*============Create_Arbitrary_waveforms===========

Instead of creating PWL files, and then including them back into a simulation, one can now create any type of waveform needed without any external files.

This example needs just four voltage sources.

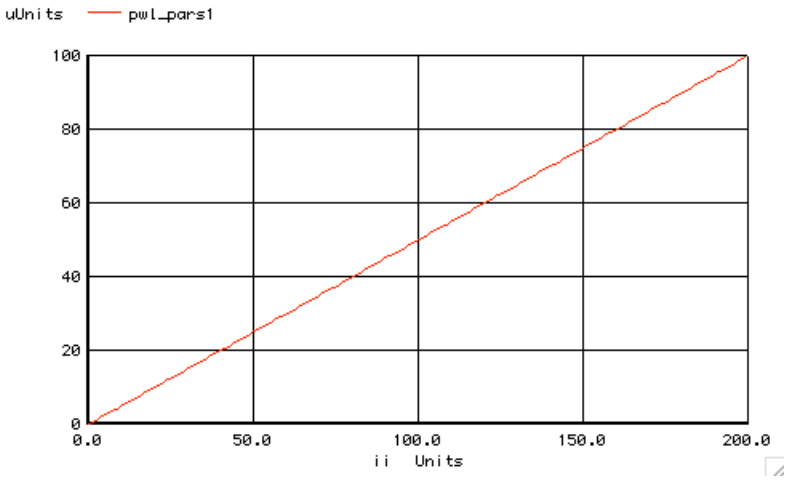
```
==========================================================================
Arbitrary_Waveform_Generator
V1 1 0 0 dc
V2 2 0 0 dc
V3 3 0 0 dc
V4 4 0 0 dc
==========================================================================
```

The PWL array is created in the control section using the "vector(N)" function. The intention is to create several arrays which alternates between a time point and a voltage point. If 100 times points are desired, then 200 points for the pwl_par array needs to be created. The "vector(N)" creates a ramp up array.

```
==========================================================================

.control
*===========Want_100_1us_steps=======
let n = 100
let tstep = 1us
*===========The_PWL_needs_200_point_.5us_each=======
let pwl_pars1 = vector(2*n)*tstep*0.5
let pwl_pars2 = vector(2*n)*tstep*0.5
let pwl_pars3 = vector(2*n)*tstep*0.5
let pwl_pars4 = vector(2*n)*tstep*0.5

==========================================================================
```

The following index ii was done so that the pwl_par array can be viewed.

```
==========================================================================

*===========View_The_PWL_array=======
let ii=vector(2*$&n)
plot pwl_pars1 vs ii
```




```
==========================================================================
```

Four different PWL arrays are created by adding voltage values that alternate with time points.

```
==========================================================================

*===========Define_a_array_called_values=======
```

```
let values = rnd(unitvec(n)*32768)

*===========PWL_array_alt_time_and_value=======
let index = 0
repeat $&n
  let pwl_pars1[1+2*index]  = values[index]
  let pwl_pars2[1+2*index]  = rnd(8)
  let pwl_pars3[1+2*index]  = rnd(8)
  let tt                    = 3.60*index
  let pwl_pars4[1+2*index]  = sin(tt)
  let index = index + 1
end
```

==========

Apparently the following code allows the four arrays to be applied to the four voltage sources as piece wise linear arrays.

==========

```
*===========Install_the_PWL_arrays=======
alter @v1[pwl] = pwl_pars1
alter @v2[pwl] = pwl_pars2
alter @v3[pwl] = pwl_pars3
alter @v4[pwl] = pwl_pars4
```

==========

Run a transient analysis, and view the waveforms.

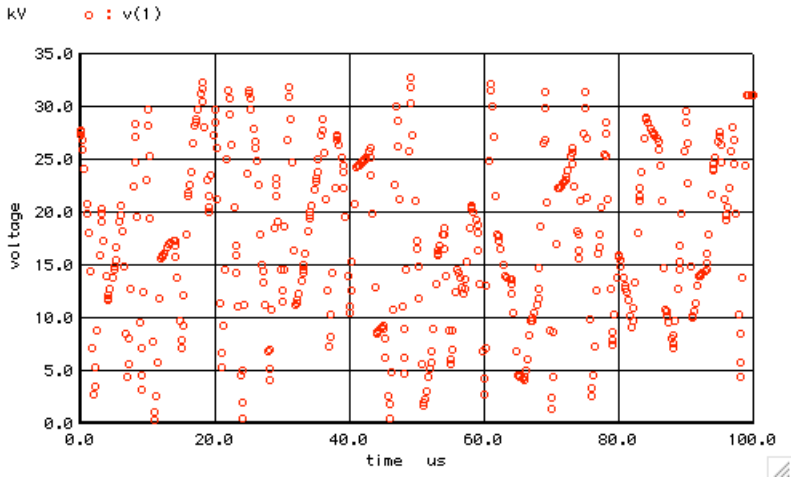
==========

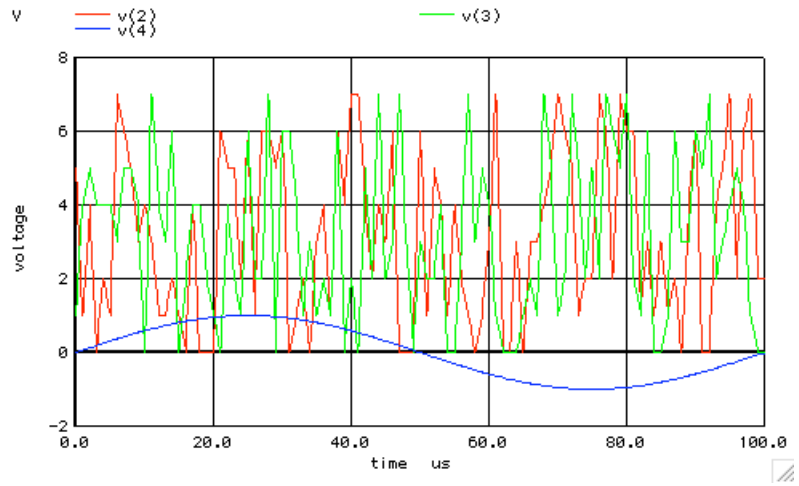
```
*===========Run_and_Plot=======
tran 0.5us 100us
plot v(1) pointplot
plot v(2) v(3) v(4)
plot v(4) pointplot
```

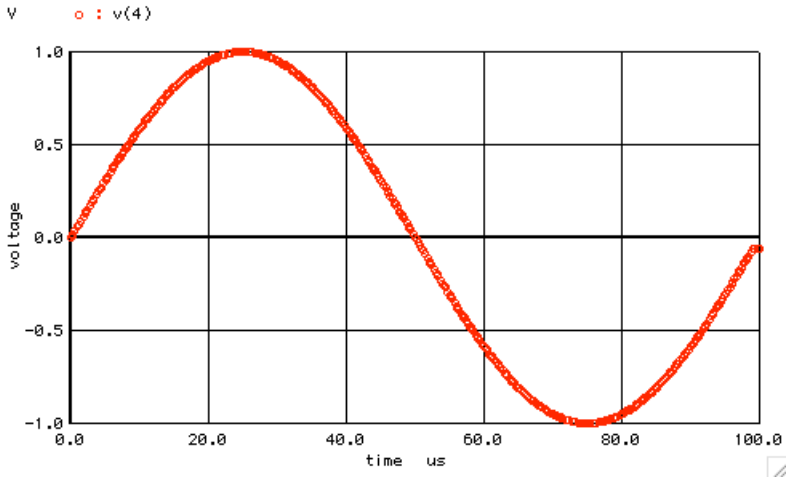
==========

The result are four independent waveforms.

==========







Looks like Spice can now do a arbitrary waveform generator function.

==========Full_Netlist_For_Copy_Paste==========

```
Arbitrary_Waveform_Generator
V1 1 0 0 dc
V2 2 0 0 dc
V3 3 0 0 dc
V4 4 0 0 dc
.control
*===========Want_100_1us_steps=======
let n = 100
let tstep = 1us
*===========The_PWL_needs_200_point_.5us_each=======
let pwl_pars1 = vector(2*n)*tstep*0.5
let pwl_pars2 = vector(2*n)*tstep*0.5
let pwl_pars3 = vector(2*n)*tstep*0.5
let pwl_pars4 = vector(2*n)*tstep*0.5
*===========View_The_PWL_array=======
let ii=vector(2*$&n)
plot pwl_pars1 vs ii

*===========Define_a_array_called_values=======
let values = rnd(unitvec(n)*32768)

*===========PWL_array_alt_time_and_value=======
let index = 0
repeat $&n
  let pwl_pars1[ 1+2*index] = values[index]
  let pwl_pars2[1+2*index]  = rnd(8)
  let pwl_pars3[1+2*index]  = rnd(8)
  let tt = 3.60*index
  let pwl_pars4[1+2*index]  = sin(tt)
  let index = index + 1
end
*===========Look_at_PWL_array=======
*plot abs(pwl_pars+1e-6)  vs ii ylog
*plot abs(pwl_pars2+1e-6) vs ii ylog
```

```
*display
*===========Install_the_PWL_arrays=======
alter @v1[pwl] = pwl_pars1
alter @v2[pwl] = pwl_pars2
alter @v3[pwl] = pwl_pars3
alter @v4[pwl] = pwl_pars4
*===========Run_and_Plot=======
tran 0.5us 100us
plot v(1) pointplot
plot v(2)  v(3) v(4)
plot v(4) pointplot
*===========To_View_Arrays=======
*display
*destroy
*display

.endc
.end
```