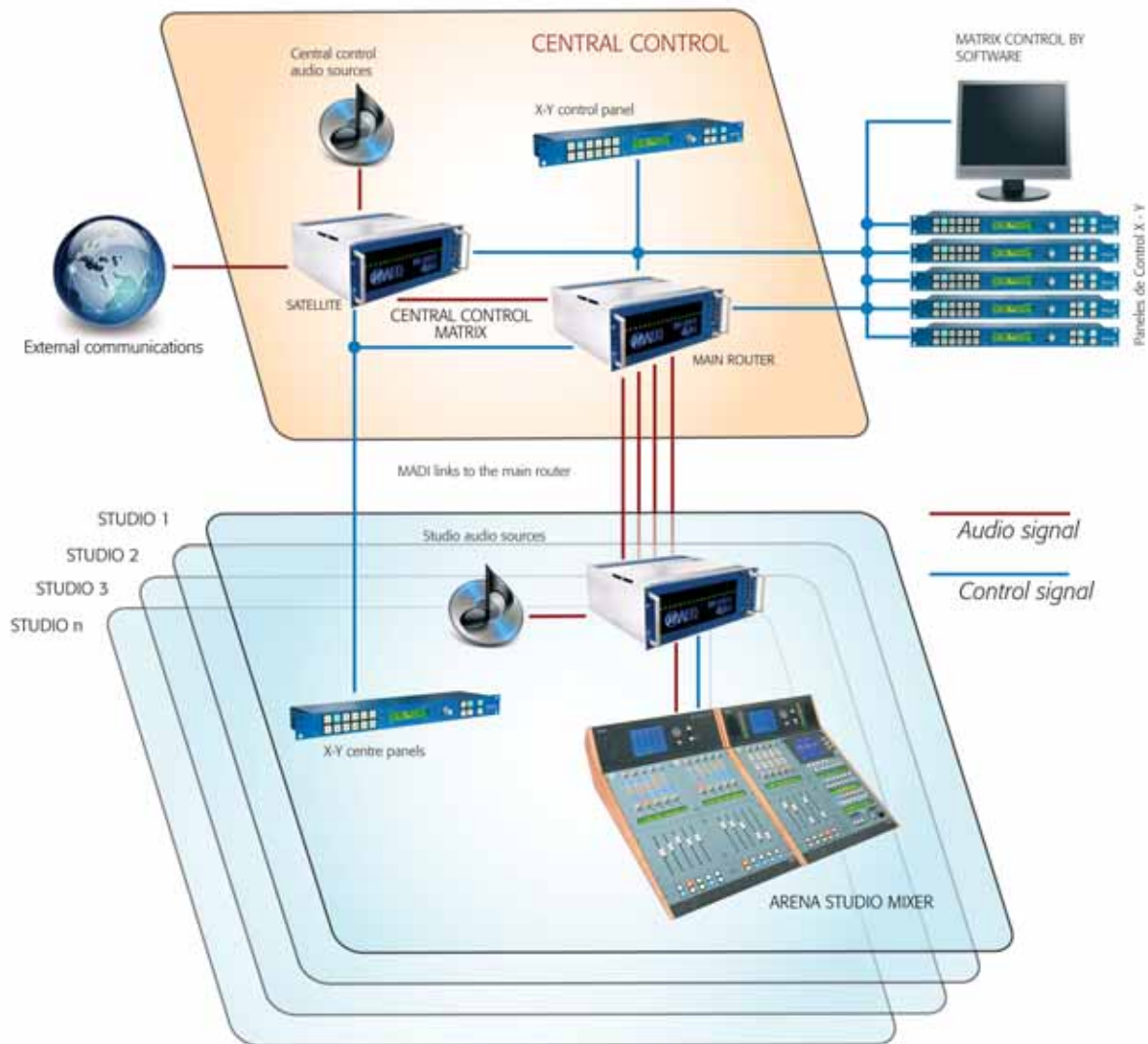# AEQ

BC-2000 D Router

Digital Audio Router

BC-2000 D Router. Functional Description

HOW IT WORKS

The backbone of the BC-2000 D Router Digital Audio system is the double TDM bus, housed in the BC-2000 D frame, with the capacity to route, mix or distribute more than a thousand channels simultaneously.

The TDM bus is divided into an input bus and an output bus, with the possibility of inserting DSP cards, achieving a higher DSP processing capacity.

The system may be decentralized through the use of MADI links as the interconnection between the different sub-frames thanks to the use of optical fiber or coaxial cable between the sub-frames and the mainframe. Each sub-rack has a maximum configuration of up to 128 x 128 local channels which will be sent through the MADI links to the mainframe. There is also the possibility to configure the board to use 64 active channels and leave the other 64 as backup.

The analog and digital inputs and outputs can be combined according to current or future needs. All the digital inputs and outputs are transformer isolated and we have anticipated the option to include them also if it is needed in the analogue inputs and outputs. In addition, there are also microphone inputs, headphone outputs and GPI/O.

HOW IT IS CONFIGURED

The configuration is done through software which communicates the pc and all the matrix' frames via TCP/IP. With it, and under the rules of protection of the system administrator, we will configure all the physic and logic elements according to the specific needs of each user.

Also through software we will check the status of the boards and/or upgrade their firmware.

HOW IT IS CONTROLLED

Control may be centralized or structured from different consoles, through TCP-IP over Ethernet or through GPI's, from different consoles, dedicated panels, intercom panels and computers with real time control software drivers. These may be classified according to the user as:

■ Operator workstations at different levels: Studio sub-router operator, studio mixing control operator, central control room router operator, etc.

■ Control and supervision workstations with access to all system control tools: Alarm monitoring, I/O level monitoring, network display, updating firmware, board status, etc.

We can create, in different computers, as many vumeters as needed, in order to control input and output levels of the different lines, or export the data to external display applications.

Main Characteristics:

■ It fully meets analogue and digital audio routing and distribution needs in radio and television program production centres and other similar settings.

■ It sums, distributes and processes up to thousands of audio inputs and outputs either located at a central control room or distributed at different points among them at a distance of more than 10 Km.

■ Control may be centralized or structured from different workstations with user, administration and supervision applications and from XY panels.

■ It offers multiple possibilities for the user to configure their interface through the configuration software, both for the control via software and via tactile panels.

■ As the central element of an installation, it is a solution based in hardware and software security and redundancy, in order to assure its work 24 hours a day, 7 days a week.

Security

All audio that is broadcast and the communications from the main control room go through the BC-2000 D Router. All possible precautions should be taken, but in the BC-2000 D Router, the situation that may result in problems have been taken into account, and the necessary steps have been taken so that you will not have to worry about your router.

HARDWARE SECURITY

- Selected high-reliability components.
- Circuits working well below their maximum allowed levels.
- Dual power supply.
- Independent or redundant controller, working as a cluster.
- Possibility of adding DSP boards as a backup
- All the boards are hot-swappable
- Possibility of duplicating: TCP/IP network, client PC network cards, AES-10 MADI multichannel links, etc..

The alarm system monitors the following problems:

- Power supply failure.
- System sync failure.
- Lack of response from a card.
- Communication error.
- Card operation fault.
- Insertion of a new card.
- AES sync error.
- Arrival at a specific date and time.
- Insufficient audio modulation or simple absence of sound on a line.
- Other user-defined alarms.

SOFTWARE SECURITY

- Unique access profile for each user, with password, priorities and masks.
- Multiple security levels: only users with a high enough level can use a resource (line, crosspoint, macro, salvo, GPIO…).
- Masks: certain resources can only be seen by authorized users.
- Backup and restore functions for the system and configurations.
- Log file to check causes of faults.
- Status Information software of the boards

If there is any incidence in the system, we can choose from among:

- Showing a message on the screen.
- Having a signal appear through a GPO.
- Executing a defined action as a macro.
- Calling up a user-defined function.

BC-2000 D
Matrix Control

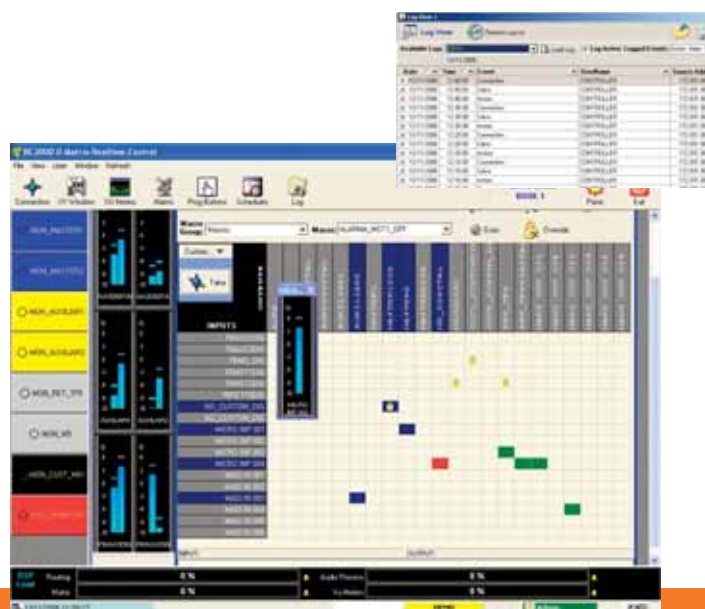## Control and supervision software

To design the control software for the BC-2000 D Router, we applied more than 10 years of experience in defining systems and providing technical support for the audio switching routers of dozens of major broadcasters. This experience helped us learn how systems are managed and supervised and identified the most practical solutions that we then incorporated in the router control software.

You will most likely find that your needs are met with the standard application, however the application may be customized for specific needs.

Real time control software

For users, the most diverse control tools have been designed, which will be available based on a secure access, protection and priorities policy:

- Real time XY control.
- Real time control by connection list.
- User-defined views.
- Programming, display and editing of salvos, macros and clock switching.
- Time programming of actions in the matrix.
- Grouping and logical renaming of lines. Protection of lines and crosspoints.
- Definition of summable lines and multiconferences.
- Undo and panic functions, loss of modulation alarms.
- Level monitoring through VU-meter, cue, intercom.
- Input, output and crosspoint gain can be modified.
- Predefined MACROS can be activated by configurable direct-access buttons, which can be activated with the mouse or via touch screens.
- Instantaneous DSP consumption display.

Supervision software: System tools

For system supervisors and administrators, we have created a powerful set of software tools that let you control the entire system from one or several workstations:

- Alarm monitoring.
- Monitoring the levels of any input and output.
- Real time DSP process display.
- Network display.
- Updating firmware.
- User and system configuration setup and updates.
- Event and fault log.
- Intercom, listening and measuring circuits, by simply making a cable connection between the station and an audio input and output from the router.
- Board status software.
- Time synchronization with GPS receivers.
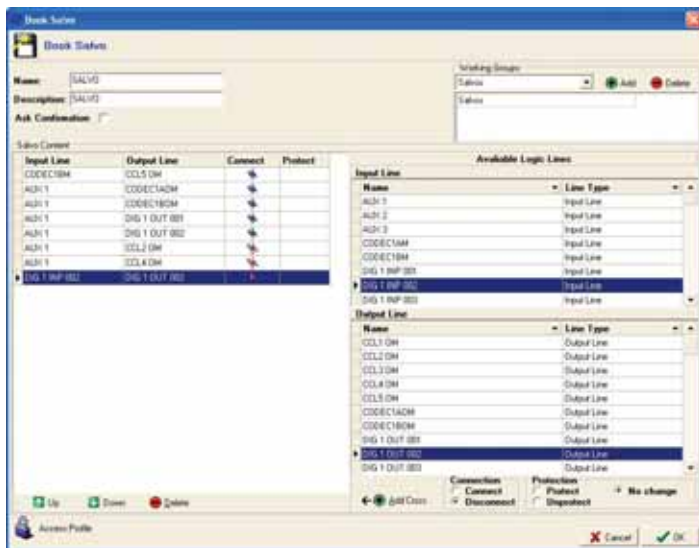
NCB-100: programmable keys panel

The NCB-100 programmable panel is for quick and easy access for low-level system users to the pre-programmed studio functions such as salvos and macros and to modify the studio cross points status.

- 2 rows of 6 free programmable keys
- 4 keys with two functions: Inputs/User change, Outputs/Undo, Salvos/Hour display and Macros/Lock.
- Take and Undo keys and Selection scroll
- Possibility of grouping simultaneous functions
- 3 GPIOs available through 15 pin SUB-D connector, located at the rear part.
- Unlimited number of panels per router
- Configuration and control over TCP/IP
- Operation is regulated by access profile for each password protected user.
- Assigning signals and functions for each user profile
- 1 R.U. x 19 inches.
- Universal power 90-240 VAC.
- Custom-made configuration if the client requires it.

System Parts

CONTROL COMPONENTS

NCB 100
XY Programmable Control Panel with GPI / GPO and Ethernet port.

BC-2000 D RTC

Standard Control Software for the BC-2000 D Router.

BASIC SYSTEM COMPONENTS

BC 2290
Power Supply 2x300W, 2 RU 19″, 90-240 V AC auto-range, auto-redundant. It can power two full racks.

BC 2000 DF
System Frame, 4u x 19", 21 slots rear side to install inputs and outputs modules. 20 slots front side to install processing modules.

BC 2230
Master Controller Board w. 1 external Access USB, and Ethernet connectivity. Each System Chassis requires at least one controller. Two units may be installed in the same rack for redundancy purposes.

INPUT / OUTPUT, PROCESS AND ROUTING MODULES

BC 2220
DSP Board for Processing and Routing. From 1 to 20 per rack can be installed depending on the number of I/O and processing needs in the system. For the basic mixing and distribution, a minimum of one DSP is required per rack.

BC 2201
Inputs / Outputs Mono Analogue Line Module. 4 Analogue Mono Inputs and 4 Analogue Mono Outputs (equivalent to 2 Stereo) electronically balanced, 4 GPI and 4 GPO. RJ45 connectors.

BC 2202
AES/EBU Inputs / Outputs Module. 4 inputs and 4 outputs stereo AES/EBU format, (individually configurable as SPDIF) transformer isolated. Inputs provide Sample Rate Converters (SRC). 4 GPI and 4 GPO. RJ45 connectors

BC 2203 M
MIC/LINE Analogue Inputs Module. 4 mono inputs, transformer isolated, Phantom power, mic/line switching. 4 GPI and 4 GPO. RJ45 connectors

BC 2203 MH
MIC/LIN Analogue Inputs and Headphones Outputs. 4 analogue mono inputs, transformer isolated, Phantom power, mic/line switching. 2 Headphone stereo outputs. 4 GPI and 4 GPO. This module occupies 2 slots. RJ45 connectors.

BC 2204
Mono Line Analogue Inputs Module. 4 Inputs (2 Stereo) electronically balanced, 4 GPI and 4 GPO. RJ45 connectors.

BC 2205
Analogue Line Outputs Module. 4 outputs (2 stereo) electronically balanced, 4GPI and 4 GPO. RJ45 connectors.

BC 2205 T
Analogue Line Outputs Module. 4 outputs (2 stereo) transformer balanced, 4GPI and 4 GPO. External XLR connectors module.

BC 2206
Digital AES/EBU Inputs Module. 4 AES/EBU stereo inputs, (individually configurable as SPDIF) transformer isolated. Inputs provide Sample Rate Converters (SRC). 4 GPI and 4 GPO. RJ45 connectors.

BC 2207
AES/EBU Digital Outputs Module. 4 AES/EBU stereo outputs, (individually configurable as SPDIF) transformer isolated. 4 GPI and 4 GPO. RJ45 connectors

BC 2211
AES 10 MADI Module for linking racks.
TX/RX, connection of 56 or 64 channels through optical fiber or coaxial cable, with wordclock synchronism and autosync. Two modules may be installed for the same link for redundancy.

BC 2212
Double AES 10 MADI Module for linking racks. TX/RX, Two independent connections of 56 or 64 channels through optical fiber or coaxial cable, with word clock synchronism and autosync. BNC and optical connectors. Two modules may be installed for the same link for redundancy.

BC 2224
AES/EBU Inputs / Outputs Module for Intercom. 4 RJ45 connections, each one with one input and output in AES/EBU format, GPI and GPO.

BC-2000 CAB: CABLING AND CONNECTION SYSTEM

There is a versatile and complete cabling system for the router. It includes adapter modules from RJ45 to XLR and WAGO connectors that make the system installation easier.

Complete cabling system can be prepared on demand, including patch panels and distributors.

Technical Characteristics

INPUTS AND OUTPUTS

Maximum Capacity: blocks of more than a thousand circuits each one. Special configurations can be achieved linking several blocks.

RF protection.

Transformer-balanced digital inputs/outputs.

Electronically balanced analogue line inputs and outputs. Transformer balanced analogue inputs and outputs are available as an option.

Digital inputs/outputs configurable as: AES/EBU (AES 3) and SPDIF, mono and stereo.

Grouped digital inputs/outputs according to AES 10 MADI, mono and stereo, 56/64 channels, fiber or coaxial.

GPI and GPO (General Purpose Inputs and Outputs for special applications):

- By optocoupler at the input and output boards
- GPO outputs by dual-status bistable relay at the controller boards

The frame has 2 built-in true monitor stereo outputs, 1 analogue output and 1 digital output, to which any stereo output signal may be sent, with direct relay connection, for special applications.

Internal or external sync (AES/EBU and TTL signals)

PROCESS

Internal sampling frequency 48 KHz, 24 bits.

Internal bus format: 32 bits per sample, floating-point.

Available process functions (All the function parameters can be modified by the user in real time):

- Inputs and outputs routing
- Gain control in the range of +12 dB to -12 dB
- Stereo (Balance/Panorama) spatial distribution
- Continuity control in modulation
- Other functions on demand

**DIMENSIONS AND WEIGHTS
(WIDTH X HEIGHT X DEPTH; WEIGHT)**

Central Unit: 4u x 19″
(482.6 x 266.7 x 450.0 mm; from 12 to 22 kg, 26.4 to 48.4 lbs).

Power supply: 2u x19″ (482.6 x 89.0 x 360.0 mm; 8.2 kg, 18 lbs)

BC-2000 D is a very flexible system. Please, ask for a solution to your particular requirements.

BC-2000 D Router