I am outlining three methods below which you can use to get a Runsummed synthetic. We can get into arguments about the theoretical steps and significance of each method concerning Equation B-1 on pg 67 of Al's thesis. At the end of the day, you will see that these three methods will all output synthetics that are almost identical. The reason why they are not 100% identical has to do with how you detrend the data, and what frequencies you use in the Ricker wave convolutions and filters. Here's a quick summary of what each method does.

Method 1 - Apply a 0 phase Ricker wavelet to the integrated and detrended RFC trace.

Method 2 - Bandpass filter the integrated and detrended RFC trace.

Method 3 - Apply a 90 degrees phase-shifted Ricker to the RFC trace (this is "raw" RFC trace, not the integrated and detrended version).

Method 1

This procedure will ouput an integrated RFC trace and synthetic. Begin at this point once you have successfully run the Welltie module and have a TWTime log in your reference set.

1. Open the *Synthetic* module under *Geophysics*. Your processing datum will automatically be set to TWTime.
2. Under SYNTHETIC_TYPE choose REFLECTIVITY
3. Change sample rate to that of the seismic data.
4. The logs you will use in the *Synthetic* module must be referenced in DEPTH or TVD (depending on the well deviation) not TWTime (see page 59 of the *Geophysics* manual). The *Synthetic* module does all of the interpolating and resampling from DEPTH to TWTime only if a TWTime log is present in the Reference set.
5. Output everything to a TWTime set. The outputs will be (see pg 20 of the *Geophysics* Manual):
   DT, RHOB, VEL, VEL_AVG – logs resampled to TWTime.
   REFC – Reflection coefficients calculated from the TWTime.DT and RHOB.
   REFC_RICK30 – Zero phase synthetic calculated by convolving a 30 Hz, 0 Phase Ricker with the REFC.
6. Under SYNTHETIC_TYPE choose INTEGRATED_REFLECTIVITY
7. Under DC_REMOVE_LEN, choose 100 (ms).
8. Output everything to the TWTime set. The outputs will be (see pg 20 of the *Geophysics* Manual):
   REFI – Integrated (Runsummed) Reflectivity
   REFI_DCR – Detrended REFI (this output depends on the DC_REMOVE_LEN. I use a length between 50 and 100 ms. You can experiment with this by choosing different lengths and then superimposing the REFC on the REFI_DCR to see how much of the trend is removed.
   REFI_RICK30 – Synthetic computed by convolving REFI_DCR with a 30 Hz, 0 Phase Ricker.

Method 2

The REFI_RICK30 is your "Rumsummed" synthetic. Its "Rumsummed" because it is created by convolving a 0 phase Ricker with the integrated RFC trace (REFC_DCR). The convolution of the Ricker is just a lowpass filter. To prove this to yourself, open up *Geophysics* > *Filter* > *Butterworth*. Run the bandpass filter on your integrated RFC trace (REFC_DCR). The output of that is also considered a "Runsummed" synthetic. I would suggest running down to the bottom of the layout where you have a "ghost" RFC output. The responses you see there should make sense in terms of polarity, bandwidth, and phase. Its very easy to get the polarity mixed up in all of these steps, so always check there to be sure.

Method 3

Here is a "quicklook" method I used for making Runsums. Only do this once you have successfully created the TWTime set with the resampled DT and RHOB logs present.

1. Open up *Geophysics > Wavelet > Ricker*
2. Change the PHASE_ANGLE to 90
3. Input the REFC trace.
4. The output will also be a Runsummed synthetic.

Deriving the Source Wavelet

I'll get to this tomorrow. My methodology was to output in ascii format a seismic trace into MATLAB. I would autocorrelate the trace in MATLAB and then re-import it into Geolog. Look at pg 39 of the *Geophysics* manual to see how to import an ascii file into Geolog to use as a wavelet.