ITU Multichannel Layout Assistant

Contents

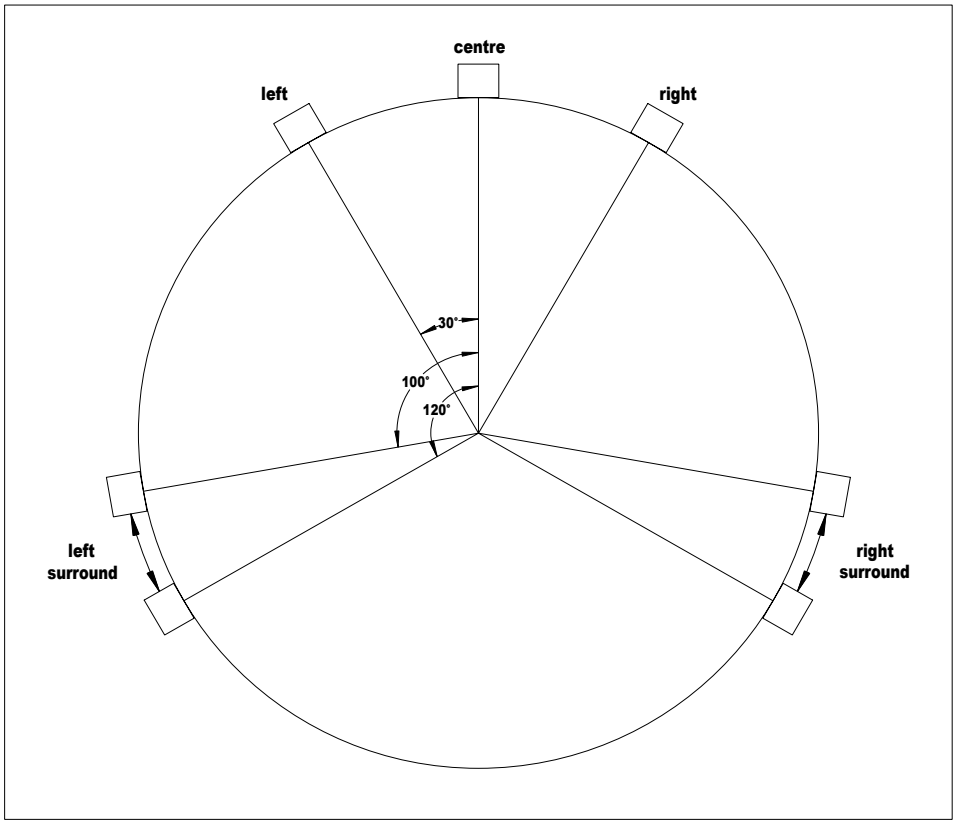
ITU Multichannel Layout Assistant is supplied as a zip file, ituassistant.zip. When unzipped it should contain:

ITUMultichannelLayoutAssistant.exe
CT_Pro.dll

and this information file.

Description

ITU Multichannel Layout Assistant performs geometric calculations based on supplied room dimensions to determine speaker positions for the 5-channel speaker layout specified in ITU-R BS.775-2 and illustrated below.



In the absence of electronic delays within the replay system, the distance of all five loudspeakers from the listening position should be identical. ITU Multichannel Layout Assistant makes its calculations on this basis, also allowing for the surround speakers to located above the listener's ear height.

System requirements

ITU Multichannel Layout Assistant should run on any Windows 32-bit operating system, from Windows 95 onwards. It has been tested on Windows XP Pro.

To run, the software requires that the supplied CT_Pro.dll be installed in the same directory as the executable. This contains the runtime files of Perfect Sync Inc's Console Tools Pro (http://perfectsync.com) which provides enhanced control over the console window's appearance and function.

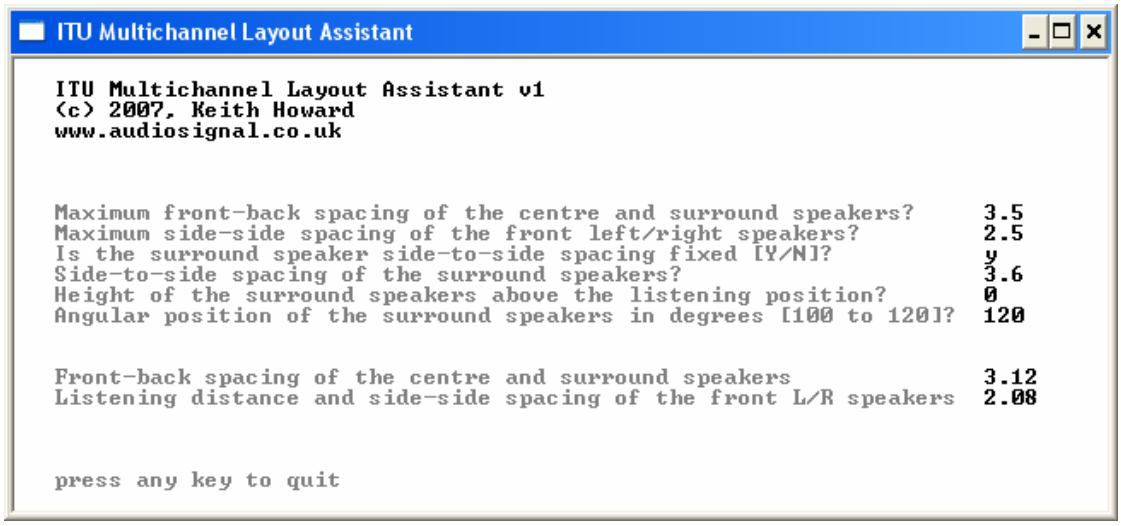
Operation

For its calculations, ITU Multichannel Layout Assistant requires the user to specify four dimensions from the intended listening room: the maximum front-to-back spacing of the centre and surround speakers; the maximum side-side spacing of the front left/right speakers; the side-to-side spacing of the surround speakers; and the height of the surround speakers above the listening position. If the surround speakers are positioned at (seated) ear height then the last figure will be 0. Dimensions can be specified in either feet or metres so long as they are consistent throughout, and should be taken from the centre of the speaker front baffles. The user has the option of specifying fixed spacing of the surround speakers, which allows for wall mounting. Otherwise the maximum available spacing of the surround speakers is entered.

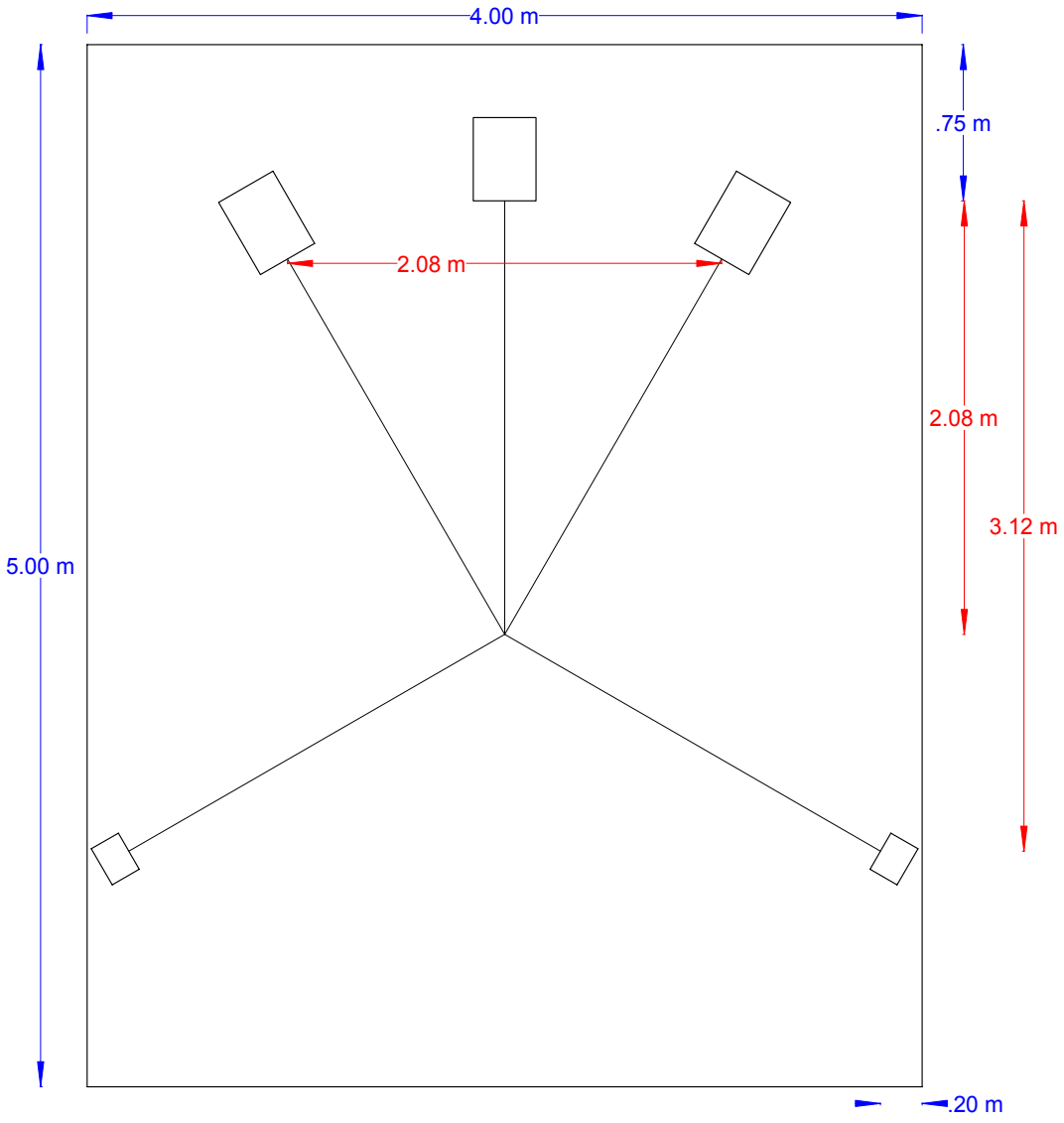
The user is also asked to specify the angle of the surround speakers from the centre speaker, which the ITU standard allows to be anything from 100 to 120 degrees. Particularly in rooms where the front speakers are arranged across the shorter floor dimension, the 120 degree position has the advantage of ensuring the largest spacing of the front left and right speakers.

Once these input values have been specified ITU Multichannel Layout Assistant outputs either two or three layout dimensions, depending on whether the spacing of the surround speakers is fixed: (1) the front-back spacing of the centre and surround speakers; (2) the listening distance, which is also the spacing of the front left and right speakers; and, if the surround speaker spacing is not fixed, (3) the spacing of the surround speakers.

The following examples illustrate the process. In the first the room is rectangular, measuring 5m long by 4m wide, and the front speakers fire down the room's longer dimension. As it is desired to keep the centre and surround speakers at least 0.75m from the front and back walls of the room respectively, the maximum front-to-back spacing of the centre and surround speakers is therefore (5 – 0.75 – 0.75 =) 3.5m. The surround speakers are compact, wall-mount types which are spaced just 0.2m from the wall, so the side-to-side spacing of the surround channels is fixed at (4 – 0.2 – 0.2 =) 3.6m. We assume to begin with that the surround speakers are positioned at ear height, so their height above the listening position is entered as 0, and that their angle to the centre channel speaker is 120 degrees:



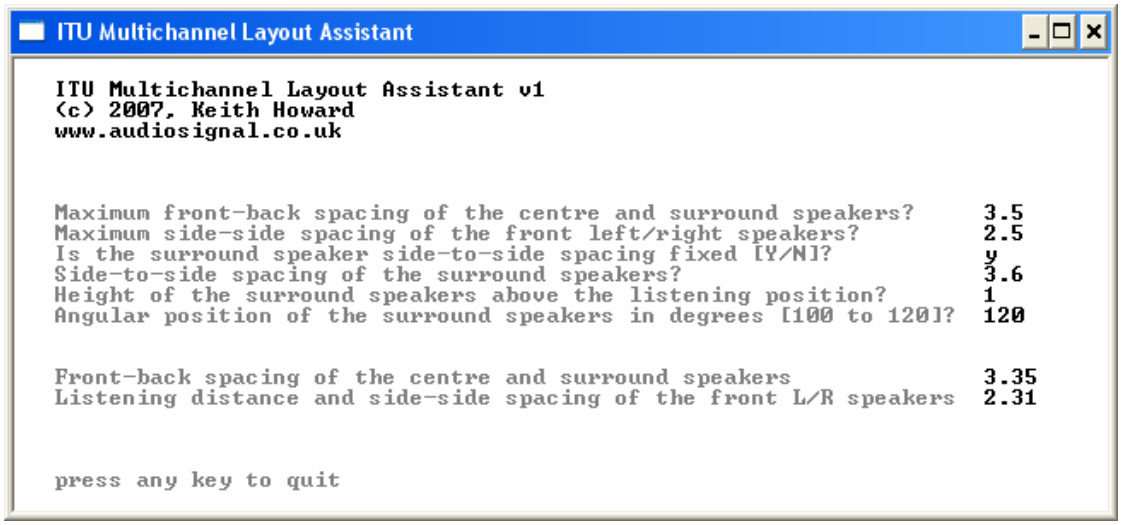
A plan view of the room below shows how the output dimensions are used to determine the speaker layout. Those dimensions specified by the user are shown in blue; ITU Multichannel Layout Assistant's output dimensions are shown in red.



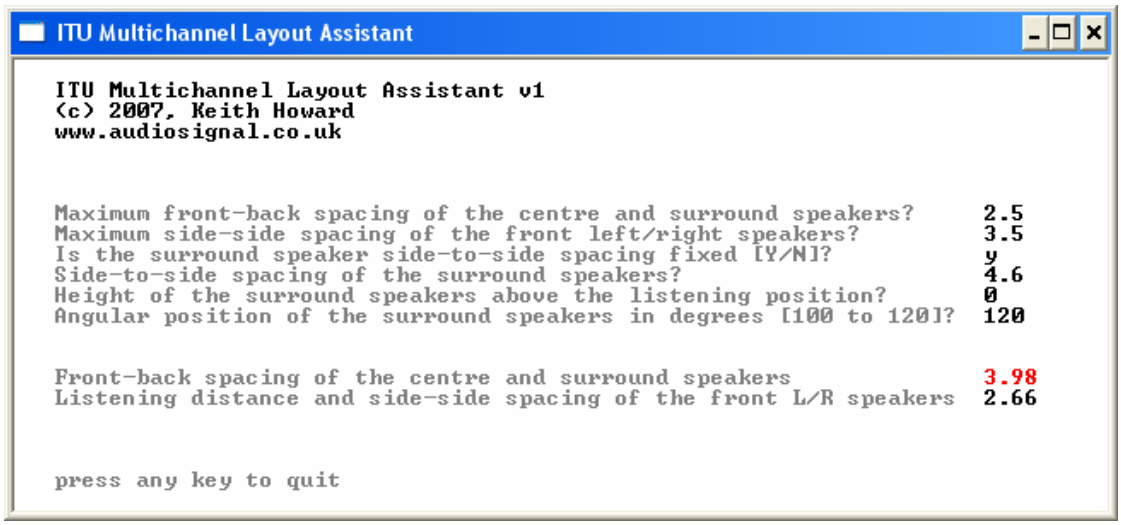
Two points to note are:

1) The front-back distance between the centre and surround speakers (3.12m) is less than the maximum specified (3.5m). This means that there is a little flexibility in the positioning of the speaker array along the room's long dimension: the centre channel speaker can be a little further from the back wall than 0.75m.

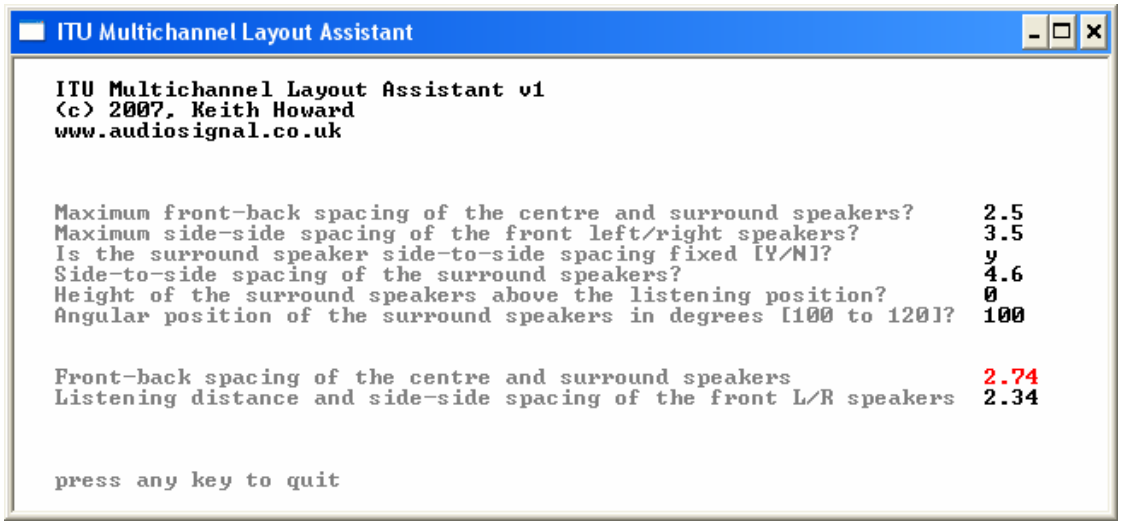
2) Because even with the 120-degree layout the surround speakers are further apart than the front left and right speakers, the latter are positioned closer together than they would often be in a stereo system. This situation can be improved by mounting the surround speakers above ear level and angling them down towards the listening position. For example, if they are positioned 1m above ear level but all the other specified dimensions remain the same, as the screen grab overleaf shows, the spacing of the front left and right speakers increases from 2.08 to 2.31m.



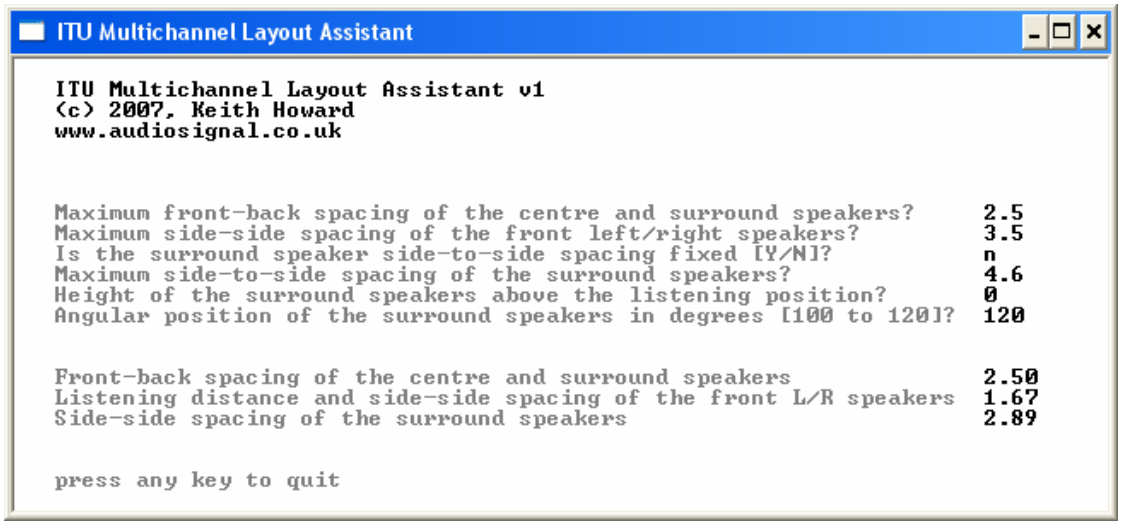
For the second example we use the same room but this time with the front speaker firing across the room's short dimension. In this case the maximum front-back spacing of the centre and surround speakers is (4 – 0.75 – 0.75 =) 2.5m and the spacing of the surround speakers is (5 – 0.2 – 0.2 =) 4.6m. If we enter these figures into ITU Multichannel Layout Assistant this is the result:



We can't achieve the required layout in this case because, even with the surround speakers at ear level, the necessary front-back spacing of the centre and surround speakers exceeds the specified maximum. Because of this it appears in red. There are two ways to tackle this problem while retaining this room orientation: first we can try decreasing the angle from the centre to the surround speakers to 100 degrees; or, if that doesn't work, we will have to use non-wall-mount surround speakers which can be positioned closer together. Taking the first approach we obtain the result:



The front-back spacing is still too large which means that to achieve an ITU speaker layout with this room orientation requires the use of non-wall-mount surround speakers. If we run the utility again but this time specify non-fixed surround spacing, ITU Multichannel Layout Assistant adjusts the speaker spacings to fit exactly within the maximum available front-back spacing of the centre and surround speakers:



Once appropriate spacings have been determined, the loudspeakers can be positioned accordingly within the room. This can be achieved using just a tape measure but is easier with a template (one can be downloaded from www.audiosignal.co.uk/setupguides.html) and a laser line projector.

Licence

This software may be freely distributed on the condition that it is unaltered and distributed in its entirety, including the supplied DLL and this information file.

You use ITU Multichannel Layout Assistant at your own risk. No warranty or support is implied or given.

If you encounter any bugs or have suggestions for improvements you are invited to email them to freeware@audiosignal.co.uk.

Keith Howard
February 2007