Applied Dynamic Measurements
ABN: 76 367 043 296

P.O. Box 294
NORTH BEACH WA 6920
AUSTRALIA

Telephone: 0414 472 901
Outside Australia: + 61 414 472 901
Email: sales@admnetworks.com
Web site: www.admnetworks.com

AWN-3
3-CHANNEL ACOUSTIC WEIGHTING NETWORK

Designed and manufactured by Applied Dynamic Measurements.

Serial number:

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1. SPECIFICATION AWN-3

Tolerance
All networks to Type '0' precision

Input
Max input ± 2.5 V for A, B, C networks (clipping)

Output Impedance
~100Ω unity gain stable into 1000 pF load

Noise
Typical Noise Spectral Density:
A = 70 $nV/Hz^{(1/2)}$
B = 60 $nV/Hz^{(1/2)}$
C = 50 $nV/Hz^{(1/2)}$
Measured at 1 kHz with 50Ω i/p termination

Environmental
Temperature -10 to +55 C

Power Requirements
± 3.5V to ± 15V @ ± 8mA

Dimensions
5.5 x 20 x 46 mm (H x W x D)
Weight 20 grams.

2. WARRANTY

The AWN-3 Acoustic Weighting Network is supplied with a conditional 12-month warranty from the date of purchase.

Applied Dynamic Measurements (ADM) undertakes to repair and recalibrate the instrument free of charge if the failure is the result of faulty workmanship or premature component failure.

This warranty does not extend to failure resulting from misuse of the instrument either of a physical or operational nature. Operational misuse refers to operations outside of the guidelines of the equipment handbook, in particular misconnection of signal sources and signal levels outside the recommended range.

The customer will cover the cost of returning the damaged instrument to ADM, in turn ADM will cover the cost of repair and any reasonable return cost for transportation to the customer.

Warranty Instructions

1) Please advise ADM of the pending warranty claim and the circumstances of the failure, prior to dispatching the instrument for repair.

2) Ensure that the instrument is packed adequately to prevent damage in transit.

3) The return address may be found by viewing the **Contact details** section of the ADM web site at *http://www.admnetworks.com*

All warranty claims will receive a high priority in order to minimise the delay and associated inconvenience to the customer.

3. FEATURES

The AWN-3 is a high precision set of acoustic weighting networks offering A, B, and C functions designed to comply with ANSI S1, 42-1986 (R1998).

The compliance of instrument makes it suitable for laboratory use; however, its compact size and low cost make it suitable for many signal processing applications including OEM.

The A and C weighting networks are commonly found in sound level meters but offer only one integrated measurement for the entire frequency range of the selected network. Conversely, the AWN-3 provides the corresponding weighted magnitude of each frequency point. In other words it can be used with other instrumentation to precisely identify the offending frequency components that contribute to an excessive weighted noise measurement.

4. OPERATION

CAUTION: Observe the maximum input rating of 5V peak to peak. Inputs larger than 5V are automatically clipped to protect the instrument from damage. Clipped signals always introduce signal distortion!

The AWN-3 module needs to be connected to a power supply and signal input and signal output connections need to be made before it is operational. This may be achieved by inserting the module into the Development Board DEV-1 or alternatively inserting the AWN-3 into a custom made printed circuit board or other acoustic measurement instrument.

Prior to making any connections to the AWN-3 module refer to the 1 page **Data Sheet** that is supplied with the module. This provides Outline Dimension information on the pin spacing as an aid to pcb layout. The Pin Connection information gives the pin allocation information for power supply and signal connections to the device. The AWN-3 pin number sequencing is shown on the device label.

CAUTION: Observe the polarity of the power supply connections to Pins 1 and 2 and ensure that the applied voltage is in the range ± 3.5V to ± 15V.

Pin 2 may be used as the power supply reference connection (0V) while Pin 7 is connected to the input signal reference (0V). Simultaneous A, B and C outputs are available from Pins 4, 5 and 6 respectively.

5. WEIGHTING NETWORKS

The subjective response of the human ear to the perceived loudness of sound not only varies with sound pressure but also with frequency.

The process of sound measurement must include an electronic weighting network for the measured result to bear any relationship to the perception of loudness and for the measurement to simulate the response of the human ear.

In order to compensate for variations in loudness due to sound pressure sensitivity, sound pressure measurements are divided into 3 regions. The A weighting network is designed to approximate the response of the human ear at low sound pressure levels i.e. below 55 dB. The B weighting network is designed for sound pressure levels in the range greater than 55 dB through to 85 dB, while the C weighting networks is designed for sound pressure levels greater than 85dB.

It immediately becomes obvious that given the extent of each of these ranges, an inherent error will exist in most weighted sound pressure measurements, since only one sound pressure level within each range will accurately match the response of the human ear.

This error may be further compounded by the selection of an incorrect weighting network for the measurement of higher sound pressure levels.

6. APPLICATIONS

The AWN-3 provides a reference transfer function of the A, B, and C weighting functions. Any time signal applied to the input will be filtered by the selected weighting function. Sound signals picked up by a microphone may be weighted prior to recording or acquisition. Similarly, unweighted recorded time signals may be played back through the AWN-3 for review and analysis.

When used in conjunction with a Dynamic Signal Analyser, time signals connected to the AWN-3 will show the contribution of individual frequency components to the noise measurement process.

It should be remembered that filter settings in external instrumentation i.e., high pass or low pass filters where the cutoff frequency is within a decade of the weighting network cutoff, will influence the final response and should be taken into account. A convolution of the two transfer functions will occur since they are now in series i.e., H(s)=H(f) * H(g).

The AWN-3 may be used in any signal processing chain where frequency weighting is required. Other applications include research and teaching where these particular transfer functions may be required or need to be demonstrated.

Typical instrumentation setups are shown below:

Field Data Collection

Laboratory Analysis

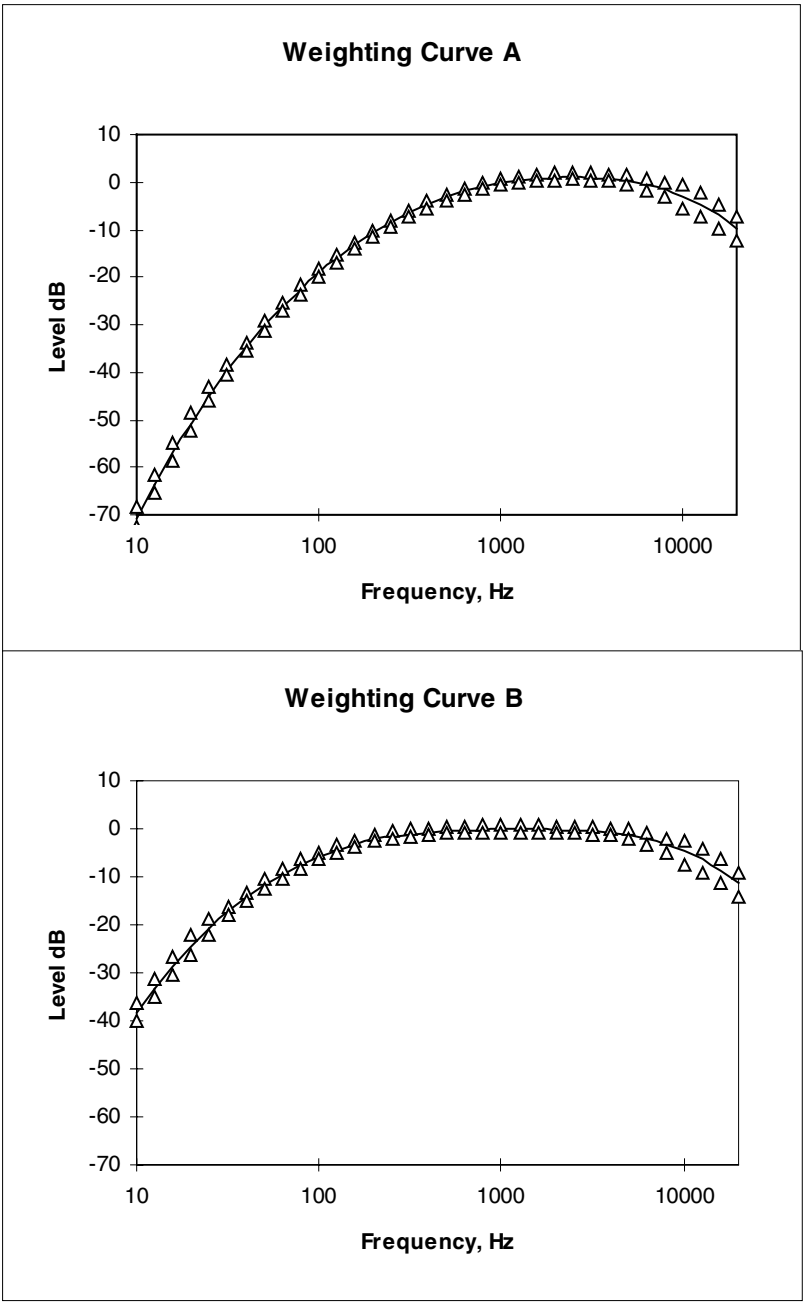
7. CALIBRATION

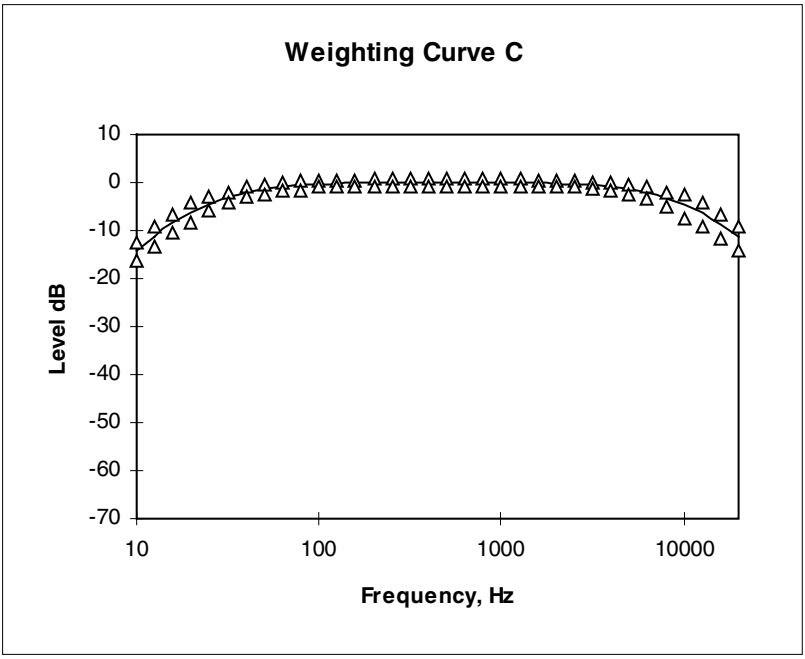
The AWN-3 is calibrated prior to dispatch. All units are tested for Type '0' compliance. In addition, some instruments will be supplied with a certified NATA calibrated Type '0' compliance, according to the customer order requirements.

The following A, B, and C weighting curves are generated from the recorded test results of a typical device. The calibration results for the supplied instrument may be viewed in an Excel spreadsheet on the accompanying CD.

The serial number of the instrument is recorded on the front page of this instruction manual, that matches the serial number recorded on the underside the associated module.

In the graphs below, the Type '0' tolerance band is shown on the respective graph by the triangular markers.


Weighting Curve A
10
0
-10
-20
-30
-40
-50
-60
-70
Level dB
10
100
1000
10000
Frequency, Hz
Weighting Curve B
10
0
-10
-20
-30
-40
-50
-60
-70
Level dB
10
100
1000
10000
Frequency, Hz


Weighting Curve C
10
0
-10
-20
-30
-40
-50
-60
-70
Level dB
10
100
1000
10000
Frequency, Hz