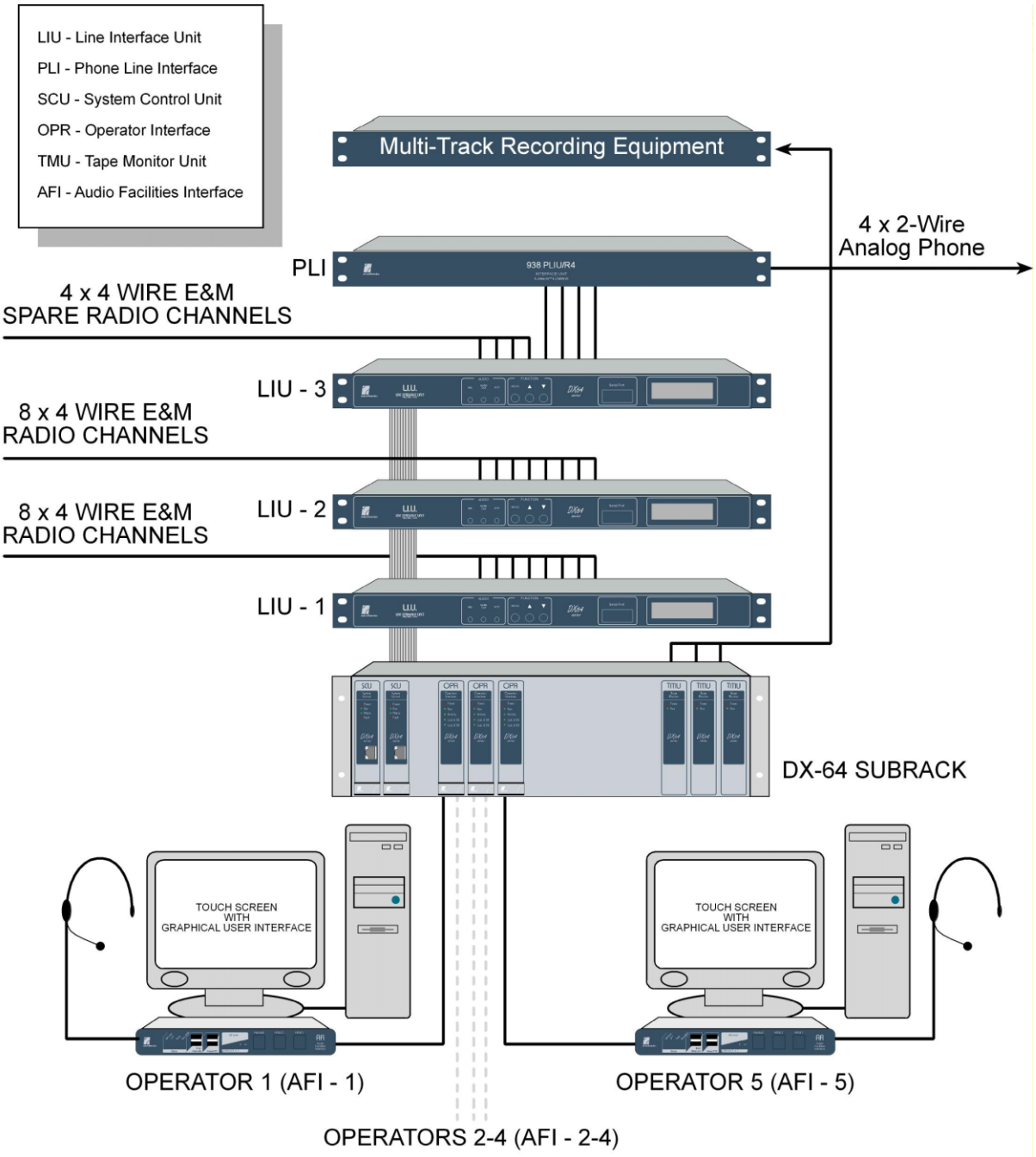
DX-64 Radio Management System



Glossary of acronyms

• *AFI-*	*Audio Facilities Interface*
• *AINFC -*	*Audio IN From Console*
• *AINFL-*	*Audio IN From Line*
• *AMU-*	*Audio Management Unit*
• *AOUTC-*	*Audio OUT to Console*
• *AOUTL-*	*Audio OUT to Line*
• *DSP-*	*Digital Signal Processor*
• *DTMF-*	*Dual Tone Multi Frequency*
• *DX-*	*Digital Switch*
• *E&M-*	*Ear and Mouth*
• *GUI-*	*Graphical User Interface*
• *I/O-*	*Input / Output*
• *ISDN-*	*Integrated Services Digital Network*
• *LCU-*	*Link Control Unit*
• *LED-*	*Light Emitting Diode*
• *LIU-*	*Line Interface Unit*
• *MTBF-*	*Mean Time Between Failure*
• *NCU-*	*Network Control Unit*
• *OPR-*	*OPeratoR Interface Unit*
• *PABX-*	*Private Automatic Branch eXchange*
• *PC-*	*Personal Computer*
• *PCM-*	*Pulse Coded Modulation*
• *PTT-*	*Push To Talk*
• *SCU-*	*System Controller Unit*
• *Selcal-*	*Selective Calling*
• *TDM-*	*Time Division Multiplexing*
• *WAN*	*Wide Area Network*

Features

- Can control a total of 56 radios with up to 32 operators.
- Can be used with a PC or a non-computer operator interface.
- The user interface can be run under Windows 98 and XP. While the options available on the PC screen can be selected using a mouse, the user interface is designed primarily for use with an embedded touch screen.
- The DX-64 system can provide channel linking for up to 8 separate groups.
- Each operator can control up to 8 workgroups.
- The DX-64 features full SELCAL on all channels.
- 'Rapid Recall' logging is standard with optional tape monitor interfaces.
- Supports Wide Area Networks using E1 or IP4 interface cards.
- Simple wiring of operator stations, with 10/1 00-baseT for data and 2-wire for digitised audio.
- The DX-64 will continue to operate even after computer failure.
- Cards and units of the DX-64 can be inserted and removed without disconnection from the power source.
- Optional redundancy, with auto changeover from the 'Master' System Controller to the 'Slave' System Controller.
- Very compact hardware installation, i.e. a system handling 32 channels and 16 operators would take up only 7 RU of 19" rack space
- Extremely 'cost competitive'.

Example of a 16 channels - 2 operators DX-64 system :

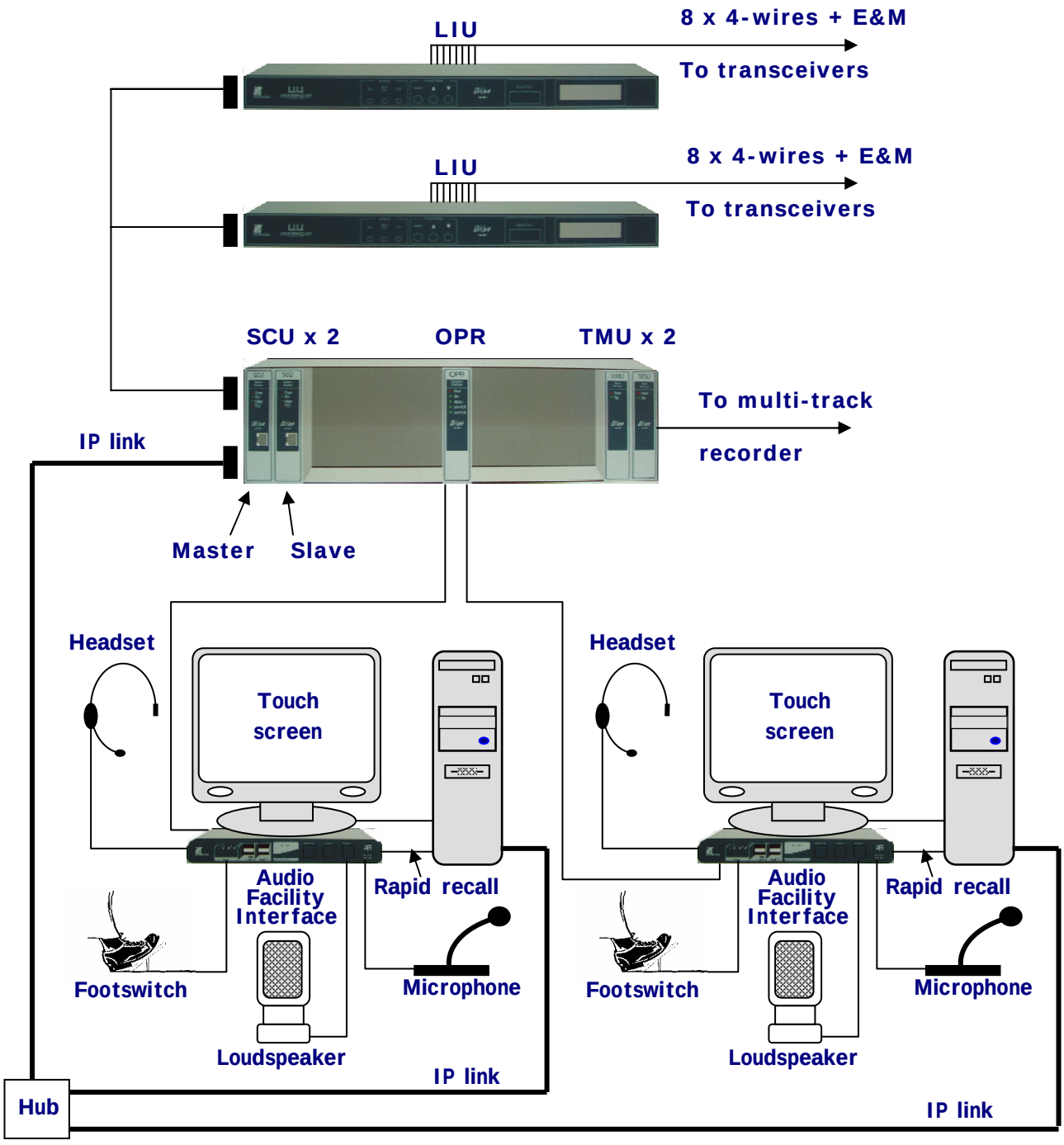


Figure 1 : 16 channels - 2 operators

The diagram above shows two DX-64 Radio Management System workstations connected to a 10/100 BaseT hub. Each workstation is comprised of an Audio Facilities Interface, a Personal Computer terminal and a connection to a Line Interface Unit via an Operator Interface and sub-rack unit. The sub-rack unit connects to two Line Interface Units and contains two System Control Units (Master and Slave), one Operator Interface Unit (supporting two operators) and two Tape Monitor Units (8 channels per unit). This configuration enables communication on 16 channels.

Further expansion is achieved through the addition of another sub-rack (with units) and/or supplementary Line Interface Units. See page 10.

Overview

Analogue to Digital then back to Analogue

The DX-64 Radio Management System is a digital switch that provides an interface between radio operators and radio or line devices. Under microprocessor control audio, in analogue form, is converted to a digital format that can be manipulated through switching and mixing before being converted back to analogue form and transmitted in the normal way.

Channel Capacity

Although there is a maximum of 64 channels (or time periods) available for use, the number of voice channels is limited to *56.* This is because a general-purpose radio management system such as the DX-64 must also provide capacity for a means of control and for information. Therefore, of the available 8 channels remaining, 4 will carry control information (PTT) 2 will carry information related to workstation identification and 2 will carry information related to intercom and PA functions.

ST-Bus (2.048Mb Time Division Multiplex)

The system employed is based on the ST 2.048Mb TDM signalling protocol where the 64 channels are contained within 2 serial buses each of 32 channels (time periods). Each ***group*** of 32 time periods is synchronised with a frame pulse at a frequency of 8kHz and each ***individual*** time period contains an 8 bit digitised sample of audio. With 32 time periods multiplied by 8 bits of digitised audio and multiplied again by 8kHz frame-sync pulses, the resultant data stream now becomes 2.048Mb. (32 channels * 8 bits * 8kHz).

TDM Data Streams

The DX-64 Radio Management System utilises four TDM data streams :

1. Audio in from the line (AINFL).
2. Audio out to the line (AOUTL).
3. Audio in from the console (AINFC).
4. Audio out to the console (AOUTC).

Two data streams are used for LINE audio

1. Audio in from the line (AINFL). This data stream carries the received audio from the line and other auxiliary sources via the Line Interface Unit (LIU). Normally, this data stream would be switched to AOUTC to provide audio to the console. With ‘Channel Linking’ active, channels carrying AINFL can be switched to provide audio out *to* the line (AOUTL).

2. Audio out to the line (AOUTL). This data stream carries the transmitted audio via the Line Interface Unit and other auxiliary devices (such as a PA system) out to the line. Normally, this data stream would be switched from AINFC.

Two data streams are used for CONSOLE audio

1. Audio out to the console (AOUTC). This data stream carries the received audio (usually AINFL) to be delivered to the console.

2. Audio in from the console (AINFC). This data stream carries the transmitted audio from the console to be delivered to the une. Audio such as voice messages and intercom could also be carried on this data stream.

The Graphical User Interface (GUI)

Full control of the DX-64 Radio Management System is through the use of a purpose-written application for the Microsoft Windows™ operating system that exploits the interface of the GUI and the power of an IBM-compatible PC. This application, with the DX-64 Operator Console, can be further enhanced with the flexibility of a touch-screen monitor.

The four main functions that are controlled in this way and which are available to the user are :

1. To select Foreground and Background channels, and adjust volume levels.
2. To display and generate Selcals.
3. To set up and edit channel link groups.
4. To patch in an extemal phone channel.

The DX64 Operator Console can be run under Windows 98 and XP Professional. While selection of the options available on the PC screen can be carried out using a mouse, the user interface is designed primarily for use with an embedded touch screen. Communication between the DX64 Operator Console and the DX-64 is via an Ethernet link.

Audio Facilities Interface (AFI)

The Audio Facilities Interface is a device that is separate from the control and signalling functions of the DX-64. This separation of the operator audio functions from the control functions of the PC allows for the continuation of communications in a situation where an operator's PC has failed. As well as providing for the inclusion of a microphone, headset and foot-switch, the AFI also allows for the option of a PC-based 'Rapid Recall' logging faciility, with a connection to the sound card of the PC.

The DX-64 and Wide Area Network capability (WAN)

The DX-64 Radio Management System also provides for WAN capability. This allows for communication centres to operate as hubs. This option is best achieved using an E1 interface card to parse G.703/704 data, allowing third party equipment such as Cisco or J-tee routers to be used, to convert DX-64 data to some other broadband medium such as ISDN and IP. For direct connection between two nodes, E1 links are available for lease from Telstra. Recently, a new IP 4 interface card was developed for the same purpose and presents in addition the capability of allowing a direct link through the IP network towards IPR modules which control remote radios or repeaters.

Simplified Maintenance

For ease of maintenance, each card and unit that is part of the DX-64 system provides up-to-the-minute indication of status. LEDs positioned on front panels indicate general RUN status and DATA fail conditions (if applicable). Status conditions are also accessible via software options, allowing the System Control Unit to ascertain the status of each device and to transmit this status condition to other workstations or maintenance terminals.

Hot Swap

Cards and units of the DX-64 system can be inserted and removed without disconnecting the system from the power supply. If the removal or insertion, of a card or unit is undertaken, the System Control Unit will detect the change in conditions and update the central database. A device recently activated will be initialised automatically by the System Control Unit.

Hot Standby Operation

Key components of the DX-64 system are supported by a 'Hot Standby' facility. The System Control Unit supports 'Hot Standby' through a Master/Slave arrangement and a heartbeat signal.

Expansion of the DX-64 system

The DX-64 Radio Management System is expandable by adding sub-racks and Line Intarface Units. All outputs are buffered to prevent loading problems.

System Architecture

Main Components

The main components of the DX-64 system are :

- *The Audio Facilities Interface (AFI).*
- *The System Control Unit (SCU).*
- *The Operator Interface Unit (OPR).*
- *The Tape Monitor Unit (TMU).*
- *The Line Interface Unit (LIU).*
- *The Operator Console (PC application).*

Connection to the Workstation

Each operator workstation (Audio Facilities Interface) is connected to the DX-64 system via a 2-wire digital audio link to the OPR Unit. This connection is full-duplex ISDN and provides two Pulse Coded Modulated (PCM) audio channels, plus a control channel. The control channel carries an operator's PTT and intercom/PA data. The maximum distance supported by this type of link is about 800m.

Each workstation is also networked with the DX-64 via the PC and a 10/100 BaseT Ethernet hub (10/100Mbits). This link allows an operator to configure non time-critical functions such as system settings, the sending and receiving of Selcals and to report the status of channel interfaces.

The Audio Facilities Interface (AFI)

This device provides an interface to the headset, microphone, foot-switch and front panel PTT button. The device also provides the foreground and background audio for external speakers and allows for a PABX phone extension to be added via a line isolation unit. The AFI transmits audio from an operator (with PTT) *to* the DX-64, while at the same time, receiving foreground and background audio *from* the DX-64. It is not necessary for a physical connection to exist between the AFI and the operator's PC for transmission over the radio network to take place.

To provide a 'Rapid Recall' facility, the AFI can also be interfaced to the sound card of an operator's PC.

The System Control Unit (SCU)

This device performs three main functions :

1. It provides the Transmission Control Protocol/Internet Protocol (TCP/IP) interface between the DX-64 and an operator's workstation.
2. It performs channel linking and digital 'cross switching'.
3. It controls the operation and monitors the status of other DX-64 devices.

The SCU also supports 'Hot Standby' utilising a Master/Slave arrangement. The DX-64 sub-rack contains two System Control Units with the Master SCU as the default controller. However, if the Slave SCU detects that the Master has failed (after a set period of time) it will take control of the DX-64 until the master recovers.

Data shadowing between the two units is achieved via background serial link that is embedded into the sub-rack.

The Operator Interface Unit (OPR)

The OPR provides the full-duplex audio connection between the DX-64 and an operator's workstation. Utilising an on-board Digital Signal Processor (DSP), it performs audio mixing and level adjustment for the Foreground and Background audio groups. Each unit supports two operator positions.

The Tape Monitor Unit (TMU)

The Tape Monitor Unit provides outputs for 8 "Line Side" channels. The channels can be selected from any two AINFL and AOUTL data streams. The unit contains a microprocessor for the control of Codec procedure (digital to analogue conversion) and a digital cross-point switch, utilised for the purpose of channel selection and to select between Mute and PTT functions.

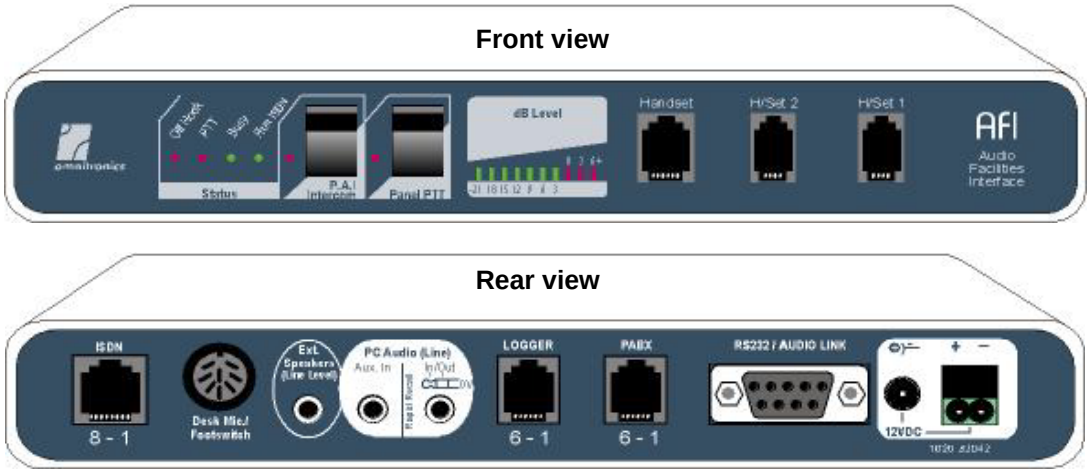
The Line Interface Unit (LIU)

The LIU is a special version of the 619 Intelligent Audio Bridge MkII and provides the same signal conditioning and isolation that is provided by that device. It provides also, the multi-channel Selcal decode/encode and DTMF encode functions. The LIU is a separate board within the confines of the unit and provides a 4-wire, plus E (Ear) and M (Mouth) interface between 8 local radios and the DX-64 Radio Management System.

The LIU provides two additional main functions :

1. The Conversion between PCM data on the DX-64 TDM bus and analogue audio on the line ports.
2. The generation of radio PTT signals from the TDM bus and the insertion of a radio's Mute status onto that bus.

The diagram below shows the Audio Facilities Interface (front and rear panels).

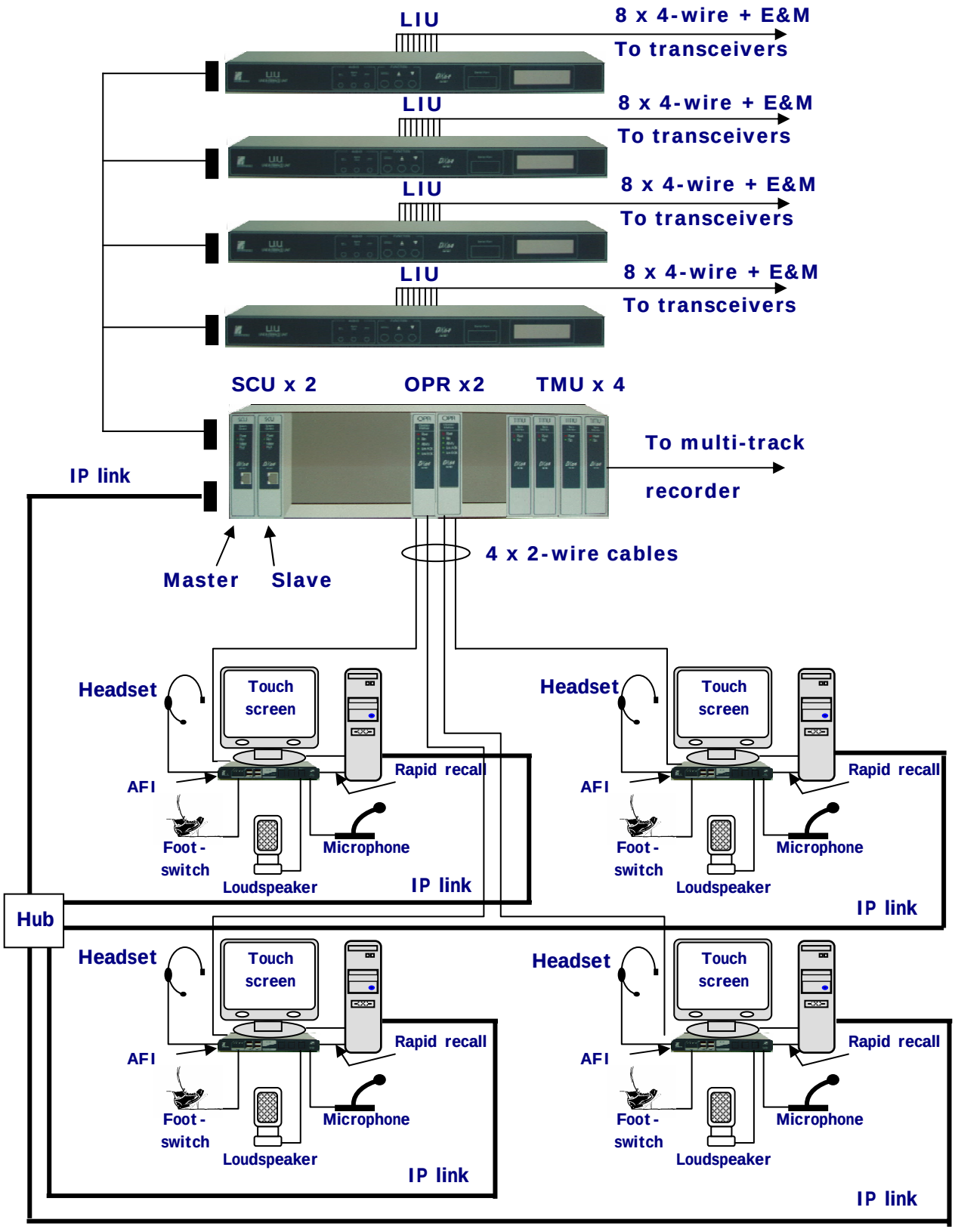


DX-64 Radio Management System (further expansion)

With the addition of a distribution panel, multiple Line Interface Units can be connected in parallel to the DX-64 system.

See the next page for a diagram showing a configuration that enables four operators to communicate on 32 channels.

DX-64 Radio Management System :
Example of a 4 operators and 32 channels.



Operation

Transmitting to Line

When the operator presses the PTT switch (attached to the AFI) :

- Audio from the microphone/headset input is enabled onto the first 'B' channel of the ISDN link and the PTT bit is set in the 'D' channel.
- The OPR detects this and generates a transmission request to the SCU by connection the audio from the 'B' channel to a pre-allocated slot in the AINFC stream and setting a PTT flag.
- The LCU in the System Controller Unit, on detecting the PTT request, checks the status of the 'selected' Foreground channels. For the channels that are free, it connects the AINFC PCM audio to each of the voice channel slots in the AOUTL stream and activates the relevant bits in the PTT slots.
- This is detected by the associated LIUs, which convert the PCM data to an analog voice signal that is then sent to the 4-wire E&M ports.

Transmitting to the PABX Extension (local connection to the AFI)

In the absence of PTT and when the telephone line is 'off-hook', the microphone/headset input is always directly connected to the PABX extension.

Receiving 'Radio' Audio

The OPR continuously monitors the Mute slots in the AOUTC stream. When a Mute is detected :

- The OPR checks the status of the 'monitor' and 'selected' settings against the active mutes. For matching channels, it builds a mixing command for the DSP. This tells the DSP which voice channels should be mixed together in the foreground and background groups.
- The DSP mixes the voice channels, according to specified levels, and sends these through the 'B' channels of the ISDN link.
- The mixed foreground and background channels are picked up in the AFI and played through the headset or external speakers.

Receiving 'Telephone' Audio

When the telephone line is 'off-hook', received telephone audio is transmitted to the OPR via the second 'B' channel in the ISDN link. The OPR mixes the telephone audio with other audio sources, taking into account radio/telephone priorities, and re-transmits it to the AFI in the foreground channel. The audio can then be heard in the headset or speakers as normal.

Sending a Selcal

Any operator using the DX64 Operator Console can initiate a Selcal :

- The operator enters the Selcal string to send and selects the 'Send Call' button on the display.
- A message is sent to the DX-64 via the network and is decoded by the SCU.
- The SCU, in turn, issues a command to each LIU that is associated with the 'selected' channels.
- Each LIU generates the Selcal tone sequence and provides a status report for the SCU. If any channel is busy at the time of the request then that channel is excluded from the transmission.
- Selcals can also be sent using a "speed-dial" facility.

Receiving Selcals

Received Selcals are broadcast to all operators. The LIU delivers received calls to the SCU, which forwards this information to all DX-64 Operator Consoles via the network. Each DX-64 Operator Console may display or discard the Selcal as required (depending on Selcal settings). Received Selcals are displayed in an on-screen queue.

Channel Workgroup Settings

An operator may set-up the 'monitored' (Background) audio group and the 'selected' (Foreground) audio group *using* the DX-64 Operator Console. Whenever channels are added to or removed from either of these two groups, a message is sent to the SCU via the network. The SCU updates its database of non-volatile settings and then relays the new information to the operator's OPR.

Up to eight workgroups can be created within the DX64 Operator Console. However, only two workgroups can be set active at any one time : one for Foreground and one for Background.

Linking Operation

An operator may set-up several link groups using the DX-64 Operator Console. Whenever a link group is modified, a message is sent to the SCU via the network. The SCU then updates its database of non-volatile settings.

Channel linking between voice channels is performed automatically by the 'Link Control' function of the SCU. When channels are linked, a Mute on one channel will cause a PTT transmission on all other channels in the link group. Linking is done on a "First-in-First-Served" basis. Therefore, all other "linkable" Mutes are ignored until the first Mute deactivates.

Telephone Patching

Using a third party Telephone Interconnect Panel, a communications channel can be established between a telephone line and another voice channel or an operator. It is a requirement that the telephone channel be allocated to one of the LIU ports and physically connected to that port.

To patch a telephone channel to an operator :

- The operator activates the required telephone channel using the DX-64 Operator Console. This sends a message to the SCU via the network.
- The SCU commands the appropriate LIU to take the telephone 'off-hook' by sending a DTMF tone sequence.
- Once the line is 'off-hook', an operator can dial the desired telephone number or use a "speed dial" facility.
- The operator is then able to talk to the telephone party using the standard PTT control. Whilst the patch is active, the telephone channel becomes part of the 'selected' audio group.
- Incoming calls can also be accepted by connecting to the appropriate phone channel.

To patch a telephone channel to another radio channel :

- First, follow the previous steps for operator patching.
- Then add the telephone channel to one of the link groups, as in normal linking.

Level Adjustments

The level of the 'monitored' and 'selected' audio groups to an operator can be adjusted using the DX-64 Operator Console. When the operator adjusts either level the following occurs :

- A message is sent to the SCU via the network.
- The SCU updates its database of non-volatile settings and then relays the new audio level setting to the operator's OPR.
- The DSP will automatically use the new level setting when mixing received audio.

The DX-64 Operator console

The DX64 Operator Console enables a user to control and monitor the DX-64 Radio Management System.

Four main functions are provided :

1. Select Foreground and Background channels and adjust volume levels.
2. Display and generate Selcals.
3. Set-up and edit channel link groups.
4. Access to external telephone channels.

The program is designed to run under Windows 98 and XP Pro. Communication between the program and the DX-64 is via the network only. Whilst operation with a mouse and keyboard is supported, the user interface is designed primarily for use with a touch-screen.

The option for PC-based 'Rapid Recall' logging requires an audio connection between the AFI and the sound card of the PC workstation.

Additional facilities include the ability to perform AMU-like functions :

- *Select TV or AM/FM music.*
- *Set the audio priority of the local PABX extension relative to the radio.*
- *Activate 'Rapid Recall' logging.*
- *Playback a portion of a 'Rapid Recall' recording.*

Warning *:*

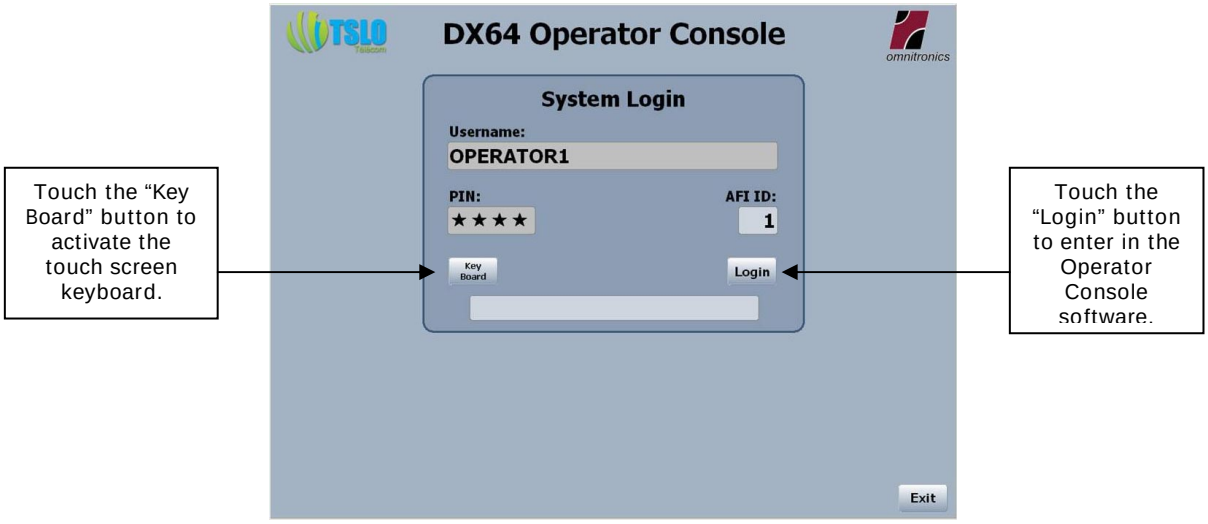
The software windows described hereafter are simply examples of the different ways the Operator Console may look like. In fact, each DX-64 is customized according to customer specific needs starting from a common software architecture, but with windows presentations that may vary very much from a customer to another.

In order to illustrate this, in the following chapter, an example of the Operator Console will be described in detail, and two variants of will be shown at the end of the document.

In addition, the system which is presented here has only eight available channels and only one LIU. It is then a minimum configuration example, in terms of radio links.

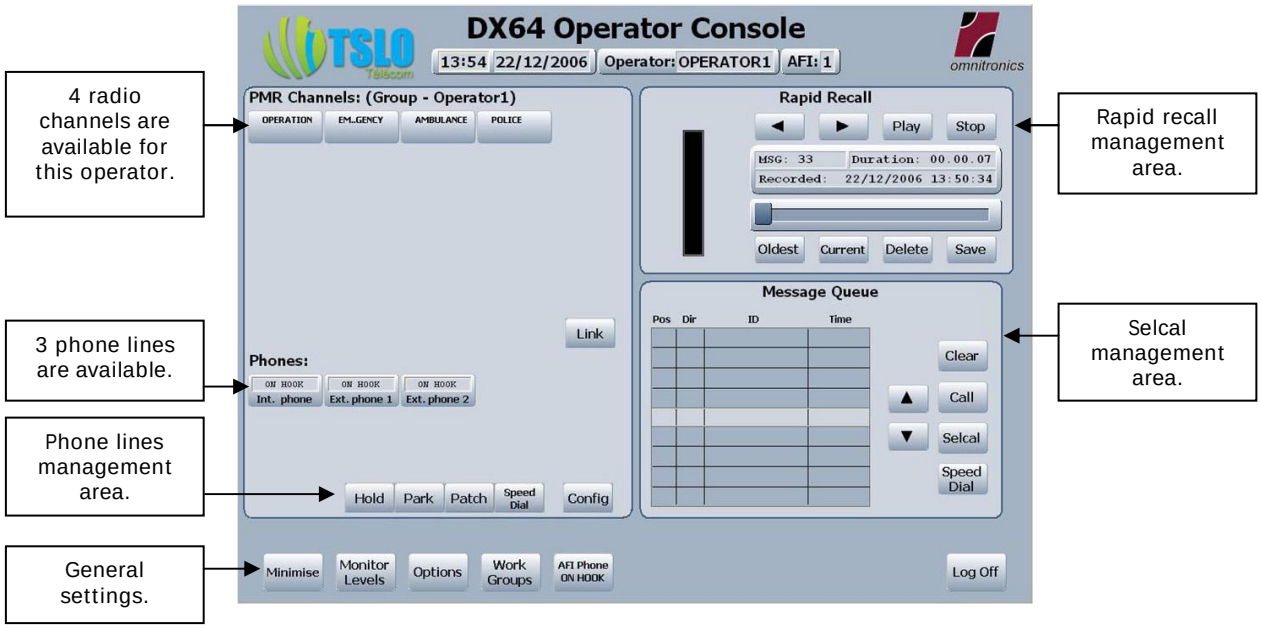
Logging in at 'Operator' level

Touching the 'Key Board' button will activate the touch screen keyboard. At the prompt type in the operator's user name followed by the operator's PIN number and the AFI identity number, then touch the 'Login' button. Alternatively use the computer's mouse and keyboard to navigate the screen.



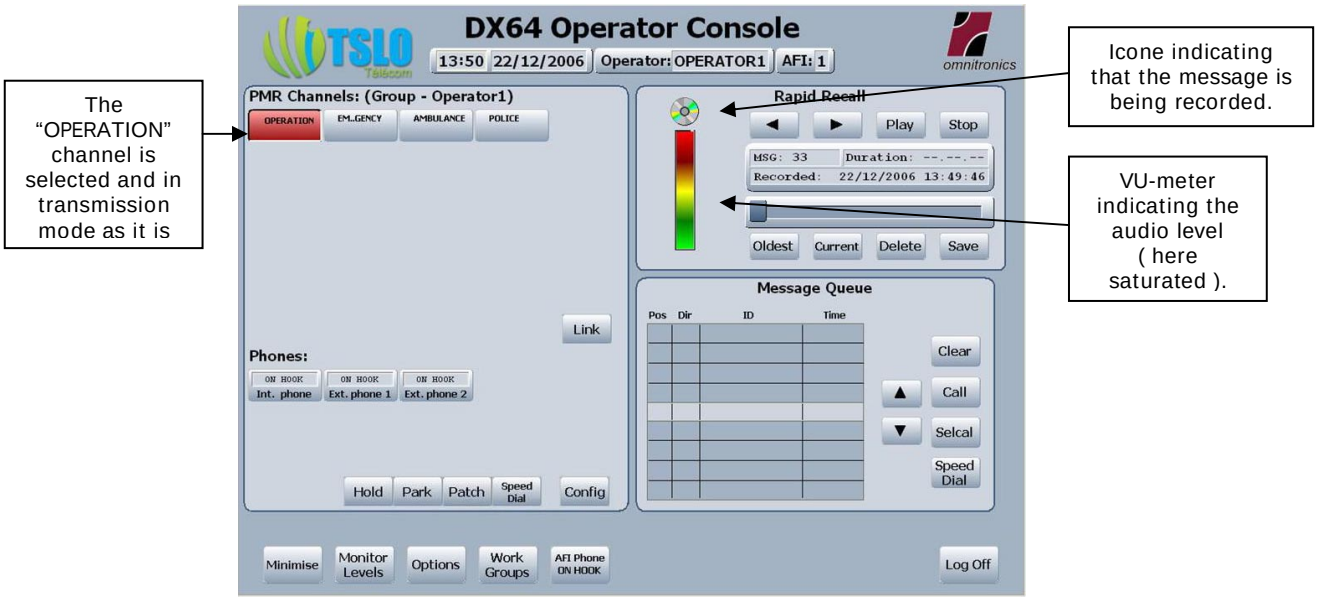
After having logged in, the following window will appear :

Warning, please keep in mind that all the window samples presented in this document are only examples.



Description of the available options at 'Operator' level.

In this example, three telephone lines have been validated and four radio channels have been configured, these configuration having been done via the Configuration and Maintenance Utility software which is described in another document. Here, no channel has been selected as they are all light grey coloured. If one touches the "OPERATION" button, this button will turn to dark grey colour, then allowing the operator to transmit on this channel.



Buttons colours :

Buttons with text that is "greyed out" are unavailable at this level of access. This is not shown on this view. See for instance the "Overwrite" button in the "Operator" window here after.

The channels which are available to be controlled (listening only, in the Background) appear in light grey, the channels which have been selected (in Foreground) are dark grey coloured.

Buttons which are GREEN coloured have at least a channel in reception mode in case a button corresponds to a group of channel. Here, as all buttons are related to an individual channel, a green button means simply that the coresponding channel is in reception mode. This is presented later in other views. The GREEN colour is FLASHING in order to point out an incoming call.

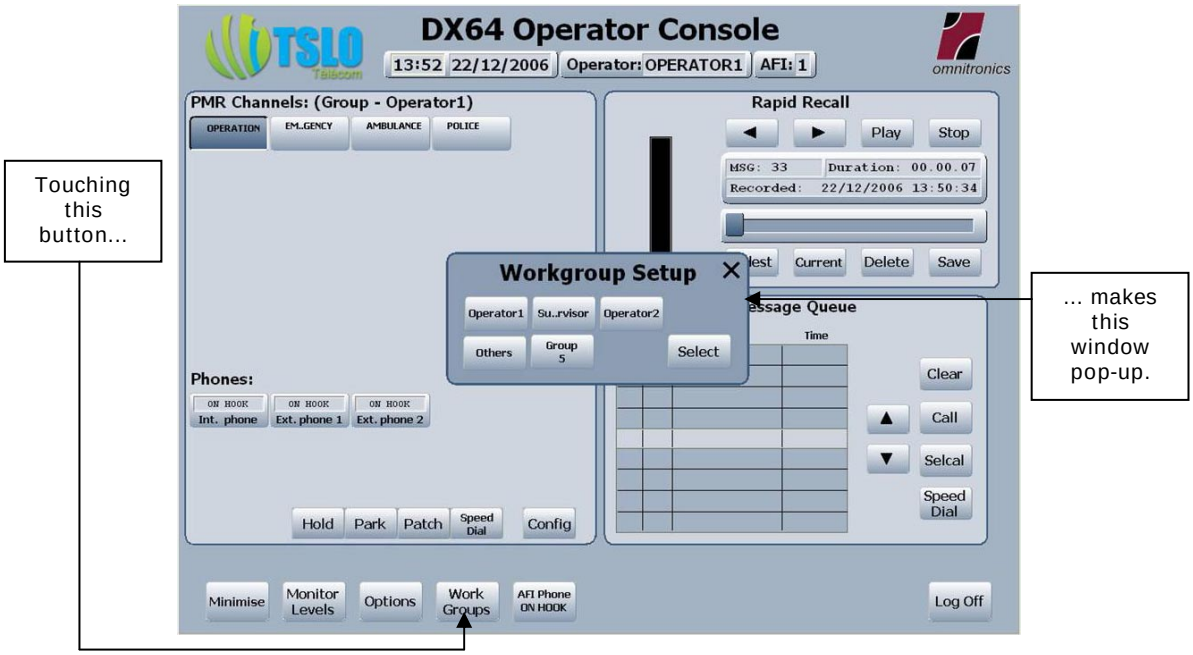
Those coloured RED indicate that the related channel(s) is (are) in transmit mode (PTT). The "OPERATION" channel is thus in transmission mode on this view.

The ORANGE colour applies to phone channels used by other operators.

In this software version, Background and Foreground channels notions are equivalent to respectively unselected and selected channels. The operator Is then controlling all channels available on his Console. See at the end of this document both other software versions with completely different notions of Foreground and Background whichh apply to groups of channels.

Work Groups :

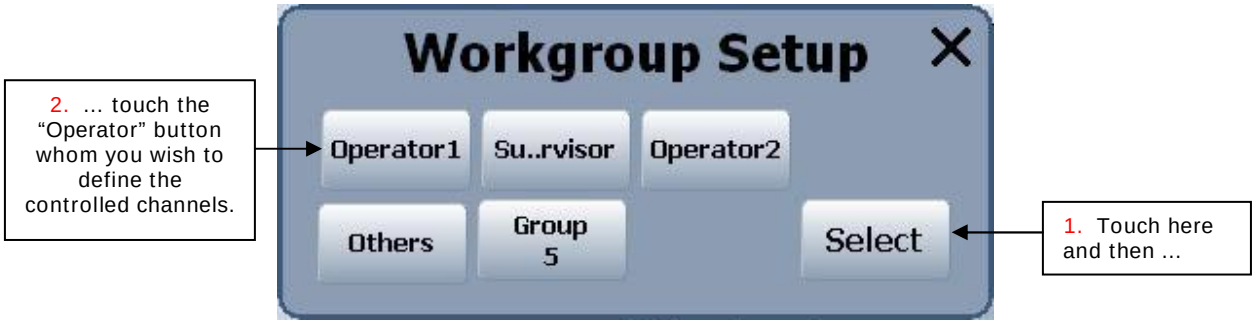
Touching the "Work Groups" button at the bottom of the "DX64 Operator Console" window will make the following window pop-up.



In this pop-up window, one can have access to both following functions :

1) The definition of the channels allocated to a specific work group.
2) The selection of a work group.

The second function needs only to touch the work group that shall be operated. The first function is accessed by means of a first touch on the "Select" button, and then on the work group which one wants to define or modify.



This leads to the following pop-up window :

The selection/deselection of a channel is made by touching the toggle channel button. Here above, the "Operation", "Emergency", "Ambulance" and "Police" channels are selected as they appear in dark grey colour, one touch on one of these channel buttons will deselect the concerned channel whch wil then appear again in white colour. Touching the "Clear All" button will deselect all the channels.

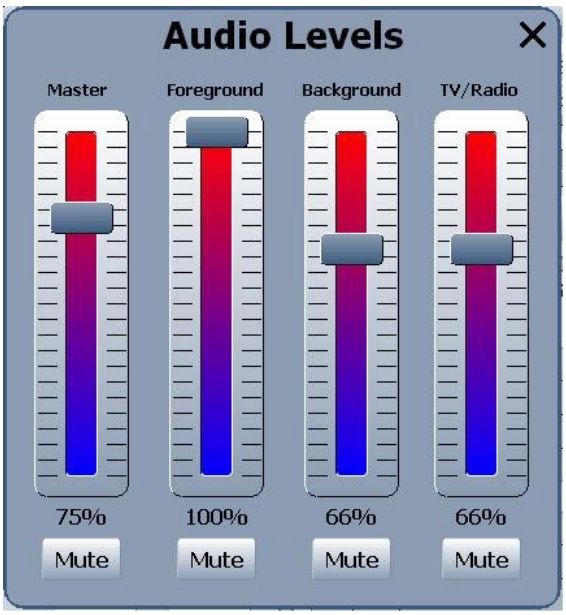
Touching the "Apply" button will save the changes of the work group.

It has to be noticed that this makes all the here above selected channels available to the operator, but then, in the Operator Console window, the operator must select among these channels the ones on which he intends to be able to transmit.

If a channel is reserved for a specific use other than radio, as for instance FM radio or phone channel, it is not possible to select it, and if the operator trys to select it anyway, the following warning window will pop-up.

Audio levels adjustment :

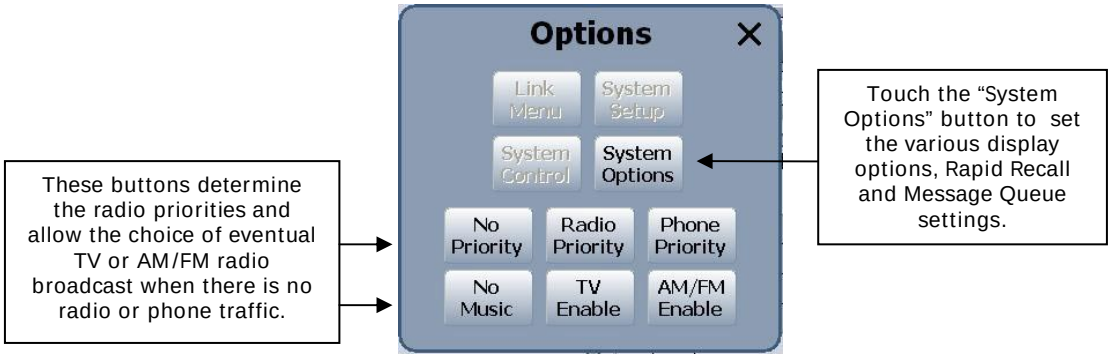
Touching the second button at the bottom of the Operator Console window "Monitor Levels" will make the following window pop-up :



Foreground and background and TV/Radio audio levels can be set to the levels desired (or muted) by the action of moving the slider controls to the required positions in the “Audio Levels” pop-up window.

The “Master” slider control in the “Audio Levels” window has overall control of all levels set in the pop-up window. In the above example the “Master” control is set at 75% of maximum audio level, therefore the foreground and background audio levels set in the pop-up window will be adjusted to 75% of the levels indicated. Here for instance, the background level will be a bit less than 50% % (0,65 x 0,75 = 0,4875). Select a “Mute” button to mute an individual audio level. Select the “Master” mute button to mute all audio.

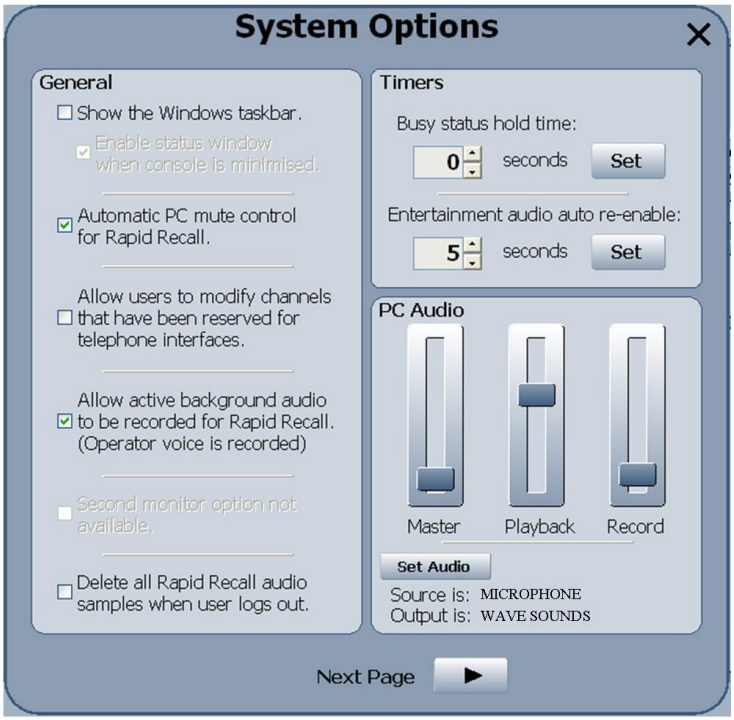
Fenêtre Options :



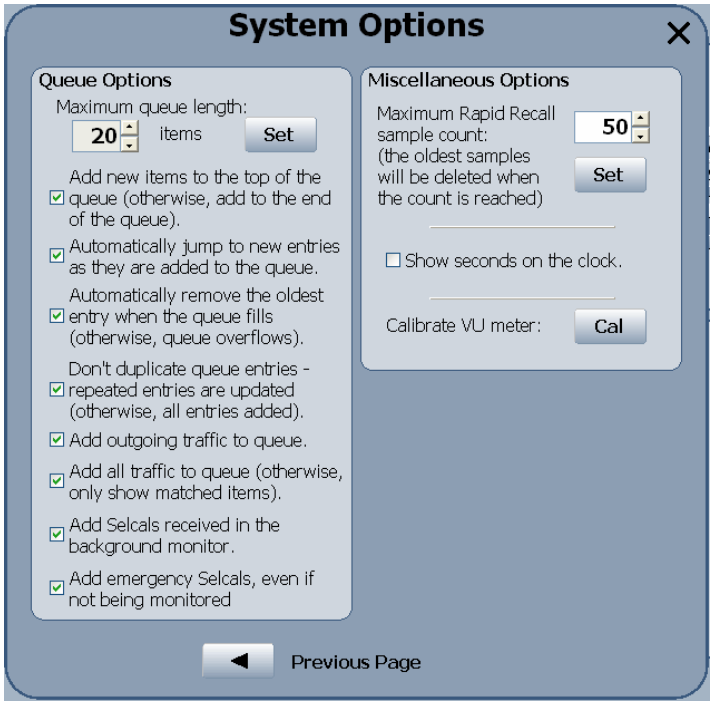
This pop-up windows opens on touching the "Options" button of the Operator Console window and presents, at this operator level, three light greyed buttons which are the "System Control", Link Menu" and "System Setup" buttons that may be accessible only at upper levels, supervisor for both first ones and administrator for the last one.

Note : As it is reminded on several occasions in this document, the access rights, as well as the GUI (Graphical User Interface) are determined according to the customer needs. Then, the rights of each level, operator, supervisor and administrator that are presented here may be extended or restricted depending on customer request.

Touching the "System Options" button will make pop-up the following window, allowing to set up specially the various parameters of display, Rapid Recall and Message Queue.

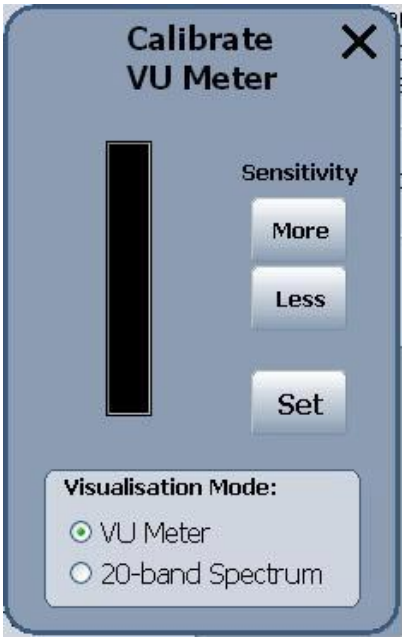


The available options are here obviously explained in such a manner that there Is no need of more specific information. Touching the "Next Page" button will make appear the following window :



The operator may then come back to the previous page or close this window by touching the upper right closing cross as well as it is done in usual Windows XP applications. Reminder, when the word "touching" is used, it may be understood that it can be done the same way using the mouse left click.

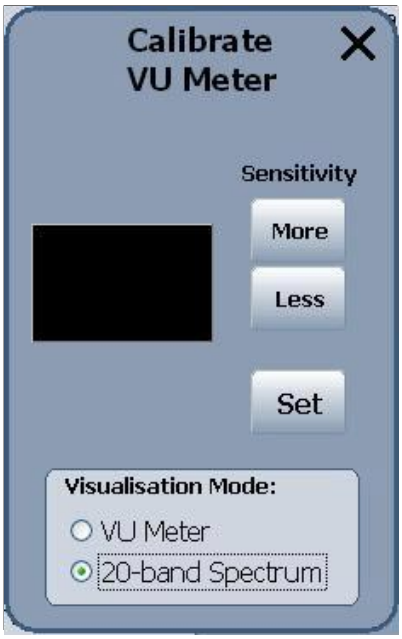
The Vu meter to be calibrated is the one that appears in the Rapid Recall sub-window in the main Operator Console window. Touching the "Cal" button leads to the following pop-up window :



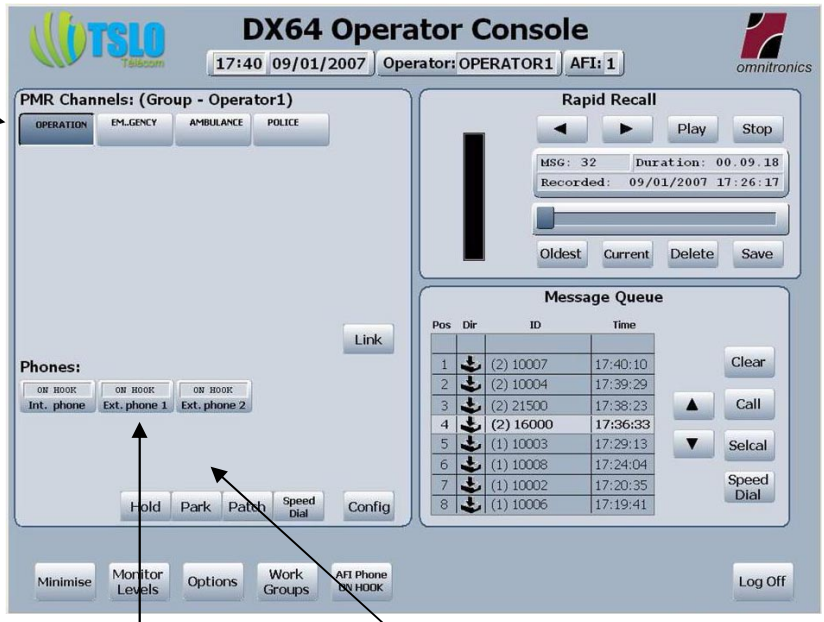
The calibration is made by speaking in the microphone and simultaneously setting the sensitivity by means of the "More" and "Less" buttons. Then, the setting is validated by touching the "Set" button.

The visualisation mode, VU meter or 20-band spectrum, is selected at the bottom of the window. If the left side window is presented at the screen, ticking the 20-band spectrum will make the right side window pop-up. ⟶

Then tick the VU meter to come back to the left side window if desired.



Let us close all stacked pop-up windows to come back to the Operator Console :



Radio channels control area.

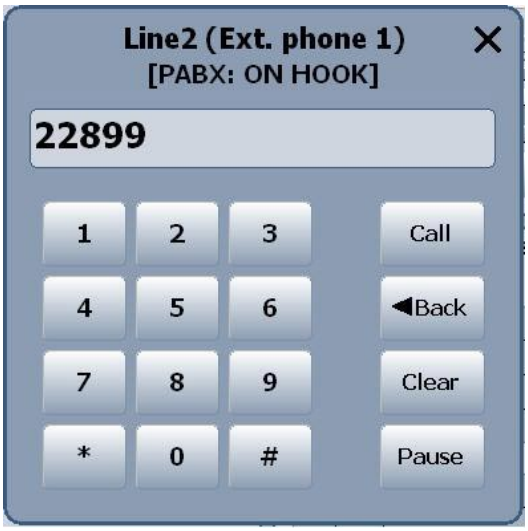
Touching the "OPERATION" button will deselect this channel, and touching any other(s) will select it (them).

The operator may select as many channels as he wishes within the available allocated channels, here four of them. When the operator pushes the PTT button, his voice is transmitted on all the selected channels. On the receiving way, the non selected channels are heared as background channels.

In order to launch a phone call, touch one of these three buttons, this will make the following window pop-up ....

Phone calls control area.

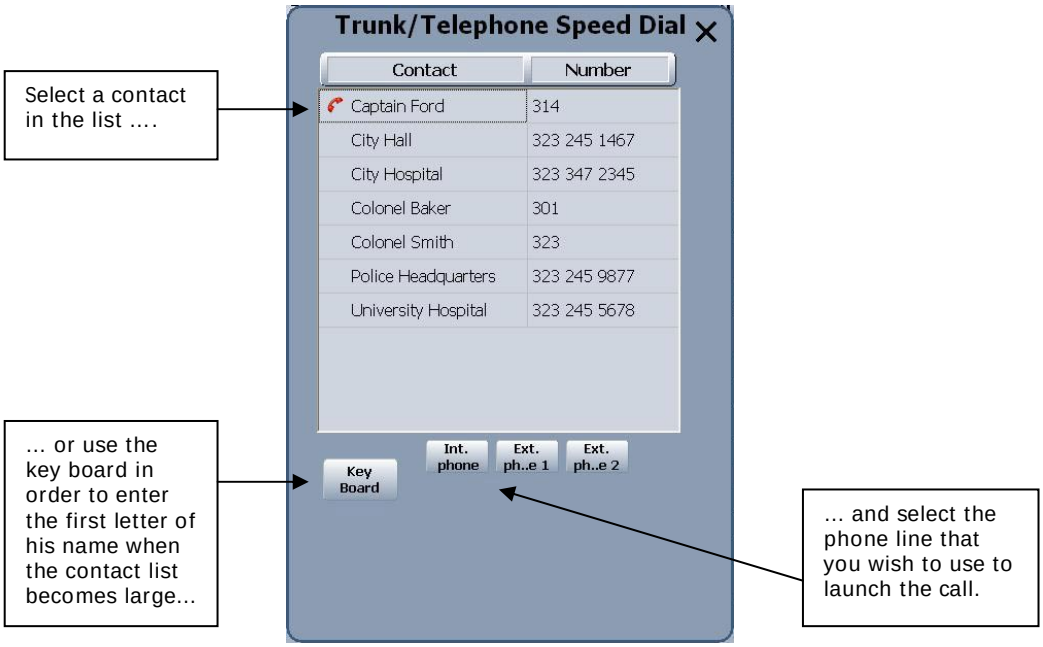
Phone call launching :



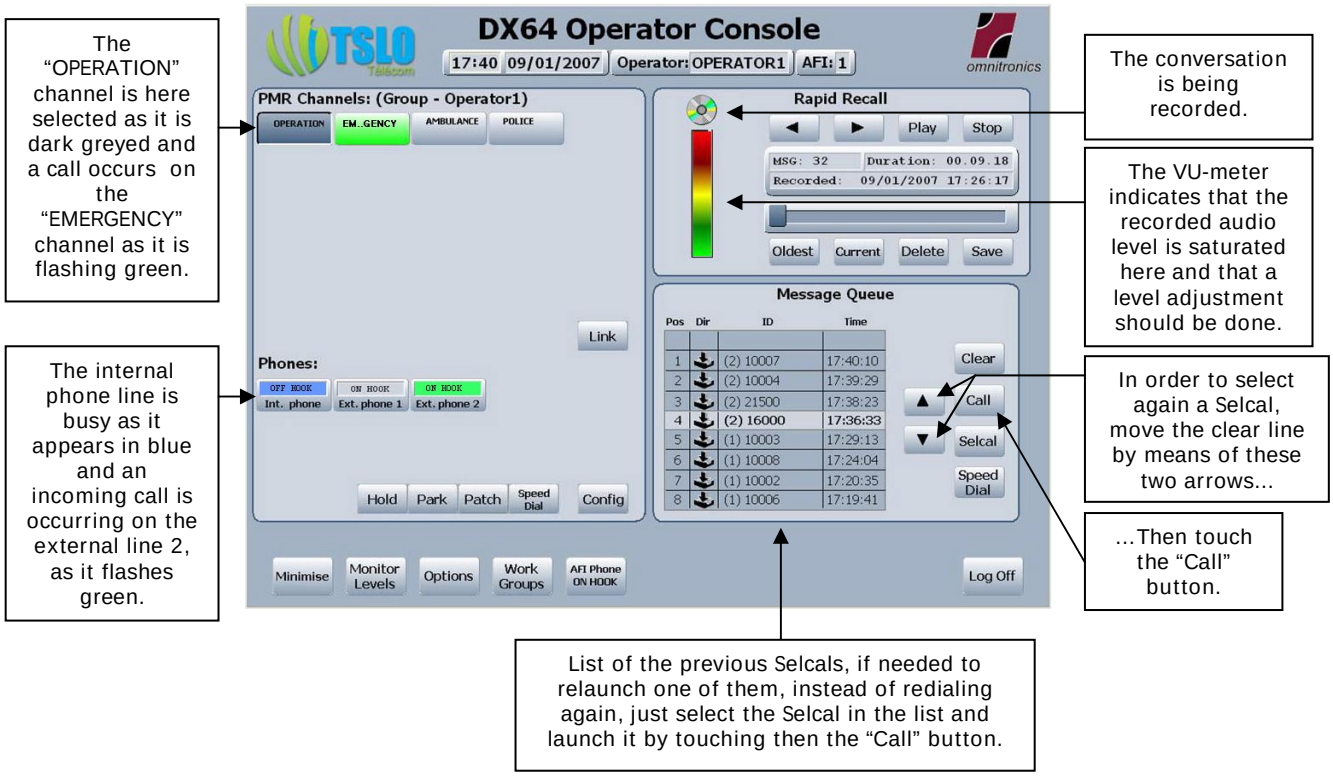
The key board allows dialing the phone number, two keys allowing to clear off the whole number or the last digit, the call being launched by touching finally the "Call" button.

The "Pause" button allows inserting a pause between two digits as it is required often when the operator gets access to the telephone network through a PABX.

A phone call may also be launched by touching the "Speed Dial" button of the phone call control area (that should not be mixed up with the Selcal "Speed Dial" button, in the Message Queue area). This will lead to open the following window :

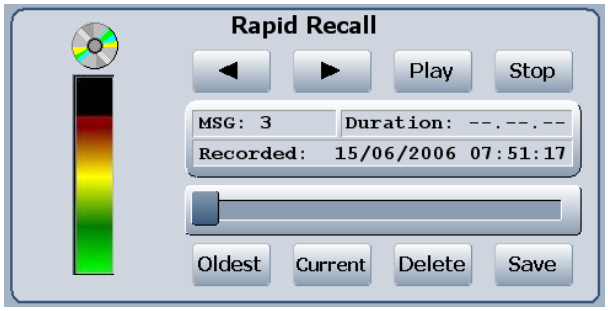


Back to the Operator Console :

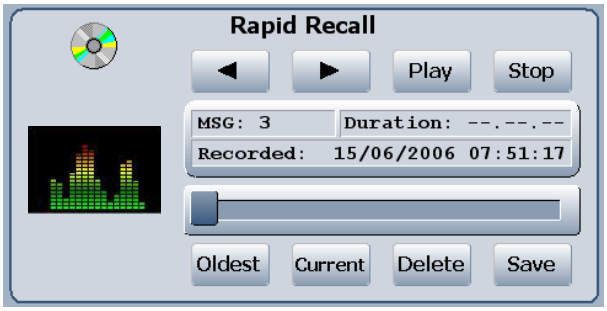


Rapid Recall :

The display can represent a VU meter or a 20-band Spectrum Analyser.



VU Meter



20-band Spectrum Analyser

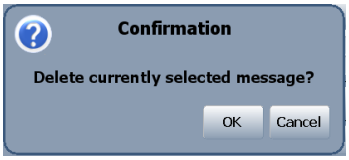
Whether it is being sent or received, all audio is recorded. Visible in the 'Rapid Recall' window is an indication of the duration of the sample of recorded audio and the date and time the recording was made. Each sample can be searched for, selected, replayed or deleted using the control buttons in the 'Rapid Recall' window.

Saved Audio

Recorded audio can also be saved to be retrieved at a later time. Previously saved audio will be tagged by the letter (S). See **MSG**: (**S**)**1** shown in the 20-Band Spectrum Analyser representation above.

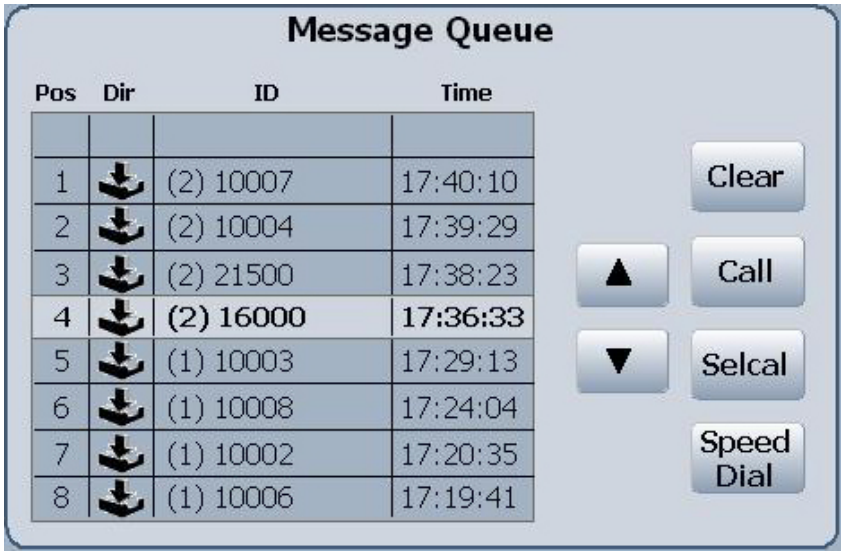
To delete a previously saved message **MSG** (**S**), select the message to be deleted followed by the 'Save' button. A pop-up window will ask for confirmation to **Un-save** the message. To continue select OK. This action will remove the (S) tag from the message allowing the message to be deleted when using the 'Delete' button to delete other 'un-saved' messages.

A similar pop-up window will ask for confirmation when attempting to delete a currently selected **MSG (S)** message when choosing to delete the message by selecting the 'Delete' button.



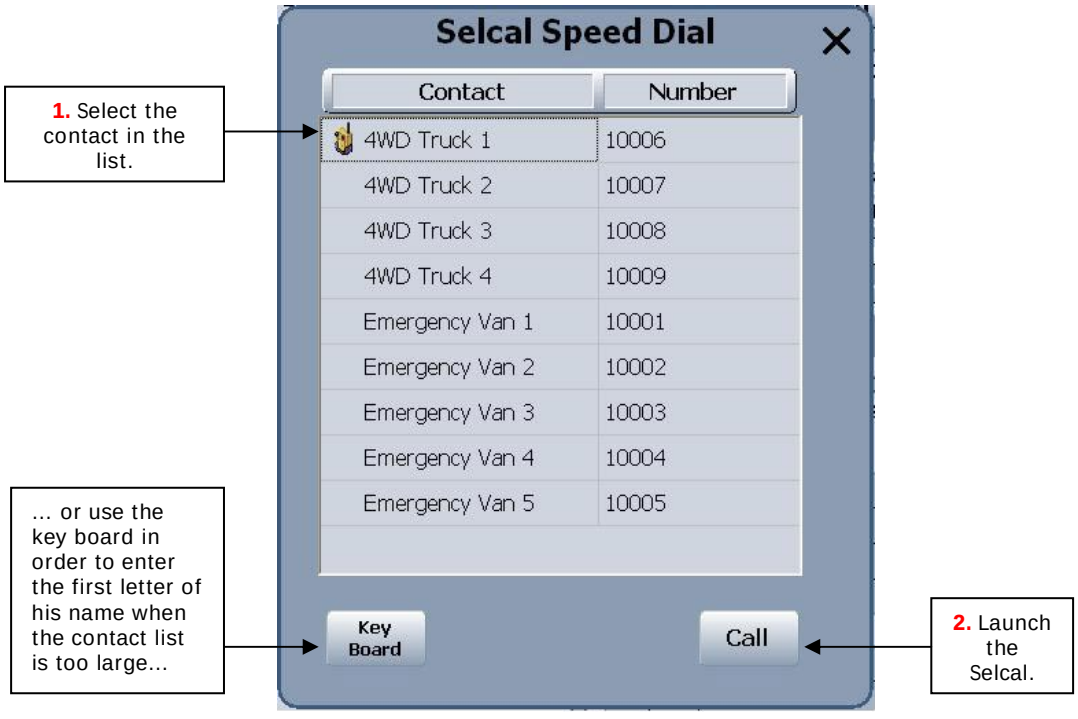
To delete 'un-saved' messages, selecting the 'Delete' button will ask for confirmation to delete the currently selected message or to delete all messages. Messages tagged with the letter (S) will not be deleted.

Message queue (Selcals) :



Located at the bottom right part of the Operator Console, this sub-window allows the operator to manage the Selcals. This list allows to repeat a Selcal in a very simple manner avoiding to search again in the speed dial directory or to directly redial the full Selcal number. This is done by browsing in the list by means of the "Up" and "Down" arrows, allowing to select the Selcal to be repeated (the clear line) and just touch the "Call" button to relaunch the concerned Selcal. If, after having selected a Selcal, one touches the "Clear" button, the concerned Selcal will be suppressed from the message queue.

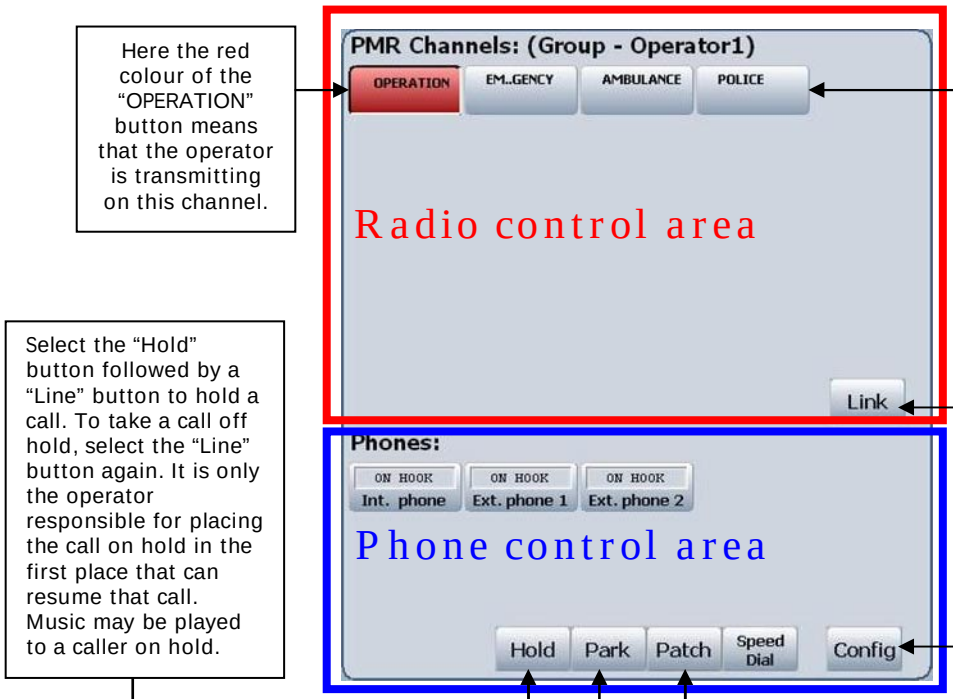
If one wishes to launch a Selcal that does not appear in the list, two different means are available to the operator. Firstly, if the Selcal has been previously entered in the Selcal directory, the simplest way is to touch the "Speed Dial" button and this will open the following window :



If the contact has not been entered in the Selcal directory, use direct dialing by calling the following window with a touch on the "Selcal" button :

This key board is used exactly the same way as the phone one.

Sub-window radio channels and phone lines :



Here the red colour of the "OPERATION" button means that the operator is transmitting on this channel.

The three other channels being light greyed are background channels.

Touching the "Link" button will lead to a new pop-up window allowing to link several radio channel together for a temporary need and thus allow some people working on different channels to be anyway in communication.

Select the "Hold" button followed by a "Line" button to hold a call. To take a call off hold, select the "Line" button again. It is only the operator responsible for placing the call on hold in the first place that can resume that call. Music may be played to a caller on hold.

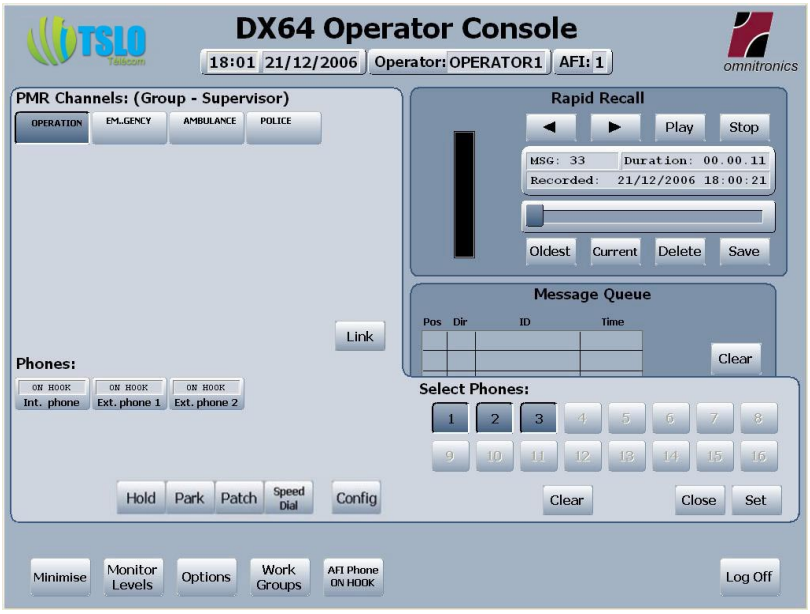
Touching this button will extend the "phone control area" on the right in order to reveal the phone lines configuration area.

To park a call, select the "Park" button. A call that is "parked" may be taken by any operator available to take the call. To take a call off park, select the "Line" button again.

Touching this button will open the "phone patch" window allowing to link a phone line to a radio channel.

Note : If a call has been "held" or "parked", touching the corresponding phone line key or the respective "Hold" or "Park" button again will reconnect the call. Touching the "Park" button when a call has been previously "held" will change simply the call waiting status from "held" to "parked". Same effect from "parked" to "held".

Here is the result of touching the "Phone control area" "Config" button :



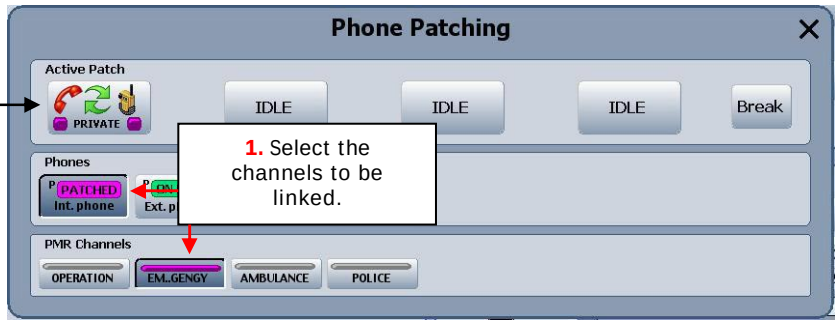
Extension of the “Phone control area”.

The lines 1, 2 or 3 may be deselected by a simple touch on the corresponding toggle button. A second touch on the same button will reselect the concerned line. When a line is deselected, the corresponding phone button in the left part disappears.

Note : The number of available telephone lines, as well as the total number of channels, is defined by means of another software, the Configuration and Maintenance Utility (CMU). Consequenty, in the here above windows, one can select only the maximum number of phone lines defined with the CMU, that is here three. The system may manage up to 16 phone lines, but the 13 remaining lines are light greyed and cannot be validated.

Once the new configuration is made, touch the "Set" button, this will validate the new choice and close the "Phone control area" extension. If no change is made, just touch "Close" to hide the configuration extension. "Clear" will deselect all selected lines.

Phone patching window :



2. The button switches from “Idle” to “Active Patch” position.

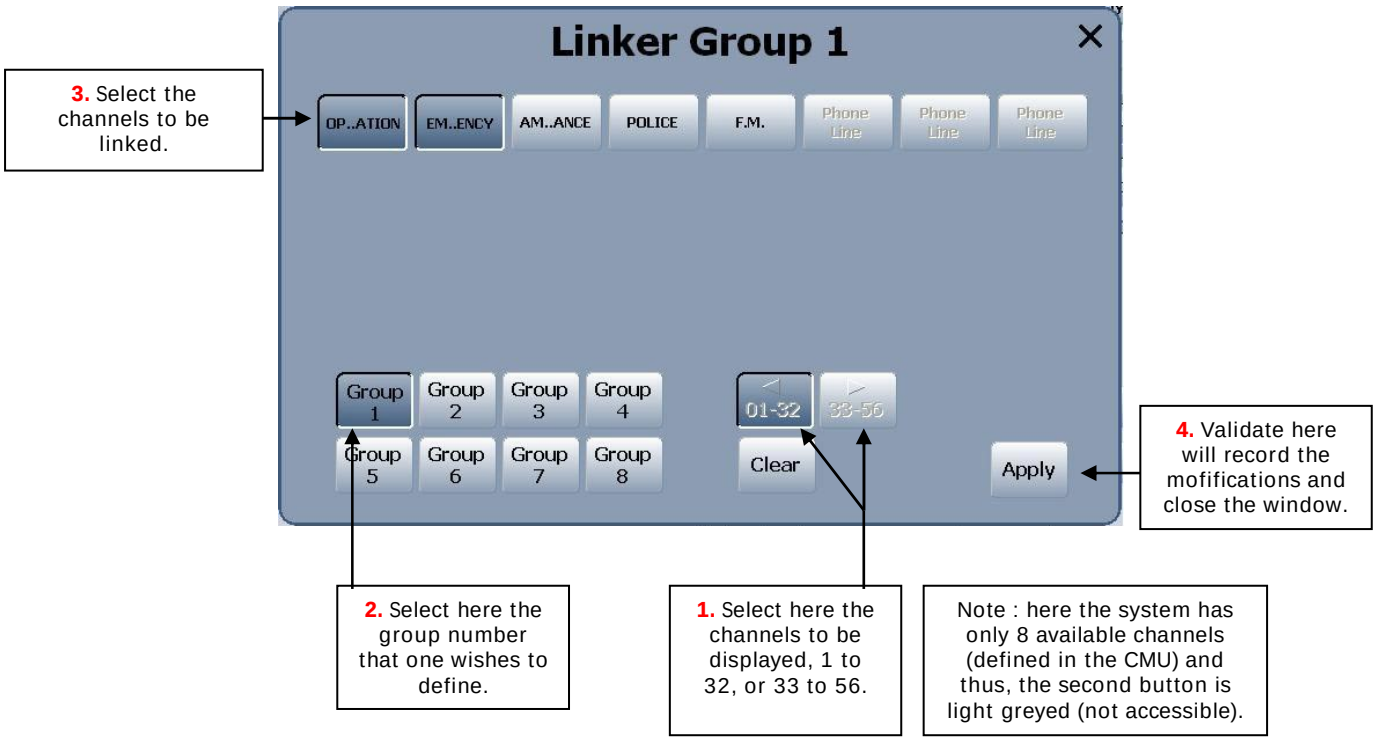
1. Select the channels to be linked.

In order to patch a phone line to a radio channel, first select both channels to be linked.

In the case another operator would have selected one of these concerned channels, a warning message will be displayed informing the operator that other users are connected to this channel and asking for operator confirmation. After confirmation, a button of the upper line will switch from

"Idle" to "Active Patch" position. To clear the patch, touch the "Break" button followed by the concerned active patch button.

Link window (radio) :

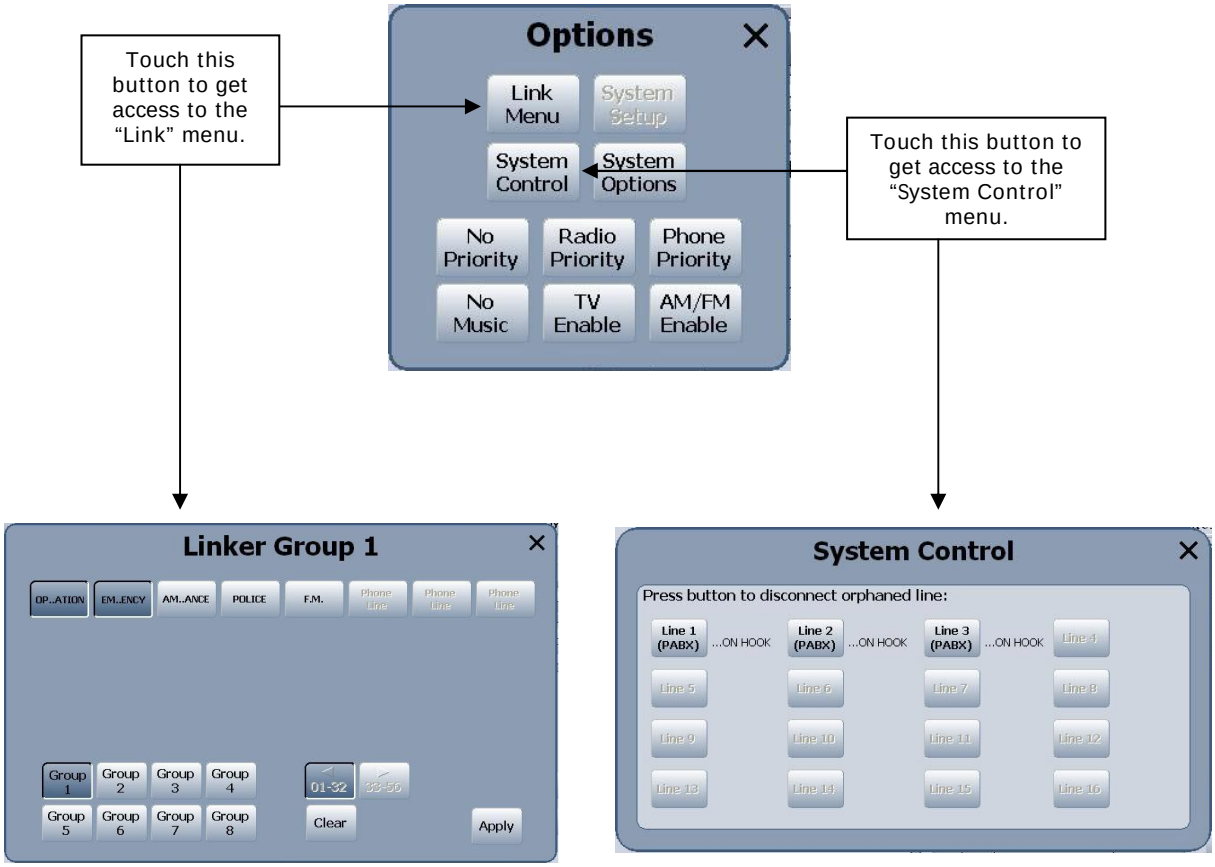


Eight different groups of linked channels may be defined. The "Clear" button, as well as in other windows, allow to clear at once all the selected channels and is then used to end the link when it is not needed anymore, followed by a touch on the "Apply" button.

Logging in at Supervisor level

For a complete understanding of the options available at supervisor level it is advisable that the section titled “Logging in at Operator level” is read first.

In the "Options" menu, two supplementary buttons are validated for this level.



The "Link" menu

In this (demonstration) version, this "Link" menu is the same as the one that is accessible at the operator level. It is simply shown here that any function may be reserved to higher level, if the customer wishes it. In this case, the "Link" button would be suppressed obviously from the operator console to let this function only accessible from the supervisor level.

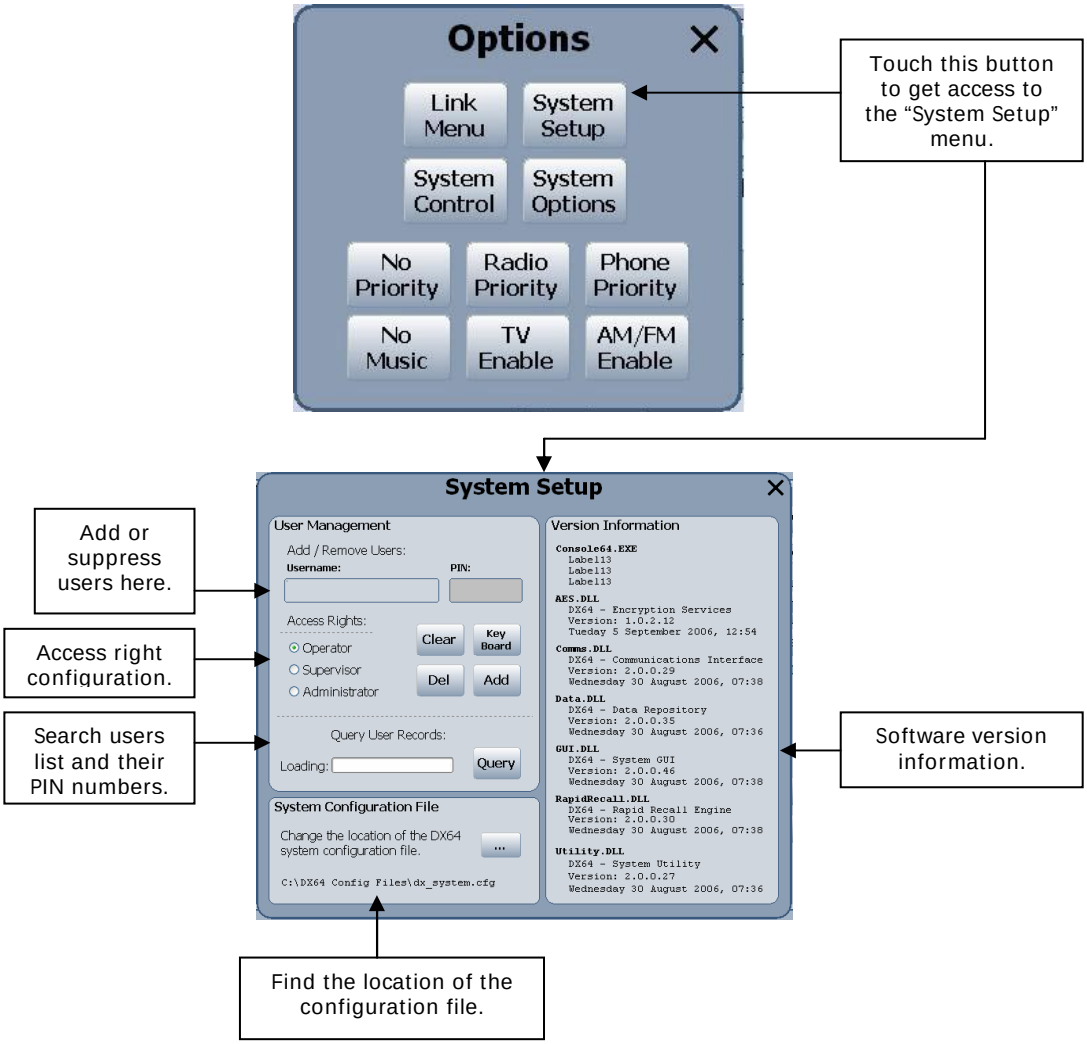
The "System Control" menu

This allows the supervisor to disconnect a phone line which could be unavailable for a particuliar operator. This situation may happen if the phone line were in use while the Operator Console O.S. would bug. In such a case, it is the only way to make the concerned phone line available again to the operator.

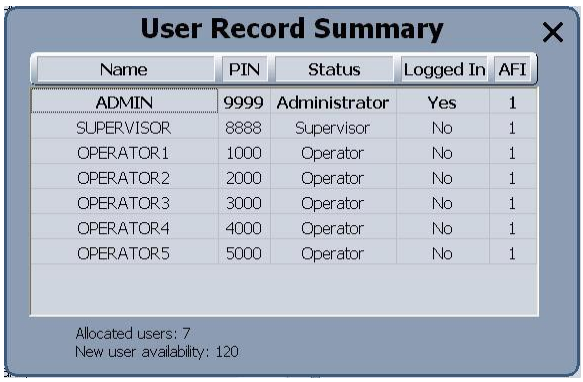
Logging in at Administrator level

For a complete understanding of the options available at administrator level, it is advisable that the sections titled “Logging in at Operator level” and “Logging in at Supervisor level” are read first.

In the "Options" menu, only one supplementary button is made available for this level.

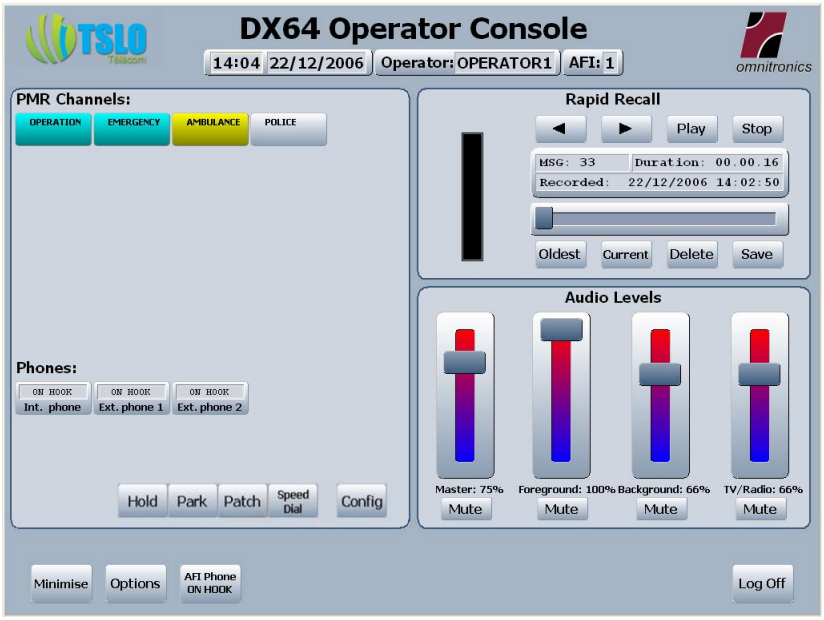


In order to get the list of the recorded users of the system, touch the "Query" button and the following window will appear :



Knowing the list of the users and their PIN numbers, the administrator may modify some entries and suppress or add some users at any access right level by coming back to the preceding window.

Second example of Operator Console :

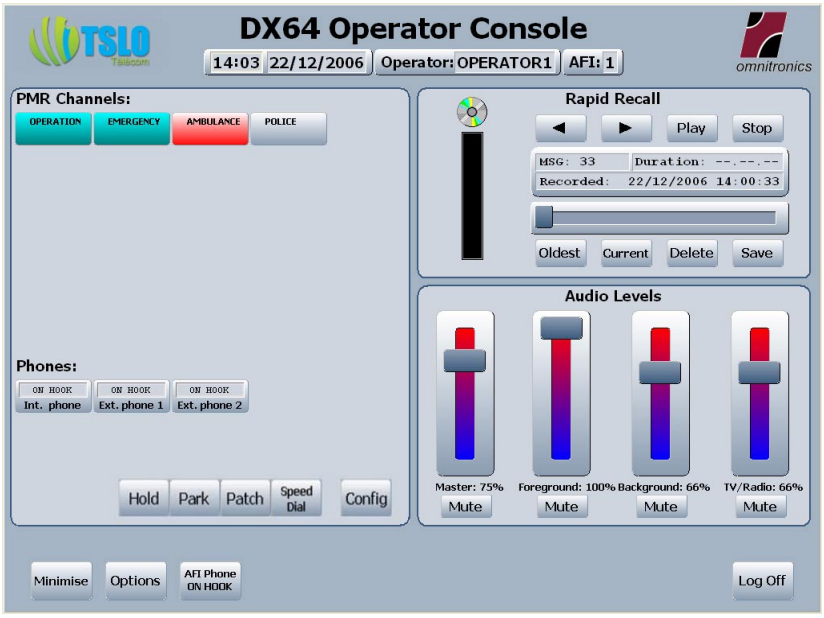


In the first Operator Console version described up to now, the available channels for the operator could have only two different statuses : background channel, if not selected, and foreground channel if selected by the operator. Here, in this second version, the channels may have three different statuses.

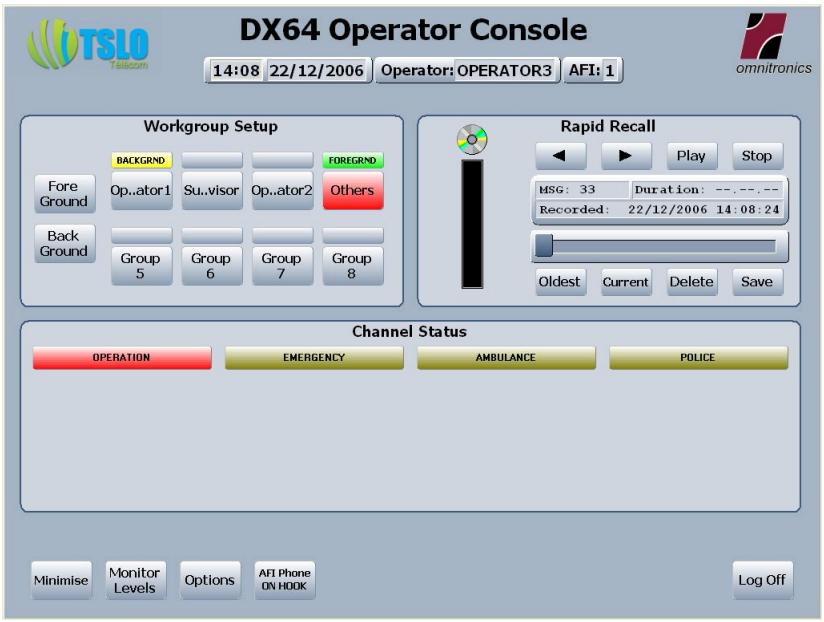
The first situation is "not selected", in this case, the operator cannot transmit neither receive anything on this channel. Here above, it is the case of the "Police" channel. By touching once a channel button, the colour of the button turns to blue which significates that the channel is selected as a background channel. So, the operator may listen to the conversations taking place on those channels, but cannot transmit. Then, by touching one more time a background channel, the channel button colour turns to yellow, and the channel becomes a foreground channel on whichh the operator may transmit by simply pushing the PTT switch. If the channel button is touched a third time, then it will go back to the "not selected" status, and thus inactivated.

It may be noticed that in this version, the customer preferred to get always available on the Operator Console the "Audio Levels" menu instead of the "Message Queue" in the first version.

When the PTT switch is put on, the channel button colour turns to red like in the first version. As well, in case of an incoming call, the concerned channel button will flash in green.



Third example of Operator Console :



Finally, in this example, the organisation is quite different. The operator manages Workgroups instead of single channels. One can see on this screen shot that the workgroup "Others" is selected as the foreground group, and the workgroup "Operator1" is selected as the background.

In the bottom "Channel status" sub-window, the "OPERATION" channel is in transmitting mode and it is the only channel of the "Others" workgroup. The three remaining channels, "EMERGENCY", "AMBULANCE" and "POLICE" belong to the "Operator1" workgroup.

Note : Features described in this document may be submitted to changes. Please ask TSLO Télécom for confirmation of these features before ordering. Version 1.0 from January 12th 2007.