

WA6UFQ's Universal Controller Operating Manual for V4.x

Power – The controller can be powered from a 9v to 12v @ 250 ma. source. However, if it is controlling a DDS-30 that has been modified with the AMQRP upgrade kit (additional 8V regulator that powers the post amp), powering from a 12v source is recommended.

Controls:

- **Select** – Course tunes the controller's frequency in steps of 100 mHz, 10 mHz, 1 mHz, 100 kHz, 10 kHz, 1 kHz, and 100 Hz. This control also has a function switch that is activated by pressing in on the shaft.
- **Fine** - Changes the frequency in 10 Hz increments.

Menu Mode – Access to the controller's menu items is accomplished by depressing the Select switch while rotating the control clockwise until the cursor is under the '>' character located on the far right on the top line of the display.

This action puts the controller in its Menu mode. The controller beeps, and the first menu item is displayed on the bottom line of the display, along with a blinking cursor.

The controller menu items are:

- Select Device
- Set Start Freq
- Set Stop Freq
- Set Offset Freq
- Set Multiplier
- Set Sweep Step
- Set Sweep Dwell
- Set Sweep On
- Set Scan Dwell
- Set Scan On
- Set Device Clk (The display shows 'Set AD9850', 'Set AD9851', or 'Set Si570 Start', depending on which device has been selected).

Initial setup – Follow these steps to configure the universal controller:

- Install a DDS card, an interface cable to an AD995x or AD9912 board, or a Si570 card.
- Turn on the controller and enter the menu mode (see above)
- Press the Select switch to select the first menu item ('Select Device').
- Now rotate the Select control to select the device of interest (AD9850, AD9851, Si570, AD9912, or AD995x).

- Press the Select switch to save the selected device. The controller will beep and display 'Saving'.
- Enter menu mode again. Rotate the Select control, and this time stop on 'Set Start Freq'; then press the Select switch to select this menu function. The controller will beep, and an underline cursor will appear on the top line of the display.
- Depress the Select switch and rotate the control to move the underline cursor to the digit you would like to change.
- Release the Select switch and rotate the control to change the digit of interest.
- Depress the Select switch again and rotate the control to the next digit that requires changing; release the Select switch and change this digit.
- Continue doing this for each digit, until the desired Start frequency has been selected.
- Then depress the Select switch and rotate the control until the cursor is at the '>' position. The controller will beep, and the bottom line displays 'Press to Save'.
- Press the Select switch to save the Start frequency.
- Return once more to the menu mode, and select 'Set Stop Freq'.
- Set the Stop frequency in the same manner that you set the Start frequency, and save this frequency as you did for the Start frequency.
- If it is desired to have the controller's frequency offset from the displayed frequency (superhet applications, etc.), the 'Set Offset Freq' menu item is selected next.
- When this menu item is selected, you will see a blinking cursor over a plus (+) or minus (-) sign on the top line of the display. If a minus offset is desired, rotate the control to change the sign to minus. Then change the digits to display the desired offset frequency.
- Now move the cursor to the '>', and press the Select switch to save the frequency offset.
- If you select a minus offset frequency that is lower than the Start frequency, you will get an 'Offset Error' message.
- If it is desired to have the controller's frequency be a multiple of the displayed frequency (SDR applications), select the 'Set Multiplier' menu function.
- Select X1, X2, or X4, and press the Select switch to save the multiplier value.
- The last menu item selects either the DDS clock frequency, or the Si570's Start-up frequency. The controller's start-up sequence will detect the presence of a Si570 card, and change this menu item to display 'Set Si570 Start' rather than 'Set AD98xx Clk'. The factory pre-set Start-up frequency of the Si570 is entered and saved.

- If a DDS card is being used, measuring the clock frequency of the DDS card, and entering this value will result in very accurate frequency readout.
- For the AD9912 board, enter the frequency shown on the top of the oscillator module X8 *ie.* $125 \times 8 = 1000$. Move cursor to the '>', and press the Select knob to save. This value can be changed later to put the board's output right on frequency (increasing the clock frequency decreases the output frequency).
- For the AD995x board, enter the frequency shown on the top of the oscillator module X4 *ie.* $100 \times 4 = 400$. Move cursor to the '>', and press the Select knob to save. This value can be changed later to put the board's output right on frequency (increasing the clock frequency decreases the output frequency).
- The configuration has been saved in its EEPROM, and the controller is now set up to operate.

Memory Mode - Access to the controller's EEPROM memory is accomplished by depressing the Select switch and rotating the control counter clockwise until the cursor is under the '<' character located on the far left on the top line of the display.

This action puts the controller in its Memory mode. The controller beeps, and 'Mem Read' is displayed on the bottom line of the display, along with a blinking cursor.

The memory functions are:

- Mem Read
- Mem Write
- Mem Erase

Entering Memory Mode:

- Depress the Select switch and rotate the encoder to choose the desired memory function.
- Press the Select switch to select this function.

Memory Read:

- Upon entering the memory read mode, the channel's frequency is shown on the first line of the display. If a memory channel is blank, the display will show all zeros. The channel number is shown on the second line of the display.
- Rotate the Select control to select the desired memory channel. The output of the controller is now on this frequency.
- Press the Select switch to return the controller to its 'Tune' mode.

Memory Write:

- Set the controller's display to the frequency that you wish to save.
- Enter memory mode (see above).
- Rotate the Select control to the Mem Write position.
- Press the Select switch to select this function.
- Rotate the Select control to the channel desired. The channel number is shown on the second line of the display. The first line of the display shows the frequency stored in this channel. If the channel is blank, the display shows all zeros. Press the Select switch to save your frequency on this channel. The second line of the display then shows 'Saving to Ch xx', and the controller returns to its 'Tune' mode.

Memory Erase:

- Upon entering the memory erase mode, the channel number is shown on the second line of the display. The top line of the display shows the frequency of that channel.
- Rotate the Select control to select the memory channel to be erased.
- Press the Select switch to erase this channel. The display shows 'Erasing Ch xx', and the encoder returns to its 'Tune' mode.

Tune Mode – Is the default mode, and is the mode that the Menu and Memory modes return to.

- The controller powers up with the last frequency used when it was powered down.
- The controller powers up with its underline cursor at the default 1 kHz digit. Rotating the Select control causes the controller to change frequency in 1 kHz increments.
- The Fine control increments/decrements the controller's frequency in 10 Hz steps.
- Depressing the Select switch and rotating the control clockwise or counter clockwise changes the course tuning rate to whatever digit the cursor is located under.
- If the cursor is moved past the left most digit, the controller enters its Memory mode; moving the cursor past the right most digit causes the controller to enter its Menu mode.
- Changing the controller's frequency to a value that is lower than its Start frequency will cause the frequency to roll over to the Stop frequency.
- Changing the controller's frequency to a value that is higher than its Stop frequency will cause the frequency to roll over to the Start frequency.
- In both the DDS and Si570 modes, the Stop frequency can be set to a value that is higher than the DDS chip's published upper frequency limit. There will be useable output at these frequencies, but the output will be

at a substantially reduced level. At some upper frequency, the controller's output will stop.

- In the Si570 mode, the lowest Start frequency is limited to 10 mHz.

Sweep Mode – Controller sweeps from the Start frequency to the Stop frequency at various frequency steps and dwell times.

- From the menu, set the desired Sweep Step (10 Hz, 100 Hz, 1 KHz, 10 KHz, 100 KHz, 500 KHz, or 1 MHz).
- From the menu, set the desired Sweep Dwell between steps (None, 10 msec, 100 msec, .5 sec or 1 sec).
- From the menu, set Sweep On.
- Rotate the Select knob one click CW to enable the display to show the current frequency.
- Rotate the Select knob one click CCW to disable the display from showing the current frequency (controller sweeps faster with the display disabled).
- The controller outputs a 3ms pulse at the start of each sweep for triggering purposes (on Piezo Sounder line, and almost inaudible).
- To exit Sweep mode, press the Select knob.

Scan Mode – Controller scans memory channel frequencies.

- From the menu, set the Scan Dwell time (250 msec, 500 msec, 1 sec, 2 sec or 5 sec).
- From the menu, set Scan On.
- To exit Scan mode, press the Select knob.