KANGA PRODUCTS

m0xpd©

Arduino DDS Shield

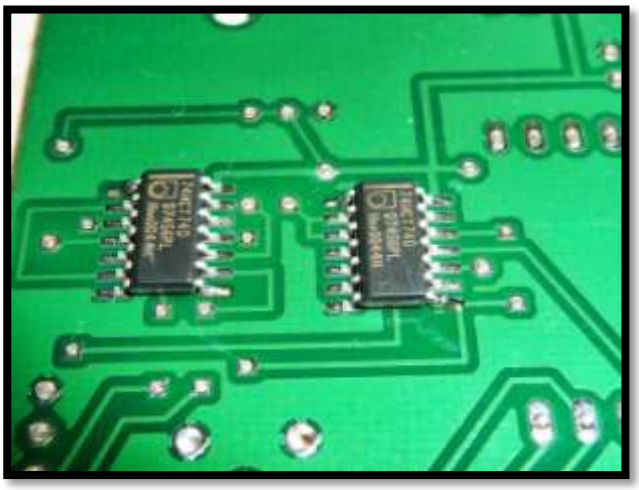
The m0xpd Arduino DDS shield provides a convenient interface between an AD9850 DDS module and an Arduino, opening up the benefits of this flexible *"Electronics prototyping platform".* The shield makes the DDS Module easy to configure (through software) and to control (through familiar, everyday interfaces such as Keypads, Displays and Rotary Encoders).

The shield can be used in a variety of applications requiring signal generation and frequency control, such as a VFO. The shield can also serve as building block in a larger system, such as a WSPR or QRSS Beacon or even a complete transceiver.

Kanga Products have kindly been given permission to produce a kit.

Application ideas and code examples are available through Paul m0xpd's blog (http://m0xpd.blogspot.co.uk/)

CONSTRUCTION



Stage 1.

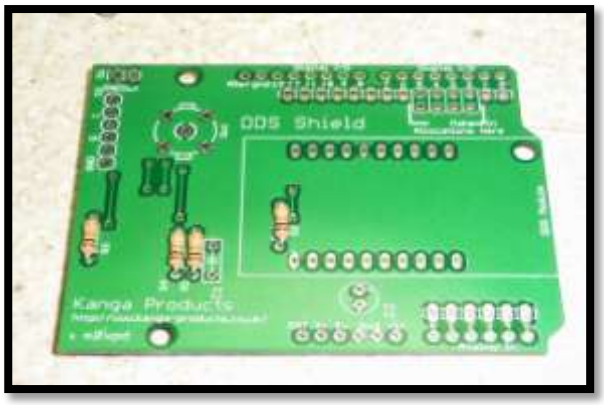
First check all components against the list within these instructions, if you find a part missing or damaged, contact Kanga Products for a replacement.

The PCB is a double-sided board with two 74HC74 surface mount IC's located on the copper side (Underside).

Note the position of Pin 1, their correct orientation is shown here in Fig 2. Please note, that the IC's supplied may not have a horizontal bar as shown, a spot or dimple could be used to denote which is Pin 1. Also some IC's have had no marking for Pin 1. In this instance, look at the IC and read the text from Left to Right. Pin 1 is then the bottom left hand Pin. If you are unsure, please contact Kanga Products.

Now check your work for solder bridges and or splashes

Stage 2.

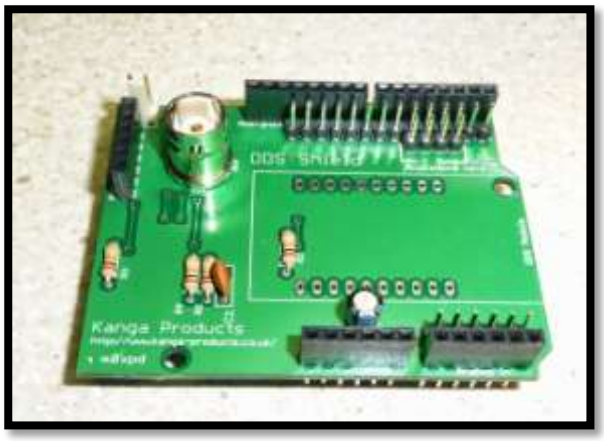


Now turn the PCB over and fit resistors R1 – R4, then the capacitors C1 – C2, see Fig 3 for how your PCB should look. The size of C2 may require it to be laid horizontal against the PCB. This is due to the capacitor supplied being higher than the 6 pin header which still has to be fitted.

Notice also that the DDS module will cover R2, so this resistor must be fitted before you solder the module in place.

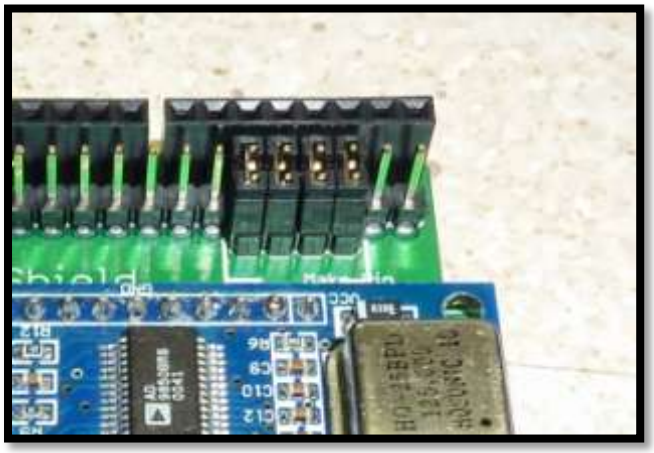
Stage 3.

The *m0xpd Shield* provides for a range of output connections, any number of which can be populated. The main sinusoidal output is provided from a BNC socket and a 0.1 inch header (JP6). The quadrature square-wave outputs are available on a 6-way 0.1 inch header (JP1), which also carries the two sinusoidal outputs from the DDS module. All these options can be seen in Fig 4. Those intending to stack a further shield above this PCB may prefer to omit the BNC socket, which will be inaccessible in the presence of another shield.



Arduino Connections

Shields plug on to their host Arduino using the long pins of "stackable headers", which also provide sockets for "stacking" another shield on top. These headers should be soldered in place on the DDS shield, taking care that they are upright (otherwise the pins will not align with the sockets on the Arduino).

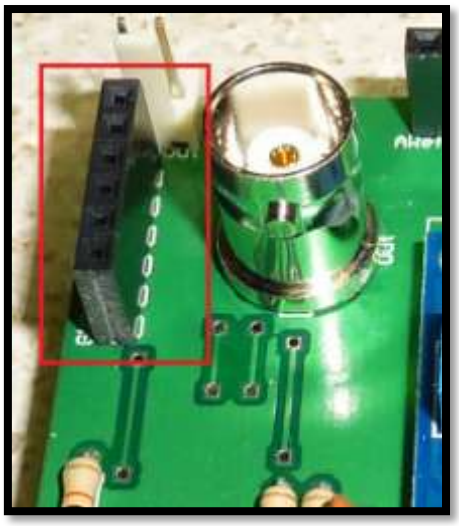


Conventional male header plugs are used to make easy connections between the Arduino's input/output pins and the DDS module. These headers, along with the stackable headers, are seen fitted in the photo right.

Arduino Pin Assignment

The assignment of Arduino pins to the control interface of the DDS module is arbitrary *(changes to the configuration can be made at will in software)*. The shield (and all of the supporting software) has a *"default"* assignment, which uses digital pins 2:5. This default assignment is reflected in four pairs of adjacent header pin positions on the PCB. Those satisfied to use the default assignment can use four shorting jumpers in the position shown in the photo, left.

Those preferring to use alternative pin assignments can use wire links to couple the four DDS control inputs to their chosen Arduino ports. All the output pins from an Arduino (Uno) are available on the shield to allow users to make this connection (*although the PCB traces between the stackable header, JP4, and the "Analog" pins A0:A5 were missed due to an error on the board – they can be added by wire links on the underside, if required – no action is required to use the shield in "default" configuration*).



The RF Bus Connector

The header outlined in red in this picture (JP1) carries all the RF signals and will be used for future m0xpd / Kanga shields.

You must cut off its long pins once soldered to the board - otherwise you will not be able to fit the Shield to the Arduino board (as the Arduino's USB connector occupies this space).

Once all connectors have been soldered into place, check your work for solder bridges or splashes, before moving onto the next stage.

Stage 4.

Gently offer the DDS Module to the DDS Shield PCB in the orientation shown here in the picture. It may be necessary just to slightly adjust the odd pin to ensure correct alignment.

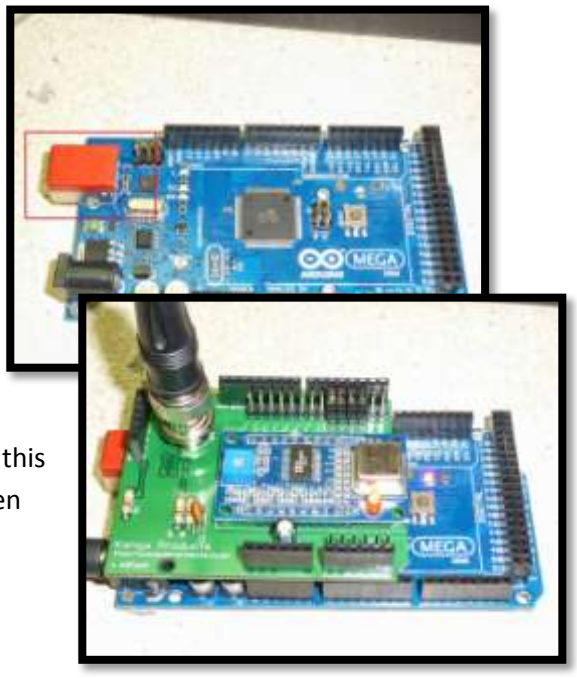
You do not need to push the module fully down, just enough for the pins to be soldered on the Shield PCB.

Once you have soldered the DDS module to the Shield PCB, again check your work.

Once you are happy with the Shield, you can couple it to an Arduino (such as the Mega 2560 seen in the photos right). Before mounting the shield you should place a small piece of insulating tape on the top of the USB socket of the host Arduino, as indicated in the picture. This is to ensure that the 6-pin header or other Shield connections do not short to ground through the body of the USB socket.

Once the socket is insulated, carefully ensure that all the shield's pins are straight and gently push it into location on the Arduino, as per the picture opposite.

You are now ready to test the completed unit. Test software is available at http://m0xpd.blogspot.co.uk/p/kanga-uk-resources.html



Please go to Paul m0xpd's blog http://m0xpd.blogspot.co.uk/ to see how this DDS Shield, along with the software and circuit details provided, have been used to create a VFO that can be used in a variety of equipment.

Component Listing.

Part	Type	Markings	QTY	Notes
IC 1	74HCT74	74hct74	1	Note the position of pin 1
IC 2	74HCT74	74hct74	1	Note the position of pin 1
C1	100 nF	104	1	
C2	47 µF Elect	47 µF 16v	1	Observe polarity
R1	10 KΩ		1	Brown, Black, Orange, Gold
R2	10 KΩ		1	Brown, Black, Orange, Gold
R3	10 KΩ		1	Brown, Black, Orange, Gold
R4	10 KΩ		1	Brown, Black, Orange, Gold
Arduino Shield PCB			1	
AD9850 DDS Module			1	
Molex 2 Pin Connector			1	
BNC Socket			1	
8 Pin Stackable Header Plugs			2	
6 Pin Stackable Header Pugs			3	
0.2" Jumpers			4	

NOTES