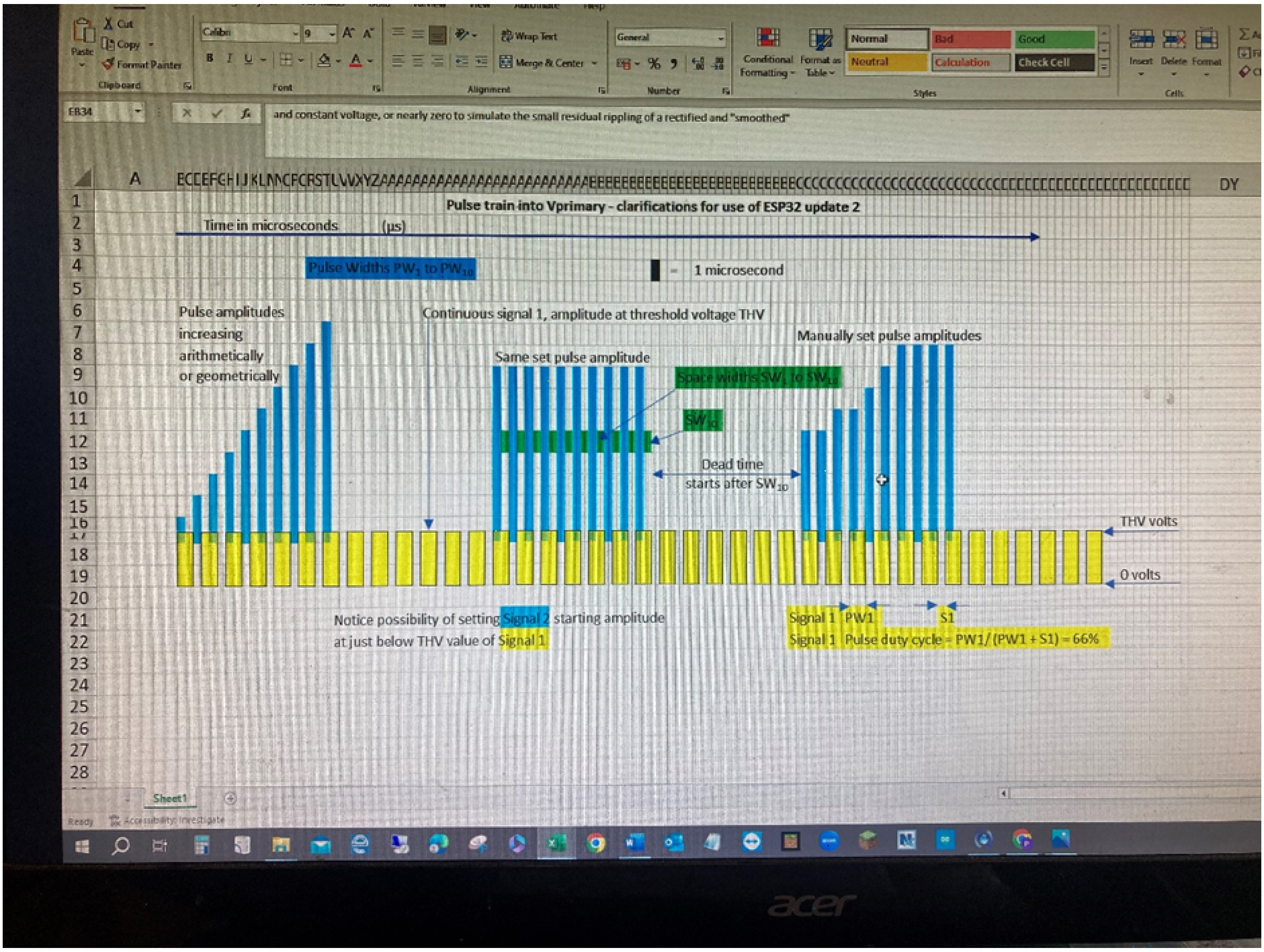
ESP32 microcontroller programming principles for pulse train to VIC



The introduction of a variable resistor between the cell's cathode and the common ground will bias the cathode above common ground

Vprimary to Vsecondary step up ratio to be 1:3 ??

Two methods to drive the cell.

Method 1 uses two separate fully rectified AC variable voltage sources (generated by two separate but commonly grounded variacs)

feeding separate optocoupler pairs. One of each optocoupler pair modifies the frequency of the fully rectified AC (slighty rippling constant voltage) input, the other its pulse width (for Meyer this means duration of the pulses between dead time)

It is suspected that one variac is set at the minimum threshold voltage of about 2.5 volts the other at a higher settbale voltage

It is also suspected that a slighty rippling threshold voltage of about 2.5 volts is desirable (see patent extract from Chris)

The opto coupler outputs are mixed and fed to Vprimary

Method 2 would use two variable DC power supplies instead of variacs

The optocoupler set up would be the same as in Method 1

Minimum threshold voltage would have no ripple, but could perhaps be imitated by using a space width of nearly zero?

CONTINUOUS SIGNAL 1: At minimum voltage *THRESHOLD* formed by:-	
No of pulses (N1)	Continuous number
Frequency (F1)	Variable from 0 to ??KHz
Amplitude to be set at threshold voltage (THV)	**Finely** variable from 0 to, say, 5 volts to be capable of discovering the threshold voltage (THV) which is actually
	required (perhaps by reference to a sensitive ammeter to ensure electron leakage is minimal?)
	All individual pulses to be of the same set amplitude
Pulse width (PW1)	**Finely** variable, but always the same value for all pulses.
Space width (SW1) between individual PW1 wide pulses	**Finely** variable but every space is the same width. Also the space width must be capable of being set to zero to create a continuous
	and constant voltage, or nearly zero to simulate the small residual rippling of a rectified and "smoothed"
	AC wave (stated by Meyer as being beneficial?).
Individual pulse duty cycle (PDC1)	Calculated as: PW1 / (PW1 + S1) %
	Question : will continuous SIGNAL 1 interfere with SIGNAL 2 pulste train below, or vice versa?

SIGNAL 2: a pulse train burst of a maximum of 10 ?? invididual pulses formed by:-	
No of pulses (N2)	Selectable from 1 to, say, 10 maximum??
Frequency (F2)	Determined by pulse width and the space between pulses; if during the pulse train both are constant so is frequency, but if either one or the
	other or both vary then frequency will be varying according to the incident rate of rising edges of each pulse in the pulse train
Offset Voltage (OffV2)	This is to be variable: OffV2 = set value of threshold voltage (THV) x multiplier of 0.90 variable up to 1.10 (to be able to see any effects of voltage
	overlap with SIGNAL 1 which has a maximum value set at THV)
	Offset Voltage (OffV2) will apply to every pulse in the pulse train no matter its amplitude.
Amplitudes of the pulses (A2)	Maximum value of each pulse to be 12 volts??
	10 amplitudes each **finely??** variable up to 12 volts and separately assignable to pulses 1 through 10, thus requiring 10 channels.
	All 10 amplitudes can be set at the same value, or they can all be of different manually set values (or the values can be set by arithmetic or
	geometric progression - see below) but, whichever the case, all pulses in the pulse train are equally and positively offset at the Offset Voltage (OffV2)
	(between 0.90 and 1.0 x the set threshold voltage (THV)) to ensure no loss of the additive (i.e, above THV) effect of the voltage of each pulse
	Note manual setting of all 10 pulses could allow a few decreasing amplitudes to be applied to force some relaxation before all of the remaining
	upward ramping pulses are applied to Vprimary
	Unless the amplitude of every pulse is being set manually at the same or different values, then in order to generate an arithmetically
	or geometrically increasing series of pulse amplitudes, either the amplitude of pulse 1 should be set at its desired value above the
	threshold voltage (THV) value or the value of the amplitude of pulse 1 can be set automatically by applying a variable multiplier to the value
	of the set threshold voltage (THV), say, between 1.01 to 1.10 x the set threshold voltage (THV) to ensure it has an immediate effect on the water molecules.
	For a series of ***arithmetically* increasing** pulse amplitudes:-
	Method 1) The value of the amplitude of the **LAST** pulse in the train must be set manually.
	Thereafter, the values of the amplitudes of pulses 2 to the **PENULTIMATE** pulse (number of pulses (N2) -1) can
	be set from the value of the amplitude of pulse 1 to increase above the amplitude of pulse 1 in steps of equal voltage calculated
	by the difference between the amplitude of pulse 1 and the manually set amplitude of the **LAST** pulse /(total number of pulses -1)
	Method 2) The values of the amplitudes of pulse 2 to the **LAST** pulse can set to
	increase above the amplitude of pulse 1 in equal steps of voltage. The value of this voltage step can be set manually.
	If by repeated application of the specified voltage step, the amplitude of a pulse is calculated to be greater than the maximum 12 volts??
	then the amplitude of that pulse, along with any subsequent pulses left in the train for which values still need to be set, will be restricted to the maximum 12 volts??
	For a series of ***geometrically*** increasing pulse amplitudes (might be helpful??) the values of the amplitudes of pulses 2 to the **LAST** pulse can :-
	***increase* by geometric progression** above the amplitude of pulse 1 in steps of voltage that are set by applying
	a constant multiplier to the amplitude of pulse 1 to generate the amplitude value of pulse 2 to which the same constant multiplier
	is applied to generate the amplitude value for pulse 3 and so on, until the amplitude of the final pulse in the train has been calculated.
	The value of the multiplier should be capable of being set at a value between 1.1 and 5?? in increments of 0.1 ???
	So, for example, for a pulse train of just 2 pulses with the first pulse amplitude set at say 2.75 volts (THV of, say, 2.5 volts x multiplier of, say, 1.01)
	the amplitude of the last pulse (pulse 2) would be 11 volts if a multiplier of 4 was used (4 x 2.75 = 11).
	If by the application of the multiplier to the value of the amplitude of the previous pulse the value of a pulse amplitude is set which
	is greater than maximum 12 volts??, then the amplitude of that pulse along with any subsequent pulses left in the train for which values
	still need to be set will be restricted to the maximum 12 volts??
	Would it perhaps be possible to "draw" the amplitude profile of 10 successive impulses in Audacity and then import the values generated and apply those valus to the ESP32 pulse train?

Pulse widths (PW2)	PW2 can be set at the same value in microseconds for all pulses in the pulse train, or may be OPTIONALLY varied for each pulse within the pulse train to
	***increase* arithmetically** above the width of pulse 1 in equal steps of 1 or more microseconds (the step value can be varied)
	***increase* geometrically** above the width of pulse 1 in steps of time that are set by consecutively applying a constant
	multiplier above the value of 1.0 (the value of which multiplier can be set manually)
	Note: inceasing pulse widths may start to cause saturation of the Vprimary/Vsecondary step up (1:3??) transformer
	***decrease* arithmetically** below the width of pulse 1 in equal steps of 1 or more microseconds (the step value can be varied)
	Note: In a pulse train with arithmetically decreasing pulse widths, if a pulse width value is calculated to be zero then that pulse width
	and those of all the remaining pulse widths in the pulse train must default to 1 microsecond in order to avoid creating an unwanted dead period
	that could result in relaxing completely the voltage stress cummulatively built above THV to that point in the pulse train
	***decrease* geometrically** below the amplitude of pulse 1 in steps of voltage that are set by consecutively applying a constant
	multiplier less than the value of 1.0 (the value of which multiplier can be set manually)
	Note: In a pulse train with geometrically decreasing pulse widths, if a pulse width value is calculated to be less than 1 microsecond then that pulse width
	and those of all remaining pulse widths in the pulse train must default to 1 microsecond in order to avoid creating an unwanted dead period
	that could result in relaxing completely the voltage stress cummulatively built above THV to that point in the pulse train
	Note: decreasing pulse widths may prove very helpful in avoiding saturation of the Vprimary/Vsecondary step up (1:3??) transformer core??
Space widths (SW2) between individual PW2 wide pulses **AND after the last pulse width**:	SW2 can be set at the same value in microseconds, or may be OPTIONALLY varied for each space width to
	***increase* arithmetically** above the space width that follows pulse 1 in equal steps of 1 or more microseconds (the step value can be varied)
	***increase* geometrically** above the space width that follows pulse 1 in steps of time that are set by consecutively applying a constant
	multiplier above the value of 1.0 (the value of which multiplier can be set manually)
	Note: increasing space widths may prove helpful in avoiding saturation of the Vprimary/Vsecondary step up (1:3??) transformer core??
	***decrease* arithmetically** below the space width that follows pulse 1 in equal steps of 1 or more microseconds (the step value can be varied)
	Note: In a pulse train with arithmetically decreasing space widths, if a space width value is calculated to be zero then that space width
	and those of all the remaining space widths in the pulse train must default to 1 microsecond in order to avoid creating an
	unwanted wide last pulse width in the pulse train that might cause saturation of the Vprimary/Vsecondary step up (1:3??) transformer core
	***decrease* geometrically** below the space width after pulse 1 in steps of voltage that are set by consecutively applying a constant
	multiplier less than the value of 1.0 (the value of which multiplier can be set manually)
	Note: In a pulse train with geometrically decreasing space widths, if a space width value is calculated to be less than 1 microsecond then that space width
	and those of all the remaining space widths in the pulse train must default to 1 microsecond in order to avoid creating an
	unwanted wide last pulse width in the pulse train that might cause saturation of the Vprimary/Vsecondary step up (1:3??) transformer core
	Note: decreasing space widths may start to cause saturation of the Vprimary/Vsecondary step up (1:3??) transformer

Individual pulse duty cycle (DC2)	Calculated as individual pulse width / (individual pulse width + space width SW2 following that individual pulse) %
Dead time (DT2)	Variable independently of the PW2 values and the SW2 values
Pulse train (PT2)	Total number of pulses and spaces widths following those pulses
Pulse train time (PTT2) from 1st pulse rising edge to last pulse trailing edge plus last space SW2	= ($PW2_1 + SW2_1 + PW2_2 + SW2_2 +$ ...... $PW2_{10} + SW2_{10}$)
Total signal 1 cycle time from 1st pulse rising edge to end of dead time (TSCT2) =	PTT2 + DT2
Total actual duty cycle of signal 2 as a whole =	(PTT2 - $SW2_{10}$) / (TSCT2)
	The number of total signal cycles of total signal cycle time TSCT2 can also be limited to a specified number down to just one
	and so the number pulse trains can be controlled

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