INTERSTELLAR

OPERATOR'S MANUAL

Version 0

CRANE SONG LTD.

DRAFT 1

IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions
2. Keep these instructions
3. Heed all warnings
4. Follow all instructions
5. Do not use this apparatus near water
6. Clean only with a dry cloth
7. Install in accordance with the manufacturer's instructions
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat
9. Protect the power cord from being walked on or pinched, particularly at plugs and the point where they exit from the apparatus
10. Only use attachments/accessories specified by the manufacturer
11. Unplug this apparatus during lightning storms or when unused for long periods of time
12. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped
13. CAUTION: To disconnect the unit completely from the MAINS, unplug the unit. Turning the power switch off does not disconnect the unit from the MAINS.

Note the background image is a back yard Nothern Lights photo taken in Superior Wisconsin looking stright up.

The internal clock of Interstellar has the lowest jitter of all pro audio products the we know of. For best sonic and low jitter results use Interstellar as the master clock in your set up.
A warm up period of 1/2 hour to 45 minutes will give best results.

Interstellar has been designed so the AD can be upgraded in the future.

THE CONTROLS
Let's have a closer look at what the front panel controls have to offer.

POWER SWITCH
A straight forward ON/OFF switch to turn the unit on or off.
Power is indicated by lighting of the LCD display.

SAMPLE RATE SWITCH
The clock rate can be set from 44.1KHz to 192KHz
When using the USB interface the sample rate is set buy the daw
Whenever the sample rate is changed, the convertor is re-calibrated. This will keep the convertor working as accurately as possible.

TRIODE
The triode function creates a triode tube like harmonic structure. The process contains strong, but not strictly, even order harmonics. This affects the bottom end of your signal by fattening it up and it should be noted that even order harmonics are difficult to hear. The harmonic structure changes with signal level and the amount of process being applied, just like it does in a tube in the analog world.

PENTODE
The pentode function creates mostly third harmonic information but contains some higher order odd harmonics depending on the signal level and the amount of processing. It is very much like driving a pentode into overload. The pentode process makes things sound brighter and brings out detail. You can also hear this as a compression effect. The pentode process affects the triode
processing stage as both processes are in series.

TAPE
The tape function emulates magnetic recording tape. Tape distortions consist of odd harmonics, starting with the third and fifth. As you increase the level on the tape process the harmonic content increases and higher odd harmonics are added. A tape recorder also contains record and reproduce equalizers that modify the harmonic content. The result is a sound that fattens up the bottom and midrange of a recording. As you increase the process there can be loss of higher content with respect to low frequencies if driven far enough. The high frequencies start compressing sooner then the low frequencies. This is a result of the compression function and eq curves in the process. The compression also squashes peaks and results in a higher average level. The tape process sits in series after the triode and pentode processes and thus modifies them

FUNCTION
The function switch has 5 settings

USB off, DSP off
USB off, DSP on
SET UP for dither and filter
USB on, DSP off
USB on, DSP on

When the USB is off Interstellar will function as a stand alone ADC
When the USB is on and the computer reconizes Interstellar
the sample rate is controlled by the computer

Dither can be set to 16 or 24 bit
When in SET UP mode, the sample rate control changes the dither between 16 and
24 bit this applies to both USB and non USB modes of operation

METER
The meter will show input level, in the event of clipping - overs
the "L", "R" or both will turn red for about 1 second

THE INTERSTELLAR generates harmonically related information. The processing
was developed by studiously analysing the harmonic distortion and characteristics
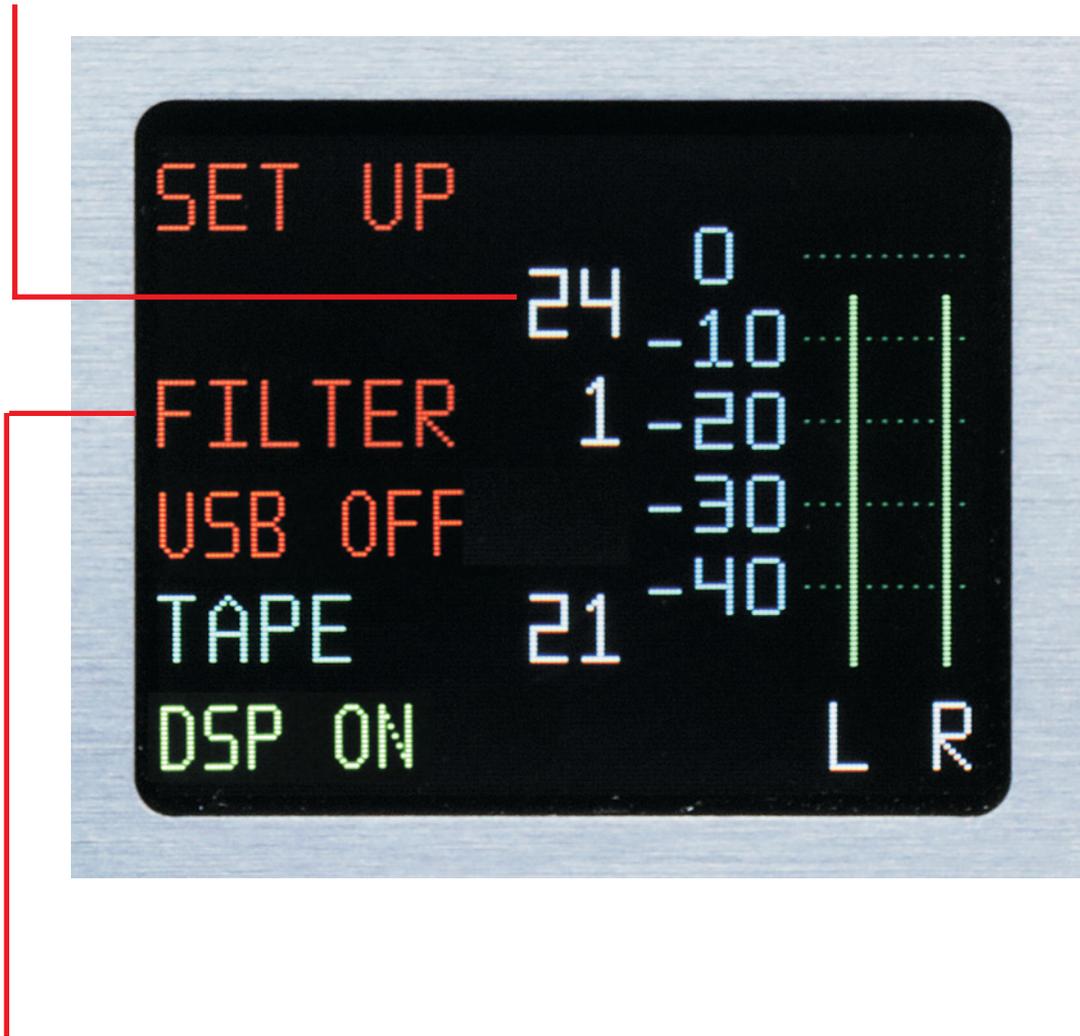found in classic and revered audio equipment and a lot of listening!
The harmonic process runs 32-bit internally.

We recommend that, if you are recording to 16-bit, you monitor the process from the
16-bit output of your system to get optimum results by adjusting INTERSTELLAR's
processing and dithering.
By using the process you will affect your average signal level if you turn the process up
far enough. When adding harmonic content, the audio is going to
get louder. The dsp process reduces the peaks in your signal while at the same time
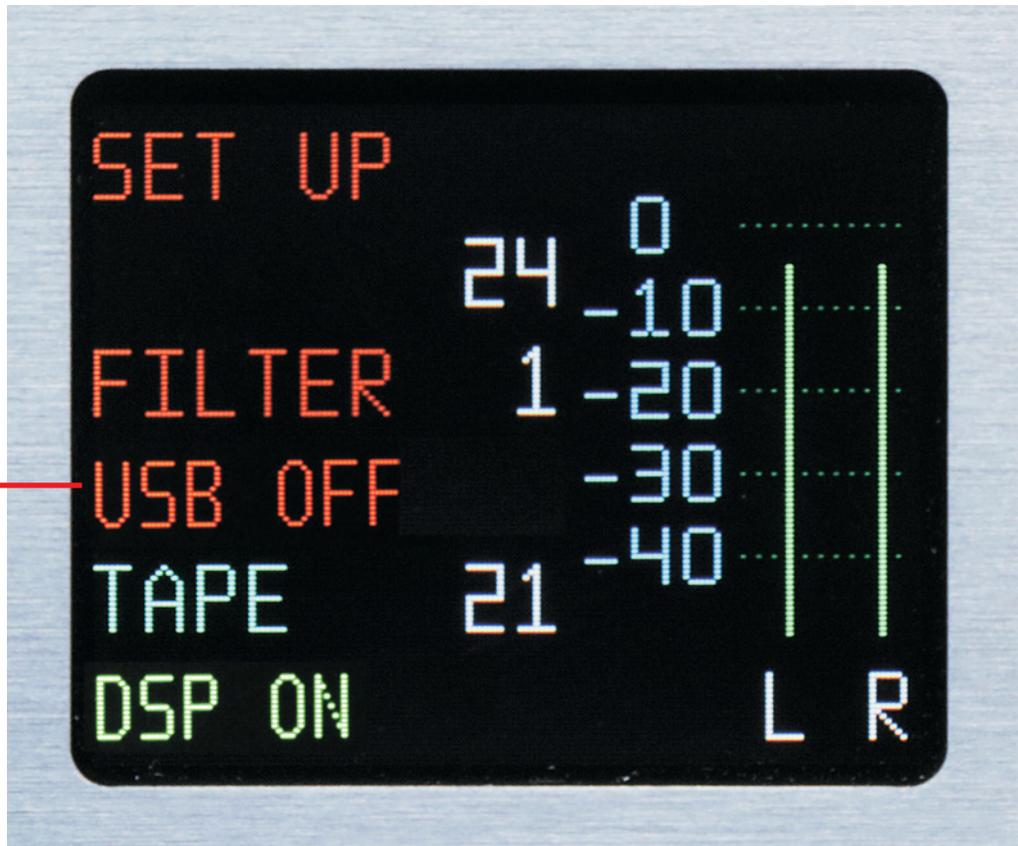increasing the low level harmonic content.
This means that the process will not cause any overs. In fact, what it will do, is reduce
the level of existing overs. Just think of it as a tube or tape doing soft clipping, i.e.
"squashing" the peaks and causing analog compression.

On the setup page, changing the SAMPLE RATE control will allow setting the unit for 16 bit dithering. Displayed here

Changing the TRIODE control will change the filter type.
Filter 1 is time domain optimized, it is more dynamic, has a cleaner bottom and low midrange, more 3D, more accurate transits. Filter 2 is frequency optimized, and a bit brighter. If one prefers both, you can use filter 1 and do a shelf boost, 12 db/oct at 20KHz. Once you distroy
the transits that can not be gotten back. Eq can always be applied. This applies to 44.1K and 48K only the higher sample rates are time domain optimized.

Changing the PENTODE knob will enable or disable the USB connection access. When USB is set to OFF the ADC mode will set the sample rate. This function is to prevent a computer from change the sample rate when using ADC mode, if one accidentally changes to USB mode. It prevents changing to USB mode.

When USB is enabled, "ON", selecting USB, the computer will set Interstellar's sample rate. USB is enabled when switching to USB mode. This sample rate will be the sample rate if one changes to ADC mode.

HOW MUCH PROCESS TO USE

There are no hard and fast rules, you need to use your ears. If it sounds good, it is good.

To get you started, we've provided some general guidelines. Making your recorded material sound "good" is what it's all about. The process is level and program dependent. Settings that will work best for one source may not work at all for another source. As a general purpose setting jump off point, try running the process knobs at 35 to 60. This should be safe. When you run into the 50 and up range it is easy to go too far but, don't forget, it could be a cool thing.

The INTERSTELLAR processing can be extremely subtle or very drastic. It depends on how you use it.

Getting to grips with the diversity of the processes will take a little ear training. When you're tweaking the signal being processed by the INTERSTELLAR, don't forget to switch the DSP in and out regularly to give you an indication of where you started out from.

The human ear loves a little harmonic generation so you'll quickly find that turning INTERSTELLAR's DSP off results in an apparent loss of life/excitement in the musical source material.
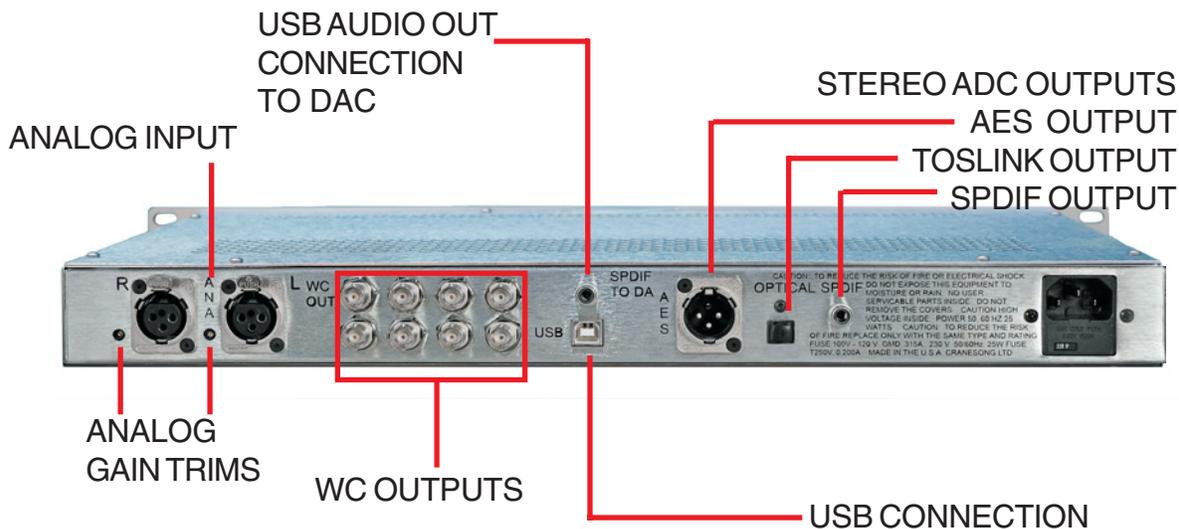
Even small amounts of DSP, e.g 10 Triode, 25 Pentode and 20 Tape, can make quite a big difference. You may not notice this turning up the pots, but by putting the unit in bypass and then switching the processing back in, it will become very apparent.

The amount of process can result in subtle changes or drastic changes depending on what the program is like and how much process is being added. It will be easier to hear in material that is more open as opposed to material that is very dense. The amount of low frequency information will also affect how we hear the process.

DITHERING

The dither process in INTERSTELLAR is proprietary to Crane Song. It is an analog generated source that has been filtered to a spectrum where the ear is least sensitive. We believe that this process sounds better than other systems and is less likely to cause noise problems as compared to other dither sources.

The dither is added to the audio source as apposed to a digital process. This is in our opinion the best way to dither an A/D converter: Dithering happens in the conversion. To disable the dither just run the unit in 24-bit mode.

USB AUDIO OUT
CONNECTION
TO DAC

STEREO ADC OUTPUTS
AES OUTPUT
TOSLINK OUTPUT
SPDIF OUTPUT

ANALOG INPUT

ANALOG
GAIN TRIMS

WC OUTPUTS

USB CONNECTION

ADC LEVEL METER
THE "L" AND "R" CHANGE TO RED ON CLIPPING

ALL SETTINGS ARE DISPLAYED ON THE
LCD DISPLAY

OPERATIONAL MODE
ENABLES USB
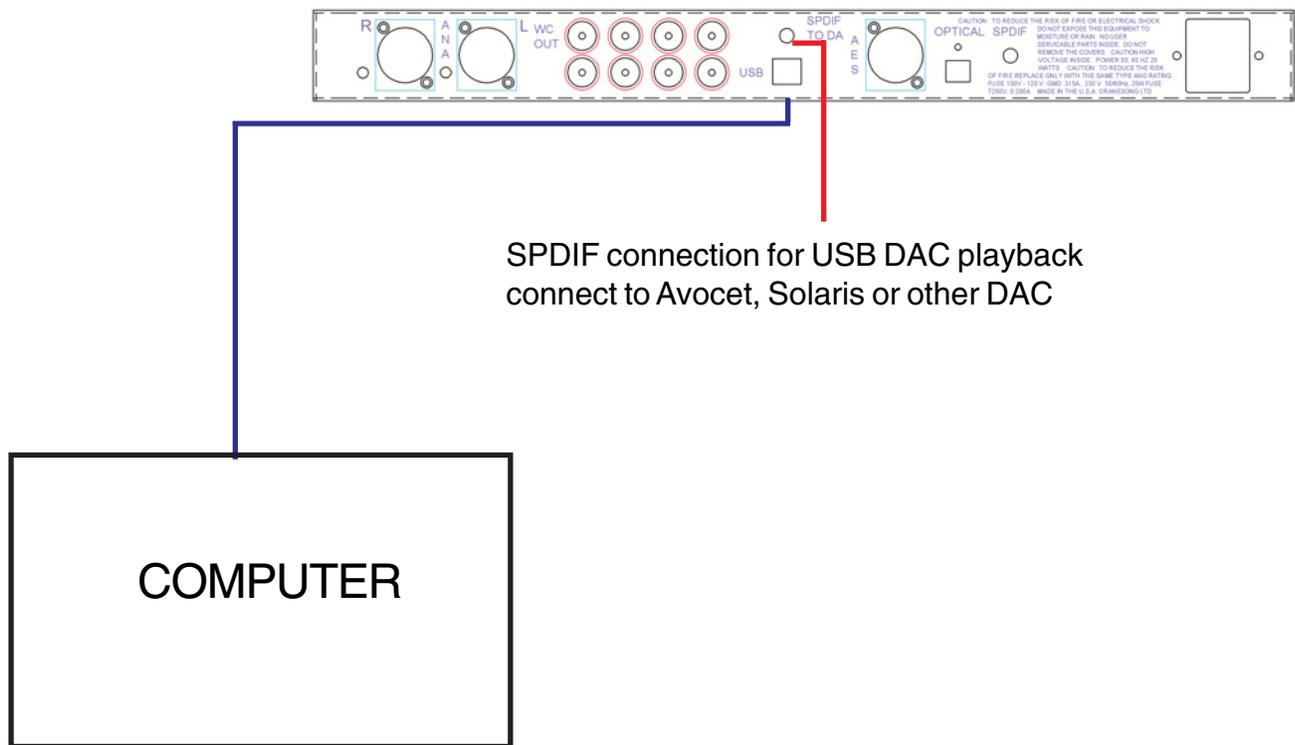TURNS THE DSP ON OR OFF
SET DITHER TO 16 BITS

DSP TRIODE, PENTODE AND TAPE EMULATION
THE SAME PROCESS AS HEDD QUANTUM

SAMPLE RATE WHEN NOT USING USB MODE

SYSTEM REFERENCE for USB
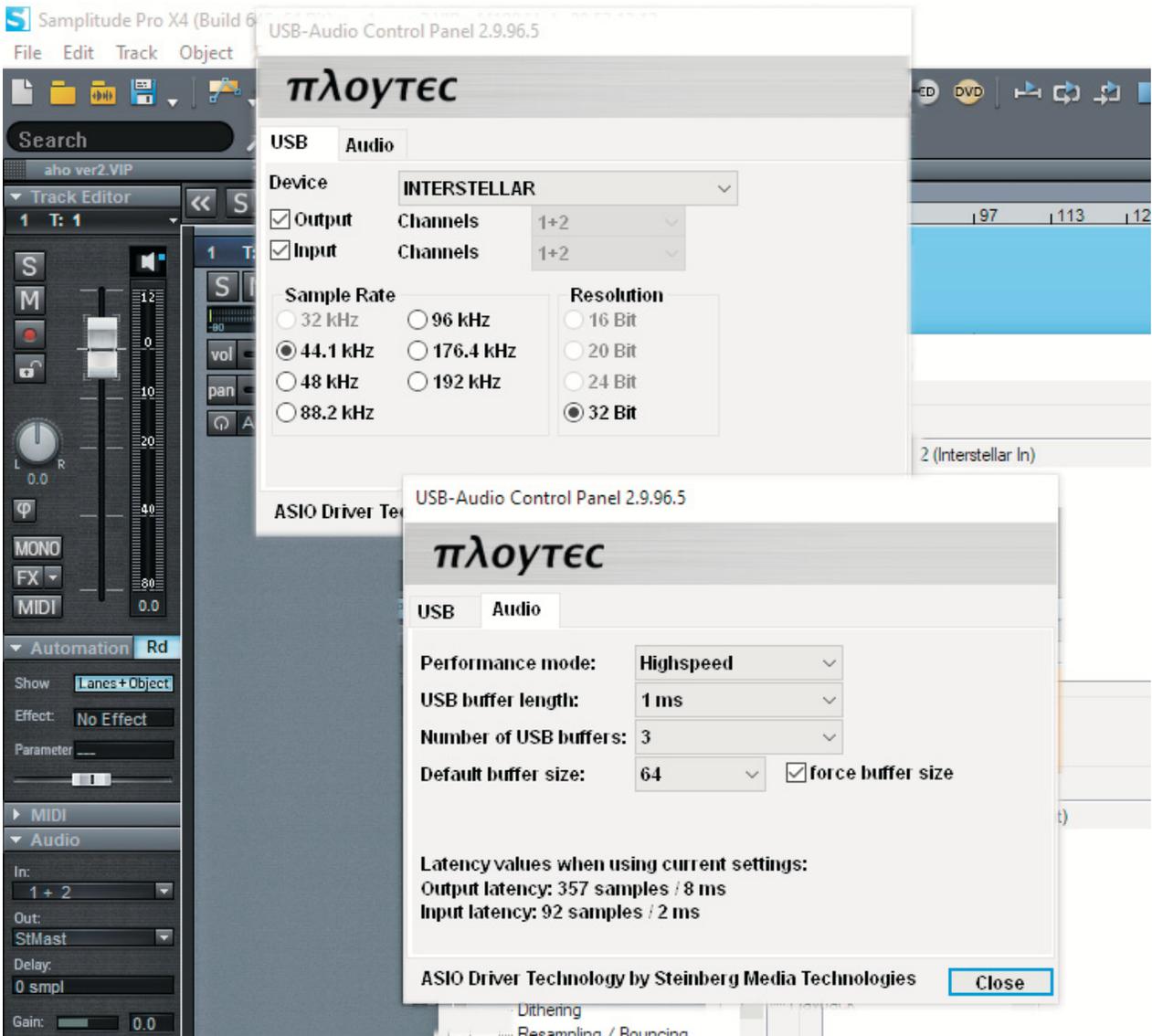## For both AD and DA, a complete interface

INTERSTELLAR AD INTERFACE

SPDIF connection for USB DAC playback
connect to Avocet, Solaris or other DAC

COMPUTER

By using the AD as the master interface the clocking will be uncompromised

NOTE: All ADC outputs are active when using the USB connection, to allow for flexable routing

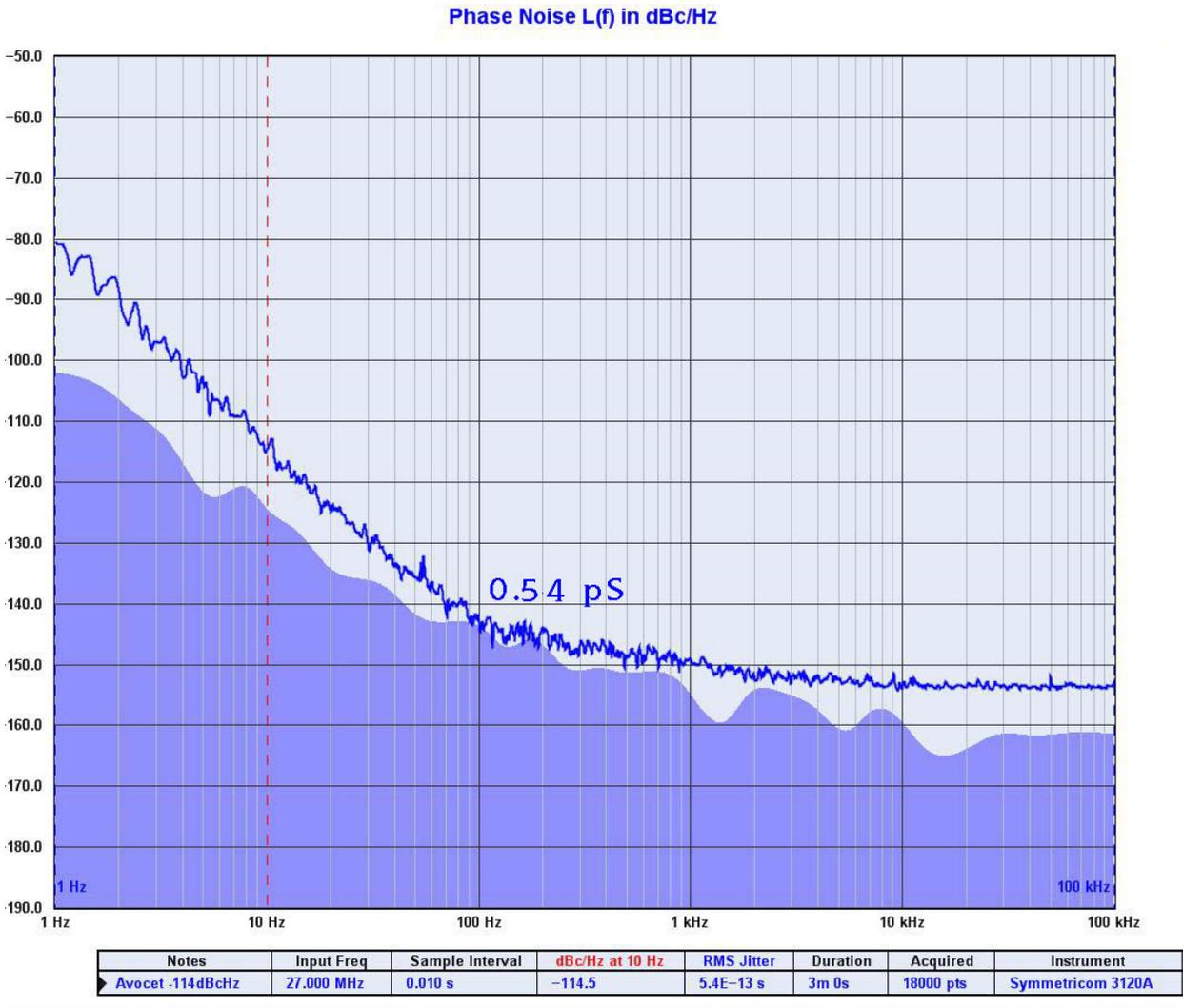WC outputs can be used to clock the system

For windows the USB driver is by Ploytec, it avoids using the windows drivers and can result is a low latency

For the driver part of the USB part of the equation, the main part of latence will be what the daw software requires for buffers

For MAC use the built in MAC USB driver

QUANTUM ADC JITTER MEASUREMENT

Phase Noise L(f) in dBc/Hz

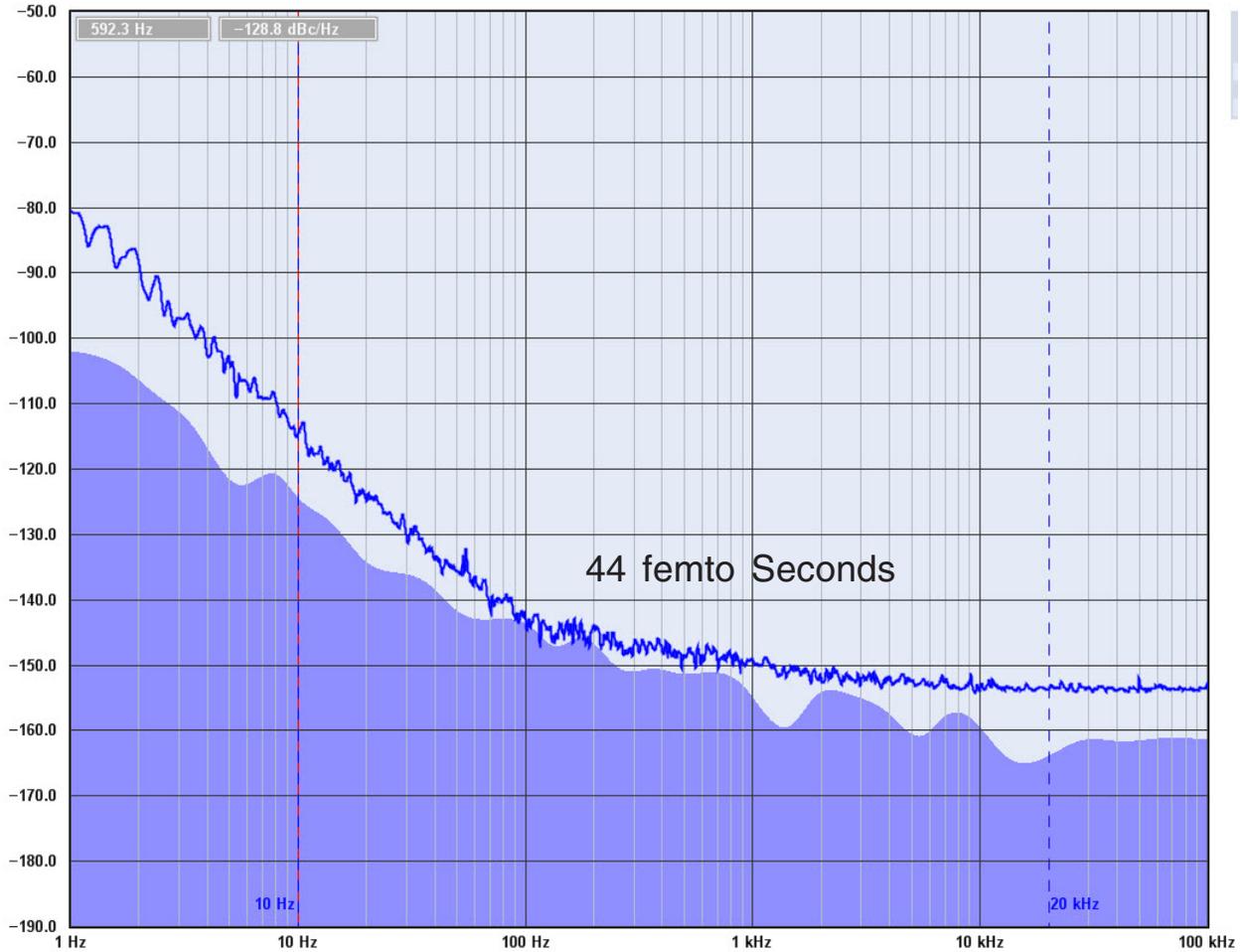| Notes	Input Freq	Sample Interval	dBc/Hz at 10 Hz	RMS Jitter	Duration	Acquired	Instrument
▶ Avocet -114dBcHz	27.000 MHz	0.010 s	−114.5	5.4E−13 s	3m 0s	18000 pts	Symmetricom 3120A

The jitter value in this measurement from 1Hz to 100KHz is 0.54pS typical
measured with a Symmetricom 3120A using a Stanford Research Systems
Rubidium Frequency Standard, PRS10
Without info on the measurement bandwidth and test instrument used, the measurement is
impossible to know about

Test Software does not make a distinction between random and deterministic jitter.
AES-12id-2006 (r2011) excludes modulation components below 10 Hz in it's jitter definition.

Jitter requirements depends on the curcuits being used and the desired results.

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Phase Noise L(f) in dBc/Hz

| 592.3 Hz | −128.8 dBc/Hz |

44 femto Seconds

Notes	Input Freq	Sample Interval	dBc/Hz at 10 Hz	RMS Jitter	Duration	Acquired	Instrument
-114dBcHz	27.000 MHz	0.010 s	−114.5	4.4E−14 s	3m 0s	18000 pts	Symmetricom 31

Jitter measured from 10Hz to 20KHz is 0.044pS or 44 fS typical
measured with a Symmetricom 3120A using a Stanford Research Systems
Rubidium Frequency Standard, PRS10
without info on the measurement bandwidth and test instrument used, the measurement is
impossible to know about

Test Software does not make a distinction between random and deterministic jitter.
AES-12id-2006 (r2011) excludes modulation components below 10 Hz in it's jitter definition.

Jitter requirements depends on the curcuits being used and the desired results.

SPECIFICATIONS:

Analog Input: Transformerless balanced stereo input on XLR-fm connectors. The default calibration is +20 dBu = Digital zero.

Gain adjust trims
are on the back panel. The analog input range for 0 dbfs is adjustable form +16 to +26 dBu

Word Clock Outputs: these 8 BNC connectors are a TTL level square wave that can be used to provide sync to other equipment. The WC outputs will be at the selected sample

Internal Sample Rate: 44.1KHz to 192KHz determined by front panel switch or the USB daw setting

S/PDIF Output: Unbalanced digital output 75 ohms RCA connector

AES Output: Balanced digital output 110 ohms XLR connector
Optical Out: this is the toslink format, stereo.

Power: 25 watts at 115 or 230 volts, 50 or 60 Hz.
Fuse size is MDL .3A for 115 volts; MDL .25A for 230 volts

Pilot Lamp: #7335 lamp

Shipping Weight: 15lbs (6.7kg)

Depth Behind Panel: 10 inches (25.4cm) plus user input/output connectors