T.E.L.L.

DR-81000

Digital Receiver

User Manual

CPM2 V2.20 build A430
LC2 V2.20 build A426

Table of Contents

1. Introduction

The T.E.L.L. **DR-81000** is a multi-line, multi-format IP / PSTN digital receiver for commercial fire and burglary monitoring. The base unit contains a **CPM Central Processing Card** with **IP support**, and a **PWR Power Card**. With additional **LC2 Line Cards**, the receiver can be enabled to monitor up to 8 telephone lines. The T.E.L.L. DR-81000 can receive and decode most of the popular and commonly used communication formats, for both IP and PSTN reception. See Appendix B. for details

The T.E.L.L. DR-81000 stores all events with time and date stamped. All information is displayed on the large LCD screen, and the events may be printed and/or forwarded to a computer. To ensure security, all programming functions, including the adjustment of the real time clock and date is password protected.

CPM2 Card

The Central Processing Unit (CPM2) controls the operation of the receiver. The CPM Unit incorporates two serial ports, two high-speed USB port, a 10-BaseT Ethernet interface for IP reception and one parallel printer port. The CPM Unit has two external inputs, one for external acknowledge, and one for tamper recognition. The CPM Unit also incorporates two programmable outputs, which can be programmed to follow different receiver status.

The CPM Unit features a 2000-event non-volatile memory buffer. The contents of the buffer may be browsed on the LCD screen. If the printer or computer is off-line, the CPM2 Card will store the incoming events in its buffer, and will automatically forward them, when the connection restores.

The CPM2 controls the large graphical LCD display of the receiver, which enables it to implement unique, user friendly features like changeable display font sizes, full line card control, and easy-to-use manual programming.

LC2 Line Cards

Each Line Card (LC2) can monitor a telephone line. The Line Cards contain a 500-event event memory to record events and caller information. Caller Identification capability is built-in and the telephone number of the calling party can be displayed, printed, stored in memory and forwarded to the automation computer. The Line Cards also support the 2-way audio listen-in.

The Line Cards are continuously supervised by the CPM Unit to ensure uninterrupted communication. Any trouble conditions are immediately reported on the LCD screen and printer and/or forwarded to the computer. The Line Card also verifies the communication with the CPM Unit. In case of CPM malfunction the operator will be advised with an audible indication and the Line Cards will continue to function in stand-alone mode - it will continue receiving events and store them in its buffer. The events will be forwarded to the CPM Unit after the connection restores.

PWR2 Power Card

The Power Card supplies the power for the other Cards in the receiver. It requires 16.5 VAC from a 115 or 230 VAC, 50/60 Hz, transformer. The Power Card is equipped with automatic battery charger and backup battery connections. In case of AC failure the Power Card automatically switches to backup battery power. The backup battery capacity can be between 7 and 15 Ah. The Power Card supervises the presence of the battery and the battery capacity and the current status is reported to the CPM Unit.

Compatibility

The T.E.L.L. DR-81000 Digital Receiver is compatible with the most commonly used automation software packages. The receiver has been tested to work with the following software:

- Alarm SyS
- SIMS II
- Microkey SIS
- Cortex WinSC Security Commander

For other automation software, if not supported directly, generally, selecting the Surgard MLR2 driver will provide compatible support for the receiver.

System Overview

- Up to 8 PSTN analog lines per receiver
- 2000-event non-volatile event buffer in the CPM2
- 500-event non-volatile buffer on each line card
- Programming is stored in internal EEPROM in the CPM2 and in each line cards
- Real-Time Clock and calendar in the CPM2
- 2 independent fast RS232 ports
- 1 parallel printer port
- 2 USB ports (serial ports coupled)
- 1 Ethernet port (10-BaseT) IP Server
- Programmable serial port configuration
- Fast transmission of multiple events to the computer and/or printer to ensure fast operator response
- Continuous control of the cards by the CPM2
- Continuous check of the receiver-computer link with "heartbeat" protocol
- Large graphical LCD screen
- Inputs on the CPM2 card for external acknowledge and tamper supervision
- 2 Programmable Outputs on the CPM2 card

- PSTN Multiformat receiver (pulse, DTMF, FSK)
- Caller ID capability (Bellcore, ETS and DTMF)
- Telephone line supervision
- Contact ID Support
- SIA FSK Support (Level 3 with restrictions)
- Each line card has an output for 2-way audio
- Event libraries for plain language message display capability.
- Built-in Contact ID and SIA Event Library
- User defined Custom Event Library option
- Easy management with T.E.L.L. DR-Term utility
- Remote management support via IP/Ethernet
- High-performance Flash RISC microprocessors.
- Firmware Upgrade by user
- Uninterrupted Switching Power Supply with AC monitoring and active battery test
- Industry standard 19" system architecture
- Standard eurocard circuit board design for reduced complexity and easy servicing.
- Highly reliable SMD technology

2. Quick Start

Receiver Setup and Operation

Unpacking
Carefully unpack the receiver and inspect the device for shipping damage. If there is any apparent damage, do not try to turn on the equipment, and notify your distributor immediately. The package contents are the following:

* T.E.L.L. DR-81000 Digital Receiver
* AT Null-modem Cable
* USB Cable (A-mini)
* Terminals and battery cables
* User Manual, Operator Guide

Introduction to Operation
Please, refer to the following chapters of this manual to help you through the installation and operation of the T.E.L.L. DR-81000 digital receiver.

Chapter 3. Installation
Chapter 4. T.E.L.L. Controls
Chapter 5. CPM2 Card
Chapter 6. LC2 Card
Chapter 7 Power Card

Bench Testing
It is highly recommended the receiver be tested before commencing the actual installation, becoming familiar with the connection and setup of the device, and the receiver programming to make the final installation more straightforward.

The following items are required for testing:

* 16.5V AC transformer
* 12V 7Ah battery
* Router and IP communicator for IP testing.
* telephone line and a digital dialer or a control panel with for PSTN testing
* Radio transceiver and Radio communicator for UHF radio testing

Please, use a certified 16.5V AC transformer with a minimum of 40VA to supply AC power to the receiver. Connect the transformer to the AC input terminals on the backplane of the Power Card. Connect the battery cables to the BAT terminals with correct polarity, but do not connect the battery to the cables yet.

Power Up
Powering up the unit starts with applying AC power to the unit. After that, connect the battery to the battery cables. The CPM unit carries out a comprehensive Power-on Self Test and tests all system components. If the CPM finds any malfunctioning/unreliable components during the POS test, it will stop, and display the problem on the screen.

After the POS test had been finished, the CPM resets the line cards in system, and will switch to event list mode (normal operation).

Operation with the default programming
Without any changes to the factory default programming, the receiver operates normally with the following specifications:

* Default Program Access Password is TELL.
* Default IP address 192.168.1.240, IP Server is initialized at port 9999.
* Line cards answer to incoming calls on the second ring
* Caller identification (Caller ID) is enabled
* The handshake sequence is 2 x dual tone, 2300,1400 and FSK answer tone
* Reception of Extended formats is disabled
* Two Way Audio (listen in) is disabled
* The default setting for serial ports is 9600,8,N,1
* COM A (or USB A) is in report mode
* COM B (or USB B) is in receive mode
* Printer is off
* Heartbeat supervisory protocol enabled heartbeat in every 30 seconds.
* Clock signal protocol is disabled
* External acknowledge is disabled
* Tamper recognition is disabled

When an event is received from IP or from a line card it will be displayed on the LCD screen with time and date. Events coming in Contact ID and SIA format are automatically decoded from the predefined event libraries. For other formats, by default, only the incoming code will be displayed. The events will be reported to the computer via the serial port COM A.

If the computer is not connected, pushing the ENTER button will silence the buzzer in case events are pending. The manual acknowledgement is recorded with time and date.

Return to the default programming
You can return to default programming at any time by entering the menu and selecting the 'Factory' menu item from the 'Utils/Reset' menu.

3. Installation

Mounting the Receiver

The T.E.L.L. DR-81000 receiver is shipped by default in a standard 3HE 19" desktop housing. With the mounting holes on the front panel, the housing can be installed in standard 19" rack cabinets.

NOTE: the feet of the desktop housing may have to be removed when installing into rack cabinets.

NOTE: the LCD screen on the receiver is designed to be viewed below eye level (12h viewing angle). If the receiver has to be mounted above eye level, it might be useful to angle the unit downward improving visibility or readjust LCD contrast settings.

Printer Connections

Any Printers equipped with a parallel Centronics interface can be connected to the T.E.L.L. DR-81000 receiver. To connect the printer to the receivers parallel printer output use a parallel printer cable.

IMPORTANT: Using parallel printer cable with only one common ground wire is not recommended.

Computer Connections

Connect the automation computer to the T.E.L.L. DR-81000 serial COM A port using the supplied cable, or to USB A using the supplied miniUSB cable. If the supplied cable is not long enough, a serial Null-modem cable can be used up to 15 meters in length, and a longer miniUSB cable can also be used, if necessary.

The port COM B or the USB B port can be used to connect to the automation computer, too, in case they are set to Report mode. The same type of serial or USB cable can be used on COM B.

IMPORTANT: Please, do not use standard AT-modem (straight) cables for the serial ports. Always use a null modem (crosslink) cable.

Ethernet Connection

The DR-81000 receiver can be connected to the Ethernet network at its RJ45 modular 10 BaseT terminal with a standard patch cable. Please, note, that the connection must be made to a switch or router on the network. The necessary setup for the local network can be found in the TCP/IP section.

CPM Card Backplane Diagram
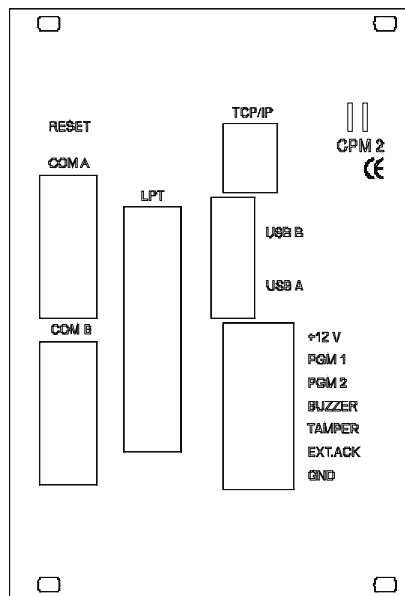
Telephone Line Connections

Connect the telephone lines to the LC2 Line Cards LINE modular jack with RJ11 4/6 pin modular cables. For ISDN connection, use one of the 2 analog outputs of the ISDN NT box.

The handsets for 2-way audio listen-in can be connected to the same modular connector. The incoming line is connected to the two inmost pins (3-4), while the handset can be connected to the neighbouring outer pins (2-5). Ensure, that the handsets connected are off-hook, because leaving the handsets on-hook will terminate 2-way Audio Mode. Measure the impedance of the handsets to check, if the line will be terminated with the proper impedance when switching to the handset. On normal telephone lines, it should be around 600 ohms. When used in PBX system 2-way audio communication needs bridging resistors with the same value as measured on the handset. Using improper termination the line will be dropped when switched to 2-way Audio Mode

Line Card Backplane Diagram
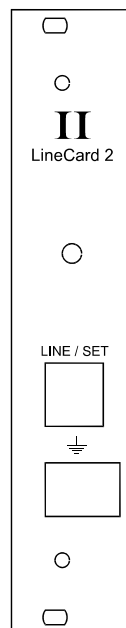
Grounding

To achieve the best resistance against static and electric noise and electromagnetic interference (EMI) connect the metal casing of the receiver to a grounding point. Note that the grounding of the frame has to be separate to the grounding of the Line Card interfaces.

Proper grounding is essential also for the reliable electric shock and lightning protection of the telephone line interface of the Line Cards. Connect the protective ground terminal of the Line Card to a proper grounding point.

IMPORTANT: *Do not connect the protective ground terminals directly to each other, or to the metal frame. Connect the terminals to the grounding pole individually with separate wires. NEVER connect the protective ground to the power/signal ground of the receiver!!!*

Power Supply Card

The Power Supply of the receiver is housed in the Power Card. The Power Supply requires 16.5 VAC as input, and has a 13.5 VDC stabilized power output with fuse and a 13.8 VDC stabilized battery charging output with fuse.

Using a 16.5 VAC 40VA transformer connect the AC power to the Power Card. Connect the battery cables to the battery outputs with the supplied terminals. Using a 7 Ah backup battery is recommended to avoid battery test problems.

It is very important to connect protective ground (shielding) to the grounding terminal on the back of the PWR card. This ensures the protection against static discharge. A standard M5 nut is provided at the earthing point for connection. This point can be connected to the ground terminal of the AC outlet.

Ensure that all connections have been made correctly.

Power Supply Backplane Connections
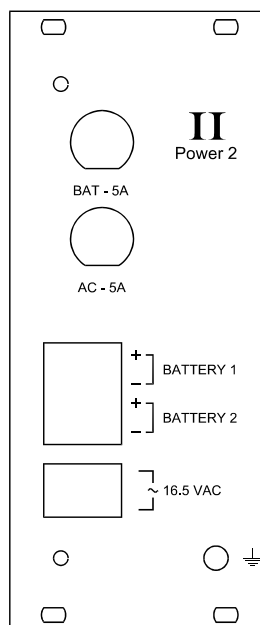
Removing and Installing Cards

The receiver does not have to be powered down while components of the system are removed or installed.

CPM2 Card

Remove the 4 retaining screws on the back panel of the Card. Carefully pull the Card out of the rack housing. Installation is the reversal of removal. Push the Card carefully and firmly back to its place, then mount the retaining screws. After plugging in, the CPM Unit will make a cold start.

LC2 Line Cards

Remove the 2 retaining screws on the back panel of the Card. Carefully pull the Card out of the rack housing. Installation is the reversal of removal.

RC2 Radio Card

Remove the 4 retaining screws on the back panel of the Card. Carefully pull the Card out of the rack housing. Installation is the reversal of removal. If you install a new RC2 card, please, remove the blank cover of the radio card slot first.

Note, that there is a dedicated position for the PWR, CPM and RC cards, which cannot be installed in other positions. Also, for the LC cards, the actual Line Card number depends on the position the Line Card installed into. If possible, please fill up the cards from right to left (1 to 8).

T.E.L.L. DR-81000 Backplane View (Example)
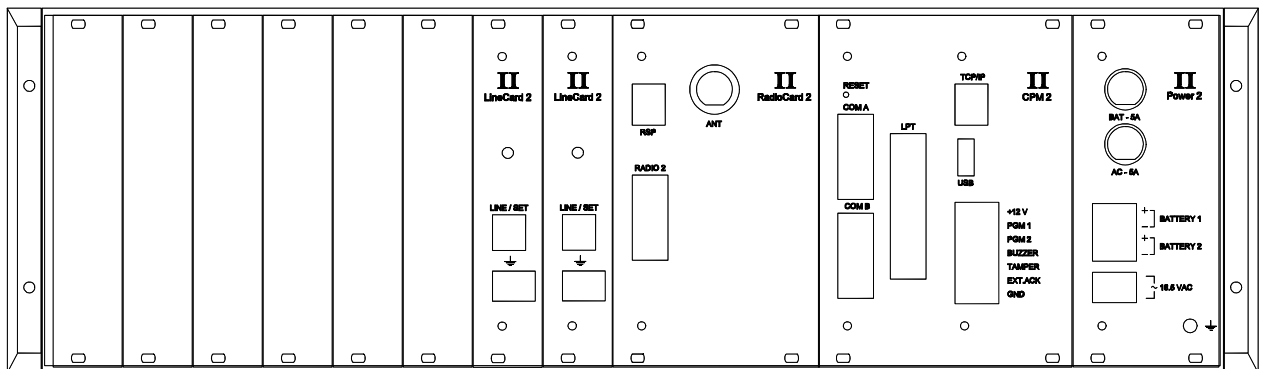
4. The T.E.L.L. DR-81000 Controls

The LCD Display
The 240 x 128 resolution graphical LCD can display up to 5 events at a time (10 with small fonts). The system status information and the time and date can be seen on the top of the screen. On the bottom, the menu is displayed. In info display mode, the display shows the status of the line cards int he system, and the status of the ports and the power supply.

Power LED
The blue Power LED indicates the operation of the receiver.

Bat LED
The red Bat LED shows the status of the battery and the AC power. If this LED is off, then there is no power problem. If it is lit, then it indicates AC power loss (the system is operated on battery power). The flashing Bat LED shows battery problem – change or recharge the connected battery. If the LED blinks fast, it indicates a problem of the power supply.

Error LED
The red Error LED lights up if there is any pending problems in the receiver. Please, review the info display on the top line of the LCD Screen.

Link LED
The Link LED shows the status of the PC/Ethernet connection. If there is a working serial or USB link with the PC, then it should light up green. Red light shows that the Ethernet cable is plugged in – in case there is an active link on the serial and USB ports at the same time, the light will be yellow. If this LED is not lit, that shows connection problem – the receiver is operating in standalone mode.

Opt LED
The Opt LED is the display for the optional Radio or GSM Receiver Card. This LED is not lit during normal operation.

RX LED
The RX LED shows the traffic status of the optional Radio or GSM Cards. Green light means, that there is reception in progress (packet received), while red light indicates transmission in progress (packet sent) – in case repeater (RX/TX) mode is enabled. During Flash Update of the card, the LED blinks slowly green.

1..8 LEDs
The LEDs 1..8 display status information of the line cards. Continuous green light indicates standby mode – the line is ok, and the card is waiting for call. Ring is signalled by fast blinking – it turns to yellow when the Line Card answers the call and receives the incoming communication. If the LED is off, and lits up red shortly in about every five seconds, that means there is a problem with the telephone line. During Flash Update of the card, the LED blinks slowly green.

DISPLAY key and LED
This button changes the display modes of the LCD screen. The default display mode is the event list – the incoming events are listed on the screen with timestamp. Pressing the Display button will change the screen into info display mode. (The LED beside the buton will light up) – in this mode the current status of the line cards and the most important system ports and components can be viewed. Pressing the Display button again returns to the event list mode. More about the event list and info display modes can be found in Chapters 5, 6, 7 and 8.

Function keys
There are four function buttons below the LCD display. These buttons have context-sensitive functions – the actual function is displayed on the bottom line of the LCD right above the buttons.

ENTER key
The Enter key can be used to manually acknowledge the incoming events in the event list mode (in case there is no link to the PC). In setup dialogs, it can be used to confirm options and save changes.

Arrow keys
With the arrow keys the list of events can be browsed up and down in event list mode. In info display mode, they can be used to navigate between the line cards. In setup dialogs, they navigate between the data fields.

5. CPM2 Card

The CPM2 Card is the central processing Card of the T.E.L.L. DR-81000 that controls the line cards and forwards the information from the line cards to the printer and the central station computer. The CPM can monitor up to 8 line cards and a radio card.

General Information
The CPM2 incorporates a high-speed RISC micro-controller. This allows very fast and effective system operation and also unique features, like handling of big, graphical display and implementing context-sensitive menus and dialogs for easy, user-friendly and efficient programming of the system.

Features
- High-speed RISC processor and multi-tasking
- Flash technology - upgradeable firmware
- Standalone IP Receiver Server
- Fast internal communication with system cards ensures no delay in transfer information between the CPM2 and the line cards. The CPM2 polls all the line cards in less than 1 second.
- Up to 2000 event non-volatile alarm memory
- Large, graphical LCD display – user-friendly environment
- List, browse and examine the line card messages on the screen.
- Selectable font size on the LCD to improve display visibility / data overview
- Context menus and dialogs help programming and diagnostics
- User definable event libraries
- 2 RS-232 serial ports, COM A and COM B
- 2 USB 2.0 CDC (A and B virtual serial ports)
- 10 BaseT Ethernet interface
- Serial port data rates can be set from 300 to 57600 baud. Serial port data protocol (data bits, parity) programmable
- External acknowledge input
- 2 OC Programmable Outputs to follow different system status

CPM2 Startup Sequence
After power-up, the CPM2 waits for flash upgrade access for 5 seconds. During this delay, `starting up` is displayed on the screen.

After the startup delay the CPM2 executes the Power-On Self Test sequence (POS Test). It verifies the function of the system components and interfaces, the integrity of the program memory, the data memory buffer and the flash libraries. The steps of the POS Test are displayed on the screen. If the CPM finds an error during the self test it will stop, beeping and the problem will be displayed on the LCD.

Figure 1. Startup and POS Test

After the POS Test is completed, the CPM Unit will enter normal operating mode.

Normal Operation
In normal operation, the CPM2 receives messages from the line cards, displays them and forwards them to the computer and / or to the printer. If a computer with automation software is connected to the receiver, the CPM2 requires minimal interaction from the central station operator. The LCD displays the events in a list, the status row at the top, and the main menu at the bottom of the screen. (Event List Mode)

Figure 2. Event List Mode

The Status Row
The status row is the topmost row of the LCD display. It shows pending receiver problems and system messages. If there are more problems and messages to display at a time, they will be displayed one by one.

On the right of the status row the current time and date is displayed.

The protected mode of the receiver is indicated with a small key displayed in the status row. The local programming of the receiver and some of the utility functions are accessible only in protected mode.

List of Events
The events received by the Line Cards are displayed on the LCD screen in a list. The rows of the list represent the individual events; the current event is highlighted in the list of events with inverse display. (see Figure 2.) The display is as follows:

`1234 Panic 01        2 15:40:02`

In the first column, the account number is displayed, in this case `1234.` Account number `0000` represents the service and trouble events of the receiver. The account number can be up to 6 digits.

The second column shows the event information. The event information can be different depending on the incoming format, the preset and user defined libraries. Examples for event information:

`21`	Normal event, code 21
`Panic 1`	SIA Event code NPA1
`Burglary 01 005`	Contact ID code E13001005
`Custom Event 01`	User defined event in the user library as "Custom Event 01"
`CALL: 1234567`	Calling number "1234567"

The event information contains all data related to the event such as group/partition and zone/user numbers. More about preset and user define libraries in the Libraries section.

The third column displays the number of the line card, from which the event was received. The line card numbers can be between `1` and `8`. The two optional radio channels are represented by `A` and `B.` System events are displayed with `S,` and events received via the TCP/IP port are shown with `IP.` If there are more receivers linked together, the line card numbers of the linked receivers are displayed with the extra character `X` added before them.

The fourth column contains the time of the event. Every event, including the service and trouble events of the receiver and the manual acknowledge, are stored in the memory buffer with timestamp. That allows the receiver to forward the messages to the computer (with Clock Signal Protocol) and printer with the real time and date of the event, even if the message is forwarded later.

Review the List of Events
The list of events can be reviewed with the use of the arrow keys. Pressing Left and Right will move the highlighted cursor backwards and forwards in the list, allowing to view the contents of the memory buffer.

Note, that incoming events have priority over browsing, so that if none of the arrow keys are pressed for 5 seconds, the CPM2 will automatically interrupt review mode, and return to the bottom of the list, if any new events come in with the newly received event highlighted in the last line.

Change List Font Size
In event list mode, in the main menu, pressing the F1 function key ("Font") will change between normal and extended display font sizes. The change is instant; the list of events and the status row will be displayed in the selected font size.

Figure 3. Event List with small fonts

Code display mode
The receiver will display events in a human readable form, in case it can decode the actual event from its built-in, or custom event libraries. Pressing the F2 function key ("Codes"), the receiver can be forced to display the incoming code, even it has been successfully decoded, and its description is displayed.

Protected Mode Operation

In protected mode, the receiver is operating the same way as in normal mode, except that all the menu and local programming functions are accessible. A small key displayed in the status row indicates protected mode operation.

Note that not all the CPM and line card parameters can be programmed locally. Some of the parameters can only be programmed by the user with the T.E.L.L. DR-Term Programmer Software via the serial ports..

NOTE: *If the receiver is in protected mode it will automatically exit protected mode after 3 minutes of inactivity.*

Entering Protected Mode

If a desired utility or programming function requires to be run in protected mode, the receiver will prompt for entering the system password.

Figure 4. Password Entry

The password can be entered with the function keys a similar way as it is well known and used to with mobile phones. The alphabet is spread up between the four function keys, 7-7 characters assigned to each. Pressing a function key first will enter the first character assigned to it, pressing it again shortly will enter the second assigned character and so on. If the desired character is reached, leaving the function key untouched for 2 seconds will finalize the character, and the cursor will step onto the next position. Pressing a different function key will also finalize the character.

Stepping back is possible with the Left arrow key, this will erase the last entered position and move the cursor one back.

Note, that at password entry, the finalized characters are replaced with a *. This makes hi-jacking harder, but also requires the user to concentrate more on the entry.

After the desired password is entered, pressing the Enter key will verify it. If the password is correct, the receiver will enter into protected mode, and an "Access Granted" message will be generated. If the password is incorrect, the receiver will return to normal operation and an "Access Denied" message will be generated. Pressing the Display button will cancel password entry at any time.

The factory default system password is "TELL". The password can be changed with the T.E.L.L. DR-Term utility, see the "T.E.L.L. DR-Term Software Manual" for details.

The Menu

The T.E.L.L. receiver has a context-sensitive menu system. The menu is displayed on the bottom of the screen, the items (functions) can be activated by pressing the Function keys below them.

Figure 5. The Main Menu

At different levels of the menu, the actual functions assigned to the Function keys are changing accordingly.

Some of the menu functions are free accessible, some of them can only be accessed in protected mode.

Utilities

The utility functions can be reached with pressing the "Util" button (F3) in the main menu.
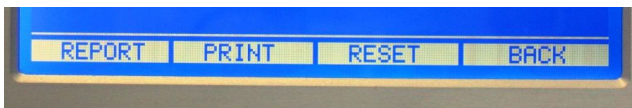
Figure 6. The Util Menu

Report

The receiver stores the last 2000 events in the memory even after it had reported to the computer or printed. At this menu some (last 50, today) or all of these events can be resent to the central station computer regardless that they were reported before or not. This menu is protected.

Print

This menu works the same way as the Report menu, except that it sends the contents of the memory buffer to the printer. This menu is protected.

Reset

This menu allows the central station operator to make a full receiver reset. This can be useful if receiver malfunctions encountered. There are three different levels of system reset. The Factory reset will reset the receiver parameters to default. This option might be useful, if the user has misprogrammed the unit and wants to return to the factory default state. This option is protected.
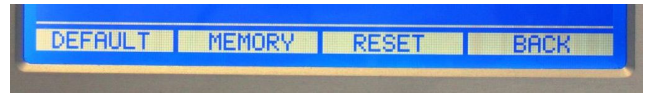
Figure 7. The Reset Menu

The Memory function will erase the contents of the memory buffer. This option is protected.

The Reset function will only do a warm-reset. The receiver will be restarted from the POS Test, but the parameters and the contents of the memory will be left unchanged. This option is not protected.

WARNING: Use the Memory and Factory commands with extreme caution because these commands will erase the contents of the memory buffer that may result in data loss.

Setup

The programming functions of the receiver can be accessed under this menu.

Figure 8. The Setup Menu

Options

The general options of the CPM2 can be set at the Options menu. The menu is protected. When selected a dialog will appear as follows:

Figure 9. CPM Options

The currently selected field is flashing. Skip between fields with the Left and Right arrow keys. The field contents can be increased with the + (F1) button and decreased with the – (F2) button. Pressing a button continuously will repeat the action until the button is released.

16

After the fields are set correctly, press the Enter key to save the set values. Pressing the Cancel (F4) or Display button will exit the dialog without making any changes.

Mute Buzzer
This option can silence the buzzer for debugging or servicing purposes. Enabling this option is not recommended for central monitoring stations, because the receiver will not beep when an event comes in and the PC Link is broken. The default setting is disabled.

External ACK
The operation of the external Acknowledge input of the receiver can be enabled and disabled here. When enabled, the events can be manually acknowledged by a normally open pushbutton connected to the external Acknowledge input of the receiver. The default value is disabled.

Receiver Tamper
When enabled, a short between the receivers tamper inputs will generate a "Receiver Tamper" status event. This can be used to record receiver tampering, when the receiver is installed in a closed cabinet with access doors. The default setting is disabled.

Printer
The operating mode of the printer can be set here. The available options are as follow:

OFF	The printer is disabled, nothing will be printed.
FULL	All incoming events will be printed.
BACKUP A	The events will be printed if the connection on COM A is broken.
BACKUP B	The events will be printed if the connection on COM B is broken.

The default setting is printer off.

Link Mode
As there are two independent serial ports are implemented on the receiver, and both can be configured to report mode at the same time, it is necessary to set, when the link with the PC should be considered ok. There are two options available here:

A OR B	The link to the PC is considered good, if there is connection in any of the two serial ports.
A AND B	The link to the PC is considered good only if both serial ports are connected.

The default setting is A OR B, so that if any of the ports is connected to the PC, the link will be considered ok.

SIA Messages
For SIA Level 2, multiple events can be transmitted in one single event block. This option decides, whether the event block should be sent to the PC as is, or it should be splitted to individual events (for SIA Level 1 protocol compatibility reasons). The two possibilities are:

BLOCK	The event block is handled as received.
SPLIT	The event block is split to individual events.

The default setting is block mode

LCD Contrast
The Contrast of the LCD Screen can be set here. Any values between 0 and 15 can be given, the higher value will result in a higher contrast. The default setting is 0.

Time & Date
The real time clock of the CPM2 can be set at this option. This function is not protected. A dialog box appears when selecting the menu item:

Figure 10. Set Time and Date

The navigation and setting of the fields can be done the same way as it is described at the CPM Option settings. The setting of the system time and date generates a "TIME/DATE SET" event so that the system time change will be recorded in the event list.

CPM2 Ports

The T.E.L.L. DR-81000 digital receiver is equipped with two RS232 serial ports, one Centronics parallel port, one high-speed USB port and an Ethernet port.

Serial Ports (COM A and COM B)

The Serial Ports are the main communication ports of the CPM2. They are almost identical, except one important feature – COM B is internally connected with the USB port, so that if the USB port is in use, COM B cannot be used at the same time.

The serial ports can be configured either as receiver or reporting ports. Regardless of the port configuration, both ports can be used for remote programming of the receiver.

Report Mode

The primary function of the serial ports is the Report Mode. When the CPM2 receives a message from a line card, radio, or from the TCP/IP port or an external receiver, or there is a CPM2 status event, it records the event in the memory buffer then forwards the event to the computer via the reporting port and awaits acknowledge signal from the computer.

Normally a positive acknowledge (ACK) is received, and the receiver steps to the next reportable event. If no acknowledge or negative acknowledge signal (NACK) is received, the CPM2 will try to resend the event 5 more times. If all attempts fail, the receiver generates a "COM x Error" event, (where x is A or B depending on the actual port number) and will keep it in the memory buffer while tries to report it repeatedly until it succeeds. The CPM2 can store up to 2000 events in its memory buffer if the link with the central station computer is broken.

If the receiver succeeds to report the event after a communication failure, a "COM x Restored" event will be recorded. After the communication link is restored, the CPM2 will send all pending reportable events from its memory buffer to the computer the same way. This method provides reliable and supervised communication between the CPM2 and the central station computer.

The reporting port is also supervised with heart-beat signals. The heart-beat signals are used to test the communication link between the receiver and the central station computer when there is no reportable event in the memory buffer. In this case the receiver sends so called heart-beat signals to the computer in a programmed time interval and requires acknowledge for that. If the acknowledge is missing or negative, it assumes that the computer is failed, and results in a "COM x Error" message.

If the automation software is not compatible with heart-beat supervision, the heart-beat signals can also be turned off (See Port Options).

Receive Mode

The secondary function of the serial ports is Receive Mode. It can be used to receive serial protocols from other receivers (E.g. SurGard or another T.E.L.L.). All the events received on the serial port are stored in the CPM2 as they would received on a virtual line card, and the prefix X will be attached to their line card numbers. These events will be listed together with the events received on the physical line cards of the receiver.

This function can be used to link multiple receivers through the serial ports and act as one, big receiver from the view of the central station computer. (E.g. when there are more than 8 telephone lines at the central station)

With this ability, the receiver can also be used to upgrade older systems.

Program Mode

Any of the two serial ports can be used for remote programming of the receiver. To access remote programming, the T.E.L.L. DR-Term software can be used. For a detailed description of remote programming, please, refer to the T.E.L.L. DR-Term Software Manual.

When commencing serial programming, the receiver will generate a "Program Mode" message. If the time and date is set during programming a "Time/Date Set" message will be stored, if any parameter of the receiver is changed a "Program Change" event will be recorded. Upon termination of the serial programming a "Program End" event will be stored in the memory buffer.

Port Setup

The features of the serial ports and the TCP/IP interface options can be set in this menu. The menu is protected.
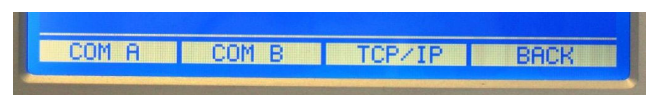

Figure 11. The Ports Menu

Serial Port Setup

The serial ports COM A and COM B are independent of each other and their parameters can also be set independently. However, as their operation is identical, their parameters are set similarly.

Figure 12. Serial Port Settings

The navigation and setting of the fields can be done the same way as it is described at the CPM Option settings.

Port Function
This option selects the basic behavior of the given port. There are two options available:

REPORT   In report mode, the events are reported via the port to the PC.

RECEIVE   In receive mode, the port can be used to connect to other receivers and receive messages from them.

The default setting for COM A is Report Mode, and for COM B is Receive Mode.

NOTE: The remote programming features do not depend on the selected port function, so that serial programming access is possible either for report or receive mode ports.

Report Option
This setting selects the protocol set for Report Mode serial port. The options are:

COMPATIBLE   In this case, the serial protocols used are compatible with the SurGard MLR2 DG receivers.

E2 CUSTOM   The E2 protocol set utilizes the possibilities in the new reception features of the T.E.L.L. receiver, however, they might not be compatible with all automation software.

The default setting is Compatible Mode. For detailed specifications of Compatible Serial Protocols, please, refer to the Serial Protocols section.

Port Settings
Here the asynchronous protocol for the serial port is set – port speed, number of databits and parity. The port speed can be set between 300 and 57600 bps, the number of databits can be set to 7 or 8, and the parity can be choosen as none, even or odd.

The default setting is 9600, 8 databits, no parity.

NOTE: The number of stopbits is always set to 1. This option is not changeable.

Receiver Number
In multi-receiver environments the automation software might have to be able to separate events by receivers. The receiver number identifies the receiver for the computer – the value can be set between 1 and 255 and has to be unique. The default setting is 01 for COM A and 02 for COM B.

Clock Signal
The insertion of the Clock Signal Protocol can be turned on and off here. The Clock Signal Protocol is used to transmit time and date information together with the event to the computer. The default setting is off. The Clock Signal Protocol can also be programmed to transmit the year or the second of the event. The default is to transmit the second of the event.

HB Monitor
This option defines, that if the port is in Receive Mode, it should monitor the heart-beat signals of the connected receivers. By default this option is disabled.

Heartbeat Time
Defines the interval of the heart-beat signals sent by the receiver to the computer to verify the serial connection. The interval can be set between 01 and 256 seconds. Programming 0 will disable the heart-beat signals if the automation software is not compatible with heart-beat protocol. The default value is 30 seconds.

Serial Protocols
The receiver uses different serial communication protocols for the connection to the automation software on the central station computer. Which protocol is used depends on which format has the event that has to be forwarded to the computer. The serial protocols used by the T.E.L.L. receiver are the following

Basic Signal Protocol
The Basic Signal Protocol is the mostly used protocol by the receiver. Receiver status events and most of the events received by the Line Cards are forwarded to the CPM using this protocol. The protocol format is:

`1RRLssssAAAAAAssGYYY[DC4]`

Where:
`1` Protocol ID
`RR` Receiver number
`L` Line Card ID
`AAAAAA` Account number
`G` Area/Group number
`YYY` Event code
`[DC4]` Terminator, 014h

Heart-beat Protocol
The Heart-beat Protocol is a special derivate of the Basic Signal Protocl. This protocol is used to supervise the connection between the digital receiver and the computer. It is sent periodically in a programmable time interval and the computer should positively acknowledge it for verification.

`1RR0ssssssssss@ssss[DC4]`

Where:
`1` Protocol ID (Basic Signal)
`RR` Receiver number
`@` Heart-beat signal
`[DC4]` Terminator, 014h

SIA Level 1 Protocol
The SIA Level 1 Protocol is used to forward events received in SIA format. When multiple events are received in one SIA data block (SIA level 2 and 3), and the receiver is programmed to split the block to individual messages then reports them with this protocol.

`3RRLssssAAAAAAXXYYYY[DC4]`

Where:
`3` Protocol ID
`RR` Receiver number
`L` Line Card ID
`AAAAAA` Account number
`XX` SIA Event code or modifier
`YYYY` Zone code/user code/time/date info
`[DC4]` Terminator, 014h

Caller ID Protocol
This protocol is used to forward Caller ID information to the automation software.

`4RRLssAAAANNNNNNNNNN[DC4]`

Where:
`4` Protocol ID
`RR` Receiver number
`L` Line Card ID
`AAAA` Account ID, (0000 if com failed)
`NNNNNNNNNN` Calling Number
`[DC4]` Terminator, 014h

Contact ID Protocol
The Contact ID Protocol is used to send messages received in Contact ID format to the computer

`5RRLs18AAAAQXXXYYZZZ[DC4]`

Where:
`5` Protocol ID
`RR` Receiver number
`L` Line Card ID
`AAAA` Account number
`Q` Event Qualifier E – new event or open, R – restore or close, P – previous event
`XXX` Class and event code
`YY` Group/Area number
`ZZZ` Zone/User number
`[DC4]` Terminator, 014h

Ademco High-Speed Protocol
This protocol is used to transmit events received in the Ademco High-Speed (4/8/1) format.

`8RRLAAAAsCCCCsCCCCsC[DC4]`

Where:
8	Protocol ID
RR	Receiver number
L	Line Card ID
AAAA	Account number
CCCC CCCC C	Channels 1-8 + 9 info
[DC4]	Terminator, 014h

Acron Super Fast Protocol
This protocol is used to transmit events received in Acron Super Fast (3/8 or 4/8) format.

`9RRLssssAAAACCCCCCCC[DC4]`

Where:
9	Protocol ID
RR	Receiver number
L	Line Card ID
AAAA	Account number
CCCCCCCC	Channels 1-8 info
[DC4]	Terminator, 014h

SIA Level 2 Protocol
The SIA Level 1 Protocol is used to forward events received in SIA format. When multiple events are received in one SIA data block (SIA level 2 and 3), and the receiver is programmed to split the block to individual messages then reports them with this protocol.

`SRRL[#AAAAAA|EXXYYYY/XXYYYY][DC4]`

Where:
S	Protocol ID
RR	Receiver number
L	Line Card ID
#	Account ID code
AAAAAA	Account number
I	Field separator
XX	SIA Event code or modifier
YYYY	Zone code/user code/time/date info
/	Data separator
[DC4]	Terminator, 014h

Clock Signal Protocol
The Clock Signal Protocol is used to transmit time and date information together with the events. The Clock Signal is inserted to the serial protocol before the terminator character. The sending of Clock Signal Protocol can be enabled or disabled (See CPM Options). The Clock Signal format is the following:

`[Protocol]HH:MM:SS-dd/mm[DC4]`

Where:
[Protocol]	Protocol normally sent by the receiver (as described above)
HH	Hour
MM	Minute
SS	Second
dd	Day
mm	Month
[DC4]	Terminator, 014h

NOTE: *for the Heart-beat Protocol the Clock Signal will not be inserted, even if it is otherwise enabled with other protocols.*

Serial Port Status Display

The status of the serial ports can be reviewed on the right of the Info Display screen.

Figure 13. Info Display Mode

"COM-A" and "COM-B" indicates the serial port status. If any of the serial ports are used via USB coupling, "USB" is displayed instead of "COM". If the connection on the given reporting port is alive, it is displayed with a "✓" icon. If the link is broken, a "-" is displayed. For receiving ports "R" is displayed.

USB Ports

The receiver is equipped with two USB ports, which are hardware coupled with the serial ports of the receiver. This means, that serial and USB connections cannot be used at the same time for the same port.

The T.E.L.L. USB port is compatible with Windows XP, Vista and Windows 7 x86. Under Windows XP, the certified serial port drivers, which are needed for the installation, can be downloaded from the FTDI website.

Under Windows Vista and Windows 7, when connected, the serial port drivers will be installed automatically.

NOTE: For older hardware revisions, with 1 USB port only, a different driver is needed. the proper USB CDC port driver for the T.E.L.L. Virtual RS Port can be downloaded from the internet.

Parallel Port

The CPM Unit has a 8-bit parallel port for printer connection. Practically any printer with Centronics parallel interface can be connected to the port, and can be used as the system printer. If possible, the use of a line printer is highly recommended, as there is no such page buffering as with most page printers, so that they can provide instant output. The receiver will forward all events to be printed to this port.

Printing

The receiver can use the printer connected to the parallel port as a full time output or as a backup of the serial ports as described at CPM2 Options. As a third option, the printing can also be fully disabled.

The receiver prints the events a similar way it displays on the screen:

`1234 Usr Open 01 005 02 06/20 15:40:23`

will print as

`2007/06/20 15:40:23 – 1234 Usr Open 01 005 – 02`

The receiver prints first the date and the time of the event, then the account number, the event and the event qualifiers (group/partition, zone/user), finally the Line Card number from which the event was received.

The contents of the memory buffer can be printed again if necessary with the Print command detailed at CPM2 menus. This option can be useful for example if some events were not printed correctly because of dirty printer head or low toner, although the printer seemed to work normally.

TCP/IP Options

In all computer networks, proper setup requires exact specification of **address** or domain name. As the current version of T.E.L.L. does not support Dynamic Host Configuration Protocol (DHCP), a **fixed IP address** should be set up for it. This requires knowledge about the available IP domain and address ranges on the local network. In doubt, please, contact the system administrator to assign a free IP address to the receiver on the network. The default setting for the T.E.L.L. is IP address 192.168.1.240, with a domain netmask of 255.255.255.0. As the receiver will act as a server only, and will not initiate any outbound connections, the „Gateway" and „IP Server" addresses, "Receiver Port" and "Server Port" are not used in the current version.

Figure 14. TCP/IP Options

The T.E.L.L. receiver acts a **server** on the network. For proper operation, several **ports** must be defined for the receiver, accepting inbound connections.

The „**Shell Port**" (default 23) is used for remote management, a secure shell server is available at this port, making remote programming possible. Finally, the „**HTTP Port**" (default 80) is used by the web server of the receiver. All these ports can be changed according to the requirements of the current system. Please, consult with the system administrator about port assignments.

Further parameters can be set with the T.E.L.L. DR-Term utility. (see "T.E.L.L. DR-Term Software Manual" for details.)

Web Interface
The T.E.L.L. receiver has a built-in web-server, which is available at its HTTP port. The web-page of the receiver can be used to browse the event memory list of the receiver. The number of lines displayed per page can be given with the „Number of lines (rows)" parameter. If there are more events to display, the receiver will brake the list into pages.

By default, the event list is displayed on the web-page without any restrictions. For more security, password based access can be enabled with the "Web Server access with password" option. In this case, entering the address of the receiver in the browser will only display a login window, where the access password must be given. The access password is 12 characters long, and it defines the event list to display, and it can be generated with the T.E.L.L. **Password Generator** utility, which installs in bundle with the T.E.L.L. Uploader utility. Different filter options for accounts, time limited or unlimited access, and even the security password of the T.E.L.L. receiver can be used at the password generation. Entering the password, the specific list of events will be displayed. In case invalid, or expired password is given, the receiver will display an error message on its web-page.

6. LC2 Line Card

The LC2 Line Card acts as the interface link between the digital communicators of the control panels and the CPM2. Different communication formats can be used to transmit information between the Line Card and the control panels.

The main function of the Line Cards is to receive and decode the incoming calls from digital dialers, communicators and control panels, to monitor the status of the telephone line and to report this information to the CPM2. The Line Cards also monitor the connection to the CPM2 and in case of connection failure, they are able to function independently with manual interaction needed from the central station operator. Each LC2 Line Card can store up to 500 events in its own event buffer.

General Information

The Line Cards are able to receive signals from digital phone communicators in different formats. The following formats are accepted by the Line Cards:

Pulse formats:
- 3/1, 3/1 with parity*, 10-40 baud
- 3/2*, 10-40 baud
- 4/1*, 4/1 with parity*, 10-40 baud
- 4/2, 4/2 with parity 10-40 baud
- Extended formats*

DTMF formats:
- Ademco Contact ID
- 4/1, 4/2, 4/3 DTMF
- Ademco Express
- Ademco SuperFast / High Speed DTMF
- FBI SuperFast*

FSK formats:
- SIA FSK level 1, 2 and 3**

* The reception of these formats depends on actual configuration
** SIA level 3 with reverse channel restrictions.

Installation

Up to 8 LC2 Line Cards can be installed in the T.E.L.L. receiver. The installation procedure of the Line Cards is described in Chapter 3.

The actual line card number depends on which slot is the line card installed. Positions 1 to 8 correspond to line card numbers 1 to 8, respectively.

LC2 Line Card Features

- High-speed RISC microprocessor
- Flash technology – user upgradeable firmware
- User programmable handshake sequence and communication format selection
- Stores up to 500 events and call numbers in nonvolatile memory buffer
- Alarm events are forwarded to the CPM2 with a minimum delay
- The LC2 monitors the status telephone line continuously. It features very reliable true loop current detection.
- Caller ID detection feature (ETS 300-659, Bellcore TR-NWT-000030, DTMF)
- Highly reliable pulse signal detection with DSP
- Programmable reception parameters
- Improved SIA reception with built-in FSK modem.
- Customizable code tables for SIA and Contact ID
- User defined code tables for standard formats
- Line switching to external handset for listen-in in 2-way audio applications
- Two level, high-power electric surge protection of the telephone line interface. Easy to change line protection module.
- The Line Card monitors the connection to the CPM2, and goes automatically to stand-alone mode if CPM2 is absent.
- Built-In watchdog timer monitors Line Card microprocessor operation
- Communication format libraries are easily upgradeable

Line Card Controls

The Line Cards do not have dedicated external controls except for their status LEDs. The control of the cards can be achieved through the CPM2 at the Info Display mode.

Figure 16. Line Card Control in Info Mode

The line card LEDs 1..8 display status information of the line cards. Continuous green light indicates standby mode – the line is ok, and the card is waiting for call. Ring is signalled by fast blinking – it turns to yellow when the Line Card answers the call and receives the incoming communication. If the LED is off, and lits up red shortly in every five seconds, that means there is a problem with the telephone line. During Flash Update of the card, the LED blinks slowly green.

In Info Display Mode, status information of the line cards are displayed on the left of the screen. Each line cards in the system have a dedicated display line, from 1 to 8. If there is no line card installed in the given position, '---' is displayed.

On the bottom of the screen, right above the context-menu, the status information of a selected line card is displayed with larger font set. That could be helpful when inspecting communication on a given line card.

In the context-menu are the functions related to the selected line card. If no valid line card is selected, the context-menu is empty.

Stand-by Mode

After power-up or reset, the LC2 line card performs a short self-test, then it goes to stand-by mode. In stand-by mode the Line Card monitors the telephone line and waits for calls from digital communicators. If the card is operating normally the following will be displayed in its status line:

READY

The LC2 line cards check for the presence of the telephone line periodically when in stand-by mode. The line card LED indicates the line test by a short yellow pulse. The line test is based on true loop current detection, which allows very reliable line monitoring. If the telephone line fails or disconnected, the line trouble condition will be sent to the CPM and the following will be displayed:

TEL LINE ERROR

After that, the Line Card reduces the line test period to sense the telephone line restoration with a minimum delay. In this case the line testing is indicated on the line LED by slow red blinking. As the line is restored, the line restoration event will be transmitted to the CPM Unit, and the display will indicate the "READY" status again.

After line restoration, the period of the line checks is reset to normal.

CPM2 Monitoring

The LC2 line cards sense the polling of the CPM2. and switch automatically to stand-alone mode in case the CPM2 is absent.

In case the CPM2 polling is continuous, the line cards also generate internal check messages to force CPM2 to perform a full communication sequence (Read + ACK) periodically. In case the CPM2 fails to perform the sequence, the line cards can go to stand-alone mode until the CPM2 is able to process messages from them again.

After the polling and event processing of the CPM2 is restored, the Line Card returns to stand-by mode, and will report all events in its memory buffer to the CPM2.

Call Reception
When a call is received, the Line Card first indicates the ringing on the phone Line

```
RING...
```

If caller identification is enabled and a valid Caller ID is received between the first and second rings the Line Card will display a message similar to the following:

```
ID: 0612575125
```

After the "ID:" prompt the calling number is displayed with area code (or without it, as received from the Service Provider). The calling number is buffered also for further processing. More about the handling of the Caller ID events can be found in the "Caller ID Processing" section

After the programmed number of rings received the Line Card will pick up the line, the Comm LED will light up and on the screen appears:

```
INCOMING CALL
```

If there was a valid Caller ID received, then the display will not change, and the number of the calling party will remain displayed.

```
ID: 0612575125
```

The Line Card issues the handshakes in the programmed sequence and waits for response. If a digital dialer responds to a handshake, a similar display will appear as the dialer sends the message to the receiver:

```
>12342756F
```

By decoding the received data, the Line Card determines, which communication format fits the best for the received sequence, and decodes the message accordingly. After a valid message is received and decoded, the event will be forwarded to the CPM Unit and the actual decoded data will be shown:

```
1234-56
```

In case there was a Caller ID received with the incoming call, it is transmitted to the CPM together with the first received event. See. "Caller ID Processing"

If there was an error in decoding the type of the error will be displayed for review and a "Fault Data"

message will be sent to the CPM. The type of faults can be the following:

```
BAD CRC/CHECKSUM
DATA ERROR
REPEAT FAILED
UNKOWN FORMAT
```

Note that although the Line Card can automatically identify most of the formats, some of the communication formats must be enabled/selected by programming.

2-way Audio Mode
There are two methods of activating 2-way Audio mode. The first is the direct activation by special event types defined in sophisticated communication formats like Contact ID and SIA. These formats have predefined event codes for listen-in request. If the proper code is received, the Line Card will activate the 2-way Audio Mode.

The other possibility is to define certain account and event groups to engage 2-way Audio that allows the extension of listen-in to 3/1, 4/1, 3/2, 4/2 etc. formats. In this case, the first digit of the account code specifies the range of accounts that are able to activate 2-way Audio, and the first digit of the event specifies the range of events that can activate the 2-way audio mode when received from the proper accounts.

When the 2-way Audio Mode is activated, the line LED will blink fast yellow and the line card will activate the connected handset. The status line will show:

```
LISTEN IN
```

The operator now can talk to the calling party with the handset. The Audio Mode can be finished by the operator by pressing the "HANG UP" (F4) button of the context-menu (of the given line-card). If the 2-way Audio Mode timeout is programmed, the Line Card will disconnect the handset after the timeout period expires, even if the operator does not hang up the call.

Call Termination
The call is normally terminated if there is no more communication attempts after the last event received. In this case, the Line Card will hang up, the line LED will return to green and the line card status line will display "READY".

If there are no valid messages received during the communication, a "Fault call" message will be sent to the CPM2. The central station operator can also terminate the call at any time by pressing the "HANG UP" (F4) button of the context-menu.

The Line Card will immediately hang up and will forward an "Operator Cancel" message to the CPM2.

The call will be terminated automatically if there is no answer for the handshakes, no valid messages are received within 30 seconds of communication, or the number of incoming events during the current call exceeds the call limit. The maximum number of events per call, the answer timeout for the handshakes and the valid message timeout are programmable by the user.

Caller ID Processing
When a valid Caller ID signal is received, the calling number is not automatically transferred to the CPM2, but buffered for further processing. The reason for this behavior is that the line card tries to assign an account number to the calling number and forwards it to the CPM2 together.

The assignment can be done when the first event is received by the line card during the call. After decoding the received event, the line card combines the received account code with the previously buffered calling number and forwards the calling number to the CPM2 before the actual received event.

```
1234 CALL: 2975125      2 15:40:02
1234 Panic 01           2 15:40:02
```

If there is no valid event received during the communication, and so there is no valid account code which could be assigned to the calling number, then the line card assigns the "0000" system account code to it, and forwards it to the CPM2 that way.

```
0000 CALL: 2975125      2 15:40:02
0000 FAULT CALL         2 15:40:02
```

NOTE: As usually and account always makes calls from the same telephone line, the account ID and the calling number can be matched. The assignment of the account code to the calling number by the line card makes possible to use advanced event checking options in the monitoring software on the PC – E.g. filtering out invalid account/calling number pairs and making account hijacking notifications.

Operating in Stand-alone Mode
If the CPM2 fails to poll the Line Cards, or disconnected, the Line Cards automatically switch to stand-alone mode, and operate independently without central station operator interaction. The incoming events will be stored in the Line Cards 500-event non volatile buffer, and will be transmitted to the CPM2 upon the restoration of the internal connection.

Line Card Menu
In Info Display mode, the context-menu of the selected line card is displayed on the bottom line of the LCD screen.

Figure 17. Line Card Context-Menu

The menu items can be accessed by pressing the F1..F4 function buttons below them.

Audio Monitoring
In the line card context-menu, the first item controls the audio monitoring option of the selected line card. There is a small audio amplifier built-in in every LC2 line card making It is possible to listen to the actual communication running on the line card – this might be useful when debugging communication problems with control panels. By default, the audio of the line card is muted. Pressing "MON ON", turns the audio of the line card on, which is signaled with a small right arrow icon next to the line card number.

```
1▶READY
```

The context-menu changes accordingly, now the first item will be "MON OFF", indicating, that pressing the button again will turn off the audio of the line card again (this will also remove the icon, and change back the menu to "MON ON").

Hang Up

The last item of the line card context-menu can be used to hang up the ongoing communications at any time. If the line card is in standby-mode, pressing this button has no effect.

During communication, pressing this button will terminate the call, and an "Operator Cancel" event will be sent to the CPM2.

Line Card Setup

Some of the Line Card parameters are programmable by the user. The programming of the parameters can be done through the "SETUP" menu item of the context-menu of the selected line card. Pressing the Setup button will invoke the Line Card Options dialog:

Figure 18. Line Card Options

The currently selected field is flashing. Skip between fields with the Left and Right arrow keys. The field contents can be increased with the + (F1) button and decreased with the – (F2) button. Pressing a button continuously will repeat the action until the button is released. After the fields are set correctly, press the Enter key to save the set values. Pressing the Cancel (F4) or Display button will exit the dialog without making any changes.

Ring Options

The first value defines that after how many rings will the Line Card answer the call. This number can be set between 1 and 8, the default value is 2.

The second value is the timeout for ringing signals in seconds. If there is no further ring signals are received within this period, the ring sequence is considered terminated, and the ring counts are reset.

Note: When using VOIP connection with analog line interface as the telephone line connection for the

receiver, the control signals on call termination may disturb the ring detector of the line card telephone hybrid – so that it might detect ringing. If the number of rings set to 1 in this case, the line card might stuck in a continuous communication attempt and will not be able to receive calls. Due to this issue, It is highly recommended to set the number of rings to minimum 2 to avoid such problems, as more and more Service Providers change existing analog PCM connections to VOIP without further notification to decrease line forwarding costs.

Signal Timing

The basic communication timings can be set here. The values from left to right are as follow:

First value is the Billing Delay in seconds. This is the time the receiver will wait before issuing the first handshake upon answering an incoming call. The default value is 3 seconds.

The second value defines the length of the 2300Hz and 1400Hz handshake and kissoff signals. The value is given in 10 millisecond units, the default is 120 (1200 ms)

The third value is the length of the dual handshake pairs, (1400/2300 Hz) in 10 milliseconds. The default is 010 (100ms)

The fourth value is the length of the SIA handshake (2225 Hz), defined in 10 millisecond units. The default is 090 (900 ms)

The fifth value is the communication timeout in seconds. This is the time the line card waits for further communication from the dialer after a successful communication has already been done during the incoming call.

HSK Frequency

The frequency of the handshakes and kissoff signals can be fine tuned here. These values should not be changed by the user unless there are serious communication problems requiring signal transmission tests. Defaults are 9E and 7B.

Receive Timing

The initial signal timings of the DTMF and pulse communication can be changed here. These values are to be changed only if serious communication problems are encountered. Default values are 010, 023 and 100.

SIA Timing

The timings of SIA communication are to be set here. The first value is the length of the SIA handshake in 10 millisecond units. The default is 080 (800 ms).

The second value is the timeout of the SIA blocks in 10 milliseconds. The default is 020 (200 ms)

The third value is the length of the initial carrier signal sent before data blocks. The default is 015 (150ms)

Caller ID
The caller identification can be enabled and disabled here. The second value is the timeout for Caller ID detection in ten milliseconds, it defines the time within the FSK Caller ID signal must be inserted by the SP after the first ring. The default setting is enabled.

Note: *The availability of the Caller ID service depends on the telephone service provider and requires may not be available in all areas and countries. Consult the Telephone Service Provider company for details.*

Two-way Audio
The Line Cards are capable for 2-way audio / listen-in applications. The 2-way Audio Mode can be enabled or disabled at this item The default setting is disabled.

The second value is the timeout for the 2-way audio mode in seconds. This is the time after the line card will automatically close the 2-way audio connection. It can be programmed between 0 and 255, the 0 value meaning there is no time limit, so that the connection can be closed only by the operator, pressing the "HANG UP" button for the selected line card. The default value is 0 (no time limit).

There are different ways to initiate the 2-way Audio Mode. Certain formats, for example SIA and Contact ID have dedicated event codes to enter listen-in mode. For other formats, dedicated account and event groups can be defined to activate 2-way Audio Mode as follow.

The first two values define an account group for 2-way audio. The first two digits of the account code must be within the range defined by these values to allow 2-way audio for the given account.

Example:

```
33   33     33xx accounts…
18   2F     18xx – 2Fxx accounts…
00   00     no accounts allowed for 2-way audio
```

The second two values define the event code range, that will activate the 2-way audio for the line card. For example:

```
81   81     The Event code 81….
21   3F     21 – 3F Event codes….
00   00     no event codes will activate 2-way audio
```

If both the 2-way Audio Event and Account ranges are defined, then both the event and account code must be in the proper defined range to activate 2-way Audio Mode. For example:

```
2-way event:      31 3F
2-way account:    11 1F

1234 – 21      will not activate 2-way Audio
3456 – 36      will not activate 2-way Audio
1234 – 36      will activate 2-way Audio
```

The defaults for the 2-way Audio Event and Account ranges are all zeros, so that no 4/2 event will engage 2-way Audio Mode.

HSK Sequence
The number and order of handshakes that a line card will issue on a call are programmable. The maximum number of handshakes is 8. Each handshake position can be set from 0-5, the numbers correspond to the following handshakes:

```
0       No handshake, terminator
1       Dual tone handshake (1400/2300 Hz)
2       2300Hz handshake
3       1400Hz handshake
4       SIA FSK Handshake (2225 Hz)
5       BG DTMF Handshake
8       NGN Activation Signal
```

The last handshake in the sequence have to be 0, this acts as a terminator of the handshake sequence, the default sequence is 1-1-2-3-4-0-0-0.

HSK Timing
The values define, how many seconds the line card will wait after a handshake for an answer, before issuing the next one. The default timing is 1-3-3-3-3-3-3-3.

Other Parameters
There are more parameters of the line cards that can be set only with the help of the T.E.L.L. DR-Term software. Please, refer to the "T.E.L.L. DR-Term Software Manual" for details.

Line Card Status
Pressing the "STATUS" button in the Line Card Menu invokes the status display of the selected line card.

On the top, the firmware version of the line card is displayed. Beneath it the internal statistics of the line card are listed. These values may help finding possible problems of the line card.

At the Line Card Status screen, it is possible to reset the selected line card by pressing the "RESET" (F3) button. The line card will perform its power-on test sequence and then starts up in standby-mode.

7. Power Card

The Power Card supplies power to the other Cards in the system, charges and supervises the backup battery and reports AC and battery status to the CPM Unit.

Inputs and Outputs
The input of the Power Card is 16.5 VAC. The Card contains a dual power supply, separate power supplies for powering up the system and for battery charging. For the system the Power Card makes 13.5 V DC stabilized power with a maximum static load of 3 Amps. For battery charging the Power Card makes 13.8 V DC stabilized power. The battery charging power is electronically controlled - the maximum charging current is at 1.5 Amps.

Power Status Display
The blue Power LED indicates the operation of the receiver. It will light up if the 13.5V system voltage is present.

The red Bat LED shows the status of the battery and the AC power. If this LED is off, then there is no power problem. If it is lit, then it indicates AC power loss (the system is operated on battery power). The flashing Bat LED shows battery problem – change or recharge the connected battery. If the LED blinks fast, it indicates a problem of the power supply.

Battery Testing
The Power Card checks for battery presence regularly, and conducts an active battery test every hour. It also makes the active test after the battery is connected to the receiver. The battery testing does not affect receiver operation in any way, as the system supply and the battery charger are independent of each other.

When checking for battery presence, the Power Card checks the voltage on the battery terminals with decreasing the charging voltage applied. If the voltage falls below a preprogrammed limit, it will cause a battery fail event.

The active test is conducted only when a battery is connected to the receiver. During the active test the Power Card first disconnects charging voltage then it applies a load to the battery observing the gradient of the voltage drop. If the voltage of the battery sinks too fast, or falls below a limit, the Power Card will cause a battery fault event.

IMPORTANT: The battery will be considered OK only if it passes the active test. The active test result depends highly on the actual battery capacity, therefore it might be that small capacity (1.2Ah) batteries will not be found good. The recommended battery capacity for the T.E.L.L. receiver is 7 Ah.

Appendices

Appendix A: System Event Table (0000)

Message	Code	Description
AC ERROR	81	No AC power
AC RESTORED	82	The AC power has been restored
BATTERY LOW	83	No battery, or not properly charged
BATTERY OK	84	Battery is ok
COM A ERROR	85	Communication failure on COM A
COM A RESTORED	86	Communication has been restored on COM A
COM B ERROR	87	Communication failure on COM B
COM B RESTORED	88	Communication has been restored on COM B
TCP/IP ERROR	89	TCP/IP connection error
TCP/IP RESTORED	8A	TCP/IP connection has been restored
UPLINK ERROR	8B	External receiver connection error
UPLINK RESTORED	8C	External receiver connection has been restored
PRINTER ERROR	8D	Printer is offline, or out of paper
PRINTER OK	8E	Printer is ready
RECEIVER RESET	8F	Receiver has been reset
TIME/DATE SET	91	Time and Date has been set
PROGRAM ACCESS	92	Program access via the serial port
PROGRAM END	93	Programming finished via the serial port
REMOTE ACCESS	94	Remote programming access
REMOTE END	95	Remote programming finished
MANUAL ACK	96	Manual acknowledgement
ACCESS GRANTED	97	Access to protected mode granted
ACCESS DENIED	98	Access to protected mode denied
RECEIVER TAMPER	99	Receiver tamper input open (if enabled)
TAMPER RESTORE	9A	Receiver tamper input closed (if enabled)
LINE CARD RESET	E0	Line Card has been reset
TEL LINE ERROR	20	Telephone line fault
TEL LINE OK	30	Telephone line has been restored
FAULT CALL	40	Fault Call, no data has been received
FAULT DATA	10	Fault data reception
OPERATOR CANCEL	50	The operator hung up the line manually
LINE CARD FAIL	F0	Internal bus communication failure

Appendix B: Supported Communication Formats IP

Name	Encapsulated Format	AES	Devices (examples)
Simple CID	Contact ID	+	VBIP, ICT PostX IP
RK3000	Contact ID / 4/2	+	Rightkey RK100
BGSM	Contact ID	-	Bentel BGSM-G / 100KCA
Texecom IP	Contact ID / 4/2	-	Texecom ComIP

Appendix C: Supported Communication Formats PSTN

Name	HSK	Data	Speed	Format	Ext.	Kissoff
Ademco Slow	1400 Hz	1900 Hz pulse	10 bps	3/1, 3/2, 4/1, 4/2	+	1400 Hz
Silent Knight Fast	1400 Hz	1900 Hz pulse	14 bps	3/1, 3/2, 4/1, 4/2	+	1400 Hz
Franklin Sescoa	2300 Hz	1800 Hz pulse	20 bps	3/1, 3/2, 4/1, 4/2	+	2300 Hz
Radionics	1400 Hz	1800 Hz pulse	40 bps	3/1, 4/2, 3/1+p, 4/2+p	+	1400 Hz
Radionics	2300 Hz	1800 Hz pulse	40 bps	3/1, 4/2, 3/1+p, 4/2+p	+	2300 Hz
Sescoa SuperSpeed	2300 Hz	1800 Hz pulse	40 bps	4/3+p	-	2300 Hz
Contact ID	Dual	DTMF		Contact ID	-	1400 Hz
Sur-Gard	2300 Hz	DTMF		4/1, 4/2, 4/3, 4/3+p*	-	2300 Hz
Sur-Gard 1400	Dual	DTMF		4/1, 4/2, 4/3, 4/3+p*	-	1400 Hz
Ademco Express	Dual	DTMF		4/2	-	1400 Hz
Acron DTMF	Dual	DTMF		4/8	-	1400 Hz
Ademco HighSpeed	Dual	DTMF		4/8/1	-	1400 Hz
SIA FSK level 1, 2, 3	FSK mark	FSK 110-300	baud	SIA data packets	-	tonal/data
BodyGuard CID 2W	DTMF	DTMF		Contact ID	-	DTMF

Appendix D: Trouble Shooting Guide

Problem: No communication with the central station computer on COM A
Solution: Ensure that the cable used is a Null Modem cable and connected properly.
Check the serial port configuration of the receiver and the computer.
Check the computer software setup.
Examine the output of the receiver with a terminal program.

Problem: Communication problems (protocol, unknown messages) with the central station computer
Solution: The automation software might not be compatible with the receiver. Contact the software manufacturer for proper driver or software upgrades.
Check the serial port configuration of the receiver and computer.
Check the serial cable for secure connection

Problem: Fault in received data
Solution: The signal on the telephone line is too weak or noisy. Check telephone line connections.
The receiver might not support the communication format - consult manual for supported formats.

Problem: Telephone line fault
Solution Check the telephone line connections for cut or short.

Problem: Fault call on the Line Card
Solution: Check that the handshake needed for the control panel is programmed for the Line Card.
Check that the handshake is being sent properly. Use Audio Monitoring option.
Check that the control panel answers the handshake, modify handshake properties if needed.
The receiver might not support the communication format - consult manual for supported formats.

Problem: The COM B cannot be used when the USB port is in use
Solution: This is normal. The USB and COM B ports are internally connected, so that only one of them can be used at a time.

Problem: The USB port does not have built-in drivers in Windows XP and Windows 2000
Solution: Please, download the latest drivers from FTDI web site

Problem: The connection with the PC is working well, but the LINK LED is not lit up
Solution: Check CPM Options and the Serial Ports. If the "Link Mode" is set to "A AND B" then the LINK LED will only light up, when both ports have been properly connected.