MILLBANK

THE INTELLIGENT USE OF SOUND

TALISMAN III

DYNAMIC LOOP AMPLIFIER SYSTEMS

INSTALLATION GUIDE

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TAL/DLS5/3
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Designed by Millbank Electronics
Manufactured in the UK by **Federal Signal Limited**

Federal Signal Limited operate a Quality Management System which meets the requirements of BS EN ISO 9001 : 1994

Federal Signal Limited is registered by the Lloyds Register
Lloyds Register certificate of Registration No. 923077

CE

Product Compliance to EC directives for Standard Products

All standard products conform to the relevant directives, regulations and standards for electronic and associated apparatus. The equipment is CE marked both on the apparatus and the packaging. The Modular range of products for use in Mainframes must be used in the configuration as described in the product literature. Failure to use the modular products in the manner described will invalidate the EC Compliance.

Our products meet the appropriate British and International standards. A product "Declaration of Conformity" Statement is available for each of the product ranges (available on request). This covers both the EMC and Low Voltage Directives.

UNPACKING

While all Millbank equipment is carefully packed to prevent damage in transit, we recommend that the equipment is unpacked and inspected immediately on receipt. If damage has occurred please advise your carrier and your supplier who will arrange appropriate action.

If it is necessary to re-pack the equipment for onward shipping or returning to Millbank for service PLEASE ENSURE THAT THE ORIGINAL PACKING OR EQUIVALENT IS USED.

For further technical information please contact our Customer Services Department.
on + 44(0) 1625 666600
or E-mail: CustomerServices@fedsig.co.uk

KEEP THIS INFORMATION IN A SAFE PLACE

Equipment Serial No .....

Supplied by .....

.....

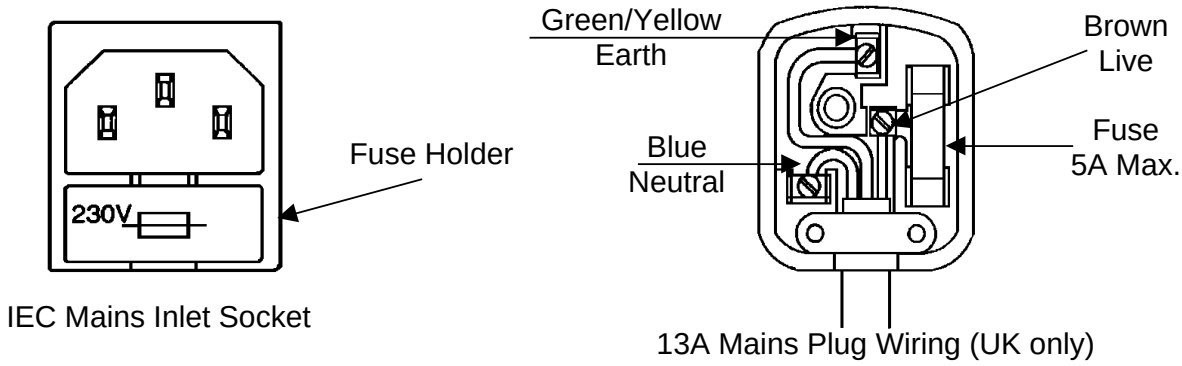
Date .....

1. INSTALLATION

1.1 Precautions

IMPORTANT: Before operating the PAC Amplifier please take note of the following points:

1.1.1 Ensure that the equipment is connected to a suitable mains supply. The equipment is supplied configured for 230V 50/60Hz AC operation.



1.1.2 For mains connections other than the UK, refer to the local requirements for connections to supply.

1.1.3 Always ensure that the equipment is properly earthed (grounded). Operating without an earth is dangerous and may cause high levels of audible hum from the loudspeaker outputs.

1.1.4 Avoid siting the equipment in locations exposed to direct sunlight, near heaters or other heat sources. Avoid locations with high humidity or dust levels. Do not obstruct the ventilation slots in the amplifier case and, if the amplifier is rack-mounted, ensure that a 1U ventilation panel is fitted above the unit.

1.1.5 Never remove the top cover of the amplifier with the AC mains supply connected. All internal servicing should be performed by a competent / qualified engineer.

1.1.6 Never make an internal adjustment when the AC supply is connected.

2. WHY INDUCTION LOOPS ?

2.1 Introduction

The problems faced by the hearing-impaired are rarely appreciated by those with normal hearing. Unfortunately hearing aids give only partial restoration of hearing with the added disadvantage that the built-in microphone cannot mimic the normal ear/brain ability to differentiate between distant, wanted sounds and nearby, unwanted noises, and so to distinguish speech clearly from a combination of direct, reflected and reverberant sounds. For instance a hearing aid user attending a concert or play may turn up the volume control in an attempt to improve intelligibility, invariably resulting in an increase in interference from nearby coughs, rustles, etc., sometimes to painful levels.

All these problems can be overcome by feeding microphone signals or the existing public address (PA) system audio directly to the hearing-aid so that only the wanted sound (without auditorium reverberation, audience noises, etc.) is reproduced.

This can be achieved by driving audio frequency currents around a large loop of wire to generate a magnetic field (varying in sympathy with the PA program material) and which could be picked up by suitable equipment. Specially designed headsets are available from a number of manufacturers such as Beyer, Danavox and telex which have applications in high-noise environments for paging/life-safety and for silent reproduction of commentary in museums and art galleries.

However, since 1974 all UK National Health Service hearing aids have had a switch to select M (internal microphone) or T (telecoil pick-up), the T position being originally intended for use with telephone handsets (later designs of telephone have proved unsuitable for this use). ‘AFILS’ (Audio Frequency Induction Loop System) are designed to work efficiently, taking into account the positions and electromagnetic characteristics of the internal pick-up coils normally fitted to hearing aids.

Now with a suitably installed AFILS the hearing impaired can appreciate and enjoy everything that those with normal hearing do and, as mentioned above, the same type of system can be used to provide paging/life safety communication in very noisy areas, secret paging for security staff, disturbance free audio for spoken commentary systems or individual AFILS for booking offices, bank tellers etc.

2.1 The MILLBANK Dynamic Loop System

The dual purpose design allows for assisted listening of the hearing impaired and for applications such as commentary systems in museums and art galleries.

The audio requirements for the two applications are different; a hearing impaired user requires tight control of dynamic range and restricted bandwidth to enhance intelligibility by maximising perceived volume while limiting maximum signal peaks and frequencies. A non hearing impaired user, however, may require less dynamic range compression and a wider bandwidth.

The Talisman range of audio induction loop amplifiers is unique in that it provides switch selectable options to cater for these alternative uses. The bandwidth may be set to either 5KHz or 10KHz high frequency roll off and the dynamic range compression circuit is switchable either on a peak limiter (to prevent distortion in wide dynamic range applications) or as a dual time constant compressor reducing the dynamic range to no more than 9dB peak to average for assisted listening applications.

A combined voltage and current feedback technique is used to optimise drive into a wide range of loop impedances. This system overcomes the disadvantages normally associated with amplifiers using voltage feedback only. Radio frequency interference (R.F.I.) is prevented by amplitude limiting and low pass filtering the signal prior to the driver stage. Unlike current feedback only designs, the TAL DLS output stage cannot clip when driving inductive loads as voltage feedback takes over when the clipping threshold is approached. Importantly, the feedback configuration means that the dynamic loop system is stable into highly inductive, multi-turn loops.

3. TAL/DLS DESCRIPTION

The Talisman Dynamic Loop System is designed for the specific applications of the assisted listening for the hearing impaired, by the users hearing aid, and for wire free sound distribution in museums, art galleries, etc.

The unique Millbank Electronic design incorporates the results of many years of operational experience in this field and offers superior performance.

Features include:

3.1 Dual purpose design

- For the hearing impaired, especially contoured frequency curve.
- For other audio induction loop applications, museum commentary, secret paging, etc., a wide range frequency response.

3.2 Dynamic amplifier output allows

- New flexibility in loop design.
- Interference (R.F.I) free loop design.

3.3 Incorporates Frequency Contour Control

- Adjusts performance to match exact requirements of the listener.

3.4 Switchable Automatic Gain Control

- Compensates for differences between signal inputs (microphones for example), especially important for hearing aid users.

3.5 Fast Acting Compression Circuitry

- Controls signal peaks without audible distortion and prevents generation of interference within the amplifier.

3.6 L.E.D. Display for optimum input levels and loop integrity

- Allows optimum setting of signal processing circuits.
- Provides visual reassurance of loop connection and operation.

3.6 Linear calibrated bargraph display of loop current

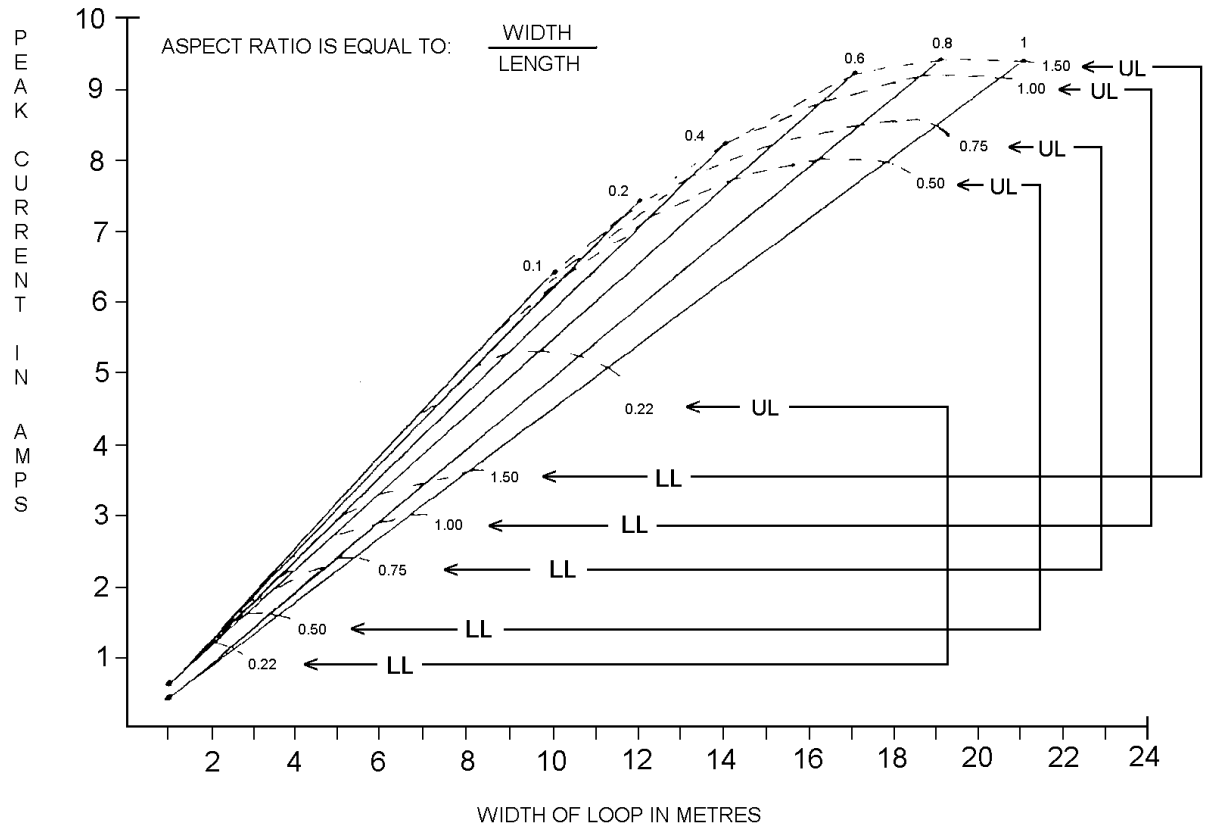
- Continuous display of peak current in loop, confirms correct drive conditions.

3.6 Comply with existing and projected industry standards

- Designed for loop systems to meet BS6083:Part4:1981.
- Designed to meet interference regulation MPT1370.

Two models are available: a single input version to connect to an existing sound reinforcement system and a five input version where no sound reinforcement system is to be incorporated and there is a requirement for sound from up to five sources to be processed.

3. CURRENT / CONDUCTOR GRAPH



Only a single turn loop of cable is normally required.

This assumes that the receiver is 1.5 metres above or below the plane of the loop.

The graph corresponds to DLS use with the AGC switched on.

Thus the maximum r.m.s. current in the loop is limited in the event of fault conditions, such as feedback between loop and microphone.

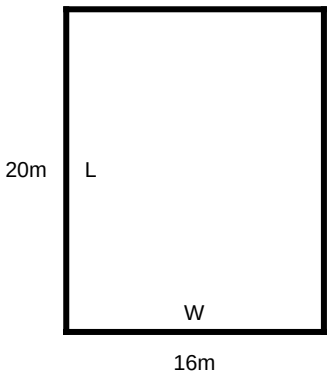
CONDUCTOR TYPE	COPPER AREA
1/0.8mm	0.5mm sq.
7/0.2mm	0.22mm sq.
13/0.2mm	0.4mm sq.
16/0.2mm	0.5mm sq.
24/0.2mm	0.75mm sq.
32/0.2mm	1.0mm sq.
30/0.25mm	1.5mm sq.

If the amplifier is to be used with the AGC switched off, a longer continuous current could be produced under fault conditions and therefore care should be taken to allow for this in selecting conductor type.

Example:

Aspect ratio (W/L) = 0.8
From the graph: 16m intersects with 0.8 A.R.
n area bounded by upper (UL) and lower (LL) limits of 0.22 and 0.50 mm sq. So either 0.2mm sq. or 0.50mm sq. may be used.

Current required = 7.8 Amps



4. CHECK-LIST FOR SYSTEM DESIGN USING TAL/DLS

Refer also to setting up procedure on following pages

4.1 Before starting you will need the following:

a) Tape measure (at least 10m long).

b) Magnetic field strength meter.

c) AFILS receiver (headphones and hearing aid recommended).

d) Tape of continuous speech and tape-player, or a sympathetic assistant with a microphone.

4.2 Using the receiver(s) and field strength meter check the area to be covered for background magnetic noise. Dimmers, power cabling, motors, etc., which can radiate powerful magnetic noise must be switched off during this test. No standard currently exists but we recommend that the noise should be at least 26dB below 0.1A/m and that the character of the noise is not objectionable (buzzes can sound worse than pure hum).

4.3 Together with the customer decide on the most appropriate positioning for the wire loop and take the dimensions so that an 'ideal' shape can be approximated (square or rectangle, etc.). Note the width (shortest side of the loop), and calculate in metres the aspect ratio by dividing the width by the length.

4.4 Using the graph, find the width (shortest side) of the loop and move vertically up the graph until an intersection is made with the appropriate 'aspect ratio' line.

4.5 The intersection of the loop width and 'aspect' ratio also determine the conductor area of the cable to be used, taking into account both the current-carrying capacity and cable resistance.

The current demanded by this size of loop can be read – off the vertical axis. If the current indicated is in excess of 9 Amps then separate loops should be employed, driven by separate amplifiers.

4.6 Temporarily install the loop as close as possible to its final position and test with the taped speech or microphone and TAL DLS amplifier to confirm design parameters.

Hidden metalwork, etc., may cause reductions in field strength which can be compensated by adjusting the master control during this test. In extreme cases the installation may prove totally unsuitable for loop use and an alternative technology offered to the customer (e.g. Infra-Red systems).

The frequency response should also be checked, losses of high frequencies may be recovered by the use of the TAL DLS 'Response' control.

4.7 Assuming satisfactory test results, permanently install the loop wiring (not in metal conduit or trunking), signal cabling (which should be routed as far as possible from the loop wire) and a.c. power supply. The amplifier generates heat and must be located in a position with adequate ventilation.

4.8 Set all 'input' front panel gain controls to maximum, the 'master' control and 'response' control to mid positions. Set the 'response' switch (located on the rear panel) to the required position – 5KHz for hearing-aid use, 10KHz for other uses.

4.9 Depending on the use of the system, the AGC is set-up in two alternative ways:

4.9.1 AGC and limiting (for hearing aid use). Select the AGC mode by setting the 'AGC' switch (located on the rear panel) to ON.

4.9.2 Limiting only (for non hearing aid use). Select the limiter only mode by setting the 'AGC' switch to OFF (the switch is located on the rear panel).

4.10 The master control should now be adjusted to give the required current drive to the loop, indicated by the bargraph display on the front panel. The field strength must be checked and the amplifier master control adjusted if necessary.

4.11 Check the field strength over the entire area to be covered, note any areas of poor coverage and ensure that hearing aid users are notified of such areas.

4.12 Confirm that the 'Loop Integrity' LED functions by disconnecting the loop wire, the LED should extinguish in about 5 seconds.

4.13 As a final check, the response control should be adjusted, if necessary, to achieve optimum frequency response.

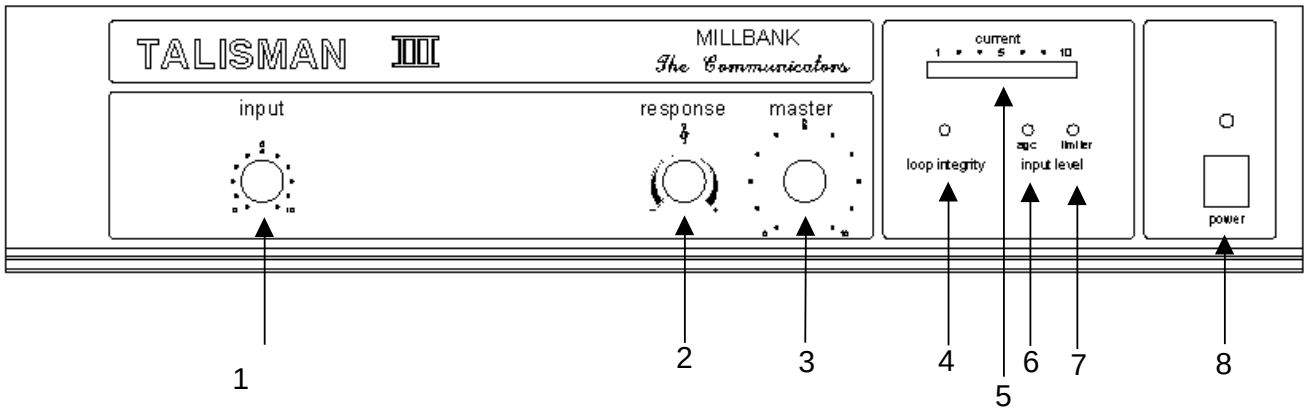
4.14 Set all unused input control to minimum.

4.15 The notice supplied with the equipment informing potential hearing aid users that the system is installed should be clearly displayed.

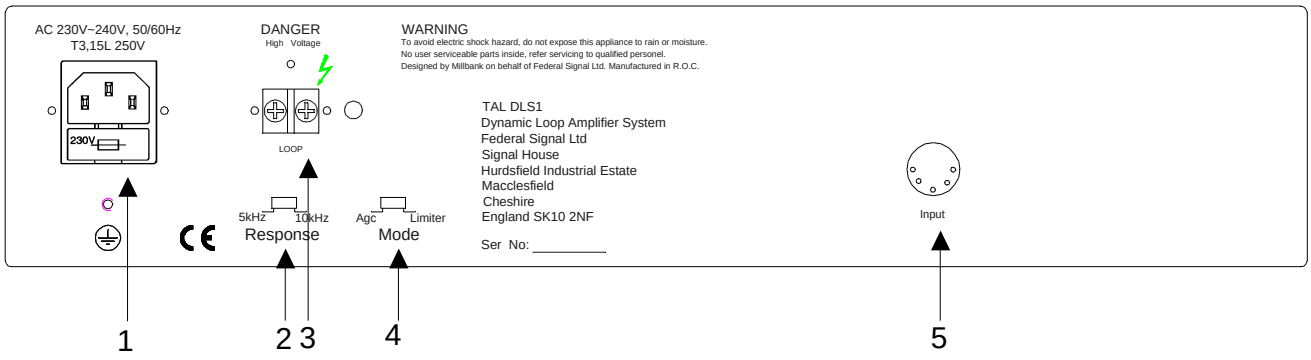
4.16 Before leaving the installation it is most important that the owner and users of the system are familiar with its operation and understand the need for regular checks to be carried out on the system – checking LED indicators for input level, loop integrity and drive current and performing listening tests.

5. CONTROLS AND CONNECTIONS

5.1 TAL/DLS1/3

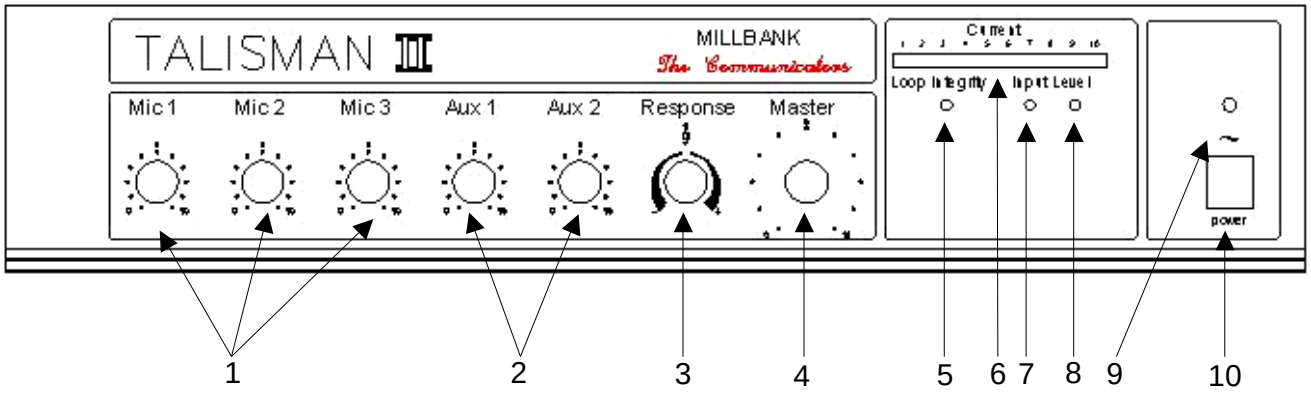


1. Input Level Control.
2. Tone Control.
3. Master Level Control.
4. Loop Integrity Indicator.
5. Loop Current Indicator.
6. AGC Indicator
7. Limiter Indicator.
8. Power On/Off Switch.

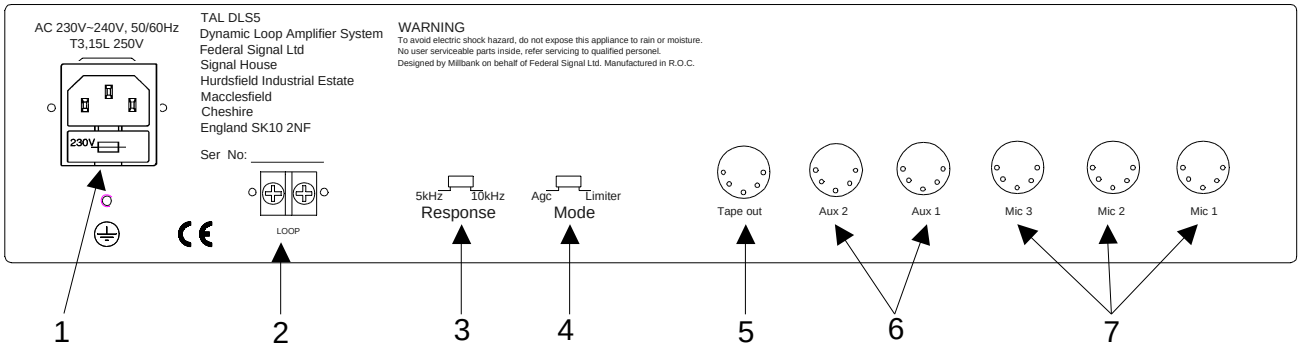


1. Mains Input Socket and Fuse
2. Frequency Response Switch
3. Loop Connector
4. Mode Switch
5. Input Socket

5.2 TAL/DLS 5/3



1. Microphone Input Level Controls
2. Auxiliary Input Level Controls
3. Tone Control
4. Master Level Control
5. Loop Integrity Indicator
6. Loop Current Indicator
7. Input Level AGC Indicator
8. Input Level Limiter Indicator
9. Power On Indicator
10. Power On/Off Switch



1. Mains Input Socket.
2. Loop Connector.
3. Response Switch.
4. Mode Switch.
5. Tape Output.
6. Auxiliary Inputs.
7. Microphone Inputs.

6. SETUP PROCEDURE

6.1 Connections

6.1.1 Loop

Screw connections are provided for connection of the wire loop.

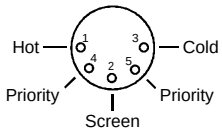
6.1.2 Microphones

All connections to the microphone inputs are by 5 pin180° DIN connectors, which are supplied with the equipment. Microphone 1 has the facility of priority, making it possible to mute all other inputs. To utilise this feature the access pins 4 & 5 must be closed (shorted) during the announcement, this is normally done via the PTT switch on the microphone to be connected.

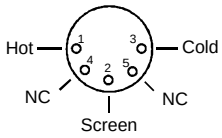
If the priority function on Microphone Input 1 is not used, ALL inputs will be in mix-mode.

All microphone inputs are balanced with 200µV @ 200Ω sensitivity. Signal is connected to pin 1 and the screen to pin 2.

Wiring Instructions for Microphone Input 1:



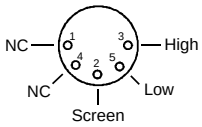
Wiring Instructions for Microphone Inputs 2 and 3:



6.1.3 Auxiliary

Up to two auxiliary input signals can be used, these can be from signal sources such as Cassette, Radio or CD players, Two sensitivity levels are provided at 300mV (low) and 50mV (high). Pin 3 provides the high sensitivity, pin 5 provides the low sensitivity and pin 2 is the screen connection.

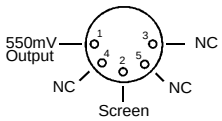
Wiring Instructions:



6.1.4 Tape output (DLS 5 only)

The connector can be used for recording purposes or driving slave amplifiers. An output level of 550mv (at full output) is provided on pin 1 and the screen or ground is on pin 2.

Wiring Instructions:



6.2 Setup

6.2.1 Set the response switch to the desired frequency response, this should be set to 5KHz for hearing impaired applications.

6.2.2 Set the mode switch to AGC (Automatic Gain Control) or the limiter position. In AGC mode (hearing impaired applications), the AGC LED should flicker off during pauses in speech by setting the input level using the input level controls located on the front panel. In the limiter mode, the input level should be set such that the limiter LED only illuminates during signal peaks.

For hearing impaired applications.	Set the response switch to 5KHz, the mode switch to AGC. The AGC input level LED should illuminate only whilst signal is passing through the equipment.
For silent paging applications.	Set the response switch to 10KHz, the mode switch to Limiter. The limiter LED should only illuminate during signal peaks.

Additional gain and frequency responses are programmable and further advise may be sought from the Customer Services department of Federal Signal Limited – see details overleaf.

7. Service and Warranty

Federal Signal Ltd. guarantees this product against defects in either materials or workmanship. The guarantee **does not** extend to damage caused by improper installation, improper storage, misuse, or operation outside stipulated conditions.

Our warranty covers only goods returned to our premises for either repair or replacement as deemed appropriate by Federal Signal Ltd.
In order to expedite the process:

Contact your supplier and quote the model and serial number of your equipment.

Should you require sending the goods directly to the manufacturer, please contact Federal Signal Limited Customer Services, which will provide you with a Return Goods Authorisation (RGA) number.
This RGA number should then be referenced on every related correspondence.

If it is necessary to re-pack the equipment for onward shipping or returning to Millbank for service or repair, PLEASE ENSURE THAT THE ORIGINAL PACKING OR EQUIVALENT IS USED.

IN CASE OF SERVICE REQUIREMENTS PLEASE CONTACT YOUR SUPPLIER
IN THE EVENT OF DIFFICULTY COMMUNICATE DIRECT TO:

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Document Change History

Issue	Details	Date
01	First Issue	Mar 00
02	Updated to include new standard clauses and company details	May 01
03	Updates section 6 to include wiring details and referral to additional programming features	Dec 01
03	Jumper setting investigated and recorded – See Customer Services Department	Dec 01

Referenced Documentation

Title	Publication Code

Referenced Tools

Description	Part Number