



# HA1500 HD-A<sup>®</sup> Loudspeaker Instruction Manual



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## Important Information

To ensure that you get the best possible experience from your new speakers, please read the following points before continuing with the set up of your speakers.



This product contains hazardous voltages inside.

**DO NOT** attempt to gain access to the internal workings of the loudspeaker.

- Before making or changing any connections between the speakers and your audio equipment, ensure that both the speakers and equipment are turned off.
- If the speaker is behaving abnormally, unplug it from the wall socket and
- Any faults or problems should be referred to a qualified repair technician. Contact your dealer for information.
- Any excessive moisture or liquid that makes contact with the speaker or its internal workings creates a potential safety risk of fire or electrical shock.
- Do not place any liquids on or around the speaker.
- Be sure to use a properly grounded AC power source.



## Introduction

Thank you for investing in the Whise 1500 HD-A<sup>®</sup> loudspeaker. It represents a leap forward in audio reproduction, and is achieved through the application of over 18 years of experience and research into both electrostatic and conventional electromagnetic speaker technologies.

- The Whise 1500 HD-A<sup>®</sup> electrostatic array does away with the perceived limitations of electrostatic sound. It can achieve crystal clear sound at amazingly high levels without distortion. The speed at which our array moves reduces inter-modulation distortion significantly, and allows not only the details of the audio to get out, but sets the music free by reproducing all the subtleties of the recording environment and presenting them to you as a holographic sound stage.
- New techniques have been employed to produce a dispersion pattern that is even and clean without resorting to curved arrays or artificial delays. This results in a smooth and well-integrated image that the speakers practically 'vanish' to your ears, and all that you are left with is an amazingly life-like sound.
- The Whise 1500 HD-A<sup>®</sup> loudspeaker features 100 Watt amplifiers for each array and woofer. This allows you to run the Whise 1500 HD-A<sup>®</sup> loudspeaker from any signal-level source, without having to purchase expensive power amplifiers for each stage. You can directly plug in your CD player, computer, game console, or even portable music player. You can even directly plug multichannel decoded outputs from any high definition source (DVD, SACD, Blu-ray, HD-DVD etc) straight into the speakers. The independent subwoofers can create a 5.2 or 7.2 or 10.2 systems when surround, rear and centre channels are added. They are compatible with all lossless formats including Dolby TrueHD and DTS-HD sources.
- Got your favorite amplifier? No problem! The Whise 1500 HD-A<sup>®</sup> loudspeaker also accepts speaker-level input for total flexibility.
- The Whise 1500 HD-A<sup>®</sup> subwoofer recreates bass with incredibly low levels of distortion, and amazing power efficiency. Using PAM<sup>™</sup>, VR/UR<sup>™</sup> and NTM<sup>®</sup> digital crossovers (an acronym for the Neville Thiele Method) enables precise control of frequency signals giving the Whise 1500 HD-A<sup>®</sup> subwoofer a proprietary advantage over competitors with conventional alternatives.
- The PAM<sup>™</sup> (Parametric Acoustic Modeling) technology uses acoustic modeling and mechanical filtering techniques to control audio quality. This technology has already won awards for its ability to remove mechanical distortion from low-frequency reproduction.

# Controls and Inputs

**Front Speaker with Sub-Woofers**  
(rear view)

**Controls (Front with woofer)**

**80Hz Adjust**  
This allows adjustment of  $\pm 6\text{db}$  at the apparent bass frequency, to give control over room effects at this frequency and to allow for personal preference.

**Volume Control**  
Use this as your primary volume control if you are listening to an audio source with no pre-amp function. Otherwise, set this knob to preference and control volume using your own equipment.

**250Hz Adjust**  
This allows adjustment of  $\pm 6\text{db}$  where the high frequency and low frequency speakers blend together, to give control over room effects at the blend frequency, and to adjust to personal taste.

**Room Brightness**  
Gives  $\pm 6\text{db}$  control of the upper frequencies (5kHz and above). Rooms with many hard reflective surfaces may want to turn this down, or heavily absorbent rooms may want a little more from the upper frequencies.

**Inputs (Front with woofer)**

**Power** – This is where you connect the mains power cord. **DO NOT** attempt to change the voltage setting! It is not user selectable, and has been permanently set to your local power requirements to avoid damage to your equipment.

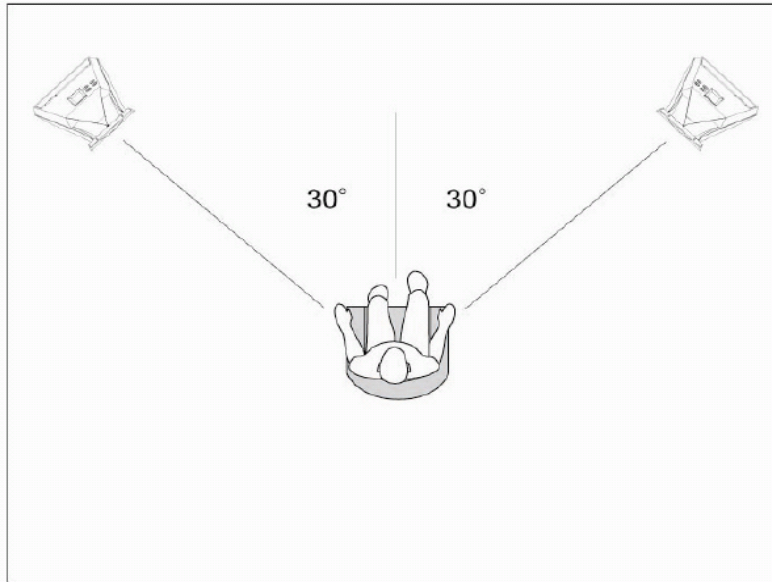
**Audio Input** – Connect either your amplifier speaker level output, or your pre-amp output to the inputs. **REMEMBER: use only one of the two methods for connecting your main audio or you risk damaging your equipment.**

If your equipment has a separate sub-woofer RCA output (such as in 5.1 surround), connect it here.

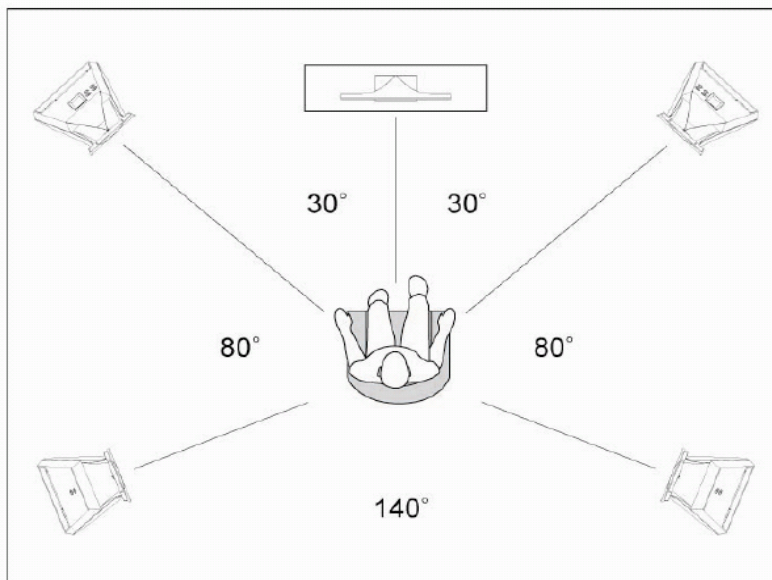
## Speaker placement

Basic guidelines for standard stereo and multichannel surround sound configurations are illustrated below. You may have to adjust the characteristic of the sound to accommodate for your room shape and size, but try to ensure that the panel portion of each speaker is a minimum of 30cm away from any nearby walls.

Typical set up for Stereo Sound



Typical set up for Surround Sound





## **Quick Start Installation**

Since you are no doubt eager to listen to your Whise 1500 HD-A<sup>®</sup> loudspeakers, here is a fast guide to get you up and running in no time.

### **Step 1) Unpack & Check Voltage**

Remove your new Whise 1500 HD-A<sup>®</sup> loudspeakers from the packaging. Check the correct voltage setting on the IEC power input at the base of the Whise 1500 HD-A<sup>®</sup> loudspeaker has been selected.

### **Step 2) Position**

For optimal performance place your Whise 1500 HD-A<sup>®</sup> loudspeakers such that the rear of upper panel is at least 30 cm from any back wall. Point the Whise 1500 HD-A<sup>®</sup> loudspeaker inwards slightly, towards the listening position if you wish.

They may also face straight forwards or slightly inwards if you wish to have a larger listening area, but for the absolute optimum listening for one person only, aim the Whise 1500 HD-A<sup>®</sup> loudspeaker directly at the listener.

### **Step 3) Connections**

With your equipment turned off, connect your Whise 1500 HD-A<sup>®</sup> loudspeakers to the equipment either via the RCA pre-amplified input or via the loudspeaker output of your equipment.

If you choose the speaker-level connection, be sure that you connect both loudspeakers in the same polarity (i.e. Red to +, Black to -) or else the loudspeakers will be out of phase with each other and the sound image will become vague and incoherent.

If your preamplifier or surround decoder system has a separate output for bass (below 80 Hz) a separate RCA input has been provided (on the front units), marked as SUB-in, to allow you to recombine the bass frequency component with the rest of the audio.

See the Controls and Inputs section of this manual for more detailed instructions.



#### **Step 4) Controls and Volume setting**

Set each of the four knobs at the upper-right of the rear of the speaker (fronts only) to the 12-o'clock position to begin with. You can adjust these settings to your personal preference once you start listening to the speakers and determine any adjustments required for the room.

#### **Step 5) Power Up**

Connect either the IEC power cable to the back of the speaker (front / rear), and the other end into the wall socket and turn on. Make sure you are not playing any audio when you turn the speakers on, as you will not know what volume to expect the first time and may damage your equipment.

The Whise logo at the front of the speaker will turn blue when there is a signal present. The speaker will go into standby mode after 2 minutes of zero input, and the logo will change to amber.

Congratulations! You are now ready to experience audio at its finest! Refer to the Audio Configuration section for more information on adjusting the Whise 1500 HD-A<sup>®</sup> loudspeaker to your room and taste.



## Audio configuration

Once your Whise 1500 HD-A<sup>®</sup> loudspeaker are in a position you are comfortable with, you should spend some time adjusting the bass and treble to suit both the room you are in, and your own personal preference.

The best way of achieving this is to select a recording that you are intimately familiar with, such as a favorite song. Select music that has a broad range of frequency components so that you can judge where to set each of the knobs more effectively.

### ***Imaging***

The first thing to check is that the stereo image is even and coherent. Make sure that the components of the track such as vocals, different instruments etc are in the places they should be within the stereo image as if you were listening to the song on headphones.

This is especially important if you have never listened to electrostatic speakers before, because they create a more precise, detailed and wider image compared with conventional electromagnetic cone speakers.

Once you are satisfied that the audio imaging is correct, listen to the various frequency components with the knobs all set to 12 o'clock.

### ***Brightness***

Now you should adjust the room brightness to your taste. It is not uncommon for this to be somewhat lower than the normal, especially if you have a lot of reflective surfaces in the room. The best way to test is to clap your hands. The echo you hear is the time delay effects and room resonances, and so this adjust feature lets you compensate for that.

Adjust the knob until it sounds natural to your ears.

Now listen to the track with frequency adjust knobs set to their extremes, one at a time. First set the 80 Hz adjust knob all the way up and listen, and then all the way down and listen. Repeat this with the 250 Hz adjust knob. This will help to give you a feel for the limits of the adjustment, and give you some idea as to where you would prefer to listen.

### ***Absolute Phase***

If you are using your own power amplifier to connect to the Whise 1500 HD-A<sup>®</sup> loudspeaker, you might want to experiment with Absolute Phase. This is a much



talked about phenomenon. Imagine you are listening to a bass drum. When the sound gets to the speaker, the diaphragm will either move forwards first or backwards first. There is some debate as to whether or not this makes a difference to the sound quality, but there have been reports of subtle changes achieved by reversing the phase on all the speakers (ensuring that they are still in-phase). Try it out for yourself and see if you prefer it one way over the other.

It helps to remember the last time you listened to a totally live and “unplugged” performance; conventional electromagnetic cone speakers start to seem dull in comparison. If your initial setting is lower than the standard setting, over time you may wish to increase this once you become accustomed to the nuances and detail that the Whise 1500 HD-A<sup>®</sup> loudspeakers offer. If you go back to listening on conventional electromagnetic cone speakers you will appreciate just how much of the recording was missing, and just how much additional information the Whise 1500 HD-A<sup>®</sup> loudspeaker recovers from the recording.

***What makes the Whise 1500 HD-A<sup>®</sup> loudspeaker sound so much better?***

The techniques employed are unrivalled, and are designed to ensure that all the frequency components are in the proper place in the time domain; harmonics and distortion components are reduced to incredibly low levels, even at maximum output. The result is a crisp clean sound that is incredibly complete. You can hear details that are commonly masked, and readily identify the smooth transition between the frequencies.



## HA1500 HD-A<sup>®</sup> Electrostatic Array

### ***No more electrostatic restrictions***

Electrostatic speakers have traditionally been known to have drawbacks.

- Poor bass response
- Low sensitivity
- Poor dispersion
- Large physical size

Different companies have tackled one or two of these issues with mixed results, introducing artificial delays in order to simulate a point source, curving the array in an attempt to improve dispersion and enhancing various frequencies to make the sound appear better than it is. The Whise 1500 HD-A<sup>®</sup> loudspeaker evolved from over 18 years research and development and overcomes these limitations without any compromise on sound quality.

### ***Non-curved array***

Some current generation electrostatic speakers use curved panels. Any curved diaphragm that is non-stretchable, such as Mylar<sup>™</sup>, cannot move linearly as the force required for forward motion differs from the force required for rearwards motion. In addition, any motion will inherently cause a buckling of the diaphragm surface. This non linear distortion increases greatly at lower frequencies, and this typically results in the use of higher crossover frequencies to minimise these problems.

Using a symmetrically flat electrostatic array, combined with the patented mechanical techniques, ensures that the shape and size of the speaker does not contribute to the sound. what you hear is an incredible reproduction of the recording, and an amazing presence of the recording environment. It truly is like being there.

### ***Front and Rear image is identical***

Uniform bi-directional speakers have a rear audio image that is identical to the front. This has two major advantages. Firstly, rather than try and discard or distort the rear image, it can be used to reinforce the audio, adding power to the overall sound. It is well known that the room contributes a lot to the listening experience. By allowing the rear audio image to propagate, the entire room is utilised more effectively.

Secondly, the rear audio image helps to extend and enhance the sound stage, giving it much needed depth of image that is essential in recreating a fully dimensional reproduction of the original recording.

### ***The Art of Speed - Whise 1500 HD-A<sup>®</sup> loudspeaker***

Because the electrostatic diaphragm has an ultra-low mass, it can respond with extraordinary speed, and react precisely to every change and nuance present in an audio signal, whether live or recorded. No electromagnetic cone speaker is as fast as an electrostatic and the Whise 1500 HD-A<sup>®</sup> loudspeaker is the one of the fastest loudspeakers in the market today.

What about other electrostatic loudspeakers? Independent tests using CSD waterfall techniques to analyse spectral decay of an impulse signal were applied resulting in a 5 times faster than those considered to be competitors to the Whise 1500 HD-A<sup>®</sup> loudspeaker, across the entire frequency range. This is not an imperceptible difference; the quality increase is apparent resulting in a cleaner, clearer sound and unparalleled audio. Take full advantage of the higher bit stream rates of the latest high definition sources.

### ***Imaging***

The Whise 1500 HD-A<sup>®</sup> loudspeakers major advantage is greatly improved imaging. It provides a sound stage that is not confined by the physical position of the speakers in the room and, depending on the recording, presents a larger image than the room the speakers are in. That startling sound image is retained even when moving around the room.

Other electrostatic loudspeakers do their best to simulate a point-source. This has the effect of destroying most of the advantages that electrostatic sound provides. The sound stage collapses, and there are artificial delays introduced into the signal, which in turn affect the clarity of the original recording, and reduce accuracy. The Whise 1500 HD-A<sup>®</sup> loudspeaker utilises an entirely flat array without any adverse effect on dispersion from the physical shape of the array.



## HA1500 HD-A<sup>®</sup> Balanced Woofer

The Whise 1500 HD-A<sup>®</sup> subwoofer recreates bass with incredibly low levels of distortion, and amazing power efficiency. Using PAM<sup>™</sup>, VR/UR<sup>™</sup> and NTM<sup>®</sup> digital crossovers enables precise control of frequency signals giving the Whise 1500 HD-A<sup>®</sup> balanced subwoofer a proprietary advantage over competitors with use conventional alternatives.

### **NTM<sup>®</sup> (Neville Thiele Method) Crossover**

This crossover design was developed by the legendary Neville Thiele, who helped formulate the Thiele/Small equations upon which all modern loudspeaker design is based. It is used to handle the critical crossover region of this hybrid speaker to give incredibly tight frequency control and a seamless transition between the woofer and the electrostatic array.

NTM<sup>®</sup> crossovers are exact summing, steep roll off crossovers. As the name suggests, they were invented by Neville Thiele and are protected by patents owned by Immersion Technologies International plc.

They have the rare advantage of providing a steep roll off with low group delay as well as a behaved phase response.

- NTM<sup>®</sup> crossovers eliminate the breadth of interference region between bands to the extent that interference becomes negligible.
- NTM<sup>®</sup> crossovers have significantly reduced group delay variation compared to conventional crossovers of equivalent steepness.
- In analogue implementations, NTM<sup>®</sup> crossovers have substantially lower component counts than conventional systems of equivalent steepness. This is because low order NTM<sup>®</sup> crossovers give steep roll offs, whereas with conventional systems a high order crossover is required to get a steep roll off.

### **PAM<sup>™</sup> (Parametric Acoustic Modeling)**

PAM<sup>™</sup> is a computer aided modelling technique for loudspeakers. It is an advance on all pre-existing loudspeaker simulation applications in that it represents waveguides as distributed parameters. Superficially this may seem a trivial advance, but it enables the simulation of impedance discontinuities to behave correctly and thus has enormous significance for all forms of waveguides. In particular it enables waveguides to be structured with custom profiles for particular applications and it provides the designer with significant flexibility to tailor the response of a loudspeaker in a predictable way.



PAM™ design manifests in loudspeakers as waveguides with one or more selective impedance discontinuities. The impedance discontinuities may be a consequence of changes in cross section, or a consequence of junctions in the waveguide.

PAM™ can be used to make the response of a loudspeaker flat and at the same time minimise cone excursion by inserting multiple cone minima in the pass band. Accordingly PAM can be used as the basis of high fidelity, low distortion loudspeakers and subwoofers. For the Whise 1500 HD-A® subwoofer, the result is very loud bass with incredibly high efficiency, and an almost ideal frequency response over its chosen frequency range. This technique has been employed in all Whise high-end, professional and cinema subwoofer designs, and is praised globally by audio professionals, including Tomlinson Holman of Lucasfilms THX fame.

### **VR/UR™ (Velocity Reflex/Ultra Reflex)**

VR/UR™ is a subwoofer technology originally developed for automotive applications. VR/UR™ is an acoustically filtered infinite baffle system that has the capability of providing quite high sound pressure levels ('SPL') at low frequencies with a small enclosure size. It also has the unique advantage of providing high SPL without causing exterior nuisance. The Whise 1500 HD-A® subwoofer is evidence of the power of this technology.

## Troubleshooting

### **No audio at all**

- Check that all the connections are secure and in the right places.
- Test all cables.
- Check that all components are powered up.
- Use another speaker to test that there is a signal.

### **Audio from only woofer or only electrostatic panel**

- Double check that sound is equalised correctly.
- Check that bass and treble adjustment knobs are set correctly.
- Likely this is an internal fault, contact your dealer for service information.

### **Indistinct Sound Image**

- Are you using the speaker-input terminals? Check to make sure you have wired them correctly and in-phase.
- Try adjusting the positioning or direction of the speakers.

### **Excessively high or low bass**

- Try adjusting the 80 Hz and 250 Hz knobs.
- Try moving the speakers, test different distances from the wall.

### **Popping, crackling, hissing noises**

- This is normal on start-up for electrostatic panels, particularly if they have not been used for some time. Wait and see if it stops in time.
- Vacuum clean the electrostatic speaker panel. Be sure to turn the speaker off and wait 5 minutes before proceeding.
- If sounds continue, turn speakers off, unplug and wait 30 minutes.
- If sounds continue after this your speaker may require servicing, contact your dealer for information.

**Please note:** It is better to leave the loudspeakers permanently plugged into the mains supply and switched on, as this keeps the panels dry and dust-free.

For further information, contact our Service Department at [support@iti-plc.com](mailto:support@iti-plc.com).



## Specification

### Frequency Response

*24 - 30,000 Hz +/- 6 dB With Active Dynamic Equalization Below 50 Hz and below 250Hz*

### Impulse "Waterfall" Decay Time

*80 microseconds*

### General Topology

*Electrostatic / Cone Hybrid Active Driven With a Total of 200 W Amplification*

### Sound Pressure Fall Off With Distance

*1 dB / m*

### Woofers Topology

*Dual 8 Inch Balanced Anti-Vibration*

### Distortion 50 to 300 Hz

*Less Than 1%*

### Woofers Amplification

*100 W Class A/B*

### Distortion Above 300 Hz

*Less Than 0.7%*

### Electrostatic Panel Amplification

*100 W Class A/B*

### Electrostatic Array Topology

*3 Segment Non Parallel Structure, Turbulence Reduction Technology*

### Maximum Output Level @ 3 Meters

*110 dB*

### Bass Control

*(+/- 6 dB Below 80 Hz)*

*(+/- 6 dB Below 250 Hz)*

### Input Impedance

*10 kOhm Fully Isolated*



**Room Brightness Control**

*+/- 6 dB Above 5 kHz*

**Electrostatic Panel Blend Crossover**

*220 Hz*

**Connectivity**

*RCA Line in ( 1 or 2 Cable ) or Speaker Level Terminal*

**Stereo/Multichannel Compatible**

*Yes*

**Power Supply**

*240/110 VAC Switchable*

**Weight**

*Approx. 37 kg*

**Vertical Dispersion**

*1100 mm Line Source*

**Dimension (HxWxD)**

*1500 x 377 x 350 mm*

**Horizontal Dispersion  
( Stereo Mode )**

*30 Degrees*

## Glossary

**AC power** - Alternating current. Household mains power is AC.

**Bass** - The low frequency component of audio.

**dB** - Decibels, the measurement of sound intensity. A logarithmic scale, an increase of 3 db represents a doubling of sound intensity.

**Dispersion** - The outgoing pattern of width from the loudspeaker.

**Distortion** - In audio this refers to unwanted frequency components present in the reproduced audio, generated by the speaker itself. Refer to THD and IMD.

**Equalised** - When the audio is balanced across the whole frequency range.

**Hybrid** - In audio this refers to any speaker which uses more than one speaker technology.

**Image** - This is the audio 'picture' that is presented to you across or around the face of the speakers.

**Panel** - In this case, the panel is the electrostatic portion of the speaker that provides the upper frequencies.

**Phase** - The amount of lead or lag one signal has over another. The human brain uses phase information to determine location of the audio, and so out of phase sound becomes confusing because the brain is telling you that the sound isn't where it's coming from, and the image becomes blurry. Some recordings do this deliberately to simulate 3-dimensional audio.

**Preamplifier** - A preamplifier usually lies between the amplifier and the signal source in order to provide volume control.

**RCA** - The standard connection type for signal-level audio. Stereo pairs are usually red and white.

**Speaker level** - This is the audio level that comes out of an amplifier. It is usually between 20 and 80 volts.

**THD / IMD** - The two main types of distortion in audio – Total Harmonic Distortion which refers to unwanted harmonic sound components, usually due to the speaker, the amplifier and the enclosure. The second is Inter-Modulation Distortion, and is a function of the capability of the speaker to reproduce more than one frequency at a time, such as music.

**Treble** - The upper frequency component of audio.

**Disclaimer:** All information contained in this Instruction Manual is correct at the time of publication. The user should follow the instructions herein and contact [support@iti-plc.com](mailto:support@iti-plc.com) for further information.



# HA1500 WARRANTY TERMS & CONDITIONS

## 1. DEFINITIONS

1.1 These terms and conditions govern any warranty claim for the HA1500 product ("the Product") supplied by Immersion Technologies International plc (Company No. 5542880) ('ITI') to a purchaser of ITI Product ("the Buyer") whether modified by legislation or otherwise.

1.2 For the purpose of these terms and conditions and where the context permits:-

"**ITI Authorised Service Centre**" means premises that are authorised and approved by ITI for the repair and/or replacement of ITI product as determined from time to time by ITI.

"Standard Warranty" means the terms and conditions of this agreement.

"**Standard Warranty Period**" means 12 months from the date of purchase of the Product by the Buyer.

## 2. GENERAL

2.1 Subject to the Standard Warranty, ITI agrees to repair or replace at ITI's cost the Product, and any ITI accessory supplied with it, purchased by the Buyer from ITI or an authorized seller and identified as not performing in accordance with ITI specifications during the Standard Warranty Period.

2.2 ITI reserves the right to replace the Product or relevant part with the same or equivalent Product or part, rather than repair it. Where a replacement is provided the Product or part replaced becomes the property of ITI.

2.3 ITI may replace parts with refurbished parts.

2.4 Replacement of the Product or a part does not extend or restart the Standard Warranty Period.

2.5 In the event of a claim under this Standard Warranty, the Product must be returned to an ITI Authorised Service Centre at the Buyer's cost.

2.6 The Product will be at the Buyer's risk whilst in transit to and from the ITI Authorised Service Centre, unless transported by ITI or its authorised representatives.

2.7 ITI and its Authorised Service Centre may seek reimbursement from the Buyer of any costs incurred by ITI if the Product is found to be in good working order.

## 3. GENERAL EXCLUSIONS AND LIMITATIONS

3.1 To the full extent permitted by law, this Standard Warranty will not apply:-

a. if the Product has not been installed, operated, maintained or used in accordance with ITI's instructions or specifications provided with the Product;

b. if the factory-applied serial number has been altered or removed from the Product;

c. to damage, malfunction or failure resulting from alterations, accident, misuse, abuse, fire, liquid spillage, mis-adjustment of customer controls, use on an incorrect voltage, power surges and dips, thunderstorm activity, acts of God, voltage supply problems, tampering or unauthorised repairs by any persons, use of defective or incompatible accessories, the operation of a computer virus of any kind, exposure to abnormally corrosive conditions or entry by any insect, vermin or foreign object in the Product;

d. to damage arising during transportation, installation or while moving the Product, or to any transportation costs of the Product or any parts thereof to and from you, unless otherwise specified in these warranty conditions;

e. to any third-party software or hardware not contained in the Product as originally configured by ITI;

f. to any failure, to the extent that the failure is not a failure of the Product to perform in accordance with its specifications.

g. to any wear and tear;

h. in commercial, business, industrial, educational or rental applications.

i. replacement or repair of any

i. consumables (including batteries and cables), or

ii. lost parts or accessories.

j. to service of any product unless returned to an ITI Authorised Service Centre.

3.2 To the full extent permitted by law ITI will not be liable for any loss, damage or alterations to;

a. third party hardware or software; or

b. programs, data or information stored on any media or any part of the Product, no matter how occurring; or

c. for any loss or damage arising from loss of use, loss of profits or revenue, or for any resulting indirect or consequential loss or damage.

3.3 ITI's aggregate liability in respect of all claims under the Standard Warranty shall not exceed the original purchase price of the Product or, at ITI's option, the cost of replacing the Product.

3.4 ITI excludes all other warranties, conditions, terms, representations and undertakings, whether express or implied.

## 4 SEVERABILITY

As far as possible the parties must ensure that:

a. this Standard Warranty is construed so as not to be invalid, illegal or unenforceable;

b. if a provision of this Standard Warranty is illegal, invalid or unenforceable, then that provision is read down to the extent necessary to ensure that it is not illegal, invalid or unenforceable and so as to give it a valid operation of a partial character; and

c. if a provision or part of it cannot be read down, then that provision or part is deemed to be void and severable and the remainder of this Standard Warranty continues to be valid and enforceable.

## 5 NOTICES

A notice must be in writing and delivered to the other party by post, facsimile, email or delivery by hand.

## 6 JURISDICTION

This Standard Warranty shall be governed by the laws of the United Kingdom and each party submits to the jurisdiction of the courts of the State or Territory in which the Product is sold.

## 7 TIME

Time shall be of the essence.