Emergency/Fireman's Microphone
EMERBOX5839
Manual V1.1

EMERBOX5839 User Manual

Revision History

Version	Modifications	Date
1.0	Original issue.	12/12/02
1.1	Re-arrange sections and add connection details	30/08/05

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good technical judgement, since all possible situations cannot be anticipated.
If there are any doubts as to exact installation, configuration and/or use, call
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Technical Support

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EMERBOX5839 Overview

The microphone comprises;

• Hi Quality Shure557B Fist Microphone with PTT (Press To Talk Button)
• Speak indicator (Green)
• Power indication
• Both Microphone and Contact Monitored to VA Rack
• Can be used as the VA system Bypass Microphone
• Rugged Steel Enclosure
• Built in Microphone pre-amplifier (D718)

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Product Description

The EMERBOX5839 Emergency/ Fireman's Microphone comprises a hand-held fist type microphone together with a DC powered microphone preamplifier housed within a wall mounted enclosure.

The microphone has a single button (PTT) which is connected to monitoring resistors located within the EMERBOX5839. When connected to an Audix MSL1000 this allow the PTT connections to be monitored for open circuit and short circuit failure.

The preamp is an Audix D718 with circuitry to inject 20kHz tone into the mic circuit for complete signal path surveillance by the host VA system and to allow the mic itself to be monitored for open circuit and short circuit failure.

When the PTT (Press To Talk) button is pressed a pre programmed, individual or grouped output (speaker zones) request is made to the host VA system.

Operating instructions

To make a LIVE broadcast announcement

- To make an announcement the user is to press and hold the Speak button. Until this point the announcer has had no effect on the PA system.

- A rapidly flashing green LED by the Speak button, indicates that the pre-announce chime is active and the announcer should wait until this green LED stays solidly on. This is the Speak-now indication.

- Whilst holding the Speak button, the announcer should then talk steadily and clearly into the microphone with their mouth about 10 to 20 cm. from the microphone head.

- Whilst holding the Speak button, the announcer should then talk steadily and clearly into the microphone with their top lip against the rubber lip guard. The microphone panel has a pre-amplifier which utilises a compressor/limiter circuit. This boosts a quiet voice and limits a loud voice to enable consistent loudness of broadcasts

- Release the PTT.
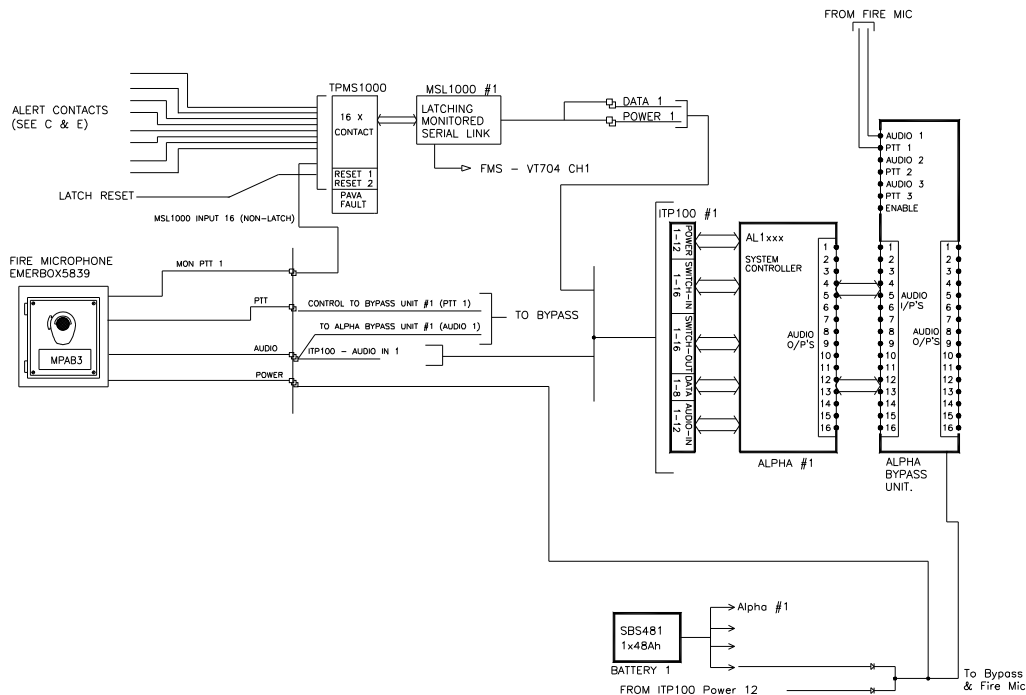
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Specifications

EMERBOX Enclosure Dimensions (HxWxD)mm	300 x 300 x 210
Weight, excluding cables	5 kg.
Power supply voltage range	15 – 30V DC
Supply current (typical)	55mA @ 24V
Audio output nominal	0dBu
Audio output max.	+10dBu
Output impedance	< 50 ohms
Load impedance	> 600ohms
Distortion T.H.D.	< 0.05%
Signal to Noise ratio	
Pre-announcement chimes	2 or 3 tone
Microphone gain trim range	Preset
Surveillance tone Frequency	20kHz
Surveillance tone Level	Adjustable
Surveillance tone stability	$100ppm/^{o}C$
Max Operating Distance from System Rack	500m
Operating temperature range	$0 – 40^{o}C$
Max Humidity	85% non-condensing
EMC operating environment	Domestic, Commercial,
(As defined by EN50081-1, EN50082-1)	Light Industrial.
Manufactured to Safety Standard	EN60065:1998
Microphone Type	Shure 577B
Microphone Technology	Dynamic, noise-cancelling
Microphone Frequency Response	100Hz – 5kHz (+/- 3dB)
Microphone Output Level (@1kHz)	-46.0 dB (5.0mV)
	0dB = 1volt per 100 micro bars
	-66.0 dBV/Pa (0.5mV)
	1Pa =94dB SPL
Microphone Impedance	175 ohm
Microphone Hum Sensitivity	Equivalent to 32dB SPL in 1 millioersted field
Microphone Operating Temperature Range	-40 to $+74^{O}C$
Microphone PTT Switch Type	Double-pole, single-throw, leaf-type, push-to-talk
Microphone Cable	Non-detachable 1.8m, neoprene-jacketed coil cord, four conductor
Microphone Case	Two tone grey, high-impact ARMO-DUR
Microphone Weight	330g

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EMERBOX5839 as part of a VA system.

The following Diagram shows how the EMERBOX5839 would typically be connected into an Audix Alpha based Voice Alarm system.

Installation and connection to VA PA system

General installation notes

Install the EMERBOX5839S5 enclosure in a suitable location, which must be fully compatible with the "Safety Considerations" section of this manual.

The unit is heavy so must be installed with adequate fixings.

Please observe all installation requirements for standards compliance.

Turn off power sources of the system rack whilst making connections to the system.

Care should be taken when installing microphone cabling with respect to other power cables and systems likely to cause interference e.g. Mains cabling, Motors etc.

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Cable requirements

The unit is connected to the PA system via a Fire Rated Four pair 0.75mm^2 cable.

Pair 1: The unit is powered from a nominal 24V D.C. supply derived from.
Pair 2: Audio output from the unit is at balanced line level audio 0dBu nominal.
Pair 3: Monitored PTT output and 0V return
Pair 4: Bypass PTT control out + spare connections.

Each pair should be individually screened, with a common overall screen connected to earth. Foil screened cables with solid copper drain-wire are preferred.

A suitable Fire Rated cable must be used if the unit forms part of a VA system.

Non-standard and specially customised units may have extra features supported on additional cables and connections on the spare terminals indicated. These functions will generally be described in the specific system documentation

Audix Systems can offer advice, based on previous experience as to suitable cable types and maximum cable lengths.

Warning: Upon first connection of the EMERBOX5839 to a system, the initial setting of the 20kHz surveillance tone is set at the factory and may need to be adjusted during system commissioning.

Summary of installation procedure.

Remove the 8 M5 screws that hold the door and the internal pre-amp panel assembly, remove the door and panel, and the fix the empty box in the required location.

Terminate cable screens to the earth stud, on the base-plate of the wall-box.

Terminate the cables onto the pre-amp/front panel assembly.

Set up any switches and jumpers Control PCB and test the system.

Refit the pre-amp/front panel assembly and the door of the wall-box.

Making connections

To meet EMC requirements short connections are required between the cable screens and enclosure metal work.

The figure below shows the recommended method of terminating the screens, which can only be achieved if the cable entry point is located close to the earth stud on the base plate within the enclosure.

The length of the cable inners should be 250 - 300mm long in order to allow the pre-amp panel assembly to be wired after fixing the enclosure.
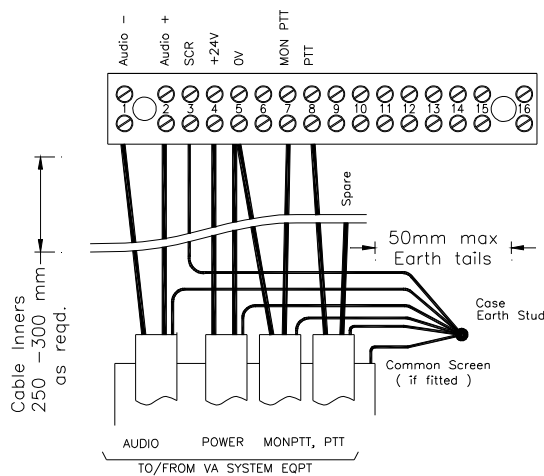
Connector Details

Connections are located on the rear of the EMERBOX5839 front panel assembly.
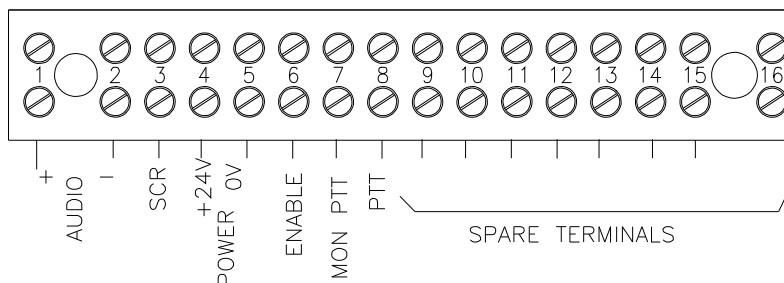
Customised units may have extra features supported on the spare terminals indicated. These functions will generally be described in the specific system documentation

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Setting Up.

There are a number of pre-set controls on the D718 Pre-amp PCB that must be set during system commissioning.

The function of these controls is shown in the list below.

Use the Channel Gain Control on the PA System to adjust the volume of the microphone. Do not adjust the "VR5 mic gain control" on D718 which has been factory set to match the characteristics of the microphone.

Trimpot VR3 should be used to adjust the chime volume after the mic volume has set on the PA system.

The jumper J1 should be set to select the required chime.

To turn the chime off completely fit J2.

Jumper settings

Normal settings for EMERBOX5839 are shown highlighted.

J1	Omit	2 tone chime
	Fit	3 tone chime
J2	Omit	Enable Chime
	Fit	Disable Chime
J3	**Omit**	**Ptt Operation, Active Low (Fit J5)**
	Fit	Ptt Operation, Active High (Omit J5)
J4	Omit	Normal Operation
	Fit	**Permanently Enable Pre Amplifier**
J5	Omit	Ptt Operation, Active High (Fit J3)
	Fit	**Ptt Operation, Active Low (Omit J3)**
J6	Omit	Power Off
	Fit	**Power On**

D718 Trim Pot Settings

VR1 – Distortion Trim	(Do Not Adjust)
VR2 – Set 20kHz Level	
VR3 – Set Chime Level	
VR4 – Set Threshold for Limiter	(Do Not Adjust)
VR5 – Microphone Gain	(Do Not Adjust)
VR6 – Set Chime Pitch	
VR7 – Output Gain	(Do Not Adjust)

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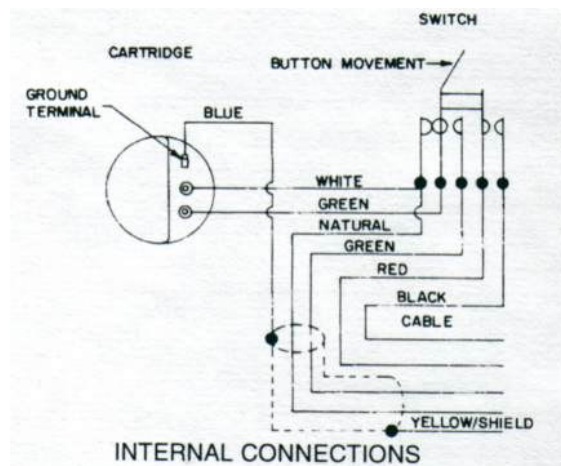
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Microphone Internal Connections

The D577 microphone, as supplied from Shure has a shorting switch contact across the mic coil. this shorting contact must be disconnected in order to allow the 20kHz surveillance to function.

If a new mic is fitted, as a replacement the modification is described below.

The green wire from the mic cartridge should be unsoldered from the wiper terminal of the switch and connected to the same terminal as the other green wire

Note that the diagram shows internal connections of an **un-modified** microphone.

How the switch contacts are monitored.

The PTT switch line between the microphone and the MSL is monitored for open circuit and short circuit failure.

Each input has 4 states, defined by voltage levels: o/c fault, s/c fault, active, and inactive.

The Microphone PTT is fitted with the specified monitoring resistors located within the EMERBOX5839

Failure of any or the power rails within the unit will cause an active low signal on the 'common fault' output from the unit.

Monitoring resistors

Specified end of line resistors, as supplied fitted within the EMERBOX5839
R in series with contacts: 910Ω 1% 100ppm 0.3W metal film
R in parallel with contacts: 3KΩ 1% 100ppm 0.3W metal film

Figure 3. MSL Wiring Details

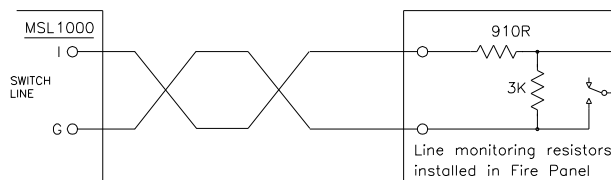This gives the following resistance readings:
Switch Closed state circuit resistance   = 910 Ω.
Switch Open state circuit resistance   = 3.91 kΩ (910Ω +3.0 kΩ)
Control Line Short Circuit   = 0 Ω
Control Line Open Circuit   = ∞ Ω

Where the Fireman's microphone is connected into the MSL1000 unit the input must be configured to be non-latching.

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Safety Considerations.

Review the following safety precautions to avoid injury and prevent damage to the product. The product should only be used as specified.

The EMERBOX5839 should be operated from a suitable DC supply of nominally 24V. Use only the correct power source, which must contain current overload protection to protect the wiring between the system and the EMERBOX5839.

Do not disconnect the cable from the product whilst the Voice Alarm system is powered.

Do not operate in wet or damp conditions or expose to dripping or splashing.

Do not operate in an Explosive Atmosphere

This product may be incorporated into a Monitored Voice Alarm system. If so, to tamper with any of the setting of the EMERBOX5839 unit may cause a Fault Condition warning on the Voice Alarm control unit. In these circumstances the restoration of normal operation of the system may not be possible without access to the Main Voice Alarm Equipment by qualified personnel.

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Technical description of D718 microphone preamplifier

The D718 is a low noise remote microphone amplifier board with balanced input and built in AGC/compressor maintaining maximum intelligibility. The nominal compression ratio is 5 to 1 , but increases towards the higher level end of the range . The underlying AGC operates slowly with an attack time of around 3s (gain control is mostly transferred from the compressor) and release time of around 10s, but has a fast recovery (approx. 1s rate) which operates if the output level falls below 10 to 15dB of its current nominal value for longer than 1.5s. The AGC recovery rate of around 10s is re-established when the signal level recovers to within the 15dB range of the nominal output level.

 The compressor effectively operates "over the top" of the AGC to reduce the dynamic range of the gain adjusted signal. The reason for this approach (rather than just having a simple compressor is to reduce the amount of crackle and distortion of the signal to improve overall intelligibility of the speech signal. The compressor operates normally with an attack time of around 10ms and a release time of 200ms which gives good dynamic range control with minimal attack distortion. To control the initial attack and any subsequent large excursions of the signal, the attack time speeds to around 1ms for any instantaneous input increase of greater than about 4dB above the current output level. To help prevent the compressor modulating the noise during short pauses in the input speech signal (i.e. unwanted "breathing") the compressor release time is increased greatly if the output level falls to below 10 to 15dB of the current output level. Normal control is re-established when the output level rises above this level.

The board also incorporates a 20kHz surveillance oscillator which injects tone directly into the microphone input for use in the rest of the PA system, but which will also detect (absence of tone) a short or open circuit fault at the microphone. The 20kHz generator is arranged to inverse-track the gain control applied by the compressor so that an approximately constant level of surveillance tone is always available at the output.

A chime circuit (ding-dong) may be optionally triggered from the control input (e.g. press to talk switch) and if used gives a logic level output which is intended to flash an led during the chime and switch it continuously on when the microphone is enabled.

Finally, the microphone is 'live' all of the time so as to enable continuous surveillance of all of the circuitry in the system. However, to avoid audible signal pick-up from the microphone in its non-active state, additional gain reduction is applied in this state which is switched out when the microphone is required.

A digitally synthesized 20kHz monitor tone for the Audix Systems FMS is injected directly at the microphone head, with innovative circuitry able to detect open or short circuit failure of the microphone.

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The D718 microphone pre amplifier features a choice of 2 built in pre announcement chime signals. There is independent adjustment for the chime volume.

Due to continued development, Audix Systems reserves the right to change any of the operational features of the EMERBOX5839 described in this document.

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S Y S T E M S

D718 Mic Pre Amp component identification

PL1

ΟP− ΟP+ 24V 0V D+ D− SWA ENA A1 A2

POWER
J6

PL2

O/P GAIN VR7

TRIM SYM
VR1

SET 20KHZ LEVEL VR2

A1
A2
D+
D−
24V
0V
IP+
IP−
SCR
SPK
SWB
SWA

D718 Iss D

SET CHIME LEVEL VR3

SET THRESHOLD VR4

VR5 MIC GAIN

T6 T5 T4 T3 T2 T1
"SK SWA SK RD V+ 0V

J2

J1

VR6

SET CHIME PITCH

R95 J1−ENABLE 3 CHIME
R96 J2−DISABLE CHIME

J3 J5

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