



# MILLBANK



**THE INTELLIGENT USE OF SOUND**

## ULTIMA II

### INTEGRATED AMPLIFIERS

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**INSTALLATION GUIDE**

**XK60**

**XK120**

**XK240**

**XKS120**

**XKS240**

MILLBANK

## 1. GENERAL DESCRIPTION

The Millbank ULTIMA II range represents a technically sophisticated range of integrated public address amplifiers, By using innovative design concepts and the latest technology, the amplifiers boast a range of features not normally available on amplifiers in the price range. Most importantly, these built-in features make the ULTIMA II range the simplest to configure and install with no internal adjustments or retrofit options required. Four models are available: two six input mixer amplifiers with 60 and 120 Watt output powers and two, two input slave amplifiers with 120 and 240 Watt output powers.

The mixer amplifiers have the following features:

## 2. FEATURES

### 2.1 Universal Input Pre-amplifier

The ULTIMA II features six inputs, the first five of which feature a 'universal' input, which allows simple configuration via slide switches associated with each input. Each of these offer a balanced input, with a trim control to allow a wide range of signal sources from microphone to line levels to be used.

### 2.2 Priority

The first five inputs have a priority ladder as follows:

- Input 1 - Mutes all other inputs.
- Inputs 2 – 5 - First come first served.
- Input 6 - No priority.

When no priority terminal is closed, all inputs act as mixing inputs.

### 2.3 Volume restoration

Enables remote volume restoration relays to be operated when the input priority terminals are closed.

### 2.4 Chime Trigger

Each of the first five inputs have a switch selectable two note chime, the chime activates when the input priority terminals are closed.

### 2.5 Phantom Power

Each of the first five inputs have a switch selectable Phantom Power facility, providing 18 Volts per input.

### 2.6 Alarm Tone Generator

Input 1 can be set as an alarm tone generator, the tone is generated on closure of the priority input.

### 2.7 Speech only output

Each mixer amplifier provides two 100V line outputs, the 'Speech & Music' output is permanently connected to the output of the amplifier providing output of all amplifier traffic, the 'speech only' output is only connected whilst a priority is closed, this can provide paging only to areas where music is not desired.

### 2.8 Dual Supply Operation

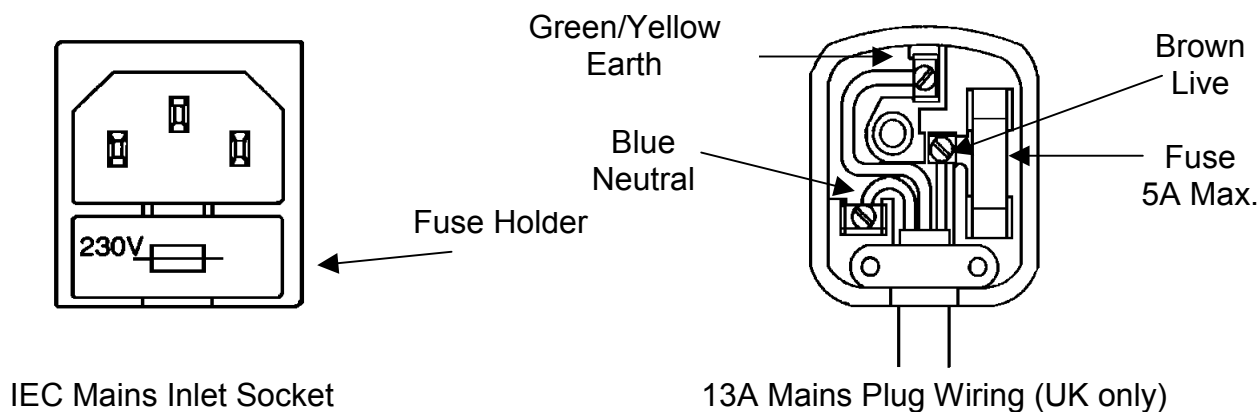
Each amplifier in the range may be operated from a 220 V – 240 Vac supply or a 24 Vdc supply.

### 3. INSTALLATION

#### 3.1 Precautions

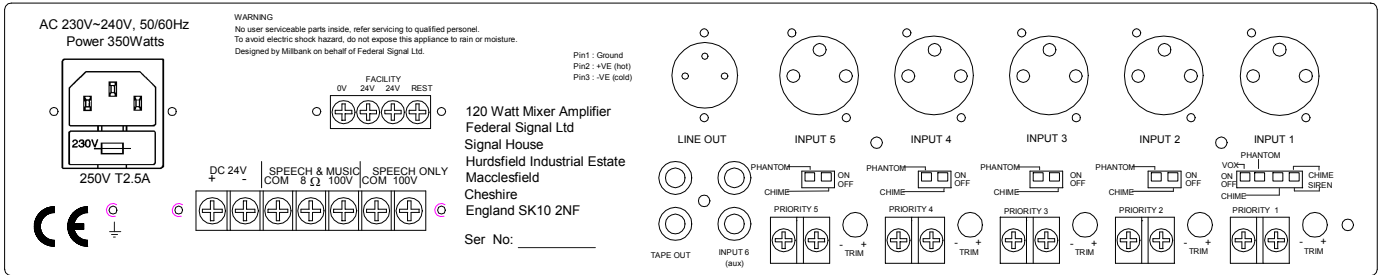
**IMPORTANT:** Before operating the PAC Amplifier please take note of the following points:

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



- 3.1.2 For mains connections other than the UK, refer to the local requirements for connections to supply.
- 3.1.3 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 speaker outputs.
- 3.1.4 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.
- 3.1.5 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.
- 3.1.6 Never make an internal adjustment when the AC supply is connected.

## 4. REAR PANEL OF MIXER AMPLIFIER



### 4.1 INPUTS

#### 4.1.1 Input Sockets 1- 5.

Input sockets 1 – 5 are balanced female XLR connectors, suitable connectors are provided with this equipment.

Balanced operation is achieved by wiring as follows:

- Pin 1 – Ground
- Pin 2 – + VE (Hot)
- Pin 3 – -VE (Cold) does not indicate polarity

Unbalanced operation is achieved by wiring as follows:

- Pin 1 – Ground
- Pin 2 – + VE (Hot)
- Pin 3 – Link to Pin 1

#### Priority Input 1

Closing the priority contacts directly below input 1 will cause all other inputs to be muted (volume of all other inputs reduced) by greater than 40dB.

#### Priority Inputs 2 – 5

Closing the priority contacts below each of inputs 2 – 5 will cause all other inputs to be muted assuming no other input was already accessed. These inputs operate on a first come, first served principal. Priority will not be established if another input had gained priority by being in use first.

#### Trim Control

Associated with each input 1 – 5 is a trim control located below the input, this control allows in input sensitivity to be adjusted from 1mV to 200mV, use this control to adjust to a suitable level for your input signal, e.g. A microphone will need this control to be at its most sensitive position.

#### Input 1 Options

Input 1 has four options, each of these options are selected by a set of slide switches located directly below the input socket. The option is turned on with the switch set in its uppermost position. The options are as follows:

**VOX** This option allows a VOX (Voice operated switch) facility to be used, when this facility is turned on, any signal (e.g. speaking into a microphone) above the threshold level will cause all other inputs to be muted, when the signal is discontinued, the other inputs will be gradually restored.

**Phantom Power** This option provides 18VDC phantom power on the XLR socket, this is often used to power external low current devices such as Electret Condenser Microphones. Add supply polarity

**Chime** This option allows the chime facility to be activated. If set, a two note chime will be heard through the Loudspeakers when the priority terminals are closed.

**Chime / Siren** This option allows the priority terminals once closed to activate the chime or a siren, if set to the siren position, a siren will sound for the duration of the closure of the priority terminals.

## Input 2 – 5 Options

**Phantom Power** This option provides 18VDC phantom power on the XLR socket, this is often used to power external low current devices such as Electret Condenser Microphones.

**Chime** This option allows the chime facility to be activated. If set, a two note chime will be heard through the Loudspeakers when the priority terminals are closed.

4.1.2 **Input 6** Input 6 provides two standard RCA phono sockets, these allow connection of a stereo signal source such as a CD player, whilst both sockets can be used for connection of a stereo signal source, both channels are internally mixed providing mono reproduction.

4.1.3 **Tape Output** These standard RCA phono sockets provide a mixed out-put suitable for connection to a tape or cassette recorder.

## 4.2 FACILITY TERMINALS

### 4.2.1 24VDC Output

The two terminals to the right provide a 24VDC current protected output, this can be used to supply external devices (such as relays, line pre-amplifiers etc.) to a maximum of 250mA.

### 4.2.2 Restoration

The two right most terminals provide volume restoration. When a closure of any of the priority terminals is detected, the terminal marked "REST" will conduct to ground (open collector), this can be used to drive volume restoration relays in volume controls or simply drive "Busy" lamps in multiple microphone systems.

### 4.2.3 External power

An external 24VDC power supply may be used, both DC and AC power supplies can be used simultaneously, If an AC supply is present the amplifier will automatically use the AC supply. Failure of the AC supply will cause the amplifier to automatically switch to the external DC supply if present. Please note, the DC supply is unswitched, an external switch must be fitted for isolation of this supply.

### 4.2.4 Loudspeaker Connections

It is possible to connect 100V line loudspeakers or Low Impedance Loudspeakers, Under no circumstances must the two be mixed. The output is overload protected.

### 4.2.5 Speech & Music

These loudspeaker output terminals give a permanent output of all signals passing through the amplifier. Three terminals are provided, "0V" gives a common connection for the 100V connection and the 8Ω connection. Connect the loudspeaker circuit to the 100V terminal if 100V line loudspeakers are used or connect the loudspeaker circuit to the 8Ω terminal if low impedance loudspeakers are used. Note: Do not connect any loudspeaker circuit where the load impedance is less than the minimum source impedance. E.g. if wiring to the 8Ω terminal, the total load impedance must not be less than 8Ω.

### 4.2.6 Speech Only

These loudspeaker terminals are 100V line only, an output is provided only when a priority exists. This is useful when an area needs coverage only from a priority source such as a paging microphone.

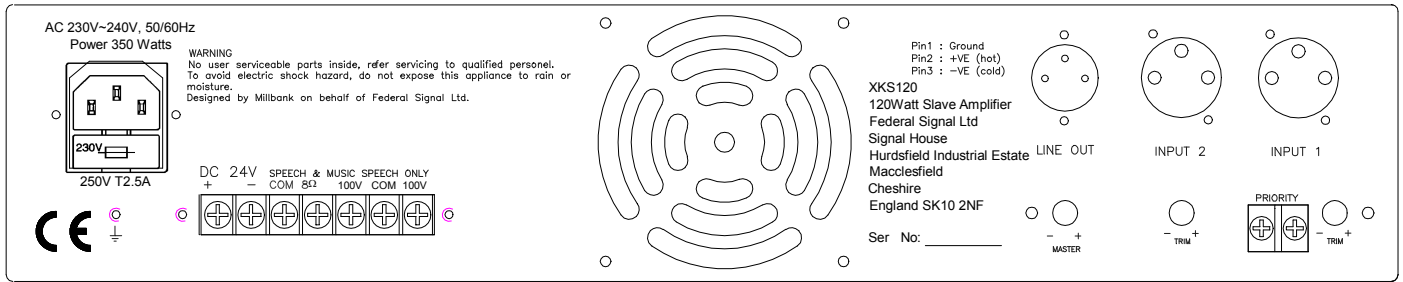
### 4.2.7 Line Out

The Line Out connector provides an output (1V) for connection to slave amplifiers for larger systems where more power is required. A connector is provided with the amplifier. The output connections are as follows:

Pin 1 – Ground

Pin 2 – Signal

## 5. REAR PANEL OF SLAVE AMPLIFIER



### Rear Panel of Slave Amplifier

#### 5.1 INPUTS

##### 5.1.1 Input 1

Input 1 is an unbalanced input with a sensitivity of 1V, cable connectors are provided within the packaging for this input. Connections are as follows: Pin 1 – Ground  
Pin 2 – Signal

**Priority :** The priority terminals when closed will mute any signal on input 2 by > 40dB.

##### 5.1.2 Input 2

Input 2 is an unbalanced input with a sensitivity of 1V, cable connectors are provided within the packaging for this input. Connections are as follows: Pin 1 – Ground  
Pin 2 – Signal

##### 5.1.3 Trim Control

For each input a trim control is provided, this control allows the input signals to be adjusted to a suitable level.

#### 5.2 MASTER LEVEL CONTROL

The master control allows the output level of the amplifier to be set, adjust this control to the desired output level to the loudspeakers.

#### 5.3 FACILITY TERMINALS

##### 5.3.1 Loudspeaker Connections

It is possible to connect 100V line loudspeakers or Low Impedance Loudspeakers, Under no circumstances must the two be mixed.

##### 5.3.2 Speech & Music

These loudspeaker output terminals give a permanent output of all signals passing through the amplifier. Three terminals are provided, "0V" gives a common connection for the 100V connection and the 8Ω connection. Connect the loudspeaker circuit to the 100V terminal if 100V line loudspeakers are used or connect the loudspeaker circuit to the 8Ω terminal if low impedance loudspeakers are used. Note: Do not connect any loudspeaker circuit where the load impedance is less than the minimum source impedance. E.g. if wiring to the 8Ω terminal, the total load impedance must not be less than 8Ω.

##### 5.3.3 Speech Only

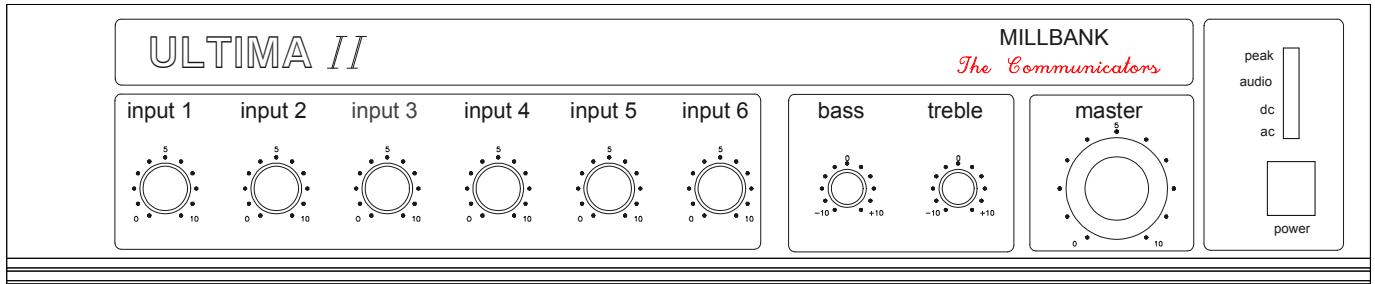
These loudspeaker terminals are 100V line only, an output is provided only when a priority exists. This is useful when an area needs coverage only from a priority source such as a paging microphone.

##### 5.3.4 Line Out

The Line Out connector provides an output for connection to slave amplifiers for larger systems where more power is required. A connector is provided with the amplifier. The output connections are as follows:

Pin 1 – Ground  
Pin 2 – Signal

## 6. FRONT PANEL



### Front Panel of Mixer Amplifier

#### 6.1 Input Level Controls

Six input level controls are provided, each will increase (rotate clockwise) or decrease (rotate anti-clockwise), the input level of it's respective input. If the control seems too sensitive or not sensitive enough, adjust the trim control located on the rear panel.

These controls should be adjusted such that each of the inputs give equal volume level.

#### 6.2 Master Level Control

The large master level control is used to set the overall volume level from the system, adjust this control to obtain the desired volume level. Note: this control is located on the rear panel of the slave amplifier.

#### 6.3 Bass & Treble controls

These controls allow the equalisation of the system to be adjusted, providing  $\pm 8\text{dB}$  of adjustment @ 100Hz and 10KHz respectively. Adjust these controls to suit the loudspeakers and acoustics of the areas to be covered.

#### 6.4 Power Switch

This push switch turns on (switch in) or off (switch out) the AC mains power, when switched on and power is connected the ac power indicator will illuminate.

#### 6.5 AC LED

Indicates that the set is turned on and power is connected.

#### 6.6 DC LED

Indicates that DC is connected and AC power is missing or the set is turned off. Note: DC power is not routed through the power on/off switch, if DC power is to be used, ensure that suitable isolator switches and fuses are fitted.

#### 6.7 Audio LED

This led will illuminate when a signal is detected passing through the output stage of the amplifier.

#### 6.8 Peak LED

This led will illuminate when 90% of the maximum output of the amplifier has been reached, avoid operating this equipment with the indicator flashing on regularly or permanently on.

**7. FAULT FINDING GUIDE**

Symptom	Possible Cause	Remedy
AC power LED does not show	AC power supply missing.  Set is turned off.  AC fuse has blown.	Ensure that the supply cable is correctly connected to a mains outlet and the supply is turned on.  Switch on set by pressing in the power on/off switch.  Remove AC power cord from the mains supply, remove AC power cord from the rear of the amplifier, remove and check fuse. Only replace the fuse with the same type and rating. If the fuse continues to fail, contact your supplier. <b>DO NOT REPLACE WITH A HIGHER RATED FUSE.</b>
DC LED does not show	DC power missing.  AC power connected.  Internal DC fuse blown.	Check that the 24Vdc is present at the DC input terminals on the rear of the equipment.  If AC power is being used, the equipment auto switches the LED's to show which supply is being used.  The covers to this equipment must only be removed by competent, qualified personnel.
Sound output is very low	Incorrect level settings	Check trim controls on rear of equipment, input level controls and master output level control.
Sound output is very low and distorted. Amplifier gets very hot.	Impedance mismatch or short on loudspeaker line.  Oscillation.	Check loudspeaker circuit impedance. The minimum for each amplifier is shown in the specification. Check for short to ground  Make sure that the loudspeaker circuits are kept away from sensitive microphone circuits, if these must cross, ensure this is done at right angles.
Excessive Hum & Noise	Poor signal ground.  Earth loop.	Check all signal sources to ensure that the ground (screen) connection to the amplifier is good.  If other equipment with a ground connection is used, an earth loop may be formed causing hum. Disconnect the screen connection at the amplifier. <b>DO NOT DISCONNECT THE SAFETY EARTH FROM ANY EQUIPMENT.</b>



8. SPECIFICATION

Specification	XK60	XK120 / XKS120	XK240 / XKS240
Rated output power <2% THD @ 1KHz 100V line: Low Impedance:	60W @ 166.6Ω 60W @ 8Ω	120W @ 83.3Ω 120W @ 8Ω	240W @ 41.6Ω 240W @ 8Ω
Power Consumption Quiescent: Full Power:	25VA 170VA	30VA 350VA	35VA 700VA
Weight Nett: Packed:	7.5Kg 8.5Kg	9.5Kg 10.5Kg	11.5Kg 12.5Kg

Input Specification	Sensitivity	Frequency Response	Signal to Noise Ratio
Inputs 1 to 5	1mV to 200mV Continuously Adjustable	70Hz – 15KHz	>58dB
Input 6	500mV	70Hz – 15KHz	>65dB
Slave Input	1V	30Hz – 18KHz	>80dB

Specification General													
Common Mode Rejection	Better than 40dB												
Slave output	1V												
Tape output	300mV												
Tone Controls	Bass ±8dB @ 100Hz, Treble ±8dB @ 10KHz												
Headroom	Better than 30dB all inputs												
Output regulation	Better than 2dB												
THD –3dB @ 1KHz	<0.2%												
Operating temperature range	-10 to 35°C												
Dimensions (HWD)	88mm x 430mm x 270mm												
Power Supply AC	Nominal 230V AC												
Power Supply DC	24V DC												
Accessories	<table border="0"> <tr> <td>Mixer Amplifier</td> <td>Slave Amplifier</td> </tr> <tr> <td>1 x Instruction Manual</td> <td>1 x Instruction Manual</td> </tr> <tr> <td>5 x XLR male plug</td> <td>2 x XLR male plug</td> </tr> <tr> <td>1 x XLR female plug</td> <td>1 x female XLR plug</td> </tr> <tr> <td>1 x Set rack mounting kit</td> <td>1 x Set rack mounting kit</td> </tr> <tr> <td>1 x Mains supply lead.</td> <td>1 x Mains supply lead.</td> </tr> </table>	Mixer Amplifier	Slave Amplifier	1 x Instruction Manual	1 x Instruction Manual	5 x XLR male plug	2 x XLR male plug	1 x XLR female plug	1 x female XLR plug	1 x Set rack mounting kit	1 x Set rack mounting kit	1 x Mains supply lead.	1 x Mains supply lead.
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## 9. Service and Warranty

Federal Signal Ltd. guarantees this product against defects in either materials or workmanship. The guaranty **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:

**MILLBANK ELECTRONICS Customer Service**