

# Integrus-puheviestintäjärjestelmä

## Esite



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## Introduction



### Simultaneous Interpretation

For international conferences with multiple languages, it is obviously of utmost importance that all participants can understand what is being said. That is why a system which enables interpreters to simultaneously interpret the speaker's language is almost indispensable. The interpretations created are then distributed throughout the conference venue, so delegates can select their language of choice and listen to it through headphones.

### Infrared Distribution

The most effective method of distributing the interpretations is by using an infrared language distribution system. Infrared means wireless, so delegates have total freedom of movement. It means information integrity, because distributed signals cannot pass beyond the conference hall. And now, with the Bosch Integrus system, it means better than ever audio quality, with no interference from hall lighting.

In simple terms, an infrared distribution system consists of a transmitter, one or more radiators and a number of pocket receivers. Various accessories are also available, such as headphones, cables and battery chargers.

The transmitter is the central element in the Integrus system. It accepts inputs from either analog or digital sources, modulates these signals on to carrier waves, then transmits the waves to radiators located elsewhere in the room. The transmitter accommodates special interface modules to ensure compatibility with these external signal sources. Depending on the transmitter model, up to 32 separate channels can be transmitted simultaneously.

The output of the radiators is intensity-modulated infrared radiation. Each delegate is supplied with a pocket receiver, which has a lens to collect the infrared signal and direct it to a sensor. These signals are then decoded back into interpretation languages, which are chosen by delegates using a channel selector and passed to the delegate's headphones.

### Advanced Digital Technology

The Integrus language distribution system incorporates unique, specially-developed Bosch Ir-Digital technology that is characterized by a number of features:

- The Integrus conforms to IEC 61603, part 7. This is the industry standard for digital infrared transmission for language distribution

- The use of the 2-8 MHz frequency band eliminates disturbance from all types of lighting systems
- Error correction by means of a Reed Solomon coder, plus the bit error rate threshold, ensures a high audio quality
- The digital transmission protocol used allows additional information to be sent (e.g. synchronization of the number of channels in use)
- The application of digital technology results in a very high sound quality with a signal/noise ratio of 80 dB

Some of the advantages of this new technology are described in more detail below.

### Characteristics of Infrared Distribution

Infrared radiation is an ideal medium for audio distribution. It is invisible to the human eye and can carry multiple channels, each with a separate language, over relatively large distances. And, above all, it is a wireless distribution system, so conference participants can receive interpretations without being physically connected to the system.

### Freedom of Movement for Delegates

With an infrared system, delegates have great freedom in movement throughout the conference room. As the interpretations are transmitted through the air, there is no physical connection to the system, so the only limitations are the walls of the venue itself. The pocket receivers used by delegates to pick up interpretations are lightweight, portable and unobtrusive, and can be easily slipped into a shirt or jacket pocket.



### Conference Hall Privacy

Conferences can often involve discussion of sensitive information, where it is important that any audio distribution does not compromise security. As infrared radiation is unable to pass through opaque structures such as walls, the conference venue itself acts as a barrier to infrared radiation escaping and being overheard.



### Language Distribution in Adjacent Halls

Infrared systems are ideally-suited for conference centers with a number of separate halls. Since walls are opaque to infrared radiation, there is no interference between separate conferences.

### No Interference from Lighting Systems

One of the limitations of traditional infrared language distribution systems was interference from lighting. The problem was particularly acute with newer (fluorescent) lighting systems, which operate at higher frequencies and therefore cause more interference. The Integrus system has completely solved this problem by using a much higher frequency band – 2 to 8 MHz – for audio distribution.

Freedom from interference from all types of venue lighting brings two major advantages: audio quality is greatly improved, and systems can be used much more easily on a rental basis, because they will be compatible with all types of venue lighting.



Distorted reception (left) with other language distribution systems, and perfect reception (right) with Bosch Integrus system

### Audio Quality

The Integrus system offers greatly improved audio quality. Better compression techniques and a higher signal-to-noise ratio means that the received signal is much clearer, and, as mentioned above, there is no interference from lighting systems. Greater intelligibility makes the system less tiring to use over extended periods. Delegates can therefore maintain their concentration more easily during a long conference session.

### Number of Channels

The Integrus gives the user real flexibility in choosing the number of required channels. By using a much higher frequency band (2 to 8 MHz) it offers four quality modes:

- Standard-quality mono (for interpretations). Four channels of this quality can be incorporated in a single carrier signal
- Standard quality stereo (for reproduction of music or presentations). Two channels of this quality can be incorporated in a single carrier signal
- Premium-quality mono (with double the bandwidth). Two channels of this quality can be incorporated in a single carrier signal
- Premium-quality stereo (for excellent reproduction of music or presentations). One channel of this quality can be incorporated in a single carrier signal

The Integrus can therefore provide a maximum of 32 standard-quality audio channels (which means up to 31 different interpretations + the floor), more than enough to accommodate even the largest international conferences. It can also be configured for high quality stereo sound, with up to eight different channels available for applications like multimedia presentations or music distribution. Combinations of standard- and premium-quality configuration are also possible.

### User-Friendly Channel Selection

The Integrus pocket receivers offer the user the exact amount of channels available. This eliminates having to scroll through unused channels before reaching the required signal. All pocket receivers in the system automatically update themselves if the number of available channels changes.

### Installation and Maintenance of the System

The Integrus system is easy to install (installation time is largely determined by the time required to position and align the radiators.) Connection of the transmitters is straightforward and quick. The transmitter has slots for modules that enable interfacing with digital or analogue conference systems. All information regarding installation, configuration and system status is given on the transmitter front-panel display. The display also shows the menu, which allows all system parameters to be set or altered. One easy-to-use button is all that is required to select all menu options.

Circuitry in the transmitter and matching circuitry in the radiators allows effective monitoring of the radiators function. The status of the radiators is indicated on the transmitter display and by LEDs on each radiator. The system is also easy to maintain. Maintenance of the pocket receivers generally involves recharging or replacing the batteries they use.

Once installed, the system can easily be extended to accommodate more conference delegates, simply by adding the required number of extra pocket receivers. The basic system structure will remain the same.

### Testing Coverage

The Integrus pocket receivers have an ingenious feature, which allows installers to test the coverage of radiators without the need for measuring equipment. Simply by walking throughout the venue holding a pocket receiver in measuring mode, it is possible to check the coverage at every point. This makes it easy to see whether extra radiators are required or if the positioning of existing ones should be altered.

### Integrated Charging Electronics

A breakthrough in technology has made receiver charging more reliable than ever. The process is regulated from the Integrus system IC, although each receiver now has integrated electronics to allow it to manage its own charging process. This ensures optimum charging performance and maximum battery lifetime.

### Room Coupling

For distributing interpretations to multiple rooms, the transmitter has a master/slave operation mode. This means that separate (slave) transmitters can be located in the other rooms, providing exactly the same functionality as the master transmitter and providing local outputs for radiators. This removes the need to connect the

radiators required for the additional rooms to one transmitter, which cuts the amount of wiring required and eliminates the risk of capacity overload.

#### **Emergency or Auxiliary Input**

To provide delegates with an additional degree of safety and security, the transmitter unit includes an additional auxiliary input which overrides all active audio channels. This auxiliary input allows the immediate distribution of emergency messages to all active channels. The auxiliary input may also be used for the distribution of music or other information.

#### **Complete Integration**

Integrus integrates seamlessly with the DCN Next Generation and DCN Wireless using an optical network for a maximum 31 different languages, plus floor. Use Integrus with CCS 900 Ultro and the analog 6-channel interpreter desk for perfect reception at smaller meetings. Or easily interface with virtually any other brand of conference system.

For more information, see the relevant data brochures.



#### **Music Distribution and Hearing Assistance**

The Integrus offers more than just language (interpretation) distribution. Its flexibility and high audio quality also make it suitable for:

- Music distribution. In places as diverse as fitness centers and factories, it can provide a choice of music for listeners in locations throughout the premises
- High-quality audio distribution. Multi-lingual cinemas can offer different language soundtracks in the same hall
- Hearing assistance. Helps the hard-of-hearing in places like theatres and other public buildings
- Concert halls and live theaters can distribute the amplified sound in high quality to the musicians on stage without interference or risk of feedback
- Distribution of instructions. TV studios can use the system to distribute instructions from the control gallery to the camera men without RF interference
- Tour guide. Canal boats and museums can offer their customers the tour information in their own language with high audio quality
- Provides musicians on stage the audio they require for their performance
- Interpretation schools. Distribution of the floor and the interpretation on respectively the left and right channel for simultaneous listening to the floor and the selected interpretation

**Example 1**



1	Integrus Pocket Receiver with headphone
2	Integrus Radiator
3	DCN Next Generation Chairman Unit
4	DCN Next Generation Delegate Units
5	Interpreter Desks
6	Microphone
7	Line Array Loudspeakers

**Example 2**



1	Integrus Pocket Receiver with headphone
2	Integrus Radiator
3	Integrus Transmitter
4	DCN Wireless Chairman Unit
5	DCN Wireless Delegate Units
6	Wireless Access Point
7	Interpreter Desks
8	Line Array Loudspeakers
9	Camera System

## System Description and Planning

### System overview

Integrus is a system for wireless distribution of audio signals via infrared radiation. It can be used in a simultaneous interpretation system for international conferences where multiple languages are used. To enable all participants to understand the discussion, interpreters simultaneously translate the speaker's language as required. These interpretations are distributed throughout the conference venue, and delegates select the language of their choice and listen to it through headphones.

The Integrus system can also be used for music distribution (mono as well as stereo).

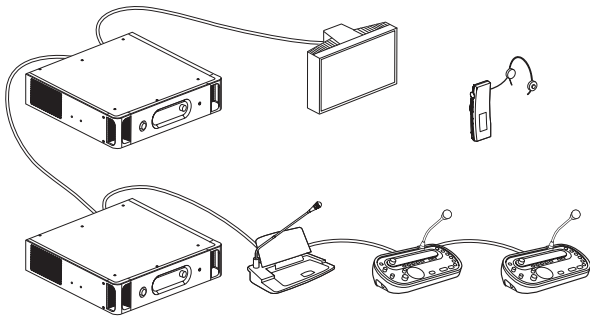


Figure 1: Integrus system overview (with DCN system as input)

The Integrus Digital Infrared Language Distribution System comprises one or more of the following:

### Transmitter

The transmitter is the core of the Integrus system. Four types are available:

- INT-TX04 with inputs for 4 audio channels
- INT-TX08 with inputs for 8 audio channels
- INT-TX16 with inputs for 16 audio channels
- INT-TX32 with inputs for 32 audio channels

The transmitter can be directly connected to the DCN Next Generation conference system.

### Interface module

LBB 3422/20 Integrus audio input and interpreters module to connect to analogue discussion and conference systems (such as CCS 900) or to LBB 3222/04 6-channel interpreters desks.

### Radiators

Two types of radiators are available:

- LBB 4511/00 medium-power radiator for small / medium conference venues.
- LBB 4512/00 high-power radiator for medium/large conference venues.

The radiators can be switched between full and half power use. They can be mounted on walls, ceilings or floor stands.

### Infra-red receivers

Three multi-channel infra-red receivers are available:

- LBB 4540/04 for 4 audio channels
- LBB 4540/08 for 8 audio channels
- LBB 4540/32 for 32 audio channels

They can operate with a rechargeable NiMH battery pack or with disposable batteries. Charging circuitry is incorporated in the receiver.

### Charging equipment

Equipment is available for charging and storing 56 pocket receivers. Two versions are available:

- LBB 4560/00 charging suitcase for portable systems
- LBB 4560/50 charging cabinet for permanent systems

### System technology

#### IR radiation

The Integrus system is based on transmission by modulated infrared radiation. Infrared radiation forms part of the electro-magnetic spectrum, which is composed of visible light, radio waves and other types of radiation. It has a wavelength just above that of visible light. Like visible light, it is reflected from hard surfaces, yet passes through translucent materials such as glass. The infrared radiation spectrum in relation to other relevant spectra is shown in figure 2

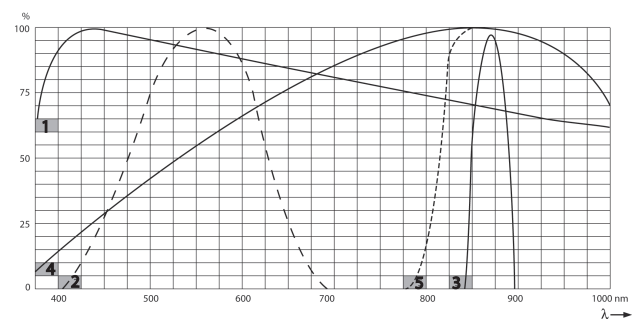


Figure 2: Infrared radiation spectrum in relation to other spectra

- (1) Daylight spectrum
- (2) Sensitivity of the human eye
- (3) IR radiator
- (4) Sensitivity of the IR sensor
- (5) Sensitivity of the IR sensor with daylight filter

### Signal Processing

The Integrus system uses high frequency carrier signals (typically 2 to 8 MHz) to prevent interference problems with modern light sources (see section 'Ambient Lighting'). The digital audio processing guarantees a constant high audio quality.

The signal processing in the transmitter consists of the following main steps (see figure 3):

1. **A/D conversion** - Each analogue audio channel is converted to a digital signal.
2. **Compression** - The digital signals are compressed to increase the amount of information that can be distributed on each carrier. The compression factor is also related to the required audio quality.
3. **Protocol Creation** - Groups of up to four digital signals are combined into a digital information stream. Extra fault algorithm information is added. This information is used by the pocket receivers for fault detection and correction.
4. **Modulation** - A high frequency carrier signal is phase modulated with the digital information stream.
5. **Radiation** - Up to 8 modulated carrier signals are combined and sent to the IR radiators, which convert the carrier signals to modulated infrared light.



In the pocket receivers a reverse processing is used to convert the modulated infrared light to separate analogue audio channels.

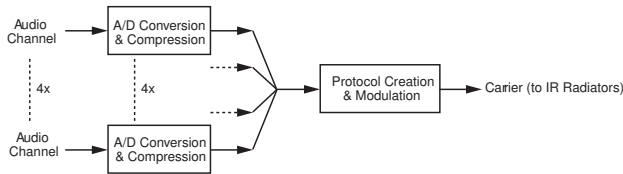


Figure 3: Overview of the signal processing (for one carrier)

**Quality modes**

The Integrus system can transmit audio in four different quality modes:

- Mono, standard quality, maximum 32 channels
- Mono, premium quality, maximum 16 channels
- Stereo, standard quality, maximum 16 channels
- Stereo, premium quality, maximum 8 channels

The standard quality mode uses less bandwidth and can be used for transmitting speech. For music the premium quality mode gives near CD quality.

**Carriers and channels**

The Integrus system can transmit up to 8 different carrier signals (depending on the transmitter type). Each carrier can contain up to 4 different audio channels. The maximum number of channels per carrier is dependent on the selected quality modes. Stereo signals use twice as much bandwidth as a mono signals, premium quality uses twice as much bandwidth as standard quality. Per carrier a mix of channels with different quality modes is possible, as long as the total available bandwidth is not exceeded. The table below lists all possible channel combinations per carrier:

**Channel Quality**

Mono Standard	Mono Premium	Stereo Standard	Stereo Premium	Bandwidth
4				4 x 10 kHz
2	1			2 x 10 kHz and 1 x 10 kHz
2		1		2 x 10 kHz and 1 x 10 kHz (left) and 1 x 10 kHz (right)
	1	1		1 x 20 kHz and 1 x 10 kHz (left) and 1 x 10 kHz (right)
		2		2 x 20 kHz (left) and 2 x 10 kHz (right)
	2			2 x 20 kHz
			1	1 x 20 kHz (left) and 1 x 10 kHz (right)

**Aspects of infrared distribution systems**

A good infrared distribution system ensures that all delegates in a conference venue receive the distributed signals without disturbance. This is achieved by using

enough radiators, placed at well planned positions, so that the conference venue is covered with uniform IR-radiation of adequate strength.

There are several aspects that influence the uniformity and quality of the infrared signal, which must be considered when planning an infrared radiation distribution system. These are discussed in the next sections.

**Directional sensitivity of the pocket receiver**

The sensitivity of a pocket receiver is at its best when it is aimed directly towards a radiator. The pocket receiver has an operating angle of 100 degrees (see Figure 4).

Rotating the pocket receiver will decrease the sensitivity. For rotations of less than +/- 30 degrees this effect is not large, but for larger rotations the sensitivity will decrease rapidly.

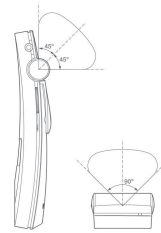


Figure 4: Directional characteristics of the pocket receivers

**The footprint of the radiator**

The coverage area of a radiator depends on the number of transmitted carriers and the output power of the radiator. The coverage area of the LBB 4512/00 radiator is twice as large as the coverage area of the LBB 4511/00. The coverage area can also be doubled by mounting two radiators side by side. The total radiation energy of a radiator is distributed over the transmitted carriers.

When more carriers are used, the coverage area gets proportionally smaller. The pocket receiver requires a strength of the IR signal of 4 mW/m<sup>2</sup> per carrier to work without errors (resulting in a 80 dB S/N ratio for the audio channels).

The effect of the number of carriers on the coverage area can be seen in figure 5 and figure 6. The radiation pattern is the area within which the radiation intensity is at least the minimum required signal strength.

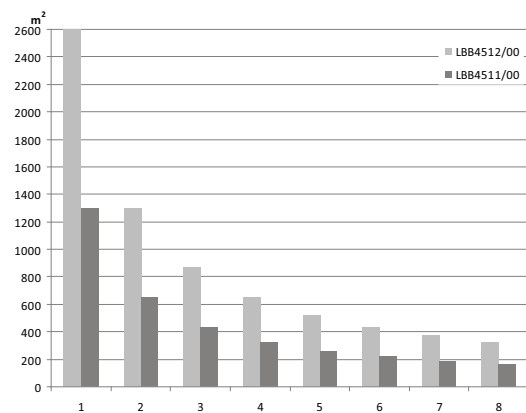


Figure 5: Total coverage area of LBB 4511/00, LBB 4512/00 and LBB 3410/05 for 1 to 8 carriers

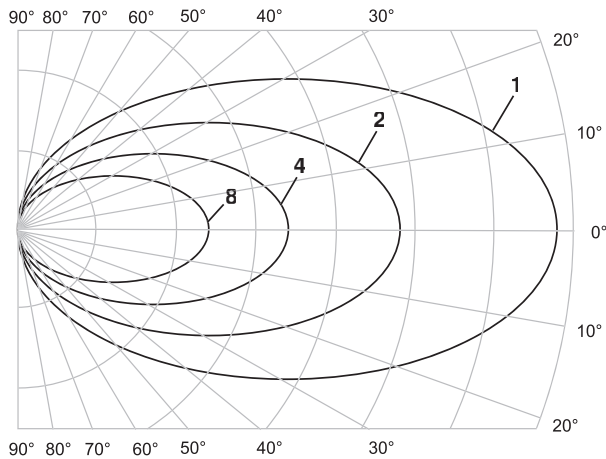


Figure 6: Polar diagram of the radiation pattern for 1, 2, 4 and 8 carriers

The cross section of the 3-dimensional radiation pattern with the floor of the conference venue is known as the footprint (the white area in figure 7 to figure 9). This is the floor area in which the direct signal is strong enough to ensure proper reception, when the pocket receiver is directed towards the radiator. As shown, the size and position of the footprint depends on the mounting height and angle of the radiator.

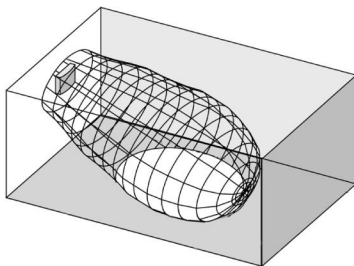


Figure 7: The radiator mounted at 15° to the ceiling

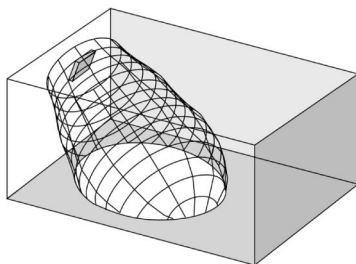


Figure 8: The radiator mounted at 45° to the ceiling

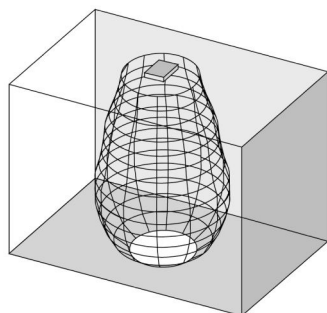


Figure 9: The radiator mounted perpendicular (at 90°) to the ceiling

**Ambient lighting**

The Integrus system is practically immune for the effect of ambient lighting. Fluorescent lamps (with or without electronic ballast or dimming facility), such as TL lamps or energy saving lamps give no problems with the Integrus system. Also sunlight and artificial lighting with incandescent or halogen lamps up to 1000 lux give no problems with the Integrus system. When high levels of artificial lighting with incandescent or halogen lamps, such as spotlights or stage lighting are applied, you should directly point a radiator at the pocket receivers in order to ensure reliable transmission. For venues containing large, unshielded windows, you must plan on using additional radiators. For events taking place in the open air a site test will be required in order to determine the required amount of radiators. With sufficient radiators installed, the pocket receivers will work without errors, even in bright sunlight.

**Objects, surfaces and reflections**

The presence of objects in a conference venue can influence the distribution of infrared light. The texture and color of the objects, walls and ceilings also plays an important role.

Infrared radiation is reflected from almost all surfaces. As is the case with visible light, smooth, bright or shiny surfaces reflect well. Dark or rough surfaces absorb large proportions of the infrared signal (see figure 10). With few exceptions it cannot pass through materials that are opaque to visible light.

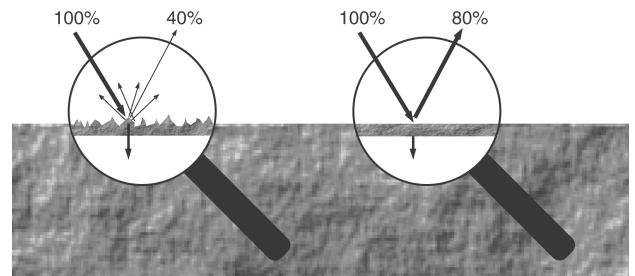


Figure 10: The texture of the material determines how much light is reflected and how much is absorbed

Problems caused by shadows from walls or furniture can be solved by ensuring that there are sufficient radiators and that they are well positioned, so that a strong enough infrared field is produced over the whole conference area. Care should be taken not to direct radiators towards uncovered windows, as most of this radiation will subsequently be lost.

**Positioning the radiators**

Since infrared radiation can reach a pocket receiver directly and/or via diffused reflections, it is important to take this into account when considering the positioning of the radiators. Though it is best if pocket receivers pick up direct path infrared radiation, reflections improve the signal reception and should therefore not be minimized. Radiators should be positioned high enough not to be blocked by people in the hall (see figures 11 and 12).

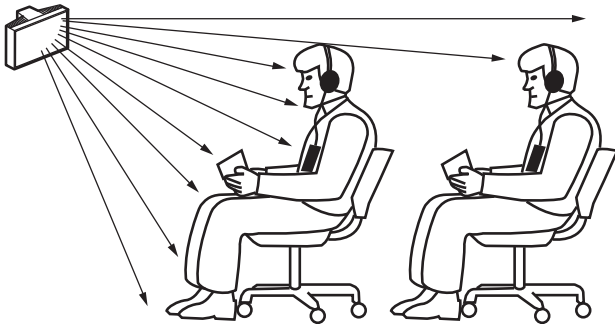


Figure 11: Infrared signal blocked by a person in front of the participant

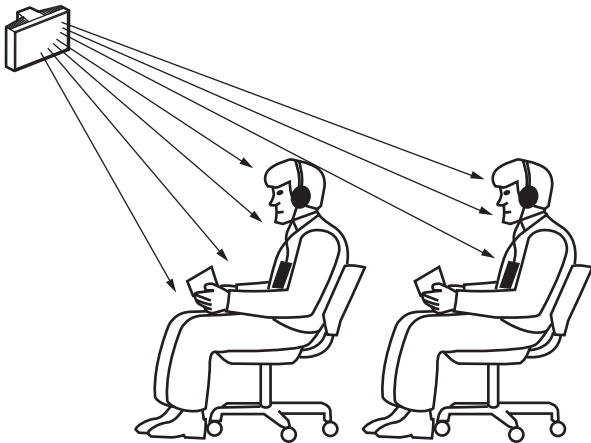


Figure 12: Infrared signal not blocked by a person in front of the participant

The figures below illustrate how infrared radiation can be directed to conference participants. In figure 13, the participant is situated clear from obstacles and walls, so a combination of direct and diffused radiation can be received. Figure 14 shows the signal being reflected from a number of surfaces to the participant.

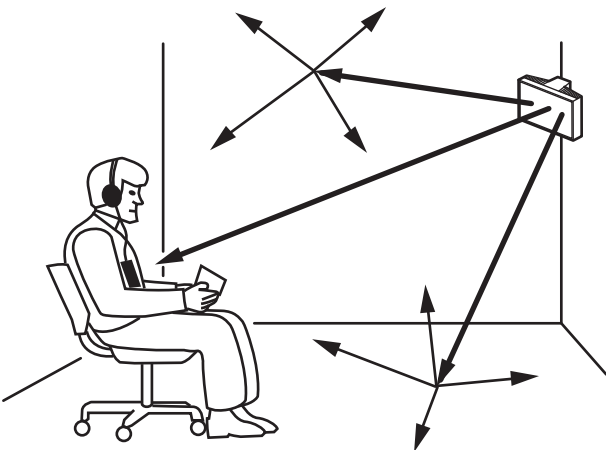


Figure 13: Combination of direct and reflected radiation

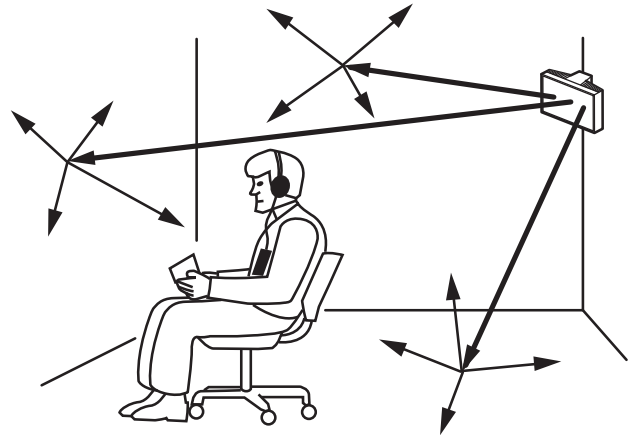


Figure 14: Combination of several reflected signals

For concentrically arranged conference rooms, centrally placed, angled radiators located high up can cover the area very efficiently. In rooms with few or no reflecting surfaces, such as a darkened film-projection room, the audience should be covered by direct path infrared radiation from radiators positioned in front. When the direction of the pocket receiver changes, e.g. with varying seat arrangements, mount the radiators in the corners of the room (see figure 15).

If the audience is always directed towards the radiators, you do not need radiators at the back (see figure 16). If the path of the infrared signals is partially blocked, e.g. under balconies, you should cover the 'shaded' area with an additional radiator (see figure 17).

The figures below illustrate the most effective positioning of the radiators:

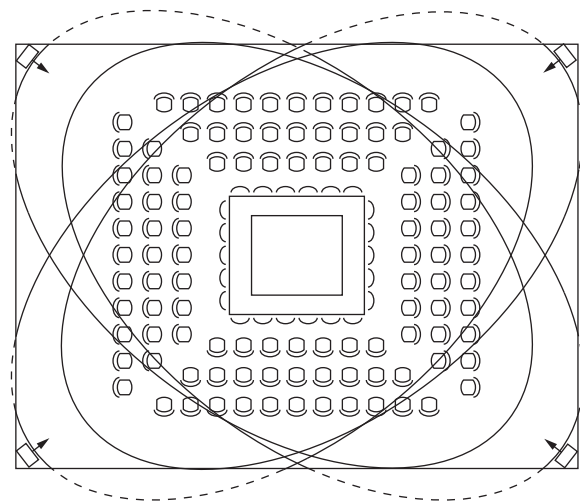


Figure 15: Radiators covering seats arranged in a square

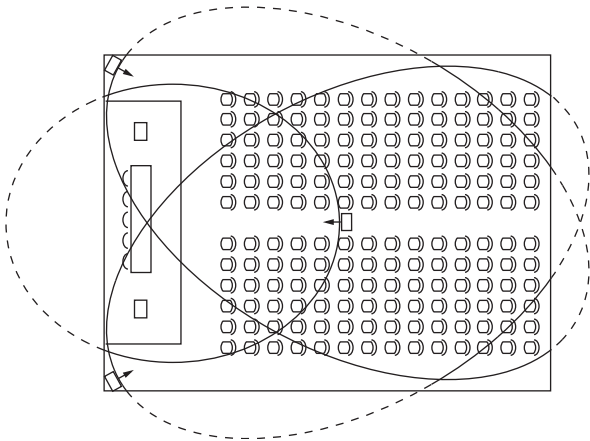


Figure 16: Radiator position in a conference hall with auditorium seating and podium

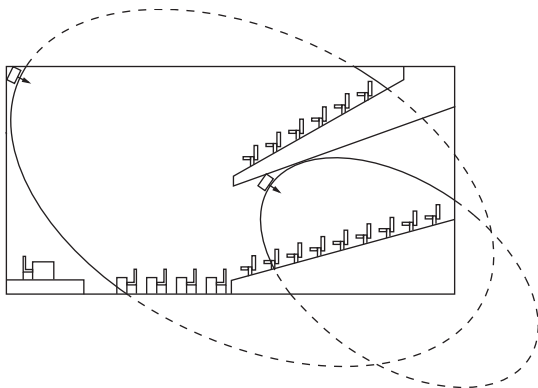


Figure 17: Radiators covering seats beneath a balcony

**Overlapping footprints and multipath effects**

When the footprints of two radiators partly overlap, the total coverage area can be larger than the sum of the two separate footprints. In the overlap area the signal radiation power of two radiators are added, which increases the area where the radiation intensity is larger than the required intensity.

However, differences in the delays of the signals picked up by the pocket receiver from two or more radiators can cause the signals to cancel each other out (multipath effect). In worst-case situations this can lead to a loss of reception at such positions (black spots). Figures 18 and 19 show the effect of overlapping footprints and differences in signal delays.

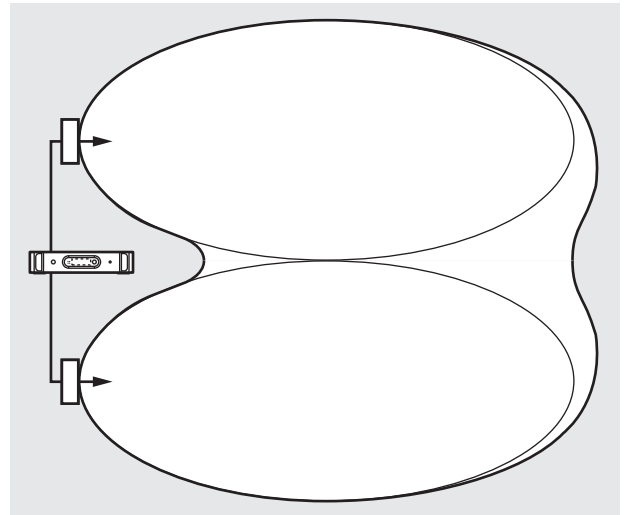


Figure 18: Increased coverage from added radiation power

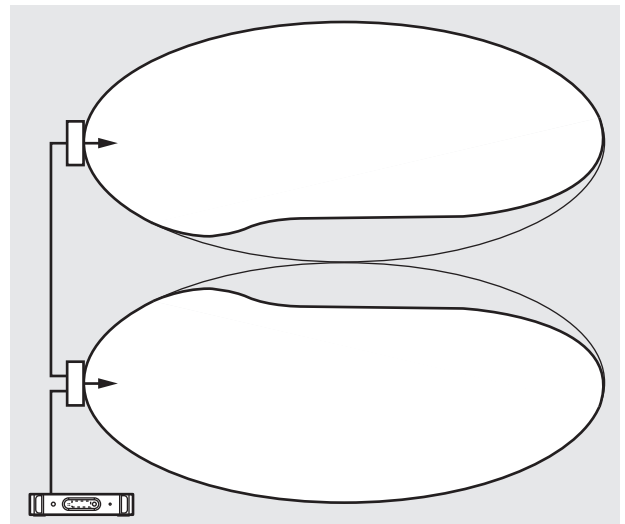


Figure 19: Reduced coverage caused by cable signal delay differences

The lower the carrier frequency, the less susceptible the pocket receiver is for differences in signal delays. The signal delays can be compensated by using the delay compensation switches on the radiators (see manual).

**Planning an Integrus infrared radiation system**

**Rectangular footprints**

Determining the optimal number of radiators required to give 100% coverage of a hall can normally only be done by performing a site test. However, a good estimation can be made by using ‘guaranteed rectangular footprints’. Figures 20 and 21 show what is meant by a rectangular footprint. As can be seen, the rectangular footprint is smaller than the total footprint. Note that in figure 21 the ‘offset’ X is negative because the radiator is actually mounted beyond the horizontal point at which the rectangular footprint starts.

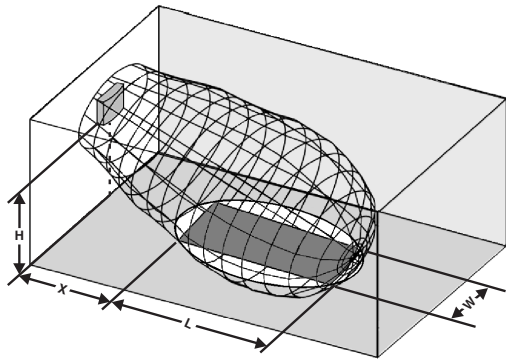


Figure 20: Typical rectangular footprint for a 15° mounting angle

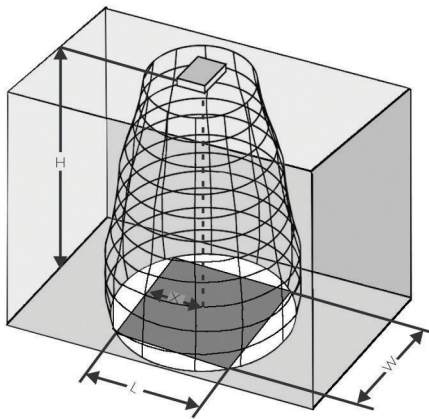


Figure 21: Typical rectangular footprint for a 90° mounting angle

The guaranteed rectangular footprints for various numbers of carriers, mounting heights and mounting angles can be found in the section ‘Guaranteed rectangular footprints’. The height is the distance from the reception plane and not from the floor.

Guaranteed rectangular footprints can also be calculated with the footprint calculation tool (available on the documentation CD-ROM). The given values are for one radiator only, and therefore do not take into consideration the beneficial effects of overlapping footprints. The beneficial effects of reflections are also not included. Generally (for systems with up to 4 carriers) if the pocket receiver can pick up the signal of two adjacent radiators, the distance between these radiators can be increased approximately by a factor 2.4 (see figure 22).

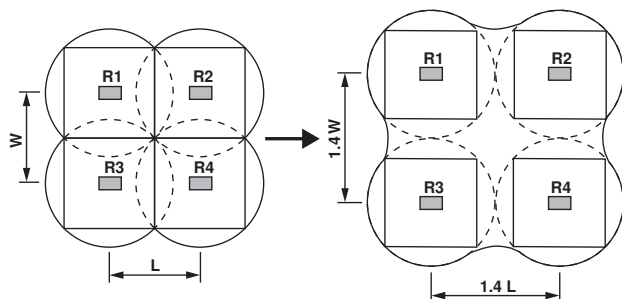


Figure 22: The effect of overlapping footprints

### Planning radiators

Use the following procedure to plan the radiators:

1. Follow the recommendations in section ‘Aspects of infrared distribution systems’ to determine the radiator positions.
2. Look up (in the table) or calculate (with the footprint calculation tool) the applicable rectangular footprints.
3. Draw the rectangular footprints in the room lay-out.
4. If the pocket receiver can pick up the signal of two adjacent radiators in some areas, determine the overlap effect and draw the footprint enlargement(s) in the room lay-out.
5. Check if you have sufficient coverage with the radiators at the intended positions. If not, add additional radiators to the room.

See figures 15, 16 and 17 for examples of a radiator lay-out.

### Cabling

Signal delay differences can occur due to differences in the cable length from the transmitter to each radiator. To minimize the risk of black spots use equal cable length from transmitter to radiator if possible (see figure 23).

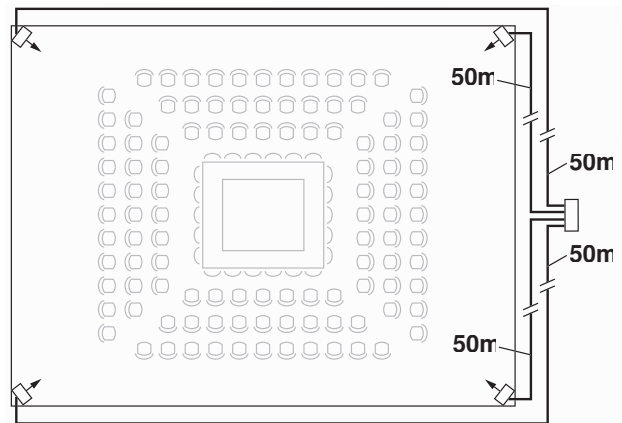


Figure 23: Radiators with equal cable length

When radiators are loop-through connected, the cabling between each radiator and the transmitter should be as symmetrical as possible (see figures 24 and 25). The differences in cable signal delays can be compensated with the signal delay compensation switches on the radiators.

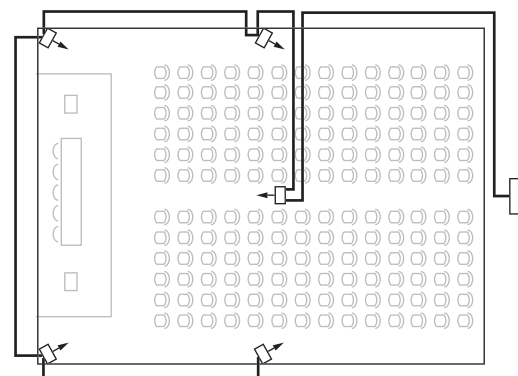


Figure 24: Asymmetrical radiator cabling (to be avoided)

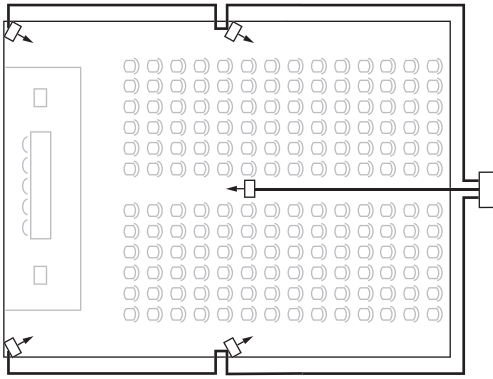


Figure 25: Symmetrical radiator cabling (recommended)

Nr.	H	$\alpha$	LBB 4511/00 at full power				LBB 4512/00 at full power				
			A	L	W	X	A	L	W	X	
1	2,5	0	814	37	22	8,5	1643	53	31	11,5	
		15	714	34	21	8	1440	48	30	10,5	
		30	560	28	20	5	1026	38	27	6,5	
	10	45	340	20	17	2	598	26	23	3	
		60	240	16	15	-0,5	380	20	19	0	
		90	169	13	13	-6,5	196	14	14	-7	
		15	770	35	22	10	1519	49	31	12,5	
		30	651	31	21	6	1189	41	29	8	
		45	480	24	20	2,5	837	31	27	3	
20	60	380	20	19	-1,5	600	25	24	-1		
	90	324	18	18	-9	441	21	21	-10,5		
	30	609	29	21	12	1364	44	31	11		
	45	594	27	22	6	1140	38	30	4,5		
	60	504	24	21	0,5	899	31	29	-1,5		
	90	441	21	21	-10,5	784	28	28	-14		
	2	2,5	15	360	24	15	5	714	34	21	7
			15	375	25	15	6	714	34	21	8
			30	294	21	14	4	560	28	20	5
10		45	195	15	12	1,5	340	20	17	2	
		60	156	13	12	-1	240	16	15	-0,5	
		90	121	11	11	-5,5	169	13	13	-6,5	
		30	330	22	15	5,5	651	31	21	6	
		45	285	19	15	2,5	480	24	20	2,5	
		60	224	16	14	-1	380	20	19	-1,5	
4	2,5	15	187	17	11	4	360	24	15	5	
		15	187	17	11	5	375	25	15	6	
		30	165	15	11	3,5	294	21	14	4	
	10	45	120	12	10	1,5	195	15	13	1,5	
		60	90	10	9	-0,5	156	13	12	-1	
		90	81	9	9	-4,5	121	11	11	-5,5	
		45	154	14	11	3	285	19	15	2,5	
		60	132	12	11	0	224	16	14	-1	
		90	100	10	10	-5	196	14	14	-7	
8	2,5	15	96	12	8	3	187	17	11	4	
		15	84	12	7	4,5	187	17	11	5	
		30	88	11	8	3	165	15	11	3,5	
	10	45	63	9	7	1,5	120	12	10	1,5	
		60	56	8	7	-0,5	90	10	9	-0,5	
		90	49	7	7	-3,5	81	9	9	-4,5	
		60	64	8	8	1,5	132	12	11	0	
		90	64	8	8	-4	100	10	10	-5	

*Guaranteed rectangular footprints of the radiators at full power (shown in metric units)*

Nr	Number of carriers
H	Mounting height (m) from the reception plane
$\alpha$	Mounting angle (degrees)
A	Area (m <sup>2</sup> )
L	Length (m)
W	Width (m)
X	Offset (m)



Nr.	H	$\alpha$	LBB 4511/00 at full power				LBB 4512/00 at full power				
			A	L	W	X	A	L	W	X	
1	8	0	8712	121	72	28	17748	174	102	38	
	16	15	7728	112	69	26	15386	157	98	34	
		30	6072	92	66	16	11125	125	89	21	
		45	3696	66	56	7	6375	85	75	10	
		60	2548	52	49	-2	4092	66	62	0	
		90	1849	43	43	-21	2116	46	46	-23	
	33	15	8280	115	72	33	16422	161	102	41	
		30	7038	102	69	20	12825	135	95	26	
		45	5214	79	66	8	9078	102	89	10	
		60	4092	66	62	-5	6478	82	79	-3	
	90	3481	59	59	-30	4761	69	69	-34		
66	30	6555	95	69	39	14688	144	102	36		
	45	6408	89	72	20	12250	125	98	15		
	60	5451	79	69	2	9690	102	95	-5		
	90	4761	69	69	-34	8464	92	92	-46		
	2	8	15	3871	79	49	16	7728	112	69	23
		16	15	4018	82	49	20	7728	112	69	26
			30	3174	69	46	13	6072	92	66	16
			45	1911	49	39	5	3696	66	56	7
			60	1677	43	39	-3	2548	52	49	-2
			90	1296	36	36	-18	1849	43	43	-21
33		30	3528	72	49	18	7038	102	69	20	
		45	3038	62	49	8	5214	79	66	8	
		60	2392	52	46	-3	4092	66	62	-5	
		90	2116	46	46	-23	3481	59	59	-30	
66	60	2744	56	49	8	5451	79	69	2		
	90	2401	49	49	-25	4761	69	69	-34		
	4	8	15	2016	56	36	13	3871	79	49	16
		16	15	2016	56	36	16	4018	82	49	20
			30	1764	49	36	11	3174	69	46	13
			45	1287	39	33	5	2107	49	43	5
			60	990	33	30	-2	1677	43	39	-3
			90	900	30	30	-15	1296	36	36	-18
		33	45	1656	46	36	10	3038	62	49	8
			60	1404	39	36	0	2392	52	46	-3
		90	1089	33	33	-16	2116	46	46	-23	
66		90	1089	33	33	-16	2401	49	49	-25	
8	8	15	1014	39	26	10	2016	56	36	13	
	16	15	897	39	23	15	2016	56	36	16	
		30	936	36	26	10	1764	49	36	11	
		45	690	30	23	5	1287	39	33	5	
		60	598	26	23	-2	990	33	30	-2	
		90	529	23	23	-11	900	30	30	-15	
	33	60	676	26	26	5	1404	39	36	0	
		90	676	26	26	-13	1089	33	33	-16	

*Guaranteed rectangular footprints of the radiators at full power (shown in imperial units)*

Nr	Number of carriers
H	Mounting height (ft) from the reception plane
$\alpha$	Mounting angle (degrees)
A	Area (ft <sup>2</sup> )
L	Length (ft)
W	Width (ft)
X	Offset (ft)

## System Specification



### Features

- ▶ Up to 32 digital audio channels
- ▶ Wireless transmission gives participants freedom of movement
- ▶ Digitized audio ensures very high audio quality
- ▶ Powerful compression techniques enable efficient, low-loss transmission
- ▶ Comprehensive error correction ensures error-free transmission

### Functions

- Conference hall privacy; the conference venue itself acts as a barrier to infrared signals escaping and being overheard (infrared cannot pass through opaque structures such as walls)
- No interference between separate conference rooms makes it possible to use an unlimited number of systems in adjacent rooms
- Synchronization with the number of channels in use means the user does not have to scroll through unused channels
- Quality levels are programmable per channel, giving maximum flexibility for optimizing transmission
- Premium quality modes for distribution of very high quality sound
- Transmission in 2-8 MHz frequency band eliminates disturbance from all types of lighting systems

### Certifications and approvals

CE marking	Conforms to IEC 60914, the international standard for conference systems. Conforms to IEC 61603 part 7, the international standard for digital infrared transmission of audio signals for conference and similar applications
Safety:	INT-TX range, LBB 4560/00, LBB 4560/50: EN60065/CAN/CSA-C22.2 60065 (Canada) / UL60065 (USA). LBB 4511/00, LBB 4512/00: EN60065/CAN/CSA-C22.2 60065 (Canada) / UL1419 (USA) LBB 4540 range: EN60065
EMC emission	According to harmonized standard EN 55103-1 and FCC rules part 15, complying with the limits for a class A digital device
EMC immunity	According to harmonized standard EN 55103-2
EMC approvals	Affixed with the CE mark
ESD	According to harmonized standard EN 55103-2
Mains harmonics	According to harmonized standard EN 55103-1
Environmental requirements	Contains no banned substances as specified in UAT-0480/100 (e.g. no cadmium or asbestos)

### Technical specifications

#### Transmission Characteristics

IR transmission wavelength	870 nm
Modulation frequency	
Carriers 0 to 5	2 to 6 MHz (according to IEC 61603 part 7)
Carriers 6 and 7	up to 8 MHz
Protocol and modulation technique	DQPSK (according to IEC technique 61603 part 7)

#### System Audio Performance

**Measured from the audio input of an INT-TX transmitter to the headphone output of an LBB 4540 pocket receiver**

Audio frequency response	
at Standard Quality	20 Hz to 10 kHz (-3 dB)
at Premium Quality	20 Hz to 20 kHz (-3 dB)
Total harmonic distortion at 1 kHz	< 0.05%
Crosstalk attenuation at 1 kHz	> 80 dB
Dynamic range	> 80 dB
Weighted signal-to-noise ratio	> 80 dB(A)

**Cabling and System Limits**

Cable type	75 ohm RG59
Maximum number of radiators	30 per HF output
Maximum cable length	900 m (2,970 feet) per HF output

**System Environmental Conditions**

Working conditions	Fixed / stationary / portable
Temperature range	
transport	-40 to +70 °C (-40 to 158 °F)
operating and storage	
for LBB 4560 and INT-RX	+5 to +35 °C (41 to 113 °F)
for LBB 4511/00 and LBB 4512/00	+5 to +45 °C (41 to 122 °F)
for INT-TX	+5 to +55 °C (41 to 131 °F)
Humidity	
transport	5 to 95%
operating and storage	15 to 90%

## INT-TX Integrus transmitter



### Features

- ▶ Can distribute a maximum of 4, 8, 16 or 32 audio channels
- ▶ Can be used with DCN Next Generation, or analogue systems like the CCS 900
- ▶ Flexible configuration of channels and channel quality modes for efficient distribution
- ▶ Configuration of transmitter and system via a display and one single rotary push button

The transmitter is the central element in the Integrus system. It accepts analogue or digital input, modulates these signals onto carrier waves and transmits these carrier waves to radiators located in the room.

### Functions

- Auxiliary mode for distribution of music to all channels during a break
- Slave mode for distribution of signals from another transmitter allows multiple rooms to be used
- Test mode which produces a different frequency tone for each input/channel, with the tone gradually rising as the channels are stepped through
- Adjustable sensitivity for each input to enable fine tuning of audio levels
- Built-in mini infrared radiator for audio monitoring
- Radiator and system status indication via display
- Each transmitter can be assigned a unique name by the installer for easy identification in a multi-transmitter system
- Each audio channel can also be assigned a unique name by the installer. These names can be selected from a list of options or entered manually
- Automatic distribution of emergency messages to all channels
- Automatic standby/on function
- Automatic synchronization to the number of channels in use in a DCN system
- Automatic synchronization of language names in use in a DCN Next Generation system
- Universal mains power facility allows use worldwide
- Stylish 19" (2U) housing for tabletop use or rack mounting
- Handgrips for easy transportation

### Controls and Indicators

- 2 x 16 character LCD display for status information and transmitter configuration
- Rotary push button for navigation through menus and configuration
- Power on/off switch on front panel

### Interconnections



Interconnections (at rear of transmitter)

- Male Euro socket for mains connection
- Slot with audio data bus connector (H 15, female) for accepting LBB 3422/20 Symmetrical Audio Input and Interpreters Module
- 4, 8, 16 or 32 cinch connectors for input of asymmetrical audio signals
- Two XLR sockets for input of symmetrical signals of floor, emergency messages or music
- One terminal block socket for distribution of emergency messages to all channels
- 3.5 mm (0.14 in) stereo headphone socket for monitoring inputs and channels
- One BNC connector for accepting an HF signal from another transmitter
- Six BNC connectors for output of HF signal to up to 30 radiators
- Two Optical Network Connectors for connection within a DCN Next Generation system\*

\* LBB 4416/xx Optical Network Cables required

### Parts included

Quantity	Component
1	INT-TX Integrus transmitter
1	19" rack mounting brackets, detachable feet and mounting accessories for modules included
1	System installation and operating manual on CD-ROM
1	Mains cable

### Technical specifications

#### Electrical

Mains voltage	100-240 Vac, 50-60 Hz
Power consumption	
operating, maximum	55 W
standby	29 W

Asymmetrical audio inputs	+3 dBV nominal, +6 dBV maximum ( $\pm 6$ dB) +15 dBV nominal, +18 dBV maximum ( $\pm 6$ dB)
Symmetrical audio inputs	+6 to +18 dBV nominal
Emergency switch connector	Emergency control input
Headphone output	32 ohm to 2 kohm
HF input	Nominal 1 Vpp, minimum 10 mVpp, 75 ohm
HF output	1 Vpp, 6 VDC, 75 ohm

### Mechanical

Dimensions (H x W x D)	
for tabletop use, with feet	92 x 440 x 410 mm (3.6 x 17.3 x 16.1 in)
for 19" rack use, with brackets	88 x 483 x 410 mm (3.5 x 19 x 16.1 in)
in front of brackets	40 mm (1.6 in)
behind brackets	370 mm (14.6 in)
Weight without brackets, with feet	6.8 kg (15.0 lb)
Mounting	Brackets for 19" rack mounting or fixing to a tabletop Detachable feet for free-standing on a tabletop
Color	Charcoal (PH 10736) with silver

### Ordering information

#### INT-TX04 4-Channel Transmitter

Integrus 4-channel transmitter.  
Order number **INT-TX04**

#### INT-TX08 8-Channel Transmitter

Integrus 8-channel transmitter.  
Order number **INT-TX08**

#### INT-TX16 16-Channel Transmitter

Integrus 16-channel transmitter.  
Order number **INT-TX16**

#### INT-TX32 32-Channel Transmitter

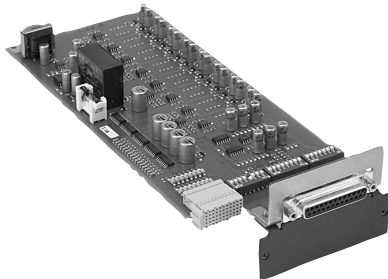
Integrus 32-channel transmitter.  
Order number **INT-TX32**

### Accessories

#### LBB 3422/20 Symmetrical Audio Input and Interpreter Module

Symmetrical audio input and interpreter module for interfacing the integrus transmitter with the CCS 900 discussion systems and the LBB 3222/04 6-channel interpreter desk.  
Order number **LBB3422/20**

## LBB 3422/20 Symmetrical Audio Input and Interpreter Module



### Features

- ▶ Direct connection of up to 12 LBB 3222/04 Interpreter Desks for six languages
- ▶ Routing of floor signal (for instance from a CCS 900 discussion system) to interpreter desks
- ▶ Eight symmetrical inputs
- ▶ Facility for mounting input transformers for galvanic isolation between audio source and the transmitter

The LBB 3422/20 Symmetrical Audio Input and Interpreters Module is used for interfacing the transmitter with the CCS 900 discussion systems and the LBB 3222/04 6-Channel Interpreter Desk with Loudspeaker. Different connections and switch settings are possible to also allow the module to be used with non-Bosch systems.

### Functions

#### Controls and Indicators

- On-board switches can be set for directly connecting interpreter desks (LBB 3222/04) or other audio sources
- An on-board switch can be used to match the amplification of floor signals from CCS 900 or from other analogue conference systems
- An on-board switch can be used to replace the interpretation signal with the floor signal for distribution to the listeners when an interpreter channel is not in use

#### Interconnection

- Symmetrical analogue audio input; 25-pole female sub-D connector
- Audio and data bus connector; H 15 male connector

### Certifications and approvals

Region	Certification
Europe	CE

### Technical specifications

#### Electrical

Audio input level with AGC	-16.5 dBV (150 mVeff) to +3.5 dBV (1500 mVeff)
Audio input level without AGC	-4.4 dBV (600 mVeff)
Asymmetric input impedance	≥ 10 kohm
DC input impedance	≥ 200 kohm

#### Mechanical

Mounting	Front panel is removed when used with INT-TX Integrus Transmitter
Dimensions (H x W x D) without front panel	100 x 26 x 231 mm (39 x 10 x 91 in)
Weight without front panel	132 g (0.29 lb)

### Ordering information

#### LBB 3422/20 Symmetrical Audio Input and Interpreter Module

Symmetrical audio input and interpreter module for interfacing the integrus transmitter with the CCS 900 discussion systems and the LBB 3222/04 6-channel interpreter desk.

Order number **LBB3422/20**

## DCN-FCCCU Flight Case for 2 Central Control Units



### Features

- ▶ Robust construction with reinforced corners
- ▶ Easy to carry and store
- ▶ Shaped interior
- ▶ Holds up to two 19" units

The DCN-FCCCU flight case accommodates two 19" units, e.g. 1 central control unit (CCU) + 1 transmitter or 1 audio expander unit.

### Technical specifications

#### Mechanical

Dimensions (H x W x D)	510 x 460 x 290 mm (20.1 x 18.1 x 11.4 in)
Weight	6 kg (13.2 lb)
Color	Light grey

### Ordering information

#### DCN-FCCCU Flight Case for 2 Central Control Units

DCN Next Generation flight case for two 19" units: CCU, audio expander, transmitter.

Order number **DCN-FCCCU**



## LBB 451x/00 Integrus Radiators



### Features

- ▶ LBB 4511/00 covers up to 1300 m<sup>2</sup> (one carrier, 4 standard quality channels)
- ▶ LBB 4512/00 covers up to 2600 m<sup>2</sup> (one carrier, 4 standard quality channels)
- ▶ Automatic gain control ensures the IREDs (infrared emitting diodes) function with maximum efficiency
- ▶ Power output selection for efficiency and economy
- ▶ Safety eye

These radiators are used to distribute infrared signals throughout the conference venue, enabling delegates to listen to the proceedings by means of personal pocket receivers.

### Functions

- Universal mains power facility allows use worldwide
- No fan - cooled by convection - resulting in quieter operation and less moving parts to wear out
- LED indicators for radiator status checking
- Communication between radiator and transmitter for easy checking by the operator
- Automatically switches on when transmitter is switched on and vice versa
- Automatic cable equalization ensures maximum transmission efficiency with different quality of cables
- Automatic cable termination simplifies installation
- Temperature protection circuitry automatically switches radiator from full- to half- power if the temperature becomes too high
- Adjustable radiator angle ensures maximum coverage
- IREDs protected by a cover plate, making the units easy to maintain and clean
- Attractive and stylish design

### Controls and Indicators

- Two yellow LEDs: one on each radiator panel to indicate that this panel is switched on and is receiving carrier waves from the transmitter

- Two red LEDs: one on each radiator panel to indicate that this panel is in standby mode
- Red and yellow LEDs simultaneously illuminated to indicate the radiator panel is malfunctioning
- Red LED flashing and yellow LEDs to indicate the radiator panel is in temperature protection mode
- Power reduction switch to reduce the output of the radiator to half-power
- Two delay compensation switches to compensate for differences in cable lengths between transmitter and radiators

### Interconnection

- Male Euro socket for mains connection
- HF input and output connectors (2 x BNC) for connection to transmitter and loop-through to other radiators

### Parts included

Quantity	Component
1	LBB 451x/00 Integrus Radiator
1	Mains cable
1	Bracket for mounting unit on ceiling
2	Plates for mounting unit on floor stand

### Technical specifications

#### Electrical

Mains voltage	100-240 Vac, 50-60 Hz
Power consumption	
LBB 4511, operating	100 W
LBB 4511, standby	8 W
LBB 4512, operating	180 W
LBB 4512, standby	10 W
Number of IREDs	
LBB 4511	260
LBB 4512	480
Total optical peak intensity	
LBB 4511	12 W/sr
LBB 4512	24 W/sr
Angle of half intensity	± 22°
HF input	Nominal 1 Vpp, minimum 10 mVpp

#### Mechanical

Mounting	<ul style="list-style-type: none"> <li>• Suspension bracket for direct ceiling mounting.</li> <li>• Mounting plates for floor stands with M10 and 1/2 in Whitworth thread.</li> <li>• Optional wall mounting bracket (LBB 3414/00) available.</li> <li>• Safety eye.</li> </ul>
Dimensions (H x W x D)	

LBB 4511 without bracket	200 x 500 x 175 mm (7.9 x 19.7 x 6.9 in)
LBB 4512 without bracket	300 x 500 x 175 mm (11.0 x 19.7 x 6.9 in)
Radiator angle	
floor-stand mounting	0, 15, and 30°
wall/ceiling mounting	0, 15, 30, 45, 60, 75 and 90°
Weight	
LBB 4511 without bracket	6.8 kg (15 lb)
LBB 4511 with bracket	7.6 kg (17 lb)
LBB 4512 without bracket	9.5 kg (21 lb)
LBB 4512 with bracket	10.3 kg (23 lb)
Color	Bronze

### Ordering information

#### LBB 4511/00 Integrus Radiator

Integrus medium-power radiator to cover up to 1300 m<sup>2</sup> (13993 ft<sup>2</sup>).

Order number **LBB4511/00**

#### LBB 4512/00 Integrus Radiator

Integrus high-power radiator to cover up to 2600 m<sup>2</sup> (27986 ft<sup>2</sup>).

Order number **LBB4512/00**

#### Accessories

##### LBB 3414/00 Wall Mounting Bracket

LBB 3414/00 Wall Mounting Bracket for radiators.

Order number **LBB3414/00**

##### INT-FCRAD Flight Case for Radiator

INT-FCRAD Flight Case for 1 radiator.

Order number **INT-FCRAD**

## INT-FCRAD Flight Case for Radiator



### Features

- ▶ Robust construction with reinforced corners
- ▶ Easy to carry and store
- ▶ Shaped interior
- ▶ Holds one radiator

Storage suitcase for LBB 4511/00 or LBB 4512/00 Radiator.

### Technical specifications

#### Mechanical

Dimensions (H x W x D)	250 x 540 x 400 mm (10 x 21 x 16 in)
Weight	7.0 kg (15 lb)
Color	grey

### Ordering information

**INT-FCRAD Flight Case for Radiator**  
 INT-FCRAD Flight Case for 1 radiator.  
 Order number **INT-FCRAD**

## LBB 3414/00 Wall Mounting Bracket



Bracket to wall mount the LBB 4511/00 and LBB 4512/00 Radiators.

### Technical specifications

#### Mechanical

Dimensions (H x W x D)	200 x 280 x 160 mm (7.9 x 11.0 x 6.3 in)
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Weight	1.8 kg (4.0 lb)
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Color	Quartz grey
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### Ordering information

#### LBB 3414/00 Wall Mounting Bracket

LBB 3414/00 Wall Mounting Bracket for radiators.  
Order number **LBB3414/00**

## LBC 1259/01 Universal Floorstand



### Features

- ▶ Multi-purpose, lightweight aluminum stand
- ▶ For mounting a loudspeaker, wireless access point or Integrus radiator
- ▶ Double-braced folding base
- ▶ Reducer flange for different mountings
- ▶ Hand-adjustable

This universal floorstand provides effective mounting solutions for loudspeaker installations, a Wireless Access Point of the DCN-Wireless system, or a radiator of the Integrus digital language distribution system. They are manufactured and finished to the same high standards as all Bosch products, assuring excellent quality and guaranteed compatibility throughout the range. The LBC 1259/01 is suited to a wide range of applications where a secure yet transportable mounting solution is required.

### Functions

#### Adjustable and safe

The LBC 1259/01 floorstand is hand-adjustable using a spring-loaded locking screw for heights between 1.4 and 2.2 m (4.6 and 7.2 ft). An extra safety bolt on the support can be tightened to ensure the stand remains extended.

This lightweight stand has a double-braced folding base for extra strength, and a wide leg span to ensure stability.

#### Adaptable

The floorstand is standard supplied with a 36 mm (1.42 in) reducer flange with an M10 x 12 threaded pin to mount different sized equipment, and with an M10 knob to fix the Wireless Access Point mounting bracket.

### Accessories

For storage and ease of transport, a carrier bag is available with two inside compartments with separate zippers for holding two universal floorstands (LBC 1259/01). The bag, with Bosch logo, is made from sturdy black weather-proof nylon. Two handles are fitted for carrying the bag by hand or over the shoulder.



LM1-CB Carrier Bag (optional)

### Installation/configuration notes



LBC 1259/01 with DCN Wireless Access Point, LBB 451x/00 Infra-red Radiator and XLA 3200 Line Array Loudspeaker

### Parts included

Quantity	Component
1	LBC 1259/01 Universal Floorstand
1	36 mm (1.42 in) reducer flange with (M10 x 12) threaded pin
1	M10 securing knob for WAP mounting bracket
2	Metal filler rings

### Technical specifications

#### Mechanical

Length: standing	1.4 to 2.2 m (4.6 to 7.2 ft)
Length: folded	1.24 m (4.06 ft)
Width: legs extended	1.32 m (4.33 ft)
Width: legs folded	130 mm (5.1 in)
Weight	4.8 kg (10.58 lb)
Max. centric load	50 kg (110.2 lb)
Material	Aluminum/steel

Color	White aluminum (RAL 9006) with black parts
Tube diameter	35 mm (1.37 in)
<b>Carrier bag accessory</b>	
Dimensions (L x D)	1.25 m x 27 mm (49 x 1.06 in)
Weight	750 g (1.65 lb)
Color	Black with light grey handles
Material	Nylon

### Ordering information

#### **LBC 1259/01 Universal Floorstand**

Universal floor stand lightweight aluminum construction, foldable, M10 x 12 reducer flange.

Order number **LBC1259/01**

#### **Accessories**

#### **LM1-CB Carrier Bag for two floorstands**

Carrying bag for storing and transporting two floor stands.

Order number **LM1-CB**

## LBB 4540 Integrus Pocket Receivers



### Features

- ▶ Specially-designed IC for maximum performance and a long battery life time
- ▶ Recharging electronics integrated in the chip, ensuring optimum charging performance
- ▶ 2-digit LCD display with battery and reception status indication
- ▶ Number of available channels is always the same as the number of channels in use by the system, eliminating the need to scroll through unused channels

These ergonomically designed pocket receivers incorporate the latest electronics technology - including a specially designed IC - to ensure maximum performance and a long battery lifetime. The pocket receivers can be used for both language and music distribution.

### Functions

- Audio signal automatically muted when signal is too low, ensuring that the user receives only high quality audio
- Can be used with disposable batteries (2x AA alkaline batteries, not included) or environmentally-friendly NiMH rechargeable battery pack LBB 4550/10, (not included)
- No power used when headphone is disconnected
- Clip for easy wearing
- Measurement mode for easy checking of radiator coverage
- Attractive and stylish design
- Up to 200 hours operation with alkaline batteries
- Up to 75 hours operation with battery pack
- Recharges from empty to full capacity within 1 hour and 45 minutes

### Controls and Indicators

- 2-digit LCD display with channel number, battery and reception status indication
- On/off button

- Volume control slide adjuster
- Channel selection up/down buttons
- Charging indicator LED

### Interconnections

- 3.5 mm (0.14 in) stereo jack output socket for headphones
- Battery contacts for use with AA alkaline batteries
- Connector for use with LBB 4550/10 battery packs
- Charging contacts on the left-hand side of the pocket receiver for compatibility with LBB 4560 charging units

### Technical specifications

#### Electrical

IR irradiance level	4 mW/m <sup>2</sup> per carrier
Angle of half sensitivity	± 50°
Headphone output level at 2.4 V	450 mVrms (speech at maximum volume, 32 ohm headphone)
Headphone output frequency range	20 Hz to 20 kHz
Headphone output impedance	32 ohm to 2 kohm
Max. signal-to-noise ratio	80 dB(A)
Supply voltage	1.8 to 3.6 V, nominal 2.4 V
Power consumption at 2.4 V (battery voltage)	15 mA (speech at maximum volume, 32 ohm headphone)
Power consumption (stand-by)	< 1 mA

#### Mechanical

Dimensions (H x W x D)	155 x 45 x 30 mm (6.1 x 1.8 x 1.2 in)
Weight	
excluding battery	75 g (0.16 lb)
including battery	125 g (0.27 lb)
Color	Charcoal with silver

### Ordering information

#### LBB 4540/04 Pocket Receiver

Integrus 4-channel pocket receiver.  
Order number **LBB4540/04**

#### LBB 4540/08 Pocket Receivers

Integrus 8-channel pocket receiver.  
Order number **LBB4540/08**

#### LBB 4540/32 Pocket Receiver

Integrus 32-channel pocket receiver.  
Order number **LBB4540/32**

### Accessories

#### LBB 4550/10 Integrus NiMH Battery Packs (10 pcs)

Integrus NiMH battery packs for pocket receivers (10 pieces).  
Order number **LBB4550/10**

**LBB 4560/00 Charging Case**

Integrus charging case for pocket receivers, for portable use.

Order number **LBB4560/00**

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**LBB 4560/50 Charging Cabinet**

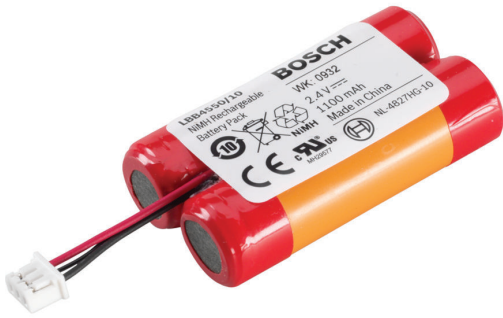
Integrus charging cabinet for pocket receivers, for fixed installation.

Order number **LBB4650/50**

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## LBB 4550/10 Integrus NiMH Battery Packs (10 pcs)



### Features

- Temperature sensor for optimal charging process

NiMH battery pack for use with LBB 4540 Pocket Receivers.

### Technical specifications

#### Electrical

Voltage	2.4 V
Capacity	1100 mAh

#### Mechanical

Dimensions (H x W x D)	14 x 28 x 50 mm (0.6 x 1.1 x 1.9 in)
Weight	50 g (0.11 lb)

### Ordering information

#### LBB 4550/10 Integrus NiMH Battery Packs (10 pcs)

Integrus NiMH battery packs for pocket receivers (10 pieces).

Order number **LBB4550/10**

## LBB 4560/xx Charging Units



Dimensions (H x W x D)	
LBB 4560/00	230 x 690 x 530 mm (9 x 27 x 21 in)
LBB 4560/50	130 x 680 x 520 mm (5 x 27 x 20 in)
Weight excl. receivers	
LBB 4560/00	15.5 kg (34 lb)
LBB 4560/50	11.2 kg (25 lb)
Weight incl. 56 receivers	
LBB 4560/00	22.3 kg (49 lb)
LBB 4560/50	18.0 kg (40 lb)
Color	Charcoal with grey

### Features

- ▶ Can accommodate 56 pocket receivers
- ▶ Universal mains power facility allows use world-wide
- ▶ Rapid recharging: within 1 hour and 45 minutes

The charging units are used for charging and storing the INT-RXxx Pocket Receivers.

### Functions

#### Controls and Indicators

- On/off switch
- Charging status indication on the pocket receivers

#### Interconnection

- Mains input with loop-through facility; male and female Euro mains socket
- 56 charging contacts. Compatible with INT-RXxx pocket receivers

### Parts included

Quantity	Component
1	LBB 4560 Charging Unit
1	Mains cable

### Technical specifications

#### Electrical

Mains voltage	100-240 Vac, 50-60 Hz
Power consumption	300 W (56 receivers charging)
Power consumption (stand-by)	17 W (no receivers in the charging unit)

#### Mechanical

Mounting	
LBB 4560/50	Screws and plugs for wall mounting included



LBB 4560/50 Charging Cabinet

### Ordering information

#### LBB 4560/00 Charging Case

Integrus charging case for pocket receivers, for portable use.

Order number **LBB4560/00**

#### LBB 4560/50 Charging Cabinet

Integrus charging cabinet for pocket receivers, for fixed installation.

Order number **LBB4650/50**

## INT-FCRX Storage Case



### Features

- ▶ Robust construction with reinforced corners
- ▶ Easy to carry and store
- ▶ Shaped foam interior
- ▶ Holds up to 100 receivers

This storage case can hold up to 100 INT-RXxx Pocket Receivers.

### Technical specifications

#### Mechanical

Dimensions (H x W x D)	207 x 690 x 530 mm (8 x 27 x 21 in)
Weight	7.5 kg (16.5 lb)
Color	grey

### Ordering information

#### INT-FCRX Storage Case

Integrus storage case for 100 INT-RXxx pocket receivers.

Order number **INT-FCRX**

## HDP-LWN Lightweight Neckband Headphone



### Features

- ▶ Comfortable neckband stereo headphone
- ▶ Lightweight with high quality sound reproduction
- ▶ Replaceable ear pads
- ▶ Right-angled stereo gold-plated jack plug

### Functions

#### Interconnections

- 1.3 m (4.25 ft) cable terminated with gold-plated 3.5 mm (0.14 in) right-angled stereo gold-plated jack plug

### Certifications and approvals

Region	Certification
Europe	CE

### Technical specifications

#### Electrical

Impedance	32 ohm per earpiece
Audio frequency response	20 Hz to 20 kHz ( $\pm 3$ dB)
Power handling capacity	30 mW
Sensitivity (1 kHz)	111 dB SPL/earpiece at 1 mW/earpiece

#### Mechanical

Weight	56 g (0.12 lb)
Finish	Charcoal (PH 10736) with silver

### Ordering information

#### HDP-LWN Lightweight Neckband Headphone

Lightweight neckband headphones for high-quality sound reproduction, replaceable ear pads.

Order number **HDP-LWN**

### Accessories

#### HDP-LWNEP Earpads for neckband headphone (50 pairs)

Replacement ear pads for neckband headphones, 50 pairs.

Order number **HDP-LWNEP**

## LBB 3443 Lightweight Headphones



### Features

- ▶ Lightweight with high quality sound reproduction
- ▶ Replaceable ear pads
- ▶ Available with normal or durable cable
- ▶ Separate available solid washable ear pads
- ▶ Right-angled gold-plated jack plug

### Functions

These headphones can be fitted with an optional set of washable ear pads.



Washable ear pads

### Interconnections

- 1.3 m (4.25 ft) cable terminated with gold-plated 3.5 mm (0.14 in) angled stereo jack plug

### Technical specifications

#### Electrical

Impedance	32 ohm per earpiece
Audio frequency response	50 Hz to 20 kHz (-10 dB)
Power handling capacity	50 mW
Sensitivity (1 kHz)	98 dB SPL/earpiece at 1 mW/earpiece

#### Mechanical

Weight	70 g (0.16 lb)
Finish	Charcoal (PH 10736) with silver

#### Ordering information

##### LBB 3443/00 Lightweight Headphones

Lightweight headphones for high-quality sound reproduction, replaceable ear pads and normal cable.  
Order number **LBB3443/00**

##### LBB 3443/10 Lightweight Headphones Durable Cable

Lightweight headphones for high-quality sound reproduction, replaceable ear pads and durable cable.  
Order number **LBB3443/10**

#### Accessories

##### LBB 3443/50 Foam Ear Pads for LBB 3443 (50 pairs)

Replacement foam ear pads for LBB 3443 (50 pairs).  
Order number **LBB3443/50**

##### HDP-LWSP Solid Ear Pads for LBB 3443 (50 pairs)

Replacement, washable solid ear pads for LBB 3443 (50 pairs).  
Order number **HDP-LWSP**

## LBB 3441/10 Under the Chin Headphones



### Accessories

**LBB 3441/50 Ear Tips for LBB 3441 (500 pairs)**  
Replacement ear tips for LBB 3441 (500 pairs).  
Order number **LBB3441/50**

### Features

- ▶ Lightweight stereo headphones
- ▶ Ergonomic design for use under the chin
- ▶ Replaceable ear tips
- ▶ Right-angled, gold-plated stereo jack plug

### Functions

#### Interconnections

- 1.2 m (4 ft) cable terminated with 3.5 mm (0.14 in) right-angled gold-plated stereo jack plug.

### Certifications and approvals

Region	Certification
Europe	CE

### Technical specifications

#### Electrical

Impedance	150 ohm per earpiece
Audio frequency response	50 Hz to 5 kHz (-10 dB)
Power handling capacity	60 mW
Sensitivity (1 kHz)	107 dB SPL/earpiece at 1 mW/earpiece

#### Mechanical

Weight	33 g (0.07 lb)
Color	Black

### Ordering information

#### LBB 3441/10 Under the Chin Headphones

Under the chin headphones with 1.2 m (4 ft) cable, terminated with 3.5 mm (0.14 in) right-angled gold-plated stereo jack plug.

Order number **LBB3441/10**

## LBB 3442/00 Single Earphone



### Features

- ▶ Lightweight single earphone
- ▶ Left or right ear use
- ▶ Right-angled gold-plated jack plug

### Functions

#### Interconnections

- 1.2 m (3.94 ft) cable terminated with 3.5 mm (0.14 in) jack plug

### Technical specifications

#### Electrical

Impedance	32 ohm
Audio frequency response	100 Hz to 5 kHz (-10 dB)
Power handling capacity	5 mW
Sensitivity (1 kHz)	114 dB SPL/earpiece at 1 mW/earpiece

#### Mechanical

Weight	25 g (0.06 lb)
Color	Dark grey

### Ordering information

#### LBB 3442/00 Single Earphone

Lightweight single earphone, 1.2 m (3.94 ft) cable, terminated with 3.5 mm (0.14 in) right-angled mono gold-plated jack plug.

Order number **LBB3442/00**

## LBB 3015/04 High Quality Dynamic Headphones



### Features

- ▶ Durable, dynamic headphones
- ▶ Replaceable ear pads
- ▶ High-quality sound reproduction
- ▶ Gold-plated stereo jack plug

### Functions

#### Interconnections

- 1.5 m (5 ft) cable terminated with a 3.5 mm (0.14 in) stereo jack plug

### Certifications and approvals

Region	Certification
Europe	CE

### Technical specifications

#### Electrical

Impedance	720 ohm per earpiece
Audio frequency response	250 Hz to 13 kHz (-10 dB)
Power handling capacity	200 mW
Sensitivity (1 kHz)	
97 dB SPL/earpiece at 0 dBV/system	
96 dB SPL/earpiece at 1 mW/earpiece	

#### Mechanical

Weight	110 g (0.24 lb)
Color	Dark grey

### Ordering information

#### LBB 3015/04 High Quality Dynamic Headphones

High quality dynamic headphone.

Order number **LBB3015/04**

### Accessories

#### LBB 9095/50 Ear pads for LBB 3015 LBB 9095 (25 pairs)

Replacement ear pads for LBB 3015 LBB 9095 (25 pairs).

Order number **LBB9095/50**



## HDP-ILN Induction Loop Neckband



### Features

- ▶ Lightweight
- ▶ Used with 'T-coil' hearing aids
- ▶ Gold-plated jack plug

### Functions

This induction loop neckband can be used with:

- Integrus receivers
- CCS900 unit
- DCN unit

The neckband magnetically couples the sound signal from the headphone output to a 'T-coil' hearing aid.

### Interconnections

- 0.9 m (3ft) cable terminated with a 3.5 mm (0.14 in) gold-plated jack plug.

### Technical specifications

#### Mechanical

Weight	45 g (0.10 lb)
Color	Charcoal with silver

### Ordering information

#### HDP-ILN Induction Loop Neckband

Induction loop neckband, lightweight.

Order number **HDP-ILN**

## LBB 3222/04 Interpreter Desk



### Features

- ▶ Accommodates 6 different language channels plus the original floor language
- ▶ Incoming channel pre-selector key eliminates the need to manually search through all available language channels
- ▶ Quick switching between the floor language and the channel set on the channel selector reduces the chance of operator errors
- ▶ Electronic channel interlock function prevents interpreters in different booths from using the same output channel

### Functions

- Built-in loudspeaker
- 12 interpreter desks can be loop-through connected within and/or between interpreter booths
- Up to three interpreter desks can be present per booth
- Auto relay enable function allows the interpreter to provide the auto relay language (OR2) for relay interpretation
- The channel B disable function allows the interpreter to disable channel B while ensuring that the desk remains connected to channel A

### Controls and Indicators

- Microphone mounted on a flexible stem, complete with a light ring which illuminates when the microphone is on
- Headphone volume, treble and bass controls
- A-B channel selector key with channel select indicators
- Six outgoing B-channel select keys with channel select indicators
- Outgoing 'OR2' (auto relay) indicator
- 'Channel engaged' indicators to show which channels are in use by other interpreters
- Microphone 'mute' key
- Microphone activating key with LED status indicator

- Select key with LED indicators for fast switching between the original floor language and the channel set on the channel selector
- Incoming channel 'OR2' (auto relay) indicator to show that the original floor language has been replaced by a transfer interpretation channel, when the auto-relay facility is in operation
- Incoming language channel selector for headphone monitoring
- Call key (voice) to provide two-way communication between interpreter and chairman/operator
- Outgoing message key
- Incoming message indicator
- Rotary switch to preset the outgoing channel via the A output

### Interconnections

- 3 m (10 ft) cable terminated with a 25-pin sub D-type connector
- 25-pin sub D-type socket for loop-through connections
- 6.3 mm (0.25 in) stereo jack headphone connectors
- 15-pole 180° DIN-type socket for connection of interpreter's headset with microphone, plus switch to mute the built-in microphone
- Auxiliary socket (message) for the desk's message function

### Certifications and approvals

Region	Certification
Europe	CE

### Technical specifications

#### Electrical

Frequency response	125 Hz (-10 dB) to 12.5 kHz (-2 dB)
Rated equivalent sound pressure due to inherent noise	< 32 dB
Total harmonic distortion at overload	< 5%
Crosstalk attenuation	> 66 dB

#### Mechanical

Mounting	tabletop or flush mounting
Dimensions (H x W x D)	20-58 x 250 x 189 mm (0.79-2.28 x 9.84 x 7.44 in)
Weight	1.75 kg (3.85 lb)
Color	light grey

### Ordering information

#### LBB 3222/04 Interpreter Desk

Interpreter desk that accommodates 6 different language channels, as well as the original floor language. Order number **LBB3222/04**

## LBB 3306 Extension Cables



Extension cables to interconnect 6-channel interpreter desks when the standard cable is too short.

### Functions

#### Connectors

- 25-pole sub-D type plug with sliding lock mechanism
- 25-pole sub-D type socket with pin lock mechanism

### Ordering information

#### LBB 3306/00 Installation Cable

Extension cable for interconnecting 6-channel interpreter desks when the standard cable is too short, 100 m (328 ft), without connectors.

Order number **LBB3306/00**

#### LBB 3306/05 Extension Cable

Extension cable for interconnecting 6-channel interpreter desks when the standard cable is too short, 5 m (16.4 ft), 25-pole, sub-D type plug and socket.

Order number **LBB3306/05**

#### LBB 3306/20 Extension Cable

Extension cable for interconnecting 6-channel interpreter desks when the standard cable is too short, 20 m (65.6 ft), 25-pole sub-D type plug and socket.

Order number **LBB3306/20**

## LBB 9095/30 Interpreter Headphones



### Features

- ▶ Durable and dynamic
- ▶ Replaceable ear pads
- ▶ High-quality sound reproduction

Lightweight, dynamic headphones for direct connection to DCN-IDESK Interpreters Desk.

### Functions

#### Interconnections

- 2.2 m (7 ft) cable terminated with a 6.3 mm (0.25 in) stereo jack plug

### Certifications and approvals

Region	Certification
Europe	CE

### Technical specifications

#### Electrical

Impedance	720 ohm per earpiece
Audio frequency response	250 Hz - 13 kHz (-10 dB)
Power handling capacity	200 mW
Sensitivity (1 kHz)	97 dB SPL/earpiece at 0 dBV/system
	96 dB SPL/earpiece at 1 mW/earpiece

#### Mechanical

Weight	125 g (0.28 lb)
Color	Black/grey

### Ordering information

#### LBB 9095/30 Interpreter Headphones

Interpreter headphones, lightweight, dynamic.  
Order number **LBB9095/30**

### Accessories

#### LBB 9095/50 Ear pads for LBB 3015 LBB 9095 (25 pairs)

Replacement ear pads for LBB 3015 LBB 9095 (25 pairs).

Order number **LBB9095/50**





### **Laadun ja luovuuden perinne**

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Oikeus muutoksiin pidätetään

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