user guide

Meridian DSP420 **In-Wall Loudspeaker**

Meridian DSP420 In-Wall Loudspeaker System User Guide

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MHR: This product incorporates copyright protection technology covered by certain patent applications and intellectual property of Meridian Audio Ltd. This technology is provided for the express purpose of securely containing copyright audio within the Meridian System only.

Reverse engineering or circumvention of this protection is strictly prohibited.

This guide was produced by Human-Computer Interface Ltd, http://www.interface.co.uk

Important safety instructions

- ❍ Refer to installation sheet for wiring and other important safety instructions.
- ❍ Heed all warnings.
- ❍ Read the instructions.
- ❍ Keep these instructions.
- ❍ Follow all instructions.
- ❍ Do not use this apparatus near water.
- ❍ Clean only with a dry cloth.
- ❍ Install only in accordance with the manufacturer's instructions.
- ❍ Only use with a Meridian Audio DSP420 wall box.
- ❍ Refer all servicing to approved service personnel.
- ❍ Connection to the mains should be carried out by a skilled and suitable qualified person.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

To avoid overheating

Do not position the speakers:

- ❍ In direct sunlight.
- ❍ Near heat sources, such as a radiator.
- ❍ Directly above heat producing equipment, such as a power amplifier.

The DSP420 front plate acts as a heatsink and requires adequate ventilation. Ensure that air can flow around it.

To avoid interference

Do not position the speakers:

- ❍ Near strong magnetic radiation, such as near a power amplifier.

Radio interference

FCC Warning: This equipment generates and can radiate radio frequency energy and if not installed and used correctly in accordance with our instructions may cause interference to radio communications or radio and television reception. It has been type-tested and complies with the limits set out in Subpart J, Part 15 of FCC rules for a Class B computing device. These limits are intended to provide reasonable protection against such interference in home installations.

EEC: This product has been designed and type-tested to comply with the limits set out in EN55013 and EN55020.

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Introduction

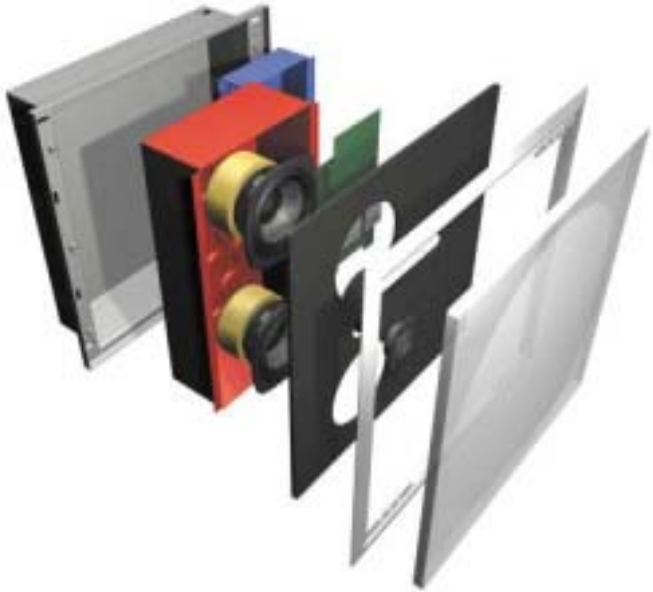
The DSP420 In-Wall Loudspeaker System uses high technology digital signal processing to remove the compromises previously associated with in-wall speakers, allowing them to achieve the same clear open sound and wide frequency response as traditional free-standing speakers. DSP420 loudspeakers are ideal as part of a home theatre system, or as the basis for a compact stereo system.

For instructions on installing and connecting up the loudspeakers please refer to the separate sheet *DSP420 Installation Instructions*.

For instructions on setting up the loudspeakers turn to the next chapter, *Unpacking the DSP420 loudspeakers*. Once they have been set up refer to *Using the DSP loudspeakers*, page 15, for information about getting the best results from all your music and film recordings.

The DSP420 In-Wall Loudspeaker System

The DSP420 In-Wall Loudspeaker System incorporates the result of several years of research and development into innovative technologies.



Meridian DSP

The DSP420 accepts digital input signals up to 96kHz/24-bit, including Meridian High Resolution (MHR) streams from Meridian surround controllers, processors, and DVD players.

Enclosed in a fully shielded housing, Meridian's unique DSP processing is performed on a specifically designed six-layer PCB using a powerful 100 MIPS Motorola DSP engine. Through this sophisticated audio computer the DSP420 receives all of the same high technology features that can be found throughout the Meridian DSP loudspeaker family. These include:

- ❍ FIFO memory buffer input for the lowest possible jitter.
- ❍ Linear-phase crossover for precision drive unit integration.
- ❍ Tweeter delay for perfect driver alignment.
- ❍ 48-bit resolution volume control.
- ❍ Minimal frequency equalisation to give a frequency response free from drive unit or electronic coloration.
- ❍ Transparent tone controls.
- ❍ Absolute phase control and phase-corrected balance control.

A further DSP enabled enhancement to the audio performance of the DSP420 is Meridian's active bass extension. This deepens the response of the system without excessive woofer excursion

and in turn produces a convincingly ‘big box’ sound from an in-wall unit. At moderate volumes, a psychoacoustically correct filter extends the bass response much further than can be achieved with an analogue speaker of equal size while at high volumes dynamic DSP bass protection is used to prevent the woofers from bottoming. As a result only the very lowest frequencies are reduced.

Power amplifiers

The speakers are driven by two high-power, low-feedback power amplifiers using carefully selected bipolar output devices. The amplifiers are direct coupled to the drive units for the most efficient delivery of power and the best possible control over driver excursion.

The power supply includes a substantial torroidal transformer and audiophile-grade capacitors, and the system uses careful star earthing, resulting in extremely low levels of noise and distortion.

DSP420 drivers

Each DSP420 loudspeaker uses two parallel 127mm (5") bass drive units. These incorporate a cast alloy chassis and a carbon fibre cone, and have a very large magnet which provides excellent drive and control. Combined with Meridian’s active bass extension technology, they provide surprisingly rich, deep bass, quite unprecedented for this size of cabinet.

The treble unit is a very high quality 25mm (1") aluminium dome with a neodymium magnet and a protective grille. It is extremely well matched to the woofer, and also tonally very compatible with the other speakers in the Meridian range.

The DSP420 is enclosed in an acoustic back box and front baffle constructed from aluminium, which has low resonance at low frequencies and has been further dampened by incorporating stiffening into the back box. Additional high-frequency damping ensures that the whole system suffers exceptionally little cabinet coloration and delivers excellent mid-range transparency. All damping materials have been fully tested to ensure they comply with building regulations for in-wall designs.

Meridian High Resolution (MHR)

The DSP420 In-Wall Loudspeaker System supports Meridian High Resolution (MHR), to allow you to connect to other MHR-compliant Meridian products to take advantage of high-rate audio sources, and provide the additional benefits of lower jitter and improved sound quality on all sources.

MHR is a proprietary secure encoding format that uses encryption and anti-copy methods to provide a secure copyright protection environment, and allow the secure transfer of audio streams within a Meridian-only system for playback only.

Meridian Comms

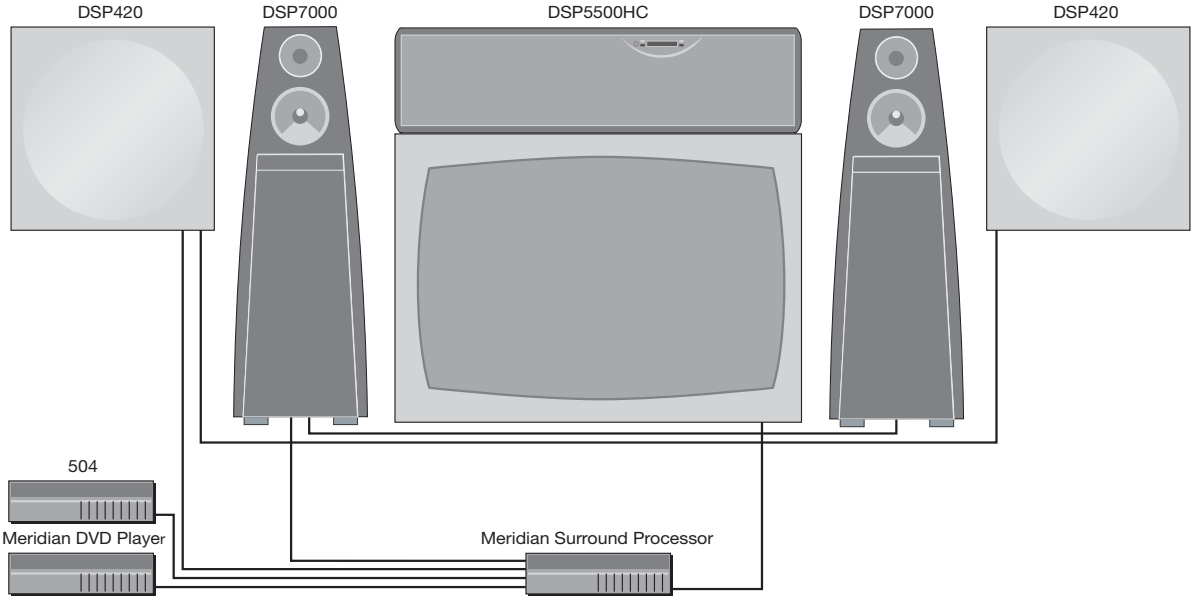
T he DSP420 In-Wall Loudspeaker System is part of the Meridian family of advanced digital, analogue, and video components, and these incorporate a sophisticated communications link, to allow you to control any combination of units using a single remote, and ensure that they will work together as a fully integrated system.

The communications system also allows you to extend your hi-fi system into two or three rooms, with the ability to control the sources in one room from the controller in another room.

The following pages show two recommended configurations based on the DSP420 In-Wall Loudspeaker System to illustrate the flexibility of Meridian components.

Sample configurations

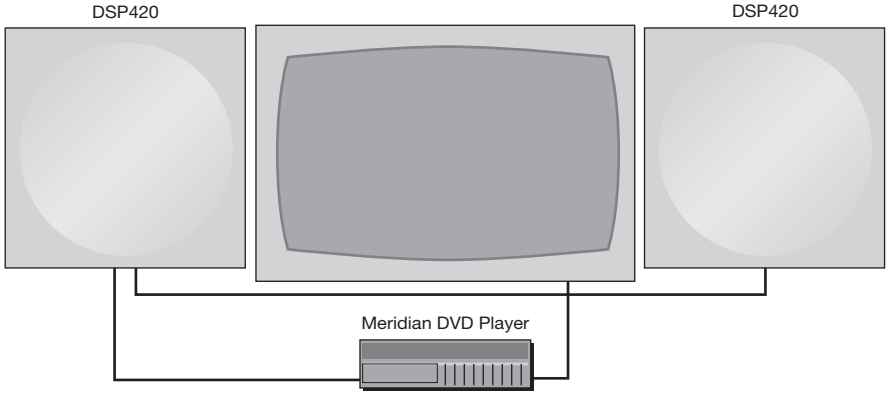
Meridian Digital Theatre™



DSP420 loudspeakers can be used in conjunction with a Meridian Surround Processor to provide the two rear channels, and optionally two additional side channels, to create an unobtrusive surround system with superb music and cinema sound.

A pair of DSP7000 loudspeakers, in conjunction with a DSP5500HC centre speaker, would provide excellent choices for the front channels, giving a complete system without compromise.

DSP420 Digital Stereo System



T he DSP420 can be connected directly to almost any source that provides a PCM SPDIF output, including CD or DVD players, some PC soundcards, and digital satellite decoders.

The DSP420 includes a DSP volume control, and with Meridian sources this operates seamlessly via the 500 comms system.

Alternatively, the volume can be controlled with the Meridian System Remote using the optional 512 Remote Eye.

Other applications

Other applications include:

- ❍ Main speaker in a Digital Music System with a Meridian CD Player (512 required).
- ❍ Main speakers with another source of digital audio; eg satellite (512 and MSR required).
- ❍ Second zone speaker in a Meridian two-room plus system (long M5 lead, 512, and MSR required).

These applications may require additional accessories; for more information see *Available accessories*, page 9.

Specification and accessories

Specification

Digital inputs	1 x cable, 75Ω, IEC958, 44.1kHz-96kHz. FIFO locks at 44.1, 48, 88.2, or 96kHz ± 150ppm, PCM and MHR. 1 x digital output cable, 75Ω, IEC958, providing a copy of the selected input.
Processing	1 x Motorola 56364 running at 100MHz.
Power amplifiers	Low feedback complementary bipolar design, with output-stage error correction and twin loop design. Treble: 65W RMS. Bass: 85W RMS.
Digital to analogue conversion	96kHz/24-bit.
Distortion	Typically <0.01%, or <0.05% up to full power at all frequencies.
Noise and hum	<-95dBr at all volume settings.
Acoustic output	Typically >104dB spl @ 1m.
Acoustic noise	<15dB spl @ 1m.
Frequency response	55Hz-20kHz ± 3dB
Crossover	Linear-phase ±30º at 2.3kHz.
Drive units	Woofers: 2 x 127mm (5") carbon fibre custom drivers, cast alloy chassis. Tweeter: 1 x 25mm (1") aluminium dome neodymium magnet, with protective grille.
Control	2 x Meridian Comms. 9-pin D connector for RS232 PC setup and control, null modem, 9600 baud, 2N1, no handshake.
Cabinet	Aluminium front baffle with sealed, mechanically dampened and insulated acoustic enclosure.
Dimensions	Frame 457mm (18") square x 89mm (3.5"). Hole cutout 420mm (16.54") square.
Power	100-125; 200-250V AC 50-60Hz. 6VA idle; 200VA max.

Meridian Audio reserves the right to amend product specifications at any time.

Available accessories

The DSP420 is shipped ready to be used as a speaker in a small Meridian Digital Theatre with a Meridian DVD Player (such as the 800 or 598) or a Meridian Digital Surround Controller (such as the 861, 568.2, or 561).

Other applications, and some advanced features, may require one or more of the following accessories, which can be purchased from your Meridian dealer:

❍ Meridian System Remote.
❍ 512 Remote Eye for remote control reception.

Unpacking the DSP420 loudspeakers

This chapter explains what you should find when you unpack the speakers, prior to installing them. It also explains how to reset the configuration from the front panel.

For information about installing and connecting up speakers please refer to the *DSP420 Installation Instructions* leaflet, supplied separately.

Unpacking

The digital loudspeaker system is supplied in a box containing the following components:

- ❍ DSP420 speaker module.
- ❍ Grille assembly.
- ❍ Spare grille scrim.
- ❍ This user guide.
- ❍ *DSP420 Installation Instructions* leaflet.
- ❍ Six screw packs for speaker module.
- ❍ Meridian Comms interconnect lead.
- ❍ Configuration program.
- ❍ Grille removal tool.

If any of these items is missing, please contact your dealer. We suggest that you retain the packaging carefully, as it provides maximum protection in transit.

Resetting the loudspeakers

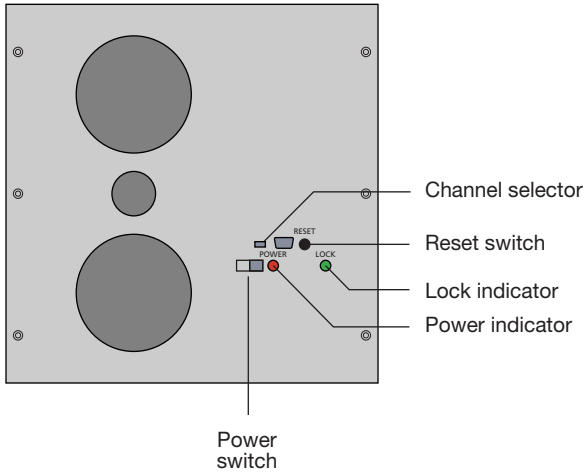
To reset the configuration of the digital loudspeaker

The following procedure can be used to reset the configuration of the DSP420 loudspeaker to the default settings, without needing a computer, using the reset switch accessible below the front panel.

- Turn off the power at the front panel.
- Press and hold in the reset switch, using a suitable object such as a bent paperclip or the grille removal tool.
- Turn on the power.

The red power indicator on the front panel will flash. When the indicator stops flashing:

- Release the reset switch.



Indicator lights

The following table explains the function of the indicator lights on the front panel:

Light	*State*	*What it means*
Red	On	Power supplied to speaker.
	Flashing	Speaker is being reset, or speaker has overheated and has shut down.
Green	On	Speaker is locked to a digital input.
	Off	Speaker is in standby.

Note: The indicator lights are blanked if the displays on the Meridian system have been blanked.

Using the DSP420 loudspeakers

In systems with a Meridian preamplifier or control unit all of the functions of the DSP420, including volume, tilt, and bass, are operated via the controller. For more information refer to the user guide for the preamplifier or control unit, and you can ignore this chapter.

However, the DSP420 In-Wall Loudspeaker System can also be connected directly to a digital source to create a complete, minimum system. This chapter provides step-by-step instructions for operating the digital loudspeakers in a system with no Meridian preamplifier or control unit.

Selecting a source

When not playing, the digital loudspeakers should be left in the standby state. This ensures that the components of the loudspeakers operate at maximum efficiency from the moment you start.

To select a source

- Press the appropriate source key on the remote; eg **DVD**.

This will bring the digital loudspeakers out of standby. If there is a signal to the speakers the green indicator on each speaker will be illuminated.

To switch to standby

- Press **Off** on the remote.

The loudspeakers will switch to standby and the green indicator on each speaker will go off.

Adjusting the volume

The digital loudspeakers adjust the volume in precise steps of 1dB, where 9dB is equivalent to doubling the loudness, and can be varied in the range 1 to 99dB.

When you first connect power to the digital loudspeakers the volume is set to 65, which is similar to the midway position of the rotary volume control on a conventional preamplifier.

To change the volume

- Press the red ▲ or ▼ keys on the remote.

To mute the sound

- Press **Mute** on the remote.

To restore the sound

- Press **Mute** again on the remote.

Alternatively, the sound will be restored if you adjust the volume.

Adjusting the balance or phase

The balance control of the DSP420 In-Wall Loudspeaker System uses digital signal processing to compensate for an off-centre listening position by delaying and diminishing the sound in one speaker, thus effectively shifting the speaker's image back.

To change the balance

● Press ◀ or ▶ on the remote.

There are 20 settings in each direction.

To reset the balance to the centre

● Press ▼ on the remote.

Note: Because the use of the balance control processes the digital signal, you may hear a slight clicking as the balance is adjusted.

To change the phase

● Press ▲ on the remote.

The phase function controls the absolute phase of the digital conversion. It can be used to compensate for signals that are out of phase, giving an unnatural-sounding bass.

Configuring the DSP420 loudspeakers using a computer

The DSP420 In-Wall Loudspeaker System provides a range of configuration options, which you can change to suit your own preferences and the other equipment in your system. To configure the DSP420 In-Wall Loudspeaker System you connect the master loudspeaker to a PC, and then use the Meridian Configuration program to set the configuration you want.

This chapter explains how to install the Meridian Configuration program, and then how to use it create your own configuration of the DSP420.

The Meridian Configuration program

The Meridian Configuration program is a stand-alone Windows-based application that lets you design your own configuration of the DSP420 Digital Loudspeaker System to suit your own personal preferences and the particular configuration of equipment in your system.

The Meridian Configuration program provides the following sections to allow you to control the corresponding aspects of the speaker's operation:

Setup

Lets you specify general features of the multimedia controller's operation, including the operation of the volume control and menus, and settings affecting its operation in multi-room systems.

Sources

Lets you customise the operation of each of the sources, including the audio input used for the source, and additional information about the type of each source.

Requirements

To use the Meridian Configuration program you need:

- A computer running Windows 95 or later.
- A 100MHz or faster Pentium-class processor.
- At least 16 Mbytes of RAM.
- 5 Mbytes of free disk space.
- A vacant 9-pin serial port assigned to one of COM1 to 4.

The software requires a mouse or similar pointing device – it cannot be operated solely from the keyboard.

To install the Meridian Configuration program

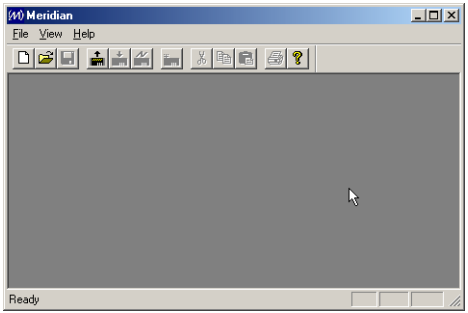
- Insert the first Meridian Configuration program installation disk.
- Choose **Run...** from the **Start** menu.
- Type `A: setup` and press ↵.
- Follow the on-screen instructions, inserting the second installation disk when prompted.

Running the Meridian Configuration program

To run the Meridian Configuration program

- Click **Start**, point at **Programs**, **Meridian** then click **Product Configuration**.

The **Meridian** window will be displayed:



The toolbar provides a convenient way of accessing the most important menu options:

Button	*Option*	*Function*
	New	Creates a new settings file.
	Open	Opens an existing settings file.
	Save	Saves the current settings file to disk.
	Fetch	Fetches the current configuration of the attached product.
	Store	Stores the current settings to the attached product.
	Disconnect	Disconnects the program from the attached product.
	Add Product	Adds a product to the current settings.
	Copy	Copies text or settings onto the clipboard.
	Paste	Pastes text or settings from the clipboard.
	About	Displays program information.

To select which loudspeaker to configure

You will only need to configure the DSP420 loudspeakers in your system if one of them is the master speaker for the system, or if you want to change the **Position** control. For more information see *Changing the setup options*, page 25.

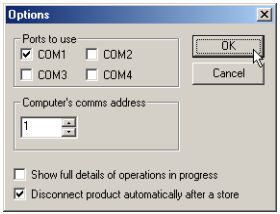
To connect the serial cable

The serial cable is symmetrical, and can be connected either way round.

- Connect one end to the RS232 connector on the front panel of the DSP420 loudspeaker.
- Connect the other end to one of the serial ports on the PC or PC notebook computer.

Then specify the serial port you are using as follows:

- Choose **Options...** from the **View** menu to display the **Options** dialogue box:



- Select the port you want to use and click the **OK** button.

Creating a new settings file

This section explains how to create a new settings file, using the Meridian Configuration program, and how to enter personal information to identify the settings in your product.

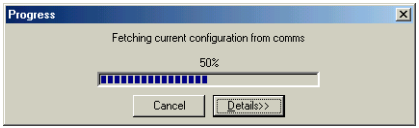
If you are programming the DSP420 loudspeaker for the first time:

- Click the New button in the toolbar:

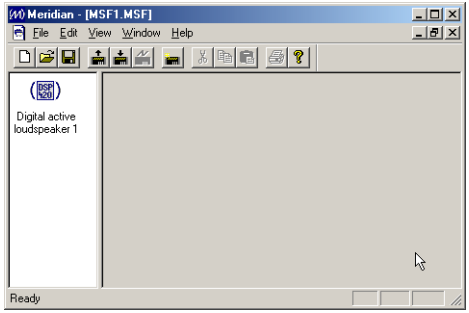
If you are amending an existing configuration:

- Click the Fetch button to fetch the existing settings:

The **Progress** dialogue box will show you the progress as the settings are fetched:



A new settings file will be created for you, with the initial name **MSF1**, and the **Meridian** window will show a **Digital active loudspeaker** icon to identify the product you are configuring:

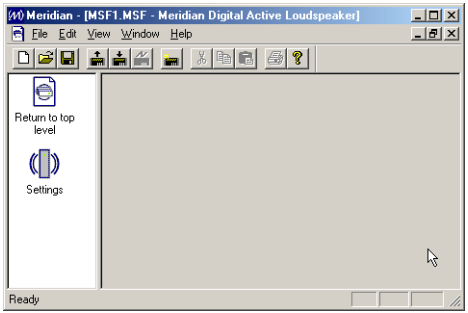


- Choose **Save As** from the **File** menu, enter an appropriate name for the file, such as your name, and click the **Save** button.

To display the settings

- Double-click the **Digital active loudspeaker** icon, to open it and display the settings it contains.

The left-hand panel of the **Meridian** window will change to show the following two icons:



Settings is the initial configuration in the settings file.

Double-clicking **Return to top level** takes you back to the previous level.

To display or edit the settings

- Double-click the **Settings** icon.

The **Meridian** window will change to show the two categories of settings contained in the settings file: **Sources** and **Setup**.

The options available in each case are explained in the following sections.

At this stage you may find it useful to maximise the Meridian Configuration program window so you can see all the options on each screen.

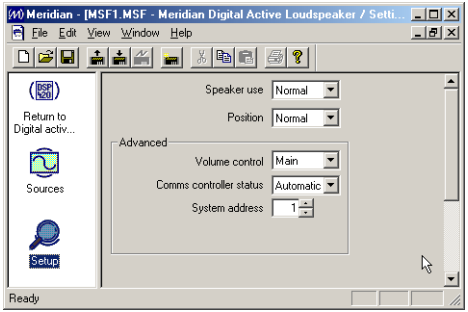
Changing the setup options

The next stage in editing the settings is to configure the general **Setup** options.

To change the setup options

- Click the **Setup** icon in the left-hand panel of the **Meridian** window.

The **Setup** options will be displayed:



- Set the **Speaker use** to **Centre** if the loudspeaker is being used as a centre speaker, or **Normal** otherwise.

The **Position** control adjusts the frequency response of the speaker to compensate for a position close to a corner or high above the floor.

- Choose the appropriate option from the **Position** drop-down menu, as shown in the following table:

Position	*What it means*
Normal	Up to 1.8m (6') above the floor and not in a corner.
High	Over 1.8m (6') above the floor.
Corner	Within 0.6m (2') of a wall.

Advanced options

The **Advanced** options are described in the following table:

Option	*What it means*
Volume control	Specifies whether the DSP420 provides volume control for the system. Choose **Main** if the DSP420 is in the main room, **Secondary** if the DSP420 is used in a second room, or **None** if the DSP420 is in the second or third room of a three-room system.
Comms controller status	Specifies whether the DSP420 is controller, not controller, or set automatically.
System address	For multi-room setups.

Setting up sources

This section describes how to use the Meridian Configuration program to configure the sources provided by the digital active loudspeaker.

To set up sources

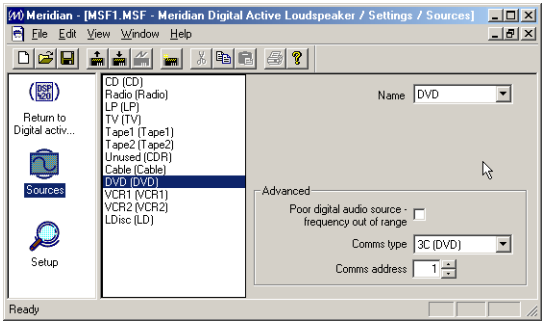
- Click the **Sources** icon in the left-hand panel of the **Meridian** window.

The right-hand panel shows a list of the 12 sources that are available. For each source you can configure its audio, tone, and advanced settings.

To configure the source options

- Select the source in the list of sources.

The settings for the source are shown in a panel to the right:



To change the name used to identify the source when using RS232 control:

- Choose a name from the **Name** drop-down menu.

Choosing **Unused** prevents the source from appearing when you press the corresponding source key on the Meridian System Remote.

The name used to identify each source is shown in the list of sources, followed by the Meridian System Remote key used to select the source in brackets.

Advanced

Specify the **Advanced** options as follows:

- Select **Poor digital audio source** if you have difficulty locking to the source.
- If the source is connected to another Meridian unit, set **Comms type** to **1C** for a Meridian CD player, **2C** for a Meridian FM tuner, and **3C** for a Meridian DVD player. Otherwise set it to **None**.
- If you have two Meridian source units of the same type you can configure them to have different Comms addresses. You can then select the appropriate source by specifying its Comms address in the **Comms address** field.

Completing the configuration

The final stage in creating a settings file is to save it, and then store it to the speaker.

To save the current settings

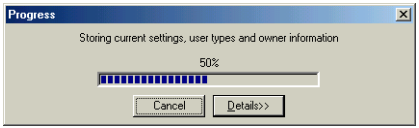
- Choose **Save** from the **File** menu or click the Save toolbar button, to save the changes you have made to the settings file to your PC hard disk:

To store the settings to the DSP420 loudspeaker

- Click the Store button:

The settings will then be downloaded and the back panel indicator will flash.

As the download proceeds the following dialogue box shows its progress:



If the download was successful the DSP420 will switch itself to standby.

Troubleshooting

This chapter provides suggested solutions to typical problems that may occur when setting up the digital loudspeaker(s).

If you are still not able to resolve a difficulty with the help of this guide and the suggestions in the following pages, please contact your Meridian dealer or Meridian Audio Ltd.

Troubleshooting

Red power indicator on front panel not lit

Check the following:

❍ The power switch on the front panel of the DSP420 is turned on.

If the DSP420 will still not illuminate, check any fuses in your power supply and the fuse on the front panel of the DSP420. If these are all intact, contact your dealer.

Red power indicator on front panel is flashing

This normally indicates that the DSP420 has overheated, and that it has shut down to cool down. If the DSP420 is cold, it may indicate a fault.

❍ Allow the DSP420 to cool down. It should then operate normally.

Green lock indicator will not light

The green indicator lights when the product is out of standby and is locked to a digital source.

❍ Check that the digital audio input is wired correctly and that it is connected to an active source of SPDIF.
❍ Check that the COMMS is wired correctly and that the Meridian system is out of standby.

Note: The DSP420 boots to an out of standby state, unlike other Meridian DSP speakers, so repowering the unit will ensure that it is out of standby.

Drive units move when the speaker is switched on or off

This is normal as the speaker active electronics settle.

Sound is odd or mono

❍ Check the channel selector switches on both loudspeakers are correctly set.

Only the master loudspeaker plays

❍ Check the S5 cables are connected correctly.

Centre not working

❍ Check that the channel switch is set to LEFT/CENTRE.

There is radio interference

The DSP420 is a digital audio and computing device which has been designed to very high standards of electromagnetic compatibility.

If this equipment does cause or suffer from interference to/from radio or television reception then the following measures should be tried:

❍ Reorient the receiving aerial (or antenna) or route the antenna cable of the receiver as far as possible from the DSP420 and its cabling.
❍ Ensure that the receiver uses well-screened antenna cable.
❍ Relocate the receiver with respect to the DSP420.
❍ Connect the receiver and this product to different AC outlets.
❍ If the problem persists contact your dealer.

Configuring the DSP420 does not have any effect

Make sure that you are configuring the DSP420 used as the master digital loudspeaker in the system. This determines the configuration of all digital loudspeakers in the system.

Meridian Configuration program repeatedly fails to talk to the loudspeaker

❍ Check that you have selected a COMMS port.
❍ Check that no other program currently running is using the COMMS port.
❍ Check that it is connected correctly.
❍ Turn off the DSP420 for a few seconds and turn back on, then retry.
❍ Quit from all other programs and retry.
❍ Reboot the computer and retry.
❍ Ensure you are using the serial lead supplied with the product, or a null modem cable.
❍ If you are using a notebook computer try turning off the screensaver or power management software.

Service and guarantee

Service

The Meridian components have been carefully designed to give years of untroubled service. There are no user-serviceable parts inside the case, nor do the units require any form of maintenance.

In the unlikely event that your DSP420 fails to function correctly, it should be returned, in its original packaging, to your Meridian dealer.

In case of difficulty within the UK or USA please contact the appropriate sales and service address shown on page ii.

In case of difficulty outside the UK or USA, contact the importing agent for the territory. A list of Meridian agents abroad is available from Meridian Audio.

No responsibility can be accepted for the DSP420 whilst in transit to the factory or an agent, and customers are therefore advised to insure the unit. When seeking service under guarantee, proof of the date of purchase will be required.

Guarantee

The DSP420 DSP In-Wall Loudspeaker System is guaranteed against defects in material and workmanship for two years from the date of purchase.

The guarantee is void if the DSP420 DSP In-Wall Loudspeaker System has been subject to misuse, accident, or negligence, or has been tampered with or modified in any way without the written authorisation of Meridian Audio Limited.
Note: Connecting anything other than the correct network lead to the COMMS sockets may cause damage to the DSP420 DSP In-Wall Loudspeaker System which will not be covered by this guarantee. Attempted servicing by unauthorised people may also invalidate this guarantee. Labour and carriage charges are not covered unless by local agreement.

Outside the UK, local warranty liability is restricted to equipment purchased within the territory. Our agents abroad are only under contractual obligation to service under guarantee equipment sold through them. They are entitled to make a non-refundable charge for any service carried out on other equipment.

This guarantee does not limit your statutory rights within the United Kingdom.

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