Beam Line Tuner for Dummies

Summary

This document hopefully gives you quick introduction on how to setup measurements for the BLT. It will not go into details and won't discuss many features but just enough to setup a simple measurement with the hope that everything else is appropriately set. More details can be found on http://www-rfi.fnal.gov/. Yes, there will be a "BLT for Smart People" as soon as we find her/him.

Accessing the BLT

The BLT can be accessed locally in the control room at MI-60 or remotely using Timbuktu. You can access the system by starting a control session to the machine miblt.fnal.gov; you must use the TCP/IP connection not the Appletalk because the BLT is a Windows NT machine, which can't do Appletalk. Your Timbuktu Application windows look as in the Figure 1 (other versions of Timbuktu have different looks). Type in the node name and select the Control button.

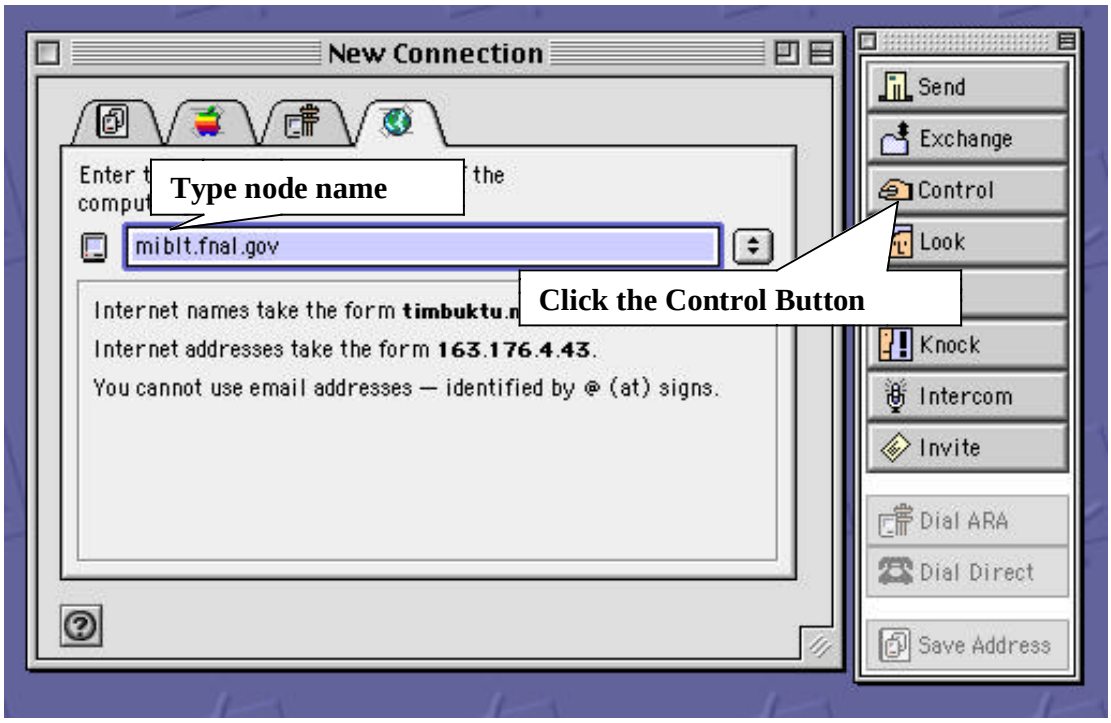

Figure 1. Creating a Timbuktu Connection.

After telling Timbuktu to open a connection, a dialog box opens in which you type the username and password that will open the connection. Of course, I can't give you the username or password here, you should have memorized it.

Unlocking the workstation

If the workstation is locked the desktop will look like in figure 2. If you are using a Mac you will have to simultaneously click Control + Option + Delete. Timbuktu will then send a Ctrl + Alt + Delete to the workstation. You will then have to use the username localadmin and the right password to unlock the account. If you are using a PC to control the BLT, right click on the Timbuktu window and select, Send Ctrl + Alt + Delete, to send this command and get the unlock dialog.

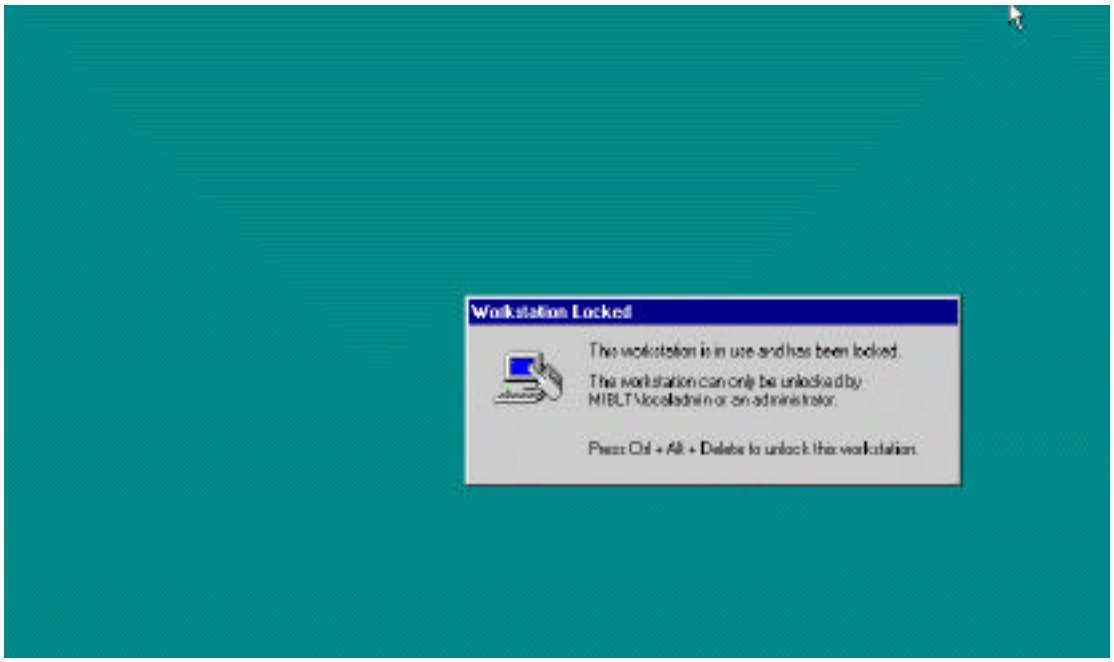

Figure 2. NT locked dialog.

Currently available Measurement Specifications

Here is a list of ready to go specs, try not to change these unless really necessary. You can use these as an example spec by saving the modifications to a different index (use indices above 10 to avoid writing over another useful spec.

Index	Name	Feature	Use
0	Waveform	Samples almost every bucket in a turn	Analyze differences between multiple buckets for, e.g. Kicker diagnostics, beam-beam interaction.
1	Turn by Turn	Samples 3 buckets/trigger for 1050 turns	Injection tuning, tunes at injection
2	TBT 10000 turns	Samples 10000 turns	Position readings into the ramp
3	Tunes up the ramp $29	Delays about 1 sec of a $29 event, 3 buckets	Measure tunes up the ramp (modify delay or event to match pincer setup)
4	Amplitudes vs Tunes	Delays about 1 sec of a $29 event, 2 buckets, per 6 points of the batch (not tested)	Relationship between Tunes and amplitude (modify to match pinger and see web page for display).

You can handle most measurements by selecting the most appropriate Spec and then modifying the **TCevent** and **TCdelay** to your. Write down your changes for later use. See the following chapters for details on how to save and activate changes.

Setting Timing Patterns

It is unlikely you will need to adjust or create timing patterns, consult an expert. Use always pattern 1 as it is timed in correctly. If, for some reason, the injection timing is changes then this pulse needs to be moved to right location. An alternative way is to set values other than 0 in the **BSdelay** field of the Measurement Specification (one unit is one bucket).

Modifying a Measure Specification

Really, that’s what it is all about. Once you have set the spec the system runs by itself. Figure 1 shows the desktop of the BLT after you have unlocked the system. Normally the Windows NT is locked to prevent unauthorized access.

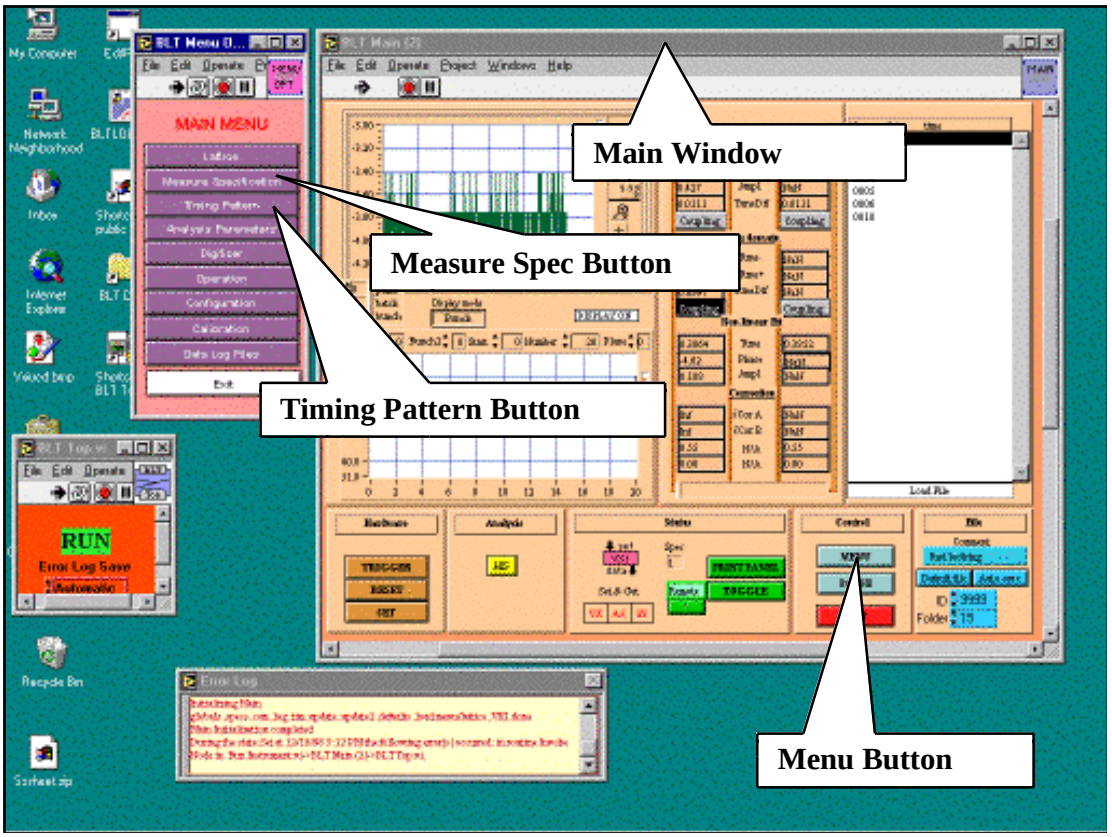

Figure 3. The BLT Desktop.

To change the specs, you must access the spec menu by performing the following steps:

1. Find the Main Window
2. Click on the Menu Button of the Main Window, this will activate the Main Menu window (pop-up if needed and run if needed)
3. To change or view Measure Specifications click on the button as shown in figure 3. (Alternatively, if you want to view or change Timing patterns click on the button labeled Timing Pattern). When done changing or viewing, you should use the exit button of the Spec or Timing Menu but you don't have to click the Exit button of the Main Menu (but you can if you want to).

So let's inspect the Measurement Specifications or MeasSpecs. The panel is shown in figure 4.

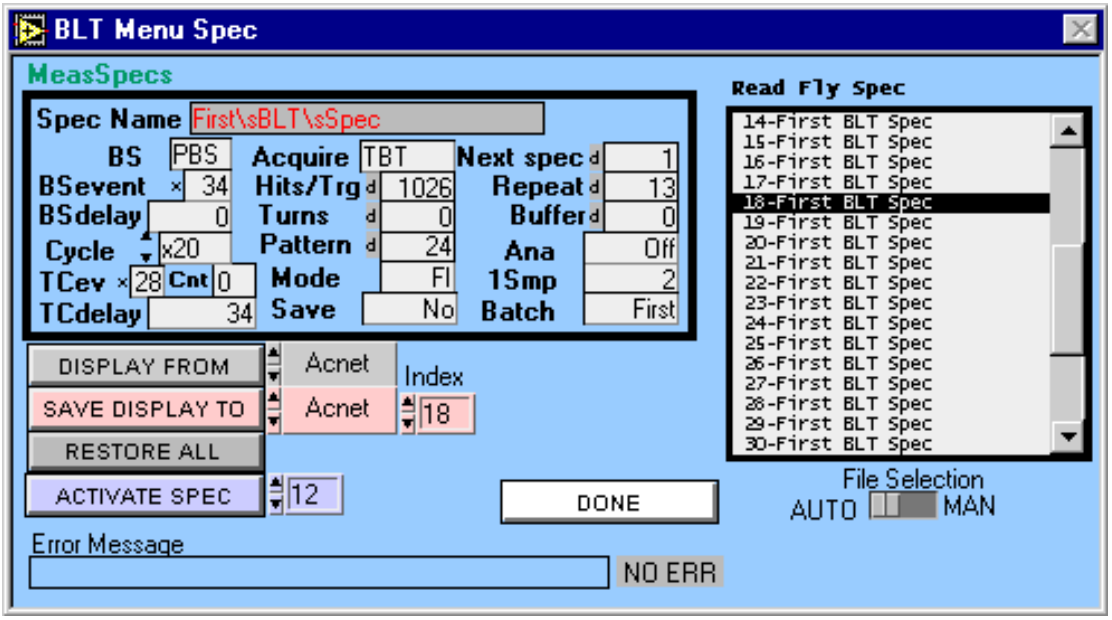

Figure 4. The Measurement Specifications.

I list only the entries you might want to play with leaving the other ones alone:

1. **Spec Name**: Name of Specification (keep it short, like about 24 characters).
2. **Cycle**: The cycle you want to take data on or select any to take data on any cycle.
3. **TCev**: This is the event that triggers the BLT. Normally this must be an event directly related to a kicker event and not a cycle reset event as this has a variable time delay to the actual injection. The event is given in Hexadecimal format.
4. **Cnt**: The number of times the TCev should occur. This helps you select the batch you want to measure, e.g. if you want to measure the second batch then select a count of 2. The maximum value is 12, the mininum is zero and means that the Tcev is disabled and the TCDelay is directly of the Cycle reset event.
5. **TCDelay**: This is the delay of the TCevent its unit is microseconds. The entry field allows you to enter up to 10 seconds off delay. Even though the resolution is in microseconds, the step size is in turns or about 11 microseconds (otherwise this delay affects what bucket is being samples as well).
6. **Hits/Trg**: This is the number of hits per trigger (there better be at least one trigger per turn defined in the pattern or you'll be waiting fairly long for any data to show up). Say you want to measure more than one bunch in a batch then use a number above one. Never put a zero here unless you don't want any data. The maximum value that makes any sense is 580 or almost one turn of data per turn. The retrigger circuit needs about 8 buckets so don't go above 580.

7. **Turns**: Number of turns you want to take data. You are most likely to do an FFT of 1024, so make it about 1050. Why? Because on injection the first samples might not have beam, this is set this way so it easy to confirm that the BLT samples exactly at the injection not a while later. Now here is a question, for how many turns can you take data? Aha, the digitizer can take up to 64k samples. Thus, Hits/Trg*Turns*number of up edges in Pattern (see below) must be smaller than 65536.
8. **Pattern**: The timing pattern played out. Only an up edge counts as a trigger. On every up edge the digitizer will take Hits/Trg samples. The pattern number is an index to a pattern that you can see in the Pattern Menu. The index goes from 0 to 39.
9. **Next Spec**: This is the number of the spec that will be used for the next data-acquisition. If it is the same as the current then you'll just be taking data the same way until you manually set another spec. You can make a chain of spec that call each other if you want to do complicated measurements, e.g. one for injection and for during the ramp. Better hope that the system has time to reset itself an be ready (actually I think it is pretty fast and you should be able to do a couple, three, maybe four measurements per MI cycle)
10. **Buffer**: If you want the data to go to different buffer for different specs then fill out different numbers, otherwise just keep it zero. There are at least ten buffers.

After you have changed an entry, you can save the changed spec or just exit the Menu without affecting the spec. If you save a spec, you can save to Acnet (an Acnet Buffer) or save it to disk (The other option of saving it to a global is not relevant now). Saving to Acnet means that for now the spec is changed but when the program is restarted it will read from disk and overwrite all current values, thus losing your changes. Use this option if you want to make a temporary change and not mess up the default files on disk. If you're sure about the chance then select All (saves to disk and to Acnet). Be careful of what index you save the spec to. If you only want to modify the current spec then leave the index (step 3 in figure 5) alone. If you want to copy a spec then save it to another index.

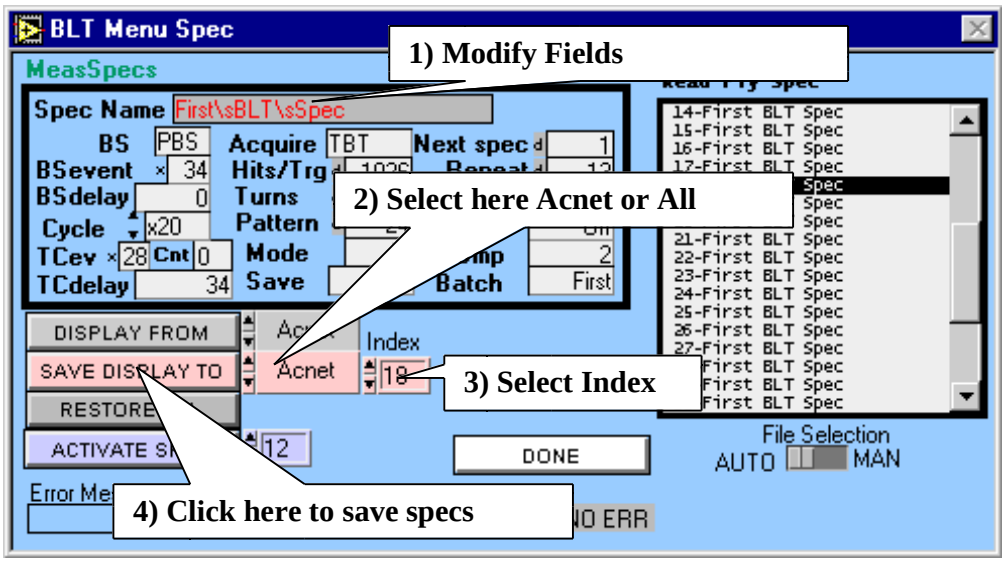

Figure 5. Modifying and changing a Specifications.

Setting a different Measure Specification

Enter the Measurement Specification Menu and select the index of the to be used specification and click on the set spec button, then exit the menu. Make sure you close the Menu, otherwise the command will not be executed.

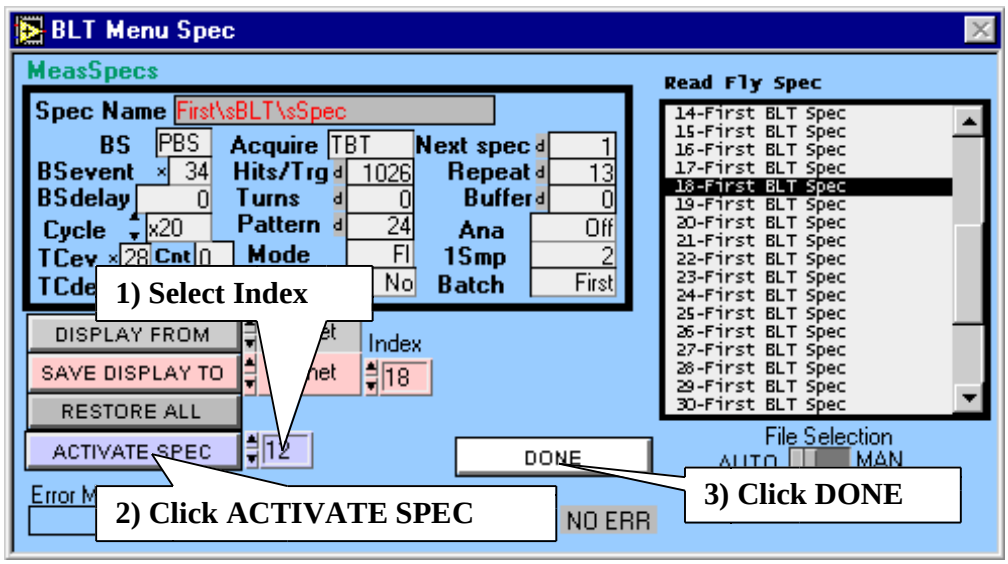

Figure 6. Activating a Measurement Specification.