MACKENZIE

Digital Audio/Display System (DADS)

Product Overview

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1. Description:

Mackenzie's Digital Audio/Display System (DADS) is a multi function, scaleable platform for playback and repetition of audible and visual information. Originally designed for compliance with the Americans with Disabilities Act, DADS is the solution for medium to large scale public address, text display, paging (both pre-recorded and live) and intercom applications. DADS is scaleable by design. The base system offers several features which may be selectively populated to best address a particular application. The following sections discuss the base functionality as well as various options.

2. Audio Output:

The standard DADS supports 1 or 2 channels of audio playback. Typically these channels are used for public address, passenger information and advertising purposes. The dual channel configuration allows the system to address multiple zones with different messages, simultaneously. This feature is beneficial in applications such as in-vehicle where a message plays inside the vehicle while a different message plays externally.

DADS utilizes standard MPEG compression for audio storage to conserve memory space with minimal effect on quality. The ISO MPEG standard offers unsurpassed signal quality and scalability. MPEG data rates range from 32kbps to 128kbps.

3. Amplification:

DADS supports a 1 or 2 channel amplifier section for driving speakers directly. Power capacities up to 100 watts can be supported. Configuration of this section will depend on the application. In cases where the DADS is driving a large network of speakers, 70 volt distribution can be supported. Incorporation of the amplifier into the DADS systems saves the expense of an external amplifier, consolidates power supplies and minimizes space/wiring requirements.

Amplifier Options:

- Microphone station for live public address/intercom integration.
- Automatic Level Control (ALC) circuitry and microphones for adjusting levels based on ambient noise levels.

4. Page Stacking (optional):

Page stacking is a unique feature to the DADS system resulting from Mackenzie's commercial success in this area. The page stacking feature is applicable to installations with a high traffic paging/public address system. This feature simultaneously records, stores, plays then repeats messages coming into the paging system. The process eliminates feedback and increases intelligibility through queuing and repetition. There is no longer annoying feedback, waiting on a busy paging system or message overlap.

5. Memory:

The DADS system supports removable flash memory for audio, text and program storage. This medium allows for upgrade ease. Program changes are as simple as changing the card and more complex or longer programs may be accommodated by obtaining increased capacity cards. Flash memory is non-volatile and data will remain intact during a system power outage.

Data is stored on the card in a DOS format. This allows portions of the audio memory to modified or added without having to re-write the entire memory. This feature also makes it feasible to update program data through serial communications. An optional USB interface allows the user to download new data to the card through use of a specially formatted USB memory key. One, or any number of the messages on the system can be updated in this fashion.

- USB Memory Key Interface

6. Text:

The DADS is able to associate text messages with the pre-recorded audio announcements. This allows the system to provide simultaneous audible and visual messaging. Text output is routed to standard LED or LCD displays using the necessary serial protocol specified by the sign manufacturer. Hardware protocols supported include RS-232, RS-422, RS-485 and J1708. Mackenzie has integrated to many different manufacturers and types of signs. Mackenzie can create a driver for any sign currently not in the Mackenzie library.

7. Communications:

The scalable architecture of DADS allows support of many different protocols for interfacing to peripheral components in the vehicle. These include RS-232, RS-422, RS-485, CANBus and J1708/ J1587. A typical application may require multiple protocols be supported simultaneously. The DADS system can incorporate as many as eight different and simultaneous communication ports.

8. Discrete Inputs and Outputs:

Every application is different. To provide the greatest amount of flexibility, the DADS system can be fitted with various types of output driver components, and signal inputs.

Relay Output – Relays provide system status to external equipment through dry contact closures. Typically Mackenzie provides Form C contacts for installation flexibility. Relays also provide optimal isolation between the DADS system and external equipment.

The DADS system can include as many relay outputs necessary for a particular application.

Contact Input - Where activation signals are provided by an external third party component, the DADS system incorporates optically-coupled inputs. Through use of an internal, isolated power supply these inputs provide galvanic isolation between the DADS system and the external equipment.

The DADS system can include as many contact inputs necessary for a particular application.

9. Power:

DADS is designed for a wide range of power formats and conditions. Both AC and DC sources are supported. Many installations have less than desirable power conditions, therefore, great care has been taken to offer a wide range of supply voltages and a variety of other measures to insure proper operation and protection.

Typical power ranges are showed below:

Nominal 12VDC input – Supported range 9 – 32VDC
Nominal 24VDC input – Supported range 16 – 36VDC
Nominal 48VDC input – Supported range 24 – 90VDC
Nominal 72VDC input - Supported range 24 – 90VDC
Mains AC input – Supported range 85 – 264VAC

10. Mechanical:

The DADS system offers a large array of features through multiple pieces of gear. The gear that requires user interface is typically located in highly populated areas, so Mackenzie designed the system to minimize the size of these pieces and off load as much circuitry into other equipment that can be hidden in a storage closet, or equipment rack where space isn't as critical.

Mackenzie can develop an enclosure for the various pieces of the DADS system to meet the needs of any particular installation.

11. Display Signage:

DADS is compatible with a variety of displays which are typically outsourced from third party manufacturers. Many technologies exist in this area including Light Emitting Diode (LED), Liquid Crystal Display (LCD), Flip Dot, etc. These signs are offered with an array of character sizes, display widths, colors, and mechanical packages. DADS controls the display signage through the communication protocols discussed in the communications section. Multiple signs can be driven simultaneously to display the same text across the vehicle.

Mackenzie has developed drivers for many different signs, and can develop new drivers as necessary to facilitate the use of the optimum sign for any particular application.

12. Optional Local Recording:

DADS may incorporate a local recording feature allowing the system to record audio from the various microphones used throughout the system. These microphones include the Automatic Level Control, Passenger Emergency Communication, and Operator public address and intercom microphones. This data is stored in MPEG format and can be offloaded from the system via removable memory card, or USB memory key.

13. Composer Creation:

In order to configure the audible and visual messages on the DADS system, the memory card must be formatted with the correct audio, text and control information. Mackenzie calls this configuration the "Composer". The route layout, recording/processing audio announcements, text association, activation points, etc. are all part of the composer. The methods for creating a composer for the DADS system are denoted below:

Factory Programming - Mackenzie offers turnkey productions services for composer creation, including live announcement service, programming and duplication. Requirements for this process include route layout with activation points from the client, audio message script and text message script. Mackenzie offers access to many different voice types and styles, samples of which are available upon request.

Voice Recording Station - This is a software package for clients to create their own composer. This software package provides the capability of configuring all aspects of the pre-recorded audible and visual playback of the DADS system.

14. Message and Firmware Updates:

Periodically, the composer for the DADS will need to be changed. To facilitate this Mackenzie provides several solutions allowing the user to replace the audio, text, route information, trigger points, and even the firmware of a particular piece of gear. This may be done through memory card replacement, Serial Communication, or USB Memory Key (optional) described below:

Memory Card Replacement - The standard DADS system offers support for removable Flash memory cards. These cards are easily accessed in the DADS system. They may be removed, programmed then replaced or simply swapped with a new card. This removable memory also allows the user to change the memory size as application requirements change.

Delta Download - In some cases, changing large quantities of memory cards, or those in hard to access locations, may not be practical. For this reason, the Delta Download feature was developed to support program changes via an auxiliary serial port on the DADS, or through a specially formatted memory card inserted in the active Head End Controller. if populated. Delta Download also offers the ability to change only specific portions of memory such as a single message, configuration or firmware without re-writing the entire memory. This greatly increases efficiency by minimizing download time.

USB Memory Key - The DADS can be fitted with a USB memory key interface which would allow the user to use a specially formatted USB memory key to download files quickly into the system. The complete composer, or a portion of it can be downloaded with this method.

15. DADS Major System Component Views:

15.1. DADS Head End Controller – HEC

15.2. DADS In Car Communication Unit – ICCU

15.3. DADS Passenger Emergency Communication panel – PEC

15.4. DADS LED Sign (Internal or External)

16. Environmental Specifications:

Each agency typically has their own requirements for Environmental Specifications. Mackenzie is familiar with the design and verification of the following Environmental Specifications and has successfully passed each of the tests listed below:

- Operating Temperature: -30C to +60C
- Storage Temperature: -40C to +70C
- Humidity: 98% @ +60C
- Shock: 30g, 6mS
- Operating Vibration: 4g RMS, 10 - 150 Hz
- Endurance Vibration: 8g RMS, 100 - 1100 Hz (random)
- Sealing: Splash and dust proof
- EMI, FCC Part 15 / EN55022
- Load Dump
- Splash and salt spray
- EN61000-4-2, Electrostatic discharge immunity test
- EN61000-4-3, Radiated, RF, electromagnetic field immunity test
- EN61000-4-4, Electrical fast transient/burst immunity test
- EN61000-4-5, Surge immunity test
- EN61000-4-6, Immunity to conducted disturbances, induced by RF fields
- EN61000-4-8, Power frequency magnetic field immunity test
- EN61000-4-11, Voltage dips, short interruptions and variations immunity tests