



DCA4

Digitally controlled Audio Matrix



Product Specification March 2002



Current
Thinking



Introduction

Voice Alarm (VA) systems are the quickest way to evacuate the public & staff from a building.

Following fire detection, automated messages control the flow of people in stairwells and corridors allowing an orderly evacuation without panic. These messages are supplemented by spoken messages from the fire service or management suite confirming the validity and need to leave the building.

This positive confirmation speeds evacuation and avoids the "false alarm" mentality reducing the risk of death from fire.

Suitability

Voice Alarm systems are recommended for all public buildings and multi story buildings over four floors by BS5588.

In public buildings it's not possible to fire drill the public, as they visit the premises infrequently, so systems such as Voice alarms save valuable time in evacuating the building.

The use of phased messages in multi-story buildings prevents overcrowding in stairwells and at exits, preventing secondary injuries. In phased evacuation, the floor in fire receives the evacuate message, and the floor above & below receive an alert message, preparing them for evacuation.

In more complex scenarios the use of multiple alert and evacuate messages can be beneficial, messages telling the evacuees they are going the right way, and messages asking people to make way for people leaving evacuated areas. These additional messages can dramatically speed up the evacuation especially in malls and large airport environments.



Overview

For small and medium sized installations this self-contained voice alarm controller provides an ideal solution.

The basic controller has 4 monitored zone outputs, and the following inputs: 2 all call fire microphone ports, a data control port for networking & configuration, 2 four zone high priority microphone ports, 2 digital message slots (allowing four messages to be held in hardware), a six input fire alarm interface with common de-latch input (24V voltage inputs for connection to sounder circuits), 2 low priority zoned microphone ports, and three stereo music inputs.

The front panel LCD allow selection of volumes, music sources and basic configuration as well as providing access to the 99-event fault log. In the event of processor failure the 2 fireman's inputs can access the whole system in line with EN60849.

Standards Compliance

The @udio Logistics DCA4 complies with all the current Voice Alarm standards including BS5839 parts 1,4 & 8 and EN60849.

We are also monitoring the meetings of the EN54-16 committee to ensure we will comply when this is released.

Additionally the DCA4 complies with the EMC requirements of EN55103-1 and EN55103-2.



System Inputs

The DCA4 has a variety of inputs; these are fixed in priority and will be described in priority order.

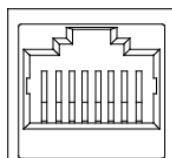
Fire Microphones

Two fire microphone ports are provided, arbitrated on a first come first serve basis. The microphones are connected to the DCA4 via a standard RJ45 type 8 pin connector, which provides all power and control information to the microphone; all lines to the Fire microphones are monitored.

Connections

Din Rail Breakout (DRB's) boards are available to convert internal rack CAT5 type cables to 2.5mm² screw connectors for attaching to fireproof cables.

The recommended cabling for the field microphones is 2 number 1.5mm² four core FP200 type soft skin cable for runs up-to 1KM, alternatively 2 number 4 core 1.5mm² MICC type cable can also be used, up-to a maximum distance of 200M



Fire Microphone Connection Details

1	+24V nominal (18V to 32V)
2	Microphone Ground
3	PTT
4	Message trigger 1
5	Message trigger 2
6	Message trigger reset
7	Audio +Phase
8	Audio -Phase

Signal Descriptions

Power for the field microphone is provided by pins 1 & 2, which are protected by a PTC type self resetting fuse rated at 100mA.



Pins 3 through 6 normally rest at 2V, and are pulled to 5V by the field microphone to operate.

Audio comes from the field microphone and is returned to the DCA4 via pins 7 & 8, this audio pair also indicates the operational status of the microphone by applying an 8V phantom voltage to the lines to indicate integrity of the microphone capsule and all field wiring.

Operation

The fire microphone has two functions, paging and message triggering.

1. **Paging.** Pressing the PTT button on the fire microphone raises the voltage on the PTT line to 5V, signalling to the control logic within the DCA4 that a microphone is required. The fire microphone input is on an ALL CALL basis and will override all four-system outputs. The routing and control of the paging audio from the fire microphone does not pass through any microprocessor, instead it is processed through state machine logic in line with EN60849 and is available in the event of any microprocessor failure.
2. **Messages.** Pressing one of the two message buttons on the fire microphone will raise the voltage on pins 4 or 5 to 5V signalling that a message is required, the default message triggers on the DCA4 are TEST and EVACUATE. Once triggered these messages repeat until the message RESET key is pressed. This informs the CPU in the DCA4 to stop the message at the end of the current cycle.



High Priority Microphones

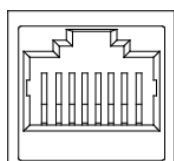
Two high priority microphone ports are provided, arbitrated on a first come first serve basis. The microphones are connected to the DCA4 via a standard RJ45 type 8 pin connector, which provides all power and control information to the microphone; all lines to the high priority microphones are monitored.

Connections

Din Rail Breakout (DRB's) boards are available to convert internal rack CAT5 type cables to 2.5mm² screw connectors for attaching to fireproof cables.

If the microphones are required for secure (life safety) operation the recommended cabling for the field microphones is 2 number 1.5mm² four core FP200 type soft skin cable for runs up-to 1KM, alternatively 2 number 4 core 1.5mm² MICC type cable can also be used, up-to a maximum distance of 200M

If the microphone is used for general paging (non life safety) operation, CAT5 FTP cable can be used up-to a maximum distance of 1KM.



High Priority Microphone Connection Details

1	+24V nominal (18V to 32V)
2	Microphone Ground
3	PTT 1
4	PTT 2
5	PTT 3
6	PTT 4
7	Audio +Phase
8	Audio -Phase

Signal Descriptions

Power for the field microphone is provided by pins 1 & 2, which are protected by a PTC type self resetting fuse rated at 100mA. Pins 3 through 6 normally rest at 2V, and are pulled to 5V by the field microphone to operate.



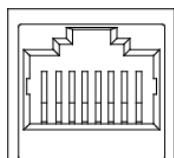
Audio comes from the field microphone and is returned to the DCA4 via pins 7 & 8, this audio pair also indicates the operational status of the microphone by applying an 8V phantom voltage to the lines to indicate integrity of the microphone capsule and all field wiring.

Operation

By raising the PTT line of the relevant zone (s) (PTT 1 to 4) to 5V the microphone signals that paging to those zones is required. If neither of the fire microphones is in use the High Priority microphone will address the selected zone(s) overriding any lower priority inputs using those zones.

DATA Page Port

The data page port is designed to connect the DCA4 to intelligent paging panels or for networking multiple DCA4's together to form a larger distributed system. Connection is via a standard RJ45 type 8 pin connector, which provides all power and control information to the microphone or network device; all lines on the data port are monitored.



Data Page Connection Details

1	+24V nominal (18V to 32V)
2	Ground
3	RS422 TX+
4	RS422 RX+
5	RS422 RX-
6	RS422 TX-
7	Audio +Phase
8	Audio -Phase

Signal Descriptions

Pins 1 & 2, which are protected by a PTC type self-resetting fuse rated at 100mA, provide power for the microphones or network devices. Pins 3 through 6 form an asynchronous RS422 serial port.



Fire Alarm Interface

The fire alarm interface provides automated delivery of pre-recorded messages stored within the DCA4. The DCA4 has two independent message generators, each of which has a high priority message and a low priority message; therefore allowing ALERT and EVACUATE messages to be broadcast simultaneously.

Messages

Following fire detection, the automated messages are required to give clear intelligible instructions. It is imperative that these message stores are of the highest quality and fully monitored.

The @udio Logistics DCA4 uses the latest 16Mb Flash memories to store uncompressed 16 bit audio up to 65 seconds and up to CD quality within the matrix controllers. Messages are edited with standard PC based programmes such as Soundforge or Cooledit and uploaded to the message stores using our Windows application through the serial port of a PC.

When the messages are not playing the on board processor continually checks the messages for integrity, and reports any deviation from the originally stored message as a fault.

All our standard messages are studio recordings, these include; Alert, Evacuate, Test, Bomb, Coded Alert and Stand Down, however any custom message can be downloaded to the message store. Please contact us for details.

Standard Messages

The DCA4 comes with the following messages loaded as standard:

@udio Safe module N°	High priority message	Low Priority message
1	EVACUATE	TEST
2	ALERT	STAND DOWN

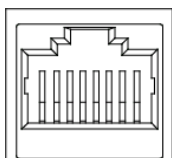


Connections

The Fire interface consists of 2 RJ45 type connectors which allows up to six external triggers to deliver messages.

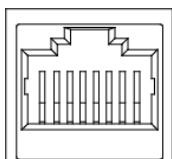
Din Rail Breakout (DRB's) boards are available to convert internal rack CAT5 type cables to 2.5mm² screw connectors for attaching to fireproof cables.

The recommended cabling for the Fire Alarm connection is 4 number 1.5mm² four core FP200 type soft skin cable for runs up-to 500M, alternatively 4 number 4 core 1.5mm² MICC type cable can also be used, up-to a maximum distance of 200M



Fire Interface 1 Connection Details

1	Message trigger 1 +
2	Message trigger 1 -
3	Message trigger 2 +
4	Message trigger 2 -
5	Message trigger 3 +
6	Message trigger 3 -
7	Message trigger 4 +
8	Message trigger 4 -



Fire Interface 2 Connection Details

1	+24V nominal (18V to 32V)
2	Microphone Ground
3	Message trigger 5 +
4	Message trigger 5 -
5	Message trigger 6 +
6	Message trigger 6 -
7	Message RESET +
8	Message RESET -



Signal Descriptions

All Message Trigger pairs are individually opto-isolated and designed for connection to reverse voltage monitored sounder circuits. Power is provided on pins 1 & 2 of interface connector 2 to allow messages to be triggered from closing contacts.

Operation

When 24V is applied to a Message Trigger pair the microprocessor in the DCA4 scans the cause and effects table and plays the messages defined into the relevant zones. The message triggers are latched and the messages continue to play until the message triggers are removed and the message reset pins have 24V applied. If the fire panel cannot provide a reset signal the inputs can be made momentary by permanently applying 24V to the MESSAGE RESET pins, in this case the message will play continuously while the message trigger voltage is present.

A typical cause & effects table for phased evacuation is thus:

Message Trigger	Zone 1	Zone 2	Zone 3	Zone 4
1	EVAC	ALERT		
2	ALERT	EVAC	ALERT	
3		ALERT	EVAC	ALERT
4			ALERT	EVAC
5	TEST	TEST	TEST	TEST
6	STAND DOWN	STAND DOWN	STAND DOWN	STAND DOWN

A typical cause & effects table for All Alert type evacuation is thus:

Message Trigger	Zone 1	Zone 2	Zone 3	Zone 4
1	EVAC	ALERT	ALERT	ALERT
2	ALERT	EVAC	ALERT	ALERT
3	ALERT	ALERT	EVAC	ALERT
4	ALERT	ALERT	ALERT	EVAC
5	TEST	TEST	TEST	TEST
6	STAND DOWN	STAND DOWN	STAND DOWN	STAND DOWN



Low Priority Microphones

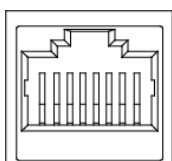
Two Low priority microphone ports are provided, arbitrated on a first come first serve basis. The microphones are connected to the DCA4 via a standard RJ45 type 8 pin connector, which provides all power and control information to the microphone; all lines to the low priority microphones are monitored.

Connections

Din Rail Breakout (DRB's) boards are available to convert internal rack CAT5 type cables to 2.5mm² screw connectors for attaching to fireproof cables.

If the microphones are required for secure (life safety) operation the recommended cabling for the field microphones is 2 number 1.5mm² four core FP200 type soft skin cable for runs up-to 1KM, alternatively 2 number 4 core 1.5mm² MICC type cable can also be used, up-to a maximum distance of 200M

If the microphone is used for general paging (non life safety) operation, CAT5 FTP cable can be used up-to a maximum distance of 1KM.



Low Priority Microphone Connection Details

1	+24V nominal (18V to 32V)
2	Microphone Ground
3	PTT 1
4	PTT 2
5	PTT 3
6	PTT 4
7	Audio +Phase
8	Audio -Phase

Signal Descriptions

Pins 1 & 2, which are protected by a PTC type self-resetting fuse rated at 100mA, provide power for the microphones. Pins 3 through 6 normally rest at 2V, and are pulled to 5V by the field microphone to operate.



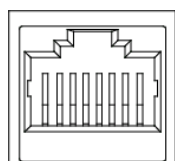
Audio comes from the field microphone and is returned to the DCA4 via pins 7 & 8, this audio pair also indicates the operational status of the microphone by applying an 8V phantom voltage to the lines to indicate integrity of the microphone capsule and all field wiring.

Operation

By raising the PTT line of the relevant zone (s) (PTT 1 to 4) to 5V the microphone signals that paging to those zones is required. If neither of the fire microphones is in use the High Priority microphone will address the selected zone(s) overriding any lower priority inputs using those zones.

Music Inputs

Three music inputs are provided, each of which is a stereo RCA type jack pair. The stereo inputs are combined to form mono sources which pass to a multiplexer which selects one of these audio sources to be available to the zones. The chosen audio source can then be routed to the zones from the front panel or using the remote music volume port.



Music Volume Port

1	+24V nominal (18V to 32V)
2	Microphone Ground
3	Volume / Select 1
4	Volume / Select 2
5	Volume / Select 3
6	Volume / Select 4
7	NA
8	NA

Signal Descriptions

Pins 1 & 2, which are protected by a PTC type self-resetting fuse rated at 100mA, provide power for external devices. Pins 3 through 6 are internally pulled to 5V, if this pin is open circuit then music is NOT selected in the relevant zone, if shorted to ground music is selected at full level (set on the LCD) if remote volume is required then placing a variable resistor



between 0K and 10K will select the audio at a volume proportional to the position of the variable resistor with 0K being the loudest volume.

Power Supply

The DCA4 has 2 independent power supplies, fed through Klippon type 5mm connectors. The DCA4 expects between 18V and 32V from these connections and indicates their presence on front panel LEDs.

Host Port

The host port allows the DCA4 to be configured by a remote computer, using a standard AT type RS232 serial link.



Zone Outputs

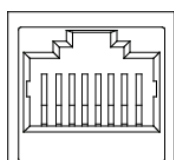
Four independently addressable zone outputs are provided by the DCA4. The zone outputs are connected to amplifiers or cascaded DCA4's via a standard RJ45 type 8 pin connectors, which provides audio and control information to the amplifiers or cascaded mixers; all lines to the amplifiers are monitored.

Connections

Normally the DCA4 will be connected to the amplifiers or other routing equipment within a rack cabinet, and standard CAT5 patch leads can be used, however the audio feeds can be used to distribute amplifiers around the site and reduce heavy gauge speaker feeds for long cable runs, in this case the following cables can be used.

Din Rail Breakout (DRB's) boards are available to convert internal rack CAT5 type cables to 2.5mm² screw connectors for attaching to fireproof cables.

The recommended cabling for the field Amplifiers is 1 number 1.5mm² four core FP200 type soft skin cable for runs up-to 1KM, alternatively 1 number 4 core 1.5mm² MICC type cable can also be used, up-to a maximum distance of 200M



Zone Output Connection Details

1	
2	GND
3	PTT 1
4	NC
5	NC
6	NC
7	Audio +Phase
8	Audio -Phase



Signal Descriptions

Pins 2 & 3, provide a two way handshake between the DCA4 and the amplifier or additional control equipment, the DCA4 monitors the voltage on the line, and normally expects to see 2V if the amplifier is healthy.

Audio comes from the DCA4 via pins 7 & 8, this audio pair also indicates the operational status of the DCA4 by applying an 8V phantom voltage to the lines to indicate integrity of field wiring.

Operation

The DCA4 raises the line voltage to 5V to indicate the DCA4 wishes to use the audio output for priority paging. This sense voltage can be used to trigger external devices such as volume over ride relays or activating page only areas.

If the DCA4 fails to see the 2V on the PTT line, and the output monitor option is set, the DCA4 signals a fault and places an entry into the front panel fault log.