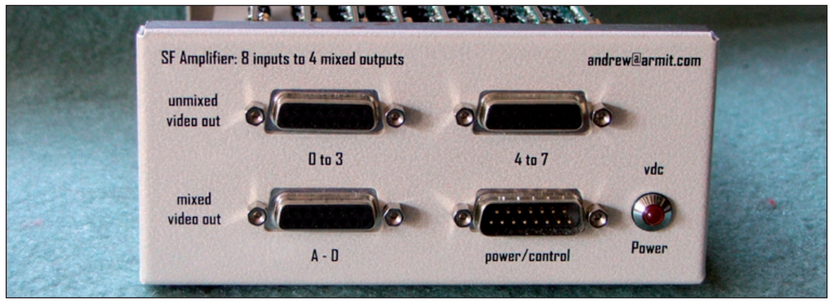
SuperFast; A new low noise, high speed, multi channel, signal amplifier for Electron Microscopes

Developed to meet the growing need for high speed imaging by backscattered electron detection in SEM's. Two leading names in the design development and manufacture of backscattered electron detectors have combined their resources to produce Super Fast, capable of imaging at speeds up to 2MHz and with up to 8 channels of amplification providing the user with unequalled opportunities for analysis and interrogation..

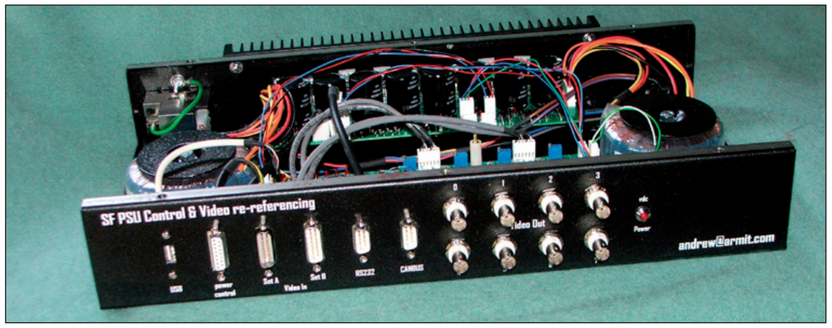


Amplifier box with mother board and 8 amplifiers installed. This is connected to the associated power and control box and permits mixed and/or unmixed differential video outputs

Headline features of the amplifier hardware include

- **Up to eight signal inputs and eight outputs**
- **Four mixed outputs comprising any combination of available input**
- **Amplifier input individually optimised by a choice of 5 input resistors**
- **Bandwidth control through 32 overlapping steps providing virtually seamless control**
- **AC/DC Control through capacitive or direct coupling minimising impact of input variances in high noise conditions,**
- **Controllable bias for each amplifier in the -10V - +10V range.**
- **Individual amplifier input offset (backoff)**
- **Bias, bandwidth, and backoff can be set for any amplifier**
- **Same bias bandwidth and backoff settings can applied to any set of amplifiers**
- **Individual signals can be cross mixed**

This array of features provides complete flexibility in the number and combination of amplifier channels. The set up of each channel can be comprehensively and accurately matched to its particular needs, yet simply transferred to any of the other amplifier channels. Once set up the output of each channel can again be individually tailored to the imaging requirements. Whilst offering a massive array of features and individual controllability the inbuilt intelligence of the units can also guide the set up procedure and prevent unworkable combinations of settings. The 8,000,000 to 1 amplification range combined with fast up to 2MHz imaging and coupled to multiple least noise functions brings enhanced and new capabilities to Backscattered electron, STEM, Forward scatter and specimen current detection.



Power and control box with 8 power supplies, PC connection, and video re-referencing for up to 8 individual outputs

Headline features of the power and control box

- **FIND command to automatically optimise initial image**
- **Configurable assignment of separate amplifiers to different detectors,**
- **Configuration options and conditions can be saved or defaults restored**
- **Selectable auto control of bandwidth from bias and input resistor selected, or reverse control of bias and input resistor from bandwidth**
- **Automatic least noise control driven by chosen gain and bandwidth.**
- **Extensive integral self test**
- **Status indicators**
- **PC interface via USB, RS232 or Canbus**
- **Firmware can be upgraded remotely**

This array of features provides the ultimate flexibility in post acquisition processing multi channel detector data. Direct or mixed output from any single or sub set of amplifiers, even multiple detector mixing is now possible. Despite the huge array of parameters that are available for manual control, the inbuilt intelligence of the unit can help the inexperienced operator achieve impressive results. With the FIND feature providing an initial image from a single button, bandwidth control of allowable settings, noise reduction starting with the individual linear power supplies, processor sleep ability, and ground loop identification, through to the re- referencing of each channel of video output a whole raft of technology is available to help achieve the finest images imaginable.

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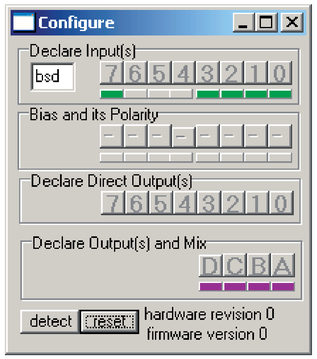
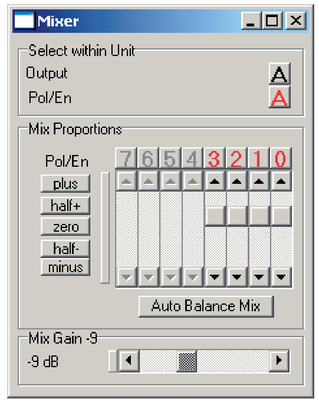
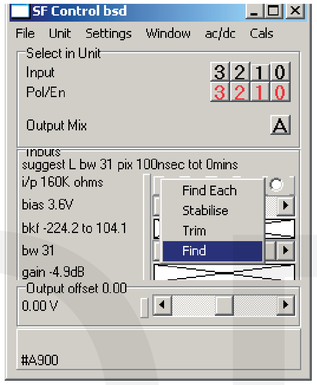
CONTROL SOFTWARE

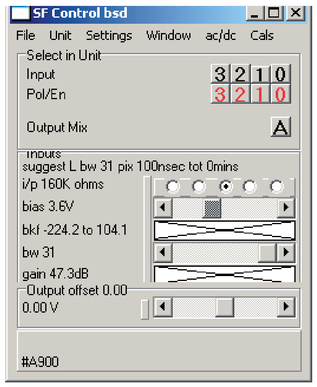


Configure and Mixer windows are revealed during set up stage and can then be minimised leaving only the BSD control window open during operation. The mixer set up window controls the mixing of any of the inputs, post mix gain available to deal with small differences in signal during topographic operation. Configure sets up selection of amplifier inputs and their associated direct or mixed output . Also provides detect override





The BSD control window requires the choice of one of the 5 input resistors applicable to the bandwidth required followed by a click on the FIND button initiating the systems automatic searching for the best fit settings to give a good initial image. Fine adjustments of contrast or brightness to suit the particular sample would follow whilst the suggested best regime based on bandwidth and gain may be adopted via a double click. Unit values are also provided to assist with consistent manual set up. Also controlled via this window are polarity, bias voltage, bandwidth and gain.



APPLICATIONS

This advanced new amplifier has been conceived with multiple novel applications in mind. Unparalleled image quality at bandwidths of up to 2MHz makes the detector particularly applicable to rapid scans of multiple samples so hugely increasing productivity. This performance may also be applied to samples whose topography rapidly alters during SEM imaging, as well as samples where there is just one fleeting opportunity to obtain the required image. With up to 8 channels of independently configurable amplification available, greater levels of interrogation and analysis can be applied to multi sector detectors such as K E Developments 4 channel backscattered electron detectors and 5 channel STEM detector. New levels of mixing of results from the same or even different detectors including probe current, EBIC and specimen current detectors is now a reality, enhancing post imaging analysis and enabling the possibility of colour imaging .