SIGMA with Bluefin

CALREC

Putting Sound in the Picture

MEETING THE CHALLENGE OF CHANGE

1956 The Calder Valley Sound Recording Group is founded as a recording studio in Hebden Bridge, West Yorkshire, where Calrec is located today.

1962 The group is registered as the Calder Valley Sound Recording Company.

1964 Incorporated as Calder Recordings Limited. Microphone production begins, producing high quality capacitor based designs for music recording and broadcast operations.

1971 Mixing console manufacturing begins with sales to Angus McKenzie, BBC Radio, Tyne Tees TV and others.

The growth of HD production is creating a demand for more and more signal paths to deal with 5.1 content. Sigma with Bluefin meets the needs of HD production and live to air delivery, now and into the future.

Why
Sigma with Bluefin?

The audio needs of live production and on-air broadcast operations are continually evolving.

Now, with the enthusiastic take-up of new, larger, widescreen and high definition TV displays by consumers worldwide, the role played by sound will become even more critical. This growing "home theater" audience is unlikely to be satisfied by anything less than the best quality video and audio content.

Demand for multi-channel surround sound production is increasing. Popular television programming is now being originated in high definition with 5.1 surround audio. Even where HD programming has not yet become commonplace, content owners routinely want to produce high definition versions of their sports, music and live events, with 5.1 audio to match, so as to guarantee extended shelf-life and future income.

Whatever the scale of your operation, from national network to playout station, the need to process multi-channel audio will soon be unavoidable.

The question is: how can you equip yourself with the increased audio mixing capacity required in the most practical and cost-efficient way?

Sigma with Bluefin High Density Signal Processing (HDSP) technology provides the innovative solution. This all digital audio console designed for live production and on-air use, provides 320 channel processing paths on a single DSP card, with full EQ and dynamics to all channels. This equates to 52 x full 5.1 channels.

The revolutionary design of Sigma with Bluefin provides phenomenal processing capacity in a very compact physical footprint.

1972 Name changed to Calrec Audio Ltd.

1977 Calrec supplies the world's first digitally controlled assignable mixing console to BBC Radio OB's.

1978 The Soundfield microphone is introduced – the world's first single point-source surround-sound microphone.

1981 Calrec supplies the world's first digitally controlled assignable mixing console to BBC Radio OB's.

Sigma with Bluefin provides the industry's most advanced, economical and practical way to deliver 320 channel processing paths.

What
is Sigma with Bluefin?

Bluefin has an unequalled ability to manage large numbers of surround sources. Sigma with Bluefin provides 320 channel processing paths on just one DSP card, with full EQ and dynamics on all channels, groups and main outputs. This equates to 52 x full 5.1 surround channels.

As with every Calrec digital console, all elements of the system design focus on simplicity and reliability. The assignable control surface minimizes screen usage enabling direct access to the majority of console functions, and the PC provides control over a number of user defined options such as monitor and metering setups.

In addition, the system provides a significant amount of audio delay to cope with the increasing AV synchronization problems, resulting from mixed format HD/SD production, for example. Bluefin signal processing provides 432 mono elements of up to 2.73 seconds of audio delay, which can be inserted exactly where the operator needs it.

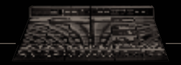
- Up to 64 dual layer faders
- 320 channel processing paths packaged as 108 stereo and 104 mono channels, allowing up to 52 x 5.1 surround channels
- 8 x mono, stereo or 5.1 surround audio groups
- Additional VCA-style grouping system
- 4 main (program) stereo or 5.1 surround outputs
- 20 mono auxiliary busses configurable up to 10 stereo
- 48 multi-track outputs for IFB or recording
- Different mix-minus output from every channel or group
- Simultaneous LCRS, stereo and mono outputs available from each 5.1 main output
- Every channel can route to every buss, at the same time, without restrictions
- All channels, groups and mains have 4-band EQ, 2-band filters, Compressor/Limiter and Expander/Gate
- Separate 2-band EQ and 2-band filters for Dynamics side-chain
- 19.6 minutes of audio delay made up of 432 mono elements of up to 2.73 seconds
- Console operates independently of PC
- Console and racks boot from power on in less than 20 seconds
- Full control system reset in less than 15 seconds with no loss of audio
- Highly resilient: all modules are hot-pluggable with automatic redundant DSP, control and power systems

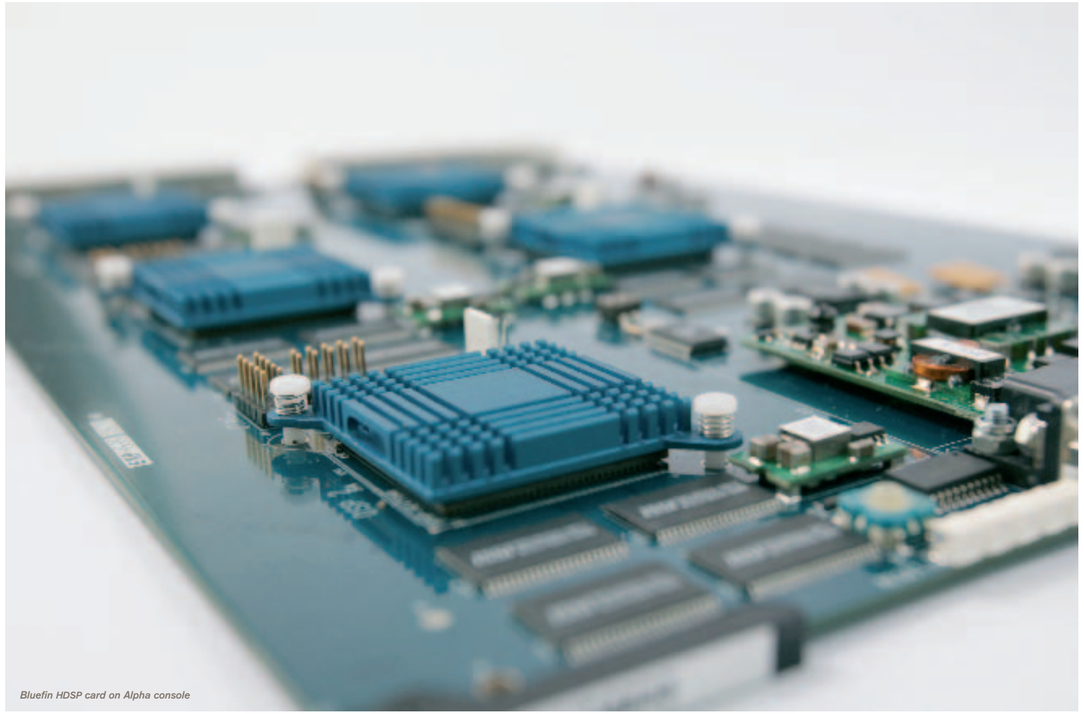
1985 Calrec introduce the VCS assignable mixing console, the world's first commercially viable digitally controlled analog console.

1989 Calrec's current management structure is formed, with Stephen Jagger as Managing Director, and the company focuses exclusively on consoles for broadcast applications.

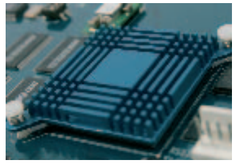
1993 Calrec introduces the T-Series, a third generation digitally controlled analog live production and live to air console.

1996 The Q2 console, purpose designed for use in remote production vehicles, is introduced to the US market where it gains immediate success.





Bluefin HDSP card on Alpha console



Bluefin High Density Signal Processing (HDSP) is a revolutionary, award-winning system which provides twice the signal processing capacity in a fraction of the space of conventional systems, at no extra cost, on just one DSP card.

How
does Bluefin work?

Bluefin is a patent pending implementation of FPGA (Field-Programmable Gate Array) technology which can provide an entire mixing console on a single card.

Recent impressive increases in the resource density and speed of FPGA technology have enabled Calrec engineers to exploit the full potential of these versatile chips in order to produce a breathtaking 5000% improvement in efficiency compared with equivalent platforms using conventional DSP chips. This means that even in our largest Alpha console, only one Bluefin DSP card is required, instead of 24 conventional ones, whilst at the same time the number of channels is more than doubled.

Calrec is the first company to implement FPGA technology in this way.

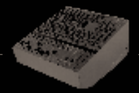
The advantages of such a dramatic reduction in the number of DSP cards required, include proportional reductions in power usage, heat generation and the chance of component failure. In short, the FPGA provides a DSP system that is much more powerful and reliable than a conventional design, for around the same cost. With system resilience reinforced by a second, redundant card, it's like having another console as a hot spare.

Bluefin also provides full EQ and dynamics to all channels, groups and mains, with 4 x 5.1 main outputs, 8 x 5.1 groups, 48 multi-track/IFB outputs and 20 auxiliary outputs.

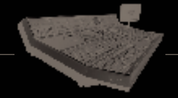
1997 The first all digital product from Calrec – the X Series radio on-air console.

1998 An all digital version of the T Series console is shown at NAB.

1999 The M3 small format console is launched at the AES convention in Munich, Germany.



1999 Following considerable customer interest in the digital T Series, Calrec introduces the Alpha at NAB.



There are no second chances in live broadcast. Audio operators are under real pressure and need to be able to mix instinctively. Calrec consoles are purpose designed for this testing environment, which is why broadcasters instinctively trust Calrec to keep them at the top of their game.

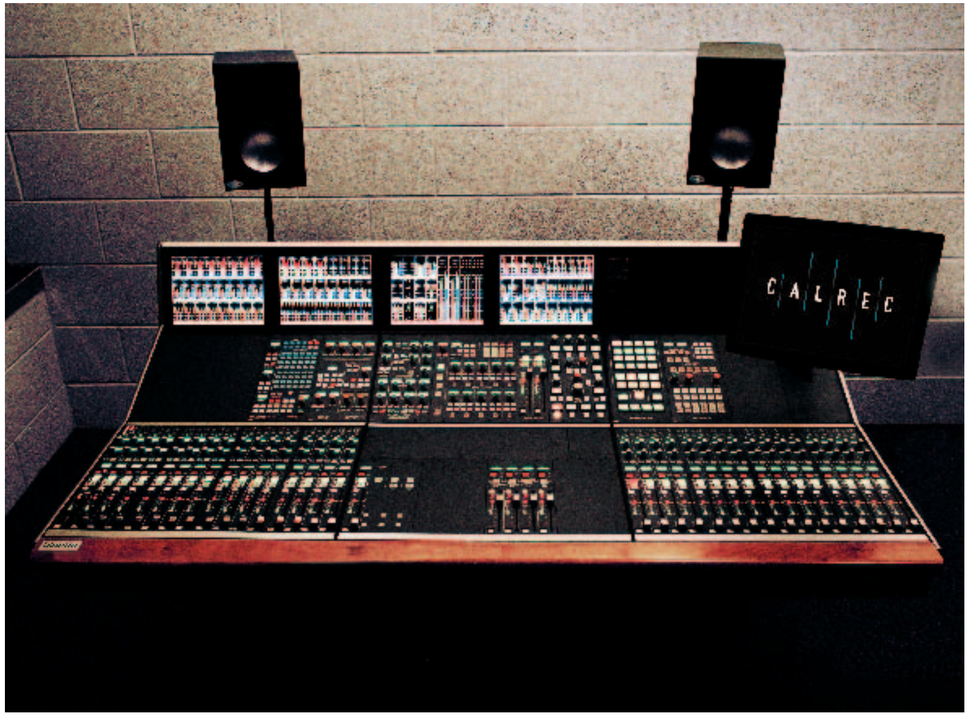
What
are the benefits?

Reliability
Calrec consoles are famous for their reliability and purpose designed not to let you down. But in the demanding environment of live-to-air broadcasting, you can't afford to leave anything to chance. That's why we go the extra mile and provide full redundancy at all system-critical points with fully redundant power supplies, DSP cards and processing cards. All cards and panels are pluggable under power and initialize on insertion. Our proprietary operating system and independent DSP ensure audio continuity, and eliminate the need for a PC for sustained operation or boot up. This means that PC failure or reset has no effect on the audio signal and accounts for a boot time, from cold, of less than 20 seconds, and a full control system reset in less then 15 seconds, with no loss of audio.

Ease of Operation
We have been designing live production and live-to-air broadcast audio mixing consoles for over 35 years, and in 1981, we introduced the world's first digitally controlled assignable mixing console. The Calrec assignable control surface, now in its fifth generation, integrates many years of user experience and feedback. The console operation is intuitive, with a fast learning curve. Use of the PC is minimal across our whole console range and layering is limited to two independent signal paths. Calrec's compact fader width enables operators to control more faders at any given time – eight faders take up only 250mm/9.85 inches, providing more physical faders in a given space than any other console manufacturer.

Power
Fully redundant power is provided from compact supplies which take up minimal rack space. High DC voltage power distribution allows for wide variations of AC power without dropping DC operating voltages. The AC voltage can drop to about 80v before the 24v output starts to drop. This makes the system highly tolerant of cable voltage drops and AC mains brown outs.

Processing
The channel count of Calrec consoles is never diminished, no matter how many output busses are in use. Using any of the output busses on some other consoles can reduce the number of input channels that can be used, but with Calrec desks output busses are more like the physical busses of an analog desk – and they are all available without reducing the input channel capability.



2001 The Alpha-OB, remote production version of the Alpha is launched in November.

2002 The Sigma console, Calrec's second digital television production console, debuts at NAB.

2003 Zeta is launched at NAB, establishing a family of three digital consoles.

2003 The launch of the Hydra audio network at IBC enables I/O resources to be shared throughout the entire family of Calrec digital consoles.

2004 Calrec celebrates 40 years in the business, providing pro audio expertise to the broadcast industry since 1964.

As the transition from stereo to surround sound gathers pace, consoles used in production and live-to-air broadcast need more than just increased channel capacity. Precision control and management of all these new sources is equally important.

Surround Sound

As well as providing the vastly increased channel capacity needed to handle the surround sound future, our Bluefin generation of consoles has been designed with all the advanced functions needed to maintain comprehensive control in this more complex multi-channel environment.

Our consoles provide all the mixing output paths and monitoring facilities required in a busy surround sound environment, including an insert for a Dolby® DP570 multichannel audio tool which can be remotely controlled directly from the monitor panel.

Calrec consoles also provide 8 x groups that are fully equipped for 5.1 surround, as well as all main outputs, and allow full control of the stereo downmix of the surround main outputs. This is often necessary when doing simultaneous HD and SD transmissions.

Calrec Surround Channels give operators the ability to control a full 5.1 source as a single channel, in a similar way to a stereo channel. This free assignability of mono, stereo or 5.1 channels delivers the optimal solution for handling and controlling surround sound sources in live production.

Surround Channels use the resources of 2 x stereo channels (for L/R and Ls/Rs) and 2 x mono channels (for Center and LFE). These resources are automatically allocated from the available mono and stereo channels as the Surround Channel is assigned, and can be individually controlled on a dedicated Surround Spill panel on the control surface.

The advantages of using two stereo channels for the L/R and Ls/Rs rather than four monos are:

- **it allows faster operation compared with 4 x mono channels when the signals need to be adjusted separately from the Surround Channel.**
- **it ensures that during adjustment, the overall balance of the Surround Channel is not upset (for example by adjusting the EQ of L and then R).**
- **it allows adjustment to the front and rear width of the surround signal – impossible if treated as mono signals.**

Hydra Audio Networking provides a flexible, reliable and cost effective method of developing your I/O infrastructure and maximizing studio flexibility.

Hydra

Hydra provides a powerful solution for sharing network I/O resources and control data between Calrec digital mixing consoles. Hydra uses Gigabit Ethernet fabric, the highest speed network infrastructure commonly available. Very high bandwidth and a scalable, flexible architecture allow the network to be tailored precisely to the requirements of each installation. Hydra I/O units, each with up to 96 inputs and outputs, analog or digital, may be connected to the network.

- **Cost effective and user-friendly**
- **Reliable, with scope for comprehensive system redundancy**
- **Very high bandwidth – data rate of 1000Mbps over copper or optical fiber**
- **Up to 585 bi-directional channels**
- **Network constructed from standardized, structured cabling or fiber-optics**

Using a natural and logical extension of our existing console operational screens and panels, control of the network is remarkably user-friendly.

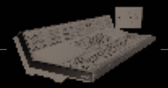
In addition to our modular remote I/O box is a range of fixed format 2 to 4U remote I/O boxes, all with built-in PSU redundancy and single or optional dual IEC power connections.

These fixed format boxes interface to the network using dual Cat 5e Gigabit Ethernet ports for audio and control redundancy up to 90m/295ft. For extended distances, the boxes also support optional duplex fiber connectors up to five kilometers.

The range also includes a 2U, 4 SDI input de-embed unit which extracts up to 64 channels of synchronous or asynchronous embedded audio from 4 HD/SD streams. It then makes these channels available to any console connected to the Hydra network. In addition each SDI unit can optionally process up to 8 Dolby E signals to provide a further 64 decoded channels. The Metadata from each Dolby E signal is also brought out as a serial interface.

CALREC IN THE NETWORKED STUDIO

2006 Bluefin High Density Signal Processing is introduced onto the Alpha at NAB and Sigma at IBC.



2007 Omega with Bluefin launched. The Omega is the third implementation of Bluefin on a console.

Among the unique advantages of digital consoles are connectivity and interactivity. Efficient networking is not just about the technicalities of sharing incoming and outgoing sources. It is about giving operators and studio managers greater creativity and scope to do their jobs.

High bandwidth, low cost solution

Calrec's Hydra networking system is easy to install and uses industry standard network switches in conjunction with standard Cat 5e/Cat 6 cable and/or fiber.

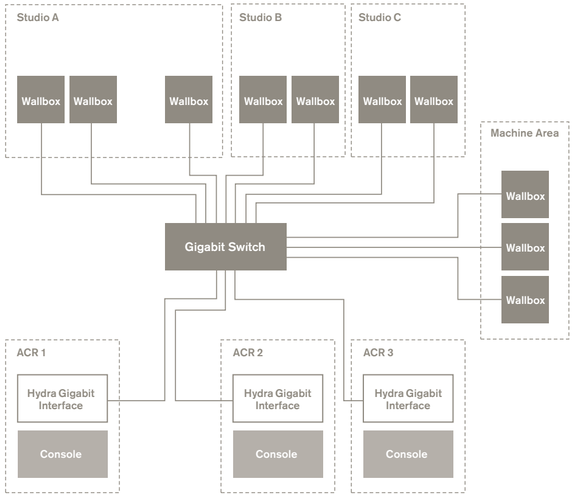
Our solution differs from most in that we use Gigabit Ethernet fabric to provide high bandwidth, low cost, excellent resilience and enormous scalability.

Given the well-understood historical reluctance of audio engineers to rely on IT networking, the challenge for Calrec engineers was to exploit the advantages of Ethernet technology, whilst eliminating the potential for fragility problems.

They solved this by establishing three key design principles in order to guarantee deterministic performance and eliminate the possibility of collisions.

The first is that audio sample delivery operates strictly at the data link layer, which means no TCP/IP overhead is imposed. Secondly, bandwidth is entirely predictable as the network is kept private. Finally, the network is constructed in a star topology. Put simply, it means no network hang-ups and the audio always gets to where it needs to be.

Hydra has been successfully adapted worldwide to meet a variety of needs, from simplifying installation projects to creating multi-console/multi-studio systems which can cater for any eventuality. In fact every single one of our customers who has adopted networking has utilized it in a different way to meet their precise needs.



An example of Hydra in a multi control room, multi studio setup.

PUTTING SOUND IN THE PICTURE

Alpha with Bluefin

Sigma with Bluefin

Omega with Bluefin

calrec.com

Our Bluefin range of consoles include the 480 channel Alpha, the 320 channel Sigma and the 160 channel Omega.

Calrec in the News Studio

When you're mixing audio for live news broadcast, you've only got one chance to get it right. That's why the world's biggest broadcasters rely on Calrec consoles. Because we are dedicated exclusively to the broadcast industry, we understand what's most important to you.

In a live news studio an audio operator may have a variety of internal and external feeds, and a host of people in the field and on the studio floor all wanting their own unique signal. Calrec consoles simplify this process by providing a mix-minus/clean feed signal for every single channel and group, and with adjustable levels and tone/ident capabilities. This is all independent of the Multitrack sends which give even more scope for custom feeds.

When your anchor, your reporters and your studio floor staff all need to be kept in the loop, Calrec desks have the capability to do so quickly and easily.

QUESTIONS, QUESTIONS

I'm always hearing manufacturers talk about redundancy. What does this mean for me?

An audio console for live on-air use has to be extremely reliable. Calrec's designs have an excellent record in this area but, there is always the chance that something might fail during the lifetime of the console. For this reason, Calrec provides on-line redundant hardware for ALL critical systems to ensure that the show always goes on. Furthermore, if the redundant hardware kicks in, the system reports this, and you can hot-swap the failed item to restore the system's back up, without interrupting the show. Beware! Some manufacturers make claims about redundancy but only provide it for parts of their system, leaving other areas that can take you off air. Also, if a part fails you often have to take their system down to fix the problem. With Calrec you can trust that you're always in control.

I'm quite happy working in stereo, but what if I suddenly need to be dealing with 5.1 sources? I don't want to have to buy another console!

The good news is, with Calrec desks you won't need to! Alpha, Sigma and Omega consoles come with Bluefin High Density Signal Processing (HDSP) as standard. Bluefin is a unique, highly evolved DSP system which can provide up to 480 channel processing paths on one DSP card. Bluefin also enables all the Main outputs and Groups to be 5.1 surround, and the ability to work with many 5.1 channels. Calrec's Surround Spill panel provides comprehensive and independent control of the L/R, Ls/Rs, Center and LFE signals of a 5.1 channel.

How easy is it to set up the metering for my Surround inputs? I don't have time to be reconfiguring the desk.

You don't need to. Calrec's TFT metering automatically detects what kind of channel is assigned to the meter and adjusts the meter accordingly. You can also move the meters around to suit your style of working, adjust the colors and the size, or even their position on the upstand.

Isn't it dangerous to have a PC as part of an on-air digital console?

Unlike many digital consoles the PC on a Calrec desk is used principally for set up and memory backup. You can switch the PC off and still operate the desk. This non-reliance on the PC accounts for a fast boot-up time from cold in less than 20 seconds, and a full control surface reset takes less then 15 seconds, with no loss of audio.

How much DSP have I got? What would happen if I needed to adjust the EQ and there was not enough DSP to do it?

That wouldn't happen. Unlike many other digital consoles, Calrec desks do not share any DSP resources so there are no limitations on what you can or cannot do. In other words, all facilities are available on all channels at all times and all the busses are always available even if you are using all the Mains, Groups, AFL and PFL as 5.1. This is essential for live broadcast as you need to know that you have freedom to adjust everything as you see fit.

What about delay? With a mix of SD and HD equipment I find this to be more and more of an issue.

It is more of an issue. The nature of Digital, HD, and 5.1 technologies has resulted in a significant increase in the need for audio-video delay compensation. For example, in HD production it is often necessary to use some SD equipment such as cameras. The up-conversion of these video signals introduces delays that must be compensated for in the audio system. This compensation must be introduced in such a way as to match the video at the output but not delay any audio being fed back to the presenters. Calrec consoles incorporate 19.6 minutes of audio delay divided into 432 mono legs of up to 2.73 seconds each. They allow this delay to be positioned in the audio path exactly where the operator needs it to achieve the desired compensation.

My space is very limited... how can I maximize the number of faders across the width of my truck?

Calrec consoles have a higher fader density than most consoles, which is important in a live environment where the more faders you can control on the desk surface at one time, the better. In fact, Calrec can fit more physical faders into a limited space than any other manufacturer. Desk size is only one aspect – rack space is always at a premium too, especially in a mobile unit, and Bluefin helps keep this down to an absolute minimum with all the DSP on a single card. Rigidity, low heat generation and lightweight materials are also important factors. Calrec designs consoles with all this in mind, which is why Calrec is a clear leader among companies providing audio mixers for broadcast trucks.

Do you have SDI inputs on the console?

Yes. In fact we offer one of the most comprehensive SDI de-embedders available from a console manufacturer. Our unit accepts and detects SD or HD signals for up to 4 streams per unit. Not only can the unit de-embed all 16 audio channels arranged in 4 groups per stream but it can also handle incoming synchronous or asynchronous audio with bypassable Sample Rate Converters. Optional Dolby Cat No 552 Modules allow for up to 8 Dolby E signals to be decoded per unit and these Dolby decoders can be assigned where required from the console. The unit provides a multi decoder serial data connector to output the Incoming Metadata. To ensure full redundancy, dual redundant PSUs and fully redundant dual Ethernet connections are fitted.

I have been asked to look at sharing 3 studio floors between 2 control rooms? Do you have any way of working in this environment?

Yes. Calrec has developed Hydra, an audio networking solution which allows multiple wall boxes to be connected to multiple consoles. A console on the network can select a remote I/O source, such as a microphone input, set the gain and phantom power and then use that source with its channel processing. Furthermore, a second console (or however many consoles are needed) may select the same source and then use its own channel processing (to apply different EQ or Dynamics and routes to its own busses). It is possible to share studio floors between consoles for ultimate flexibility. Calrec has a range of units from 12 mic/line and 4 line outputs 2U units, through to fully modular 7U units, handling up to 88 mic inputs with options for mic splits, line outputs, AES inputs and outputs. The SDI unit also appears as a resource on the network allowing picture related audio content to be shared across consoles.

SIGMA with Bluefin

The Sigma with Bluefin console features an assignable control surface which incorporates Calrec's vast experience designing live production and live-to-air broadcast audio mixing consoles. Calrec introduced the world's first digitally controlled assignable mixing console in 1981. Our assignable control surface is now in its fifth generation, integrating many years of user experience and feedback.

TFT
Calrec's TFT metering provides full operator configurability of layout, size and color. Each meter can be mono, stereo, M/S, 5.1 surround or a phase display and automatically detect whether the channel is mono, stereo or 5.1.

Surround Spill
Calrec's Surround Spill panel allows an operator to adjust the individual legs of a surround channel, group or main. Surround channels use the resources of 2 x stereo channels (for L/R and Ls/Rs) and 2 x mono channels (for Center and LFE) and are automatically allocated from the available mono and stereo channels.

Faders
The Sigma with Bluefin console can incorporate up to 64 physical faders, including up to 52 x 5.1 surround channels. Calrec's 5.1 surround channels provide the ability to control a discrete 5.1 source on a single fader.

PC
All Calrec consoles have a proprietary operating system and are entirely independent of the PC for sustained operation or boot up. This means that PC failure or reset has no effect on the audio signal.

Monitoring
In live broadcast you need immediate access to many different sources. Calrec monitor panels can be configured to select up to 112 mono, stereo or 5.1 sources, and these can be banked together for ease of access.

Wild Controls
Sigma with Bluefin provides up to four wild controls for each fader. Almost any rotary control on the console can be assigned. Each wild control has its own LED display providing clear visual feedback to the operator.

With an impressive 36dB of pre-fader headroom, Calrec consoles have the dynamic range to handle even the most excitable broadcast commentators.

The audio stays clean even when channel faders have to be pulled back well below the -30 mark.

The enhanced flexibility of our TFT metering system solves the problems of dealing with 5.1 sources using conventional metering.

Metering

Working in a 5.1 environment presents users with very specific problems. Operators see an increasing number of 5.1 sources coming into the console. They need to know that that all six legs are present and at the expected level, but on conventional metering systems it is very difficult to display a 5.1 input, especially in the space of a single fader width. It also follows that with many more 5.1 outputs, even more metering is required.

Calrec's TFT metering provides full operator configurability of layout, size and color as well as ensuring a high degree of redundancy, without increasing the cost over conventional bargraphs. Each meter can be mono, stereo, M/S, 5.1 surround or a phase display. Our meters automatically detect whether the signal format is mono, stereo or 5.1 and display the signal appropriately.

The system allows up to three rows of meters per TFT screen, and can incorporate mixed sizes: $^1/_3$, $^2/_3$, $^1/_2$ and full height. Meter size, location and color are user definable, as is screen brightness.

As well as enabling a greater density of signals to be displayed, TFT metering provides users with absolute flexibility. For example, a typical meter set-up could have one screen metering Tracks 1-24, A Paths 1-8 and B Paths 1-8. In the center of the console, an operator could set up a screen to display full height hi-res monitoring of Main Outputs 1-4 in 5.1 and a Meter Selector in 5.1 (or stereo when a stereo source is selected).

The following signals can be metered:

- **Channel inputs, A and B paths (simultaneously, or set to follow A/B assign button)**
- **Main Outputs**
- **Groups**
- **Auxiliary Outputs**
- **Track Outputs**
- **External Inputs**
- **AFL/PFL/APFL**
- **Meter Selectors**
- **CRLS**
- **Mix-minus**

Calrec consoles are designed to deliver excellent audio quality – in other words, an open, transparent sound with high input headroom and low noise.

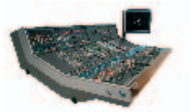
Audio Quality

Audio quality is of paramount importance. It's been at the core of our business for more than 30 years. Over the years all console manufacturers have tempted customers with more and more facilities and features, yet Calrec's reputation for audio quality has never been compromised.

All our products are renowned for their very clean, uncolored sound quality, with very high headroom and low noise.

- **Maximum Mic input headroom of +36 dB**
- **24 bit converters for all I/O**
- **Sample Rate Converters on every AES input**
- **Low Latency (from an input port to a channel path, routed to a group buss, in turn routed to a main buss, to an output port)**
- **<1.25ms digital input to digital output**
- **<3ms analog input to analog output**

Alpha with Bluefin



Sigma with Bluefin

Omega with Bluefin

Our Bluefin range of consoles include the 480 channel Alpha, the 320 channel Sigma and the 160 channel Omega.

Sound gives pictures an emotional dimension that movement alone can't convey. Now HD images with 5.1 surround sound add a new dimension to broadcast picture quality – and a new challenge for audio-mixing technology.

Calrec Live to Air

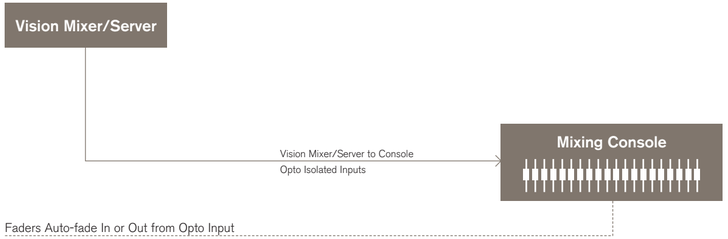
Calrec consoles are made exclusively for live broadcast. They are purpose designed for this function and this function only, so whether you are on air with music, a news show or even an election night special, you can be confident that the desk has all the facilities you will need for a smooth production.

Our assignable control surface is now in its fifth generation and is totally intuitive, with minimal use of the PC. All assignable desks with complex processes have an element of 'layering', but making it instinctive in a live situation is critical. Calrec desks have two signal paths available to each fader and access to either is via a single button press. All your live channels are in front of you and visible at all times, nothing is deeply buried.

In addition, our flexible Hydra networking with its range of modular and fixed format I/O boxes means that you can switch studio space quickly and efficiently and at minimum expense, whilst our flexible operating architecture allows operators to commit complex setups into non-volatile flash memory.

Whatever else happens on the day, with Calrec you can be assured that all your audio will be open, transparent and, above all else, ever present!

In a broadcast audio control room, signalization often encompasses a range of requirements for the audio mixer to control or communicate with external devices and for external devices to control functions of the audio mixer.



Signalization

Signalization requirements range from simple remote cut functions to the ability to disable certain functions such as Tone when On Air. To simplify the set up of these operations, they are arranged as three separate functions within Calrec's operational setups.

1. TX/REH
The Transmission (On Air) and Rehearsal modes can be set up to work in conjunction with the broadcast facilities panel. This allows condition switching to be set up for three states; Transmission, Rehearsal or Neither (both TX and REH off). The condition switching is set up as operational inhibits on functions such as tone or talkback on the main output. This is to reduce the risk of human error, making the system a more robust, less stressful and more user friendly environment for the operator.

The console can also be put in to Transmission or Rehearsal mode externally using the General Purpose Inputs.

2. General Purpose Inputs (GPIs)
Calrec consoles provide a number of GPIs to allow functions of the console to be controlled externally, such as a vision mixer fading in channels using the auto fade function. Channel cuts can be set up to provide remote cut or to control the channel-on function when controlled by a vision mixer. A number of miscellaneous functions are provided, such as the remote control of the Control Room LS Dim and Mute.

3. General Purpose Outputs (GPOs)
Calrec consoles provide a number of GPOs to enable the control of external devices, such as CD player from a fader start. A large number of miscellaneous functions can be set up, such as switching on a red light. Each GPO can be set to Pulse On when the function is activated, Pulse Off when the function is de-activated, Pulse Both so that it will pulse when the function is activated and again when deactivated, as well as simply latching.

Whether it's synchronizing the audio with the action in sports events or making life a little easier in late-night news studios, automatic cross-fading means that nothing is left to chance.

Automatic cross-fading

This feature allows the console to automatically fade channel or group faders in or out under the control of external signals. It is also possible to cross-fade between two or more channels by driving more than one opto – one being faded in while another is faded out. Typical applications include:

Motor racing
Coverage of high speed sporting events demands rapid switching between multiple camera feeds to keep up with the action. Matching the audio to video can be achieved via the GPIO system allowing the Vision Mixer to trigger automatic cross-fades between camera shots. This guarantees the console is synchronized to the video, allowing the operator the time to concentrate on the audio quality and mixing.

Late night news bulletins
In a modern news environment, regional and local late-night bulletins are typically manned by the minimum number of staff possible. In such cases, Calrec consoles can be connected to the video server which automatically opens the relevant channel on the console when the news item is played. When the item is finished the video server will automatically close the channel. Using a remote fader panel simplifies this process further still, enabling the vision operator to adjust the presenter levels without needing access to the audio control room.

In a high pressure broadcast environment, speed of access is paramount.

Ergonomic design for ease of operation

Getting control of channels in live broadcasting should take as few steps as possible. Having them buried on hidden layers or banks can be a real problem, especially when you need to use elements that are hidden three or more layers deep.

On Calrec consoles there are two signal paths available to each fader and access to either is via a single button press. Assignable controls have the great advantage of enabling ready access to as many controls as possible, rather than having them spread across the width and height of the board. Local assignable controls are also provided for setting IFBs and mic gains etc. This means that the majority of controls you need are just one button press away.

This attention to ergonomic design also extends to our buss architecture. Although it is often assumed that digital consoles – like analog consoles – have all their facilities available at all times, this is not always true. Some desks offer a pool of busses that can be used for different things, but not simultaneously. Some can also lose DSP functions, such as EQ and dynamics, as busses are used. Calrec desks do not 'pool' resources in this way. Our buss structure is designed to provide everything you need, all of the time.

Calrec monitor panels provide enhanced user configurability, simpler operation and hugely expanded functionality.

Monitoring

In live broadcast you may need to monitor many different sources, both within the console (such as IFB outputs) and external (such as off-air monitoring). These sources can be mono, stereo or 5.1. The same source, such as the main output, can even be a processed 5.1 output with a stereo downmix.

On Calrec monitor panels, each selector button can be configured as mono, stereo or 5.1 and can be an internal signal within the console or fed externally to the console.

Up to 112 sources can be set-up at any one time and can be given user-definable labels. Sources of the same type can be banked together for ease of access. Our consoles provide seven different banks to organize groups of monitor sources, with up to 16 sources in each bank. This gives a high degree of user configurability and very simple operation. These setups can be saved to be recalled by individual operators at any time.

In addition to Main Control Room LS monitoring, further monitoring outputs with full source selection are provided for other destinations, such as the studio or production gallery.

Alpha with Bluefin

Sigma with Bluefin

Omega with Bluefin

Our Bluefin range of consoles include the 480 channel Alpha, the 320 channel Sigma and the 160 channel Omega.

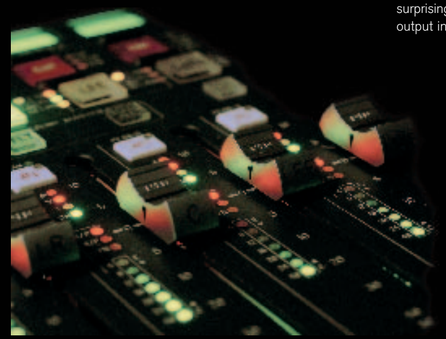
Calrec in Broadcast Trucks

Calrec's reputation for build quality, long-term reliability and excellent audio performance has made our consoles the benchmark for broadcast trucks, particularly for the critical environment of live sports coverage.

An independent survey by the Sports Video Group (SVG)* in North America shows Calrec Audio as a clear leader among companies providing audio mixers for broadcast trucks, with 48% of all HD trucks, and 31% of the total market – more than any other provider. A similar survey by Germany's Medien Bulletin** shows Calrec with 22% of the HD broadcast truck market across Europe. Not surprisingly, between 40 and 60% of our production output in any given year is destined for trucks.

Calrec consoles are ideally suited to a truck environment. They have minimal impact on space, weight and heat generation. Bluefin technology dramatically reduces rack space, and our compact fader widths maximize the number of faders you can fit across the width of a truck. Eight faders take only 250mm/9.85 inches. Our specialist in-house design team has developed a unique construction that allows for all the signal processing and control systems to be located beneath the control surface, without any significant increase in size or weight over a standard system and without sacrificing access to system hardware or interfacing.

*SVG Mobile Sports Production Yearbook 2007
**Medien Bulletin HD OB Van Special 2007



Thanks to Calrec quality, sports TV audiences can enjoy all the excitement of being there. With our consoles in almost half the HD trucks and nearly a third of all the trucks in the USA, we're racing ahead of the competition.

Originally built to house one of the most famous worker-producer textile co-operatives in England, the nineteenth century Nutclough Mill, (left and below) is now home to one of the broadcast industry's most technologically advanced manufacturing companies.

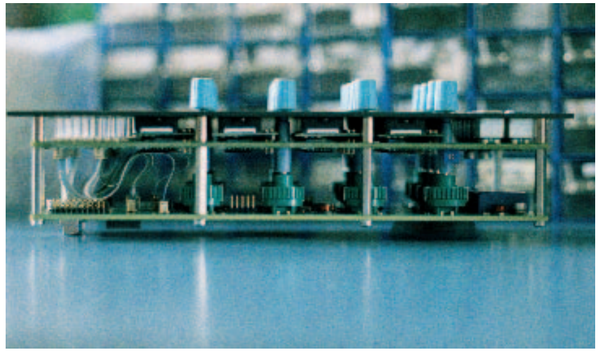
Meeting your changing needs

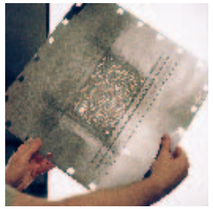
Established in 1964, Calrec Audio has more than forty years of pro audio expertise. Since the launch of our first mixing console in 1971 we have been exclusively dedicated to the design and manufacture of live broadcast audio mixing consoles.

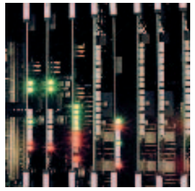
This consistent focus on the needs of broadcast customers has given us a deep understanding of the ergonomic and system specifications required for modern production. We understand what's most important to you and how best to meet the changing needs of the broadcast environment. Calrec was the first company in the world to design and manufacture a commercially available stereo mixing desk for broadcast stereo sound, the first to develop a single-point surround-sound microphone and the first to launch a commercially available digitally controlled assignable broadcast console. With the launch of our Bluefin range, we were the first to provide a truly practical and cost-effective solution to the needs of multi-channel surround sound mixing.

Our expertise, our experience and our technology is trusted and endorsed by the world's most successful broadcasters.

Clockwise from left; Ersascope Visual Inspection Camera, Cross section of wild control panel in final assembly, solder paste stencil, DSP cards in test rack, MYDATA MY19 SMT placement machine.







Key to Calrec's outstanding reputation for innovation and reliability within the broadcast industry is the integrity of the product development process. From original concept, through R&D, to state-of-the art production, every element – even the metalwork for frames and racks – is carried out in-house.

System Specification

Digital Inputs	
Formats Supported	AES/EBU (AES3) 24-bit Also suitable for use with SPDIF (IEC958 Type 2) signals
Interface	110 Ohm transformer balanced, 5V Pk-Pk 75 Ohm unbalanced (BNC), 1V Pk-Pk
Sample Rate Conversion	24-Bit switchable on all digital inputs
SRC THD+N	-117dB @ 1kHz, 0.00014%
Digital Outputs	
Formats Supported	AES/EBU (AES3) 24-bit
Interface	110 Ohm transformer balanced 4V Pk-Pk (nominal) into 110 Ohm load 75 Ohm unbalanced 1V Pk-Pk (nominal) into 75 Ohm load (BNC)
Analog Inputs	
Analog - Digital Conversion	24-Bit
Input	Electronically Balanced
Input Impedance	>1k Ohms for Mic gains 10k Ohms for Line gains
Sensitivity	+18 / -78dB on Mic/Line Input Card +18/-24dB on Line Only Input Card.
Equivalent Input Noise	-126dB (150 Ohm source)
Distortion	-1dBFS @ 1kHz - Better than 0.003% -20dBFS @ 1kHz - Better than 0.006% -60dBFS @ 1kHz - Better than 0.3%
Frequency Response	20Hz to 20kHz +/- 0.5dB on Mic/Line Input Card 20Hz to 20kHz +/- 0.25dB on Line Only Input Card
Input CMR (Common Mode Rejection)	>70 dB (Typical 80dB) on Line Inputs >75 dB (Typical 85dB) on Mic Inputs
Analog Outputs	
Digital - Analog Conversion	24-Bit
Output Balance	Electronically Balanced, 20Hz to 20kHz, Better than -35dB, typically -45dB
Output Impedance	<40 Ohms
Distortion	-1dBFS @ 1kHz - Better than 0.006% -20dBFS @ 1kHz - Better than 0.003% -60dBFS @ 1kHz - Better than 0.3%
Frequency Response	20Hz to 20kHz +/- 0.25dB

Performance		
Digital to Digital (AES/EBU) Distortion	-1dBFS, 20Hz to 10kHz - Better than 0.002%	
Digital to Digital (with SRC) Distortion	-1dBFS, 20Hz to 10kHz - Better than 0.005%	
Frequency Response (Analog Input to Output)	20Hz to 20kHz +/- 0.5dB	
Synchronization		
48kHz synchronization	NTSC/PAL Video Internal Crystal Reference TTL Wordclock (48kHz) AES/EBU Digital input (48kHz)	
Environmental Considerations		
	Operating	Non-Operating
Temperature Range	0°C to +30°C (32°F to +86°F)	-20°C to +60°C (-4°F to +140°F)
Relative Humidity	25% to 80% Non-condensing	0% to 90% Non-condensing
Maximum Altitude	2,000 Meters (6500ft)*	15,000 Meters (49,000ft)

– Analog input for 0dBFS can be pre-set globally to +28, +24, +22, +20, +18 or +15dBu
– Pre-fader headroom on mic inputs is adjustable globally from +24 to +36dB in 2dB steps
– Analog output for 0dBFS Matches input setting into >1kOhms (+24dBu max into 600 Ohms)

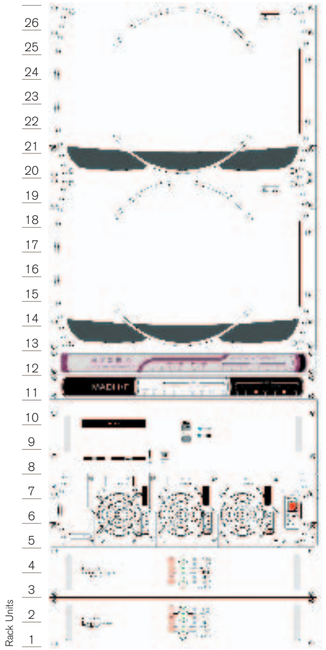
The system can be pre-set with up to five external sync sources, plus internal, such that if the 1st source fails, it will automatically switch to the 2nd, and so on.
*This is the limit to which the safety tests are valid.

Maximum Cable Lengths			
Cables		Maximum Length	
From	To	Feet	Meters
Control Surface	Digital I/O Rack	492	150

Extenders are supplied to provide console data connections greater than 30 meters (98 feet).

Designed and produced by Rees & Company.

Typical Rack Layout



Digital I/O Rack
(Including Fan Tray)

Analog I/O Rack
(Including Fan Tray)

Optional Hydra Gigabit Interface Unit

Optional Madi Interface Unit

PC

Bulk Power Supply & Distribution Unit
(Holds up to 3 plug-in PSUs)

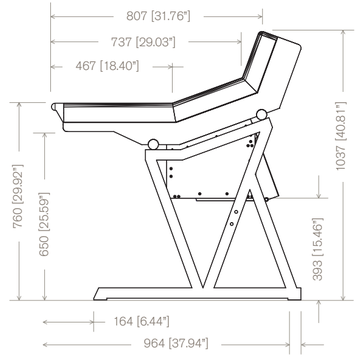
Multi-Rail PSU #1

Multi-Rail PSU #2

Control Surface Frame Sizes

No. of Modules Wide	Length inches / mm		Depth inches / mm	
12	60.9	1547	38	964
13	65.9	1672	38	964
14	70.8	1797	38	964
15	75.7	1922	38	964
16	80.7	2047	38	964
17	85.6	2172	38	964
18	90.5	2297	38	964
19	95.7	2428	38	964
20	100.6	2553	38	964
21	105.5	2678	38	964
22	110.4	2803	38	964
23	115.4	2928	38	964

Control Surface End Profile



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