biamp.

Vocia®

VO-4e
OPERATION MANUAL

May 2019
585.0358.90C

BIAMP SYSTEMS 9300 SW GEMINI DRIVE, BEAVERTON, OREGON 97008 U.S.A. 503.641.7287 BIAMP.COM

VO-4e Product Description

The VO-4e is an enhanced networked audio output expansion device allowing the user to add four line-level and CobraNet output channels to a Vocia system. The VO-4e can be configured for channel-to-channel or device-to-device failover and uses comprehensive fixed-chain digital signal processing within the device, including volume control, ducking, equalization, compressor/limiter, speaker crossover, delay, and output gain. Emergency messages for life safety systems are stored in non-volatile memory. Two RJ45 connectors on the rear panel of the device provide redundant connectivity to process control data, audio and power over a single Ethernet cable. In addition to this the VO-4e also has dual inputs for accepting power from an auxiliary supply. The per-channel paging relay provides a contact closure when paging is active on an associated channel.

Setup and Use

The Vocia software provides an intuitive interface for configuration, DSP equalization, and programming of the VO-4e. The information supplied by this manual relates to physical connections and assignment. For more details on software setup, please consult the Vocia Help File.

Installation

The unit requires one 1.75 inch (44.45 mm) high and 19 inch wide rack space with 17 inch (432 mm) depth. Mounting the unit using four screws with washers will prevent marring of the front panel. PVC or nylon washers are appropriate.

System Indicators

The LED indicators on the front panel provide information and operational status of the unit and associated output channels. LEDs have been grouped into Chassis and Channel indicators.

Chassis Indicators

These indicators relate to the entire unit (chassis).

PoE

PoE is a green LED indicator that will illuminate when PoE power is applied to the unit via either or both CobraNet ports.

Aux

Aux is a green LED indicator that will illuminate when an auxiliary DC supply is applied to the unit via either or both 24V Auxiliary power inputs.

Chassis Fault

Chassis Fault is a amber LED indicator that illuminates when a Chassis Fault has occurred. There are two types of Chassis Faults that can be reported depending on the severity of the problem. Flashing amber indicates a Warning that means some aspect of the unit is not performing within normal specification. Audio may still be passing but if the condition causing the warning is not corrected chassis failure may occur. Solid amber indicates a fault which means that some aspect of the unit has failed and audio may no longer be passing through the device. Use Vocia software to determine the specific type of chassis warning or Fault that has occurred.

Activity

Activity is a two-color LED that indicates the configuration status of the device. A solid green LED indicates that the unit is configured. A flashing yellow LED indicates the unit is active but unconfigured. A solid yellow LED indicates the unit is configured and in standby. Standby only occurs when a unit has been designated as a redundant device when Device Failover is enabled.

Status

Status is a tri-color LED that indicates the health of the hardware. A green LED indicates that the unit powered up normally. A flashing amber LED is shown briefly during the power-up self-test and will turn solid green upon successful start. A red LED indicates that the unit experienced a problem during the power-up self-test.

Channel Indicators

These indicators relate to each of the four channels.

Amp Fault is a amber LED that illuminates when the corresponding Amp Fault Input on the rear of the unit has been asserted.

Activity is a two-color LED that illuminates green when that channel is configured and actively passing audio and yellow when that channel is configured and in standby. Standby only occurs when a channel has been designated as redundant channel in a failover configuration.

Signal is a tri-color LED that illuminates in the following manner when audio signal is present. Detailed metering of current output levels can be obtained in real time via the Vocia software interface.

Red	Amber	Green	Dark
Signal above clip threshold > -2dBFS	Signal above nominal but below clip threshold > -18dBFS < -3dBFS	Signal above minimum but below nominal threshold > -48dBFS < -19dBFS	Signal below minimum threshold < -48dBFS

Power

The VO-4e accepts an external dual 24V DC power source, Power over Ethernet (PoE), or both methods for redundancy. Both power sources may be connected concurrently, however each must be capable of supporting the full 15 watt load of the unit. Loss or return of either power source will not result in an interruption to normal operation as long as one of these power sources remains functional. Monitoring of power sources is selectable via the Vocia Software.

The power connector is a four-way 5.08mm standard header with mating pluggable screw terminal block with cable restraint. When power is present at either or both 24V power inputs or the Auxiliary Power input the corresponding front panel green power LED will illuminate.

CAUTION
Due to potential energy hazard, connections to the Auxiliary Power DC inputs must be made by a qualified electrician or other qualified person as required to conform with all local codes.

Pin	Function
1	DC Power 1 24V(+)
2	DC Power 1 24V(-)
3	DC Power 2 24V(+)
4	DC Power 2 24V(-)

Device ID

The rotary ID switches give the unit a unique Device ID. The switches are in hexadecimal format. All units of the same device type must have a unique Device ID to function properly within a Vocia Paging World. The Factory Default Device ID is 01. A Device ID of 00 is invalid and cannot be used.

To assign a Device ID of hex 07, leave the MSB switch on 0 and turn the LSB switch to 7. Device ID switches should be set using a 0.1 inch (2.5mm) to 0.12 inch (3.0mm) flat blade screwdriver.

NOTE
Changes made to the Device ID while connected to the network require a power cycle of the device in order to take effect.

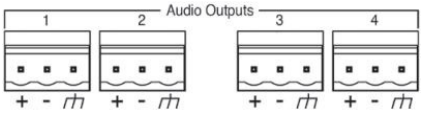
Network Connections

All CobraNet routing and bundle assignments are processed by the Vocia devices locally. Vocia makes dynamic use of available bundles in CobraNet. A 100Base-T Ethernet switch (not repeater hub) is required when networking multiple units. CobraNet utilizes standard CAT5, CAT5e, CAT6, or CAT7 cabling, which has a specified maximum length of 328 feet (100 meters). Additional Ethernet switches, or switches which provide fiber-optic interface, can be used to extend the physical distance between units within a network. Please note that CobraNet limits network extensions to seven hops (one-way transmissions) within a network. The CobraNet network connection is configured with the primary connector on the left and the secondary (redundant) connector on the right. The primary and secondary CobraNet ports are provided to facilitate connection redundancy. Each connector provides two LEDs that indicate Ethernet link and network activity.

Left LED	Right LED	Description
None	None	No Data Connectivity or CobraNet activity
None	Green	Link established

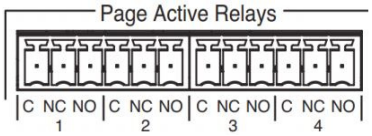
Flashing yellow	Green	Link established and CobraNet activity detected; The unit is acting as a CobraNet Performer
Flashing yellow	Flashing green	Link established and CobraNet activity detected; The unit is acting as a CobraNet Conductor
Flashing yellow	None	CobraNet fault. Check cabling and configuration for errors

Analog Audio Outputs



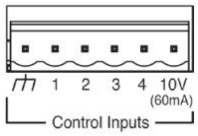
Four 0.2” (5.08mm) three way pluggable barrier strip connectors are provided for analogue audio signal output. The Vocia software enables a nominal output level of -10dBu, 0dBu or +4dBu to support a wide range of connection devices.

Page Active Relays



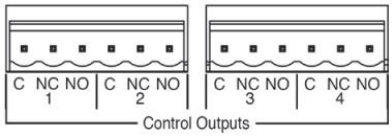
Page Active Relays (PAR) are provided in the form of one Form C (single pole, changeover) relay presented per output channel. Each PAR connector is a six way 3.5mm pluggable barrier strip connector. The Page Active relay connections are labeled as follows: • C – Relay Common • NC – Normally Closed • NO – Normally Open

Control Inputs



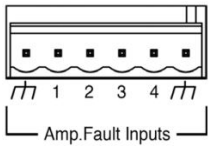
Four separate Control Inputs are provided via a six-way 0.2” (5.08mm) pluggable screw terminal block. Each Control Input allows for an external voltage-free contact closure to ground to assert a Control Input Event as configured in Vocia software. In addition to the four control inputs, a ground and 10V reference Out (100mA) is provided. When configured for device failover the Control Input connections must be paralleled between the main and failover device.

Control Outputs



Four Control Outputs are provided via two six-way 0.2” (5.08mm) pluggable screw terminal blocks. Each Output has a Common, Normally Closed (NC) and a Normally Open (NO) connection. Outputs will be capable of being associated with control Output Events configured in Vocia software. Both NC and NO connections are able to be used at the same time. When configured in a Failover Mode the Controls outputs are able to be used to indicate the active state of the respective output channel. When configured for device failover as NO and NC relay connections are being used, consideration should be given to the performance of the circuit before and after failover.

Amp Fault Inputs



Four amplifier Fault Inputs are provided via a six-way 0.2” (5.08mm) pluggable screw terminal block. These allow for fault monitoring of the output of the VO-4e as indicated from an external amplifier. By default each input allows an external voltage-free contact closure to ground to indicate a fault condition for the corresponding VO-4e Output channel. Inputs are pulled high internally to create a default non-asserted condition. When configured for device failover the Amp Fault Input connections must be paralleled between the main and failover device. This is software configurable so if inverse operation is required this can be adjusted per input.

Output Fault Detection (VO-4e output channel used in conjunction with a Vocia End of Line Device 1 [ELD-1])

The VO-4e monitors audio output circuit integrity per channel by monitoring multiple out-of-band (inaudible), high frequency tones in conjunction with ELD-1 devices that have been assigned to the relevant channel using the Vocia software. To prevent the possibility of interference with these monitored tones:

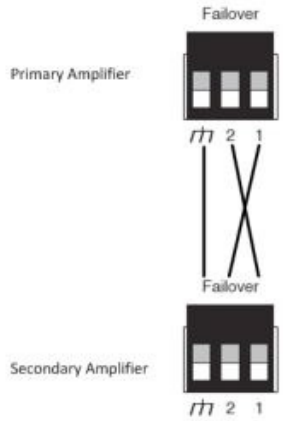
- Recorded audio messages or audio content with continuous or swept tonal components (e.g., alert tones) should be band limited at 15 kHz during recording;
- Program signal levels should be adjusted to minimize clipping, as severely clipped signals may also affect these out-of-band fault detection tones.
- The use of shielded speaker cable is not supported;
- Highly capacitive speaker lines or loads may prevent correct operation of the ELD detection system;
- Legacy monitored speaker circuits that use capacitors and resistors or similar methods must have all legacy monitoring circuitry removed for correct operation of the ELD detection system;
- If legacy speaker systems and speaker wiring are to be re-used, these must conform with the requirements herein;
- Any external power amplifier equipment must be capable of relaying the out-of-band fault detection tones to the ELD-1. For reliable performance a frequency response of better than -3dB at 24kHz must be supported through the amplifier and all speaker wiring up to the End of Speaker Line connections on the ELD-1s;
- The amplifier gain or level control must be set so that nominal output level from the VO-4e (-10dBu, 0dBu or +4dBu; as set in Vocia software) delivers an output level from the amplifier 6dB below the amplifier maximum output level (clip level). This setting must be accurate and must remain constant for predictable operation of ELD-1 units.

Failover Modes

Device-to-Device or Channel-to-Channel failover modes are supported. Only one type of failover mode can be implemented per device.

Device-to-Device Failover

VO-4e units provide for Device-to-Device failover when a fault is detected. A Failover Link Cable must be connected between the primary and the redundant units as shown. Connect ground to ground, and Pin 1 of the primary device to Pin 2 of the redundant device; connect Pin 2 of the primary device to Pin 1 of the redundant device.



Failover is triggered by any of the following conditions:

- Chassis Fault
- Channel Fault
- Loss of power
- Loss of CobraNet link
- Loss of Failover Link Cable
- ELD-1 / speaker line Fault (if enabled in software)
- External amplifier Faults being asserted

Only Chassis and Channel Faults trigger the Device failover mechanism. Abnormal conditions that do not immediately impair audio will appear as warnings but will not trigger failover. After a failover condition has been asserted, a power cycle of the units is required to recover from the failover. This can be done either by physically repowering the devices or by performing a 'Device Reset' in the Vocia software via the Test tab of the device dialog. The units are required to be reset within 10 seconds of each other in order to ensure the primary device resumes control.

Channel-to-Channel Failover

Channel-to-Channel failover is supported as 1:1 Channel. In this configuration, channel pairs can be specified and adjacent channels will act as a redundant backup. Channel 2 will act as backup for Channel 1 and Channel 4 will act as backup for Channel 3. Channel failover is triggered by either a Channel Failure Fault, an ELD-1/Speaker Line Fault (if enabled in software) or an amplifier Fault Input being asserted. The VO-4e will return to normal operation after the Fault condition is cleared and the unit is re-powered or reset via the Test tab in the Properties sheet.