

# ***MACKENZIE***

## **DADS-MB701** In Vehicle Automatic Announcement System



## **User's Manual**

Version 1.1, Revised 19, January 2016

Doc 99-20-087

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## 2. Overview:

The DADS-MB701 is a full featured, automated next stop and destination announcement device. It incorporates two audio outputs with associated text on the internal channel, industry standard triggering, automatic level control and highly reliable operation in a ruggedized package.

## 3. DADS-MB701 Installation

### 3.1. Interconnections

There are four interface connectors on the DADS-MB701 system. Each is detailed below:

#### 3.1.1. Main interface, J4

DB-50M, ref: Amp 205212-1. Recommended mating connector: Amp 205211-1

Pins 1, 18, 35 – Chassis Ground (Connected together internally)

Pins 2, 19, 36 – Power return (Connected together internally)

Pins 3, 20, 37 – System power (Connected together internally)

Pins 4, 21, 38 – Unused

Pins 5, 22, 39 – Unused

Pins 6, 23, 40 – Balanced Line Level Output, CH2 (Non-Inverting, Ground, Inverting)

Pins 7, 24, 41 – Balanced Line Level Output, CH1 (Non-Inverting, Ground, Inverting)

Pins 8, 25, 42 – 1708 Com Port (Non-inverting, Inverting, Shield)

Pins 9, 26, 43 – Input Commons (0V, system ground) (For use with Signal Inputs)

Pins 10, 27, 44 – RS232 Com Port (Transmit, Receive, Return)

Pins 11, 28, 45 – Playing relay, CH2 (Normally Closed, Normally Open, Common)

Pins 12, 29, 46 – Playing relay, CH1 (Normally Closed, Normally Open, Common)

Pins 13, 30, 47, 48 – Spare inputs (Spare input 2, 3, 4, 1)

Pin 14 – Message #1 (Stop Request) play control input

Pin 31 – Message #2 (Lift Request) play control input

Pin 15 – Microphone volume adjust (Down)

Pin 32 – Microphone volume adjust (Up)

Pin 49 – Enable external audio zone for operator microphone

Pin 16 – Enable internal audio zone for operator microphone

Pin 33 – MB701 System disable

Pin 50 – Input common (0V, system ground)

Pin 17 – Background Music Input (BGM), Line Level audio

Pin 34 – Audio Ground (For BGM)

### 3.1.2. ALC / PA interface, J1

8 Pin circular connector, ref: Conxall, 4282-8SG-300. Recommended mating connector: Conxall, 3282-8PG-3DC.

Pin 1 – CH1 ALC Mic (+)

Pin 2 – CH1 ALC Mic (-)

Pin 3 – CH2 ALC Mic (+)

Pin 4 – CH2 ALC Mic (-)

Pin 5 – Operator microphone, push to talk input

Pin 6 – Microphone element (-)

Pin 7 – Microphone element (+)

Pin 8 – Input common (0V, system ground)

### 3.1.3. CH1 and CH2 Speaker output, J2

2 pin circular connector, ref: Conxall, 4382-4SG-300. Recommended mating connector: Conxall, 3382-4PG-3DC.

Pin 1 – CH1, Speaker output (+)

Pin 2 – CH1, Speaker output (-)

Pin 3 – CH2, Speaker output (+)

Pin 4 – CH2, Speaker output (-)

### 3.1.4. USB Host Interface, J3

Female USB, Type A connector for use with standard USB Memory Keys

## 3.2. Potentiometer adjustments

There are four potentiometers on the front panel of the DADS-MB701. These adjust the PA microphone, the BGM input, and the ALC threshold level. Use a small Phillips head screwdriver to adjust these potentiometers.

Note: There is no backing to the potentiometers. Although no components are placed close behind the potentiometers, do not force the adjustment tool when inserting it to avoid potential damage to the device.

### 3.2.1. BGM Level Adjustment

Turning this potentiometer clockwise increases the BGM audio level. Turning the potentiometer counterclockwise decreases the audio level of the Background Music.

### 3.2.2. Operator Microphone Level Adjustment

Turning this potentiometer clockwise increases the audio level. Turning the potentiometer counterclockwise decreases the audio level from the operator microphone.

### 3.2.3. Channel 1 ALC Threshold level adjust

Turning this potentiometer clockwise increases the sensitivity of Channel 1's ALC circuit. Turning the potentiometer counterclockwise decreases the sensitivity of the ALC circuit.











### 3.2.4. Channel 2 ALC Threshold level adjust

Turning this potentiometer clockwise increases the sensitivity of Channel 2's ALC circuit. Turning the potentiometer counterclockwise decreases the sensitivity of the ALC circuit.









### 3.3. LED Status

The Dual Color LED on the front of the unit provides system status information. A blinking cadence is used to signify the condition of the device. Cadence details are in the tables below:















#### 3.3.1. Standard Indications

System status	LED indication
Boot up – initialization	 Off
System idle	  Repeat until status changes 250ms 1.75 Sec
System Playing on any channel	 Stays on until end of message On
USB Transfer	  Repeat until all files have been transferred On 250mS (between files)
Firmware updating	    Repeat 250ms 250ms 50ms 50mS

#### 3.3.2. Boot Up Error Indications

No Application code and No SD Card Installed	    Repeat for 1 sec then reset 50ms 50ms 50ms 50ms
No Application code	    Repeat for 1 sec then reset 250mS 50mS 250mS 50mS

#### 3.3.3. Application Code Error Indications

No sentence.cfg file detected on SD Card	  Repeat 250mS 2 Sec
No SD Card installed	    Repeat 250mS 250mS 250mS 2 Sec
Memory Full during a USB transfer, or invalid USB key.	      Repeat until USB removed 250mS 250mS 250mS 250mS 250mS 2 Sec
Audio Amplifier Fault active	  Repeat until Fault removed 1 Sec 1 Sec

### 3.4. ALC operation

The DADS-MB701 will not automatically change the output level during a message play. The system is constantly averaging the audio level detected by the microphones on the vehicle. When a message is started, the system will increase the audio output level to overcome the average level of the noise on the vehicle.

Because the audio level is not adjusted during the message play the placement of the Mics in relation to the speakers is of little importance, unless the speakers are used for live pages or background music. If the speakers are used for these other functions, then the microphone should be placed away from the speaker.

The microphones should be placed in an area where the noise is more likely to vary because of human factors. The AGC is designed to overcome the noises associated with more people being on the vehicle. The system will be setup when there are no people on the vehicle, but with the vehicle running so that the system's base audio level can be set according to the baseline noise associated with the vehicle itself. Typically, the noise made by the vehicle itself will not change, just the amount of people on it. So, place the microphones where the people will be and the system will increase the output audio level as more noise is detected within the vehicle.

### 3.5. Playing Relay Operation

A playing relay with Form-C contacts is provided for each audio channel. This relay will activate whenever the system is playing a message, or if the microphone is active, through the corresponding channel. These contacts are rated at 24VDC at 1 amp, non-inductive load.

### 3.6. Operator Microphone Section

The Operator microphone allows the driver to make live announcements as necessary. When the Operator microphone goes active, it stops any pre-recorded message that is playing.

To activate a function within this section, connect its corresponding input to input common. Each input is optically isolated, and power is sourced from the input power connection of the MB701. A 2.2K ohm resistor is placed in series with each input signal, internally to the unit.

#### 3.6.1. Operator Microphone Push To Talk Function

When activated, the microphone audio will be routed to the active zones, as selected by the operator.

When the microphone interface is active, meaning a zone is selected, and the PTT is active, any playing pre-recorded message will be stopped. Any pre-recorded message triggered during an active operator microphone session will be ignored.

#### 3.6.2. Zone enable (Internal/External) Operation

These signals instruct the system where to route the microphone audio when the push to talk (PTT) switch is activated.

While the Internal zone enable signal is active, the microphone will route to the internal zone.

While the External zone enable signal is active, the microphone will route to the external zone.

If both the Internal and External signals are INACTIVE, the microphone audio will be routed to both the internal and external audio zones.

#### 3.6.3. Microphone volume adjust (Up/Down) Operation

The microphone volume adjustment allows the operator to increase or decrease the level of the microphone in 16 steps, as shown below (in dB).

+11, +7, +3, 0 (Default), -4, -8, -11, -15, -19, -22, -26, -30, -33, -37, -41, -44

Each activation of an input adjusts the level by one step. The setting is saved in non-volatile memory when the microphone session has ended, so it is saved through power outages.

#### **3.6.4. System Disable Function**

The system disable signal is used to disable the operation of the MB701 unit. When this signal is active, neither prerecorded announcements, nor operator microphone audio will be routed to the speaker networks. The signage interface from the MB701 will also be disabled.

### **3.7. Miscellaneous Play Inputs**

The system has two miscellaneous inputs which can be used to trigger messages from an external contact closure.

#### **3.7.1. Miscellaneous play input #1 (eg: Stop Request)**

When this input is activated, the system will automatically play message #1 through channel 1.

#### **3.7.2. Miscellaneous play input #2 (eg: Lift Request)**

When this input is activated, the system will automatically play message #2 through channel 1.

If one of these play inputs is received while a message is playing on a specified channel within the command, the system will queue the message playback until the current message has stopped playing. Standard system status responses over the J1708 and RS232 ports will occur when a message is played with these inputs.

### **3.8. USB operation**

The system has a host USB port which can be used to transfer files from a USB key onto the internal SD Card memory. When a USB key is inserted into the MB701, the system will immediately check it for valid audio files. If valid audio files are present, the system will cease standard operation and begin transferring files from the USB key to the internal SD card. During this process the red LED will light solid, and the MB701 will be unavailable for commands from the J1708 or RS232 ports. Once complete, the red LED will extinguish, and the green LED will blink until the USB key is removed, at which time the MB701 will reset.

To prevent the unauthorized transfer of files, audio tracks are required to be placed in specific folder names. To delete all the files on the system and rewrite the entire SD Card, audio and configuration files must be placed in a folder named "Complete". To only overwrite specific files, place the audio and/or configuration files in a folder named "Delta". If both folders are present on the USB key, the system will not perform an update, and the red LED will blink until the USB key is removed.

### **3.9. BGM operation**

If audio is placed on the BGM input, the system will route this audio through the internal audio amplifiers, and to the speaker network. If no audio is placed on this input, the passengers will simply hear silence when a message, or the operator microphone, is not active.

## 4. Specifications

### Electrical Specifications:

Input Voltage: 24VDC nominal(range 9 - 32VDC)  
Fuse: Internal, self resetting (3A)

### Communications:

Message Triggering: J1708 / J1587  
Auxiliary: RS232

### Manual Announcements:

Microphone Interface Yes  
Volume Adjust Inputs Yes  
Zone Select Inputs Yes  
Lift / Stop Request Yes

### Audio Specifications:

Channels: 2, independent  
Coding: MPEG 1, Layer 3  
Frequency response: 20Hz to 15kHz, +/-3dB (highest bit rate)  
THD: <0.1%  
Signal to noise ratio: 85dB

### Amplifier Specifications:

Channels: 2, independent  
Power: 20 watts per channel  
Drive: 4 ohm

### Automatic Level Control:

Performance: Up to 19dB of gain, adjustable sense level

### Memory:

Type: FLASH EPROM  
Package: Standard FAT formatted SD CARD

### Connections:

DB-50M Power, J1708/J1587, RS232, playing relay,  
manual announcement controls  
4382-4SG-300 4 pin sealed circular for audio outputs  
3282-8PG-3DC 8 pin sealed circular for PA / ALC inputs

### Mechanical:

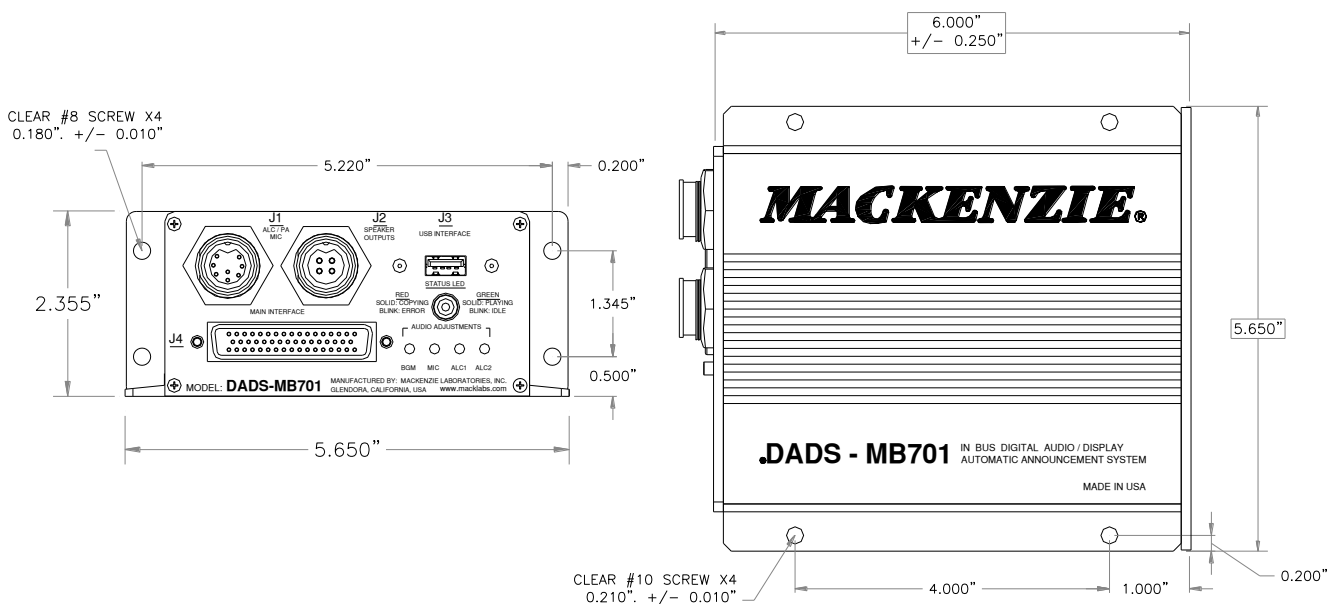
Size(approx): 5.6" W x 6.1" D x 2.3" H  
Packaging: Painted aluminum extrusion with end plates  
Mounting: Flanges w/ mounting holes

### Environmental:

Storage Temp: -40 to +70 degrees, Celsius  
Operating Temp: -20 to +60 degrees, Celsius @ 98% R.H.  
Vibration, operating: 4G RMS, 5Hz to 150 Hz (sine)  
Endurance: 8G RMS, 100Hz to 1,100Hz (random)  
Shock: 30G, 6 millisecond duration  
EMI/RFI: FCC 15, class A



## 5. Unit Pictorial



## 6. Appendices

### 6.1. J1708 / J1587 Communication Protocol

[\\Big-Mac2\Engineering\MB701\DADS-MB701\\_J1708\\_Serial\\_protocol.doc](\\Big-Mac2\Engineering\MB701\DADS-MB701_J1708_Serial_protocol.doc)

For information on the operation of the J1708 / J1587 Communication Port, reference the attached document.

### 6.2. RS232 Communication Protocol

[\\Big-Mac2\Engineering\MB701\DADS-MB701\\_RS232\\_Serial\\_protocol.doc](\\Big-Mac2\Engineering\MB701\DADS-MB701_RS232_Serial_protocol.doc)

For information on the operation of the RS232 Communication Port, reference the attached document.

### 6.3. MB701 Installation Wiring Diagram

<\\Big-Mac2\Engineering\MB701\E3401.pdf>

For information on the wiring of the MB701 unit, reference the attached document.