DDS Signal Generator Project Notes

This club project is put forward by Mike M0BLP. It is based on the work of Charlos Potma PA3CKR and information can be found at the URL:

http://www.geocities.com/CapeCanaveral/Lab/9595/ddssg.html

Mike has designed a 160mm by 100mm Eurocard double sided PTH PCB for this project and had ten boards professionally made. All the kits have been reserved by CDARC members so please don't email Mike asking if there are any kits left - there aren't. The kits cost £111.87. The DDS chips have now arrived. Technical data on the DDS chip can be found at this URL:

http://products.analog.com/products/info.asp?product=AD9850

The board uses two PIC16F84 processors and an Analog Devices DDS the AD9850. Most of the components are surface mount, so a magnifying eyepiece, a pair of tweezers and a fine tip soldering iron will be required.

Project Notes:
1) On the component overlay the anode of diodes D5 and D6 are indicated by a + symbol.
2) Elbow BNC connectors J5,8,9 & 10 should be RS part 112-2634. The part originally intended was Farnell\'s 886-439, but they have the PCB footprint shown in their catalogue incorrect.
3) As the PCBs do not have a solder resist you must remember to put appropriate insulation under the power supply heatsinks and under U10 the ADSL driver THS6002. Note that the THS6002 has a lump of metal exposed on its lower surface and this should not be allowed to come into contact with any of the PCB wiring.
4) The LCD module supplied is a Farnell 142-608 manufacturers part number TriMods-1537.
5) The holes for the resonator U5 are a bit of a tight fit. You may have to waggle the component a little to seat it properly.
6) Please be very careful to avoid solder splashes.
7) Do not fit any tall components to the board until the DDS chip is down as it\'s very difficult to solder it otherwise.

Modification List:
1) Change R4,5,6 & 7 to 1KOhm.
2) The inductor shield ground tabs for L1,2 & 3 are not connected to the ground plane of the PCB. You will have to solder blob them to the ground plane.
3) My 100MHz oscillator module was giving an output oscillation between +8V and -3V! I\'ve found that adding a series 100 Ohm resistor between the oscillator module and the DDS chip clock input keeps the voltages at the clock input in the range 0 to 5V.
4) To make the current feedback amplifier U10 stable I found that R51 and R53 need to be changed to 200 Ohms. You may want to fit a small heatsink to the top of the THS6002.
5) The DDS is programmed serially by the PIC. The DDS chip must be told to use serial download mode instead of the default parallel download mode. This is achieved by hard wiring the following data bits:
Data bit 0 (pin 4) = +5V.
Data bit 1 (pin 3) = +5V.
Data bit 2 (pin 2) = GND.
Unfortunately I forgot these connections on the PCB layout, but the modification is easy as there is a nearby decoupling cap.
6) Incremental encoder mod. Change R12 to 4k7. Change R16 to 4K7. With the two now spare 22K resistors add pull-downs to ground on pins 1 and 3 of J2, the connector to the encoder. These surface mount resistors can be added just to the U3 side of the existing positions for R12 & R16 and then add a wire to ground which can be conveniently found at one of the LEDs. I have also found that the debounce period used in U4 needed reducing.
7) R1 at the bottom of the R-2R ladder should be 20k.
8) There should be a 150pF capacitor in parallel with the 100k resistor following the two Schottky diodes.

DDS KEY USAGE by M0BLP 18/6/03
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Layout
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1 2 3 F
4 5 6 E
7 8 9 D
A 0 B C

Key use & menus

A = Enter Frequency
B = Enter Frequency
Or start to enter a number immediately by
pressing a number in the range 0 - 3.
C = 0 1 3 6 7 <-- key to press to select menu item.
s m u s r <-- menu acronym.
| | | | | RESTORE from memory
| | | | |\\----> R0-2 Enter 0, 1 or 2 to select memory.
| | | | SAVE current frequency to memory
| | | | \\------> S0-2 Enter 0, 1 or 2 to select memory.
| | | Display UPDATE during sweep/wobbulate
| | \\--------> 0=y 1=n dup Enter 0 for display update.
| | Enter 1 for display disable.
| | MULTIPLIER for step rate
| \\----------> Mult 1-9 Enter digit in range 1 - 9.
| STEP interval in Hertz
\\------------> 1 10 100 1 10k <-- frequency.
0 1 2 3 4 <-- key to press to select menu item.
D = Wobbulate Frequency \\
E = Decreasing Frequency > with step interval of
F = Increasing Frequency / \"MULTIPLIER\" times \"STEP\".
N.B. Once D, E or F is pressed the next press of any key
stops the Wobbulate, Decrease or Increase.

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