

Match/Helix PC Tool in Details

DSP PC-Tool v4

BRAX DSP HELIX DSP ULTRA HELIX DSP PRO MK2

HELIX DSP PRO HELIX DSP.3 HELIX DSP.2

HELIX DSP HELIX DSP MINI HELIX P SIX DSP MK2

HELIX P SIX DSP HELIX V TWELVE DSP HELIX V EIGHT DSP

Version 4.71a - Disconnected

Device Type: HELIX DSP ULTRA
 Device Serial Number: Demo Mode
 ACO Version: Demo Mode
 USB Mode

HELIX DSP ULTRA
 In: 8-channels
 Out: 12-channels
 64 Bit resolution
 96 kHz sampling rate
START DEMO

AUDIOTEC FISCHER
 INNOVATIVE CAR AUDIO

Universal tool

► How good a signal processor actually is in practice depends not only on the quality of hardware components such as DSP chip and converters, but also on the software. Because the software is crucial for a wide range of functions.

While every DSP on the market, starting with the cheapest models, has more or less mastered the basics of signal processing, the premium DSPs are characterized by a number of additional features, such as integration into the vehicle. In modern vehicles or more complex factory sound systems, it is usually not the way to simply search for two wires with a music signal. In such cases, premium ware is required, so that you can sensibly retrofit an audio system at all. Here we are observing the "PC Tool" software

from Audiotec Fischer, which works with the DSP products of the brands Match, Helix and Brax. Almost all devices work with the fourth upgrade stage PC Tool 4; the software recognizes the connected device and automatically displays the possible channels and functions. The PC Tool 4 now furnishes 20 devices, from the Match PP 62DSP to the present day's releases. This makes evidence of the developers' effort to make new features accessible to all existing devices, so that the owners of the older products can also enjoy

them, as far as technically feasible. Meanwhile, the PC tool has become incredibly complex and powerful, with a whole range of features that are not available anywhere else in the market. A full description would go beyond the scope here, yet we can try to help a little bit in understanding ACO, DCM, VCP, ISA, RTA, ATM or FX.

The classics

Of course, all Match/Helix DSP devices include standard audio features such as high pass, low pass, equalizer and time alignment. The exact range of functions such as the number of EQs or the step and maximum limit of the delay depend on the hardware, in other words, on the device. This also includes Hi-



In the output menu you can set crossovers and equalizers for all output channels

Res audio capability. By default, there are 30 parametric bands per channel, which can be switched either as EQ or as Allpass of 1st or 2nd order. The shelf filters are also available at both ends of the frequency band. The crossovers range up to 42 dB/oct. In addition to the characteristics Butterworth, Bessel, Chebychev and Linkwitz, the Q can also be freely chosen. In contrast to the cheaper DSPs, the PC Tool can not only apply filters on the output channels, but also on the inputs. Thus, banded or factory delayed or all-pass filtered signals can be corrected ex works and then continued with a clean signal.

FX Functions

In addition to the standards, the PC Tool also offers some advanced audio functions. These are programmed on-site and are therefore unique in shape. In the section FX (effects), algorithms for optimizing center, front and bass can be activated. First of all, the Real Center is a blessing by its existence, here a center channel signal is calculated by real audio processing. Thus, the Real Center is

not a temporary solution such as a monosum or a reversed sum of left and right. For center and front, there is a Clarity Expander, which affects center playback, for example, the voices. The front can also be “pulled apart” to broaden the stage image. There is also the Mid-Side EQ, which can be used to influence the centre of the stage (voice) and the edges of the stage (instruments) separately. The bass processing includes a SubXpander, which adds deep frequencies to the music by creating subharmonics to existing frequencies. There is also a dynamic bass boost, which raises the bass depending on the playback volume. This works great with factory systems with limited power handling woofers and subwoofers. For all FX functions there are adjustment sliders that can be used to influence the extent and function in a targeted manner.

Channel management

The PC Tool offers a free routing between all inputs and all outputs, which is clearly displayed and can be done for analog inputs,



The time alignment is set either as distance or as time. As a special feature, the phase can be adjusted by a slider when a filter is set

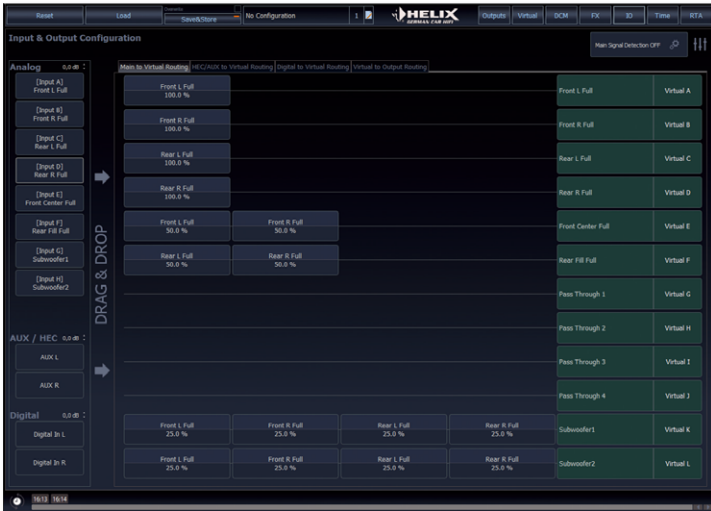
AUX sources and digital inputs. The inputs are simply placed by drag’n’drop and thus automatically summed up, whereby you can prioritize some of them. The standard method works quite easy by routing the inputs to the outputs. The newer DSP devices (approx. since 2020) from Audiotec Fischer also master the VCP (Virtual Channel Processing)

Virtual Channel Processing

In the VCP, a third virtual channel stage is added between input and output channels. It is divided into as many virtual channels as there are outputs. The virtual channels are designated as Front, Rear, Center, Rearfill, and Subwoofer applications and a series of “universal channels”. Routing now takes place in two steps. First, the inputs are placed on the virtual channels, then the virtual channels are placed on the outputs again. The full program of equalizers and time alignment (without crossovers) is available for the virtual channels. The whole thing offers invaluable advantages for more complex devices with multiple channels, such as active systems. For example, a three-way front system with six output channels for right and left sides can be managed from the virtual channels front left and right. The delays of the individual speakers, the crossing of tweeter, midrange and woofer are performed at the output channels, the peculiarities of the installation situations are also corrected here. However, the sound decisive equalizing can be done conveniently with the virtual front channels, for the entire front system and across all crossover frequencies. The virtual channel can also be used to “move” the entire three-way side via time alignment or gain control. The FX sound effects now also affect



The front processing now includes a mid/side EQ, which can be used to control the stage centre and stage edges separately



VCP routing step 1: The inputs are routed to the virtual channels, as usual for main/analog/HEC/digital inputs. The virtual channels are subtly highlighted in green

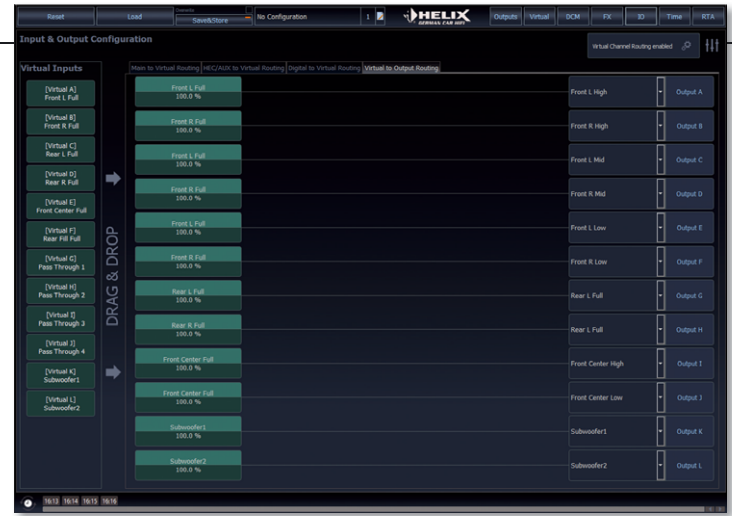
the virtual front, center and rear channels, which can also be used to control two-way centers perfectly.

Integration features

There is no use for the most gorgeous equalizer, when no sound comes out of the system. Some vehicles do not make it easy for the installer to retrofit a hifi system. Here the PC Tool offers a number of features that make it easier or just finally possible to dock to the factory system. User comfort is also a top priority. First of all comes the in-house ADEP.3 system, which is able to bypass the loudspeaker diagnosis of some vehicles. For vehicles with a factory amplifier or premium sound package, voltages over 15 volts must be allowed to work, but this is, again, depending on the device. The switching on and off of the components can be done additionally on demand. The Power Save Mode has to do with switching off. In CAN-Bus vehicles, it may happen that the music system is under

The setup of the virtual channels is similar to that of the output channels, only without crossovers. The virtual front EQ and FX front processing then affect all output channels that have been routed from there

voltage even after leaving the vehicle. Here, the PC Tool ensures that the retrofit components are switched off after an adjustable resting time, so that the battery is not drained. Some helping features take care of preserving vehicle sounds such as reversing warning or announcements from traffic radio or navigation systems, automatically switching the sources if music is heard from external sources. All this is individually adjustable, as well as the switch-on delay(s), which prevents cracking and popping. Especially for



Routing Step 2: Now the 8 virtual channels are routed to the 12 outputs, e.g. a virtual front channel on tweeter, midrange, woofer and a virtual center channel on center woofer and center tweeter



newer Volkswagen radios there is a trick to improve sound. These Class SB radios have a power saving function, which can cause distortion. However, not all DSPs and DSP power amplifiers can do this, but only those with the ACO platform (since Helix DSP MINI). This Advanced Coprocessor enables a number of new features, including FX functions, new accessories such as WiFi control, 10 memory slots and ISA system.

Measurement functions

So this is where the measurements brought us, and this is becoming more and more important nowadays. The DSPs are well on the way to replace an external measurement system. In this way, the measuring possibilities are constantly expanded in the PC Tool. The ISA (Input Signal Analyzer) is a measurement function for the analog inputs. If, for example, the speaker lines of the vehicle are connected to the inputs of the DSP, you can determine the amount of incoming signals. The PC Tool offers a frequency response measurement of all input channels, so that you can immediately see if a complete full-range signal is present. In addition to the above, sums of several inputs

In the ISA, any inputs and their sums can be measured. EQ (with allpass) and time alignment are adjusting the incoming signal.



Frequency responses are measured with the RTA. At the same time, EQs can be set, also fully automatic

however, the ATM works for the vast majority of cases with perfect results. Device Monitor is a new feature, a diagnostic function that monitors the temperature in the retrofit devices. This can be useful in troubleshooting (insufficient power supply), in certain devices the supply voltage can also be measured. For both functions there is a graphical overview displaying the minimum and maximum values.

can be measured, so you can find hidden all-pass filters that remain inconspicuous in the individual measurement. This electrical measurement of the inputs saves the installer a lot of time in troubleshooting and tuning of the DSP, because at the same time with the measurement the input EQs (and the input delay) can be set, with immediate success check. The second measurement option has long been available in the Match/Helix DSP products. The RTA (Real Time Analysis) is an acoustic frequency response measurement. With an external microphone, this is done in real time, as the name says, so that correct functioning and setting of the speakers can be controlled.

The latest achievement of PC Tool 4.71 is the ATM (Automatic Time Measurement). This enables a fully automatic adjustment of the complete time alignment. The highlight here is that the measurement signal is not generated in the DSP, but is played as a music file. This bypasses the challenge of transmitting the DSP signal into the car. So a WAV (or MP3) file is simply burned to a CD or copied to a stick and played on the car's headunit. This can be easily done on any vehicle and is quite convenient. The music track consists of a continuous sequence of signals, a microphone is necessary just like during the frequency response measurement. Then you specify a reference speaker (front left full range or midbass, right side for right-hand drive cars). Commence the measurement – and that's it. If you want to see the results in centimeters, measure the distance to the reference speaker with a measuring tape, the software will do the rest. Finally, the time menu of the PC Tool is filled in completely. For the whole thing to work, some audio processing is necessary. The measuring signal consists of two pulses at a defined time interval. The first impulse always goes to the reference speaker, the second one to the one to be measured. This allows you to determine the relative distance between the two speakers. Because

the software knows the distance between the pulses on the recording (and the speed of sound), from the measured distance induced delay of the second pulse, this distance can be calculated. Dirac signals are not used as impulses, instead there are homemade "needles" with a higher energy content. Quite simple, but the devil is in the details. What is an easy game with the home cinema could turn out tricky, depending on the car. Discs reflections and the adversities of modern factory systems need to be taken into account. The system should also work with premium factory packages. Then the measurement signal possibly runs through the head unit, factory amplifier with DSP and, of course, through a retrofit DSP with incalculable delays in the millisecond range. In cases like this, relative measurement with the double pulse can also achieve a correct result. All-pass filters, which rotate phase frequency-dependently, can also be tricky, so first you have to approach them with the ISA. Another inconvenience: a deeply crossed subwoofer in a boot well sealed from the passenger compartment. Here, in individual cases, the data in higher frequencies may be missing. You can help it to some extent by letting the sub play as loud and "high" as possible. There are also other things to consider, namely applying high passes to sensitive retrofit tweeters and midrange drivers(!), whereas generally a full-range signal input into the retrofit DSP is advantageous. The factory system can be helped by a skillful routing and eventual summing of the signal. Overall,

The time alignment measurement is performed with two needle pulses. Input level control helps to adjust the volume correctly

Goodies

After all, the PC Tool offers many subtle niceties that make the operation easier and more customized. Connected remote controls can be adjusted, the PC Tool itself as well. The windows are freely scalable, so you can handle any display. Many smart keyboard shortcuts make it easier for the power user to work and some things are easy to use with drag'n'drop. In case you made a mistake while setting, the Time Machine helps to undo actions.

Conclusion

With PC Tool 4, users of Match/Helix DSP products have a clearly structured tool at their fingertips that is incredibly comprehensive, neat and easy to use. The tool is constantly being expanded, which also benefits the owners of older devices, so that we can look forward to many new features. This makes the PC Tool 4 unique and far ahead of the market.

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