

The Balance Box

A precision microphone or line amplifier for balanced or unbalanced signals producing clean low distortion audio of the highest technical quality.

The Balance Box is for the matching of impedance, amplification, suppression of crosstalk, and to provide rejection of radio interference at frequencies in the range 25 Hz to 1 GHz. This is achieved without using heavy matching transformers that limit audio performance.

The use of close tolerance (0.1%) components and a state of the art transformerless design enables the unit to operate with a variety of inputs, either balanced or unbalanced, with low noise and distortion, while operating from a single PP3 battery. Extended frequency response with low phase shift results in superior transient performance compared to transformers. The floating nature of the circuit enables both input and output to be configured as balanced or unbalanced, in either the microphone or line modes at all gain settings, without change to the nominal stage gain selected. Comprehensive protection from radio interference, including digital mobile phones, is provided by the balancing of the lines, low pass filtering, and screening.



The excellent distortion, noise and common mode rejection (i.e. interference cancellation) performance enables the device to be used where a high quality audio signal is needed, e.g. digital front ends, as well as educational, news gathering, live music recording, public address, entertainment, multimedia and industrial purposes.

Typical microphone modes of operation

a) With long microphone cable runs, the Balance Box can be used, with either balanced or unbalanced microphones, and, with switchable gain in the range 20 dB to 50 dB in 10 dB steps, to provide a low impedance high level output for driving long balanced lines particularly advantageous in electrically noisy environments.

b) With short microphone cable runs, the Balance Box can be used as a high quality balanced pre-amplifier driving an unbalanced input directly.

Typical line modes of operation

a) With such sources as CD, DAT, cassette players and tuners, the Balance Box can be used as a line input device with a high bridging input impedance and gain selectable in the range -10 dB to 20 dB in 10 dB steps to convert an unbalanced output to a low impedance balanced line output. (With a stereo source a balanced mono signal can be obtained by using two 22 kOhm resistors from the unbalanced left and right outputs connected to Pin 2 of the Balanced Box input, with Pins 1 and 3 grounded. Alternatively, for stereo two units are required.

b) Conversely, the Balance Box may be used to convert an unbalanced input on mixing desks, control centres, cassette and DAT recorders, etc. to a balanced input where this facility is not available or is of inadequate performance.

Typical Performance Specification

Frequency Response	+/- 0.25 dB from 2 Hz to 20 kHz
Noise	<-125 dBu referred to the input (Note 1)
Distortion	<0.005 % from 2 Hz to 20 kHz
Phase Shift	<1 degree from 2Hz to 5 kHz
Gain	
MIC (microphone mode)	20 dB, 30 dB, 40 dB and 50 dB (+/- 0.5 dB)
LINE (line mode)	-10 dB, 0 dB, 10 dB and 20 dB (+/- 0.5 dB)
Common Mode Rejection	>110 dB at maximum gain; >80 dB at minimum gain
Input Common Mode Clipping	+10dBu at any gain setting
Input Impedance	
MIC	2 kOhms - for 100 Ohm to 600 Ohm microphones
LINE	60 kOhms - bridging input
Input Clipping Level	
MIC	-10dBu
LINE	+16dBu
Output Impedance	50 Ohms
Output DC Offset	<50 mVolts at any gain setting
Output Clipping Level	+10 dBu into 600 Ohms
Connectors	
Input	XLR 3 pin female or 3 pole A gauge jack combination socket
Output	XLR 3 pin male
Pin Connections	PIN 1 (sleeve) GROUND; PIN 2 (tip) SIGNAL; PIN 3 (ring) RETURN. To unbalance connect PIN 3 to ground
PP3 Alkaline Battery Life	50 hours
External DC Connector	2.5 mm. centre pin positive (Note 2)
Dimensions	Width 80 mm, Height 45 mm, Depth 135 mm
Weight	300 gm including battery

Notes to Specification

- 1) Measurements of dBu are dB with respect to 0.775 Volts.
- 2) The unit may be operated from an external supply between 6 Volts and 12 Volts DC (maximum) at 100 mA The recommended voltage is 9 Volts. The supply for each unit should be fully floating and regulated.
- 3) The circuit is DC coupled and no voltage offsets should be present on the input or output.
- 4) In the Line mode, if ground loop problems are experienced, the signal ground can be disconnected at the balanced receiving connection.
- 5) It is recommended that a nominal peak output of 0 dBu is used to avoid peak clipping.

Operating Controls

Front Panel

Gain Selection	Four position rotary knob
Microphone/Line selection	Two position slide switch
Connectors	Audio input and output

Rear Panel

Battery Holder	PP3 externally accessible
Power on/off	Two position slide switch with LED indicator
Connector	External DC supply