



Application Notes

Software Installation

*** IMPORTANT *** The setup program must be run before the RF receiver/electronics module is attached to your machine. This is necessary to ensure that the correct drivers are installed and will then later be loaded when the hardware is attached.

Insert the Invisible Waves Installation Flash Drive in your computer and run the setup / installation program (e.g. iw_install.msi). When the Setup Wizard runs, follow the prompts for installing the application. Be sure to review the License Agreement as you progress through the installation procedure. When the Setup Wizard has completed then click the 'Finish' button.

NOTE: When prompted to install the WinRadio shortcut on the Desktop, please uncheck that selection (no need for this shortcut).

NOTE: Vista and Windows 7 have some security features which may require you to enter in the Registration Code each and every time you launch the IWx application. If you encounter this, please do the following: Run IWx as an administrator: You will need to go into the folder "Program Files\Kaltman Creations\Invisible Waves X", RIGHT-click on "IW100X.exe" and select "Run as administrator". Then enter the registration code and it will no longer be necessary to enter in the code each time to launch the software.

Powering On

With the computer powered-up and running Windows, attach the RF receiver to your machine using the USB cable included in the package.

If you have the optional Smart LiPO rechargeable battery pack, power it on first followed by the IWx scanner module. The battery pack has a single, multi-colored status LED that will blink once every 2 seconds. The receiver has a single, blue LED that will display two short flashes every second. When the application is running and communicating with the receiver then this pattern will change to one short flash followed by one long flash every second.

About the Optional Battery Pack

The Smart LiPO battery pack will typically provide power for 3 to 6 hours of continuous use. The external AC/DC adapter is used to recharge the battery pack. The IWx scanner may still be used while the battery is charging.

The battery pack will also function as an uninterruptible power source (UPS). Under normal circumstances, the IWx Scanner is powered from the power adapter (via the battery pack) and in case of AC power dropout, the power for the IWx scanner is immediately supplied by the battery pack without any noticeable interruption.

The remaining battery charge is indicated in percentages of total charge, corresponding to the following colors:

Green = 95-100% (full charge)

Yellow = 80%

Orange = 60%

Orange/red = 40%

Red = 20%

Flashing red = less than 10%

IMPORTANT:

1. Do not deeply discharge the batteries. In contrast to the older NiMH or NiCd type of cells, the LiPo cells have no memory effect and there is no need for a deep discharge to maintain their useful life and capacity.

2. Avoid charging the batteries in excessively cold or excessively hot conditions.

The Smart battery pack will automatically prevent charging under such extreme conditions so that the batteries will not suffer any damage, but this may mean that the charge cycle will not be completed. Also, storing the battery pack at very high temperatures will significantly speed up self-discharging and shorten the battery life.

Application Notes

LEVELS – The IWX dbm “typical” scale range is from -30dbm down to the RF noise floor at around -120dbm. There are no ‘hard rules’ as to what constitutes a strong signal vs. a weak signal (because it’s all relative to the RF noise floor and interference levels), but generally we say the following:

0dbm to -30dbm: very strong

-30 dbm to -70dbm: very good

-70dbm to -90dbm: weak, but usable

-90dbm to -110dbm: very weak (possibly still usable provided there are no stronger, overpowering interfering signals)

-110dbm to -130dbm: not usable

RANGE / SPAN – Always select the smallest frequency range required (no need to waste time sweeping frequencies ranges that are not of interest). Start out with a coarse resolution setting (larger value) and then select finer resolutions as necessary. We recommend a 1MHz, 750KHz or 500KHz resolution to start with. We also recommend that you activate the Adaptive Sweep function for the first couple of sweeps as this will greatly reduce the number of sweeps required to achieve maximum signal level readings (please see below, “**Use the Adaptive Sweep™ function to increase sweep speeds**”).

NOTE: The Adaptive Sweep can have the opposite effect and slow down the sweep if you are sweeping a very RF congested environment. If this is the case, please uncheck the Adaptive Sweep feature.

Please keep in mind, as with any RF spectrum analyzer, the greater the frequency span you select (range), the slower the sweep speed will be. Additionally, the finer the resolution setting the slower the sweep speed will be. Therefore, if you attempt to cover a large frequency span and also set the analyzer to a fine resolution, the sweep speed may become very slow.

THRESHOLDS – Setting threshold levels for the UFO Alert, Level Alert, and RF Coordinator requires some initial experimentation, but once you have a feel for appropriate threshold levels, you can probably leave the settings as-is for most events/applications. Thresholds levels are the minimum levels (above or below) in which an action will occur. So, for example, when setting the low Level Alert, you will want the threshold level set at a point, maybe 10dbm to 15dbm above the noise floor, or above a source of potential interference. The same applies for the UFO Alert and RF Coordinator because here you will want the thresholds set just above any potential interference levels.

IWXAV VERSION – To use the IWXAV version, you must connect the WinRadio Down Converter (DNC) output to the analyzer electronic antenna input and also select (within the IWX software) the 3.5GHz range option. Once connected and selected, the Invisible Waves IWXAV will now operate in the 1.7GHz to 3.5GHz range. Typical applications for this range include 1.9GHz cellular, 2.4GHz Wi-Fi, intercom, remote control equipment, data linking equipment, etc. Please note that you can only select one range at a time, i.e., the standard range of 9KHz to 1.8GHz or the higher range of 1.7GHz to 3.5GHz.

OTHER ANTENNAS – You can connect an antenna combiner or antenna distribution amplifier to the RF input of the IWX analyzer. This will allow you to take direct measurements from your external antennas (which is considered ideal) as opposed to using the included broadband antennas. Please keep in mind, when making direct connections to the analyzer, that the maximum input level of the analyzer is 0dbm (1mW). Exceeding this level will burnout the input stage of the analyzer.

Quick Notes

User Manual: There is an extensive User Guide (under the Help pull-down), plus there is a Help Assistant (question Mark & Pointer) located in tool bar.

Zoom-in and out: There are two ways to zoom in and out within the Spectral Trace View: use the Zoom tool (magnifier in the tool bar). Right click zooms in, and left click zooms out. Or, highlight an area by clicking and dragging across an area of interest and then double click on that area and it will zoom into the highlighted region only. Please note that you can also return to the original frequency span by simply using the Undo and Redo functions.

Heat Map: The Heat Map (also sometimes referred to as a “histogram”) displays RF energy over time and therefore provides a visual history (‘look-back’) for intermittent RF “hits” and overall RF activity. Please note that it may take several initial sweeps before the display begins to draw.

Data Recorder: The Data Recorder allows you to record all of the IWX parameters for extended periods of time so that the data can be reviewed at a later time. Typical applications include determination of intermittent, interfering frequencies, extended RF studies, site surveys, general RF transmission activity, research applications, etc. Please note that it may take several initial sweeps before the data capture begins.

Undo / Redo: Remember that there are multiple levels of Undo and Redo, if you make an entry mistake or wish to go back to a previous setting.

Custom Profiles: You can 'globally' save all settings for later recall with the "Save Settings" selection and you can save the Master Status Display Panels with the "Save Master Status" selections for later recall. These functions are ideal for reoccurring or consecutive touring performances, performances with multiple acts, or for repeatable measurement taking.

Hidden feature: In the Spectral Trace View, place your cursor on the MHz scale values across the bottom of the screen and left click & drag to the left or right. You are now sliding the whole frequency scale up or down, yet retaining the span.

Suggested Feature Use

Pre-setup and baseline readings

Use the RF Congestion Scale™ to gauge the severity of local RF. This gauge will help you determine just how much attention and detail will be required in transmitter frequency spacing. Or, if the gauge indicates a really harsh, congested RF environment, you can select transmitter models/types based on minimum frequency spacing requirements.

Scan and use the RF Coordinator™ to identify usable open RF space. Set the parameters for the RF Coordinator (typical settings: 500KHz bandwidth, minimum of 500KHz spacing, and threshold level at -80dbm). Then view both the graphics on the screen and/or the hard data for potential, usable open RF Space. Please remember that you may still have to take into account RF intermodulation components.

Setting up your wireless equipment

Use the Adaptive Sweep™ function to increase sweep speeds. The Invisible Waves standard sweep/scan function sometimes requires multiple sweeps before acquiring all RF data (depending on the resolution and span settings). So, it may take several full sweeps before the full signal level of a transmitter appears. To reduce the number of sweeps required to achieve these maximum results, you can activate the Adaptive Sweep function for the first couple of sweeps. Activation will adaptively sense the rise in the RF waveforms and apply a finer resolution to only those rising signals. After a couple of Adaptive sweep passes, you can click the function off and return to normal sweeps.

Use the CTL™ feature (Click to Listen™) to listen-in to all RF signals. To help identify transmitters or potential interference, use the CTL tuner function to "listen in." Please note that the CTL function will tune-in and demodulate any analog signal, i.e., FM radio stations, most VHF and UHF wireless microphones, wireless intercom, 2-way radio, etc., but it will not demodulate digital transmission such as cellular phones or encrypted data. But you can still hear the digital noise from those digital transmissions which will allow for potential signal identification. The CTL tuning indicator can be dragged left or right across the frequency scale in the Spectral Trace View. Once you tune into a transmission, you can right click and select/place the tuned transmission into the Master Status Display as a cataloged signal (see "**Catalog & name all RF signals into the Master Status Display**" below).

Catalog and name all RF signals into the Master Status Display, (catalog all your transmitters and any interference). Simply highlight (click & drag across), the transmission in the Spectral View and/or use the Click to Drag function to pull the Peak Marker transmissions down into the Master Status Display (MSD) for cataloging. Catalog signals in the Master Status Display (MSD) are called Master Status Panels (they appear as boxes that contain the transmission frequency, name and signal level). These Master Status Panels can be re-ordered by frequency, name or by your choosing. You can also color code them according to type i.e. vocals, instruments, IEM, etc., and based on the Level Alert threshold that you set, the Master Status Panels' borders will indicate an alert of Yellow as a caution, and flashing Red as urgent attention needed. Each Master Status Panel also has a Speaker Icon for instant Click to Listen (as fast as you can click from one to the next, you can listen in).

As mentioned above in the "**Use the CTL™ feature (Click to Listen™) to listen-in to all RF signals**" the CTL tuning indicator can also be used to catalog signals. Once you tune-in to a transmission, you can right click and select/place the tuned transmission into the Master Status Display as a cataloged signal.

Custom Markers

By simply right clicking in the Spectral Trace View screen, you can activate the Marker Points feature and insert Markers. These Markers can be custom named, color coded, positioned and resized as desired.

Monitor just the Master Status Display. Once all signals and interferers are cataloged, you can close the Spectral Trace View and monitor from the Master Status Display only. With just one click you can switch back to include the Spectral and other displays.

Set the RF Level Alert™ to warn when any cataloged signal levels fall below assigned thresholds. Once all signals are cataloged as Master Status Panels in the MSD, set the RF Level Alert to warn when any cataloged signal levels fall below assigned thresholds. A RF Level Alert could be an indication that a transmitter has moved into a dead spot, out of range, some source of interference is diminishing the transmitters output, or possibly that the transmitter battery is bad.

Naturally, you would not want to be alerted if a cataloged 'interference signal' became weaker (this would be a good thing!). So, when cataloging the interference into the MSD, you can select to ignore the Level Alert for that specific signal.

Set the UFO Alert™ (Unidentified Frequency Objects™) to warn of unexpected interference. Once all signal are cataloged as Master Status Panels in the MSD adjust the UFO threshold level (typically set to around -85dbm) to warn of rogue interference. If any new, un-cataloged signals appear, the UFO Alert will appear in the Spectral Trace screen, the UFO Alert will flash, and an audio beep is generated from the computer.

Click to Listen™ (CTL) Connections

Click-to-Listen™ (CTL) set-up:

The CTL audio output is a mono, line-level signal appearing on a 3.5mm mini stereo plug. The recommend connection requires running the mini-plug audio output signal into the computer microphone input - adjust levels - and then use the computer audio output to feed headphones, a mixer or powered speakers. Or, take the mini-plug audio output and plug it directly into a mixer audio input (when using this method there is the potential for continuous extraneous noise). In either case, the typical audio mixer inputs could include: Cue Input, Aux, Tape Input; any Bus that will allow headphone or local monitor soloing. *Please note that it may be illegal to monitor certain transmissions.

Unique Click-to-Listen™ (CTL) applications:

Use the CTL function as a playback source; play local FM radio stations. Simply input the FM radio band (88MHz to 160MHz) and drag the CTL Tuning Bar to find an appropriate station.

*Use the CTL to monitor other event communications and wireless intercom transmissions. For example, listen-in to emergency 2-way communications, promoter communications or LD communications. Tune into Assisted Listening frequencies to confirm proper transmissions.

Hardware Notes

CTL Audio

When the Click-To-Listen™ (CTL) function is not activated, and using the CTL audio output plugged directly into a mixer or amplifier (not via the computer audio in and out), extraneous noise in the form of clicks and pops appears on the audio output. If this is your only method of connection, it is recommend that you use your audio mixer Solo On/Off, Mute or Volume control to diminish the audio level when not accessing the CTL function. If using the recommend CTL connections (computer mic input and headphone output), there are no noise issues.

Carrying Case

The IWx hardware is packaged and pre-wired into the included carrying case and removable of the components is not recommended for general use. However, if the IWx is to be permanently installed ("fixed rack installation"), please be sure that the components have adequate ventilation.

Warnings

The IWxLIVE and IWxAV electronics modules, power pack, and IWxAV Down Converter run warm to the touch. Please do not run the system with the carrying case lid closed or run the system without adequate ventilation/airflow.

*The IWx is considered a professional, precision test and measurement analyzer, and is intended for professional test and measurement use only. Please note that it may be illegal to monitor certain wireless transmissions.

Minimum Requirements

Operating System: Windows XP, Vista, Windows 7

CPU: 2.0 GHz or above, 32 or 64-bit

Memory: 2 GB

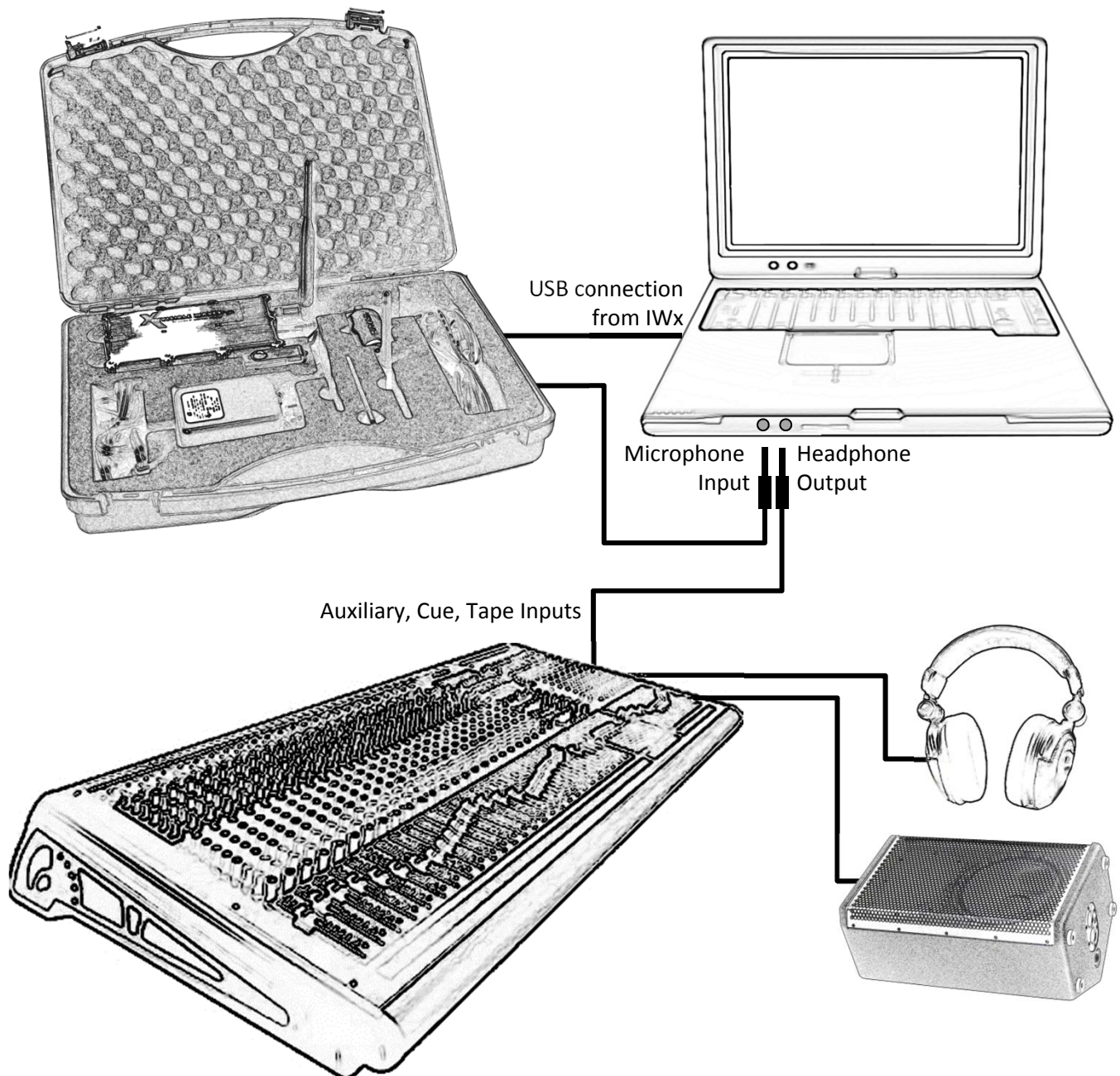
Hard drive storage: Minimum 200 MB

For Technical Support, please contact Kaltman Creations LLC at: Sales@KaltmanCreationsllc.com or call 678-714-2000

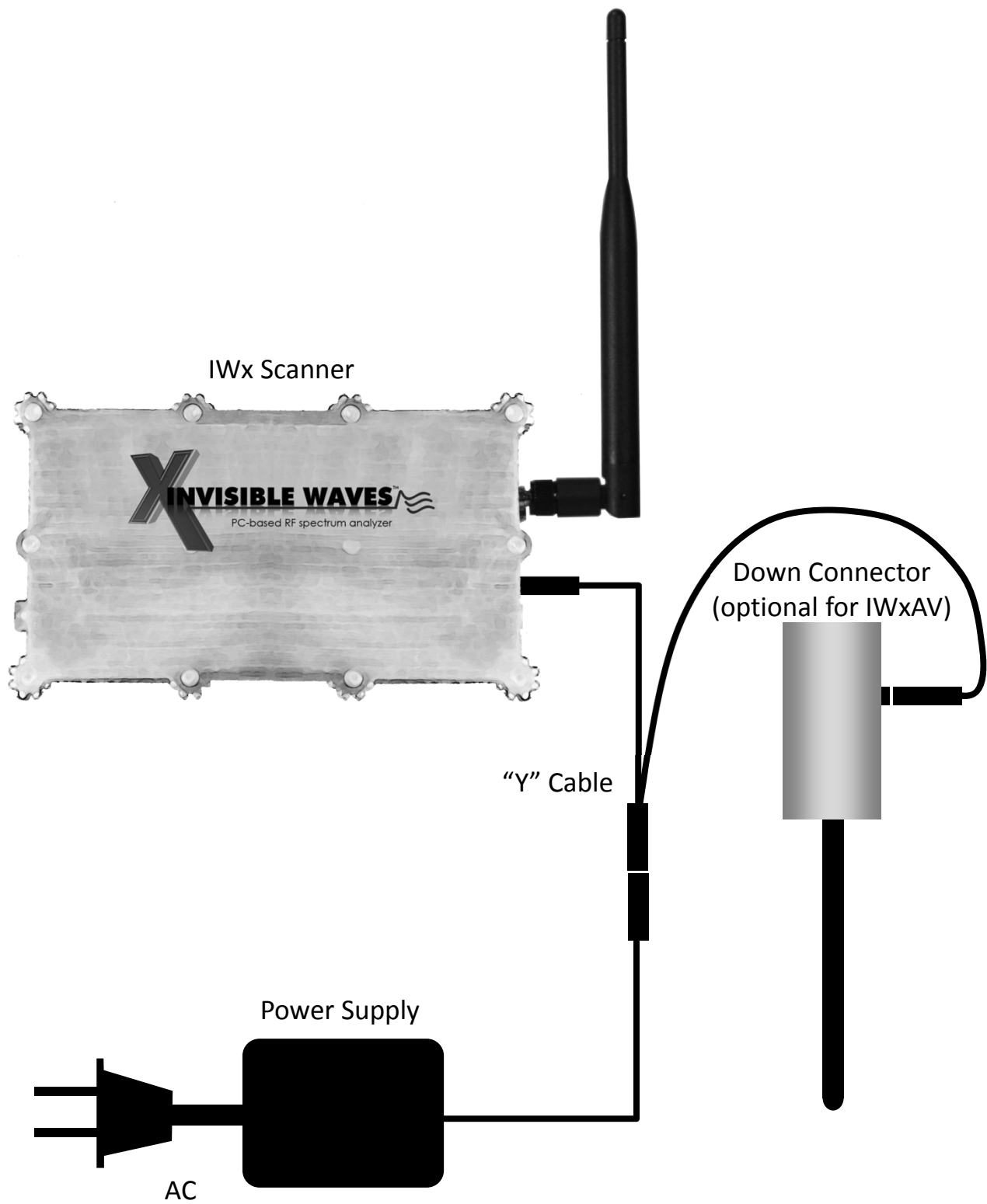
IWx Hookup to Mixer Board and Laptop

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IWx Power Connection



IWx Power Connection with Rechargeable Battery Pack

