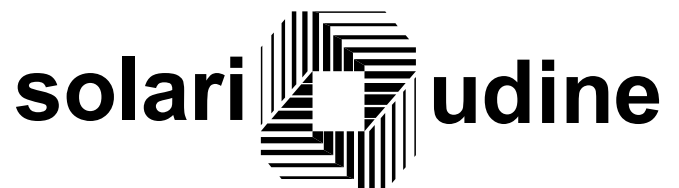

Public Information System for SBC devices

STUDIO SHADE - CALIFORNIA (C06V01)

Functional Specification and Operator Handbook

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1. INTRODUCTION

This document describes the basic architecture and the operational features of the **Message Manager** application, designed in order to define the information to display in to a network of devices based on SBC technology and to handle the distribution of them in to the network.

The information to display are collected on a Control Centre Unit (CCU) and transmitted and displayed on one or more Remote Display Units (RDU).

The link between the Control Centre Unit and the Remote Display Units is base on LAN networks and is handled via the TCP/IP protocol.

The information handled are:

- data concerning the messages to display (e.g. texts of messages and rules for the messages alternating);
- data concerning the devices working hours (e.g. opening and closing times, visiting hours).

The Message Manager application is the user interface of the Control Centre Unit.

This document is divided into the following chapters:

SYSTEM ARCHITECTURE

it describes the basic architecture of the system and the communication interface.

HOW TO INSTALL THE APPLICATION

it describes in details the procedure for installing, on the Control Centre Unit, the Message Manager application.

THE SYSTEM FUNCTIONS

it describes in details the user interface designed in order to define the data handled by the system, to perform a network connection with a remote device, to send it specific data and commands and to control in real-time the connection status of all remote devices.

UTILIZED ACRONYMS

CCU	Control Centre Unit
RDU	Remote Display Unit
LAN	Local Area Network
TCP/IP	Transfer Control Protocol / Internet Protocol
SBC	Single Board Controller

2. SYSTEM ARCHITECTURE

2.1 INTRODUCTION

The system architecture is based on the client/server scheme and it includes two type of systems:

- one server (i.e. the Control Centre Unit) providing all the services required by the clients,
- one or a network of clients (i.e. the Remote Display Units) connected to the Control Centre by means of a LAN network and requiring services to the server.

The link between the CCU and the RDU systems is handled via the TCP/IP protocol.

The Control Centre Unit collects, from the system operator, the data (messages to display and rules for the message alternating) relating to the whole network and it transmits them to the Remote Display Units.

Each Remote Display Units receives, from the Control Centre Unit, the configuration data and it handles the acquired information displaying them.

The system architecture is of distributed intelligence type. As a matter of fact, the system is made up of a single configuration centre and one or more networks for the diffusion of the information, composed by a set of visualisation devices each provided with a PC located inside the display.

2.2 THE CONTROL CENTRE

The CCU is the system supervisor, and it provides all the functions for a complete handling of the connected devices.

All the data handled by the system are defined on the Control Centre Unit and distributed on the Remote Display Units network for their management.

The following table describe the hardware and software CCU's features.

HARWARE REQUIREMENTS	
CPU	PENTIUM
RAM MEMORY	32 MB
INTERFACE	ANY PHYSICAL INTERFACE FOR A LAN OR WAN CONNECTION (MODEM, GSM TERMINAL ADAPTER, ETHERNET NETWORK CARD)
SOFTWARE REQUIREMENTS	
OPERATING SYSTEM	ANY WINDOWS CLASS OPERATING SYSTEM (WINDOWS 95, 98, NT, 2000)
APPLICATIVE PACKAGE	THE SOLARI PUBLIC INFORMATION SYSTEM FOR SBC DEVICES SERVER PACKAGE

2.3 THE REMOTE DISPLAY UNITS

The RDU systems are intelligent visualisation devices, based on SBC technology and controlled by a PC located inside the display.

The embedded PC offers the advantage of great flexibility and high future expandibility and allows to execute the following functions:

- the communication management with the CCU system,
- the storage of the received data on a permanent support (flash memory),
- the management of the scheduling between the visualisation messages received,
- the visualisation of the received information.

Each Remote Display Unit work in automatic mode and it is able to displayed the received data (free format messages) and no communication with the CCU is needed until the system's operator transmit new data. In this conditions, the CCU is only a configuration centre in which are scheduled and defined all data for the autonomous work of all the connected devices.

The following table describe the hardware and software RDU's features.

HARWARE REQUIREMENTS	
CPU	486 – 40 MHz MINIMUM
RAM MEMORY	8MB
INTERFACE	ANY PHYSICAL INTERFACE FOR A LAN OR WAN CONNECTION (MODEM, GSM TERMINAL ADAPTER, ETHERNET NETWORK CARD)
SOFTWARE REQUIREMENTS	
OPERATING SYSTEM	UNIX - LIKE OPERATING SYSTEM
APPLICATIVE PACKAGE	THE SOLARI PUBLIC INFORMATION SYSTEM FOR SBC DEVICES CLIENT PACKAGE

The software environment is based on a real-time, multi-user, multi-tasking, networking operating system. The application software have been developed using the "C" language and following the criteria of structured programming. The applicative package is made up of modules having well defined functions, single input, specific output and private data areas.

2.4 THE NETWORK

The link between the CCU and RDU systems is a LAN or WAN network handled via the TCP/IP protocol. Any choice of communication physical interface can be used.

For example, Ethernet cards can be used for a LAN network, modems or GSM terminal adapters can be used for a WAN network.

The system can be easily configured and expanded in order to satisfy user's need.

A RDU system can be added, removed or re-configured both in location and in the communication physical interface.

Only minimal software configuration on the CCU system is needed.

3. HOW TO INSTALL THE APPLICATION

In order to install the application **MessageManager** on a Personal Computer with Windows operating system and a Desktop area of 800 by 600 pixels or greater, please, perform the following instructions:

- copy the set-up files in a working directory (e.g. C:\MessageManagerSetup);
- run the application **Setup.exe** (e.g. C:\MessageManagerSetup\Setup.exe) and answer **Next** to the questions showed during the installation phase;
- the application Setup.exe, automatically, installs the program **MessageManager.exe** in the directory **C:\ProgramFiles\Solari\MessageManager**;
- run the program MessageManager.exe and, if you want, copy it on the desktop.

4. THE USER INTERFACE

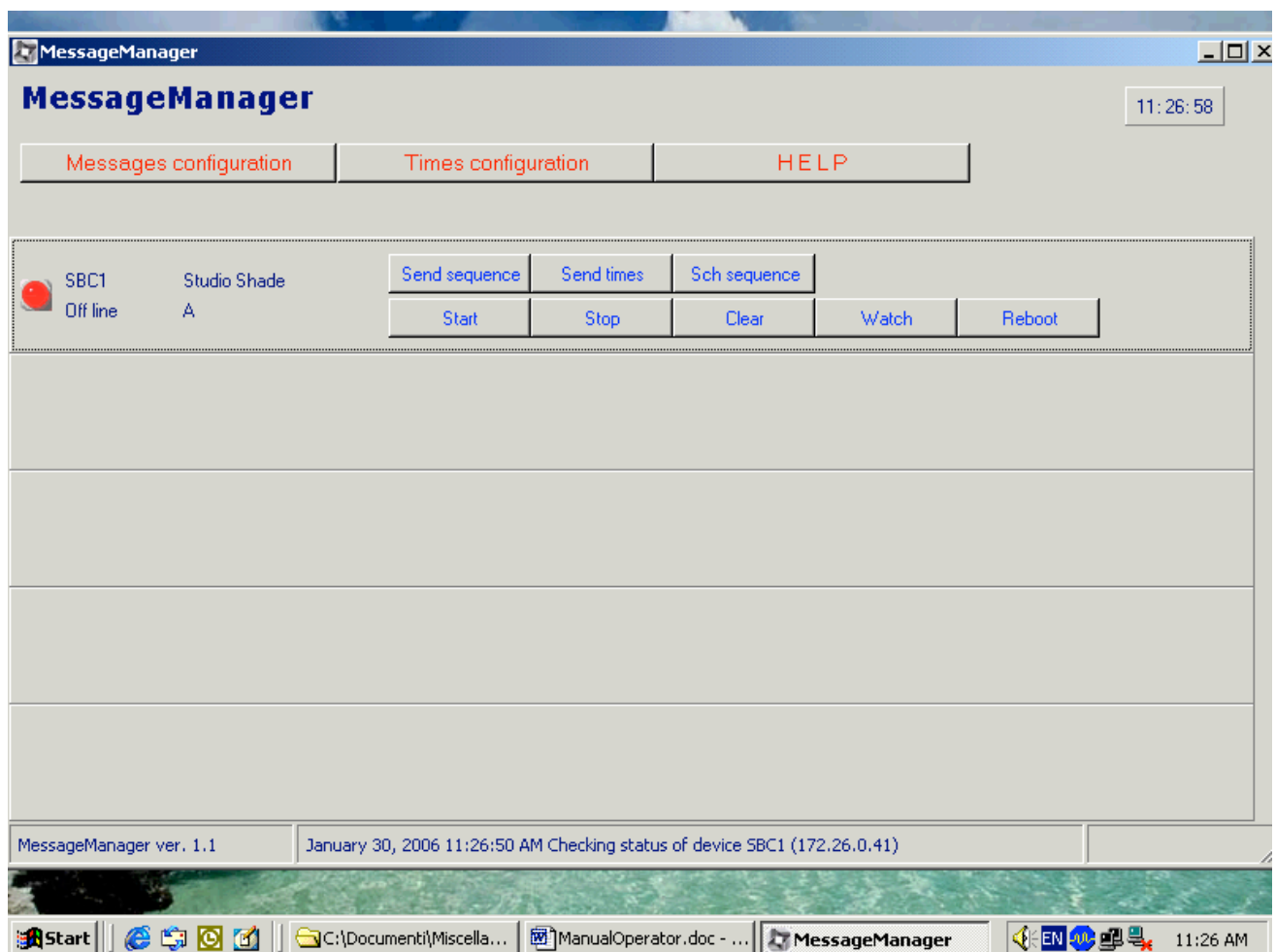
4.1 THE MESSAGE MANAGER MONITOR

The start up of the Message Manager application displays a page with the description of the network of SBC devices connected and handled by the Control Centre.

The page shows up to four devices at time. The user can use the scroll bar on the right of the monitor in order to display the other devices.

For each device the following data, like showed in picture 1, are displayed:

- the device logical name (e.g. SBC1);
- the device description (e.g. device location);
- the device status (e.g. unknown, off line, on line);
- a signal related to the device's status (red button for unknown and off line devices, green button for on line devices);
- the device group (it allows to join different sequences of messages to different groups of remote devices);
- a list of functions that can be requested (e.g. SEND SEQUENCE, WATCH, REBOOT).



PICTURE 1 - MESSAGE MANAGER MAIN WINDOW

A status bar on the bottom of the monitor shows:

- the application software version (e.g. “Message Manager ver.1.1”);
- the application action (e.g. “Checking status of device SBC1 <172.26.0.41>”);
- the application status (e.g. “BUSY”).

The application action describes what the system is doing.

The application status, on the contrary, is used to describe either the application activity (busy or not) as well as the status of the last operation performed (successful or unsuccessful).

No any operation must be selected by the system operator if the status of the application is busy.

4.2 THE SYSTEM FUNCTIONS

The Message Manager application provides all the functions for the complete handling of the connected devices.

These functions permit to :

- acquire the information to display on the remote visualisation devices,
- acquire the data necessary to schedule the information displayed,
- transmit data and information to the remote visualisation devices,
- control in real-time the connection status of all remote devices.

Each function is related to a button that permits to select it.

The whole list of the application functions is described in the following.

MESSAGE CONFIGURATION

This function permits the access to a configuration phase in which the user, with a user friendly tool, can define (e.g. add, delete or modify) the texts of messages to display on each remote visualisation device and the rules for scheduling the message alternating. These information (texts and rules) are saved on a local file. A more detailed description of this function is illustrated on the chapter FREE FORMAT MESSAGE CONFIGURATION.

TIMES CONFIGURATION

This function permits to handle the devices working hours in order to define in which periods of times the remote visualisation devices are enabled to display the scheduled messages. These information are saved on a local file. A more detailed description of this function is illustrated on the chapter TIMES CONFIGURATION.

SEND SEQUENCE

It sends the file with data about messages texts and rules for their alternating (defined in the message configuration tool) to the selected remote device. It automatically sends, also, a start of visualisation command in order to allow the selected remote device to read and show the new received data.

SEND TIMES

It sends the file with the data about the devices working hours to the selected remote device. It automatically sends, also, a software shutdown command in order to allow the selected remote device to handle the new received data.

SCH SEQUENCE

This function shows, on the monitor, a window with the sequence of messages scheduled for the selected remote device.

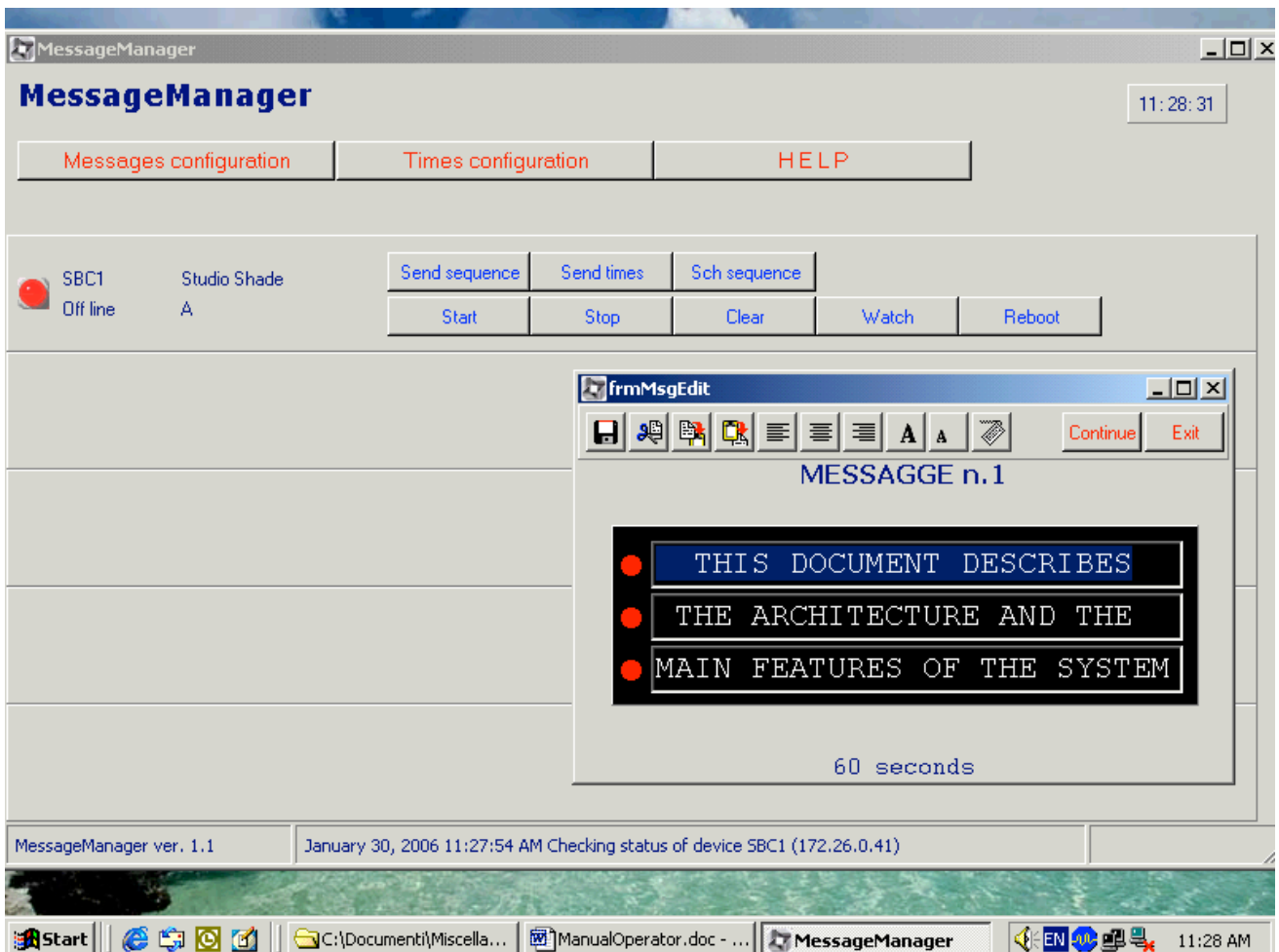
The sequence of messages related to a device is made up of all messages, defined during the messages configuration phase, with the following characteristics (see FREE FORMAT MESSAGES CONFIGURATION chapter):

- the message is enable;
- the message visualisation time is greater then zero;
- the message group include the device group.

For each message of the sequence (see picture 2) it is showed the title of the message (e.g. MESSAGE n.1), the text and the time of visualisation (e.g. 60 seconds).

It is not allowed to change the message characteristics (e.g. text justification, visualisation time, etc...) in this context.

The button **Continue** permits to show the next messages of the sequence (scroll tool) and the button **Exit** ends this function.



PICTURE 2 - SEQUENCE OF MESSAGES SCHEDULED

START

It sends a start of visualisation command to the selected remote device in order to enable the visualisation of the scheduled messages and to reread all its configuration files.

After received this command the remote device performs the following operations:

- reads all its configuration files;
- shows all scheduled messages.

STOP

It sends a stop of visualisation command to the selected remote device in order to disable the visualisation of the scheduled messages. No one message is showed on the remote device until the user send a start visualisation command.

CLEAR

It sends a clear command to the selected remote device in order to delete all information displayed on it. After this, according to the status of visualisation (enable or disable), the device behaviour is the following:

- a new message will be showed when the visualisation time of the current message is expired and the application schedule a new message to display (the visualisation status is enable);
- no one message is showed until the user send to the remote device a start command (the visualisation status is disable).

WATCH

It sends the date and the time of Control Centre Unit to the selected remote device in order to synchronise the remote device clock with the date and time of the Control Centre Unit .

The system automatically send also a REBOOT command after the WATCH command .

REBOOT

It sends a software shutdown command to the selected remote device. This function can be used to reset the remote device.

Moreover, the application automatically checks the connection status of all handled remote devices by sending, every minute, a query to a socket port of each remote device.

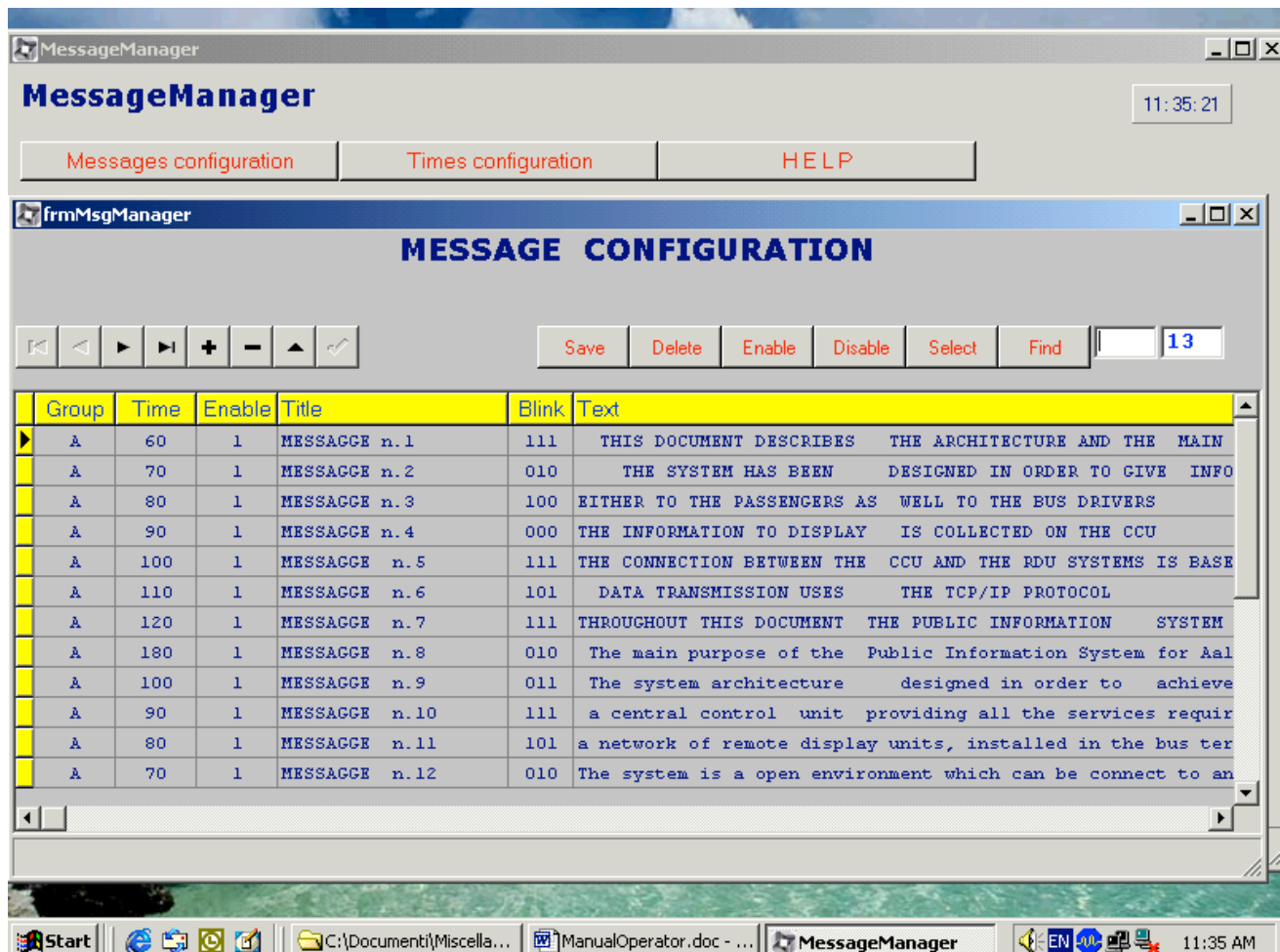
If a remote device answer to the query, the Control Centre Unit define its status on line (green led) otherwise, the status of the remote device is off line (red led).

4.3 FREE FORMAT MESSAGES CONFIGURATION

In order to modify the data showed on the remote devices, the user must select the **MESSAGE CONFIGURATION** function on the MessageManager main window.

This function displays a page showing (see picture 3):

- a table with data about the free format messages (i.e. messages table);
- a set of buttons situated on the left of the page and used to move through the records of the messages table and to perform operations on the data, such as inserting, deleting or saving record modifications;
- a set of buttons situated on the right of the page and used to save the messages data on a file, to delete all messages, to enable or disable all messages, to have a view of the messages as they are showed on the device;
- a box situated on the right of the page and showing the number of records of the messages table;
- a status bar situated on the bottom of the page and showing application actions (e.g. please wait, the system is deleting all messages data).



PICTURE 3 - MESSAGES CONFIGURATION PHASE

The messages configuration concern the definition of :

- the text of the messages (i.e. messages editing);
- the sequence of the messages (i.e. messages sorting);
- the time for which each message must be displayed (i.e. waiting time before the visualisation of the next message).

These data permits to define, univocally for each device, the sequence of messages to display. After the visualisation of the last message, the sequence restart from the beginning.

MESSAGES TABLE

A record of the messages table stores the following information.

- **THE MESSAGE GROUP**
It is the list of all groups of devices on which the message must be displayed. This information defines the dissemination network of the message and permits to define different sequences for different groups of devices. The maximum length of this field is 10 bytes.
- **THE MESSAGE ABILITATION**
It defines if the message is included in the sequence of messages to display on the remote device (i.e. ENABLE is 1) or if it is excluded (i.e. ENABLE is 0). This information permits to modify the messages sequence to display.
If the user perform a double-click of the primary mouse button when the mouse pointer is over this field, the application automatically changes the message abilitation data.
- **THE TIME OF VISUALISATION**
It defines the interval of time in seconds for which a message must be displayed or the time before the visualisation of the next message. The time of visualisation must be greater than 60 seconds and less than 99999 seconds
- **THE MESSAGE TITLE**
It is the title of the message. This information permits to identify a message with a short description. The maximum length of this field is 20 bytes.
- **THE BLINK FLAGS**
This information is a sequence of integer numbers that define for each row of the device if the flashing function must be active (value 1) or not (value 0).
- **THE MESSAGE TEXT**
It is the text of the message showed on the device. The maximum length of this field is 81 bytes (i.e. 3 rows of 27 characters).

If the user performs a double-click of the primary mouse button when the mouse pointer is over a field different from MESSAGE ABILITATION, the application shows a window having special tools for the message editing (see MESSAGE EDITING section for more information).

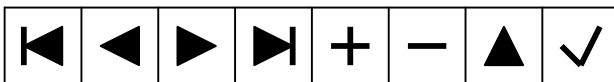
FUNCTIONS

The Message Manager user interface provides all the functions for the complete handling of the messages tables. These functions permit to :

- define a new message,
- delete from the table one or more messages,
- display or modify every message data (i.e. the title, the text, the visualisation time, the blinking flags, the abilitation flag, the list of related groups),
- save on file the messages table data.

Using these functions the user can configure for each device a peculiar messages sequence sending to different devices different sequences of messages.

The whole list of the application functions is described in the following.



A list of buttons permits to:

- select the first message of the table;
- select the previous message respect the current one;
- select the next message respect the current one;
- select the last message of the table;
- add a new message before the current one;
- delete the selected message (a confirmation is required) and makes the next message the current one;
- put the table into edit state in order to modify its data;
- save on the table (not on file) the modifications performed.



This function permits to saves permanently the messages table data on a local file. This file can be sent to one or more remote visualisation devices in order to change the data displayed on them.



This function deletes all selected messages and makes (in case of more messages selected) the first message of the table the current one. It required a confirmation. For selecting more messages type CONTROL + ALT keys and click the primary mouse button when the mouse pointer is over a field of the selected message.



This function enables all messages so all messages table are included on the sequence.

DISABLE

This function disables all messages so no one message is included on the sequence.

SELECT

This function permits to see the text of the selected message as it is showed on the visualisation device and to access to special tools for message editing (see MESSAGE EDITING section for more information).

It is also requested by a double-click of the primary mouse button with the mouse pointer over a field different from MESSAGE ABILITATION.

This function may be requested every time the user define a new message or modify an existing one.

FIND

This function permits to select the message whose number or position in the messages table is showed in the box jointed to this button.

MESSAGE EDITING

The selection of SELECT function, in the MESSAGE CONFIGURATION procedure, or the double-click of the primary mouse button when the mouse pointer is over a field of messages table different than MESSAGE ABILITATION permits to access to a message editing tool for defining and changing the text message.

Like showed on picture 4 the message text is displayed like in the remote visualisation device (i.e. 3 rows of 27 characters) and a set of button are given in order to help user in the input procedure.

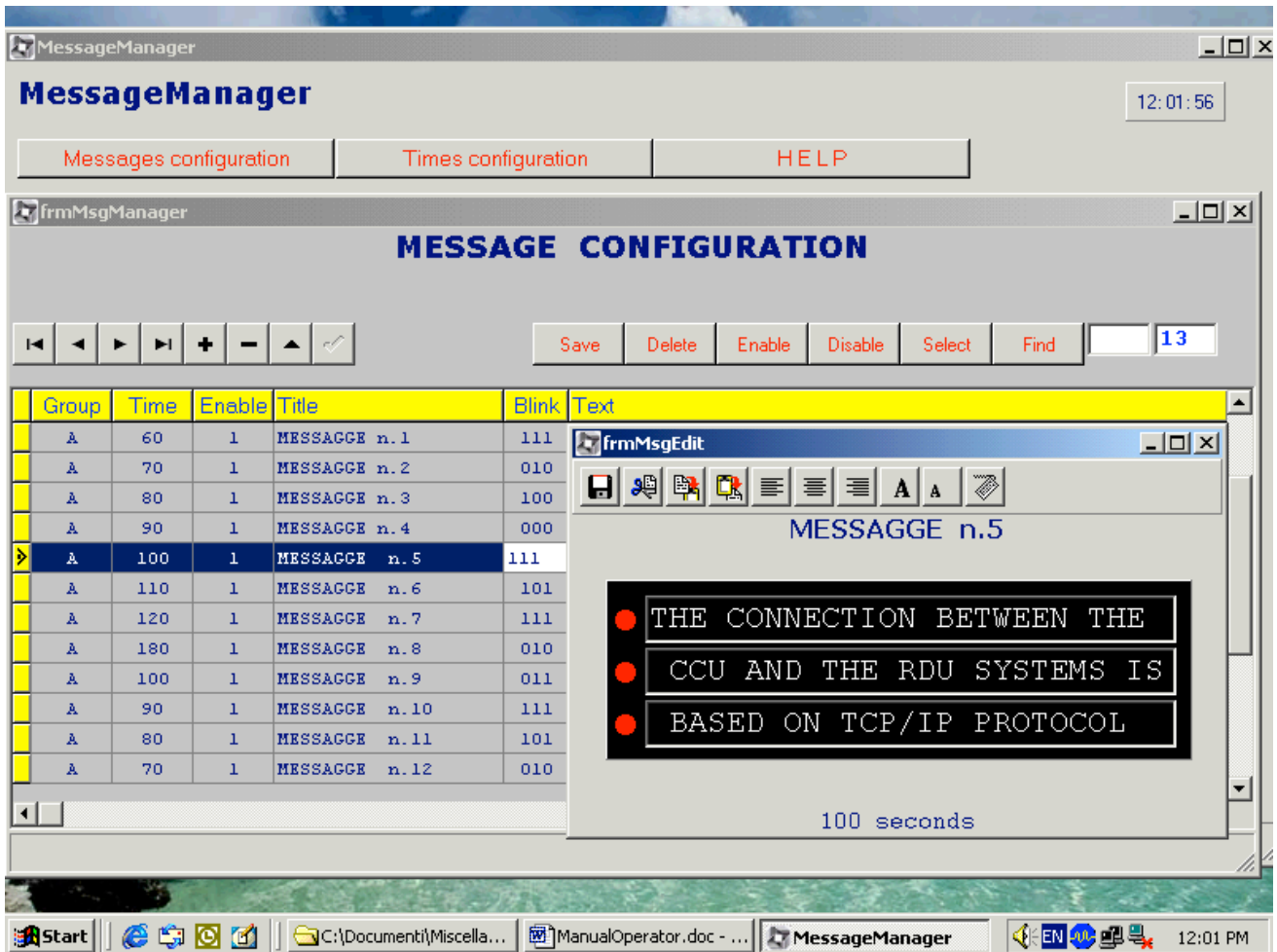
These buttons can be selected in order to:

- save the text editing;
- delete the selected part of text;
- copy the selected part of text on a buffer;
- paste the previous copied part of text;
- perform a right justification of the selected part of text;
- perform a left justification of the selected part of text;
- centre the selected part of the text;
- change the selected part of text in upper case;
- change the selected part of text in lower case;
- use special characters (see picture 5).

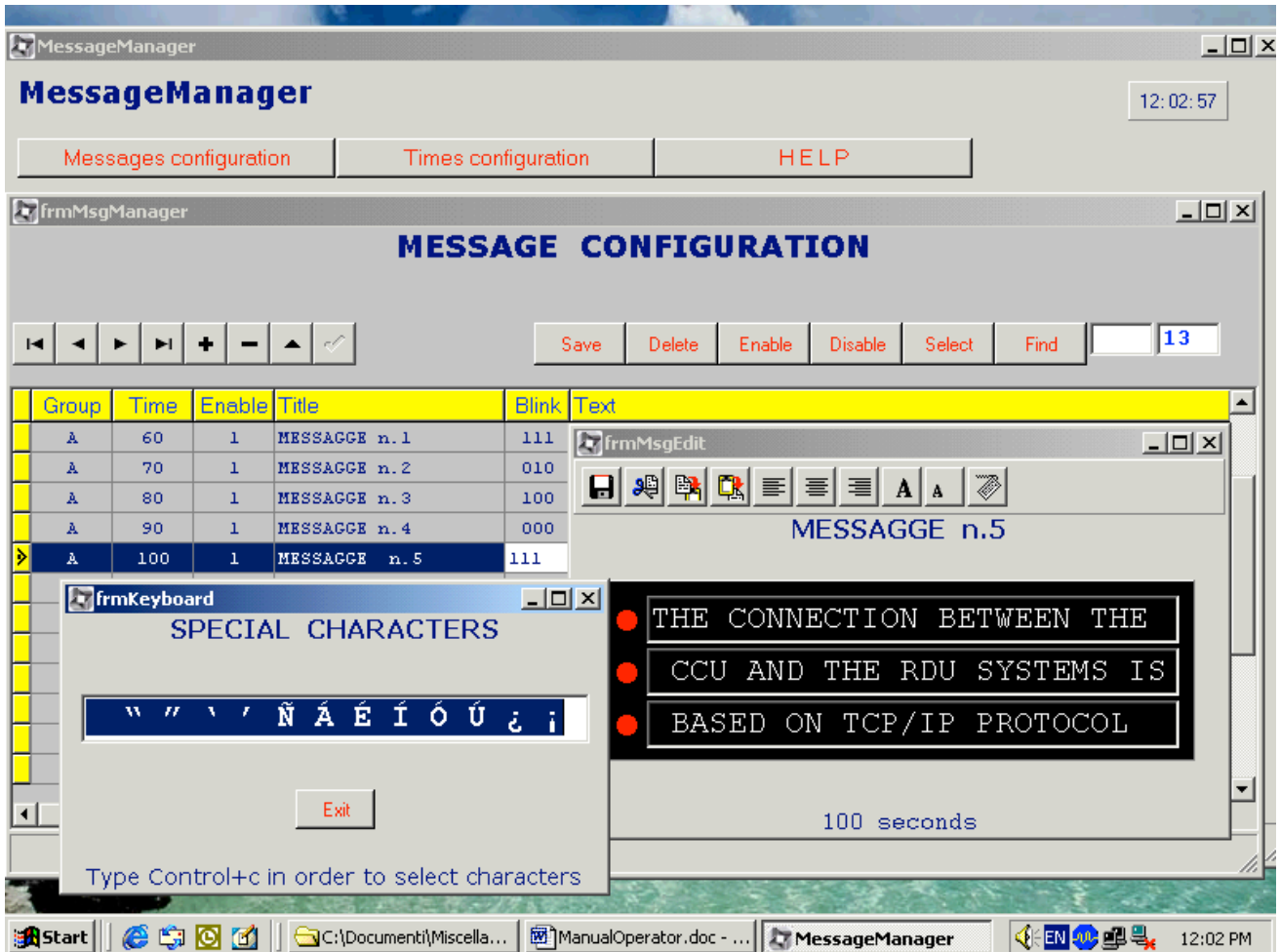
To sum up, in order to modify the sequence of messages showed on the remote visualisation devices, the user must:

- modify the data showed on the messages table of the MESSAGES CONFIGURATION procedure;
- save the table's records on file (click SAVE button of MESSAGE CONFIGURATION procedure);

- send the messages file to the remote visualisation device (answer YES to the question: “Do you want to send the last configured messages sequence to all connected devices ?” or click the SEND SEQUENCE button of MessageManager main procedure).



PICTURE 4 - MESSAGE TEXT EDITING PHASE



PICTURE 5 - SPECIAL CHARACTERS

In order to write special characters on the message's text, the user must:

- select the needed characters on the special characters window by typing **Control c** characters in order to save them on a buffer;
- insert the saved characters on the message's text showed in the message editing window by typing **Control v** characters.

The special characters are showed on the devices only if they are present in the flap unit of the devices.

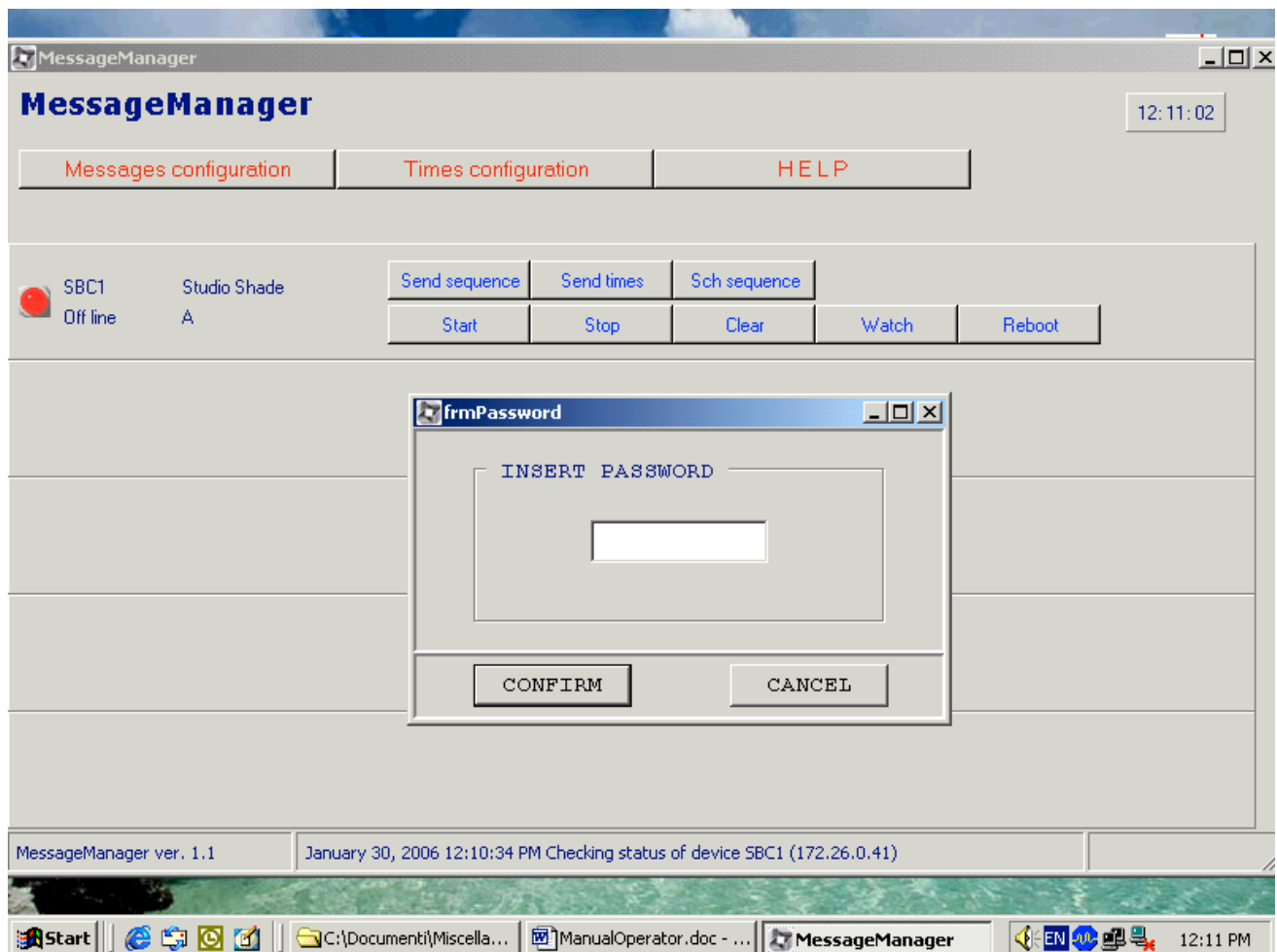
4.4 TIMES CONFIGURATION

In order to modify the devices working hours, the user must select the **TIMES CONFIGURATION** function on the Message Manager main window.

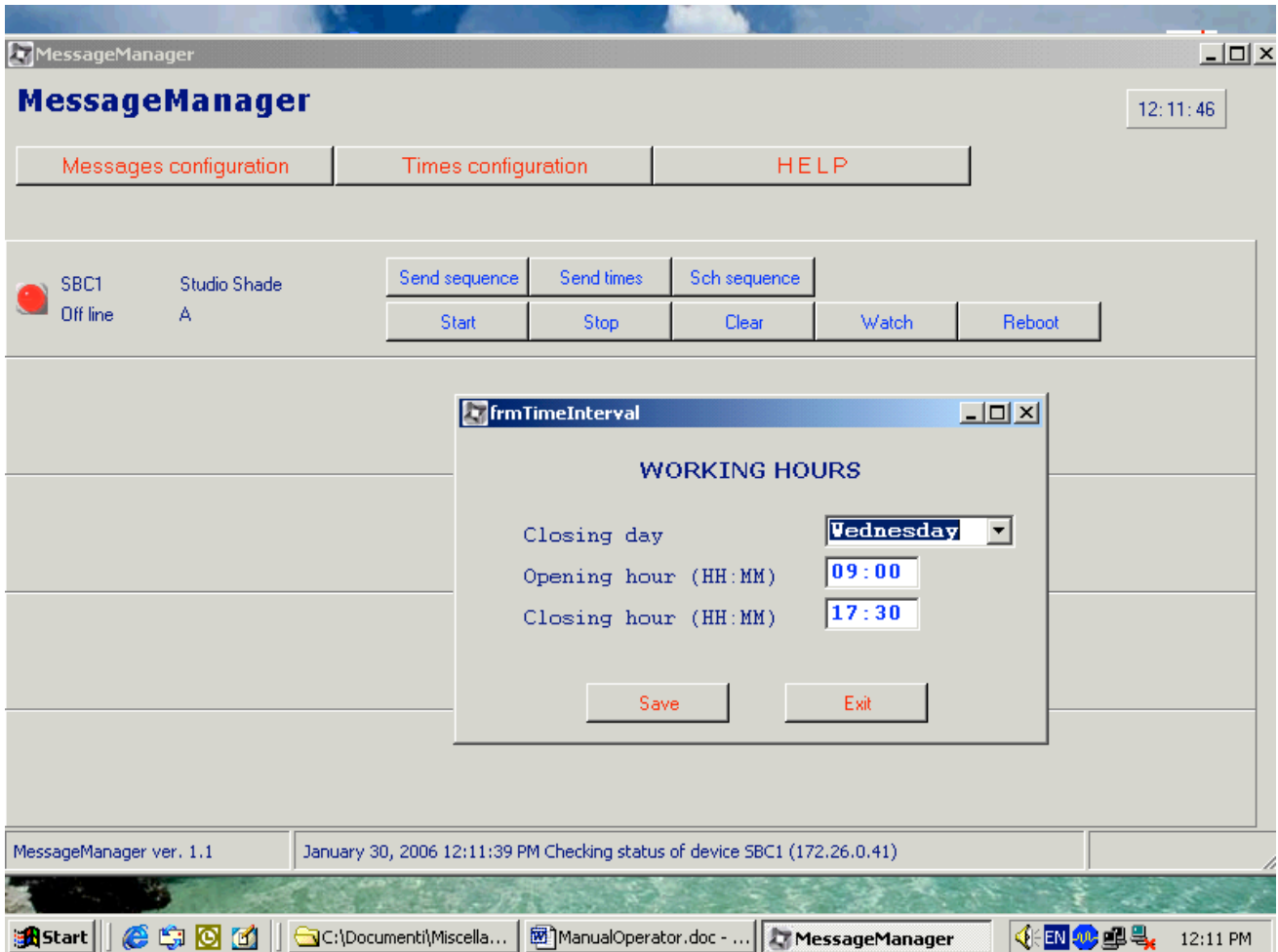
This function displays a page requiring a password (see picture 6).

If the user insert the correct password this function displays a page showing (see picture 7):

- the closing day (e.g. Wednesday);
- the opening hour with the format HH:MM (e.g. 09:00);
- the closing hour with the format HH:MM (e.g. 17:30).



PICTURE 6 - PASSWORD REQUEST



PICTURE 7 - WORKING HOURS CONFIGURATION

The whole list of TIMES CONFIGURATION functions is described in the following.

SAVE

It saves the input values on a local file. This file can be sent to the visualisation devices in order to change the times in which the device is enabled to work.

EXIT

It closes the TIMES CONFIGURATION procedure and returns to the MessageManager main window.

To sum up, in order to modify the devices working hours data, the user must:

- modify the values showed on the TIMES CONFIGURATION procedure;
- save the new data on local file (click SAVE button of TIMES CONFIGURATION procedure);

- send the local file to the remote visualisation device (answer YES to the question: “Do you want to send the last configured devices working hours to all connected devices ?” or click the SEND TIMES button of the Message Manager main procedure).