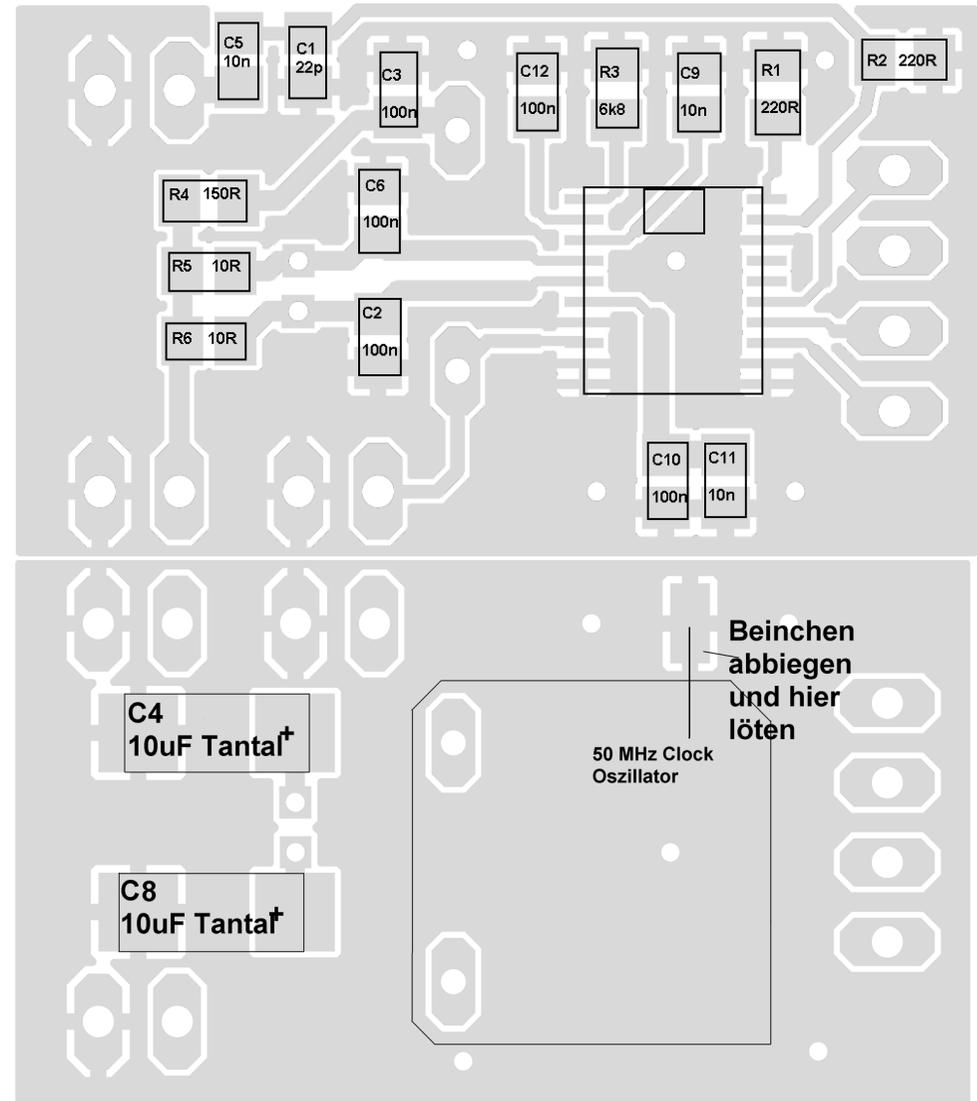
[ ] C5	10nF (103)	[ ] C1	22pF (22, 22p, 220)
[ ] C3	100nF (104)	[ ] C12	100nF(104)
[ ] R3	6k8 (683)	[ ] C9	10nF (103)
[ ] R1	220R (221)	[ ] R2	220R (221)
[ ] R4	150R (151)	[ ] C6	100nF (104)
[ ] R5	10R (10)	[ ] C2	100nF (104)
[ ] R6	10R (10)	[ ] C10	100nF (104)
[ ] C11	10nF (103)		

Turn around the PCB and solder the integrated clock oscillator. To place it correct, you must orientate the rectangular edge of the housing to the lower right side as shown in the picture. The upper right Pin of the clock oscillator must be bent off in an riht angle, it mus be soldered flat to the ground pad. The other pins must be soldered at the oposite side of the PCB.

[ ] 50 MHz Clock Oszillator.

Now th e2 tantalum caps. Remember, Tantalum caps have the PLUS side

12



marked by a bar.

[ ] C4	10uF Tantal
[ ] C10	10uF Tantal

## Preparing and Installation of the DDS Module.

(beginning here both, types of selfmade DDS Modules use the same procedure )

Use a cutter to isolate 2 connectors with 2 pins and 1 connector with 4 pins out of the male and female connectors provided with the kit. Place the female connectors into their places on the controller board. Place the male connectors with the thicker pins into the female connectors. Place the DDS Modul on the thinner pins of the connectors.

**Attention: with both versions of the DDS module you must see the DDS chip if you look to the assembled boards. Dont install the module reverse**

Adjust the Module. All pins must be orientated rectangular on the controller board, the Module should have the same distance to the controller at any side. Solder the connector Pins at the controller and at the Module PCB. Hauptplatine alle 6 Pins der Steckverbinder.

[ ] Steckverbinder komplett

Now install the remaining Quartz. Take care to install it about 1/2 mm above the PCB to avoid shorts by excessive solder.

[ ] Quartz

### Beginning installation of the ready made DDS Modules

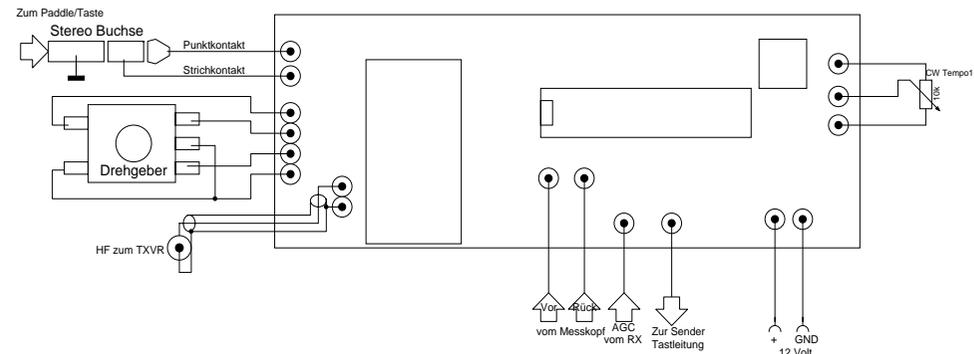
The ready made modules have the connectors already installed because they are still tested. Use a cutter to isolate 2 female connectors with 2 pins each and 1 female connector with 4 pins and put them into the corresponding holes on the part side of the controller board. **Do not solder now!**

Now place the DDS Module into the female connectors and adjust it to give the same distance to the controller board at each side.

Solder the connector pins at the solder side of the controller board now

### Starting here, same procedure for all DDS Modules.

Place the PIC controller into its socket on the controller board. Remember, the PIC itself is extremely ESD sensitive. The notch of the PIC looks into the direction where the DDS Module is.



All parts are placed now you can do the .

### First test of DL-QRP-AG UniDDS

Do another check the PCB before you apply any Voltage. Use a magnifier and really good light source to find solder joints, missing solder and other faults. If all is ok, you may connect the peripherals

To start the UniDDS you need following connections:

1. Power Supply - (10V-15V)
2. Shaft encoder with built in key
3. CW Speed Poti - Only if you want to test the internal keyer
4. Paddle or hand key - Only if you want to test the internal keyer
5. Uagc - positive AGC Voltage, only if you want to use the S-Meter
6. Key Line to transmitter
7. Vor/Rück Only if the optional Micro-SWR is installed.

Switch power on. We recommend a Powersupply with limited current for the first try. If you dont have it, use a 100 mA fuse instead. Even if you have built all well, you will mostly see nothing in the display until you have adjusted the contrast Potentiometer on the controller board. Is it impossible to set the display contrast, there must be a fault somewhere on the controller board. If all is ok, switch off and on again. For a short time you will see „DL-QRP-AG Uni DDS“ and the firmware revision number. A new unprogrammed DDS will jump into the basic setup as described at page 7, a programmed DDS will jump into receive mode..

To do a first test of an unprogrammed UniDDS, use the Mosquita Basic Parameter set. This is number 34 if you use the 24 MHz clock or number 2 if you use the 50MHz clock.

choose the number by using the Shaftencoder.

Move the cursor by pressing the shaftencoder switch to the left behind the numbers.

Choose Save by using the shaft encoder and press the shaft encoder switch

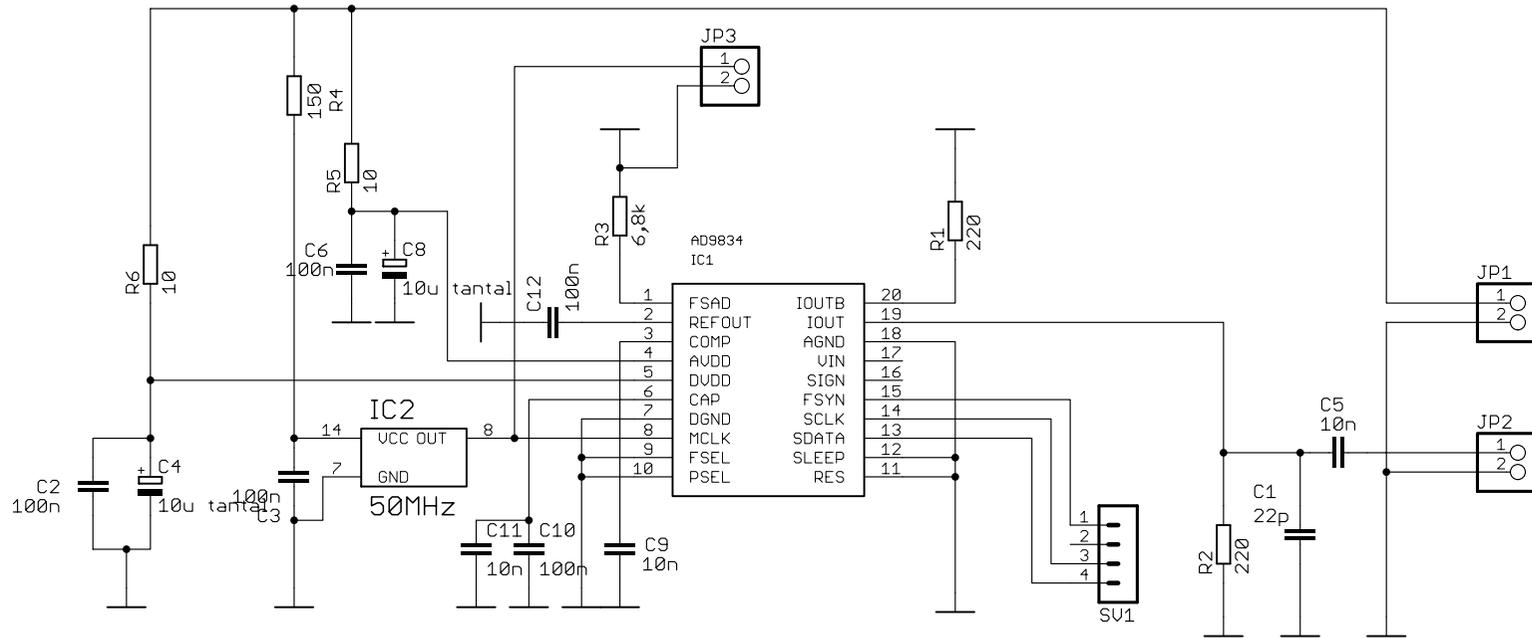
After reset, the display should show the frequencies for VFO A and B in the 40m Band, in the upper right corner the Voltage of the power supply and something undefined in the right lower corner because there is no calibrated S-Meter Value now.

At the RF output you should find an RF Signal. Its frequency should be

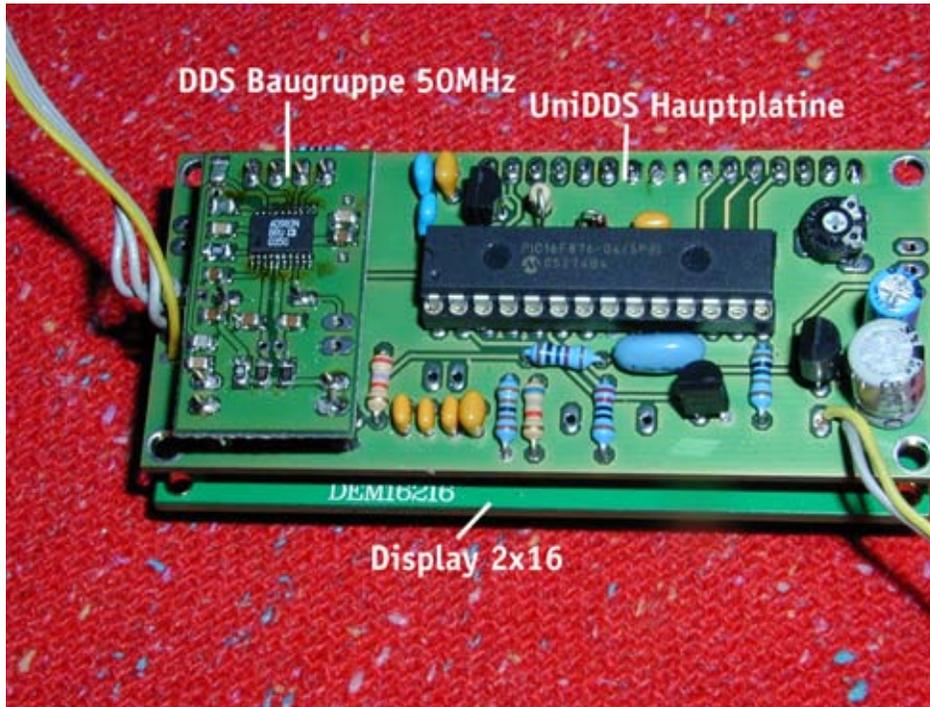
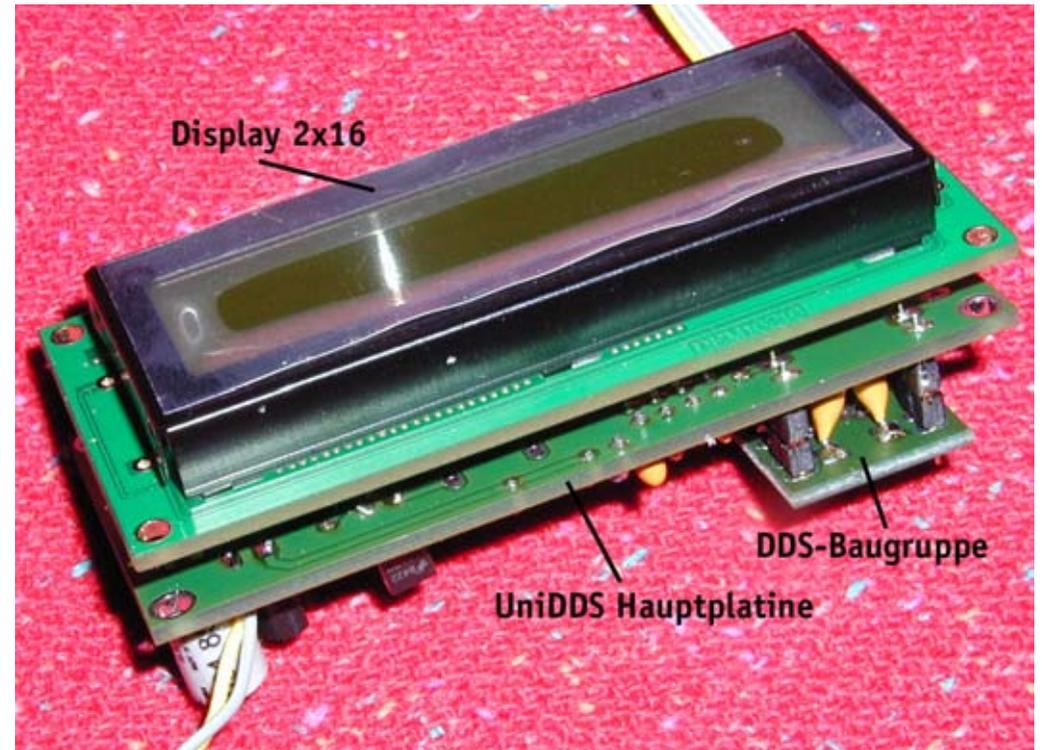
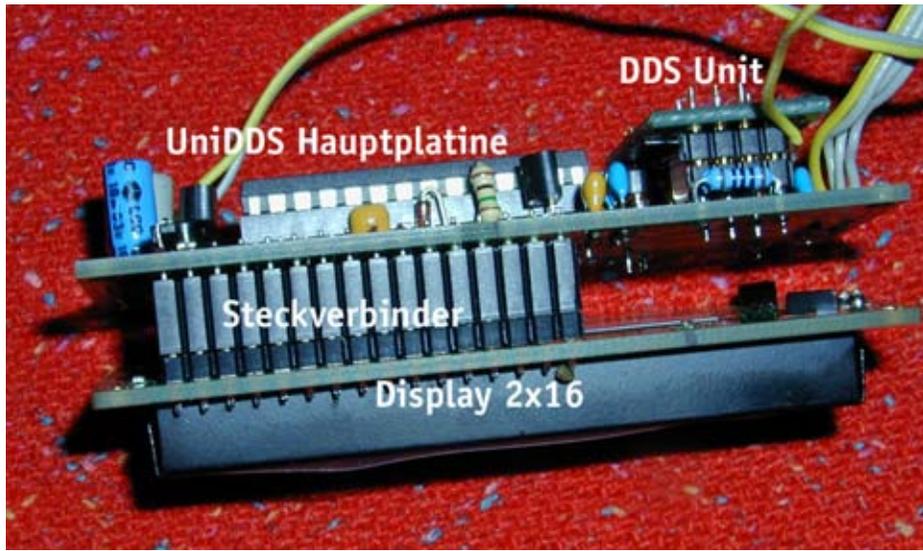
Displayed Frequency minus 3999 kHz





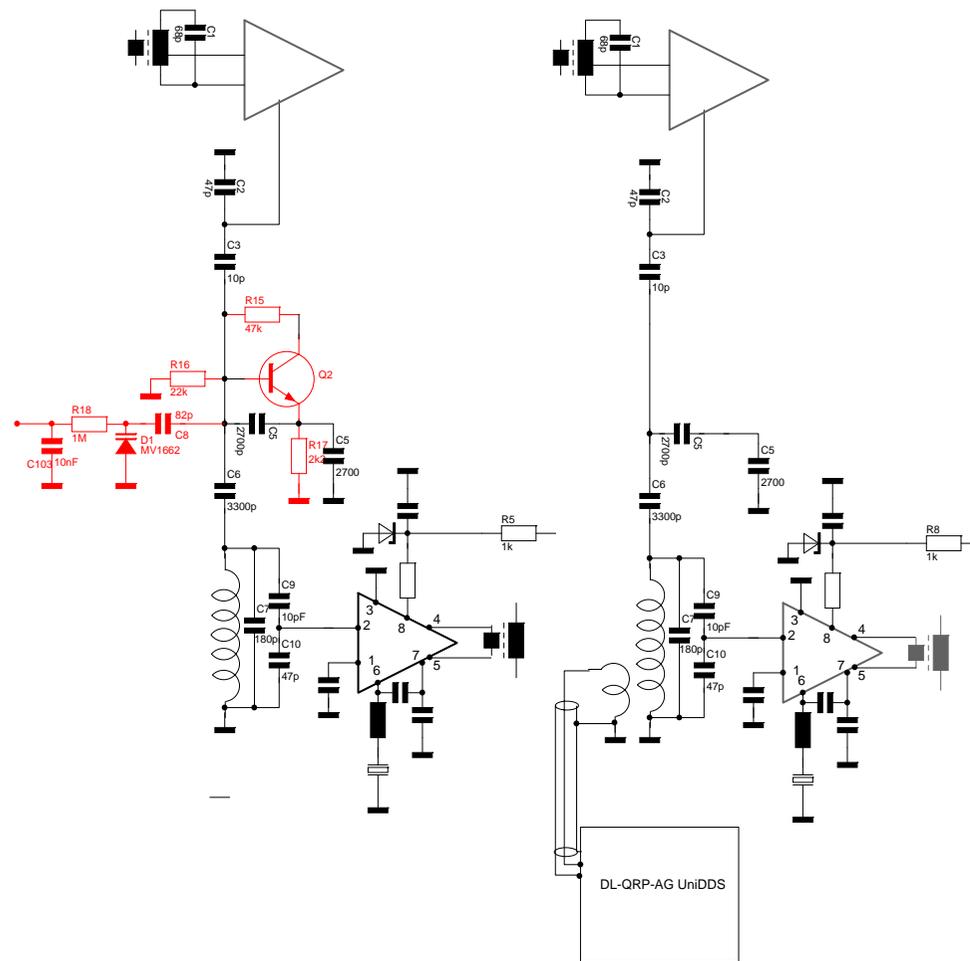


TITLE: oszineu	
Document Number:	REV:
Date: 11.08.2005 20:09:25	Sheet: 1/1



## Connecting of the UniDDS to an SW+ transceiver of Small Wonder Labs

Remove the VFO Transistor, the power connecting parts of the VFO and the Varicap. Now you can couple the UniDDS directly with a piece of coax and a link to the former VFO coil.



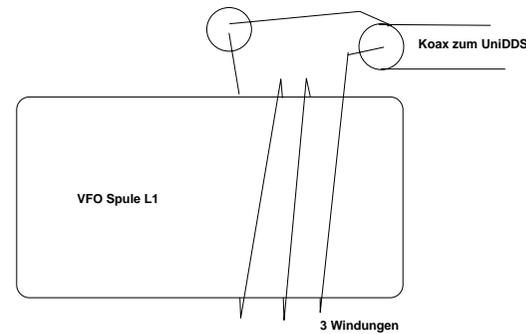
- |                          |             |                          |            |
|--------------------------|-------------|--------------------------|------------|
| <input type="checkbox"/> | R15 remove  | <input type="checkbox"/> | R16 remove |
| <input type="checkbox"/> | R17 remove  | <input type="checkbox"/> | C82 remove |
| <input type="checkbox"/> | C103 remove | <input type="checkbox"/> | R18 remove |
| <input type="checkbox"/> | D1 remove   | <input type="checkbox"/> | Q2 remove  |

Caps C7, C9, C10, C4, C5, C6 are not allowed to be removed because they belong to the resonate circuit. They will be used as a filter circuit instead of a VFO circuit now.

## RF Connection of the UniDDS

The output of the UniDDS will be coupled inductive by a Link coupling. Place the SW+ PCB on the working bench, the VFO coil is placed in the left part of the PCB.

Use 6cm of isolated wire. Remove 3mm of the isolation at one end. Solder this end to the ground lug just behind the Coil. Pull the wire through the torroid, then back above the outer part of the torroid and again forward through the torroid. The same again, back and for. Now you should have 3 new windings inside the torroid. Shorten the wire so that it ends some



mm before the torroid and remove 3mm of the isolation. Solder the inner conductor of a piece of coax (this must be long enough to be connected to the DDS) and the shield of the coax to the ground pad where the link coil started.

Connect the inner part of the other Coax end to the RF out pad of the Controller board and the

shield to a ground pad of the controller board.

That's all, now you only have to program the DDS Controller and you can use it.

Example SW+ 40:

Switch the UniDDS to Setup, go to def. config and use the keynumber 34 (most right digits) if you use the 24 MHz clock or 2 if you use the 50 MHz clock. Save the configuration and you are ready to use the SW+40 with UniDDS

Configuration numbers for other SW+:

- 80m 1 or 33
- 30m 3 or 35

20m 4 or 36

Now use the Setup Menue, ho to IF ( ZF) and choose and save::

80m: 7,999 kHz

30m : 7679 kHz

20m : 8999 kHz

Thats all.

Other connections:

:

Main power supply of the UniDDS directly to the main pwr supply connector

„Tastausgang“ of UniDDS directly to „key“ of SW+

If you would like to show the SWR and Power, you need the Micro SWR option. Connect connection Vorwärts / rückwärts (forward / backward) with the corresponding connections of the Micro SWR board.

Because the SW+ do not have anj AGC, the S-Meter cann option cannot be used. Connect a 1k Ohm Resistor between the UniDDS S-Meter port and ground.



