HP 3582A Spectrum Analyzer quick reference guide

The HP 3582A spectrum analyzer is an older technology instrument, but is one of the easier to use since all of its controls are on separate knobs instead of menu driven selections.

As you can see there are quite a few setting to work through. This guide will cover the controls needed to use it in the most basic modes.

Input Section:

The input section, much like an oscilloscope input section, controls the input amplifier gain settings and coupling modes.

This particular instrument has two identical input channels, A and B. The signal is applied to the two binding posts (red and black). Each channel has a slide switch to select between DC coupled (down) and ac coupled (up). There is also a switch between the two inputs to allow the pair to be referenced to chassis ground or isolated. Most measurements are made in the isolated mode and AC coupled.

Below the two coupling switches are adjustments to allow the removal of a small amount of DC bias voltage that may be on the signal. This is can be set for each amplitude on the selector switch and should be ignored for this course.
Above the input connectors is a selector switch to set the input mode to either just channel A, both A and B or just channel B.

Above each input connection is a knob set for setting the maximum input signal. The small center knob should always be rotated fully clockwise until it clicks, putting the instrument in calibrated input mode. The larger dial, controlled by the back half of the knob, sets the input amplitude. This ranges from 3mV to 30V p-p. These should be

adjusted to the smallest value that prevents the red overload indicator from blinking on. If this indicator lights, it is an indication that the signal is clipped and the readings will be incorrect.

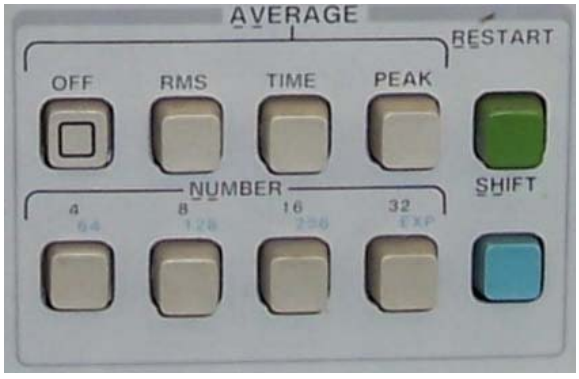
Trigger section:

For the instrument to determine the frequency components in the signal, the signal must actually be acquired. The trigger section takes care of starting each acquisition cycle. The length of the cycle is dependent on the frequency range being measured.

The FREE RUN position allows the analyzer to trigger the next cycle as soon as the current cycle is completed. Some signals may need to be triggered differently. This control section allows you to adjust the signal level (amplitude) that begins the acquisition, whether that is a positive going or negative going signal (slope), and if the signal is repetitive, or if the acquisition should be done only one time. The DATA LOADING indicator illuminates when the acquisition cycle is in progress. The ARM button and indicator are used for non-repetitive signals. For most things the repetitive button should be pressed in. If manual triggering is desired, the LEVEL knob should be rotated until the signal is triggered reliably.

Averaging:

Not all signals are nice, clean and repetitive. Many times the signal has enough variation that it is desirable to average the signal in some form.



The OFF selection disables all averaging. In addition there are RMS, TIME, PEAK and NUMBER averaging modes.

As it implies, the RMS mode does an RMS average of consecutive cycles. This mode is not highly used in the applications we are looking at in this course.
PEAK averaging keeps the highest peak measured for each frequency.
TIME averaging mode does a time domain averaging when a synchronized trigger is available. This mode is unique as it results in an enhancement of the signal to noise ratio. NUMBER averaging is the most commonly used. This mode averages N number of acquisition cycles (trigger events) and displays the results. The blue shift key enables the blue numbers when pressed in.

RESTART: **This is a very important button!** Any time the display reads “overload” the instrument is telling you that the input signal has overloaded and clipped. The data

being displayed is no longer accurate. This button resets this condition and discards all data collected to this point and allows the instrument to continue normal functions again.

Frequency Range:
The frequency range selection knob has several functional options.

While hard to see in this image, there are two stages to this knob. The front most portion of the knob controls the mode, and the rear portion controls the frequency selection. There are two base band modes, one a 0 to X frequency mode, where the frequency range (the X axis of the display) starts at zero and extended to the frequency dialed onto the frequency selection portion of the knob. This is the selection labeled “ZERO START”. The other base frequency selection range is fixed at 0 to 25KHz. The other two selections are a band set. “SET START” and SET CENTER” both use the ADJUST knob to move the appropriate point (either starting frequency or the middle of the frequency band) to the desired frequency. The range portion of the control adjusts the width of the band. Setting a range of 1KHz with a center start mode and position of 3KHz will give you an x axis on the display from 2500Hz to 3500Hz.

Bandpass Shape:

The bandpass shape selection allows the selection of one of three characteristic shapes.

FLAT TOP: This bandpass is a broad response ideal for measuring amplitudes of individual spectra. This it he most accurate mode for measuring amplitude and is the most typically used in this lab.

HANNING: This is derived from a raised cosine shape and is best suited for isolating a specific frequency spectra or singe spectral line from a group of closely spaced spectral lines.

UNIFORM: This response is designed for measuring transient signals and is most commonly used for non-periodic and impulse signals. This bandpass should be used with caution as it generates the greatest display aberrations.

DISPLAY SECTION:

The display section determine what information is selected for display and how that information is displayed.

AMPLITUDE: This set of buttons select which inputs are displayed. The only two choices can be selected at any one time. Most times the two input channels are selected (A and B). Optionally a transfer function can be chosen, using channel A as a reference. This mode displays the difference between channel A and channel B. For this lab we will not be using this function. If two many selections are pressed, an error message is displayed on the screen.

SCALE: The scale section selects how the vertical scale of the display is set. Linear mode starts at 0 volts at the bottom of the display and adjusts up to the maximum set on the input channel selection. In the 10dB/DIV selection the scale is logarithmic with a range of 80dB maximum, with the base offset set by the AMPLITUDE REFERNCE LEVEL adjusting knob. The 2dB/Div is similar to the 10dB/DIV mode, its range being 16dB instead of 80dB.

PHASE: This display mode displays the phase of a signal. Typically this is done relative to a trigger signal injected into the trigger connection on the rear of the unit. The display for this is with 0 at the center and each major division represents 50º of phase shift. For this lab we will not be using this mode.

TIME: The time and coherence functions will not be used in this lab and should be left turned off.

Marker:

The marker section generates an illuminated dot on the trace to allow you to read specific data off the traces. The display of the marker data is generated at the top of the display window. Turning the marker on enables this function. It is most commonly used to scroll down the trace and pick the amplitude and frequency of the peaks off the display. It is possible to set relative and reference modes but for the purposes of this lab all the mode buttons should be off for basic operation of the marker.

Display Adjust:

The display adjust section contains a few interesting knobs and buttons. The focus, intensity and grat illum set the CRT display conditions and do not affect the data in any way.

In addition to these controls you can store and recall the data currently displayed on trace one and two. This can be handy to compare data collected currently against data yet to be collected. While there is no real comparison, other than visual, they can be useful in visualizing changes in signals.

RESET: This button forces an instrument reset and returns it to a fresh power on state.