ControlSpace® ESP-00 Series II
engineered sound processor

TECHNICAL DATA SHEET

Product Overview

The ControlSpace ESP-00 Series II engineered sound processor offers high-quality signal processing through a flexible audio platform. Install up to eight analog and/or digital audio expansion cards to create customized audio systems. Onboard connectivity includes Ethernet, RS-232, expandable GPIO, and support for elegant Bose® control centers and volume controls.

Product Information

Eight open card slots supporting up to 64 (input and/or output) audio channels take user-installable analog, digital, or audio networking I/O cards to better match signal type and channel count requirements. A full range of I/O cards is available and can be mixed, including microphone/line level analog audio, AES3, Dolby®/DTS® surround decoding, and Bose ESPlink output for simplified audio to same-rack PowerMatch® amplifiers. Dante™ and CobraNet® cards are also available to route and distribute audio to Bose PowerMatch amplifiers and single-rack-space DSPs as well as other manufacturer's compatible equipment.

Onboard connectivity includes Ethernet for control and configuration, RS-232, and expandable general purpose I/O with 8 control inputs and 8 control outputs. Five elegant Bose wall-mounted user interfaces can be used to control all Bose networkable devices.

Device and control configuration is accomplished using Bose ControlSpace® Designer™ software, which offers an expanding list of algorithms and improvements to deliver a high level of functionality for most audio installations. Installers can quickly and easily drop in the signal processing and channel routing required, creating high-quality customized audio systems they can then tune real-time with ControlSpace Designer™ software. For programming Bose user controls, a unique drag-and-drop interface and simulator lets installers program and test end-user control functionality offline before a single hardware device is installed, saving onsite installation time.

Applications

Designed for a wide range of applications, including:

- Auditoriums
- Houses of worship
- Resorts and hospitality venues
- Retail stores
- Schools and universities
- Multi-purpose spaces

Key Features

- **Flexible I/O** through a customizable card-frame design. With a powerful DSP core, the ESP-00 Series II processor accommodates up to 64 channels of audio over 8 open card slots, and general purpose I/O (GPIO) expansion up to 16 control inputs and 16 control outputs
- **High-quality open-architecture DSP** supports 48 kHz sample rate/24-bit conversion, uses a floating-point DSP and operates at low latencies for sound system precision
- **I/O expansion cards** cover a number of audio channel requirements from mic/line analog to Dante™ networking. These cards offer different audio options to populate the 8 open card slots
- **Support for popular network protocols** – Allowing integrators more flexibility in selection, the ControlSpace ESP-00 II processor supports audio networking protocols Dante™ and CobraNet® for interconnection with other products and audio systems
- **A large suite of signal processing algorithms** is available. These include automatic mic mixing, multiband graphic and parametric EQs, Bose loudspeaker libraries, signal generators, routers, mixers, AGC's, duckers, gates, compressors, source selectors and delays
- **A variety of control options.** The ControlSpace ESP-00 II processor is compatible with five user control interface options and can integrate with industry-standard control systems using a comprehensive serial protocol through onboard RS-232 and Ethernet ports
- **ControlSpace® Designer™ software** is used to configure both the signal processing and control capabilities of ControlSpace ESP processors. With ControlSpace Designer™ software it is possible to design, configure, control and monitor all Bose® networked system electronics from a single software application

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Technical Specifications

Integrated DSP	
Signal Processor	Four 32-bit floating-point digital signal processors, 200 MHz
Maximum Calculation	6.4 GIPS / 4.8 GFLOPS
Delay	288 s
Audio Latency	860 µs (analog in to analog out)
A/D and D/A Converters	24-bit
Sample Rate	48 kHz
Control Inputs	
Inputs (Control)	8 analog or digital inputs, 5.1 kΩ internal pull-up resistor to 5 V, 3.81 mm Euroblock, 9-pin
Analog Input Voltage Range	0 V to 3.3 V (maximum 5 V)
Digital Input Voltage Range	0 V to 3.3 V (threshold voltage = 1.6 V)
Control Outputs	
Outputs (Control)	8 digital outputs, 3.81 mm Euroblock, 9-pin
Output Voltage	High: 7.5 V (open circuit), 2.5 V @ 10 mA, Low: < 1 V @ 100 mA, push-pull
Indicators and Controls	
LED Status Indicators	Power, Status, Ethernet/Serial (RS-232 + CC-16)
Audio Signal Indication	Green (-60 to -20 dBFS), Yellow (-20 to -2 dBFS), Red (-2 to 0 dBFS)
Electrical Specifications	
Mains Voltage	85 VAC-264 VAC 50/60 Hz with PFC
AC Power Consumption	< 35 VA typical / < 70 VA max at < 95°F (35°C) ambient
Mains Connector	IEC 60320-C14 (Inlet)
Power Dissipation	70 W (239 BTU, 60 kcal)
Physical	
Dimensions	3.5" H x 19.0" W x 13.0" D (88 mm H x 483 mm W x 331 mm D)
Net Weight	10.8 lb (4.9 kg)
Operating Temperature	32 °F - 104 °F (0 °C - 40 °C)
Cooling System	Internal fan
General	
PC Configuration Software	ControlSpace® Designer™ software
Network Control	Ethernet (RJ-45), 10 Mb
Communications Ports	RS-232 (DB9M, DTE), Bose CC-16 (5.08 mm Euroblock 3-pin)
Expansion Slots	8 analog/digital audio, 2 GPIO (1 occupied)
Audio Channel Capacity	64 (bi-directional, digital and/or analog)

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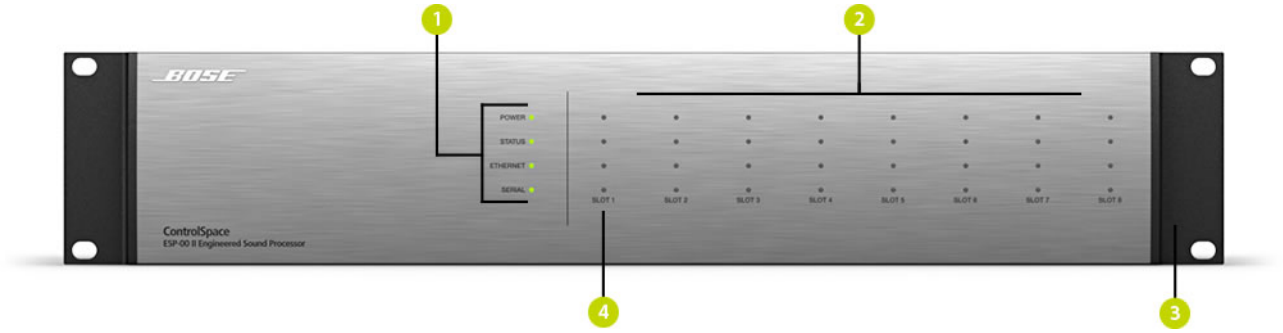
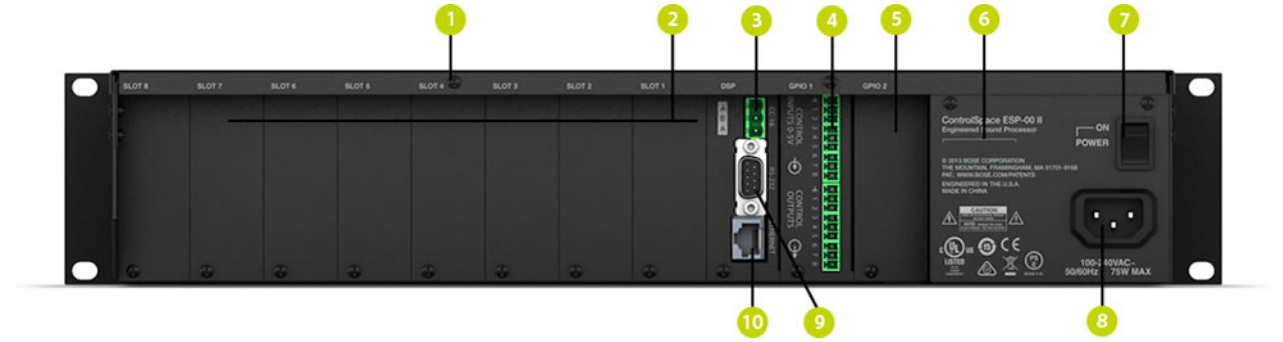
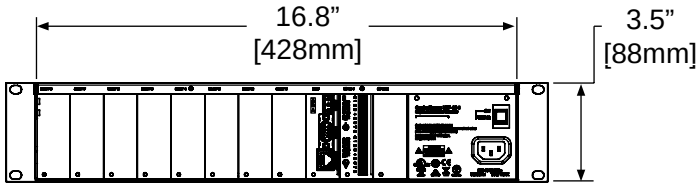


1. **LED indicators:** - Power, Status, Ethernet and Serial indication
2. **Channel signal indicators** - 32 LED windows relaying channel status from each installed expansion card
3. **Front rack-mount ears** - For use when securing into rack enclosures
4. **Slot labels** - Numbered expansion card locations with corresponding signal indicators

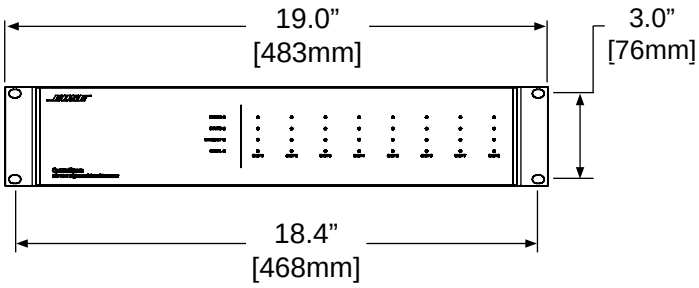


1. **Top panel** - With the removal of 8 screws, lid removes to allow installation of expansion cards
2. **Card slot panels** - Removable panels, houses up to 8 expansion cards
3. **CC-16 connector** - Allows Bose® CC-16 zone controller connections
4. **GPIO slot 1** - Pre-loaded GPIO card which provides eight general-purpose control inputs, eight general-purpose control outputs
5. **GPIO slot 2** - For optional 2nd GPIO card
6. **Chassis serial number** - Location for unit serial number
7. **POWER switch** - AC power switch
8. **AC Mains receptacle** - Power cord connection (IEC 60320-C14 Inlet)
9. **RS-232** - 5-wire, RS-232 (DTE) serial data interface connection
10. **ETHERNET connector** - RJ-45 jack for network connectivity

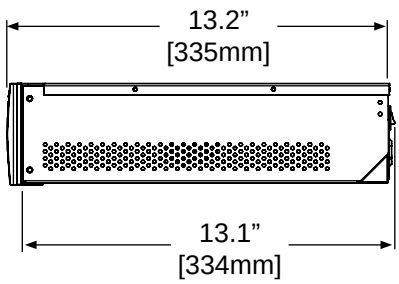
Mechanical Diagrams



Back View



Front View



Right View

Software Information

Bose® ControlSpace® Designer™ software is used for the design, configuration, real-time operation and monitoring of a system containing selected Bose system electronics and control centers. Using a standard drag-and-drop user interface, ControlSpace Designer software offers the flexibility to quickly and accurately configure signal processing functions within processors, and to develop complex control programming for system operation.

When actively connected to the system ControlSpace Designer software can be used to either control and operate the system in real time for system set-up and optimization, or may be used as a system monitor. When configured for monitor mode device parameters are protected and the system operator only has access to virtual control panels and amplifier monitor functions.

Parameter sets provide the ability to program and recall system settings ranging from an individual signal processing parameter to a complete system setup; while Group controls provide master volume control of multiple gains, or control of multiple instances of the same signal processing function type. Both Parameter set and Group programming functions are easily mapped to the physical controls of a Bose control center, or may be invoked remotely using a standard serial protocol or general purpose inputs.

Smart Simulation programming enables designers to test and modify system control programming while off-line, eliminating the need to connect to the actual system to configure and test system control programming. Virtual control centers are included to test system operation, and all parameter set, group and general purpose input and outputs may be tested using the Smart Simulation.

Integrated Dante routing, configuration and monitoring streamline setup and control of optional Dante networked audio components.

Minimum System Requirements

The following are the minimum system requirements for ControlSpace® Designer™ 4.0

Processor:
1GHz processor (or better)

RAM:
512MB of RAM available (1GB recommended)

Disc Space:
512MB of disk space available (1GB recommended)

Ports Required:
1 USB, 1 network port (Wired LAN, Ethernet, 100 Mb minimum, or wireless LAN 802.11g/n)

Expansion Cards

ControlSpace® ESP-00 4-channel mic/line input card II
Provides four high-quality analog input channels, accommodating a wide range of signals from both line-level devices and microphones using software-selectable gain control up to 64 dB and switchable +48 VDC* phantom power.
Product Code: 638298-0010

ControlSpace® ESP-00 4-channel line output card II
Provides four high-quality analog line-level output channels. The card inserts into one of eight expansion card slots on the ESP-00 II processor.
Product Code: 638299-0010

ControlSpace® ESP-00 ESPLink 8-channel output card
Provides eight channels of digital audio over a single optical cable for sending audio to one or more ESPLink-equipped PowerMatch® amplifiers.
Product Code: 350513-0010

ControlSpace® ESP-00 Dante™ network card
Provides up to 32 channels (16 input and 16 output) of low-latency digital audio using the Dante audio networking solution from Audinate®.
Product Code: 359843-0020

ControlSpace® ESP-00 CobraNet® I/O expansion card
Provides up to 32 channels (16 input and 16 output) of digital audio using CobraNet audio networking technology.
Product Code: 311506

ControlSpace® ESP-00 AES3 eight-channel input card
Provides eight channels of AES3 digital audio input.
Product Code: 041765

ControlSpace® ESP-00 AES3 eight-channel output card
Provides eight channels of AES3 digital audio output.
Product Code: 041766

Architects' and Engineers' Specifications

The engineered sound processor shall be an open-architecture card-frame based audio signal processor with eight open card slots for audio expansion and one open card slot to double control general-purpose input and output connections.

The digital signal processing shall be performed by four Texas Instruments® brand TMS320C6713 DSP chips running at 200 MHz, supporting floating-point calculations at 6.4 GIPS / 4.8 GFLOPS, and utilizing a total of 64MB of RAM (288 seconds of buffer) for delay operations. All processing shall be done at 32-bit resolution, and audio sampling shall be at 48 kHz/24-bit. System latency, from input to output, shall not exceed 860 microseconds.

The front panel shall include LED indication for POWER, STATUS, ETHERNET, and SERIAL. Optional audio cards shall provide LED signal level indication on a per channel basis.

The engineered sound processor shall support eight user-installable audio cards with the total capacity of up to 64 audio channels. Compatible audio card options shall include analog microphone/line level input, analog line level output, AES3 input, AES3 output, Dolby® and DTS® surround sound decoding, a proprietary Bose ESPLink output card for use with PowerMatch® amplifiers, and 32-channel audio networking card options: CobraNet® or Dante™.

Design, configuration and real-time control/monitoring shall be provided through a rear RJ-45 network connector using standard 10 Mbit/s (or faster) Ethernet connections and Bose® ControlSpace® Designer™ software. The PC-based ControlSpace Designer software shall enable the following minimum set of processing modules: Bose® Professional loudspeaker EQs, crossovers, graphic and parametric EQs, routers, delays, matrix mixers, automatic microphone mixer, signal generators, meters, compressor/limiters, duckers, automatic gain controls, gate, room combiner and source selectors. The software shall allow full IP addressability of the processor with password protection of system files.

The engineered sound processor shall include external control capability through serial (RS-232 or Ethernet port), Bose CC-16

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device control, and eight general-purpose control outputs and eight general-purpose inputs that can be expanded for a total of 16 general-purpose control outputs and 16 general-purpose inputs. The engineered sound processor shall be compatible for use with Bose CC-64, CC-16, and CC-4, Volume, and Volume A/B user control interfaces.

All signal-processing modules, parameter sets and groups shall be directly controllable by Bose user interfaces, generic switches and 10k potentiometers, and third-party control systems (using a published serial protocol). It shall also be possible to flag signal processing modules in the design file for which asynchronous serial communication feedback can be requested by external control system devices. The processor shall provide a real-time clock (RTC) by which automated events can be scheduled using the configuration software.

The processor shall be constructed of painted steel with a black durable chassis finish and brushed aluminum front panel. The processor shall allow for 19-inch (483 mm) EIA-310 standard rack mounting using the pre-installed rack ears. The processor dimensions shall be 3.5 inches in height (88 mm, 2RU) and 13.0 inches (331 mm) in depth. The processor shall weigh 10.8 pounds (4.9 kg).

The processor shall have a universal auto switching power supply capable of accepting input voltages from 85 VAC to 264 VAC, 50 Hz to 60 Hz, and be able to operate in ambient temperatures up to 95ºF (35ºC). Power consumption shall be less than 75 W. Certifications shall include cUL, C-Tick, PSE and IEC/EN 60065, and have a CB report including all country deviations. The processor shall meet FCC Class A, Canadian ICES-003 Class A and EN55103-1 and EN55103-2 EMC requirements.

The engineered sound processor shall be the Bose ControlSpace® ESP-00 Series II engineered sound processor.

Safety and Regulatory Compliance

The ControlSpace ESP-00 Series II engineered sound processor meets cUL (UL 60065 7th edition), C-Tick, PSE and IEC/EN 60065 7th edition, and has a CB report including all country deviations. It meets FCC Class A, Canadian ICES-003 Class A and EN55103-1 and EN55103-2 EMC requirements.

Accessories

ControlSpace CC-64 control center	041760
ControlSpace CC-16 zone controller	041761
ControlSpace CC-4 room controller	042023
ControlSpace CC-PS1 universal power supply	371407-0010
Volume control with A/B switch user interface	041967
Volume control user interface	041966

Product Codes
ESP-00 II

ControlSpace ESP-00 II 120V – US	370610-1120
ControlSpace ESP-00 II 230V – EU	370610-2120
ControlSpace ESP-00 II 100V – JPN	370610-3120
ControlSpace ESP-00 II 230V – UK/Sing	370610-4120
ControlSpace ESP-00 II 240V – AU	370610-5120

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