I have written this manual in an attempt to clarify some of the functions and wiring with the OMS wavedriver. Although I have done my best to be as thorough as possible for two phase systems, I have not fully explored use of the wavedriver for higher phase systems. Also, please be aware that future wavedrivers may not function or be wired the same as the one I am about to describe.

Currently in lab (July 24, 2012) we have two 4 phase wavedrivers and a larger wavedriver that can be operated in either 5 or 6 phase by changing the rainbow ribbon on the beige circuit board on the bottom of the wavedriver box.

Inputs on the Wavedriver

In order to operate properly, a 12 V DC power supply must be attached to the wavedriver.

Ground the outside of the case.

On one side there is a set of inputs for voltages.

Each input along a row must increase in voltage as you move left to right.

The bottom left must be the lowest voltage of the system

The upper right must be the highest voltage

The highest voltage on any input may not exceed 1 kV

The range of voltages between the minimum and maximum applied voltage may not exceed 500 V.

On the same side of the wavedriver, there is an additional row of inputs labeled with letters starting with 'A'

These are the TTL inputs to control the rate of flipping between OMS phasese.

For two phase systems, you will need two TTL inputs. This is easily accomplished with a frequency generator and an inverter circuit. For higher phases, the input must be asymmetric and spend more time in one state than the other. This can be accomplished with a separate circuit built by the electronics shop.

It does not matter which inputs you use (for a two phase system, you can use: A and B, A and C, A and D, B and C, B and D, or C and D)

Outputs of the Wavedriver

The opposite side of the wavedriver is a large array of outputs.

Each output is controlled by a single board.

The voltage, phase, frequency, and OMS phase can all be defined by rewiring the wavedriver using the following information:

The Rainbow Ribbon Cable

This cable carries the TTL inputs from the outside of the wavedriver box to the individual circuit boards.

Purpose: defines which phase to operate in.

The cable is much larger than the number of pins, resulting in many positions it can be attached, each one resulting in a different function

The letters printed on the board are set to indicate which TTL input will drive that specific board.

If 'D C B' is visible, then that board will be triggered by input B (the six phase wavedriver boards will have 'F E D C B' visible when using input B).

The Grey Ribbon Cable

This cable carries the input voltages.

Purpose: defines which row of input voltages can be used for the output

Each strand of the ribbon is directly connected to a single input. As each wavedriver will probably be different, it is a good idea to map out which pin connects to what input. The easiest way to do this is use a paperclip to connect inside the wire, and use a DMM to test for a short to any of the inputs. Keep in mind that not all wires will be connected to an input, some may be left detached.

All of the wavedrivers to date have a 16 wire cable, and use an 8x2 connector. Looking at it from the perspective of 2 columns and 8 rows, a pattern can be easily discerned. Down one column, every other input should be connected to sequential inputs on the same row. A separate row will fill in the voltages between the two. On the wavedrivers with a third row, these voltages can usually be found on the second column.

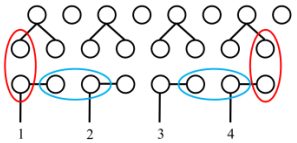
On the circuit board, this cable can be attached in four different positions. Only the column of pins furthest from the board actually connects to the circuit. Aligning with the 'H' or 'L' printed on the board allows the operator to choose which row of input voltages can go to that board. The other two positions are 'H' and 'L' when the ribbon cable is only on one row of pins. This results in the second column depicted above being connected to the circuit.

Pins and Jumpers

These jumpers connect the voltages from the grey cable to the actual circuit

Purpose: defines which inputs will be used on that output

The following is a representation of this part of the circuit board. There are multiple steps to ensure that the wiring is done properly. First connect whichever pins you want to use (shown with a red circle). In an x phase system you use x input voltages. Be sure to jumper all (1 – 4) to some voltage (show with blue circles).



Clarification

If you want two outputs to be exactly the same voltage, but 180° out of phase, then the pins and grey ribbon cable will be identical on the two boards. The only difference is that the rainbow ribbon cable will be connected to a different set of pins according to the white printed letters on the board itself.

This manual should help make the wavedrivers more robust and allow for additional experiments and instruments without requiring a new box to be made. Following this, you will be able to vary the number of OMS phases (limited by which wavedriver you use) and control each output individually. Each output CAN output any combination of inputs within a given row. You CANNOT alternate between two voltages on different input rows without changing some of the hard wiring. You should be able to get the voltages you need, but in the very rare case, cutting the wire from the TTL in to the ribbon cable will allow you to attach that position of the ribbon cable to a different input.

I hope this helps,
Steven Zucker