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## Dual AC voltage source – DualDAC 2

Two-channel audio frequency ultra-stable arbitrary wave generator



Operation manual v0.2

## ***Description and introduction :***

See separate specifications document.

## ***How to get started:***

- 1) Connect your DualDAC 2 (DD2) unit to dc voltage supplies in the following manner using Binder-680 cables delivered with the unit. Make sure that the power switches at the regulator unit are in OFF position.
  - a. Place your unit on a table and, if possible, prepare an oscilloscope next to your unit. Connect short BNC cables between "clk in" and "clk out" connectors for both channels. Later, a separate delay generator can be connected to clock out/in in order to fine-tune the phases of the two output waveforms



- b. Connect GPIB cord to controller unit. We recommend using National Instruments' GPIB-USB-HS adapter. Connect 3-pin Binder cable to bipolar power supply +/-15V. Set possible current limiter to 0.5A.



- c. Connect 2-pin Binder cable to unipolar power supply +8V. Set possible current limiter to 1A. Acceptable voltage range is 8 - 12V.
- d. Connect another 2-pin Binder cable from fibre receiver to unipolar power supply +8V which can be the same supply as in b). Fibre receiver accepts any dc voltage between 7 – 12V. Green led should indicate operation. Connect optical fibre between fibre receiver and sync out connector of controller unit.



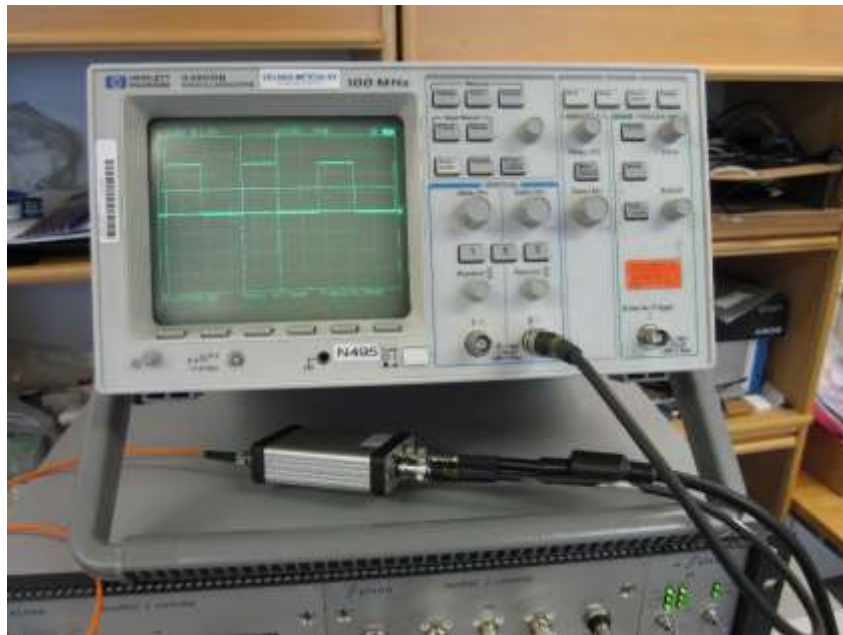


- e. Connect banana cords (provided by user) from rear panel temperature controller supply connectors to unipolar power supply +5V. Set possible current limiter to 3A. To achieve temperatures deviating significantly from factory set point of about 37C the user should increase the supply voltage up to maximum of +30V. Temperature control is based on PTC2.5K-CH controller by Wavelength Electronics Inc.



- 2) Turn on the DD2 power in the following sequence:
  - a. Switch ON the **converter** power switch. Six leds in regulator panel should indicate correct internal voltages.
  - b. Switch ON the **controller** power switch. Two leds in regulator panel should indicate correct internal voltages. A welcome text should appear in controller display.
  - c. Switch ON the **temperature control** power switch in rear panel. One led should lit.

- d. Make sure that the current consumption is the following:
- Bipolar supply:  $-0.14 \pm 0.03A$  in  $-15V$  supply,  $+0.24 \pm 0.05A$  in  $+15V$  supply
  - Unipolar supply:  $+0.55 \pm 0.1A$  in  $+8V$  supply
  - Temperature controller supply: in standard laboratory environment the current should start with high value ( $>1A$ ) because the controller tries to reach the factory set point of  $37C$ . Within few minutes the current should saturate to less than  $0.3A$  as the unit reaches its set point and the DD2 electronics dissipation provides most of the heating power. The user can check the temperature set point by measuring voltage at Set T Mon connector. Factory set point is  $0.6V$  corresponding to  $37C$ . The actual temperature of the internal temperature sensor can be measured from Act T Mon connector. Contact Aivon to get a table of voltage-to-temperature dependency.
- e. Connect a BNC cable between optical-to-TTL converter and oscilloscope and make sure that there is a  $5V$  square wave with frequency of about  $3\text{ kHz}$ . You can use this signal to trigger later your sine outputs in oscilloscope. This sync signal can be used as reference in lock-in amplifier measurements.

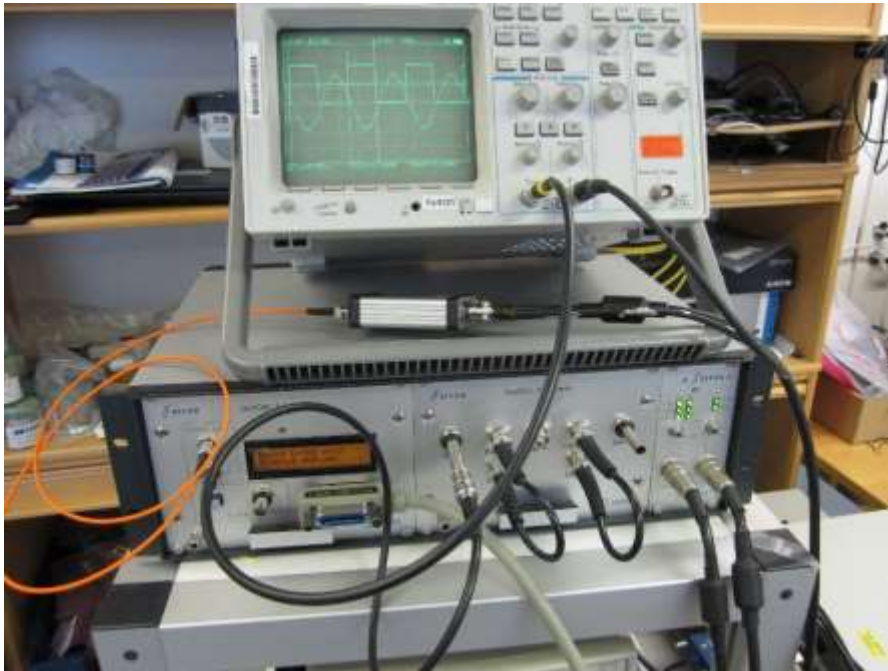


- f. Download DD2015 software package from Aivon web page and unzip it to your computer. Using LabView open the DD2015\_Control.lvproj LabView project. Open files DualDAC\_Control.vi and write\_DAC1.vi and check that the GPIB addresses are 10.

### ***Operation:***

Sine waveforms for both output channels are created in two-step procedure:

- 1) Specify the amplitudes using program “write\_DAC1.vi”, which controls the 20-bit DACs in converter unit.
- 2) Specify the amplitudes, phases, offsets and common frequency using program “DualDAC\_Control.vi”, which controls the 16-bit DACs in converter unit. The amplitude can be set to unity since it has already been set by 20-bit converters in 1).
- 3) Observe the waveforms using oscilloscope.



- 4) More details can be found in separate software manual for DualDAC2

### ***Opening the enclosures:***

The user may need to open the enclosure if

- internal Zener has to be replaced by external reference fed to BNC connector “ref in”
- setpoint of the temperature control has to be changed

The opening procedure is as follows:



1)

Turn off all power supplies and detach the side panels using a flat screwdriver



2)

Detach the top panel using a flat screwdriver. There are suitable spots at both ends of the side part of the top panel as shown in the image.



3)

Undo the four collar screws holding the converter unit.



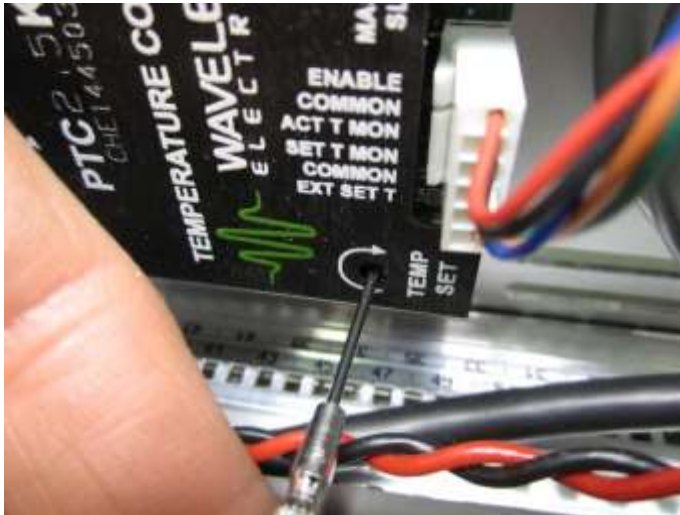
4)

Slide the converter unit few centimeters outside the frame.

- 5) **Adjusting the setpoint of the temperature control.** Connect a multimeter between GND and “set T mon” banana connectors at the rear panel. Select dc voltage scale and turn on the temperature control power. The multimeter should read 0.6V. Locate the temperature setpoint trimmer at the controller inside the rear panel.

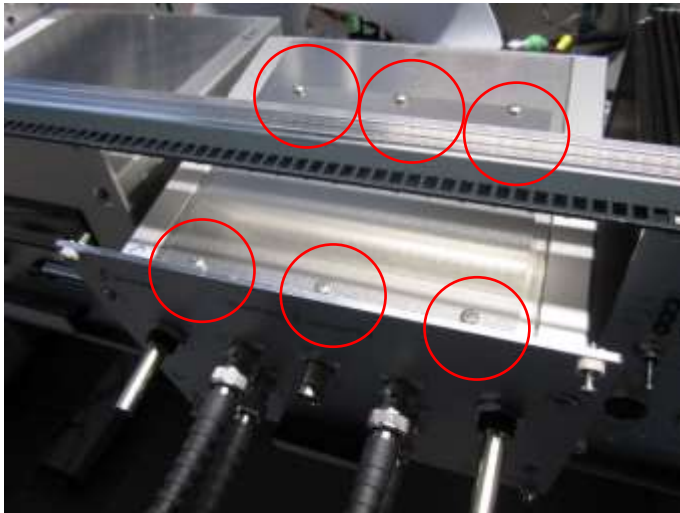






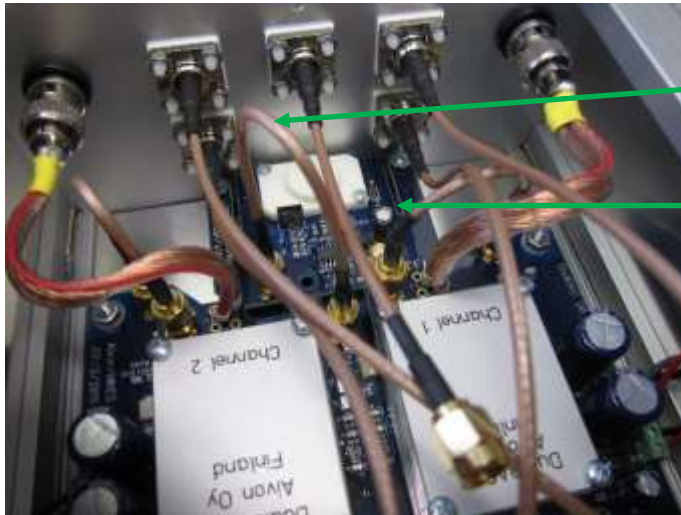
Turn the trimmer and monitor multimeter reading until the desired setpoint is achieved.

**6) Changing the internal reference to external reference.**



Open the maintenance lid to the converter unit by removing six screws. Remove screws and the lid and slide the unit back inside the frame.

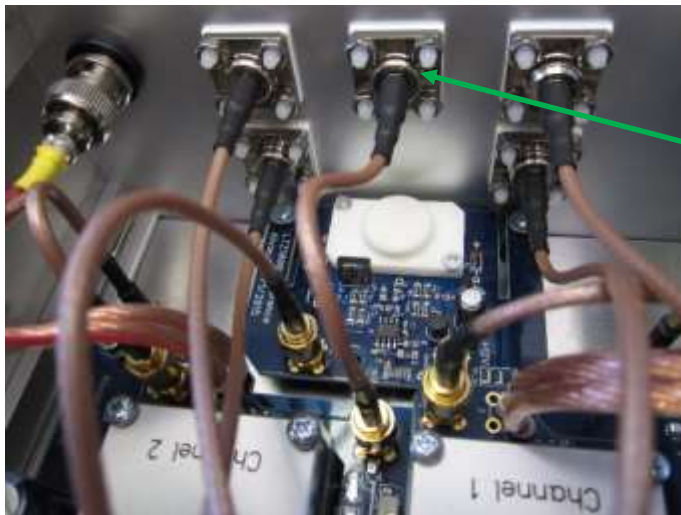
**7) Remove the short SMA cable between internal Zener printed circuit board and main board.**



SMA cable for internal reference voltage

Internal Zener pcb

Connect the SMA cable from "ref in" BNC connector to main board. Do not overtighten the SMA connector.



External reference input "ref in"