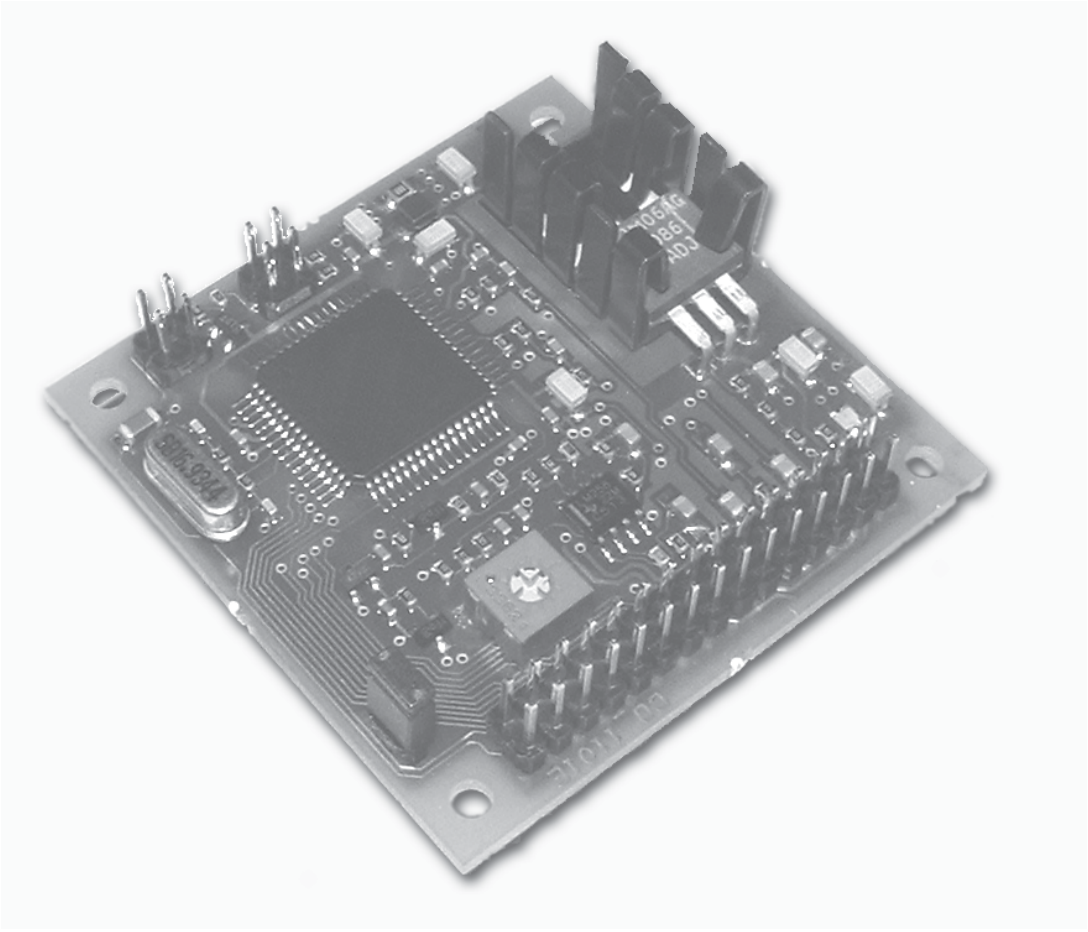
bhi

ENC-1
Echo and Noise Cancellation DSP board

User Guide



1064-100D
Issue A

1. General.

The bhi ENC-1 board provides DSP noise cancellation and echo cancellation on one small compact circuit board. A block diagram of the board is given in Figure 1. In addition to the on-board echo and noise cancellation features, the bhi ENC-1 board provides a **R**esidual **E**cho **S**uppression **C**ircuit (RESC) to suppress residual echo which may occur in cases of non linearity in the audio path or if the microphone and speaker of a hands free application are very close together.

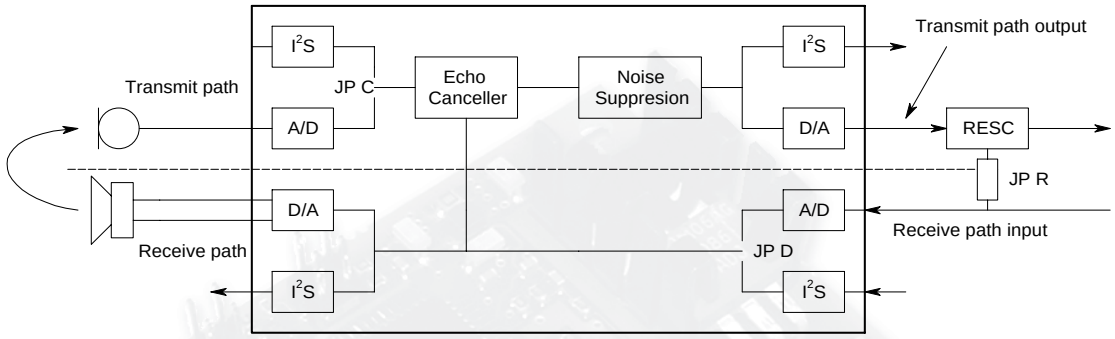


Figure 1: Block diagram of the bhi ENC-1 Board

Supply voltage range for the bhi ENC-1 evaluation board is 6V to 15V. The schematic of the board is given in Figure 2.

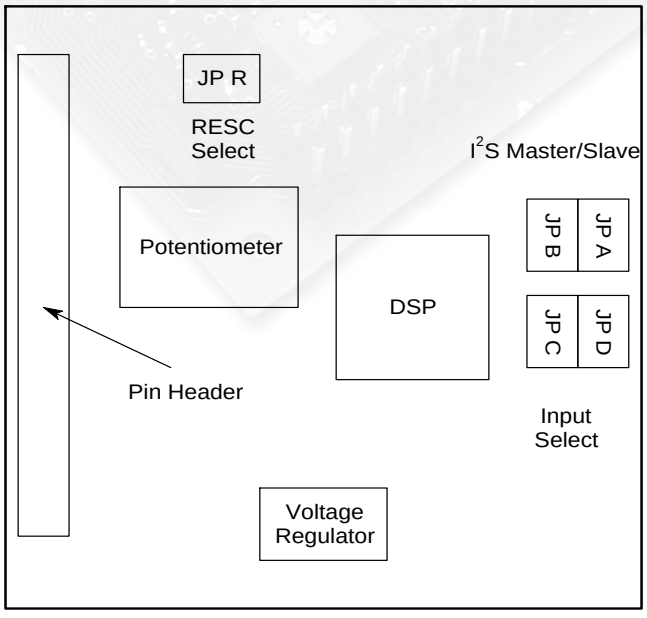


Figure 2: Schematic of the ENC-1 Board

The pin head connector on the evaluation board is used to interface the board with the power supply, the I/O signals and to set the desired echo and noise parameters.

2. Specifications.

Features

- Echo Suppression 40 dB (max.)
- Suppression of signals with an echo path delay of up to 128ms
- Noise Suppression 9 - 35dB
- Single ended analogue inputs and outputs
- Industry standard digital audio Interface
- Input and output levels

ELECTRICAL CHARACTERISTICS

(V_s=16V, T_{amb}= 25^{i}C unless otherwise stated)

DC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_s	Supply voltage		12	16	18	V
Iq_s	Quiescent current	V_s = 12V V_s = 16V V_s = 18V		4.6 6.8 7.1		mA

ANALOGUE CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min	Typ	Max.	Units
T_d	System delay			26		mS

DIGITAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{OutHigh}$	High level digital output voltage	I_{OHigh} = 0.4mA	V_{dd}-0.7		V_{dd}	V
V_{Olow}	Low level digital output voltage	I_{Olow} = -0.4mA	0	0.2	0.4	V
I_O	Output leakage current				30	mA
R_{DL} C_{DL}	Output load (digital)		1	 20		KW pF
V_{inHigh}	High level input voltage (Scmitt trigger)				3.3	V
V_{inLow}	Low level input voltage (Scmitt trigger)		0.8			V
I_{iHigh} I_{ilow}	Input leakage current	Vin = Vdd Vin = 0V	10 -30	30 -30	60 -60	mA
V_{ON}	ON input	Edge triggered			5	V

2.1. Applications

The bhi ENC-1 is ideally suited to a number of applications where noise and interference give rise to poor voice communications. Suitable applications are Amateur radio, commercial, military and emergency service communications systems and intercoms and hands free applications. The boards can be connected into the microphone path or the receive path of Recording equipment, CCTV, door entry intercom systems, removing unwanted background noises, like the sounds of car engines, road and wind noise and the sounds of generators and machinery etc.

3. Echo and Noise cancellation parameters

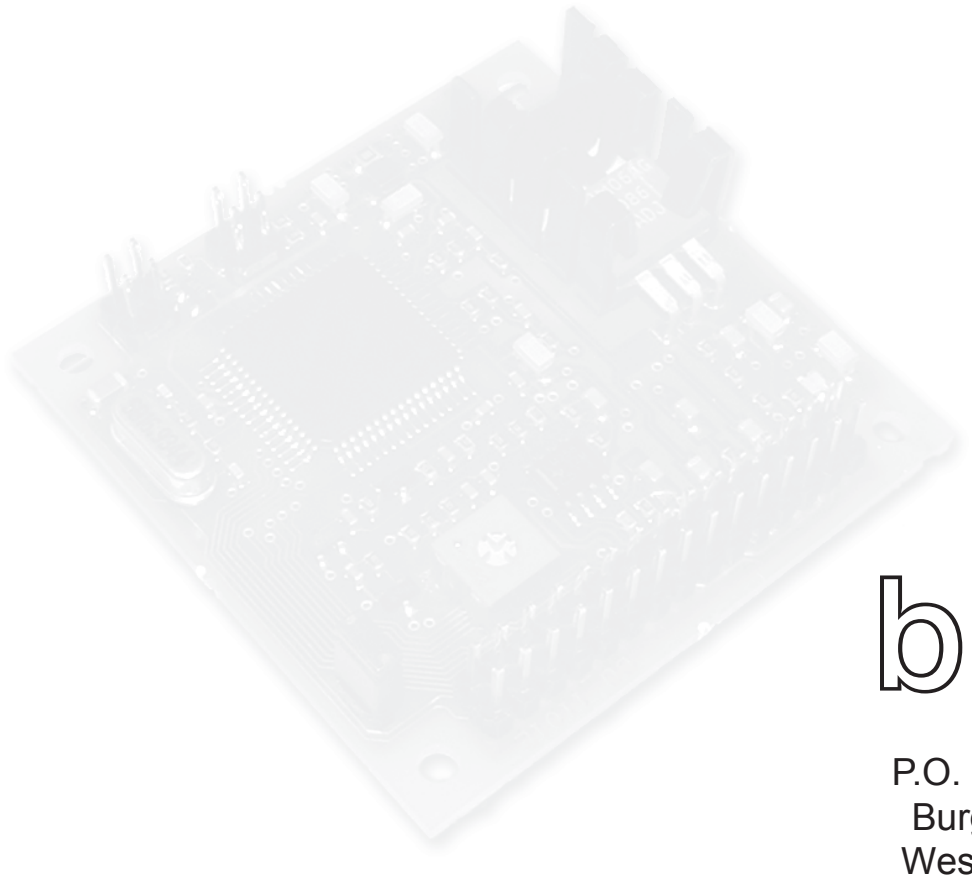
The echo and noise parameters can be set using the jumpers on the bhi ENC-1 Evaluation Board (see fig 2). Table 1 and Table 2 give the echo cancellation and noise suppression parameters as a function of the jumper settings. The pin description is given in Figure 3 below.

Pin	Jumper	Description
29-30	OFF	Echo cancellation enabled
	ON	Echo cancellation disabled
27-26	OFF	Noise suppression enabled
	ON	Noise suppression disabled

Table 1: Echo and Noise control by jumpers

Jumper			Description
21 - 22	23 - 24	25 - 26	
ON	ON	ON	Suppression level 1 (weakest)
OFF	ON	ON	Suppression level 2
ON	OFF	ON	Suppression level 3
OFF	OFF	ON	Suppression level 4
ON	ON	OFF	Suppression level 5
OFF	ON	OFF	Suppression level 6 (recommended)
ON	OFF	OFF	Suppression level 7
OFF	OFF	OFF	Suppression level 8 (strongest)

Table 2: Noise suppression level as a function of the jumper setting



bhi

bhi Ltd
P.O. Box 318
Burgess Hill
West Sussex
RH15 9RR
England
Tel: (0845)217 9926
Fax: (0845)217 9936
sales@bhi-ltd.co.uk
www.bhi-ltd.co.uk