

Overview

This Chapter presents a general overview of the structure of the Model 824, an example of selecting a Setup or Instrument Definition (ID), performing a measurement and storing the data. Subsequent chapters will deal specifically with these steps in a more structured manner.

System 824 Setups or Instrument Definitions

The power and flexibility of the System 824 gives you a variety of measurement possibilities. The System 824 has a number of distinct setups or Instrument Definitions (ID) from which you can select the one best suited for a particular application. You can, of course, modify any instrument definition for another application and add it to the existing list of instrument definitions.

The System 824 was designed to be upgraded with new instrument capabilities as they are made available. Please contact Larson•Davis for information on the latest available upgrades.

An ID name consists of an eight character name followed by a three character extension called the Instrument Type. Some IDs presently available are: SLM&RTA.SSA, SLM.ISM and Logging.LOG.

The complete ID consists of its name and an instrument setup based on one of the available Instrument Types. There are a number of factory supplied setups available for use by the user. In order to create a new setup, modify an existing ID and store it under a different name as a new setup. The Instrument Type will remain the same as that of the ID used to create it. Thus, a new setup created for the measurement of environmental noise by modifying the Logging.LOG ID might become ENV.LOG.

Instrument Definition (ID) Types

	Instrument Definition (ID)		
	SLM&RTA (SSA)	Logging (LOG)	SLM (ISM)
SLM Range (dBA)	80	105	105
Real-time Spectrum Analysis	1/1 and 1/3 octave bandwidths	No	No
Manual Data Storage	Yes	Yes	Yes
Back Erase	Yes	No	Yes
Automatic Data Logging	Time History Intervals (sound level and spectral data)	Time History Exceedance Events Intervals (sound level)	No
Major Applications	Noise Reduction Sound Power	Noise Monitoring Noise Workplace	Point & Shoot Law Enforcement Workplace Noise

Write Protect, Delete, Write Enable IDs

After an ID has been created, it can be protected (or locked), or deleted if necessary. This is described in detail in the section "Write Protect, Delete, Write Enable IDs" on page 3-17.

SLM&RTA (SSA)

The SSA ID performs simultaneous sound level measurements and real-time spectrum analysis using 1/1 or 1/3 octave bandwidths. The Instrument Type designation "SSA" represents Sound Spectrum Analyzer. Sound levels during the measurement period are displayed and can be stored for later recall. In addition to a live spectrum display, the System 824 can display an equivalent level (L_{eq}) spectrum, a minimum bin by bin level (L_{min}) spectrum and a maximum level (L_{max}) spectrum, which is the spectrum time

coincident with the maximum value of the sound pressure level during the measurement period.

A back erase function allows the removal of up to the last 30 seconds (in one second steps) of data when a disruptive noise occurs.

The 824 also provides an automatic measurement and logging feature which provides the sound level parameters L_{eq} , SEL, L_{max} , L_{min} , L_{Peak} and the L_{eq} and Max or Min spectra data at regular user-defined time intervals. Due to the complex digital processing necessary to perform simultaneous sound level measurements and spectrum analysis, the measurement range in this mode is reduced to 80 dBA.

The design of the System 824 permits the simultaneous measurement of the following sound level parameters, a feature we call “Any Data”:

	Leq	Peak	Live SPL			Lmax			Lmin		
			Detectors			Detectors			Detectors		
			Slow	Fast	Impl	Slow	Fast	Impl	Slow	Fast	Impl
A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: The detector used to create Leq is a pure integrating true RMS detector which integrates the energy over a specific period of time. It may be as short as 1/32 second, in a time history which may be as long as 24 hours. As a result, it does not include decay artifacts of older instruments that integrate the output of the SLOW or FAST detectors.

Peak Sound Pressure Level (L_{peak}) with A, C and Flat weighting.

Equivalent Continuous Sound Pressure Level (L_{eq}) with A, C and Flat weighting. A time history record can be enabled to capture samples at periods as short as 1/8th of a second.

Spectral Analysis with Time History Record allows you to record spectral data along with the 33 sound level parameters mentioned above.

An interval history which includes 6 L_n values (6 values with 0.1 dB resolution, based on user-selected percentages with 0.01% resolution).

For Takt users, as a no-cost option, the following additional parameters are provided:

Taktmaximal with the following combinations of frequency weighting and time weighting:

	Taktmaximal 3		Taktmaximal 5	
	Slow	Fast	Slow	Fast
A	✓	✓	✓	✓
C	✓	✓	✓	✓
Flat	✓	✓	✓	✓

SLM (ISM)

The SLM (ISM) is the simplest to operate, providing the functions of a “point-and-shoot” sound level meter with manual data storage. The SLM (ISM) Instrument ID measures the same thirty-three sound level parameters as the SLM&RTA (SSA) ID, but it does not provide frequency spectrum measurement capability. However, since less digital processing is required, the measurement linearity range is 105 dBA, permitting the use of a single range for all measurements.

Logging (LOG)

This ID is designed particularly for noise monitoring applications and provides extensive automatic data storage features. The Instrument Type designation, LOG, represents a Logging sound level meter. Like the SLM (ISM) ID, the measurement range is 105 dBA and does not provide frequency spectrum measurement capability. Up to thirty-six measured sound level parameters can be stored as a Time History record at rates as rapid as 32 samples per second.

The following parameters can be logged at user-selectable time intervals between 1 second and 99 hours (hh:mm:ss)

- L_{\max} , L_{\min} , SEL, and L_{eq} ($q=3$) or Time Weighted Average ($q=4, 5, \text{ or } 6$) levels for a selected detector (Slow, Fast, or Impulse) and a selected frequency weighting (A, C, or Flat)
- L_{peak} level corresponding to the frequency weighting selected for L_{eq} (see charts above) and a second L_{peak} level corresponding to one of the two alternative choices of frequency weighting.
- L_n (6 values with 0.1 dB resolution, based on user-selected percentages with 0.01% resolution)
- Date, time and duration of interval
- Six user-selected values of L_n can be measured and stored as part of the automatic interval data storage function.
- A special feature is the automatic measurement and logging of data associated with noise exceedance events that are triggered by the sound level exceeding a user-defined threshold. L_{eq} , SEL and L_{peak} for each event are logged along with a Time History of the sound level during each event.
- Daily history and community noise metrics.

Selecting a Measurement Setup

The simplest way to setup the instrument is to select the ID which most closely meets the requirements of the measurement to be made and then modify it to meet your specific needs. The instrument is delivered with a number of permanent setups. The standard ID delivered with the instrument is ISM. The optional IDs available are: SSA, LOG, RTA, FFT, AUD, and TAL. If the options for the SSA, LOG, RTA, FFT, AUD, or TAL have not been purchased, they can be evaluated in a **demo mode**.

Restrictions of demo IDs:

- Cannot print reports
- Cannot store data
- Cannot perform any I/O commands
- Only 20 demos are permitted
- Memory must be purged prior to activating these IDs

The following is an overview of how to select a measurement setup.

Step 1 To display the available instrument setups, press the  Setup key.

Note that each of the permanent setups has a letter “p” to the left of the setup name, indicating that it cannot be modified or deleted. It can be saved under another name and then modified.



At any time, one of the available setups will be the active setup. The name of this setup will be at the top of the list below the Edit Setting message. Pressing the  key while the “Edit Settings” menu item is highlighted initiates the modification procedure.

After selecting a measurement setup, press the **▶** key to initiate the measurement.

Step 2 To select the desired setup, scroll through the setup list with the **▲** and **▼** keys until the item is highlighted, then press **▼**.

It will be shown later how the Setup Menu can be utilized to modify one of the permanent setups to meet your requirements. The 824 Utility software is also very useful for selecting and modifying setups.

Performing a Measurement; SLM&RTA (SSA)

Without getting into the fine details of operating the System 824, let's just press some keys and see what it can measure and display.

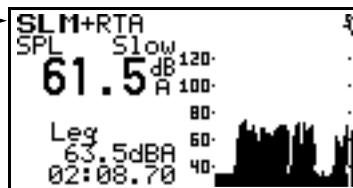
Step 1 Let's look at the SLM&RTA (SSA) ID Access the Setup Menu by pressing **Ⓜ** and use the **▼** and **▲** keys to highlight the SLM&RTA ID, as shown below:



Step 1 With SLM&RTA highlighted, press **▼** to select it as the current ID.

Step 2 Press the RUN/STOP key **▶** to begin a measurement and obtain a display resembling the following:

You can see from the top line that the meter is in the SLM+RTA mode, and the bold SLM indicates that it is the SLM display or VIEW as we refer to it when using the Model 824.



The large numerals represent the SPL measurement taken with the Slow detector and the A-weighting. In the lower left is an indication of the Leq value and the elapsed time of the measurement for which the Leq value is calculated. The graph being traced across the display is a time history of the SPL value.

Stop, Pause and Back Erase Functions

While taking a measurement you can stop, pause, and back erase.

Stopping and Starting Measurements

To stop the measurement, press the  key. Restart by pressing .

Pausing Measurements

To pause the measurement press the  PAUSE key. To continue the measurement press the  key a second time. While paused, the  and  keys can be used to move a cursor across the time history and display the SPL and secondary parameters as measured at any particular time during the measurement period.

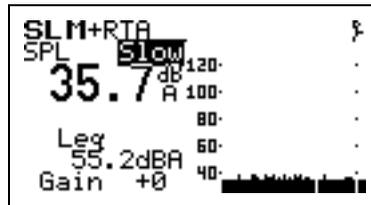
Back Erasing

Should an unwanted sound occur during the measurement, such as a door slam, you can pause the instrument, cursor to the left with the  key to a time prior to the unwanted event, and press the  key once more to recommence the measurement from that point, erasing the data to the right of the cursor. This is the *Back Erase* feature as indicated on the display when the  key had been initially pressed.

Changing the detector of the displayed SPL value

You can change the parameters being displayed in the View window while a measurement is in progress without going to the Setup menu.

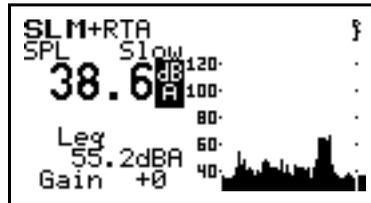
- Step 1** To change to the detector type, use the \blacktriangle or \blacktriangledown keys to highlight the Slow detector, as shown below:



- Step 2** To scroll through the optional detectors, press the \blacktriangleright or \blacktriangleleft arrow keys. This will display the SPL corresponding to the Fast and Impulse detectors. Go back to the Slow detector and press the check \checkmark key or wait several seconds until the highlight disappears.

Changing the frequency weighting of the displayed SPL value

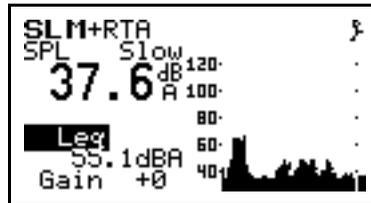
- Step 1** To select the frequency weighting parameter, press the \blacktriangle or \blacktriangledown keys to highlight the A-weighting as shown:



- Step 2** Use the \blacktriangleright or \blacktriangleleft arrow keys to display the C-weighted or Flat-weighted SPL corresponding to the Slow detector.

Changing the displayed secondary parameter

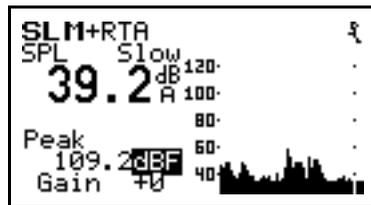
- Step 1** To select the secondary parameter to be displayed (Leq in this example), use the ▲ or ▼ keys to highlight the Leq label.



- Step 2** Press the ► or ◀ arrow keys to display the values of A-weighted SEL, Lmin, Lmax, Lpeak values. Select “Peak” and press the check ✓ key.

Changing the frequency weighting of the displayed Lpeak value

- Step 1** With the Peak label selected, press the ▲ or ▼ keys to highlight the Peak weighting.



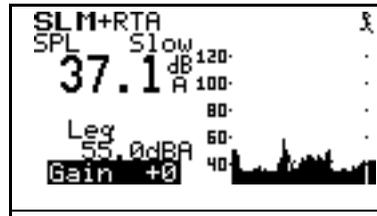
Use the ► or ◀ arrow keys to display the A, C or Flat weighted Lpeak values.

Changing the amplitude range, or input Gain

When using the SSA ID, as in this example, the measurement range is 80 dB, unlike the ISM and LOG IDs for which it is 105 dB. In order to optimize a particular measurement, provisions have been made to select a value of input gain directly from the graphic display. The gain can

also be changed from the Setup Menu, as described later in this manual or it can be changed here.

Step 1 To change the gain, Use the ▲ or ▼ keys to highlight the Gain, as shown below



The gain shifts the dynamic range up or down. See page 5-3.

Step 2 Use the ► or ◀ arrow keys to change the input gain.

Views

For each instrument type (e.g. ISM, LOG or SSA), a unique set of data displays or VIEWS are available.

Selecting a VIEW

There are eight different VIEW choices available in the SSA instrument.

Step 1 To display the set of available data presentations, or VIEWS, press the View key (use the ▼ and ▲ keys to scroll through the entire range of choices).



The VIEW choices for the SSA instrument type are as follows:

SLM	Sound Level Meter parameters, graphic and digital display
Any Data	Tabular presentation of sound level meter parameters
RTA Live	Live display of real-time frequency spectrum
RTA Leq	Display of Leq spectrum over elapsed measurement period
RTA Max	Display of the live spectrum corresponding to the maximum value of sound pressure level occurring during the measurement period.
RTA Min	The minimum level recorded for each frequency during the measurement.
Intervals	Sound Level parameters measured and automatically stored at regular user-defined time intervals.
Leq Spectrum	Leq spectra measured and automatically stored at the interval rate.
Max/Min Spectra	Instantaneous spectrum corresponding to the maximum sound pressure level occurring during each of the user-defined time intervals or the minimum level for each frequency as selected by the “Intv Spectrum” setting.
Time History	Sound Level parameters and spectral data measured and automatically stored at user defined time periods.
Run Log	Displays the start and stop times/dates of the active measurement.
Ln Centiles	L1 - L99 displayed for the measurement period.

Use the up ▲ and down ▼ arrows to select a menu item, right ► arrow to enter a submenu and left ◀ arrow to exit a menu.

As part of this exercise, select each of these various VIEWS and use the  and  keys to see how a variety of different parameters are displayed within each function.

We have sought only to explain the general concept of the VIEW function at this time. More detailed explanations are provided later in Chapters 3 and 6.

Data Storage and Recall

When a measurement has been performed and the instrument stopped, the measured data can be stored to non-volatile memory before the instrument is reset or the setup changed; otherwise the data will be lost. Attempting to change the setup while there is measured data available will cause the system to prompt you to store the data before continuing.

Storing Data

The “Recall Files” line only appears if data has previously been stored.

Step 1 To store measurement data, press the  DATA key. The following menu appears:



Step 2 With the message “Store File” highlighted, press the  Check key to store the data.

Recalling Data

Step 1 To recall stored data, highlight “Recall Files” and press the  Check key. The following screen appears.



- Step 2** Press the up  and down  arrow keys until the desired file is indicated. Press the check  key, select “Recall” from the menu and press the check  key again.

Calibration

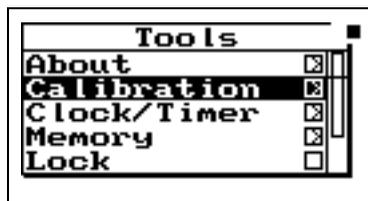
Power off the instrument prior to connecting a microphone or preamplifier; the high voltage spike created when connecting while the instrument is on can damage sensitive electronic components.

Calibration is one of the functions available from the Tools Menu.

- Step 1** Press the  TOOLS key.



- Step 2** Press the  key to highlight “Calibration”.



- Step 3** To setup the calibration process, press the  key to move into the Calibration Menu.



- Step 4** To set the calibration level, press the  and  keys to highlight "Cal Level",



NOTE: The output level specified by the calibrator manufacturer will be at standard temperature and pressure. In practice the level is a function of temperature and static (barometric) pressure, so a corrected level should be used. Similarly, the sensitivity of the microphone itself is a function of temperature and static pressure. For directions on compensating for temperature and static pressure during calibration, see "Correction of Calibrator Output Level" on page 2-17.

- Step 5** To set the value of the sound level provided by the calibrator, press the  key. This displays the **Cal Level** window.



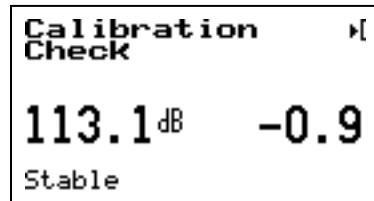
- Step 6** Then use the  and  keys (to move the cursor position) and the  and  keys (to change digits) to enter the proper level.

- Step 7** To select the new calibration level press the  key.

Step 8 To verify that the instrument is properly calibrated, use the \blacktriangle key to highlight “Check”.

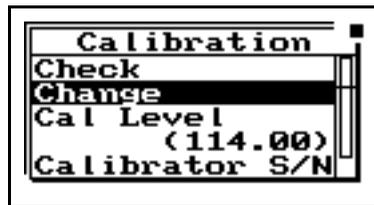


Step 9 Place the calibrator over the microphone, switch the calibrator ON, and press \checkmark to activate the calibration **Check** process.



The display will show the measured level and the difference from the calibrator level entered and the measured level as shown.

Step 10 If the calibration is not reasonably close to the level of the calibrator, the calibration can be changed by choosing **Change**. Press \checkmark , use the \blacktriangledown key to highlight “Change”.



Step 11 Switch the calibrator ON, and press \checkmark .

Correction of Calibrator Output Level

The CAL200 provides a nominal pressure level of 94 dB or 114 dB. The exact levels are printed on the Larson Davis calibration sheet that is delivered with the calibrator. The free field level is -0.12 dB from either of these levels. If the calibrator and instrument are near room temperature and near sea level then no other corrections need to be made. If the calibration sheet for the CAL200 indicates 113.98 dB for its level when set to 114 dB then set the Cal Level in the 824 to 113.86 dB.

When the microphone and instrument are at a temperature other than near room temperature or static pressures not near sea level, then corrections need to be added for the ambient temperature and the prevailing static pressure. Check the calibration data shipped from Larson Davis with the CAL200 to get these corrections. The corrections can be added to the level obtained in the previous paragraph to get the actual level of the CAL200.

The 377B41 microphone's sensitivity varies with static pressure. The coefficient of static pressure is -0.01 dB/kPa. If the system is calibrated at 85 kPa for instance then it will be 0.16 dB less sensitive at sea level. The 377B41 and 824 vary with temperature. The coefficient of temperature is +0.012 dB/°C. If the system is calibrated at 25°C then it will be 0.024 dB less sensitive at 23°C.

