TAIDEN®

HCS-5100 Digital Infra-red Language Distribution System

Simultaneous Interpretation System

Installation and Operating Manual

V 1.6

Remark:

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- Contents may change without prior announcement

- All technical specifications are guideline data and no guaranteed features

- We are not responsible for any damage caused by improper use of this manual

- The equipment must be connected to earth!

- This product conforms to the rules of the European directive 2004/108/EC.

- To protect your hearing avoid high pressure level on earphones. Adjust to a lower and convenient level.

- If any detailed information needed, please contact your local agent or **TAIDEN** service center in your region.

   Any feedback, advice and suggestion about the products is appreciated

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Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not bypass the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Do not leave the battery near the fire or under an environment over 60 ºC (such as under direct sunlight in the car), otherwise it may damage the protection circuit of the battery and cause fire, explosion, leakage or heat generation.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. Do not place the equipment on any uneven or unstable stand; original product package or appropriate package should be used to avoid damage caused by strong impacts during transportation.
16. Power supply cords:
    America, Japan: AC 110 V-120 V 60 Hz
    Asia, Europe: AC 220 V-240 V 50 Hz
17. The quantity of connected transceivers in one system should not exceed prescribed quantity. For service, please contact the nearest TAIDEN Service Center.

18. All TAIDEN products are guaranteed for 3 years excluding the following cases:
    A. All damage or malfunction caused by human negligence;
    B. Damage or malfunction caused by improper operating by operator;
    C. Parts damage or loss caused by disassembling the product by non-authorized personnel.
19. Use ONLY specified connection cable to connect the system equipment.
20. Upon receipt of the product, please fill out the Warranty Card enclosed and post it to TAIDEN Service Center nearby in your region.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

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

> **CAUTION:** To reduce the risk of electric shock, DO NOT open covers, no useable serviceable parts inside. Refer servicing to qualified service personnel only.

This label appears on the rear of the unit due to space limitations

The lightning flash with an arrowhead symbol, with an equilateral triangle, is intended to alert the user to the presence of uninsulated 'dangerous voltage' within the products enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

> **WARNING:** These apparatuses shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases shall be placed on the apparatus.

> **WARNING:** To reduce the risk of fire or electric shock, DO NOT expose units to rain or moisture.

Important Safety Instructions

Attention: Installation should be performed by qualified service personnel only in accordance with the National Electrical or applicable local codes.

Power Disconnect: Units with or without ON – OFF switch have power supplied to the unit whenever the power cord is inserted into the power source; however, the unit is operational only when the ON – OFF switch is in the ON position. The power cord is the main power disconnect for all units

WARNING: The apparatus should be connected to a mains socket outlet with a protective earthing connection.

Content

Installation & User Guide

About this manual

This manual is a comprehensive guide to the installation and operation of **TAIDEN** HCS-5100 Digital Infra-red Language Distribution System. It includes the detailed description of the functions and interfaces of the HCS-5100 system components, system connection and installation, system set-up and operation.

The manual is divided into the following chapters:

Chapter 1: Introduction

Introduction to the HCS-5100 system, as well as introducing the user into constitution, technical principle and aspects of infrared distribution systems.

Chapter 2: Digital Infrared Transmitter

Detailed description of functions, connection, configuration, operation and monitor function.

Chapter 3: Digital Infrared Radiator

Detailed description of functions, connection, position planning, installation of the radiator, and using of power switch and delay switch.

Chapter 4: Digital Infrared Receiver

Detailed description of functions, operation, using of testing mode and introduction to earphone and battery.

Chapter 5: Charging Case and Storage Case

Detailed description of functions, charging operation, precautions and introduction to the Storage Case of HCS-5100KS.

Chapter 6: Fault diagnosis

Trouble-shooting guide for simple faults.

Chapter 7: Technical data

Mechanical and electrical details of the complete HCS-5100 equipment.

Installation & User Guide

This manual is applicable to:

- **Digital Infrared Transmitter**

HCS-5100MAF/04N/08N

4, 8 CHs Digital Infrared Transmitter (compatible with HCS-4385K2/50 or HCS-4100M/HCS-8300M, optical fiber interface)

HCS-5100MA/04N/08N

4, 8 CHs Digital Infrared Transmitter (compatible with HCS-4385K2/50 or HCS-4100M/HCS-8300M)

HCS-5100MC/04N/08N/16N

4, 8, 16 CHs Digital Infrared Transmitter

- **Digital Infrared Radiator**

HCS-5100T/15S

Multi-channel Digital Infrared Radiator (15 W, 75 Ω)

HCS-5100T/25S

Multi-channel Digital Infrared Radiator (25 W, 75 Ω)

HCS-5100T/35S

Multi-channel Digital Infrared Radiator (35 W, 75 Ω)

- **Digital Infrared Receiver**

HCS-5100R/04/08/16/32

4, 8, 16, 32 CHs Digital Infrared Receiver (LCD, language display, optional rechargeable battery pack or 2xAA alkaline cells)

HCS-5100RA/04/08/16/32

4, 8, 16, 32 CHs Digital Infrared Receiver (LCD, language display, 2xAA alkaline cells)

- **Earphone**

EP-820AS

Single Earphone (TRS connector, Ring: NC)

EP-820BS

Single Earphone (TRS connector, Ring: NC)

EP-920BS	Earbuds (stereo)
HCS-5100PA	Headphone
HCS-5100PB	Headphone

- **Ni-MH Rechargeable Battery Pack**

HCS-5100BAT-16

Ni-MH Rechargeable Battery Pack

- **IR Receiver Charging Case**

HCS-5100CHG/60

IR Receiver Charging Case (60 pcs/case)

- **IR Receiver Storage Case**

HCS-5100KS

IR Receiver Storage Case (100 pcs/case)

Chapter 1. Introduction

1.1 Summary

HCS-5100 series is a system for digital infrared language distribution. It uses digital infrared audio transmitting and control technique dirATC as well as a special digital infrared chip, both **TAIDEN**'s intellectual property. HCS-5100 can be used in simultaneous interpretation systems for multi-language conferences.

In simultaneous interpretation systems, the interpreter translates the speaker's speech and the translated audio is transmitted within the conference venue by modulated infrared radiation. Delegates may now select a language on the infrared receiver and listen via earphone.

The system can also be used for other audio signal distribution occasions, such as music distribution (mono as well as stereo).

The HCS-5100 series is compliant to IEC 61603-7 (Transmission of audio and/or video and related signals using infra-red radiation-Part 7: Transmission system for digital audio signals for conference and similar applications) and IEC 60914 (Conference systems - Electrical and audio requirements)，moreover, it is compatible with other IR systems, compliant to IEC 61603-7.

Parts of IEC 61603 are used in this manual for a better understanding of both theory and technique of the system.
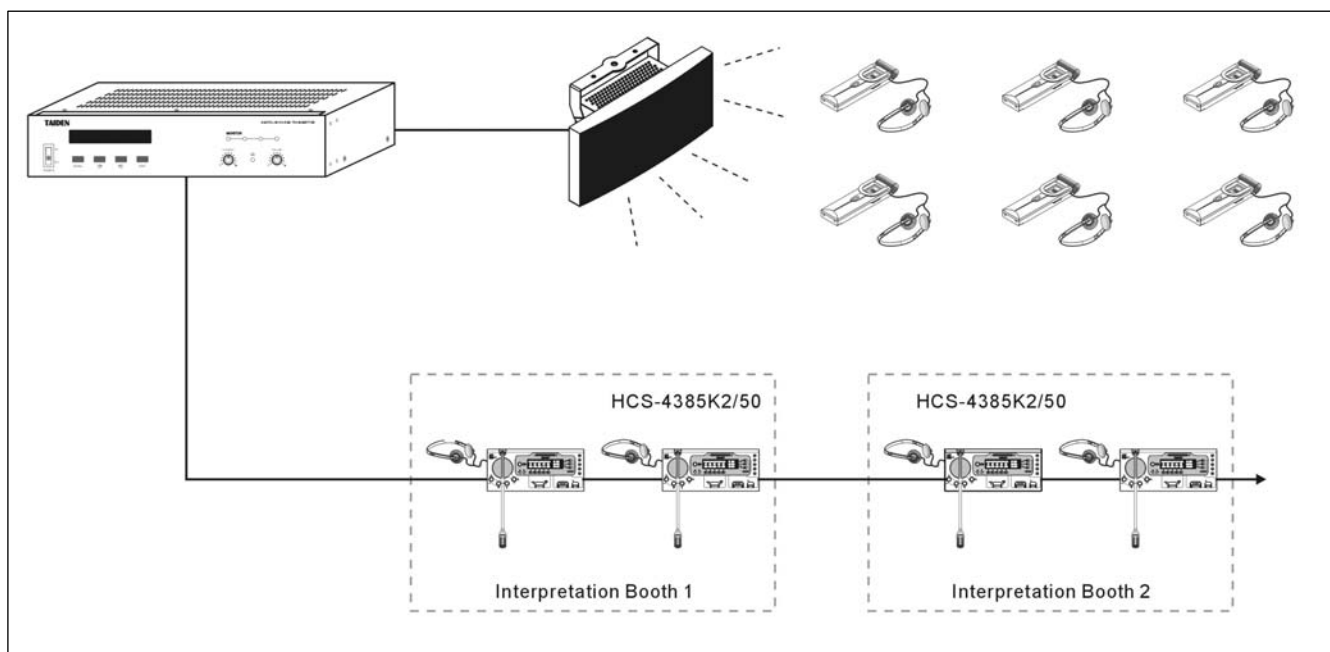
Figure 1.1　System overview

The system is composed of one or more of the following:

■ **Digital Infrared Transmitter**

HCS-5100MAF/04N/08N

4, 8 CHs Digital Infrared Transmitter (compatible with HCS-4385K2/50 or HCS-4100M/HCS-8300M, optical fiber interface)

HCS-5100MA/04N/08N

4, 8 CHs Digital Infrared Transmitter (compatible with HCS-4385K2/50 or HCS-4100M/HCS-8300M)

HCS-5100MC/04N/08N/16N

4, 8, 16 CHs Digital Infrared Transmitter

■ **Digital Infrared Radiator**

HCS-5100T/15S

Multi-channel Digital Infrared Radiator (15 W, 75 Ω)

HCS-5100T/25S

Multi-channel Digital Infrared Radiator (25 W, 75 Ω)

HCS-5100T/35S

Multi-channel Digital Infrared Radiator (35 W, 75 Ω)

■ **Digital Infrared Receiver**

HCS-5100R/04/08/16/32

4, 8, 16, 32 CHs Digital Infrared Receiver (LCD, language display, optional rechargeable battery pack or 2xAA alkaline cells)

HCS-5100RA/04/08/16/32

4, 8, 16, 32 CHs Digital Infrared Receiver (LCD, language display, 2xAA alkaline cells)

■ **Earphone**

EP-820AS

Single Earphone (TRS connector, Ring: NC)

EP-820BS

Single Earphone (TRS connector, Ring: NC)

EP-920BS   Earbuds (stereo)

HCS-5100PA   Headphone

HCS-5100PB   Headphone

■ **Ni-MH Rechargeable Battery Pack**

HCS-5100BAT-16

Ni-MH Rechargeable Battery Pack

■ **IR Receiver Charging Case**

HCS-5100CHG/60

IR Receiver Charging Case (60 pcs/case)

■ **IR Receiver Storage Case**

HCS-5100KS

IR Receiver Storage Case (100 pcs/case)

1.2 System technology

1.2.1 Basic system concept

The basic system concept is shown in figure 1.2.

The system consists of a number (N) of audio sources, either analog or digital, which are connected to a transmitter. The transmitter processes the audio signals into an electrical output to feed the infrared radiator (see section 1.2.3). The infrared signal is received by the infrared receiver that processes the signal and outputs an audio signal and/or associated data.
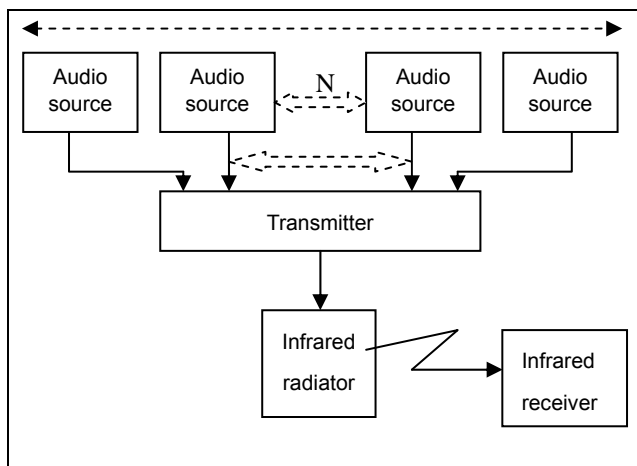

Figure 1.2   The basic system concept

1.2.2 IR radiation

HCS-5100 series audio signal is based on transmission by modulated infrared radiation (IR). Infrared radiation is part of the electro-magnetic spectrum, which is composed of visible light, radio waves and other types of radiation. The IR wavelength is larger than the wavelength of visible light.

Conference hall privacy: the congress venue itself acts as a barrier to infrared signals escaping. As Infrared is unable to pass through opaque objects such as walls, the signal cannot be overheard. Moreover, HCS-5100 series does not emit radio radiation. Operating the system does not require a radio frequency license, worldwide.

1.2.3 Signal processing

HCS-5100 uses high frequency carrier signals (typically 2-8 MHz) to prevent interference by modern light sources. Fully digital audio processing guarantees a constant high audio quality.

The signal processing in the transmitter consists of the following main steps (see figure 1.3):

1. Code – each analog audio channel is converted to a digital signal; the digital signals are compressed to increase the amount of information that can be distributed on each carrier (compression ratio is related to required audio quality); groups of up to 4 digital signals are combined into a digital information stream. Extra fault algorithm information is added. This information is used by the receivers for fault detection and correction.
2. Modulation – a high frequency carrier signal is phase-modulated with the digital information stream by DQPSK digital modulation technique.
3. Filter.
4. Magnify.
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 IR receivers, a reverse processing is used to convert the modulated infrared light to separate digital audio channels.
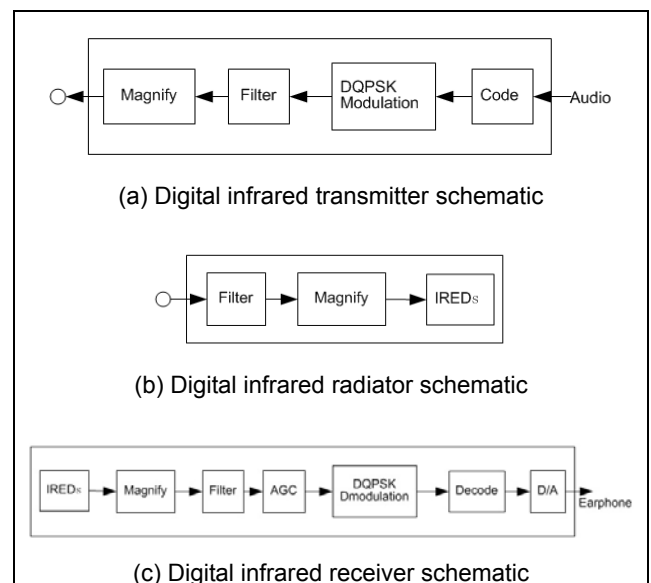

(a) Digital infrared transmitter schematic

(b) Digital infrared radiator schematic

(c) Digital infrared receiver schematic

Figure 1.3   Overview of the signal processing

1.2.4 Audio quality modes

HCS-5100 can transmit audio in four different quality modes:
- Mono, standard quality, maximum 32 channels
- Mono, perfect quality, maximum 16 channels
- Stereo, standard quality, maximum 16 channels
- Stereo, perfect quality, maximum 8 channels

The standard quality mode uses less bandwidth and is used for transmitting speech. The perfect quality mode gives near CD quality and is used for transmitting music.

1.2.5 Carriers and channels

HCS-5100 is transmitting within the 2 ~ 8 MHz frequency band. It can transmit up to 8 different carrier signals (depending on the transmitter type). Carriers 0 to 5 are according to IEC 61603-7 (see figure 1.4). Figure 1.5 shows the band allocation.

Each carrier can carry up to 4 audio channels. The exact number of channels per carrier depends on the selected quality modes. Stereo signals use twice as much bandwidth as mono signals; perfect quality uses twice as much bandwidth as standard quality.

A mix of channels with different quality modes can be chosen for each carrier, with the total bandwidth not exceeding the available bandwidth. The table below lists all possible channel combinations per carrier:
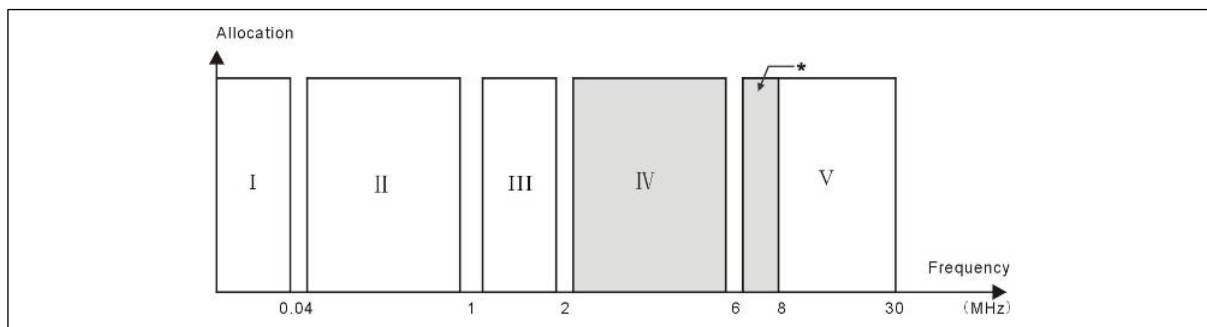
Figure 1.4   Standard band of HCS-5100 infrared language distribution system
(*6-8 MHz Extension band for carrier 6 and carrier 7)
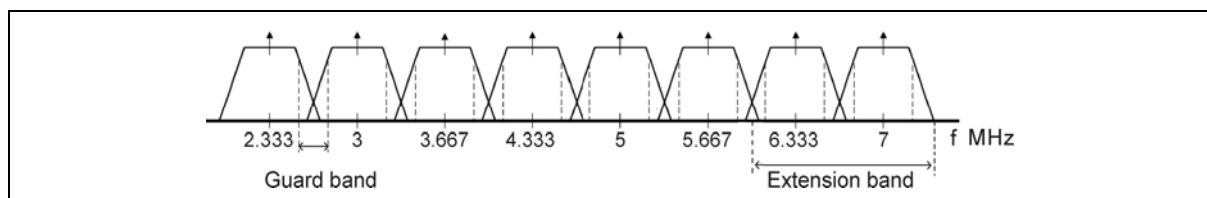
Figure 1.5   Band allocation

Table 1.1   The numbers and quality modes of channels per carrier

| Possible number of channels per carrier | Channel quality | | | | Bandwidth |
	Standard Mono	Perfect Mono	Standard Stereo	Perfect Stereo	
	4				4 x 10 kHz
	2	1			2 x 10 kHz and 1 x 20 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 10 kHz (left) and 2 x 10 kHz (right)
		2			2 x 20 kHz
				1	1 x 20 kHz (left) and 1 x 20 kHz (right)

1.3 Aspects of infrared distribution

A good digital infrared language distribution system ensures that all delegates in a conference venue receive the distributed signals without disturbance. This is achieved by using a sufficient number of well positioned radiators, in such a way that uniform IR signal with adequate strength can be received at any place of the conference venue.

When planning an infrared distribution system several aspects influencing the uniformity and quality of the infrared signal should be considered. These are described in the next sections.

1.3.1 Ambient lighting

HCS-5100 can be operated without any problem even if fluorescent lamps (with or without electronic ballast or dimming facility), such as TL lamps or energy saving lamps are switched on. (see figure 1.6 and figure 1.7).
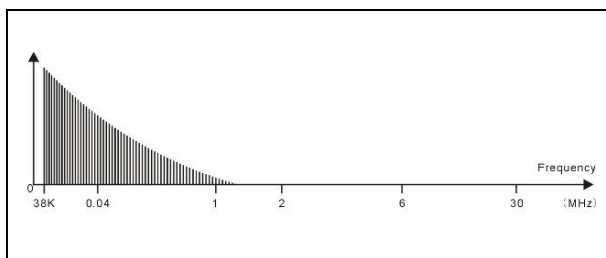

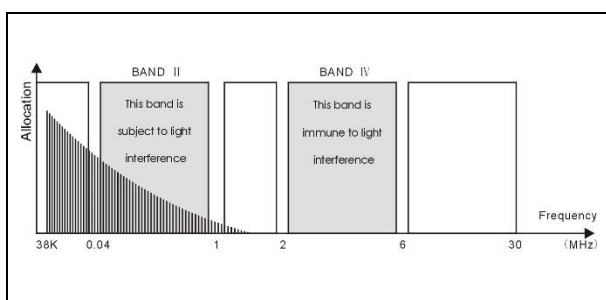Figure 1.6　The interference band of the HF driven lighting system (fluorescent lamp)

Figure 1.7　The infrared language distribution system using 2-8 MHz eliminates disturbance from high frequency lighting systems

For venues with large, unscreened windows, more radiators should be added. For outdoor use, a site test will be required to determine the required amount of radiators. With sufficient radiators, the receivers will work well, even in bright sunlight.

1.3.2 Objects, surfaces and reflections

Just like visible light, infrared radiation is reflected from hard surfaces and refracted by hyaloid (glassy or transparent appearance) objects. Both objects in the conference venue and structure of the walls and ceilings will influence the distribution of infrared light.

Infrared radiation is reflected from almost all hard surfaces. Smooth, bright or shiny surfaces reflect well. Dark or rough surfaces absorb a large part of the infrared energy. Normally surfaces opaque to visible light are also opaque to infrared radiation.

Shadows from walls and furniture will influence the transmission of infrared light. This can be solved by using a sufficient quantity of radiators.

They should be positioned in a manner to provide an infrared field strong enough to cover the whole conference area.

Take care not to direct radiators towards uncovered windows, or most of this radiation will be lost.

1.3.3 Directional sensitivity of the receiver

The sensitivity of a receiver is at its best when it is aimed directly towards a radiator. To minimize the disadvantage of this aspect, HCS-5100R/RA receiver adopts an ingenious structural design with peculiar 270° ultra wide angle to get perfect IR capture and sound quality at any disposition (see figure 1.8).
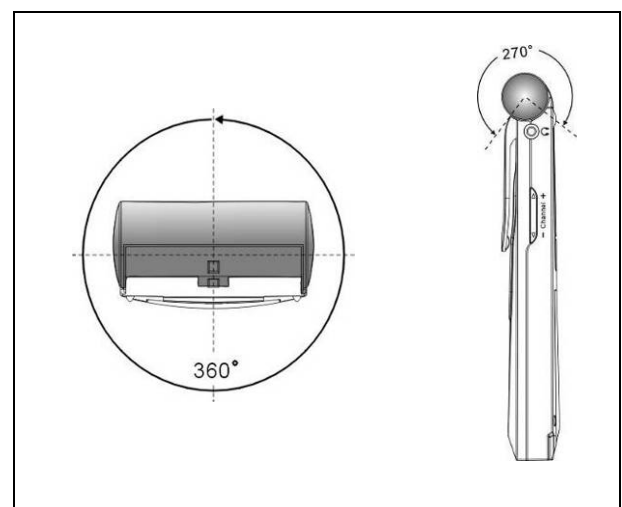

Figure 1.8　Directional characteristics of the receivers

1.3.4 The footprint of the radiator

The number of transmitted carriers and the output power of the radiator determine the coverage area of a radiator. The total radiation energy of a radiator is distributed over transmitted carriers. The coverage area becomes proportionally smaller if more carriers are used. The receiver requires a strength of the IR signal of 4 mW/m^2 per carrier to work well (resulting in an 80 dB S/N ratio for uninterrupted audio channels).

The cross section of the 3-dimensional radiation with the reception level of participants is the footprint (the dark grey area in figure 1.9 to figure 1.11). In this area, the direct signal is strong enough to ensure proper reception when the receiver is directed towards the radiator.

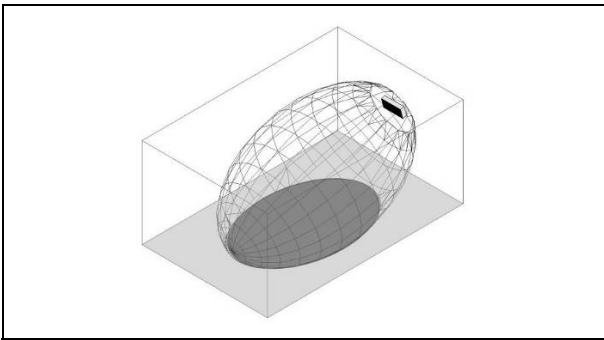The size and position of the footprint depends on the mounting height and the angle of the radiator.

Figure 1.9   The radiator mounted at 15$^°$ to the ceiling
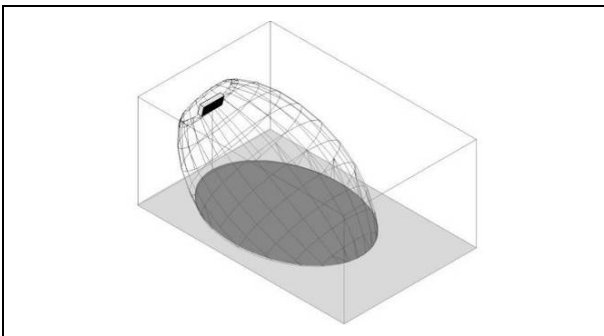

Figure 1.10   The radiator mounted at 30$^°$ to the ceiling
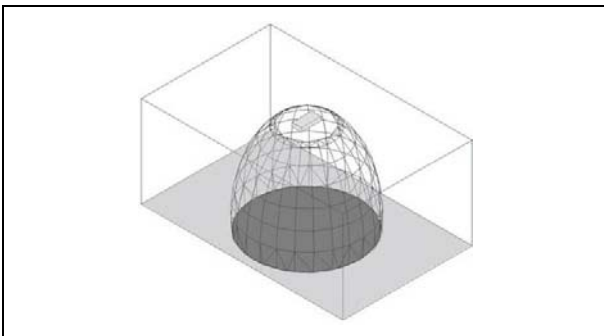
Figure 1.11   The radiator mounted perpendicular (at 90$^°$) to the ceiling

1.3.5 Positioning the radiators

Because infrared radiation can reach a receiver directly and/or via diffused reflections, it's important to take this into consideration when installing the radiators. For best reception quality, receivers should pick up direct infrared radiation. In addition reflections will improve the signal reception. In big conference halls, infrared signal will be blocked by the people in front of the receiver. For that reason the radiator should be installed at an appropriate height, usually not below 2.5 meters.

For concentrically arranged conference venues, radiators located high up and faced to the center from every angle can cover the area very efficiently. If the direction of the receiver changes, e.g. changing seat direction, the radiators can be installed in the corners of the room.

In the case the seating is always directed towards the IR emitting source, there are no radiators needed at the back (see figure 1.12).

Figure 1.12   Radiator positioning in a conference hall with auditorium seating and podium

If the path of the infrared signals is blocked, e.g. under balconies, at least one additional radiator is needed to cover the 'shaded' area (see figure 1.13).
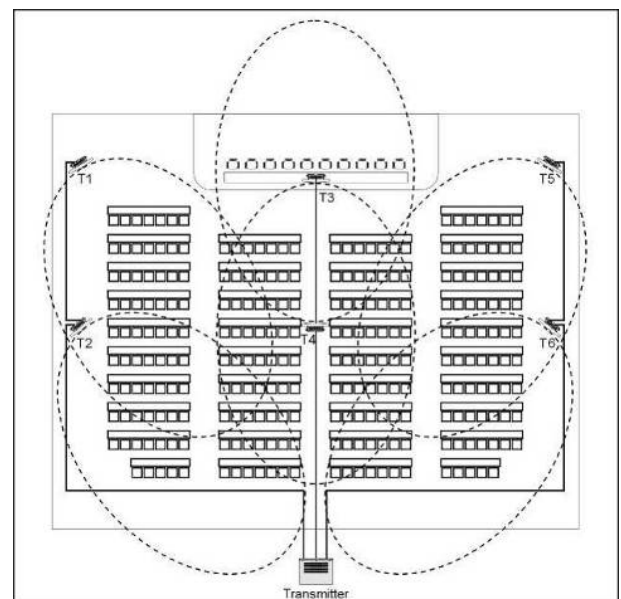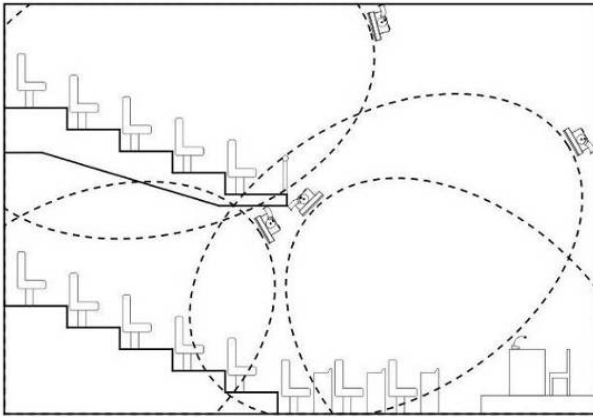

Figure 1.13   Radiator for covering seats beneath a balcony

1.3.6 Overlapped footprints and multipath effects

If footprints of two radiators overlap, the total coverage area maybe larger than the sum of the two separate footprints. In an area with overlap effect, the individual radiation signals of two radiators are added, resulting in an increase of the radiation intensity, larger than the required intensity.

However, due to the differences in the delays of the signals from two or more radiators, the signals may cancel out each other (multipath effect). In a worst-case situation, loss of reception at some positions (black spots) may be the consequence.

Figure 1.14 and figure 1.15 illustrate the effect of overlapped footprints and differences in signal delays.

Figure 1.14   Increased coverage area caused by added radiation power
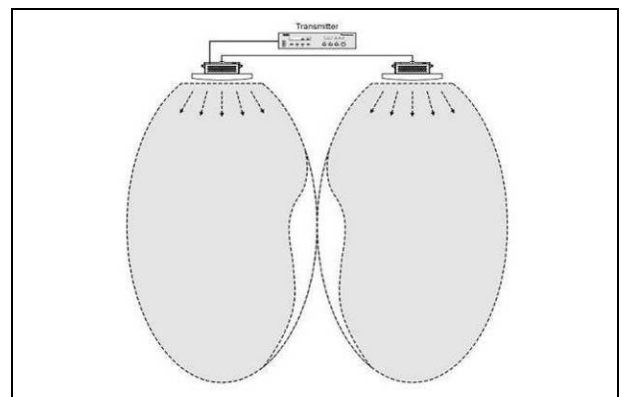
Figure 1.15   Reduced coverage area caused by differences in cable signal delay

The lower the carrier frequency, the less susceptible the receiver is for differences in signal delays.

The signal delays can be compensated by adjusting the delay compensation switches on the radiators (see section 3.7).

Chapter 2. Digital Infrared Transmitter

2.1 Overview

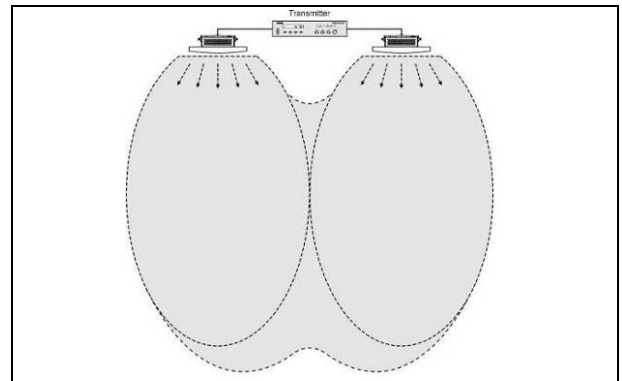The HCS-5100M transmitter is the heart of the HCS-5100 system. Up to 32 unbalanced audio signals can be accepted (under combination mode) via digital/analog audio signal input connectors. It can be connected to HCS-8300 or HCS-4100/50 congress main unit directly via optical fiber interface, 6P-DIN connector or DCS interface (RJ45 standard socket), and it can also be connected to other discussion and interpretation systems, such as HCS-4385K2/50 interpreter units, or be used as a stand-alone system for distributing external audio signals. HCS-5100M is suitable for either tabletop or 19-inch rack mounting using. Four feet (for tabletop) and two brackets (for rack mounting) are supplied.

Types:

HCS-5100MAF/04N/08N

4, 8 CHs Digital Infrared Transmitter (compatible with HCS-4385K2/50 or HCS-4100M/HCS-8300M, optical fiber interface)

HCS-5100MA/04N/08N

4, 8 CHs Digital Infrared Transmitter (compatible with HCS-4385K2/50 or HCS-4100M/HCS-8300M)

HCS-5100MC/04N/08N/16N

4, 8, 16 CHs Digital Infrared Transmitter

Front of HCS-5100M/N

Rear of HCS-HCS-5100MAF/N

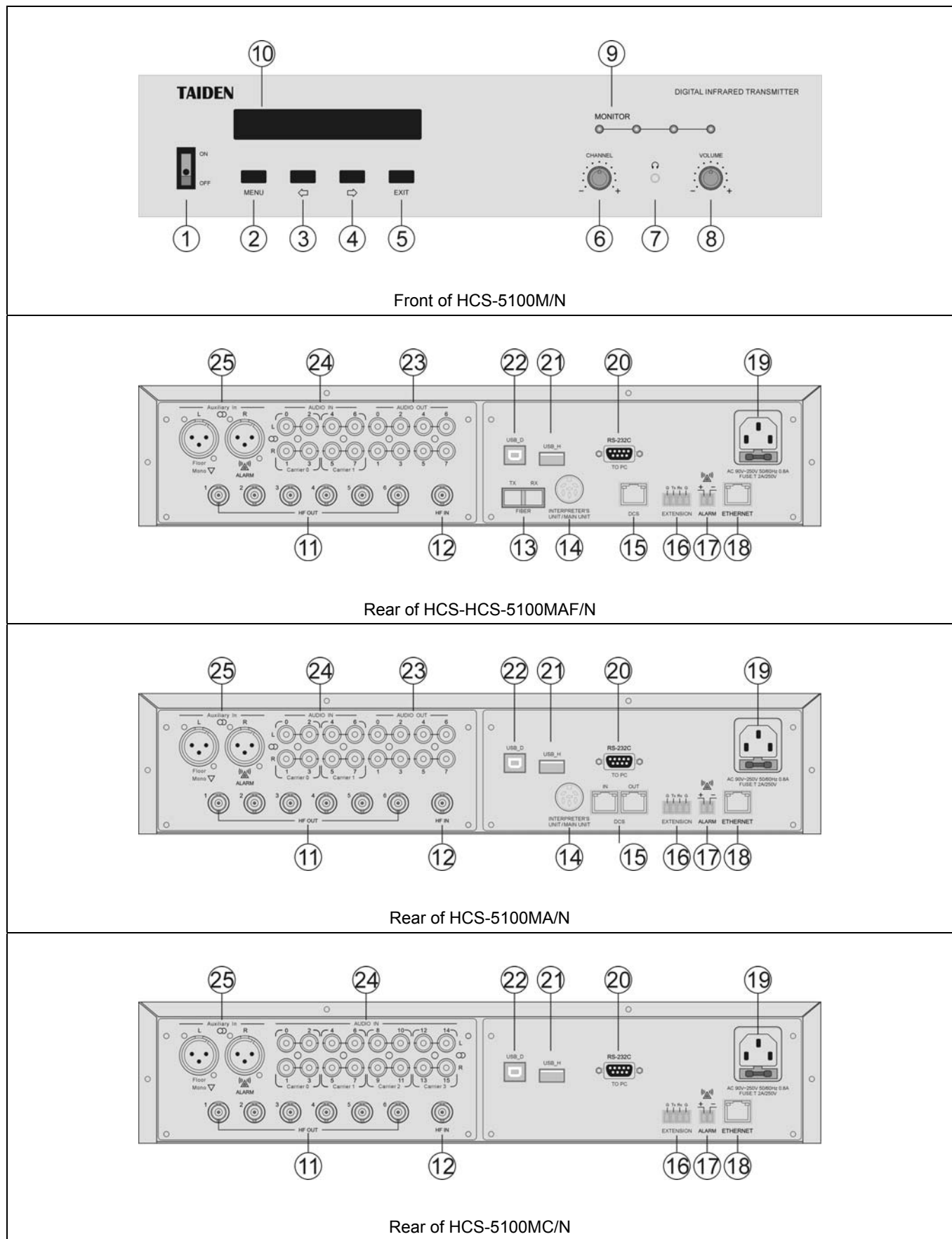Rear of HCS-5100MA/N

Rear of HCS-5100MC/N

Figure 2.1   HCS-5100M/N Digital Infrared Transmitter

◇ **Front:**

1. Power switch with indicator (red)
- When the switch is off, it does not completely disconnect the unit from mains

2. "MENU" button
- a. Under current state, press "MENU" button go to main menu;
- b. Under main menu, press "MENU" go to sub menu;
- c. Select/Deselect in network configuration.

3. "⇦" (Left) button

4. "⇨" (Right) button

5. "Exit" button

6. Monitor channel select knob

7. Monitor earphone interface
- Ø 3.5 mm jack for stereo monitor earphone

8. Monitor volume control knob

9. Mini IR radiator
- 4 IREDs transmitting the same infrared signal as the radiator output for monitor purpose

10. Display
- 256×32 LCD. Display the status of the transmitter and the menu of system configuration

◇ **Rear:**

11. HF signal output
- 6 BNC connectors for output HF signal to radiator. To each connector, up to 30 radiators can be connected

12. HF signal input
- 1 BNC connector for receiving HF signal from other transmitter

13. Fiber interfaces
- For connecting to the congress main unit, congress extension main unit or 8-channel audio input interface (bridging distance can reach tens of kilometers)

14. INTERPRETER'S UNIT / MAIN UNIT 6P-DIN interface
- For connecting to HCS-4385K2/50 interpreter unit

  or
- For connecting to HCS-4100M/50 or HCS-8300M congress main unit via CBL6PP-02 extension cable

15. DCS interfaces
- For connecting to HCS-4100M/50 or HCS-8300M congress main units

16. Extension interface
- For connecting to another transmitter under combination (master + slave) mode

17. Fire alarm linked trigger interface
- When this switch is closed, the emergency audio signal on the Aux-R input is distributed to all output channels and overriding all other audio inputs

18. Ethernet
- TCP/IP protocol was adopted for communication between main unit and computer. Remote control can be achieved via Ethernet interface

19. Power supply

20. RS-232
- For connecting to PC

21. A type USB interface
- To plug-in a USB stick

22. Mini USB interface
- For connecting to PC

23. Audio signal output
- for output DCS multi channel audio

24. Audio signal input
- 4, 8 or 16 audio connectors to connect external unbalanced audio input signals. The number of connectors depends on the transmitter type

25. Auxiliary audio input
- female XLR connectors for external audio inputs to connect auxiliary balanced audio signals such as music, floor language or emergency audio signal

2.3 Installation

The transmitter can be fixed in a standard 19-inch cabinet. The transmitter is equipped with a pair of fixing brackets ①. First unscrew the lateral screws ② from the housing. Then fasten the brackets with these screws and put the CMU in the cabinet. Finally fix the four holes ③ up with screws.
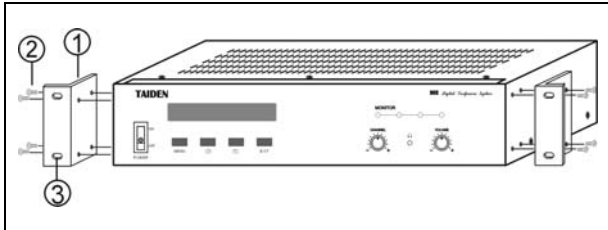

Figure 2.2   Installation of transmitter

In addition, 1U metal stripes are included as decoration to be installed between the transmitters in the cabinet. It is also good for the ventilation and cooling off. Fix up the four holes ③ with screws.
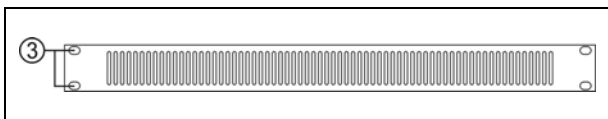

Figure 2.3   Decoration of cabinet

2.4 Connection

Typical system connection includes:
- to another transmitter
- to external audio sources
- to emergency signal switch
- to HCS-4385K2/50 interpreter unit
- to HCS-8300 Paperless Multi-media Congress System or HCS-4100/50 Fully Digital Congress System

2.4.1 To another transmitter

■ **Bypass (master + bypass) mode**

The transmitter can be operated in bypass mode to loop-through the IR radiator signals from another transmitter. Multi room application can be achieved by setting the transmitter in the center room to "Master" mode and the transmitters in other rooms to "Bypass" mode. One of the six radiator outputs of the master transmitter is connected with an RG-59 cable to the radiator signal loop-through input of the bypass transmitter.

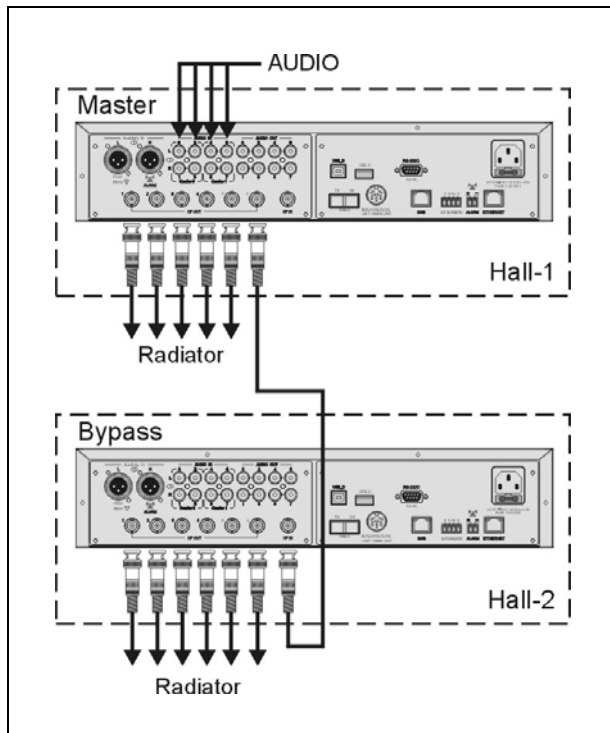2 Transmitters should be set to "Master" and "Bypass" separately (see section 2.6.1).

Figure 2.4   Transmitter connected to another transmitter in bypass mode

■ **Combination (master + slave) mode**

HCS-5100M/N series transmitter unique combination function can combine two N channels transmitter as one 2N channels system (maximum 32 channels).

It can be achieved by setting the transmitter which is connected to radiator(s) to "Master" mode and the other transmitter to "Slave" mode. One of the six radiator outputs of the slave transmitter is connected with an RG-59 cable to the radiator signal loop-through input of the master transmitter, and the EXTENSION interfaces of both transmitters must be connected by a cable.

Transmitters should be set to "Master" and "Slave" separately (see section 2.6.1).
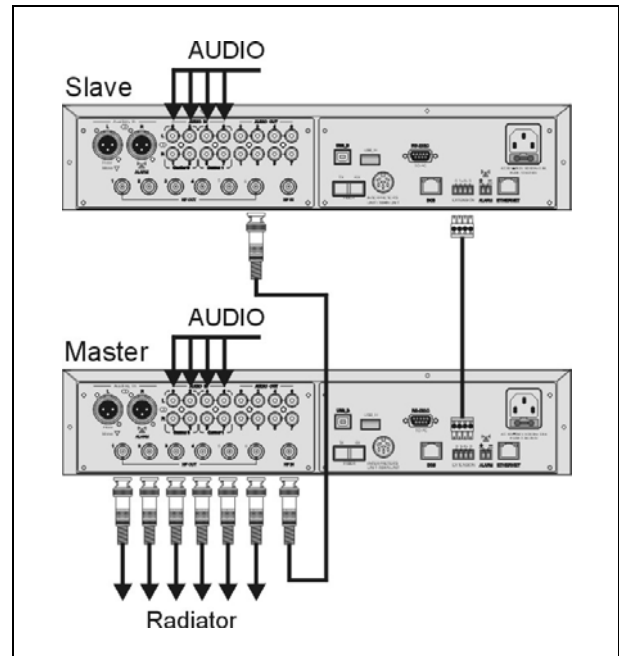
Figure 2.5   Transmitter connected to another transmitter in combination mode

Connection explanation

If two transmitters are operated in combination mode, the EXTENSION interfaces of both transmitters must be connected by a cable, according to figure 2.6. This cabling is additionally required to the cabling shown in figure 2.5.

G		G
Tx		Rx
Rx		Tx
G		G
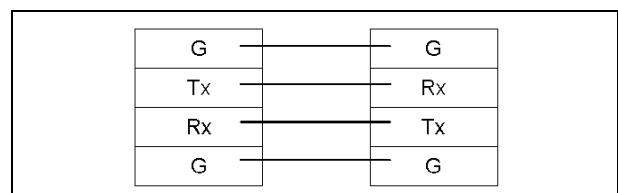
Figure 2.6   Connection of EXTENSION interfaces in combination mode

2.4.2 To external audio sources

HCS-5100M/N transmitter has up to 16 channels audio input (depends on transmitter type) for connecting to external unbalanced audio sources (such as other brand conference systems) or for music distribution.

Figure 2.7　Transmitter connected to external audio sources

2.4.3 To emergency signal switch

To use emergency function, fire alarm linked trigger interface (normally open) must be connected to the emergency switch connector. When the switch is closed, the audio signal on the Aux-Right input is distributed to all output channels and overriding all other audio inputs.
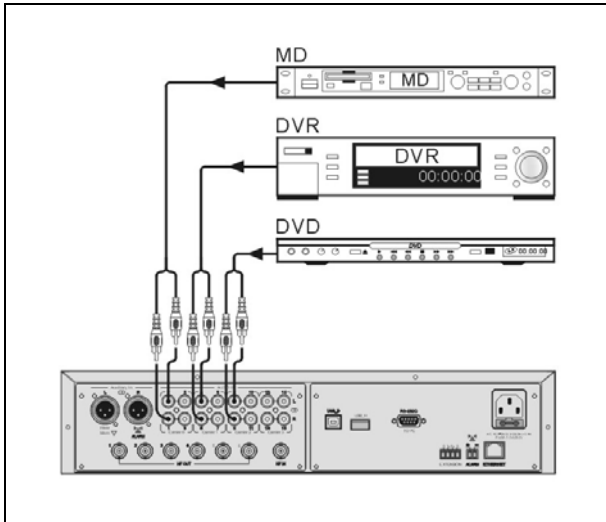"ALARM" will be displayed at this moment.
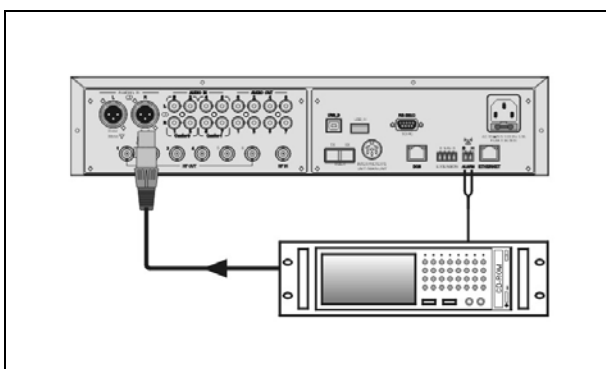
Figure 2.8　Transmitter connected to emergency signal switch

2.4.4 To HCS-4385K2/50 interpreter unit

HCS-4385K2/50 interpreter units can be connected to the INTERPRETER'S UNIT interface of HCS-5100MA(F)/N.
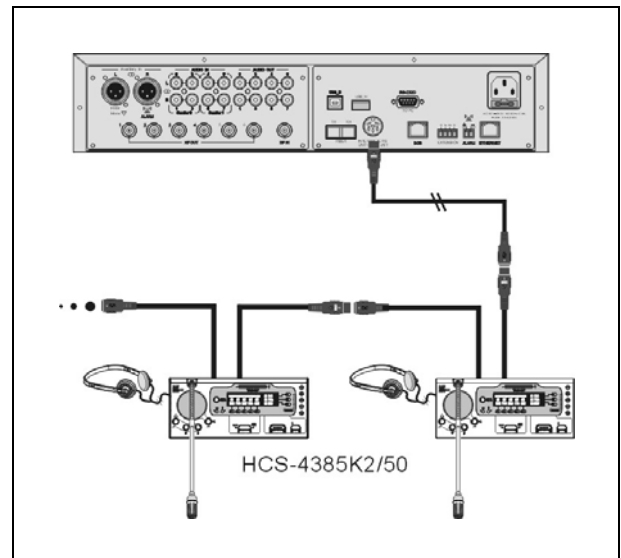
Figure 2.9　Transmitter connected to interpreter units

2.4.5 To HCS-8300 Paperless Multi-media Congress System

■ **HCS-5100MA(F)/N connected to HCS-8300 Paperless Multi-media Congress System**

HCS-8300M congress main unit can be connected via optical fiber interface, 6P-DIN interface or DCS interface on HCS-5100MA(F)/N, and 8 channels audio output can be used for audio recording (see figure 2.10).

■ **HCS-5100MC/N connected to HCS-8300 Paperless Multi-media Congress System**

HCS-5100MC/N transmitter do not have optical fiber interface, 6P-DIN interface and DCS interface, it can be connected to **TAIDEN** HCS-8300M congress main unit through **TAIDEN** HCS-8300MO 8 Channels Audio Output Device. The output of HCS-8300MO should be connected to the audio input of HCS-5100MC/N transmitter one-to-one correspondingly through audio cable (see figure 2.11).
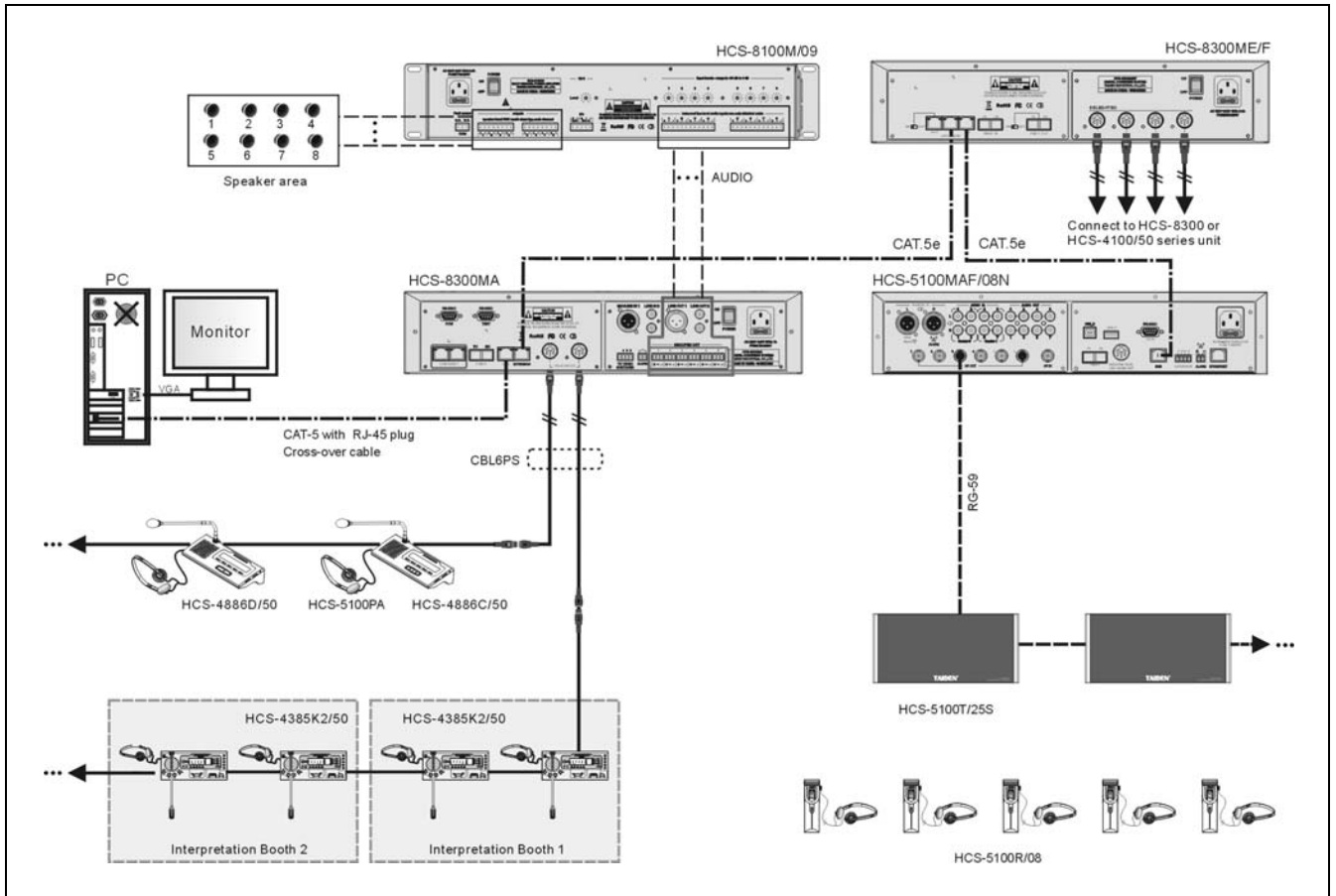
Figure 2.10   HCS-5100MA(F)/N transmitter connecting to HCS-8300M congress main unit
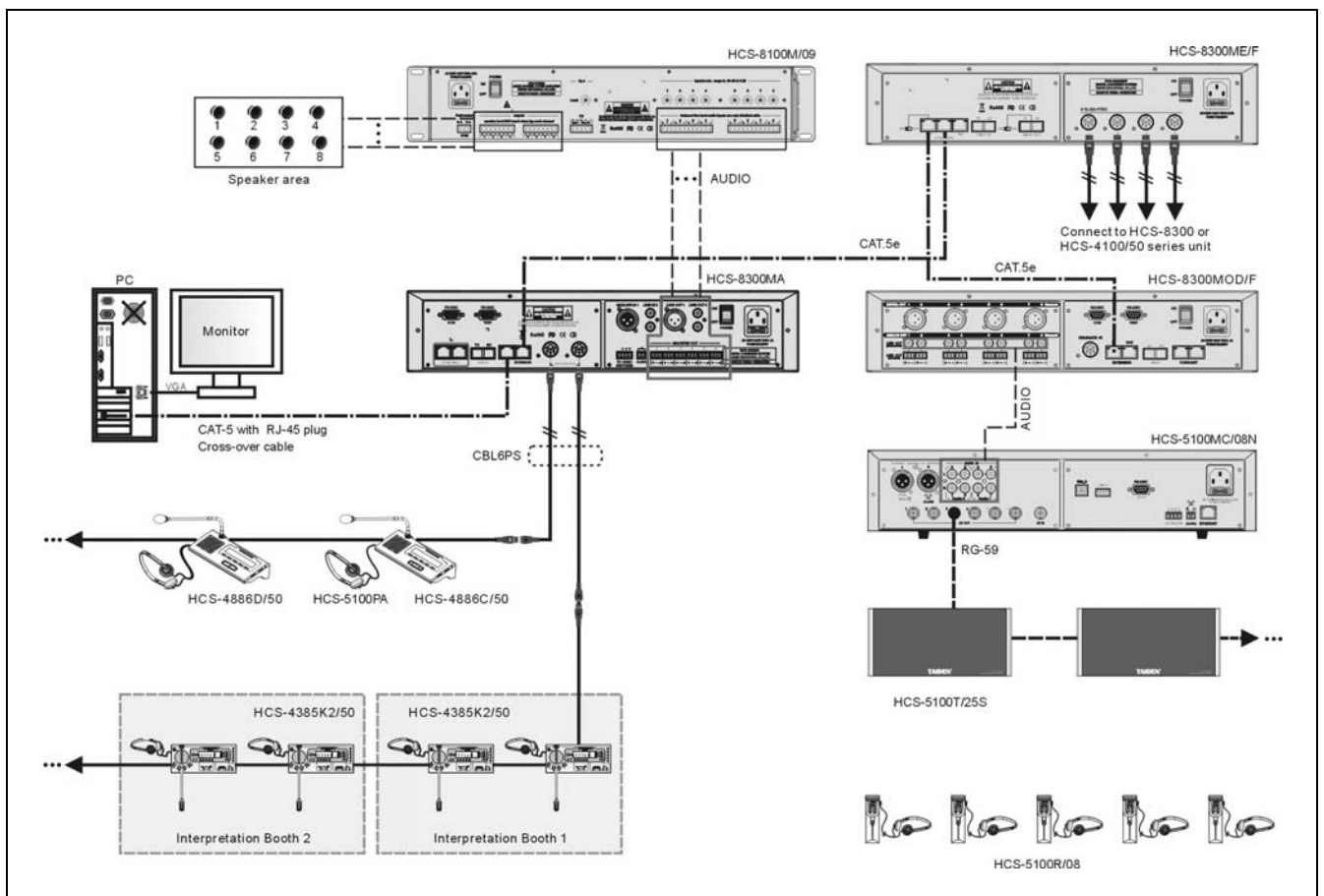
Figure 2.11   HCS-5100MC/N transmitter connecting to HCS-8300M congress main unit through HCS-8300MO

2.5 Menu structure

2.5.1 Transmitter menu structure (work mode: Master-Analog)
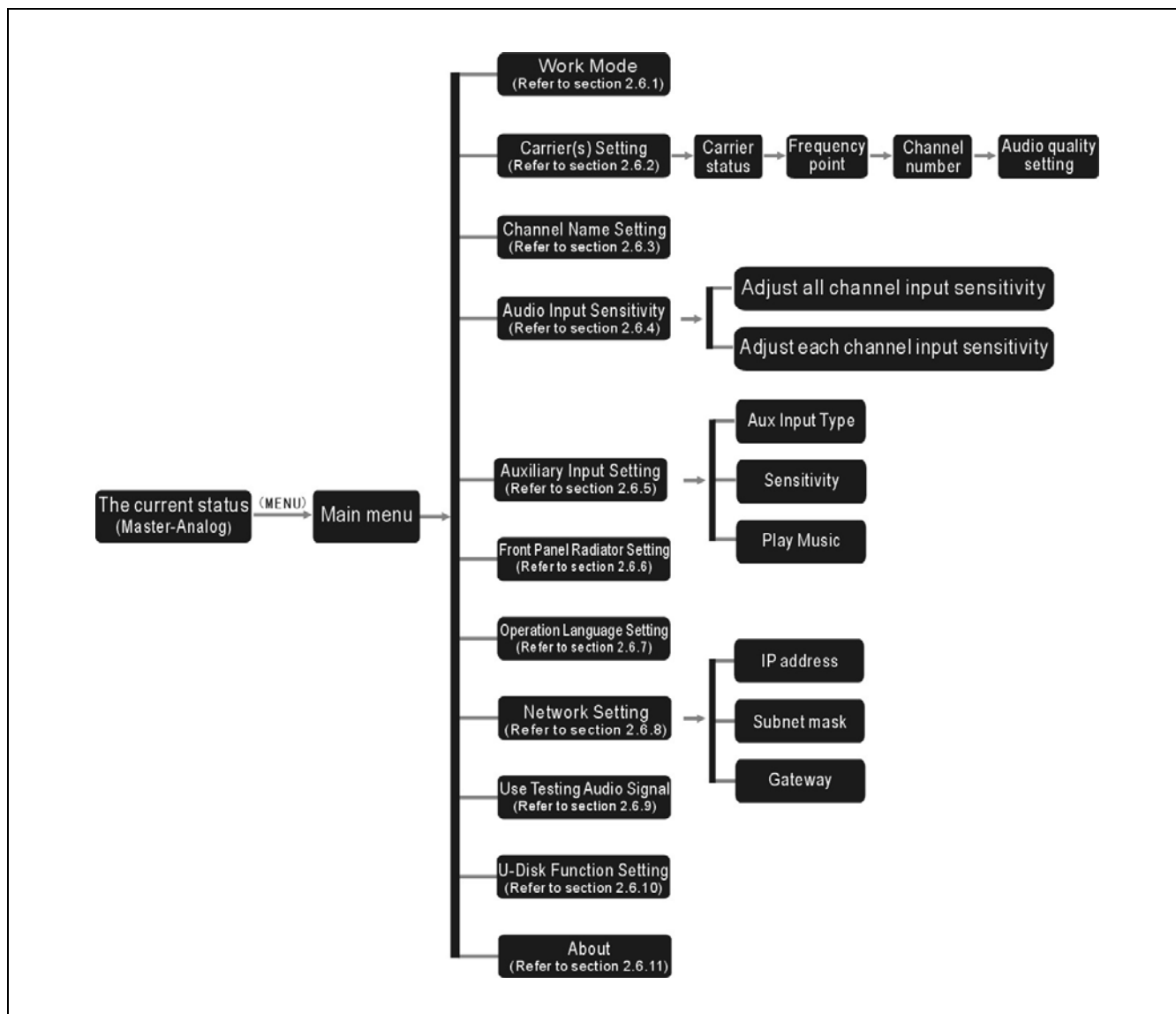
Figure 2.12a   Transmitter menu structure (work mode: Master-Analog)

2.5.2 Transmitter menu structure (work mode: Master- Interp. U)
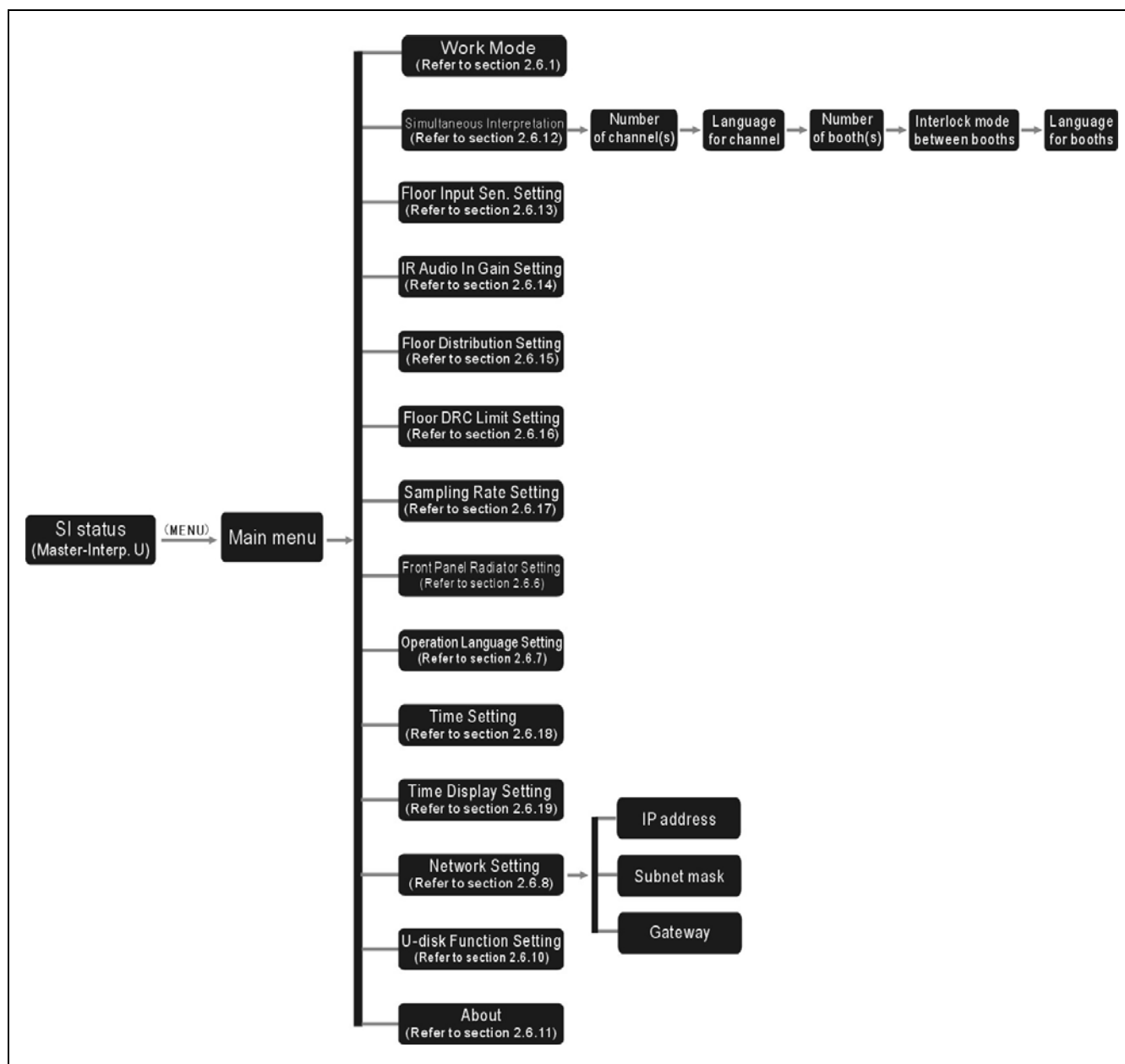
Figure 2.12b   Transmitter menu structure (work mode: Master- Interp. U)

2.5.3 Transmitter menu structure (work mode: Master- Central U)
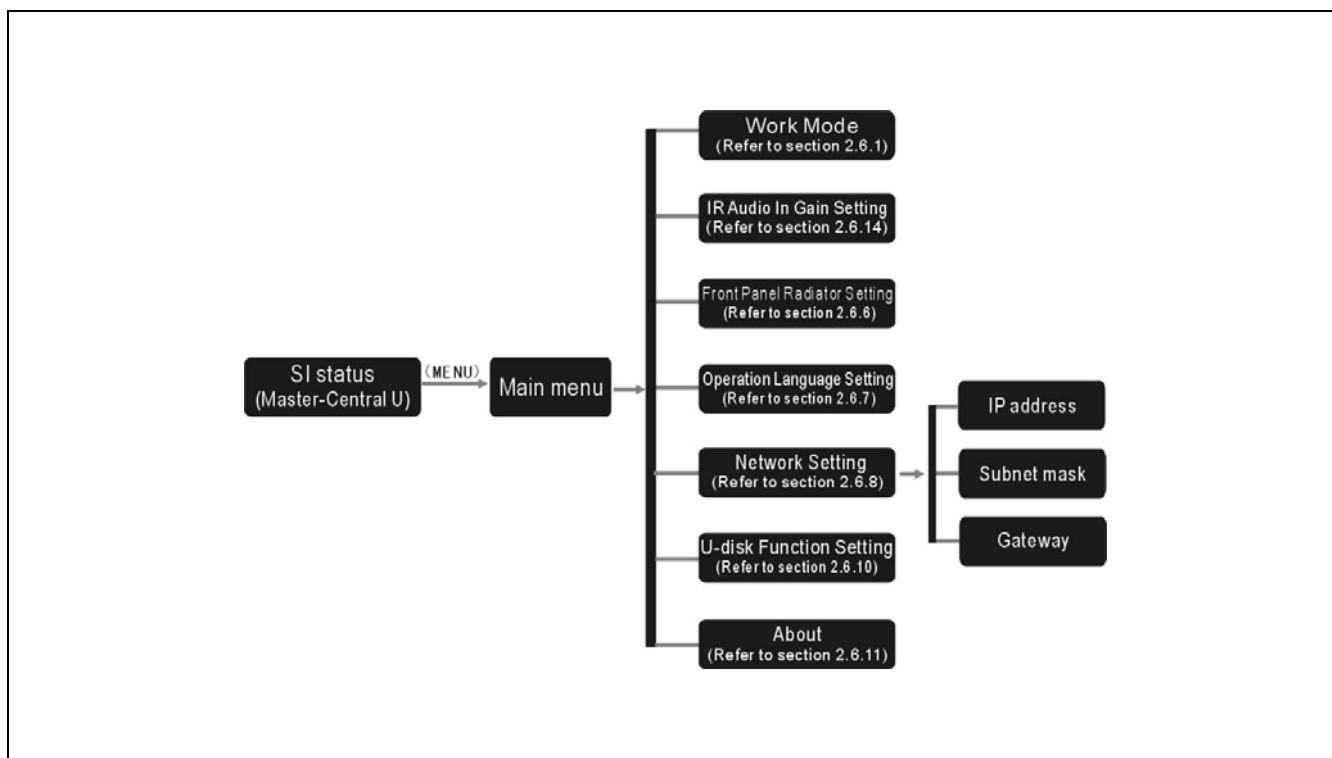
Figure 2.12c   Transmitter menu structure (work mode: Master- Central U)

2.5.4 Transmitter menu structure (work mode: Slave, Bypass)
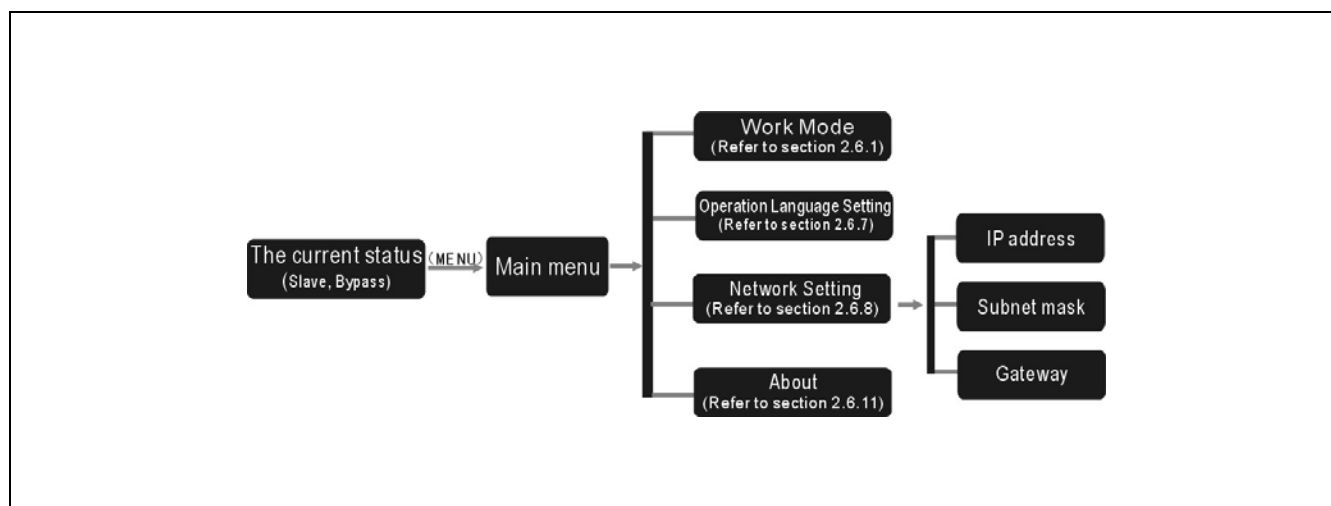
Figure 2.12d   Transmitter menu structure (work mode: Slave, Bypass)

2.6 Configuration and operation

A) Set up of all status of the transmitter

Via an interactive menu on the LCD and 4 operation buttons.

> **Note**:
> ☞ To come back to the English version, please hold the "EXIT" button and switch on the transmitter.

B) Starting initialization:

Switch on the HCS-5100M/N transmitter. The current status of the transmitter will be displayed on the LCD:
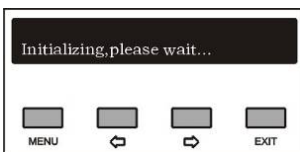
■ If the status is **"Master" mode (N) or (C)**, the display shows:
  "Total Channels"
  "Monitor Channel"
  "Work Mode"
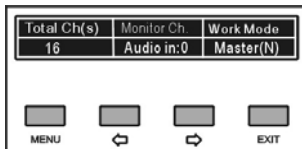
"Master (N)" = NO slave transmitter connected
"Master (C)" = Transmitter in combination mode
                And
                Slave transmitter connected

Please refer to 2.6.1 for detailed description.

> **Note**:
> ☞ When the HCS-5100MA(F)/N transmitter is connected to the conference main unit, the simultaneous interpretation status instead of the status of the transmitter will be displayed on the LCD.
>
>
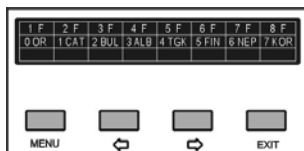
■ If the status is **"Bypass"** mode, the display shows:
  "Work mode"
  "Monitor Channel"
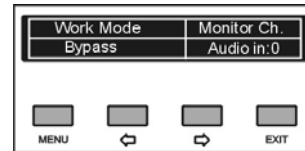
■ If the status is **"Slave"** mode, the display shows:
  "Connection status"
  "Monitor channel"
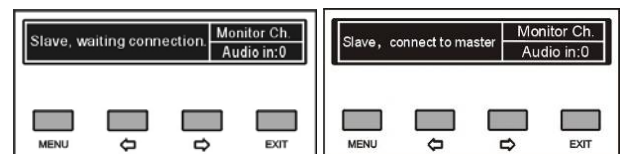
C) Accessing "Main" menu:

Press the "MENU" button. Depending on the transmitter work mode, the LCD display shows the terms:

In **"Master - Analog"** mode:
→"Work Mode"
→"Carrier(s) Setting"
→"Channel Name Setting"
→"Audio Input Sensitivity"
→"Auxiliary Input Setting"
→"Front Panel Radiator Setting"
→"Operation Language Setting"
→"Network Setting"
→"Use Testing Audio Signal"
→"U-disk Function Setting"
→"About"

In **"Master - Interp. U"** mode:
→"Work Mode"
→"Simultaneous Interpretation"
→"Floor Input Sen. Setting"
→"IR Audio In Gain Setting"
→"Floor Distribution Setting"
→"Floor DRC Limit Setting"
→"Sampling Rate Setting"
→"Front Panel Radiator Setting"
→"Operation Language Setting"
→"Time Setting"

→"Time Display Setting"

→"Network Setting"

→"U-disk Function Setting"

→"About"

In **"Master - Central U"** mode:

→"Work Mode"

→"IR Audio In Gain Setting"

→"Front Panel Radiator Setting"

→"Operation Language Setting"

→"Network Setting"

→"U-disk Function Setting"

→"About"

In **"Slave"** and **"Bypass"** mode:

→"Work Mode"

→"Operation Language Setting"

→"Network Setting"

→"About"

- ◆ Press the "MENU" button to go to the corresponding submenus.
- ◆ To switch from term to term use the "⇦/⇨" button.
- ◆ To exit the current menu and to return to the upper level menu use the "EXIT" button.

2.6.1 Work Mode

a) Use the "⇦/⇨" button to switch between "Master", "Slave" and "Bypass";
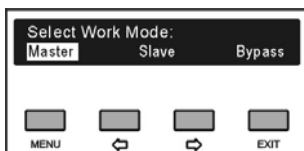
- ・ "Master", use the "MENU" button to confirm and go to step b);
- ・ "Slave" or "Bypass", use the "MENU" button to confirm and go to step c);

b) Use the "⇦/⇨" button to select the master mode interface, switch between "Analog", "Interp. U" and "Central. U";
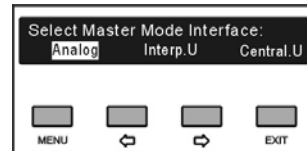
- ・ "Analog", SI audio signal input from AUDIO IN interfaces of transmitter;
- ・ "Interp. U", SI audio signal input from Interpreter unit(s) connected to the transmitter;
- ・ "Central U", SI audio signal input from main unit(s) connected to the transmitter;

c). Transmitter needs to restart to implement working mode configuration. Use the "⇦/⇨" button to select reset now or not.
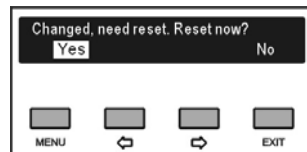
Note:

☞ In combination mode, the sensitivity must be setup on the "Master" unit to make them coincident on "Master" unit and "Slave" unit; in this mode, carriers of audio signals of the "Slave" unit are also setup on the "Master" unit.

2.6.2 Carrier(s) Setting

Setting up → "Set up status"

→ "Channel number"

→ "Frequency point"

→ "audio setting"

Note:

☞ Carriers of "Slave" unit will be set via "Master" unit.

1) Enable/disable current carrier

a) Use the "⇦/⇨" button to enable or disable the current carrier;

b) Use the "MENU" button to save;
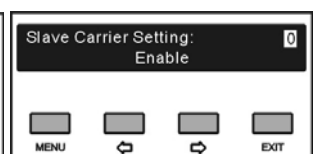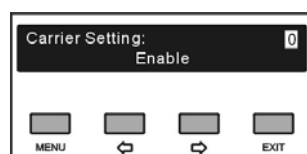
■ **If "Enabled":**

• Press the "MENU" button to setup the current carrier;
• The frequency of the current carrier will be displayed. (figure 1.5 shows the band allocation).
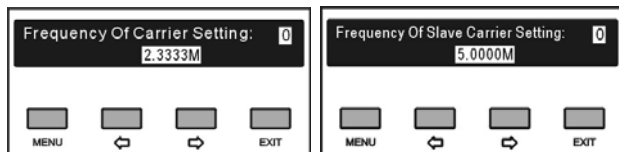
■ **If "Disabled":**

• Press the "MENU" to return to the upper level menu.

2) Channel number configuration

a) Press the "MENU" button at this interface to go to the channel number configuration, as shown in the following figure;
b) Use the "⇦/⇨" button to increase or decrease the channel number. The exact channel number depends on the audio quality (see section 1.2.5).
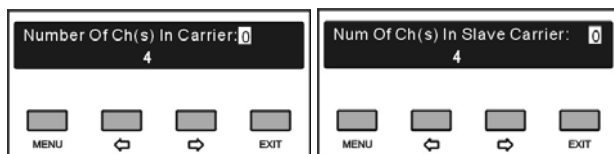
c) Use the "MENU" button to the save channel number setting.

3) Audio quality setting

a) Go to the audio quality setting interface;
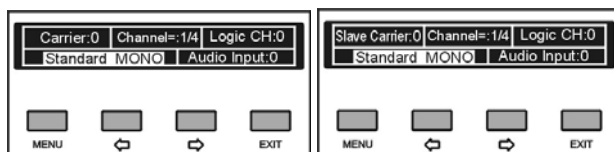
b) Press the "MENU" button to switch channel number (in the case of more than one channel).
"Audio input:" indicates the current channel corresponding to the HCS-5100M transmitter audio input channel;
c) After having selected channel number(s), use "⇦/⇨" to adjust audio quality.

Audio mode includes: → "Standard MONO"
→ "Perfect MONO"
→ "Standard STEREO"
→ "Perfect STEREO"

The selectable audio quality depends on the channel number (refer to section 1.2.5).

4.) Save settings

a) Use the "MENU" button to save setting;
b) Go to the next carrier configuration,
c) Repeat above until all carriers have been set up.

2.6.3 Channel Name Setting

Assign a language name for every channel.
a) Use the "MENU" button to switch the channel number;
b) Use the "⇦/⇨" button to adjust the current channel name (for selectable language name refer to section 7.7).
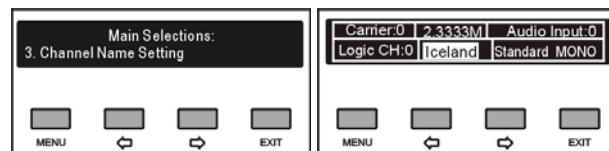
2.6.4 Audio Input Sensitivity

"Input sensitivity" includes 2 submenus:
• **"All"** = adjust all channels input sensitivity
• **"Per Input"** = adjust each channel input sensitivity separately
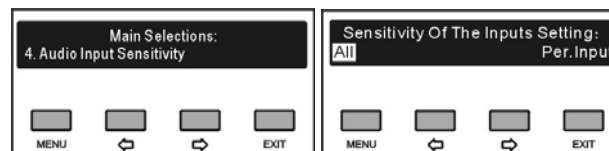
• "All":
Use the "⇦/⇨" button to adjust input sensitivity for all channels. Range from –12 dBV - +12 dBV.

• "Per Input":
a) Use the "MENU" button to switch channel number
b) Use the "⇦/⇨" button to adjust the input sensitivity for each channel. Range from –12 dBV - +12 dBV.
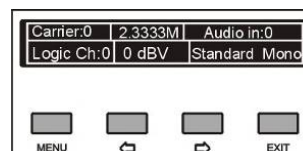
2.6.5 Auxiliary Input Setting

"Aux Input" (Auxiliary audio input) includes 3 submenus:

→ "Aux Input Type"
→ "Sensitivity"
→ "Play Music"
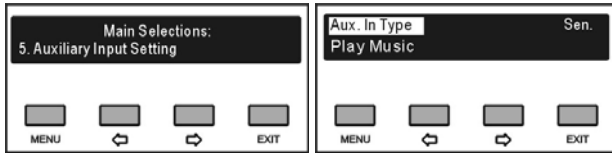
• "Aux Input Type"
Use the "⇦/⇨" button to select the auxiliary input type between "Stereo Music" or "Mono + Emergency".
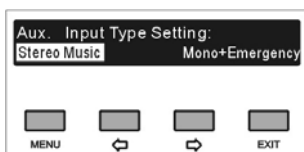
a) "Stereo Music":
If "Play music", stereo music from 2 channels auxiliary audio input will be distributed to all output channels, usually for playing music when adjournment.

b) "Mono + Emergency":
Once the alarm signal is turned on, the emergency signal from Aux-R audio input will be distributed to all output channels on the premise that fire alarm linked trigger interface is closed (see section 2.4.3).

• "Sensitivity"
Use the "⇦/⇨" button to adjust the auxiliary input level, range from –6 dBV - +18 dBV.
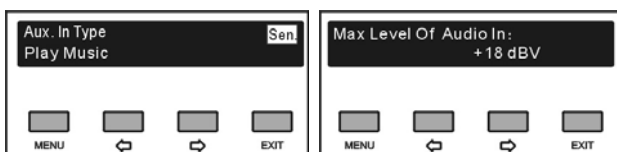
• "Play Music"
a) If "Aux input type" is "Stereo music", stereo or mono music from the auxiliary audio input will be distributed to all output channels. "MUSIC" will be displayed at this moment;
b) Use the "MENU" button to stop and exit.
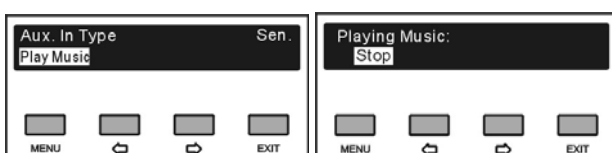
2.6.6 Front Panel Radiator Setting

Enable/disable the front panel radiator. If "Enable", the infrared signal can be monitored or tested via the front panel radiator.
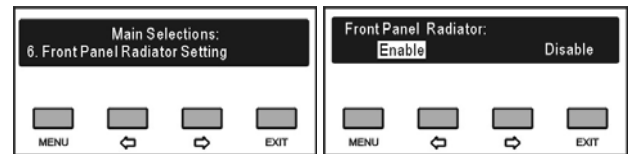
a) Press the "⇦/⇨" button to select enable or disable the front panel radiator;
b) Press the "MENU" button to save and return to the upper level menu.

2.6.7 Operation Language Setting

Select the LCD display language from simplified Chinese, Traditional Chinese, English, etc. Other languages can be added by the user through software operation (refer to the software operation instruction for details).
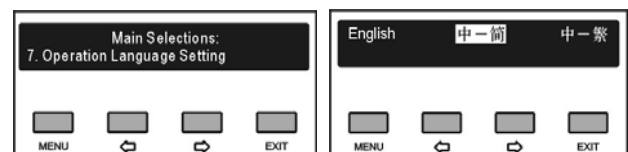
a) Press the "⇦/⇨" button to select the LCD display language;
b) Press the "MENU" button to save and return to upper level menu.

2.6.8 Network Setting

"Network" includes three submenus:

→"IP Address"
→"Subnet Mask"
→"Gateway"
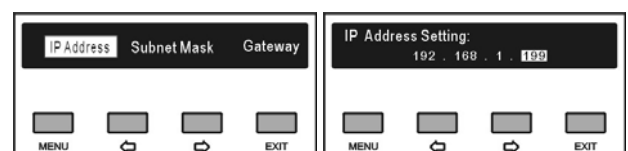
1) Setting up unique "IP Address" for the transmitter:

• Use the "⇦/⇨" button to switch between the four numbers;
• Use the "MENU" button to edit the selected number;

- Use the "⇦/⇨" button to decrease/increase the number (press and hold the "⇦/⇨" button will adjust the numeric value quickly);
- Use the "EXIT" to return to the upper level menu.

2) Setting up "Subnet Mask" and "Gateway":

Same chronological order as for the "IP address" set up.

Note:
- ☞ "IP address", "Subnet Mask" and "Gateway" of the system software should correspond with the above transmitter settings, else connection error will occur;
- ☞ All menu setup except "Network" and "Input sen." use the "MENU" button to exit saving changes, and use "EXIT" to exit discarding changes.

2.6.9 Use Testing Audio Signal

The transmitter goes to testing mode and testing tone will be distributed to all output channels.
Use the "MENU" button or "EXIT" button to stop the testing mode.
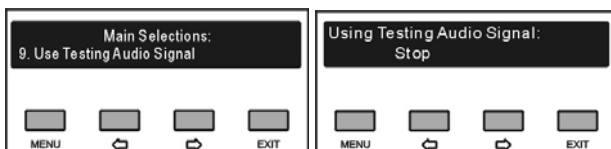
2.6.10 U-disk Function Setting
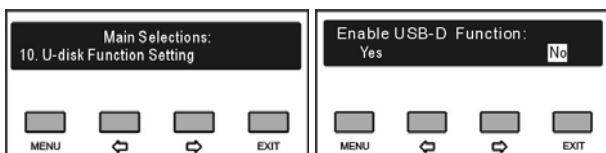
a) Press the "⇦/⇨" button to select enable U-disk function or not;
b) Press the "MENU" button to save and return to upper level menu.

2.6.11 About

Transmitter firmware information will be displayed, including: version, TAIDEN information and product series number. Use any button to exit.
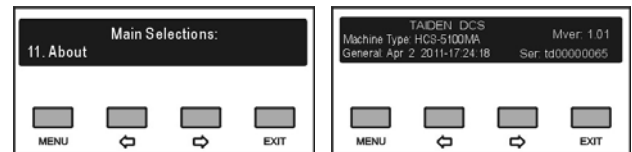
2.6.12 Simultaneous Interpretation

In "Simultaneous Interpretation" submenu, the following parameters need to be setup:
- ♦ "Select Number Of Channel(s):"
- ♦ "Select Language For Channel:"
- ♦ "Select Number Of Booth(s):"
- ♦ "Select Interlock Between Booths"
- ♦ "Select Language For Booth:"
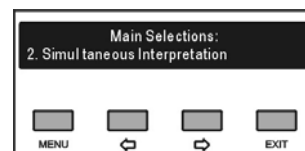
Operation steps:

a). Setup the number of interpretation channels
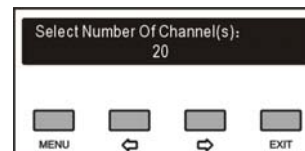
Use the "⇦/⇨" button to switch the number of interpretation channels (press and hold the "⇦/⇨" button will adjust the numeric value quickly);
- ▪ If "0" is selected, it stands for no SI function, use the "MENU" button to save and return to the main menu;
- ▪ If other values are selected, it stands for the number of interpretation channels, use the "MENU" button to go to step b).

b). Setup interpretation language

1). Setup channel 1 first, use the "⇦/⇨" button to switch between languages;

2). Use the "MENU" button to confirm the selected language and go to the next channel;

3). Repeat 1) - 2) to set up the language for all channels, and go to step c);

c). Select number of booths
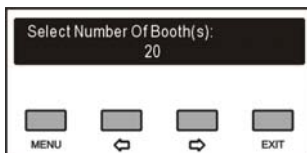
Use the "⇦/⇨" button to switch the number of interpretation booths. Usually, one language will take one booth.

▪ If "0" is selected, it stands for no SI function, use the "Menu" button to save and return to the main menu;

▪ If other values are selected, it stands for the number of interpretation booths, use the "Menu" button to go to step d).

d). Select interlock mode between booths

Select interlock mode between booths, includes:

"OVERRIDE"

"INTERLOCK"
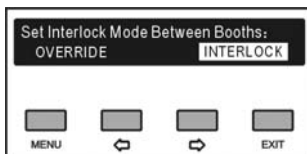
1). Use the "⇦/⇨" button to switch between two interlock modes;

▪ "OVERRIDE" mode enables an interpreter in another booth to override an occupied channel in another booth, but supplying the same channel.

▪ "INTERLOCK" mode prevents that two booths engage the same channel.

2). Use the "MENU" button to confirm selected interlock mode and go to step e).

e). Select the language for the booth

To distribute the interpretation languages separately, A/B/C channels are provided in each interpretation unit. The language setting of A/B/C channels for all interpretation units in one booth is uniform. After the setup of booth numbers, the user interface to set up output the channel A/B/C language will be shown for each booth.

General procedure:

1st step: select a language for channel A

2nd step: select ALL or NONE for channel C

If ALL is selected for C then

3rd step: select a language for B. Three channels are now available: A and B output a selected language and C outputs any available language.

If NONE is selected for C then

4th step: select B: NONE or ALL

If NONE is selected for B, only A outputs the selected language of step 1. B and C do not output languages

If ALL is selected for B, then 2 output channels are available: A outputs the selected language of step 1 and B outputs any available language. No language output at C

1). Setup channel A language for booth 1: press the "⇦/⇨" button to select the language from those languages that have been selected in step b) and press the "MENU" button to confirm;
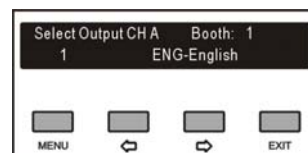
2). Select channel C language for booth 1: "NONE" or "ALL";
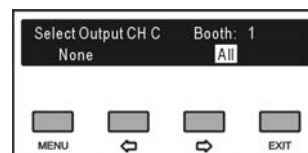
▪ If ALL is selected for C then press the "⇦/⇨" button to select the language for B from those languages that have been selected in step b) and press the "MENU" button to confirm;
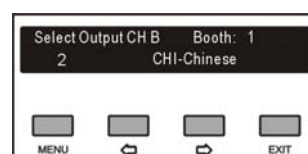
▪ If NONE is selected for C then select channel B language from "NONE" or "ALL";

Select Output CH B   Booth: 1
None   All

MENU   ⇦   ⇨   EXIT
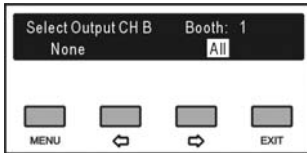
* **"NONE"** stands for no language output from channel B;
* **"ALL"** stands for the language of channel B which can be any of the selected languages.

Press "MENU" button to confirm and go to configuration for next booth;

5). Repeat 1) - 2) to setup output channel A/B/C language for all booths and return to the main menu.

2.6.13 Floor Input Sen. Setting

Main Selections:
3. Floor Input Sen. Setting

MENU   ⇦   ⇨   EXIT

Floor Input Sensitivity:
0 dBV

MENU   ⇦   ⇨   EXIT
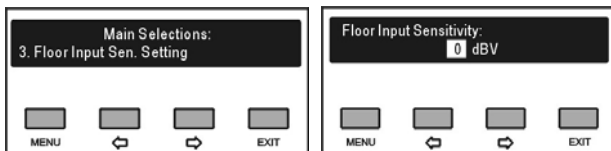
a). Use the "⇦/⇨" button to adjust the floor input sensitivity (press and hold the "⇦/⇨" button will adjust numeric value quickly), range from –6 dBV - +18 dBV;
b). Press the "MENU" button to save and return to the upper level menu.

2.6.14 IR Audio In Gain Setting

Main Selections:
4. IR Audio In Gain Setting

MENU   ⇦   ⇨   EXIT

IR Audio In Gain:
0dB

MENU   ⇦   ⇨   EXIT

a). Use the "⇦/⇨" button to adjust the IR signal audio in gain (press and hold the "⇦/⇨" button will adjust the numeric value quickly), range from –6 dB - +6 dB;
b). Press the "MENU" button to save and return to the upper level menu.

2.6.15 Floor Distribution Setting

Select distribution of floor audio to used simultaneous interpretation channels or not.
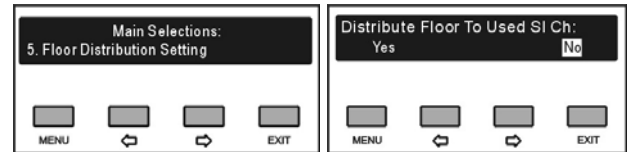
Main Selections:
5. Floor Distribution Setting

MENU   ⇦   ⇨   EXIT

Distribute Floor To Used SI Ch:
Yes   No

MENU   ⇦   ⇨   EXIT

a). Use the "⇦/⇨" button to select "Yes" or "No";
b). Press the "MENU" button to save and return to the upper level menu.

2.6.16 Floor DRC Limit Setting

Setup the DRC limit of the floor channel in the system.

Main Selections:
6. Floor DRC Limit Setting

MENU   ⇦   ⇨   EXIT

Floor DRC Limit:
-3 dB FS

MENU   ⇦   ⇨   EXIT

a). Press the "⇦/⇨" button to select the DRC limit of the floor channel between: OFF, -3 dB, -6 dB, -9 dB, -12 dB and -15 dB;
b). Press the "MENU" button to save and return to the upper level menu.

2.6.17 Sampling Rate Setting

Select the sample rate between 32 kHz and 48 kHz. If "48 kHz" sampling frequency is selected, the system response frequency is 30 Hz - 20 kHz; if "32 kHz" sampling frequency is selected, the system response frequency is 30 Hz - 16 kHz.

Main Selections:
7. Sampling Rate Setting

MENU   ⇦   ⇨   EXIT

Select Sampling Rate Of System:
32K Hz   48K Hz

MENU   ⇦   ⇨   EXIT
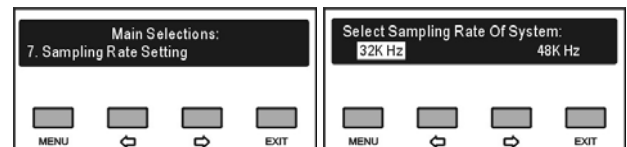
a). Press the "⇦/⇨" button to select "32 kHz" or "48 kHz";
b). Press the "MENU" button to save and return to the upper level menu.

2.6.18 Time Setting

Setup system clock.

a). Press the "MENU" button to go to "Year", "Month", "Day", "Hour", "Minute" in turn;

b). Press the "⇐/⇒" button to set time (press and hold the "⇐/⇒" button will adjust the numeric value quickly);

c). Press the "MENU" button to save and return to the upper level menu.

2.6.19 Time Display Setting

a). Use the "⇐/⇒" button to select "Yes" or "No";

b). Press the "MENU" button to save and return to the upper level menu.

2.7 Monitor

For testing the transmitter, the front panel has a monitoring facility including a monitor channel selector, a monitor earphone jack and a monitor volume control (please refer to figure 2.1).

The Monitor channel will only work if the transmitter is working. Plug the earphone into the monitor earphone jack, select the monitor channel with the monitor channel selector. The audio signal input and the auxiliary audio signal input of the transmitter will be monitored. The selected channel is displayed on the LCD.
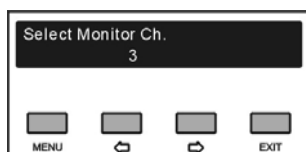
After monitor channel selection, LCD will return to transmitter status interface. The monitor channel is updated to the channel selected at last.
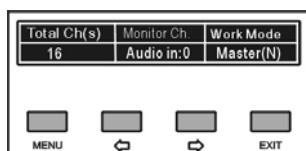
Monitor volume can be adjusted by monitor volume control between -30 dB and 0 dB. Default volume: -15 dB.

Chapter 3. Digital Infrared Radiator

3.1 Overview

This unit accepts carrier signals generated by the transmitter and emits infrared radiation, carrying up to 32 audio distribution channels. Radiators are connected to the HF (BNC) connectors of the IR transmitter. A maximum of 30 radiators, daisy chained connected, can be connected to each of these outputs. HCS-5100T/15S, HCS-5100T/25S, and HCS-5100T/35S use universal power supply and automatically power on/off synchronously with the transmitter.

If the radiator does not receive a carrier, it switches to stand-by state automatically. If the radiator is overheating, it will automatically switch from full power to half power, or from half power to stand-by state.

Types:

HCS-5100T/15S
Multi-channel Digital Infrared Radiator (15 W, 75 Ω)

HCS-5100T/25S
Multi-channel Digital Infrared Radiator (25 W, 75 Ω)

HCS-5100T/35S
Multi-channel Digital Infrared Radiator (35 W, 75 Ω)

3.2 Functions and indications
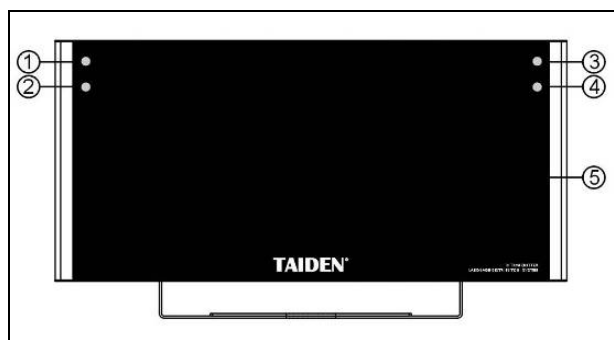
Figure 3.1   Radiator (front)

Figure 3.1:

1. **Power indicator**

2. **Temperature protection indicator**

3. **Input signal indicator**

4. **Fault indicator**

5. **Infrared emission area**
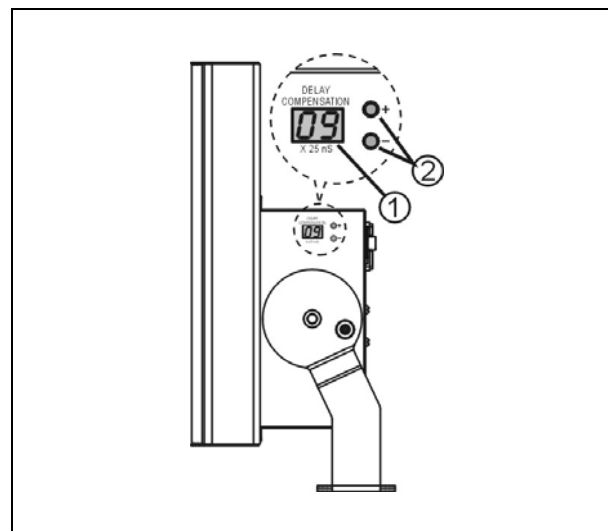
Figure 3.3   Radiator (side face)

Figure 3.3:

1. **Delay compensation indicator**

2. **Delay compensation switch (-/+)**
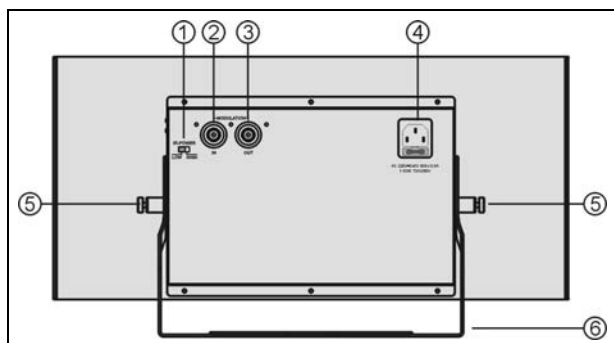
Figure 3.2   Radiator (rear)

Figure 3.2:

1. **Output power switch**

2. **Signal input**

3. **Synchronous output interface**

4. **Power supply**

5. **Angle adjust handle (135°/10 gear)**

6. **Bracket**

3.3 Position planning

For position planning, please read section 1.3 to understand and consider every aspect of infrared distribution.

3.3.1 Rectangular footprints

The determination of the optimal number of infra-red radiators needed to have complete coverage of a conference venue can only be done by performing an on-site test. However, estimation can be done by 'guaranteed rectangular footprints', see figure 3.4 and figure 3.5. The rectangular footprint is smaller than the actual footprint. Figure 3.5 shows a negative 'offset' X because the radiator is currently mounted beyond the horizontal point at which the rectangular footprint starts.
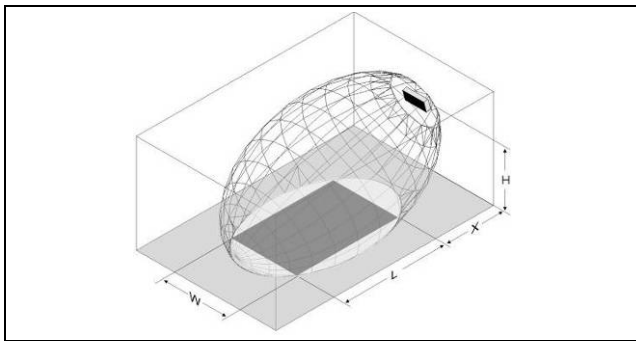
Figure 3.4   A typical rectangular footprint for a mounting angle of 15°
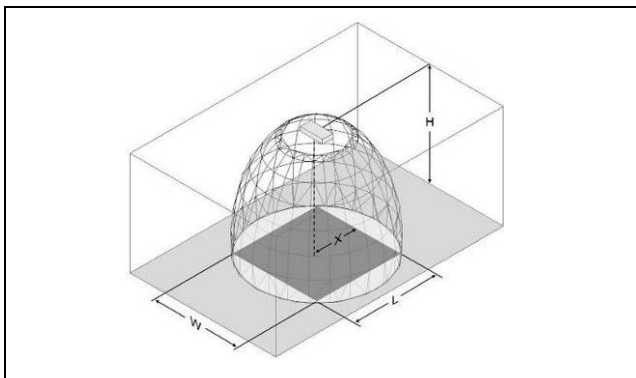
Figure 3.5   A typical rectangular footprint for a mounting angle of 90°

The guaranteed rectangular footprints of various numbers of carriers, mounting heights and mounting angles can be found in section 7.6. The mounting height is the distance to the radiator from the receiver reception level and not from the floor. Usually, the distance from the receiver reception level to the floor is 1 m approximately.

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, they do not take into consideration the beneficial effects of overlapping footprints and reflections (see section 1.3.6).

For up to 4 carriers, experience shows that if the receiver can pick up the signal from adjacent radiators (presumed radiators at a distance W, their rectangular footprints just touching each other seamlessly) the distance W between these radiators can be increased by a factor 1.4 approximately (see figure 3.6).
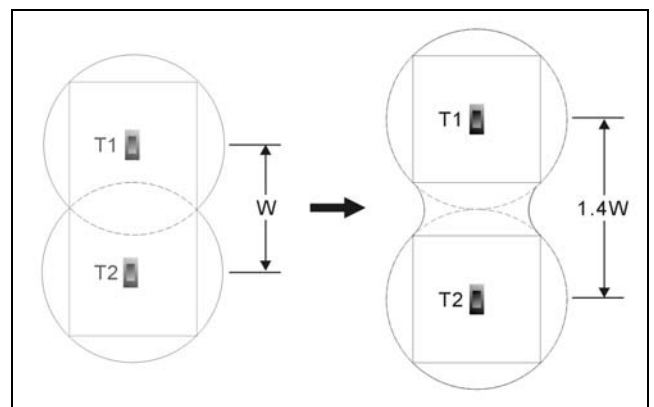
Figure 3.6   The effect of overlapping footprints

3.3.2 Planning radiators

Plan the radiators by following procedure:
1. Decide the positioning of the radiators by the recommendations in section 1.3.
2. Decide the applicable rectangular footprints by consulting the table or calculating with the footprint calculation tool.
3. Draw a picture of the rectangular footprints in the layout of the room.
4. If the receiver can pick up the signals from neighbored radiators in some areas (according to fig. 3.6) determine the overlapping effect and draw the picture of the footprint enlargement in the layout of the room.
5. Check whether it have sufficient coverage with the radiators at the intended positions.
6. If not, add additional radiators.

See figure 1.12 and figure 1.13 for examples of a radiator layout.

3.3.3 Cabling

Signal delay differences can occur because of the differences in the cable length from the transmitter to each radiator. In order to avoid the risk of black spots (see section 1.3.6), use equal cable length from transmitter to radiator if possible (see figure 3.7).
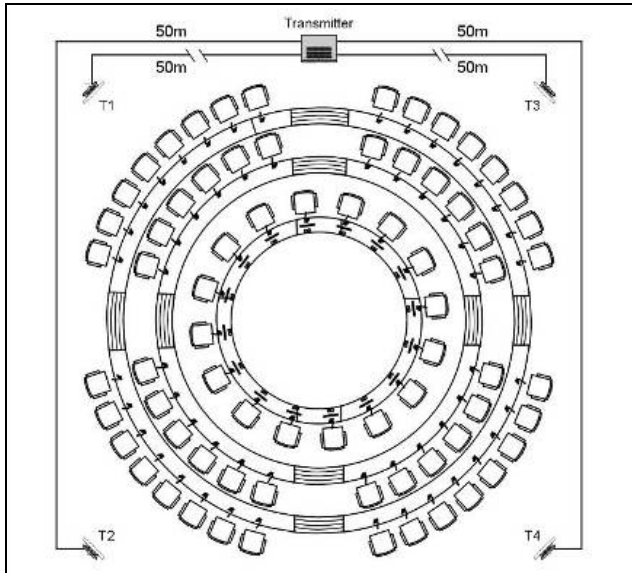
Figure 3.7   Radiators with equal cable length

If radiators are loop-through, the cabling between each radiator and the transmitter should be as symmetrical as possible (see figure 3.8). The differences in cable signal delays can be compensated with the signal delay compensation switches on the radiators.
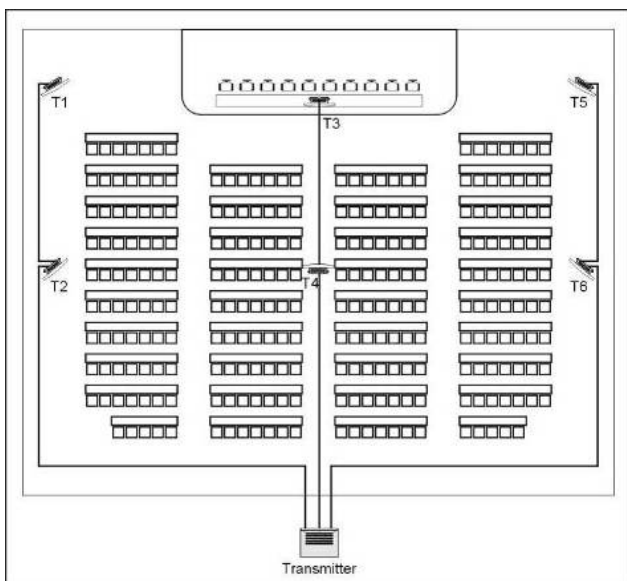
Figure 3.8   Symmetrical arrangement of radiator cabling

3.4 Mounting

The radiator can be permanently installed onto the wall, under a ceiling or a balcony by bracket. The mounting angle can be adjusted for optimal coverage through angle adjust handle.

A separate bracket (HCS-5100TBZJ) is optional for wall mounting and a floor stand can be used for non-permanent installation.

> **Note:**
> ☞ When in operation, the radiators may feel warm. It is normal and does not indicate a radiator fault or malfunction.

> **Warning:**
> ☞ Always make sure that natural airflow is not obstructed by ceilings, walls etc. when determining the position of the radiator. Leave plenty of space around the radiator to prevent overheating.

3.4.1 Mounting on a floor stand

Fix the bracket of the radiator into the top of the floor stand with screw. The bracket is supplied with both metric and inch screw plate and is compatible with most stand floor tripods.
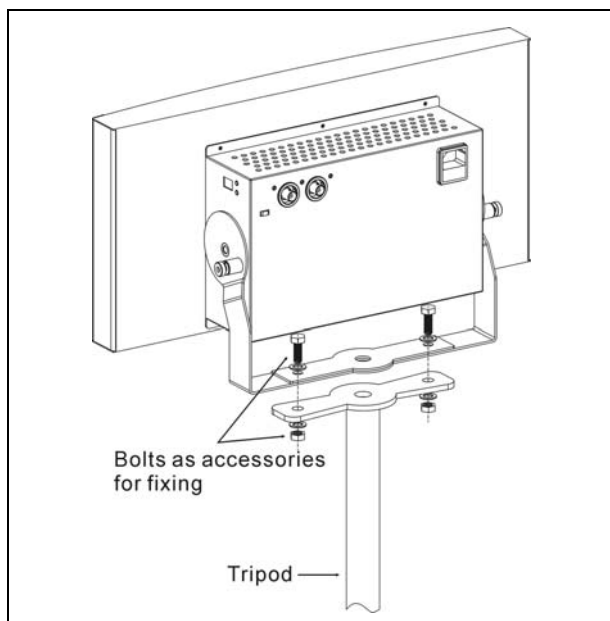
Figure 3.9   Mounting on a tripod

3.4.2 Wall mounting

A separate bracket (HCS-5100TBZJ) is optional for wall mounting (refer to figure 3.10). The bracket can be fixed onto the wall by 4 screws.
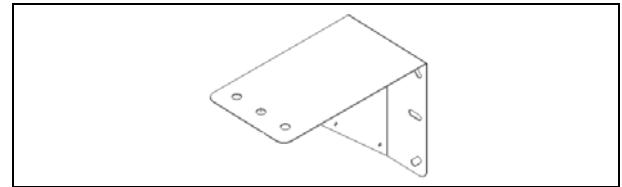
Figure 3.10   HCS-5100TBZJ bracket
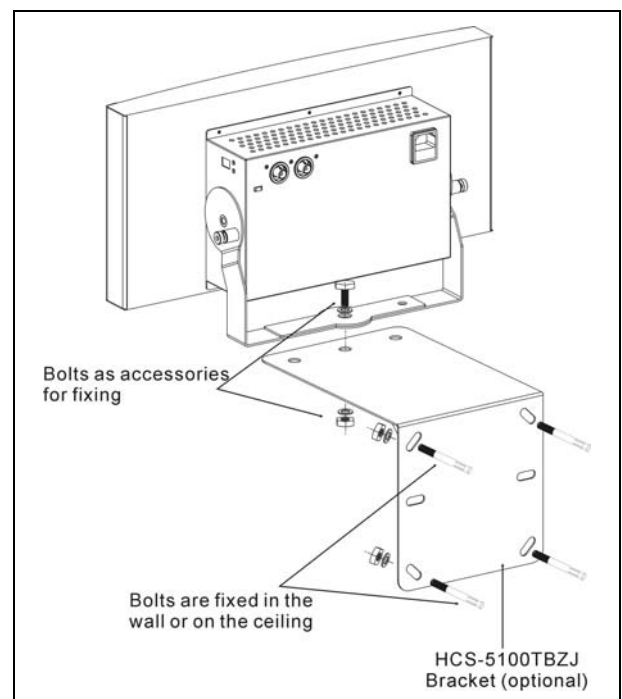
Figure 3.11   Wall mounting 1
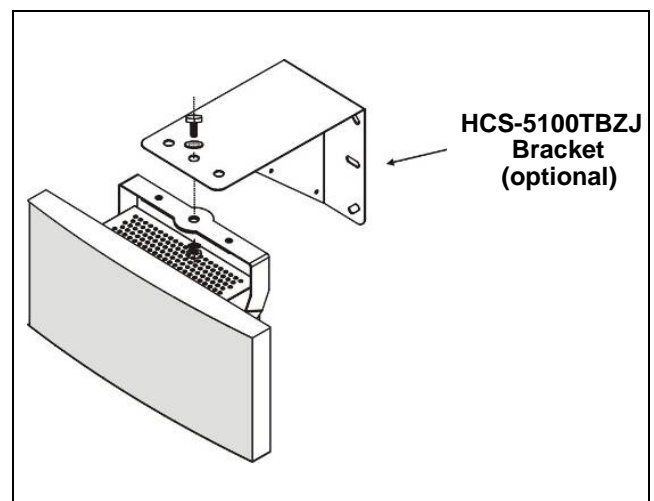
Figure 3.12   Wall mounting 2

Infrared radiator installing on a soft wall (such as plaster):

1. Reinforce the wall on both sides with a wood plate (about 500*500*10mm);
2. Drill holes into the wood plates and the wall according to the position of the fixing holes on the bracket;
3. Fix the wood plates on both sides of the wall with M3 screws; select screw bolts with suitable length (length > A);
4. Fix the bracket onto the wood plate and the wall with screw bolts;
5. Fix the radiator onto the bracket.

If the wall is too weak, use thicker wood plates to reinforce it. The best way to reinforce the wall is fixing the wood plate onto the girder of the wall.
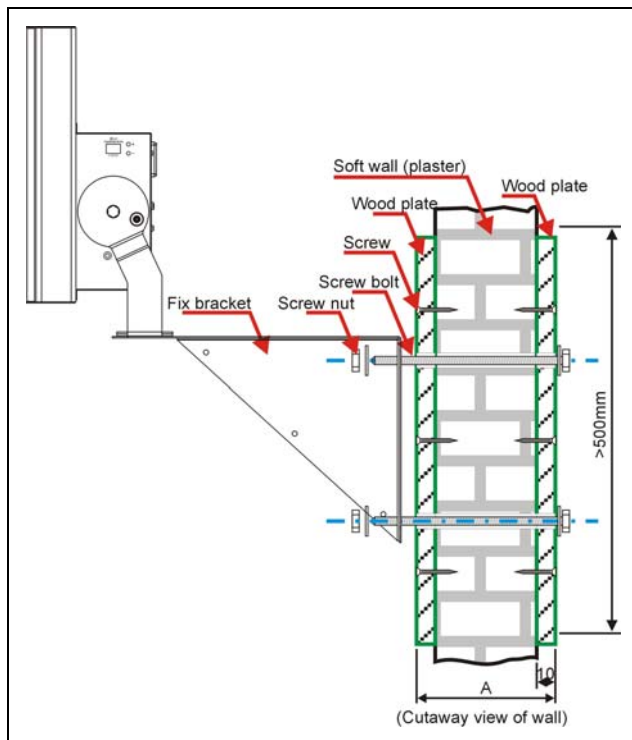
Figure 3.13   Wall mounting 3

3.4.3 Ceiling mounting

The radiator can be fixed to the ceiling by using the built-in bracket. Please make sure to have enough space for a proper air flow around the radiator when selecting ceiling mounting.

In most cases, a ventilator is needed to prevent overheating.
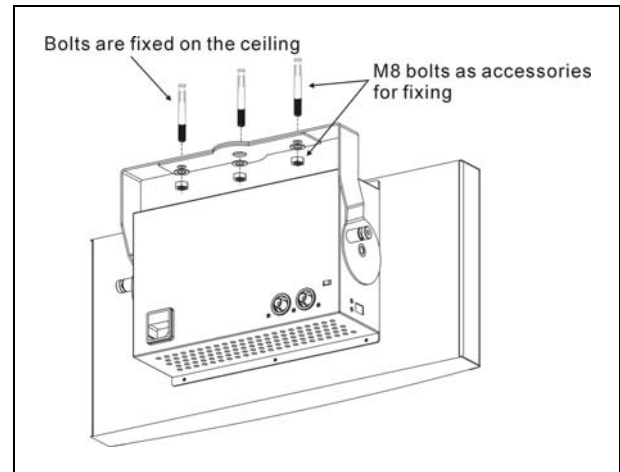
Figure 3.14   Ceiling mounting

3.4.4 Mounting on horizontal surface

If the radiator has to be installed on a horizontal plane (e.g. on the top of an interpreter booth), the distance between the radiator and the plane should be at least 4 cm to ensure enough airflow around the radiator. Normally, this can be achieved by using the built-in bracket as a support. If not, switch the radiator to half power. If the radiator is working at full power on top of an interpreter booth, the ambient temperature should not exceed 35℃.

3.5 Connecting to transmitter

There are six functionally identical HF signal output interfaces on the transmitter. Each one can connect up to 30 radiators (HCS-5100/15S/25S/35S) by daisy chain. The radiators are connected with RG-59 cables. The maximum cable length per output is 900m. Automatic cable termination is achieved by a built-in switch in the BNC connectors on the radiator.

> **Notes:**
>
> ☞ For the automatic cable termination function, do not leave an open-ended cable connected to the last radiator in a loop-through chain.
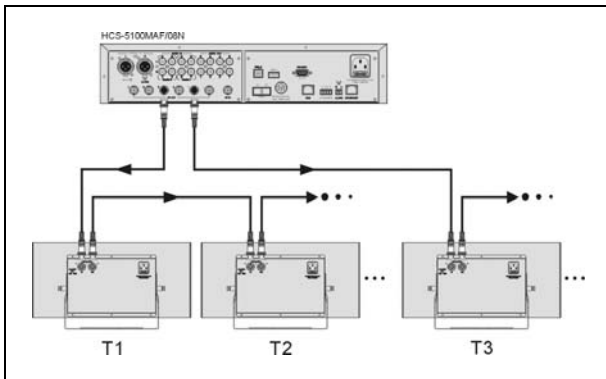
Figure 3.15   Radiators connected by daisy chain

3.6 Output power selection

The radiator can be switched to half power output. This is usually done when full power output is not needed, e.g. when a portable system is used in a small venue. Switch a radiator to half power if an adequate airflow cannot be guaranteed, e.g. if the radiator is mounted on the top of an interpreter booth. Reduce the power as often as possible to save energy and to increase the lifetime of the radiator.

3.7 Setting the radiator delay switches

As described in section 1.3.6, signals picked up by the receiver from two or more radiators can cause black spots due to delay differences.

Signal delays reasons:

- Cable signal delay, caused by the cable transporting the signal from the transmitter to the radiator.
- Radiation signal delay, caused by the air transporting the signal from the radiator to the receiver.
- Transmitter signal delay, caused if two or more transmitters are used in a Bypass configuration.

To compensate the signal delay differences, the delay of each radiator can be increased. Signal delays can be set with the delay switch situated at the side of the radiator. HCS-5100T has a digital display showing the current compensation value. The switch can be adjusted from "00" ("00" means no compensation) to "99". Compensation time is calculated by multiplying 25 ns with the switch set value. Thus compensation time varies between 25ns and 2475 ns.

In most cases the cable signal delays can be calculated manually using in addition the delay switch calculation tool (available on the documentation CD-ROM).

How to calculate the delay switch positions manually for systems with one, two or more transmitters will be described in the next sections. Refer to the delay switch calculation tool for information how to do to get a computed value for the delay switch position.

3.7.1 System with one transmitter

There are no cable signal delays in systems with only one transmitter and radiators directly connected to the transmitter with cables of identical length. The delay switches on all radiators are to be set to zero. Subsequently check whether to compensate for radiation signal delay (see section 3.6.3).

If the cable lengths differ from radiator to radiator, the delay switch parameter can be calculated with the formula:

$$X = \frac{(L_{MAX} - L) \times 5.6}{25}$$

- Take signal delay rate as 5.6 ns/m (value as example for calculation only, real value depends on the cable type used)
- X : delay compensation parameter, displayed on the LCD
- L_{MAX} : maximum cable length in the considered chain. For the most distanced radiator, L_{MAX} and L are identical.
- L : cable length between transmitter and radiator

Use the following procedure to determine the delay switch position based on cable lengths:

1. Measure the cable length L between the transmitter and every single radiator;
2. Determine the maximum cable length L_{MAX};
3. For each radiator calculate the cable length difference value $L_{MAX} - L$;
4. To obtain the cable signal delays for each radiator; multiply the cable length difference of each radiator with the cable signal delay per meter;
5. Divide the calculated signal delay difference by 25. The rounded off figure is the signal delay switch position for the radiator;
6. If applicable, add delay switch positions for radiators under a balcony, (see section 3.7.3);
7. Set the delay switches to the calculated switch positions.

Figure 3.16 and table 3.1 illustrate the calculation of the cable signal delay.
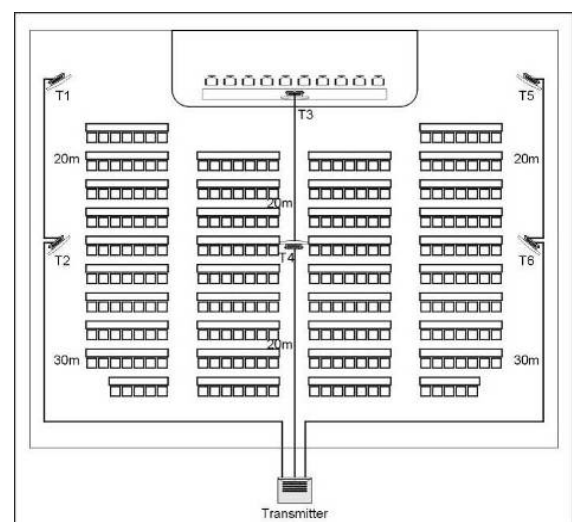
Figure 3.16   System with 6 radiators and measured cable lengths

Table 3.1 Calculation of the cable signal delays

Radiator number	Total cable length L(m)	Cable length difference L$_{MAX}$-L(m)	Cable signal delay per meter (ns/m)	Signal delay difference (ns)	Delay switch position
1	30+20=50*	50 - 50 = 0	5.6	0*5.6 = 0	0/25 = 0
2	30	50 - 30 = 20	5.6	20*5.6 =112	112/25 = 4.48≈4
3	20+20=40	50 - 40 = 10	5.6	10*5.6 = 56	56/25 = 2.24≈2
4	20	50 - 20 = 30	5.6	30*5.6 =168	168/25 = 6.72≈7
5	30+20=50*	50 - 50 = 0	5.6	0*5.6 = 0	0/25 = 0
6	30	50 - 30 = 20	5.6	20*5.6 =112	112/25 = 4.48≈4

* L$_{MAX}$=50 m

Note:

☞ The used cable signal delay per meter is only serving as an example. For your calculation, use the actual signal delay per meter value specified by the cable manufacturer.

3.7.2 System with two or more transmitters in one room

When radiators in one multipurpose room are connected to two transmitters, an extra signal delay is added by:

● Transmission from master transmitter to bypass transmitter (cable signal delay)
● Transmission through the bypass transmitter.

Use the following procedure to determine the delay switch positions in bypass mode:

1. According to the procedures for a system with one transmitter, calculate the cable signal delay for each radiator in Hall-1 and Hall-2;
2. Calculate the signal delay between the master and the bypass transmitter (Table 3.2);
3. Add the master-to-bypass signal delay to each radiator connected to the bypass transmitter in Hall-2;
4. Determine the maximum signal delay;
5. For each radiator calculate the signal delay difference by subtracting the cable signal delay from the maximum signal delay;

6. Divide the signal delay difference by 25. The rounded off number is the signal delay switch position for the radiator;
7. If needed, add delay switch positions to radiators under a balcony (see section 3.7.3);
8. Set the delay switches to the calculated delay switch positions.

Note:

☞ If a master-bypass mode is used for two rooms that are always separated, the delay switch positions can be calculated separately for each system and the delay caused by transmission from master to bypass transmitter can be ignored.

Figure 3.17, table 3.2 and table 3.3 illustrate the calculation of the extra master- bypass signal delay.
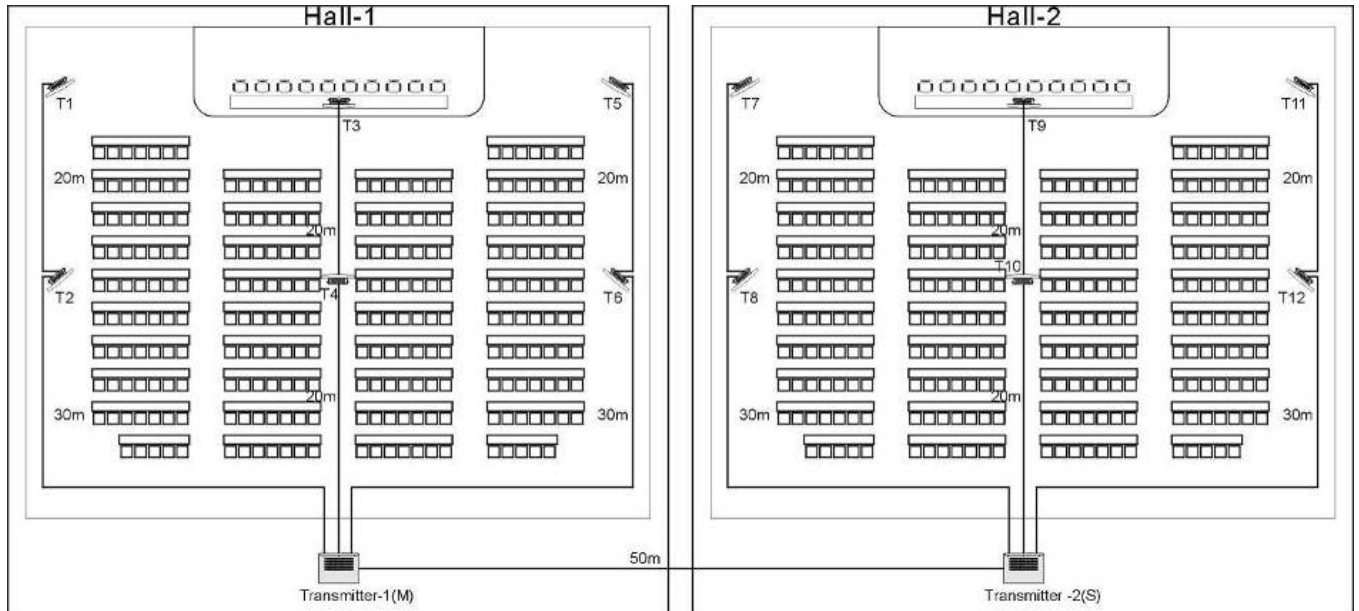
Figure 3.17   System with master and bypass transmitter in multi purpose room

Table 3.2   Calculation of the master-bypass signal delay

Master-bypass transmitter cable length (m)	Cable signal delay per meter (ns/m)	Master-bypass signal delay (ns)
50	5.6	50*5.6 = 280

Table 3.3   Calculation of the delay switch positions of a system with two transmitters

Radiator number	Transmitter	Cable length to transmitter (m)	Cable Signal delay (ns)	Master-bypass signal delay (ns)	Total signal delay (ns)	Signal delay difference (ns)	Delay switch position
Hall-1-T1	"Master"	50	50*5.6 = 280	0	0+280 = 280	560-280 = 280	280/25 = 11.2 ≈ 11
Hall-1-T2	"Master"	30	30*5.6 = 168	0	0+168 = 168	560-168 = 392	392/25 = 15.68 ≈ 16
Hall-1-T3	"Master"	40	40*5.6 = 224	0	0+224 = 224	560-224 = 336	336/25 = 13.44 ≈ 13
Hall-1-T4	"Master"	20	10*5.6 = 112	0	0+112 = 112	560-112 = 448	448/25 =17.92 ≈ 18
Hall-1-T5	"Master"	50	50*5.6 = 280	0	0+280 = 280	560-280 = 280	280/25 = 11.2 ≈ 11
Hall-1-T6	"Master"	30	30*5.6 = 168	0	0+168 = 168	560-168 = 392	392/25 = 15.68 ≈ 16
Hall-2-T1	"Bypass"	50	50*5.6 = 280	280	280+280 = 560*	560-560 = 0	0/25 = 0
Hall-2-T2	"Bypass"	30	30*5.6 = 168	280	280+168 = 448	560-448 =112	112/25 = 4.48 ≈ 4
Hall-2-T3	"Bypass"	40	40*5.6 = 224	280	280+224 = 504	560-504 = 56	56 /25 = 2.24 ≈ 2
Hall-2-T4	"Bypass"	20	10*5.6 = 112	280	280+112 = 392	560-392 = 168	168/25 = 6.72 ≈ 7
Hall-2-T5	"Bypass"	50	50*5.6 = 280	280	280+280 = 560*	560-560 = 0	0/25 = 0
Hall-2-T6	"Bypass"	30	30*5.6 = 168	280	280+168 = 448	560-448 = 112	112/25 = 4.48 ≈ 4

* The maximum signal delay is 560 ns

3.7.3 System with more than 4 carriers and a radiator under a balcony
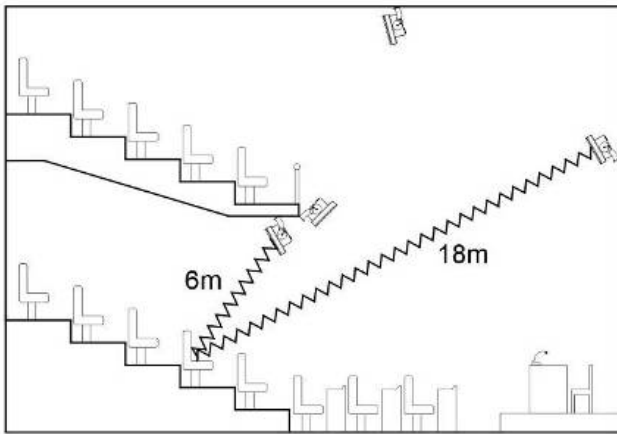
Figure 3.18   Radiation path length difference for two radiators

Figure 3.18 shows a radiation signal delay which needs to be compensated. For a system with more than four carriers, add one delay switch position per 8 meters difference in signal path length to the radiators that are closest to the overlapping coverage area. In figure 3.18 the signal path length difference is 12 meter. Add one delay switch position to the switch position(s) for the radiator(s) under the balcony.

3.7.4 System that mixes TAIDEN radiator with other brand compatible radiator

The radiators in above-mentioned systems are all **TAIDEN** HCS-5100T. The delay of electric input to light output of this radiator is 360 ns.

Other brands on the market have a higher electric input to light output delay - for example 760 ns which means a 400 ns higher delay compared to **TAIDEN** HCS-5100T (equivalent to the delay caused by about 71 m of cable, i.e.16 steps of delay switch position).

The reason for these delay differences is due to the use of different AD converters.

If in a system **TAIDEN** HCS-5100T radiators are mixed with radiators of other brands mixed, the differences in delay of electric input to light output must be taken into consideration.

Chapter 4. Digital Infrared Receiver

4.1 Overview

HCS-5100R/RA is a series of Digital Infrared Receivers, which can receive up to 32 language channels. Both rechargeable Ni-HM battery and disposable battery can be used. The receiver is equipped with channel selector, volume control, power switch, Ø 3.5 mm stereo earphone jack, and charging circuit on the PCB. A LCD displays channel number with language name, received signal intensity, battery capacity and volume.

Types:

HCS-5100R/04/08/16/32

4, 8, 16, 32 CHs Digital Infrared Receiver (LCD, language display, optional rechargeable battery pack or 2xAA alkaline cells)

HCS-5100RA/04/08/16/32

4, 8, 16, 32 CHs Digital Infrared Receiver (LCD, language display, 2xAA alkaline cells)

4.2 Functions and indications
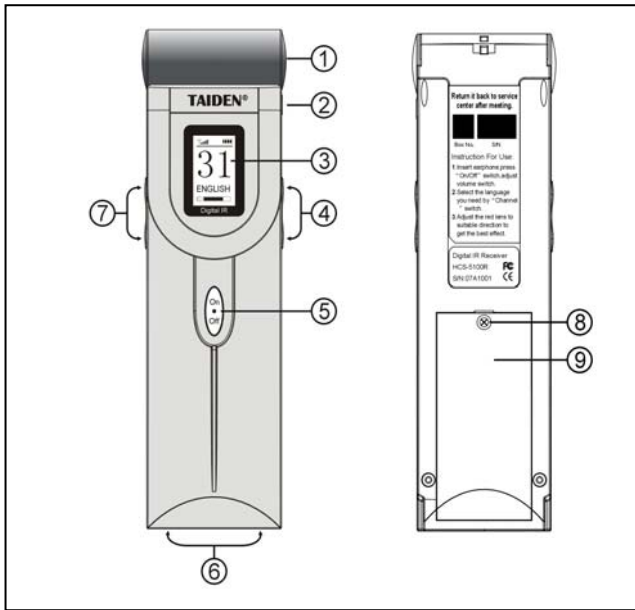
Figure 4.1   HCS-5100R/RA receiver

Note:
☞   When the receiver is not used, please disconnect the earphone. This ensures that the receiver is totally switched-off and no energy is consumed from the batteries or the battery pack.

Figure 4.1:

1. **Infrared red filtering glass**
   - For receiving IR signal
2. **Earphone jack**
   - Ø 3.5 mm jack for stereo monitor earphone
3. **LCD**
   - Displays channel number, language, battery capacity, signal intensity and volume
4. **Channel selector**
   - An up/down switch to select the audio channel. The channel number and the language name will be displayed on the LCD.
5. **Power switch**
   - When the earphone is plugged in, the receiver changes to stand-by status. Press the power switch to switch on the receiver. Press and hold for 2 s will return to stand-by status
6. **Charging contacts**
   - Used for charging
7. **Volume control**
   - An up/down switch to adjust the volume, the volume will be displayed on the LCD
8. **Screw to fix the battery cover**
9. **Battery pack or disposable batteries**

4.3 Operation

The receiver only works when an earphone is connected and the receiver switches to stand-by state. Push shortly on the power switch button to switch on the receiver. The channel number is shown on the LCD. The channel can be changed with the channel selector. The channel number is in accordance with the channel configuration set up in the transmitter (see section 2.6.2).

When working, the battery icon and the antenna icon will be displayed on the LCD to indicate the current battery and signal status. A battery symbol "⊏▭" is visible on the display when the batteries or the battery pack is almost empty and needs recharging, but it still might work for 7-8 hours. When the signal is interrupted for a short time, the receiver mutes the earphones output. If the IR receiver does not get an adequate IR signal for more than 1 minute (e.g. when a delegate leaves the conference room), the receiver switches to stand-by state automatically.

The volume can be adjusted and displayed on the LCD.

To switch the receiver manually to stand-by mode, simply press and hold the on/off button for more than 2 seconds. If the earphone is disconnected, the receiver is switched off automatically.

The infrared receivers are operable either with disposable batteries (2xAA alkaline cells) or with a rechargeable battery pack (HCS-5100BAT-16).

Install the batteries or the battery pack with the correct polarity, as indicated in the battery compartment. A separate connection cable is required if a battery pack is used. The charging circuitry will not work if this cable is missing, preventing thus also charging of disposable batteries by mistake. The battery pack is equipped with a temperature sensor to prevent overheating during charging.

For more details about charging the battery pack please refer to chapter 5.

> **Note:**
>
> ☞ At the end of their technical lives both disposable batteries and battery packs should be discarded according to ecological standards, preferably at your nearest recycling station.

4.4 Testing the coverage area

4.4.1 Reception test mode

The receivers can be switched to test-mode to indicate the reception quality for every carrier.

To activate the test-mode: Push the "+" button of the channel selector, and press the power switch button. A quality indication (00-99) will be displayed on the LCD. Larger value stands for better signal reception.

The test mode is deactivated when the receiver is switched off.

4.4.2 Testing the coverage area

To make sure that the whole area is covered with adequate IR radiation and avoiding thus black spots, an extended reception quality test should be done. The test can be done in two ways:

Testing during installation

1. Check that all radiators are connected and powered up;
2. Set the transmitter in the Test-mode (see section 2.6.9). For each channel, a test tone frequency will be transmitted;
3. Set a receiver to the highest available channel and listen to the received signal through the headphones;
4. Test all positions and directions (see next paragraph).

Testing during a meeting

1. Set a receiver in the Test-mode. The quality of the received carrier signal is indicated on the display of the receiver (see section 4.4.1).
2. Test all positions and directions (see next paragraph). The higher the value, the better the signal.

Testing all positions and directions

Walk around the conference venue under the test mode of the transmitter or the receivery; test every position where the signal must be received. If an area is detected as having bad reception or even no reception at all, two main causes should be taken into consideration:

■ **Bad coverage**

The receiver cannot pick-up adequate infrared radiation. This may be because the tested position is out of the footprint of the installed radiators or the radiation is blocked by obstacles such as a column, an overhanging balcony or other large objects.

Check whether you used the correct footprints for the system design or not. Check if the radiators used have a) sufficient output power and b) are not switched to half power operation by mistake. If bad reception is caused by a blocked radiation path, try to remove the blocking obstacle or add an extra radiator to cover the shaded area with more IR energy.

■ **Black spots**

IR signals coming from two radiators may cancel out each other (multipath effect) when reaching the receiver. Bad reception only happens on some special path. Multipath effect is confirmed being the cause of bad reception if the bad signal received by the receiver is improving the instant a radiator is a) changing the direction of the receiver b) shaded-off or simply switched-off. IR radiation, reflected from a surface with a high reflectivity may also cause multipath effect.

Check that the signal delay compensation switches on the radiators are set to the correct value. Check the system design. If necessary, reduce the distance between the two radiators that cause the problem and/or add an extra radiator.

Please note that due to the physical characteristics of the signal distribution, it is not possible to avoid multipath effects completely.

4.5 Earphones

The earphones are connected to the receivers via an Ø 3.5 mm stereo jack. Suitable earphone types include:

● **EP-820AS earphone**

● **EP-820BS earphone**

● **EP-920BS earbuds**

● **HCS-5100PA headphone**

● HCS-5100PB **headphone**
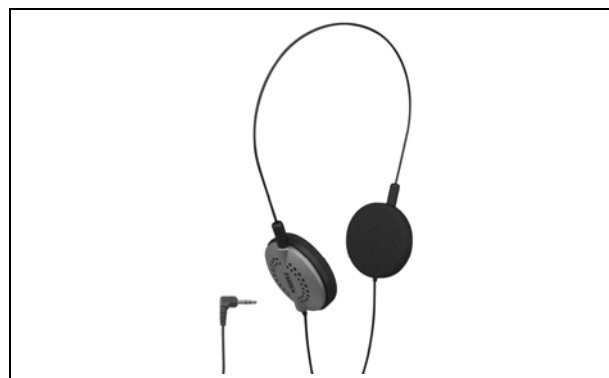
● Any other compatible type (see chapter 7, Technical Data).

4.6 Ni-MH Rechargeable Battery Pack

● HCS-5100BAT-16 Ni-MH rechargeable battery pack

Chapter 5. Charging Case and Storage case

5.1 Charging case

5.1.1 Overview

The charging Case can charge up to 60 receivers at once. It uses universal power supply with automatic voltage matching. There is a charging indicator on the receiver. The charging circuit will check if the battery pack is present and control the charging process.

> **Note:**
> ☞ The Charging Case is only used to charge HCS-5100R with battery pack HCS-5100BAT-16. Please do not charge other receiver types with HCS-5100CHG/60 or charge HCS-5100R with other charging unit.
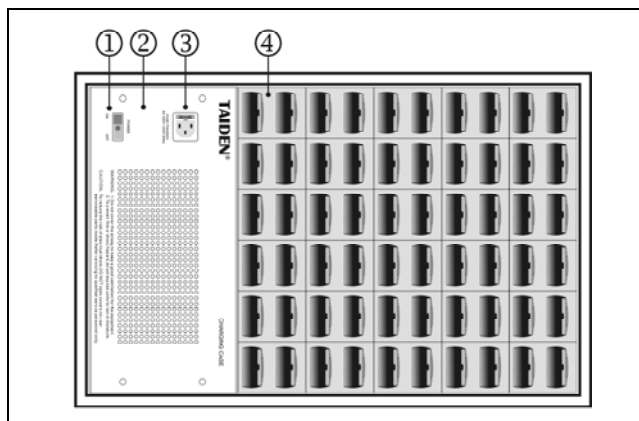
Figure 5.1   HCS-5100CHG/60 Charging Case

Figure 5.1:

1. **Power switch**
   - Just switches on/off power for charging lattice. Does not switch power input and power output
2. **Power output**
   - Not switchable by power switch
3. **Power input**
   - Not switchable by power switch
4. **Charging lattice**

5.1.2 Charging procedure

1. Connect power cord;
2. Switch on;
3. Insert receiver;
4. Receiver charging indicator lights up.

LED Status	Charging Status
On	Charging completed
Blinking	Charging
Off	Charger power off or receiver not inserted properly.

> **Note:**
> ☞ Pull out the earphone before charging the receiver.
> ☞ Switch on the charger before inserting the receiver. Inserting and removing the receiver when the charger is powered on will not damage the receiver.
> ☞ To maintain the service life of the Ni-MH battery, please charge it for 24 hours before first service (until the charging indicator keeps lighting).
> ☞ The charger supplies fast charge during the first 10 minutes after inserting the receiver. So please do not frequently insert and remove the receiver to protect the battery pack.
> ☞ Continuously charging will not damage the receiver or the battery pack.
> ☞ It will result in low battery and may damage the battery pack if the battery pack is not used for a long time. Please fully charge the battery every three months.
> ☞ Please check the battery pack regularly every 3 years whether the battery pack is leaking or not. If any leakage or corrosion is detected, please replace the battery pack. Please use HCS-5100BAT-16 only. The battery pack should be replaced at least every 5 years.

5.2 Storage case

HCS-5100KS storage case is used to store and to transport IR receivers (HCS-5100R/RA). It can contain 100 receivers in 1 storage case.

Figure 5.2   HCS-5100KS storage case

Chapter 6. Fault diagnosis

Some simple trouble-shooting instructions are provided in this chapter. If more serious faults arise, please contact a qualified technician.

Fault	Solution
Transmitter display does not light up	✧ Confirm that transmitter power cord is connected correctly and the power is switched on.
Emergency does not work	✧ Confirm that the emergency is connected correctly. ✧ Confirm that "Playing music" is stopped.
Radiator power light does not light up	✧ Confirm that radiator power cord is connected correctly.
Radiator input indicator does not light up	✧ Confirm that the radiator input/output cable is connected correctly.
Receiver does not work properly	✧ If dry batteries are used, please make sure that the batteries have sufficient capacity and are assembled properly. ✧ If rechargeable batteries are used, please make sure that the batteries are fully charged. ✧ Confirm that the earphone is connected correctly. ✧ Switch on the receiver and confirm that the channel indicator works properly. ✧ Make sure that the receiver picks up sufficient IR signal and check the antenna signal intensity indicator. ✧ Check the receiver by taking it in front of the mini radiator of the transmitter front panel. ✧ Make sure that the volume is turned up. ✧ Set the transmitter to test mode and check if the test tone is audible from the receiver. ✧ If all receivers do not work properly at this spot, testing the coverage area as 4.4.
Receiver sound with distortion	✧ Adjust the distance between receiver and radiator (commonly needs to be over 5 meters)
Receiver sound with noise	✧ Adjust the receiving distance. ✧ Adjust the receiving direction. ✧ Switch radiator to full output.
The charging indicator of the receiver does not light up	✧ Confirm that the Charging Case is working under proper conditions (see technical data). ✧ Confirm that the receiver battery pack is connected correctly. ✧ Confirm that the receiver is at normal temperature. ✧ If the charging indicator still does not light up, please replace the battery pack.
Receiver discharges quickly	✧ Replace the rechargeable battery.
Bad signal coverage effect	✧ Testing the coverage area as 4.4.

Chapter 7. Technical data

7.1 System specification

System performance

Conforms to IEC 60914, the international standard for conference systems

Conforms to IEC 61603-7, the international standard for digital infra-red transmission of audio signals for conference and similar applications

Transmission characteristics

IR transmission wavelength	870 nm
Protocol and modulation	DQPSK, according to IEC 61603-7
Modulation frequency	Carriers 0 to 5: 2 to 6 MHz, according to IEC 61603-7
	Carriers 6 and 7: up to 8 MHz

Band allocation:

System audio performance

(Measured from the audio input of an HCS-5100M transmitter to the headphone output of an HCS-5100R receiver.)

Audio frequency response	20 Hz to 10 kHz (-3 dB) at Standard Quality
	20 Hz to 20 kHz (-3 dB) at Perfect Quality
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 per HF output

System environmental conditions

Working conditions	Fixed/stationary/transportable
Temperature range	
- Transport	-40 °C to +70 °C
- Operating	0 °C to +45 °C
Max. Relative humidity	< 95%
Safety	Compliant to EN 60065
EMC emission	Compliant to EN 61000-6-3, EN 55022
EMC immunity	Compliant to EN 61000-4-3
EMC approvals	CE, FCC
Static resistance	Compliant to EN 61000-4-2
Power harmonic	Compliant to EN 61000-3-2
Surge resistance	Compliant to EN61000-4-5
EFT test	Compliant to EN61000-4-4
Transient power-off test	Compliant to EN61000-4-11

7.2 Infrared transmitters

Physical characteristics

Mounting	Brackets for 19" rack mounting or fixing to a table top
	Detachable feet for free-standing use on a table top
Dimensions (H×W×D)	430 × 325× 99 mm
Weight	7.5 kg
Color	White

Electrical characteristics

Unbalanced audio inputs	-12 to +12 dBV nominal
Balanced audio inputs	-6 to +18 dBV nominal
Emergency switch connector	Emergency control input
Headphone output	32 Ohm to 2k Ohm
HF input	Nominal 1 Vpp, minimum 10 mVpp, 50 Ohm
HF output	1 Vpp, 6 VDC, 50 Ohm
Mains voltage	110 to 260 V, 50 to 60 Hz
Power consumption	Maximal 55 W
Power consumption (standby)	29 W

7.3 Radiators and accessories

7.3.1 Radiators (HCS-5100T)

Physical characteristics

Mounting	Suspension bracket for direct ceiling mounting
	Mounting plates for floor stands
	Wall mounting bracket HCS-5100TBZJ can be used for fixing radiator to wall surfaces
Dimensions (H×W×D, without bracket):	
-HCS-5100/15S/25S	450×245×145 mm
-HCS-5100/35S	500×305×145 mm
Weight (without bracket):	
-HCS-5100/15S/25S	5 kg
-HCS-5100/35S	6.5 kg
Color	Red

Electrical and optical characteristics

Angle of half intensity	±22°
HF input	Nominal 1Vpp, minimal 10 mVpp, 50 Ohm
HF output	1 Vpp, 6 VDC, 50 Ohm
Mains voltage	110/220 V, 50 to 60 Hz
Power consumption	35 W (HCS-5100/15S)
	75 W (HCS-5100/25S)
	150 W (HCS-5100/35S)
Power consumption (standby)	8 W

7.3.2 Wall mounting bracket (HCS-5100TBZJ)

Physical characteristics

Dimensions (H×W×D)	200×285×203 mm
Weight	1.55 kg
Color	Silver gray

7.4 Receiver, Earphones, Battery Pack, Charging Case and Storage Case

7.4.1 Receiver (HCS-5100R/RA)

Physical characteristics

Dimensions (H×W×D)	155×46×24 mm
Weight	80 g (excl. batteries/battery pack)
	135 g (incl. batteries/battery pack)
Color	Black

Electrical and optical characteristics

IR irradiance level	4 mW/m2 per carrier
Angle of sensitivity	270°
Headphone output level at 2.4V	450 mVrms (speech at maximum volume, 32 Ohm headphone)
Headphone output freq. 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	
- normal(at 2.4 V)	38 mA (32 Ohm headphone)
- unplug headphone jack	0 mA
Battery life	
-2×AA alkaline cells	70 h
-rechargeable battery pack	52 h

7.4.2 Earphones

- **EP-820AS Single Earphone**
- Used with the receiver/conference unit
- Hi-Fi sound quality
- Ø 3.5 mm stereo plug
- 32 Ω (Tip and Sleeve, Ring: NC)
- Frequency response: 50 Hz to 20 kHz
- Sensitivity: ≥102 dBA/1 mW

- **EP-820BS Single Earphone**
- Used with the receiver/conference unit
- Hi-Fi sound quality
- Ø 3.5 mm stereo plug
- 32 Ω (Tip and Sleeve, Ring: NC)
- Frequency response: 20 Hz to 20 kHz
- Sensitivity: ≥108 dBA/1 mW

- **EP-920BS Earbuds**
- Used with the receiver/conference unit
- Hi-Fi sound quality
- 16 Ohm×2, Ø 3.5 mm stereo plug
- Frequency response: 50 Hz to 20 kHz
- Sensitivity: ≥108 dBA/1 mW

- **HCS-5100PA/PB headphone**
- Used with the receiver/conference unit
- Hi-Fi sound quality
- 32 Ohm×2, Ø 3.5 mm stereo jack
- Frequency response: 20 Hz to 20 kHz
- Sensitivity: ≥108 dBA/1 mW

7.4.3 Ni-MH Rechargeable Battery Pack (HCS-5100BAT-16)

Physical characteristics

Dimensions (H×W×D)	49×29×14.5 mm
Weight	55 g

Electrical characteristics

Voltage	2.4 V
Capacity	2000 mAh

7.4.4 Charging Case (HCS-5100CHG/60)

Physical characteristics

Dimensions (H×W×D)	516×386×240 mm
Weight	12.3 kg
Color	Blue

Electrical characteristics

Mains voltage	AC 110 V /220 V
Power consumption	280 W (60 receivers charging)
Power consumption (standby)	7 W (no receiver in charging unit)

7.4.5 Storage Case (HCS-5100KS)

Physical characteristics

Dimensions (H×W×D)	669×307×205 mm
Weight	6 kg (excl. receivers)
	14kg (incl. 100 receivers, excl. batteries)
Color	Blue

7.5 Connection details

7.5.1 Mains cables

Blue	Neutral
Brown	Live
Green/Yellow	Earth/Ground

7.5.2 Audio cables

3-pole XLR connector (female)

Pin 1	Earth
Pin 2	Signal +
Pin 3	Signal -
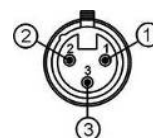
Chinch connector (male)

Pin 1	Signal +
Pin 2	GND

7.5.3 Earphones

3.5 mm Jack plug

Tip (1)	Signal left
Ring (2)	Signal Right
Sleeve (3)	Electrical earth/screen
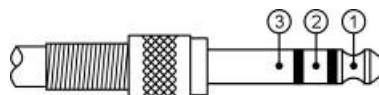
7.5.4 Emergency switch

Terminal block

Connect the emergency switch to +, -.

ALARM

7.6 Guaranteed rectangular footprints

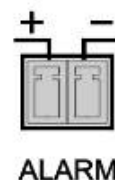| N0. of carriers	Mounting height H(m)	Mounting angle	HCS-5100T/15S				HCS-5100T/25S				HCS-5100T/35S			
			Area $A(m^2)$	Length L(m)	Width W(m)	Offset X(m)	Area $A(m^2)$	Length L(m)	Width W(m)	Offset X(m)	Area $A(m^2)$	Length L(m)	Width W(m)	Offset X(m)
1	2.5	0	242	22	11	4	648	36	18	6	1274	49	26	10
	5	15	220	20	11	4	646	34	19	6	1242	46	27	10
		30	170	17	10	3	493	29	17	4	936	39	24	6
		45	108	12	9	1	300	20	15	2	594	27	22	3
		60	72	9	8	0	195	15	13	0	399	21	19	0
		90	49	7	7	-3.5	121	11	11	-5.5	225	15	15	-7.5
	10	15	220	20	11	6	612	34	18	8	1196	46	26	13
		30	209	19	11	3	576	32	18	5	1118	43	26	7
		45	150	15	10	1	425	25	17	2	816	34	24	3
		60	120	12	10	-1	320	20	16	-1	621	27	23	-1
		90	81	9	9	-4.5	225	15	15	-7.5	400	20	20	-10
	25	30	160	16	10	8	416	26	16	12	828	36	23	19
		45	135	15	9	4	375	25	15	6	748	34	22	10
		60	165	15	11	1	432	24	18	1	858	33	26	1
		90	100	10	10	-5	289	17	17	-8.5	552	23	24	-12
2	2.5	15	120	15	8	3	312	24	13	4	627	33	19	6
	5	15	120	15	8	3	325	25	13	5	646	34	19	7
		30	91	13	7	2	252	21	12	3	504	28	18	4
		45	63	9	7	1	165	15	11	1	336	21	16	1
		60	48	8	6	-1	130	13	10	-1	270	18	15	-1
		90	36	6	6	-3	100	10	10	-5	182	14	13	-6.5
	10	30	104	13	8	4	273	21	13	5	532	28	19	9
		45	84	12	7	1	240	20	12	2	486	27	18	3
		60	70	10	7	-1	204	17	12	-1	396	22	18	-1
		90	49	7	7	-3.5	121	11	11	-5.5	240	15	16	-8
	25	60	70	10	7	2	204	17	12	3	396	22	18	4
		90	64	8	8	-4	169	13	13	-5	342	18	19	-9.5
4	2.5	15	66	11	6	2	180	18	10	3	312	24	13	4
	5	15	55	11	5	3	162	18	9	4	288	24	12	6
		30	54	9	6	2	150	15	10	3	273	21	13	4
		45	35	7	5	1	108	12	9	1	192	16	12	1
		60	35	7	5	-1	99	11	9	-1	180	15	12	-1
		90	25	5	5	-2.5	64	8	8	-4	121	11	11	-5.5
	10	45	48	8	6	2	130	13	10	3	234	18	13	4
		60	40	8	5	0	117	13	9	0	216	18	12	0
		90	36	6	6	-3	100	10	10	-5	182	14	13	-6.5
	25	90	25	5	5	-2.5	64	8	8	-4	121	11	11	-7
8	2.5	15	32	8	4	1	91	13	7	2	162	18	9	3
	5	15	21	7	3	3	66	11	6	4	120	15	8	6
		30	28	7	4	2	77	11	7	3	135	15	9	4
		45	24	6	4	1	70	10	7	1	117	13	9	1
		60	20	5	4	0	56	8	7	0	90	10	9	0
		90	12	4	3	-1.5	36	6	6	-3	64	8	8	-4
	10	60	20	5	4	1	56	8	7	2	90	10	9	3
		90	16	4	4	-2	49	7	7	-3.5	81	9	9	-4.5

(The mounting height is the distance from the reception level and not from the floor).

7.7 Display language list

No.	Chinese	English	Abbr.	No.	Chinese	English	Abbr.	No.	Chinese	English	Abbr.
1	原声	Floor	Flo	33	阿塞拜疆语	Azerbaijani	AZE	65	加利西亚语	Galician	GAL
2	阿尔巴尼亚	Albanian	ALB	34	巴利语	Balinese	BAN	66	古吉特语	Gujarati	GJT
3	阿拉伯语	Arabic	ARA	35	孟加拉国语	Bengali	BEN	67	夏威夷语	Hawaiian	HAW
4	保加利亚语	Bulgarian	BUL	36	缅甸语	Burmese	BUR	68	坎那达语	Kannada	KAN
5	加泰罗利亚	Catalan	CAT	37	白俄罗斯语	By_russian	BEL	69	克什米尔语	Kashmiri	KAM
6	汉语	Chinese	CHI	38	科西嘉语	Corsican	COS	70	哈萨克语	Kazakh	KAZ
7	捷克语	Czech	CZE	39	爱尔兰语	Irish	IRI	71	柬埔寨语	Cambodian	CAM
8	丹麦语	Danish	DAN	40	哈萨克语	Kazakh	KAZ	72	库尔德语	Kurdish	KUR
9	荷兰语	Dutch	DU	41	吉尔吉斯语	Kirghiz	KIR	73	马拉雅拉姆	Malayalam	MLM
10	英语	English	ENG	42	老挝语	Lao	LAO	74	马拉地语	Marathi	MRA
11	芬兰语	Finnish	FIN	43	蒙古语	Mongolian	MON	75	摩尔多瓦语	Moldovan	MLD
12	法语	French	FR	44	尼泊尔语	Nepali	NEP	76	恩德贝勒语	Ndebele	NEB
13	德语	German	GER	45	塔吉克语	Tajik	TGK	77	奥里亚语	Oriya	ORY
14	希腊语	Greek	GRE	46	泰国语	Thai	THA	78	旁遮普语	Panjabi	PJB
15	希伯莱语	Hebrew	HEB	47	藏语	Tibetan	TIB	79	罗曼什语	Romansh	RMS
16	匈亚利	Hungarian	HUN	48	土库曼斯坦	Turkmen	TUK	80	梵文	Sanskrit	SKT
17	印度尼西亚	Indonesian	IND	49	乌克兰语	Ukrainian	UKR	81	信德语	Sindhi	SID
18	意大利语	Italian	ITA	50	越南语	Vietnamese	VIE	82	僧加罗语	Sinhalese	SIH
19	日语	Japanese	JAP	51	粤语	Cantonese	CAN	83	梭托语	Sotho	SOT
20	韩国语	Korean	KOR	52	克罗地亚语	Croatian	CRO	84	斯瓦西里语	Swahili	SWA
21	马来语	Malay	MAL	53	斯洛伐克	Slovac	SLO	85	泰米尔语	Tamil	TAM
22	挪威语	Norwegian	NOR	54	斯洛文尼亚	Slovenian	SLV	86	泰卢固语	Telugu	TEL
23	波斯语	Persian	PER	55	爱沙尼亚	Estonian	EST	87	茨瓦纳语	Tswana	TSW
24	波兰语	Polish	POL	56	拉脱维亚	Latvian	LAT	88	乌尔都语	Urdu	URDU
25	葡萄牙语	Portuguese	POR	57	立陶宛	Lithuanian	LIT	89	威尔士语	Welsh	WELSH
26	罗马尼亚语	Romanian	ROU	58	乔治亚语	Georgian	GEO	90	班图语	Bantu	BANTU
27	俄语	Russian	RUS	59	冰岛语	Iceland	ICE	91	祖鲁语	Zulu	ZUL
28	塞尔维亚语	Serbian	SER	60	阿萨姆语	Assamese	ASM	92	壮族语	Zhuang	ZHU
29	西班牙语	Spanish	SPA	61	巴斯克语	Basque	BSQ	93	傣族语	Dai	DAI
30	瑞典语	Swedish	SWE	62	达里语	Dari	DAR	94	维吾尔语	Uygur	UYG
31	土耳其语	Turkish	TUR	63	宗卡语	Dzongkha	DZK	95	音乐	Music	MUS
32	亚美利亚语	Armenian	ARM	64	菲律宾语	Filipino	FLP	96	未知语种	unknown	---

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