Close Talk Central Unit

User Manual

Part Number: 60-00-9999
Revision: 1.04

Revision History:

Rev. 1.00
First public release. Applies to Central Unit program version 2.01 or later.

Rev. 1.01
Minor corrections.

Rev. 1.02
Minor corrections.

Rev. 1.03
Minor corrections.

Rev. 1.04
Minor corrections.

Table Of Contents

Rev. 1.04

Section 1

Introduction

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Welcome!

Thank you for purchasing the Close Talk Conference System. The design philosophy was to make a revolutionary product in both design and productivity, providing a powerful conference tool. We hope it will provide a long time of good use.

About this manual

The manual is divided into several sections, each focusing on a specific topic:

- **Introduction**
  This section
- **Exterior**
  A brief description of the unit exterior
- **Using the front panel**
  Tutorial for using the front panel
- **Menu structure**
  An overview of the menu structure
- **Settings and functions**
  Detailed description of the unit settings
- **System description**
  Conference system and system component's functional description
- **Specifications**
  Central Unit specifications

Support

Sales questions and support issues should be directed to your local dealer.

If you have a specific problem, please check at www.closetalk.se for soft- and firmware updates before contacting support. Updates are available for download free of charge.

About Close Talk

Close Talk AB is a Swedish company responsible for the development and manufacturing of the Close Talk Conference System product range.

Close Talk ships its products using a world wide network of distributors. Check the web site at www.closetalk.se to find a local distributor.

We value your input! Please send comments by e-mail to 'sales@closetalk.se'. You may not get a personal response but we can assure you that all input is read. We will use this feedback to improve our products even further.

System description

A *Close Talk Conference System* installation consist of a *Central Unit* (CU), one or more *Transceiver Units* (TU) and an optional number of *Delegate Units* (TU).

Figure 1.1 - Central Unit (CU)

The CU and DU's communicate via infra-red light. The CU use one or more TU's to send and receive data and audio. The DU has a built-in transceiver unit.

Figure 1.2 - Delegate Unit (DU)

The system has a total of six channels, 2 data and 4 audio. The CU has 2 transmitters, 1 audio and 1 data, and 4 receivers, 1 data and 3 audio, where FM modulation is used as the information carrier. The FM receivers in the CU and DU provides an FM signal strength level indicator which is monitored by the built-in computer. The signal strength level is compared to a threshold to determine if a channel is active or not. This threshold is called *Mute Level* (ML).

Figure 1.3 - Transceiver Unit (TU)

The CU can have 20+ TU's connected depending on the size and type of room for the installation. Each added TU will alter the noise characteristics for the CU FM receiver's. The ML factory setting will normally work automatically for systems with a maximum of 5 TU's. In installations with more than 5 TU's, the ML will probably need to be re-calibrated. The 'Close Talk Install' software utility is used to determine the correct mute levels, check the communication to and from delegate units and to measure the battery quality in delegate units. 'Close Talk Install' is available for downloading free of charge from www.closetalk.se. It is intended to be used by qualified installation personnel only and should normally not be provided to the end-user.

Since the DU is a self contained unit, the noise characteristics of it's internal FM receiver is fixed, hence the ML is factory set and cannot be changed.

Rev. 1.04

Section 2

Exterior

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Front panel

Figure 2.1 shows the Central Unit front panel:

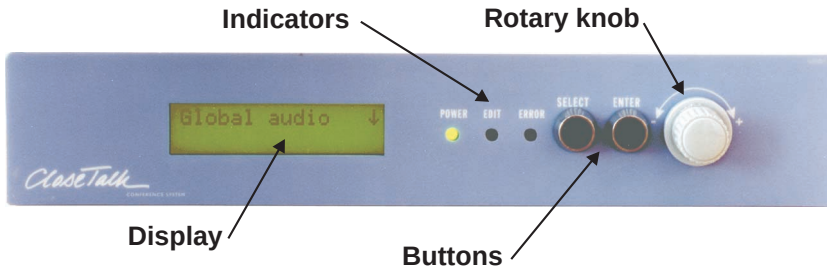

Figure 2.1 - Central Unit front panel

The main front panel components are:

- **Display**
  16 characters x 2 lines backlit LCD display. This is where all settings in the Central Unit is shown
- **Indicators**
  Contains three LED indicators that shows the state of the Central Unit where:
  POWER - Power is applied
  EDIT - The current setting is in edit mode
  ERROR - The unit is in an error state
- **Buttons**
  The SELECT and ENTER buttons are used to navigate the menu structure and to change settings
- **Rotary knob**
  Used to navigate the menu structure and to change settings

Rear panel

Figure 2.2 shows the Central Unit rear panel:

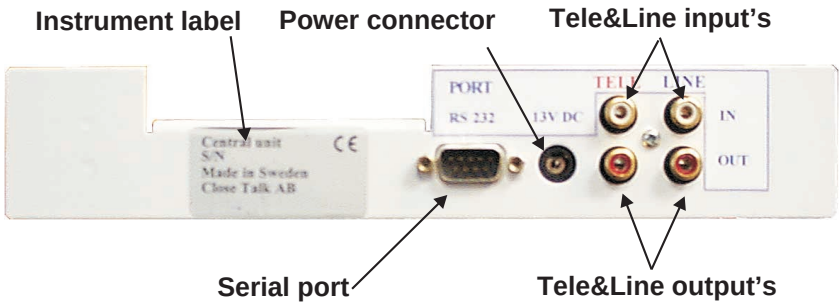

Figure 2.2 - Central Unit rear panel

The rear panel components are:

- **Instrument label**
  Contains manufacturer information and unit serial number
- **Serial port**
  RS-232 compatible serial port used for firmware updates and remote control
- **Power connector**
  Power input for the unit and the connected transceiver units. WARNING! Always use a Close Talk approved power supply. Use of other power supplies may be a fire hazard and cause permanent damage to the unit and/or other equipment and property
- **Tele&Line input's**
  Used for tele conferencing and to input other audio signals for distribution in the conference system
- **Tele&Line output's**
  Used for tele conferencing and to output the conference system audio for recording and/or distribution

Section 3

Using the front panel

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Navigating the menu tree

Figure 3.1 shows the Central Unit front panel:

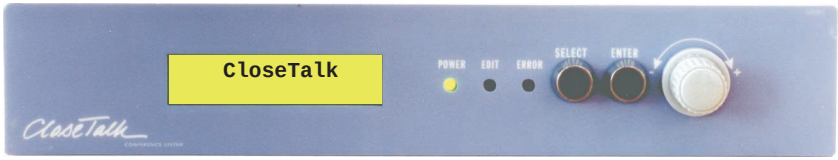

Figure 3.1 - Central Unit front panel. The display as it shows after power on.

Controls

There are three controls used to access the Central Unit settings, the SELECT button, the ENTER button and the rotary encoder knob.

Menu structure

The menu structure is built as shown in figure 3.2:

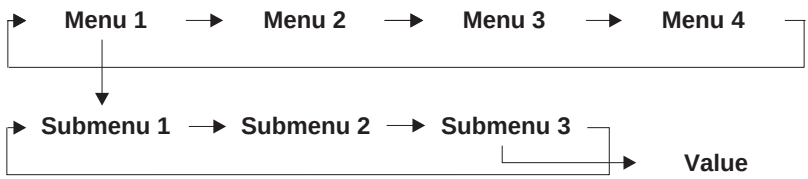

Figure 3.2 - Menu tree design

The structure is in a layered-circular fashion. Use the rotary knob to move horizontally. Turn clockwise to move to the right and counter-clockwise to move to the left. Use the SELECT and ENTER keys to move vertically.

Menu level indicator

Top-right in the display is a menu level indicator as shown in figure 3.3:

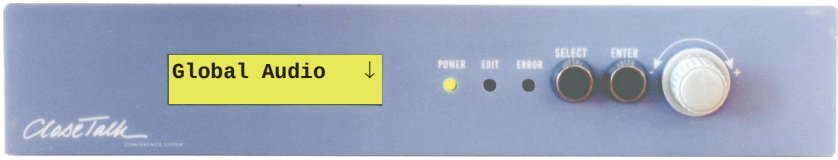

Figure 3.3 - Menu with submenu available

The following indicators are used:

- ↓
  The menu item has sub-menus
- ↑
  The bottom of the menu layer has been reached. The menu value can be edited or its function be used
- E
  The menu value is being edited

Using the controls

The SELECT key is used to move down through the menu layers. Pressing SELECT at the menu shown in figure 3.3 will proceed to the next lower layer:

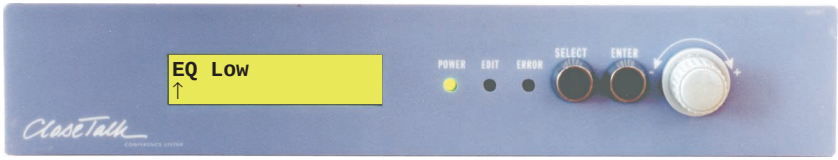

Figure 3.4 - Menu with submenu available

We are now at the bottom layer as shown by the ↑ indicator in the display. A menu value is now visible on the display's second line. If the menu item is a function, the ↑ indicator is still shown but the second line may show other information or be blank.

To move around the current menu layer, use the knob as described earlier.

To move back up one layer, press the ENTER button. The ENTER button is also used in edit mode to save changes.

Rev. 1.04

To change a value, press the SELECT key:

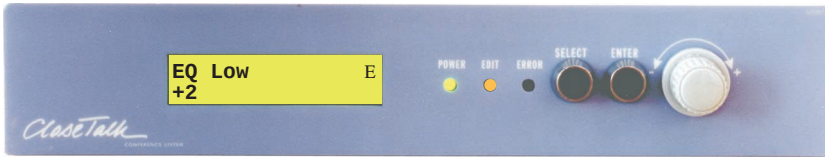

Figure 3.5 - In edit mode

Use the knob to change the setting. Unlike the menu system which is circular, the value has a minimum and maximum limit where the knob stops responding. All editing is 'live', i.e. the editing continuously updates the conference system.

To abandon the change and restore the original setting, press SELECT. The EDIT lamp is turned off and the menu returns to browse mode. Turning the knob now will move around in the current menu layer as described earlier.

To save the new setting, press ENTER. The EDIT lamp is turned off and the new setting is stored. All saved settings are retained after power-off.

When pressing the SELECT key and the menu item is a function, one or more function choices are presented:

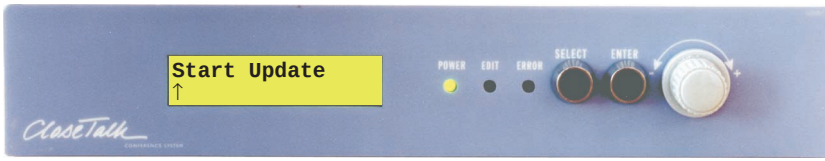

Figure 3.6 - The menu item is a function

Figure 3.6 shows an example of a function. It is still in browse mode (EDIT lamp is off). Press the SELECT key to enter the function. One or more function alternatives are presented:

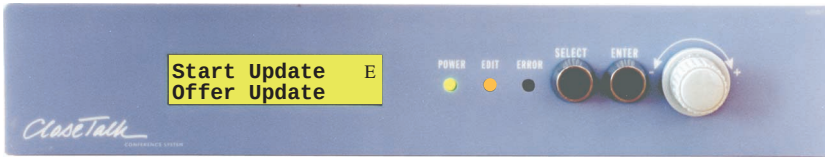

Figure 3.7 - The menu item is a function

Use the knob to select the desired function. Press ENTER to execute the function or SELECT to exit without changes.

This concludes the description of the front panel controls. Section 4 and 5 will describe the menu structure and all settings in more detail.

Section 4

Menu structure

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Top level menu

Figure 4.1 shows the top level of the menu structure:

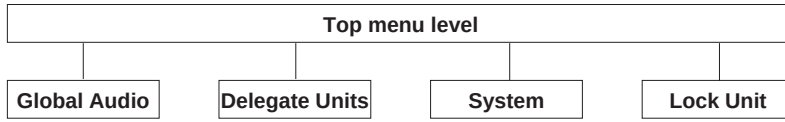

Figure 4.1 - Menu system overview

The top menu level is the level entered at power on.

The following entries are available:

- **Global Audio**
  Settings for the Central Unit audio system such as equalizer, delegate microphone sound level, Line In and Out levels, Tele In and Out levels and Level Compensation
- **Delegate Units**
  Settings regarding the Delegate Units such as speaker and headphones sound levels, power off delay, loose talk channel delay, Chairman unit, Priority unit, firmware update function, chairman channel mode and number of simultaneous speakers
- **System**
  Administrative information and settings for the Central Unit such as serial number, security code, backlight time and firmware version
- **Lock Unit**
  Menu function used to lock the central unit to prevent unauthorized changes

Global Audio menu layer

Figure 4.2 shows the Global Audio menu layer:

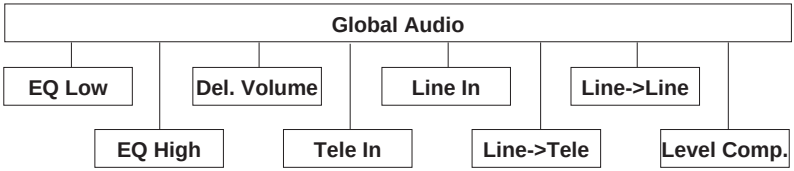

Figure 4.2 - Global Audio menu layer

The Global Audio menu layer contains settings for the Central Unit audio system. Refer to section 6 on page 35 for more information about the audio system.

The following entries are available:

- **EQ Low**
  Low frequency boost or cut for the delegate microphone audio
- **EQ High**
  High frequency boost or cut for the delegate microphone audio
- **Delegate Volume**
  Sound level for the delegate microphone audio
- **Tele In**
  Level control for the Tele In rear panel connector
- **Line In**
  Level control for the Line In rear panel connector
- **Line->Tele Out**
  Level control for the Line In to Tele Out cross-coupling
- **Line->Tele Out**
  Level control for the Line In to Line Out cross-coupling
- **Level Compensation**
  Feedback margin compensation setting

Delegate Units menu layer

Figure 4.3 shows the Delegate Units menu layer:

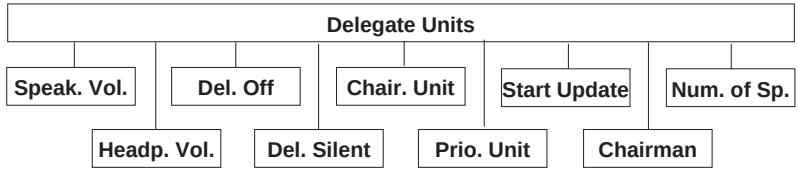

Figure 4.3 - Delegate Units menu layer

The Delegate Units menu layer contains settings closely related to the functionality and use of the Delegate Units.

The following entries are available:

- **Speaker Volume**
  Settings for the minimum and maximum speaker sound level for the Delegate Unit
- **Headphones Volume**
  Settings for the minimum and maximum headphones sound level for the Delegate Unit
- **Delegate Off**
  Setting that specifies the Delegate Unit power off time
- **Delegate Silent**
  Setting that specifies the loose audio channel timeout
- **Chairman Unit**
  Setting that specifies which Delegate Unit to treat as the chairman unit
- **Priority Unit**
  Setting that specifies which Delegate Unit to treat as the priority unit
- **Start Update**
  Function for Delegate Unit firmware updates
- **Chairman**
  Setting that selects the Chairman Audio Channel Guarantee method
- **Number of Speakers**
  Setting that specifies the number of available audio channels

System menu layer

Figure 4.4 shows the System menu layer:

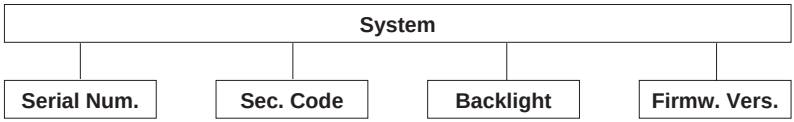

Figure 4.4 - System menu layer

The system menu layer contains administrative information and settings for the Central Unit.

The following entries are available:

- **Serial Number**
  Informative. The Central Unit serial number
- **Security Code**
  Security code setting for Central Unit locking
- **Backlight**
  Setting for display backlight timeout
- **Firmware version**
  Informative. Central Unit firmware version

Lock Unit function

Function used to lock the Central Unit menu system.

Section 5

Settings and functions

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Global Audio

The Global Audio menu layer contains settings for the Central Unit Audio system. Refer to section 6 on page 35 for a better understanding of these settings.

EQ Low

Figure 5.1 - Equalizer low register setting

Specifies boost or cut in the low frequency region of the delegate microphone audio signal.

Maximum value is +12 and minimum value is -12. Factory setting is 0 (flat response).

EQ High

Figure 5.2 - Equalizer high register setting

Specifies boost or cut in the high frequency region of the delegate microphone audio signal.

Maximum value is +12 and minimum value is -12. Factory setting is 0 (flat response).

Delegate Volume

Figure 5.3 - Delegate audio volume

Controls the level of the delegate microphone audio signal.

Maximum value is 40 and minimum value is 0. Factory setting is 34.

Tele In

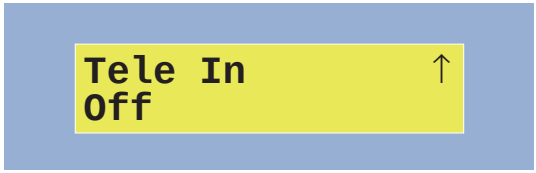

Figure 5.4 - Tele In input level

Controls the level of the rear panel Tele In input.

Maximum value is 39 and minimum value is 0. Factory setting is 0 (input off).

Line In

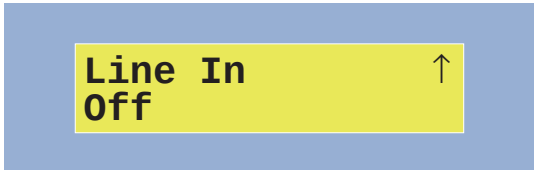

Figure 5.5 - Line In input level

Controls the level of the rear panel Line In input.

Maximum value is 39 and minimum value is 0. Factory setting is 0 (input off).

Line->Tele Out

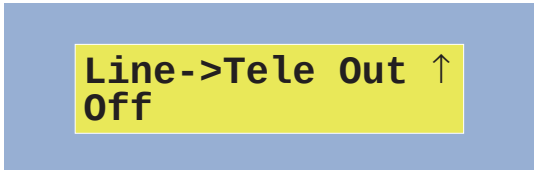

Figure 5.8 - Line In to Tele Out cross coupling

Controls the level of the rear panel Line In to Tele Out cross-coupling.

Maximum value is 39 and minimum value is 0. Factory setting is 0 (cross coupling off).

Line->Line Out

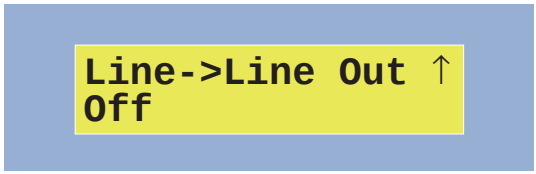

Figure 5.6 - Line In to Line Out cross coupling

Controls the level of the rear panel Line In to Line Out cross-coupling.

Maximum value is 39 and minimum value is 0. Factory setting is 0 (cross-coupling off).

Level Compensation

Figure 5.7 - Level Compensation

Level Compensation is a setting used to compensate for feedback in problem environments such as small rooms with a lot of hard surfaces like walls, ceilings and windows which may reduce the system feedback margin.

The Level Compensation setting increases the feedback margin by reducing

the delegate microphone sound levels depending on the number of active delegate unit microphones. The sound level is controlled by subtracting from the Delegate Volume setting.

There are four levels of compensation:

- **None**
  Compensation turned off
- **Low**
  Low range compensation. No reduction with one or two active microphones. Reduces the Delegate Volume setting one step with three active microphones
- **Medium**
  Medium range compensation. No reduction with one active microphone. Reduces the Delegate Volume setting one step with two active microphones and two steps with three active microphones
- **High**
  High range compensation. No reduction with one active microphone. Reduces the Delegate Volume setting two steps with two active microphones and three steps with three active microphones

Factory setting is None. The Level Compensation setting should only be turned on when needed and will require some experimentation for a proper result.

Delegate Units

Speaker Volume

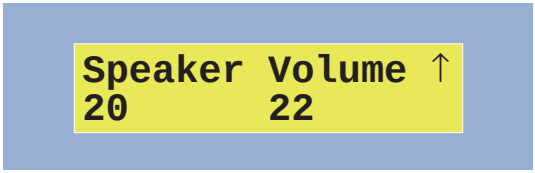

Figure 5.9 - Speaker Volume

Delegate Unit's are equipped with a volume knob that may be used to adjust the delegates speaker- and headphones levels. The Speaker Volume setting specifies the range of this volume knob for the speaker by a minimum and maximum level.

The range for the minimum and maximum value is 0 to 31. Factory setting is 20 for minimum and 22 for maximum.

The function of the Delegate Unit volume knob can be disabled by setting the minimum and maximum value to the same level.

Headphones Volume

Figure 5.10 - Headphones Volume

Delegate Unit's are equipped with a volume knob that may be used to adjust the delegates speaker- and headphones levels. The Headphones Volume setting specifies the range of this volume knob for the headphones output by a minimum and maximum level.

The range for the minimum and maximum value is 0 to 31. Factory setting is 20 for minimum and 22 for maximum.

The function of the Delegate Unit volume knob can be disabled by setting the minimum and maximum value to the same level.

Delegate Off

Figure 5.11 - Delegate power Off

The Central Unit can save Delegate Unit battery power with the Delegate Off setting. This timer specifies for how long the system can be in idle before the Delegate Unit's are turned off. This power off time-out is reset every time a delegate requests to speak. I situations where the system will be left on for a longer period or is used for listen-only, the function can be turned off.

The power off time can be set between 1 and 59 minutes or turned off. Factory setting is 15 minutes.

Delegate Silent

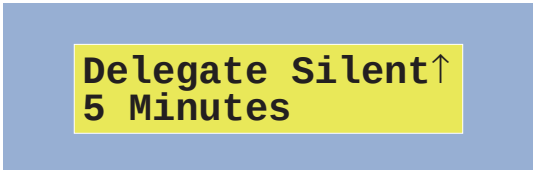

Figure 5.13 - Delegate Silent

The Delegate Unit contains a microphone signal detector. This detector can be used to make Delegate Unit's that has an audio channel release it automatically if no one is speaking to preserve battery power and prevent deadlocks.

The timeout can be set between 1 and 29 minutes or turned off. Factory setting is 5 minutes.

Chairman Unit

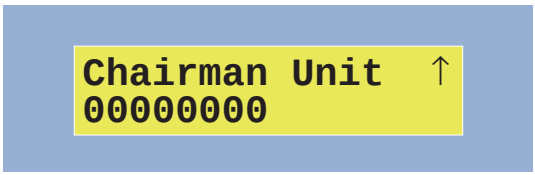

Figure 5.12 - Chairman Unit

The Central Unit can give one Delegate Unit special privileges suitable for the chairman. A Delegate Unit with chairman privileges is always guaranteed an audio channel in a manner specified by the Chairman setting (see page 30) and will bypass the speaking queue.

In order for the Central Unit to know which Delegate Unit to treat as the chairman unit, the Delegate Unit ID number is specified in this setting. Turn the Delegate Unit up-side down and enter the unit serial number.

Besides the channel guarantee functionality, the chairman unit is treated as any other Delegate Unit including power-off and Delegate Silent time-out settings.

Factory setting is 00000000, i.e. no chairman unit.

Priority Unit

Figure 5.14 - Priority Unit

The Central Unit can give one Delegate Unit special privileges suitable for platform use. A Delegate Unit with priority privileges is always guaranteed an audio channel by stealing the longest used audio channel if no one is free. It will also bypass the speaking queue.

In order for the Central Unit to know which Delegate Unit to treat as the priority unit, the Delegate Unit ID number is specified in this setting. Turn the Delegate Unit up-side down and enter the unit serial number.

Unlike other Delegate Unit's, the priority unit will never loose it's audio channel, regardless of the Delegate Silent setting.

Factory setting is 00000000, i.e. no priority unit.

Start Update

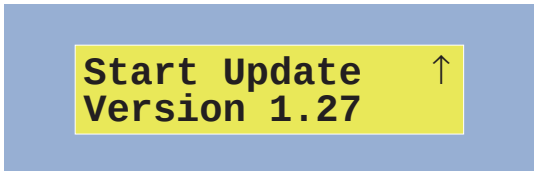

Figure 5.15 - Delegate Unit firmware update

The Central Unit is used to update the firmware in the Delegate Unit's via the infra-red communication. A copy of the delegate firmware is stored in the Central Unit memory and this function is used for updating.

The second line shows the current firmware version stored in the Central Unit. Check with www.closetalk.se regularly to see if there is a newer version available. New versions will often improve performance of the system.

The current firmware version is sent over the infra-red data link so Delegate Units with lower versions will recognize this and indicate that they need an update by flashing the vote result LED's.

To update the Delegate Unit's firmware:

- Turn on all Delegate Unit's to be updated
- Press SELECT and choose either Offer Update or Force Update. Offer Update will only update Delegate Units with lower firmware versions than the current. Force Update will update all Delegate Unit's, regardless of the current version number. Force update is normally only used if it is required to install an older firmware version over a newer one
- Press ENTER. The update starts with a percentage-completed counter in the display. The Delegate Units will flash the vote result LED's slower during the update
- After the update function has reached 100%, the Delegate Unit's will automatically turn them self off if the update was successful. Delegate Unit's that failed to update will remain powered on with the LED's flashing. Verify that failed units has a clear infra-red communication path. If required, move them closer to a transceiver unit and try again

The Delegate Unit firmware copy in the Central Unit is updated with the Microsoft Windows compatible Close Talk Loader software utility which can be downloaded free of charge from www.closetalk.se. A null-modem cable is required to connect the PC to the Central Unit. A connection diagram for a null-modem cable can be found in the Close Talk Control manual, also downloadable for free at www.closetalk.se.

Chairman

Figure 5.16 - Chairman

One Delegate Unit can have special privileges as described for the Chairman Unit setting. The chairman unit is always guaranteed an audio channel, even if all channels are occupied, using one of three methods. This setting is used to select method.

Methods available:

- **Steal Channel**
  The chairman will steal the channel from the speaker that has used it's channel the longest time

- **Borrow Channel**
  The chairman will borrow the channel from the speaker that has used it's channel the longest time. After the chairman releases the channel, it will be returned to the original speaker
- **Own Channel**
  The chairman will have a dedicated audio channel. This reduces the number of regular audio channels available for normal delegates

If the Number of Speakers setting is set to one, the Own Channel method is not available. If so, first increase the number of channels to at least two.

Factory setting is Steal Channel.

Number of Speakers

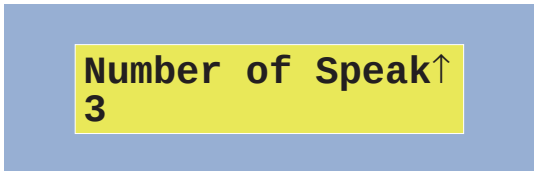

Figure 5.17 - Number of Speakers

The Number of Speakers setting specifies how many audio channels that should be available to the delegates. Close Talk Conference System can have a maximum of three simultaneous speakers. Use this setting to limit the number of channels.

Valid settings are 1 to 3 channels. If the Chairman setting is set to Own channel, the chairman is counted and only the choice of two or three channels is available.

Factory setting is 3 channels.

System

Serial Number

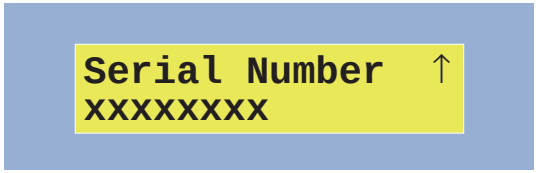

Figure 5.18 - Central Unit serial number

Informative only. Shows the Central Unit's serial number.

Security Code

Figure 5.19 - Central Unit serial number

The Central Unit settings can be protected with a four digit security code. Enter a code other than 0000 to enable the security system. Enter 0000 to disable it. After entering a valid code, use the Lock Unit function to prevent unauthorized changes to the Central Unit settings.

Important!
Do not forget the code, unlocking a locked unit requires special tools.

Factory setting is 0000, i.e. no protection.

Backlight

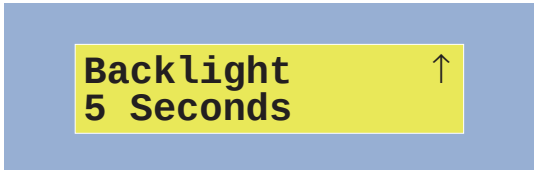

Figure 5.21 - Display backlight time

The Central Unit has a backlit LCD display. If a button is pressed or the knob is turned, the backlight is turned on for the duration in this setting.

The time can be set from 0 to 59 seconds where 0 means that the backlight is turned off. Factory setting is 5 seconds.

Firmware version

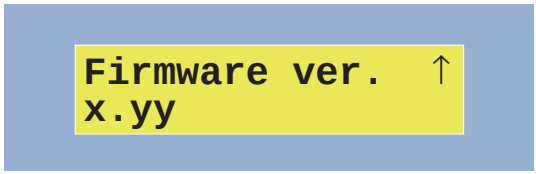

Figure 5.20 - Central Unit firmware version

Informative only. Shows the Central Unit firmware version. Check with www.closetalk.se regularly to see if there is a newer version available. New versions will often improve performance of the system.

The Central Unit firmware is updated with the Microsoft Windows compatible Close Talk Loader software utility which can be downloaded free of charge from www.closetalk.se. A software loader adapter is also needed to connect the PC to the Central Unit. Contact your dealer for advice.

Lock Unit

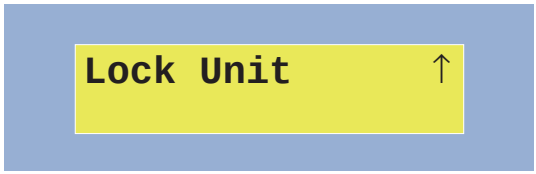

Figure 5.22 - Lock Central Unit

If a valid security code has been specified in the Security Code setting, the Central Unit can be locked to prevent unauthorized changes to the settings.

Press SELECT followed by ENTER. The unit is now locked. Pressing any button or turning the knob will prompt for the code. After entering the correct code, press ENTER and the unit is unlocked.

Important!
Do not forget the code, unlocking a locked unit requires special tools.

Section 6

System description

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Overview

Figure shows a block diagram of a conference system setup:

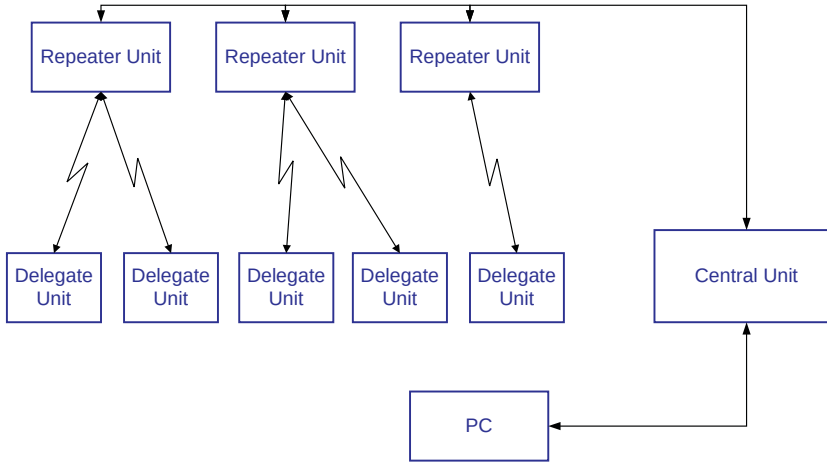

Figure 6.1 - Conference system block diagram

The Central Unit (CU) has one or more Transceiver Unit's (TU) connected which transmits and receive's the infra-red light signals to and from the Delegate Unit's (DU). There are 6 infra-red light channels available in the system:

- **Global data**
  Transmitted from the CU. Center frequency is 3.61Mhz. Contains administrative communication
- **Global audio**
  Transmitted from the CU. Center frequency is 2.92Mhz. The main audio signal received by the DU's
- **Audio channel 1 to 3**
  Transmitted by the DU's. Center frequency is 4.84MHz (channel 1), 2.38Mhz (channel 2) and 4.36Mhz (channel 3). The microphone audio signal
- **Data channel**
  Transmitted by the DU's. Center frequency is 5.61Mhz. Used for administrative communication

An optional PC can be connected to the CU serial port where the Microsoft Windows-compatible software *Close Talk Control* expands the system functionality with controllable speaker queues, roll-call, voting and more.

Central Unit

Figure 6.2 shows a block diagram of the Central Unit (CU). The TU's sends the HF signal via cables down to the FM receivers where the signal is band-pass filtered and demodulated in four channels, Audio 1 to 3 and Data.

The three audio channels contains a compressed audio signal which is expanded, mixed and band-pass filtered. The resulting signal is then distributed by the CU audio system where it is mixed with external audio, compressed and transmitted to the DU's.

The data channel is filtered and the data pulse train is extracted. The pulse train is sent to the computer for reconstruction into the system byte stream data protocol.

The outgoing system byte stream data protocol is converted by the computer to a pulse train suitable for transmission.

The computer also manages the display and controls, control noise gates, audio input- and output levels, mixer levels and communicates with a PC via the serial port.

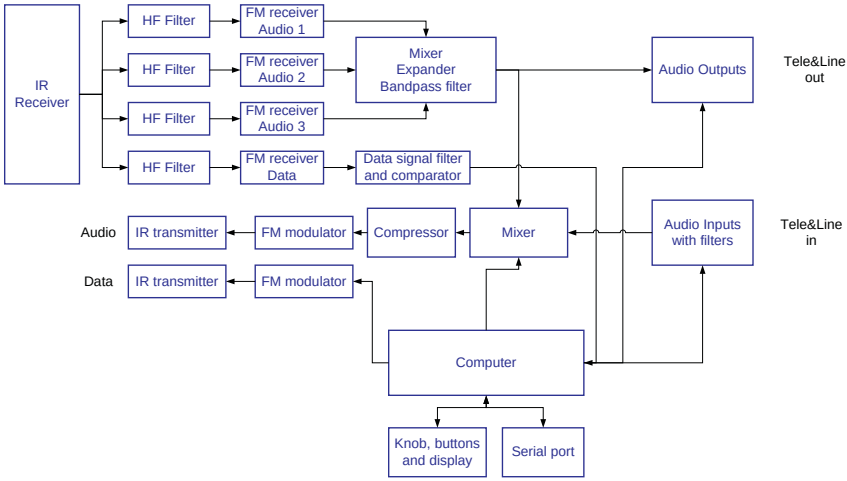

Figure 6.2 - Central Unit block diagram

Rev. 1.04

Delegate Unit

Figure 6.3 shows a block diagram of the Delegate Unit (DU). The infra-red HF signal is received and band-pass filtered by the built-in IR receiver. The resulting signal is sent to the two FM receivers, global audio and data, where it is demodulated.

The demodulated audio signal is expanded and band-pass filtered before it is sent to the speaker/headphones amplifier. The amplifier level is controlled by the computer that receives levels and volume knob span information from the CU via the data channel.

The data channel is filtered and the data pulse train is extracted. The pulse train is sent to the computer for reconstruction into the system byte stream data protocol.

The outgoing system byte stream data protocol is converted by the computer to a pulse train suitable for transmission.

The microphone signal is band-pass filtered and compressed before transmission.

The computer also manages the buttons, LED indicators and volume knob.

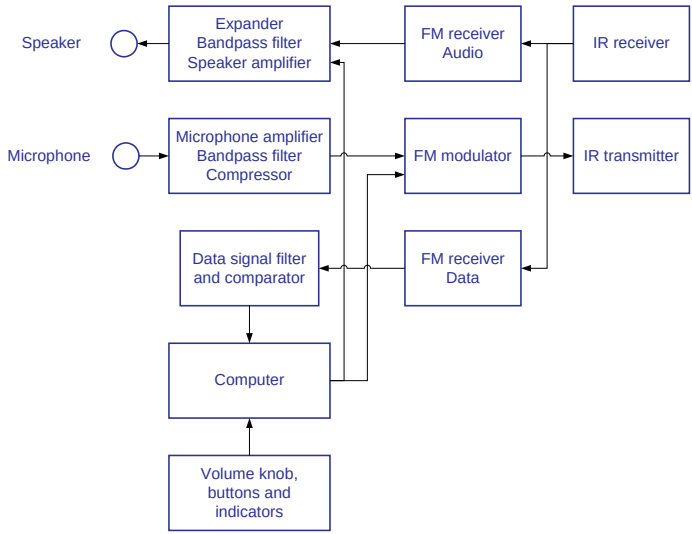

Figure 6.3 - Delegate Unit block diagram

Audio system

Figure 6.4 shows a block diagram of the system audio path:

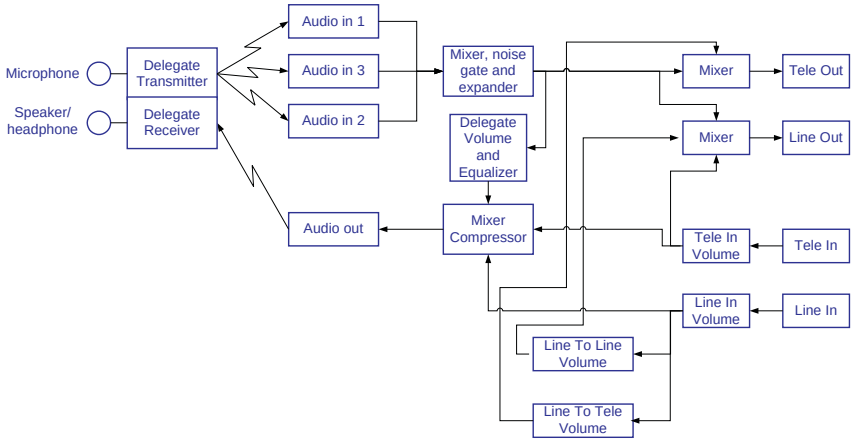

Figure 6.4 - Audio path block diagram

The DU microphone signal is sent on 3 channels to the CU where it is expanded and mixed into a single channel main audio path.

The main audio is sent straight to the Line Out and Tele Out connectors.

The main audio passes through a level control, Delegate Volume (page 24), and equalizer, EQ Low (page 23) and EQ High (page 23).

The Line In and Tele In connectors are mixed into the main audio signal via two level controls, Tele In (page 24) and Line In (page 24).

The main audio is then compressed and transmitted to the DU's.

A cross-coupling function is available where the Tele In signal is mixed into the Line Output after the level control. The Line In signal can be cross-coupled to Line Out and/or Tele Out via level controls, Line->Line Out (page 25) and Line->Tele Out (page 25). This built-in cross-coupling feature makes it possible to use a telephone hybrid together with a tape recorder directly without external mixers or patch bays.

The DU speaker and headphones volume levels can be controlled via the Speaker Volume (page 26) and Headphones Volume (page 27) settings, making the audio system completely controllable from the CU. The microphone level in the DU is fixed.

Section 7

Specifications

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Transmission

Media	Infra-red	
Wavelength	875nm	
Carrier	FM modulation	
Frequency	Audio (transmitted)	2.92MHz
	Data (transmitted)	3.61MHz
	Audio 1 (received)	4.84MHz
	Audio 2 (received)	2.38MHz
	Audio 3 (received)	4.36MHz
	Data (received)	5.61MHz
Data	Bit phase modulation	

Audio

Frequency response	250Hz - 6kHz (-3dB)
Dynamic range	> 40dB @ 1kHz
THD	< 1% @ 1kHz
Line In level	500mV$_{RMS}$ nominal @ 1kHz with 'Line In' setting set to 36
Tele In level	500mV$_{RMS}$ nominal @ 1kHz with 'Tele In' setting set to 35
Line Out level	500mV$_{RMS}$ nominal @ 1kHz
Tele Out level	500mV$_{RMS}$ nominal @ 1kHz
Line In impedance	20kOhm @ 1kHz
Tele In impedance	20kOhm @ 1kHz
Line Out impedance	1kOhm @ 1kHz
Tele Out impedance	1kOhm @ 1kHz

General

Serial port	RS-232C, 9 pin male D-Sub, DTE device
Display	16 characters x 2 lines backlit LCD
Firmware update	Via serial port
Security	Panel can be locked by PIN-code

Power

Power consumption	4.3W + 4W/transceiver powered by the CU
Power requirements	Use only Close Talk approved power supply

Physical

Dimensions (WxHxD)	234x44x276mm
Weight	1.9kg (4.2 lbs)

Mounting	Wall (check with dealer for other alternatives)
Line&Tele connector	Phono

Environment

Temperature	0 to +40 degrees centigrade

All specifications subject to change without prior notice

Rev. 1.04

Null-modem cable

25 pin serial port

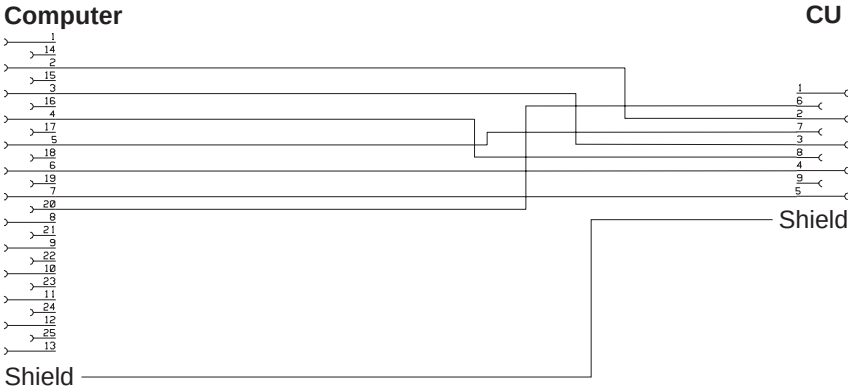

Figure 7.2 - 25 pin connector null-modem serial cable

9 pin serial port

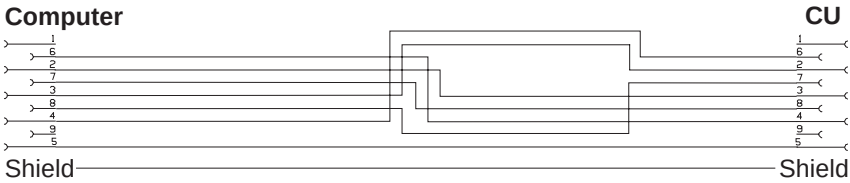

Figure 7.1 - 9 pin connector null-modem serial cable

It is generally recommended to use a purchased null-modem cable. In the event that a longer cable length is needed or if the installation requires it, a custom built cable can be used and should be connected according to the drawings in figure 7.2 and 7.1.

- Only use high quality foil shielded cables recommended for data communication
- Use high quality connectors with, preferably, shielded connector housings
- Do not exceed the RS-232 specification of a maximum of 15 meters (45 feet) cable length

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Index

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

Q

R

S

T

U

W

V