DRR and DRR-REP

User's Guide

FW ver: 1.2.xx
(12-08-2004)

http://cdrs.try.hu

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1. Introduction

DRR radio receiver and DRR REP repeater are the main parts of a radio network for transmitting security signals on 450 MHz. The system is designed for transmitting the signal of CiD radio but, optionally, the system is able to receive the signals of the older RT-44 transmitters.

1.1 General features

DRR receiver and DRR REP repeater

- Flexible CiDuni radioprotocol, 4/2 and global Contact ID transmission
- User Key for signal encrypting, no unauthorised „listening" and jamming
- Receives CiD42 (or CiDold) conventional radio protocols
- Converts 4/2 code table to Contact ID format (optional)
- Traffic control for flexible receiver ID management
- acknowledge protocol, complex acknowledgement and backup process prevent useless repetition
- Optional CiD42 (or CiDold) transmission, devices are compatible with conventional radio networks
- LCD display, analogue field strength display
- In-built speaker to monitor transmission and reception. Squelch for reception
- In-built clock
- Large event buffer, 8000 events with date and time stored in "non-forget" FLASH memory
- Contact ID and CiD42 events can be displayed in English
- Field strength and receiver ID display by events
- Log search filtered by date and account number
- The entire system is programmable through the local menu, optional password protection
- In-built RS232 port, Ademco 685 or Basic serial protocol
- Optional "Clock signal" and "Heart beat" protocols
- Optional field strength report, Contact ID field strength event generation according to set parameters
- Local event generation in 4/2 or Contact ID format
- Fully programmable through RS232-es port, Windows based downloading program
- Secure FW (Firmware) and background file (menus and code tables) update
- In-built 12V(7Ah) battery charger, 16.5V AC input
- Tamper input and PGM output

DRR receiver

- Compact desktop design (55x235x195mm)
- In-built transreceiver
- 12V(7Ah) Backup battery and 230V/16.5V external transformer

DRR REP repeater

- IP54 wall-mounted, sabotage-proof plastic box (300x220x120mm)
- In-built transreceiver and 12V(7Ah) battery
- External 230V/16.5V transformer

1.2 Differences betweeen DRR receiver and DRR REP repeater

Functionally they are the same, therefore, in the following sections they are discussed simultaneously. The main difference is in the mechanical structure.

2. Content of the package

2.1 DRR Receiver

- DRR receiver with in-built transreceiver (optionally it can be ordered without transreceiver!)
- Connectors and battery cables
- RS232 serial cable
- CD, setup program for Windows and manuals
- Printed User's Guide
- 230V/16.5V external transformer

The package doesn't consist the receiver antenna and its accessories unless ordered!

There is no 12V(7Ah) BATTERY in the package but it is required for the system to work!

2.2 DRR REP Repeater

- DRR REP repeater with in-built transreceiver (optionally it can be ordered without transreceiver!)
- RS232 serial cable
- CD, setup program for Windows and manuals
- Printed User's Guide
- 230V/16.5V external transformer

The package doesn't consist the receiver antenna and its accessories unless ordered!

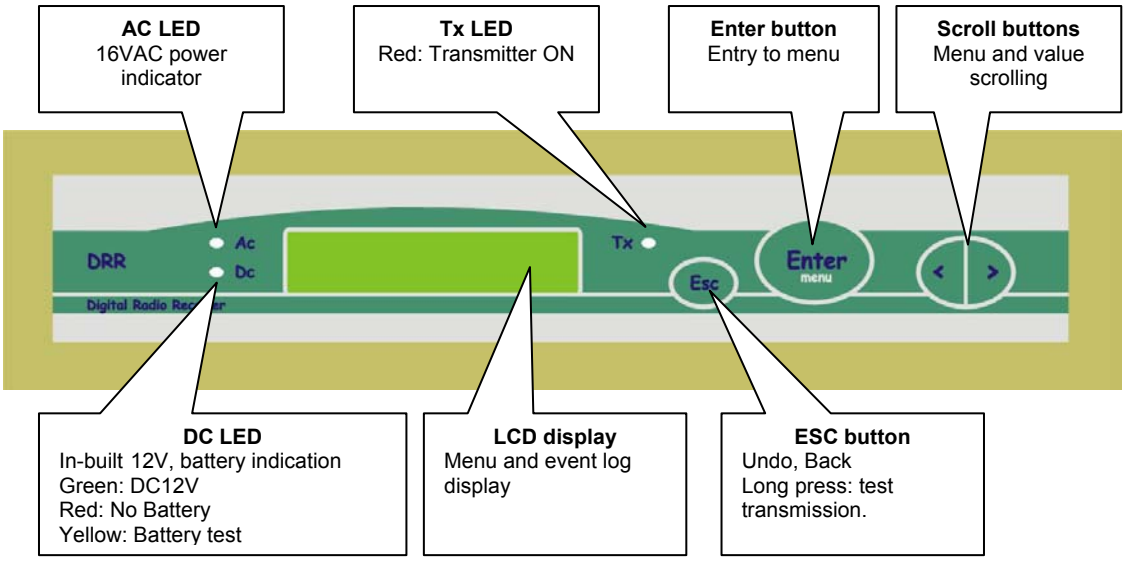
There is no 12V(7Ah) BATTERY in the package but it is required for the system to work!

3. Controls

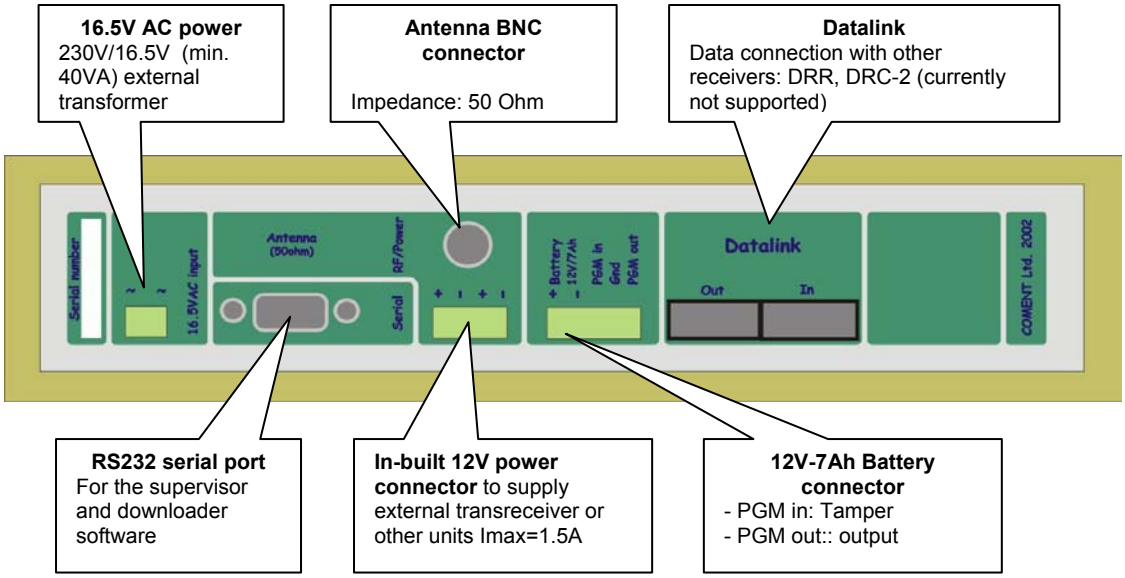
The controls and features of DRR receiver and DRR REP repeater are the same, the only difference is in their mechanical structure.

3.1 DRR Receiver

Front: controls and indicators

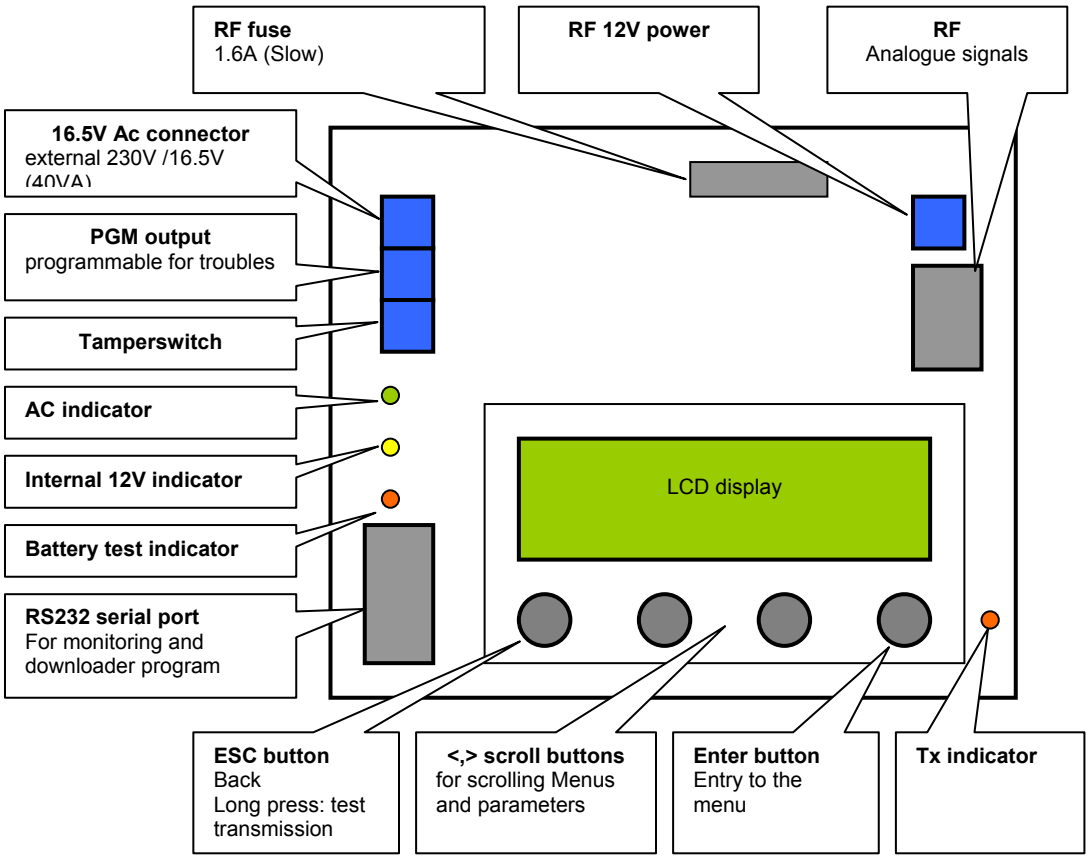


Back connectors:



3.2 DRR REP Repeater

Control pnael connectors and controls



4. Installation

The LongRange radio requires permission in Hungary. Having the required permissions the manufacturer is allowed to set the radio to the permitted channel.

The user is not supposed to modify the channel number!

After unpacking the device check the accessories.

4.1 Installing DRR Receiver

Place the device on a desk or a shelf. Do not expose the device to direct heat, do not cover it to prevent overheating caused by inadequate ventillation! The receiver can only be used inside, on normal room temperature. Avoid humidity.

1. First, connect the BNC connector of the installed antenna to the receiver. Never use the receiver without antenna because it may be damaged during transmission!
2. Connect the connector of the attached serial cable to the RS232 connector of the receiver, and connect the other end of the cable to the free serial port of the PC. If the PC has 25-pin connector use standard port restrictor.
3. Connect the 16.5V output of the AC transformer to the attached bipole plug-in terminal then connect it to the AC input connector. Connect the Mains to the 230V side of the transformer.
4. Connect the 12V(7Ah) battery to the attached five-pole connector mounted cable using the red pole as positive and the black pole as negative. Finally, connect the cable to the receiver.

4.2 Installing DRR REP Repeater

It is recommended to place the repeater indoor. Avoid extreme temparature conditions in order for the proper operation. (Direct sunlight in summer, frost in winter) Optimal temperature range is -20 °C to +35 °C. Since the internal parts raise heat the higher temperature can be critical.

1. Unscrew the four bolts and remove the box cover. Cut off a U-shaped reed for the coaxial antenna, it is recommended to cut the top right hand side of the box. Drill a 5-8mms diameter hole on the bottom of the box for the 16.5V AC cable. Mount the box towards the wall, sign the place of the holes and drill them. Mount the 230V/16.5V transformer to the wall. Connect adequate cable to the 16V side (min: 0.5mm^{2}AWG) and draw it in the repeater's box. After drawing in the coaxial antenna fasten the box to the wall.
2. Connect the BNC connector fo the antenna to the transreceiver unit.
3. Connect the 16.5V AC to the terminals.
4. Since the IP54 box is dust-proof and moderate water-proof it's recommended to seal the cables into the holes by a rubber-composition sealer.
5. Connect the 230V part of the transformer to the Mains.
6. Connect the 12V(7Ah) battery (red: positive, black: negative), then place it to the top of the box.

4.2 Power on

Switch AC power and the device starts.

1. After power up, the device tests the load capacity of the battery. It's necessary because a half run-down battery is able to supply nominal voltage when the load is small but it decreases when the load rises. To increase the load the test switches on LCD backlight. If the voltage is not adequate the process stops at this point.

```
-= Wait Power =-
```

2. If the power is adequate the system performs self-test meaning background memory and the event buffer. During the test it shows the current FW version and the related information. If trouble occurs the system halts. In that state DRRsetup program commands will only be received on the RS232 port.

```
-=Start System=-
v1.0.00 DRRHUN01
```

```
-=System Halt=-
v1.0.00 DRRHUN01
```

If the system is OK it starts normal function and the LCD displays the default message.

```
?? ??  DC: 12.7V
####-O--------04
```

4.3 Version information

E.g. **v1.0.00 DRRHUN01**

v<**Mainversion**>.<**Subversion**>.<**Built**> <**Name**><**Country**><**Country version**>

Mainversion: Identifies major changes in function.

Subversion: Identifies minor repairs and extensions.

Built: Identifies the different hardwares or distinguishes options built in the program.

Name: 'DRR' identifies the Receiver, 'REP' identifies the Repeater.

Country: Identifies the country dependent encrypting algorythm. 'HUN' means Hungary.

Country version: You can desing different systems within a country.
Currently not used

5. Menu structure

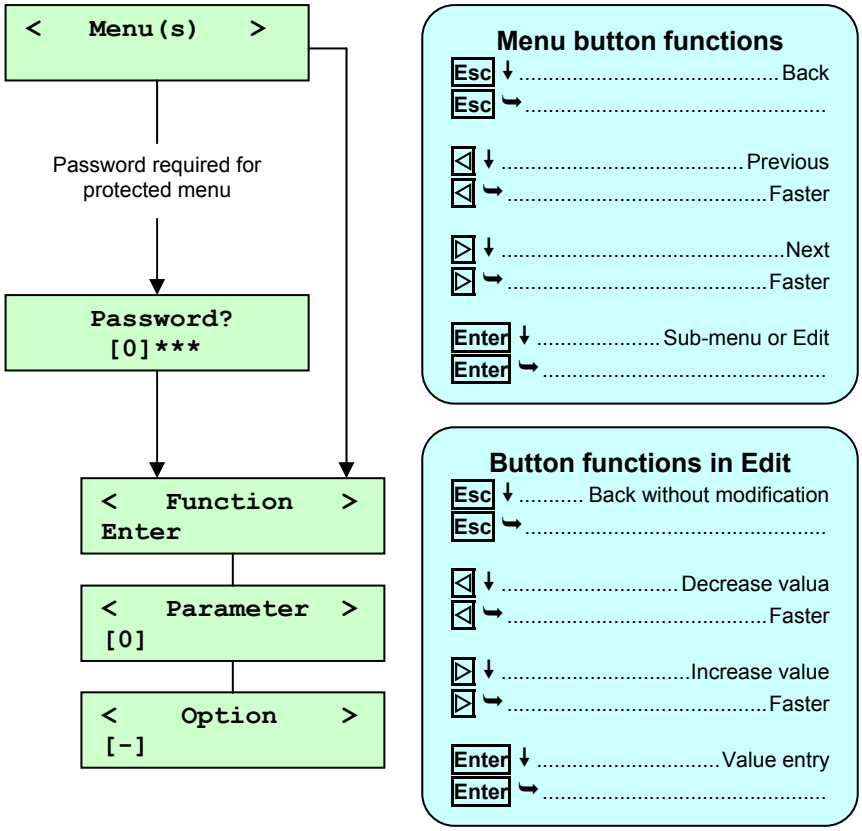
DRR (and DRR REP, as well) is controlled by four buttons and an LCD.

Buttons

The buttons have two different functions according to the length of the press. There is a short [↓] and long [➥] (2 sec) press. The functions may differ according to the menu level, please, refer to the summary table.

Menu Levels

In DRR system the features are consisted by a menu system. The menu system is stored in FLASH memory, so it updates simultaneously with the FW. There are basic features in the menu:



The menu starts with the default screen displaying the functions. If no action taken during a minute the device restores to the default screen. (Service functions will not restore to the default screen!)

Menu, Sub-menu and Password

After entering the menu the sub-menus consisting the related functions can be seen. The sub-menus are divided into further sub-menus. Sub-menus can be password-protected, the password must be entered before emtering the sub-menu. The password is valid until leaving the menu. The granted or denied access generates local events. The password displays the edited character only. You can enter the password similar to the parameter entry. In the menu, the arrows appearing in the top line indicate the existence of previous or next menu point.

Functions, Parameters and Options

Functions: Press Enter to start an application (e.g. Event buffer listing)

Parameters: Values effecting the function of the system. Brackets "[…]" contain the value to modify. The brackets will be flashing if you enter the option Edit. Use arrows to modify the value then press Enter to save. Press Esc to restore the last saved value (LCD contrast will appear and be stored immediatelly.) If the edited value consists more digits the next digit will be highlighted by Enter and will only be stored when the last digit is entered.

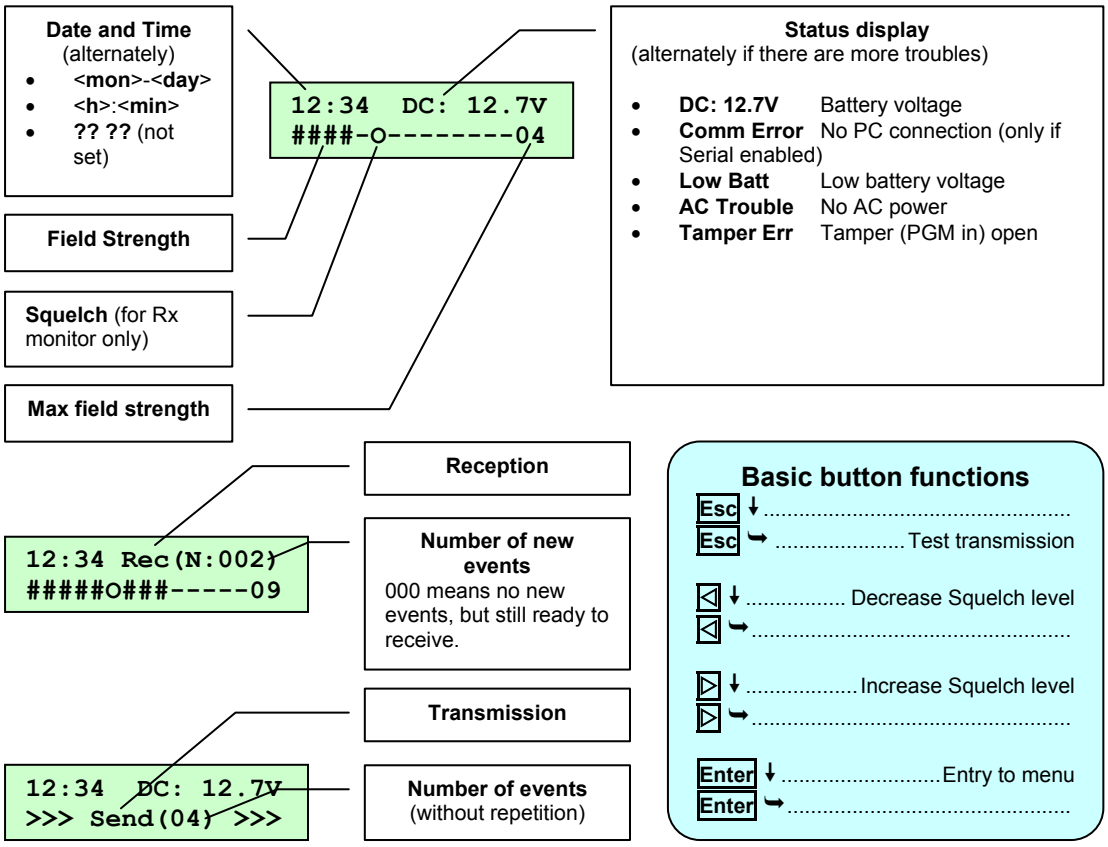
Options: A parameter type which can be set to "Yes/No, On/Off" state. They can be accepted by the "*" character and denied by the "-" character. They can be edited similar to the aboves.

Related Parameters

There are parameters can be entered together. (e.g. Date or Time) They are stored after the last character is entered.

5.1 Default Screen

Standby, Multi-function display.



Field Strength: A line displays the momentary Field Strentgth (each character corresponds to a unit) The maximum value (in the last 30 sec) appears in numbers at the end of the line. Now, the Field Strength scale is more accurate then it was in the prior versions.

Squelch: If the Reception is enabled this function prevents the speaker generating continuous noise by setting a minimum received field strength level. It's recommended to set the Squelch to a level which generates no sound if there is no traffic on the channel. If the speaker is disabled during reception the character indicating squelch level does not appear.

Clock: The clock is based on quartz mechanism powered by the Firmware, therefore, the clock „lives" only if the system is On. After power on the clock resets and "?? ??" characters appear

alternately, and a local event will be generated. If you restart the system from menu (or from PC) the current time will be saved, and after reset it goes on (No need to set the clock). During FW update the clock stops but the system notes it a restart, therefore, a 2 minutes earlier time will be loaded. **It is recommended to set the time after every FW update!** The Flash file update won't cause such problem, the clock will goes on.

Testreport: Holding down the ESC generates test report, it will be logged, displayed on the PC (if serial port is enabled) and will be transmitted (if the transmitter is enabled). Besides the testreport, a special command will be sent. The command is: every repeater which receives the command measure the field strength of the test signal and report it with its own account ID. Hence, you simply activate the Test signal and every repeater within the range send the measured field strength one after another. With the log the events can be backtracked. The test is transmitted once but it is repeated 15 times. It is useful for the read on the receiver side.

Reception Display: The receiver displays the number of currently unknown received messages. 000 means that the device received messages but none of them is new. If the encrypting key of the transmitter doesn't match of the receiver the reception won't appear either!

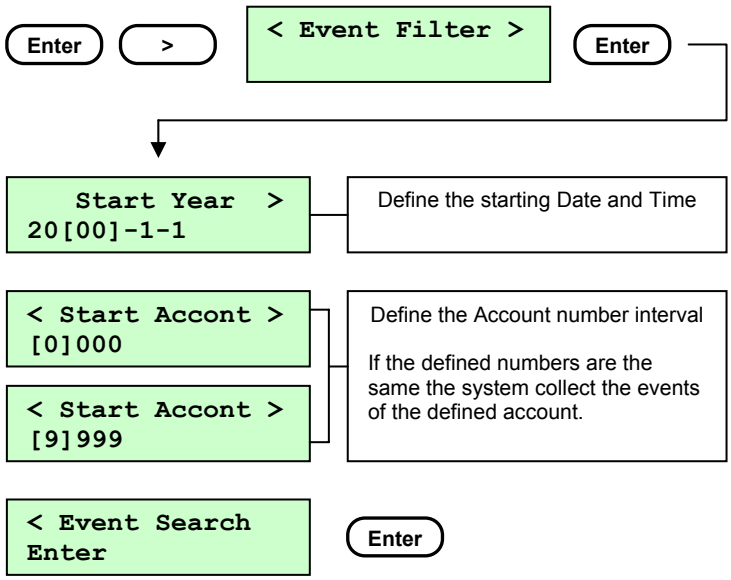
Transmission Display: During transmission the number of events is displayed. The number doesn't consists the repetitions.

5.2 Event Buffer

Events can be displayed on two ways, one with filter (Event Filter) or without filter (All Event).

Enter the Event Buffer displaying **All Events**: (Always the latest event received can be seen)

Event Filter: before you enter to Event Buffer the filter conditions must be defined. The system stores the last definitions. This function is useful when you are looking for the events of one specific account.

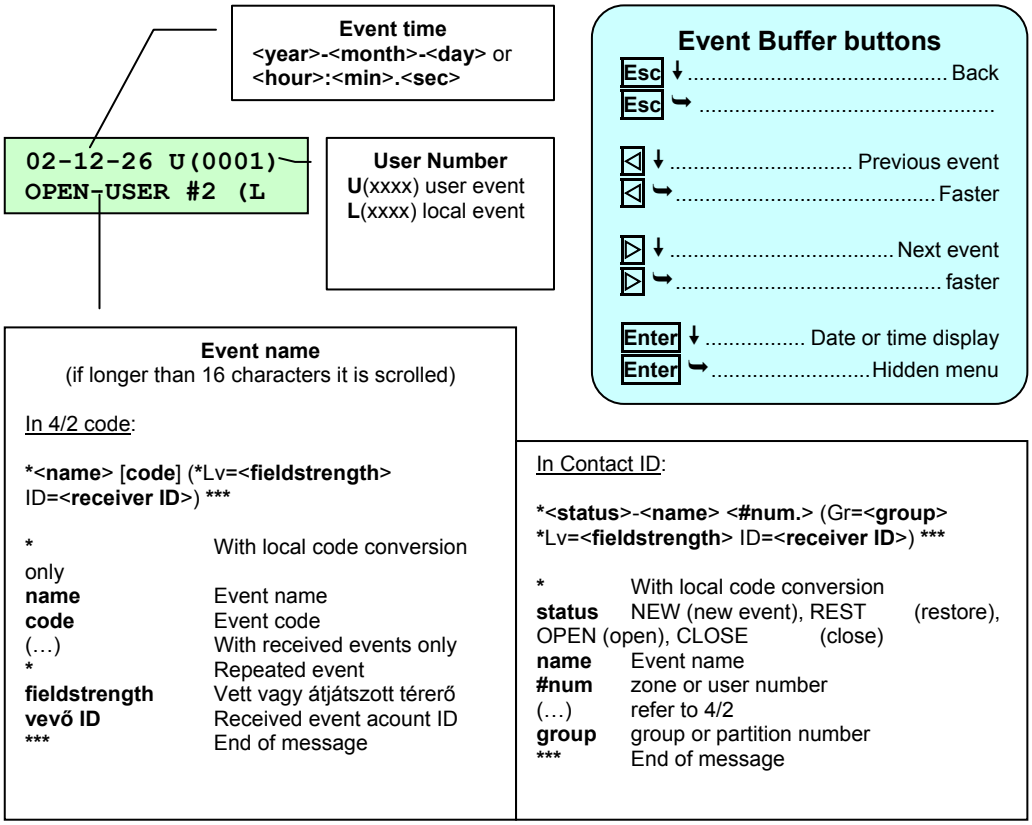


The filter condition edit is similar to the parameter edit. After all filter condition defined the scan starts. The oldest events will be displayed first (contrasted with the events).

Event Buffer: The Event Buffer stores the untransmitted (according to settings) events or the events not displayed on PC. The events stored to the second. You can switch between Date and Time display.

Hidden Menu: Holding down the Enter the "Serial Resend" function appears. The function resends the events from the selected to the latest to the computer. In the second line the selected percent of the Event Buffer appears. Please, note that the Event Buffer is able to consist 8000 events and the reprocessing of the entire buffer may take a long time (30-60 mins) according to the monitoring software. Since the selected period may consist events don't have to be transmitted through serial the displayed value is only informatory.

Even if resend activated in filter mode all event will be re-transmitted since the filter not applied to serial data!



In the above figure the possible displays of the event buffer can be seen. The system always compare the Local Accont to define if the account number is local or distant. If you change the local account the U(xxxx) form will appear in the process of the logged data retrospectively!

5.3 Restart

The Restast means software reset. Even the Event Buffer can also be deleted if the "Clr all event" option is enabled. This is the only way to delete the Event Buffer. After executing the function the clock is not reseted opposing the Reset after power on. Since the data of the Event Buffer are essential the sub-menu is protected by password.

5.4 LCD parameters (LCD param.)

The sub-menu consists the setting of the LCD display. No password required!

Contrast

You can set the contrast by an analogue scale. The display shows the effect of the settings during the edit. No undo and not affected by the "Default"!

Backlight

It is recommended not to use backlight continuously because of the degradation and the consumption. Three condition of the backlight can be defined.

- **AC**: Turns on if AC detected. (It it recommended to disable it for the repeater)
- **Event**: Turns on if new event arrives.
- **Key**: Turns on if button pressed.

Each turn on event turns the backlight on for a minute.

Last Rx Event

The option "Last Rx event" is useful when the reception is monitored and you desired to view the received events. If new events arrives the latest record of the event buffer will be displayed automatically. You can scroll the events in the buffer normally but the new event switch the default diplay back to show the number of the received events and the fieldstrength.

5.5 Date & Time

The device has an in-built real-time clock. No password required! AC and/or Battery is required for the clock to work. In the sub-menu the date can be defined: Year → Month → Day. The order is important for the system to calculate leap-years and the days of the month. The sequence Hour → Minute defines the time. For more details please, refer to section Default Display.

5.6 Audio Monitor

This sub-menu enables/disables the speaker during reception (Rx Audio mon.) and transmission (Tx Audio mon.). No password required! For more details plesae, refer to sectionDefault Display.

5.7 Local setup

This sub-menu contains settings of the device. Password required!

- Receiver Reception settings
- Transmitter Transmission settings
- Local System Local settings
- PGM output PGM output settings
- Serial prot. Serial protocol settings
- Battery Battery settings
- Default Set all settings to default

The note "-Local-" appearing below the sub-menus means no flash or remote sdetting but local setting. The current software version manages local menus only. For detailed menu description please, refer to Appendix.

5.8 Security

This sub-menu contains the significant or critical settings. Password required!

Local Accont

Local events will be transmitted with local account code. It must be unique in the system to identify the repeaters and the receiver. Same account codes may confuse the radio protocol (data loss).

User Key

This is a confidential parameter. It can be defined but there's no way to read it! It must be the same in the entire radio network (CiD transmitters, DRR REP repeaters and DRR receiver)

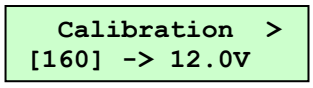
Set Password

This is a confidential parameter. It can be defined but there's no way to read it! The defined password is required for the protected menu points, do not ofrget it! Value 0000 disables the password protection. If you define wrong password you can modify it only by the PC uploader software, since the password setting is password protected!

5.9 Service

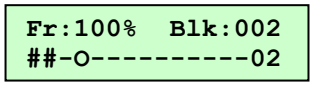
This sub-menu contains parameters required for the system function check and other settings. Password required!

Calibration

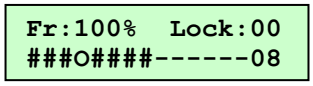


The Battery voltage measurement can be set more accurate. Press Enter to display the current voltage of the battery clamps. Connect the gauge to the battery clamps then set the calibration value by the <,> buttons until the measured and the displayed voltage match. Press Enter to save the value. This way appr. 1% permanent accuracy can be set (Cheap gauges may be less accurate). Each device comes with factory calibration, do not modify unless required.

Rec quality

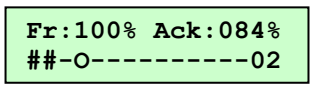


In CiDuni format the quality of the reception can be measured and statistics can be filed. After starting the function the following data will be displayed:



- **Fr:100%** Rate of flawless and defective frames (units of data transmission). Frames checked according to CRC code. The higher the value the better the transmission. Since the system measures the rate it displays a long term average. The rate can be degraded by RF jam, noise, low field strength or transmission collision.
- **Blk:002 or Lock:00** During reception the decoder program synchronises to the data bits by a digital phase locked loop (DPLL). His is "Lock" state. The value displayed after Lock calculates the errors occured in synchronising. Such error occurs when the signal is noisy and no reference phase can be calculated. This results in defective decoding. Value 00 means continuous reference phase. After reception the display changes and displays the number of received flawless blocks (frames), in **Bl:002** form.
- In the bottom line the fieldstrength is displayed in the form described in default display, but the empty box shows the receiver limit (Receiver →Level Limit parameter).

By Enter you can toggle vice-versa between Bl:xxx and Lock:xx display and the value representing the effectivity of the acknowledge protocol.



The value "**Ack:xxx%**" represents the percent of trasnmissions denied by the acknowledge protocol. The point of acknowledge protocol is that if received data pack is acknowledged or transmitted by a repeater closer to the receiver (or by the

receiver itself) before the repetition of pack then it won't be transmitted. The rate of such denied and the packs to be transmitted is recorded by the system. This value is useful when installing repeater.

If the value is high the utilization of the repeater is low (it can be desired in a high security system with many overlaps). If the value is low the utilization of the repeater is high because of the rare or no overlaps. If the repeater goes wrong there will be transmitters out of sight causing data loss. The accuracy of the measurement is distorted by the fact that the local events will surely be transmitted within a range. The system registers the value continuously. The longer period you examine the accuret the value you get. (1-2 weeks test operation is recommended)

< button reset statistics. The reset is required when the repeater is moved or the conditions changed.

Press Esc to exit the function, no timed exit. The function has no effects on the operation of the device.

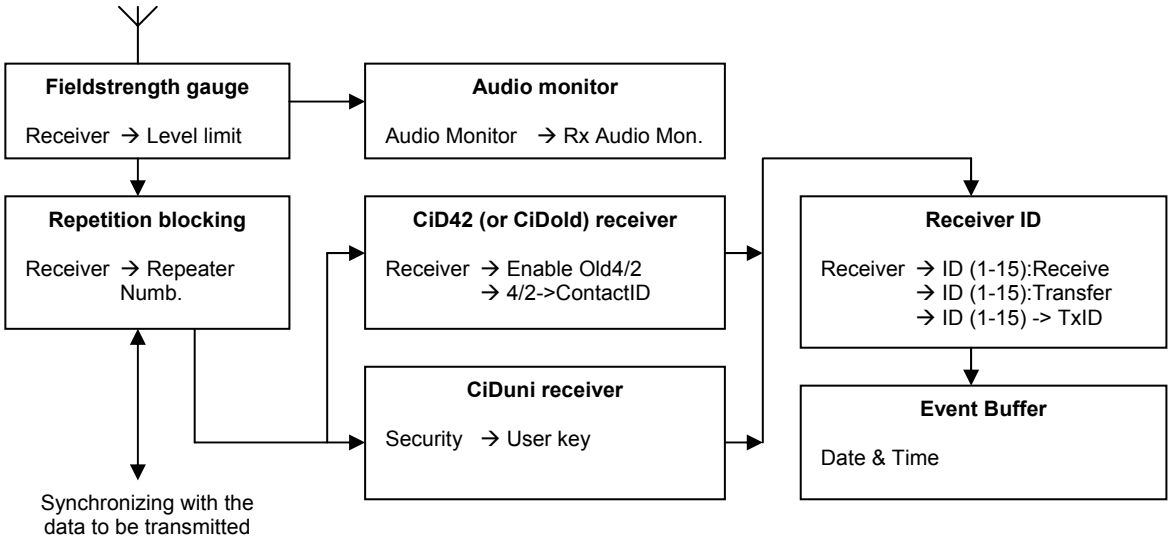
OS Status and Clear Status

These functions relate to the internal status of the Firmware. These information can only be useful for the manufacturer. No direct effect on the system operation.

6. DRR operation

The operation is managed by a multi-tasking program, therefore the display modes and the processes don't effect the system operation. The following sub-sections introduce the main operations.

6.1 Reception



Route of the received data

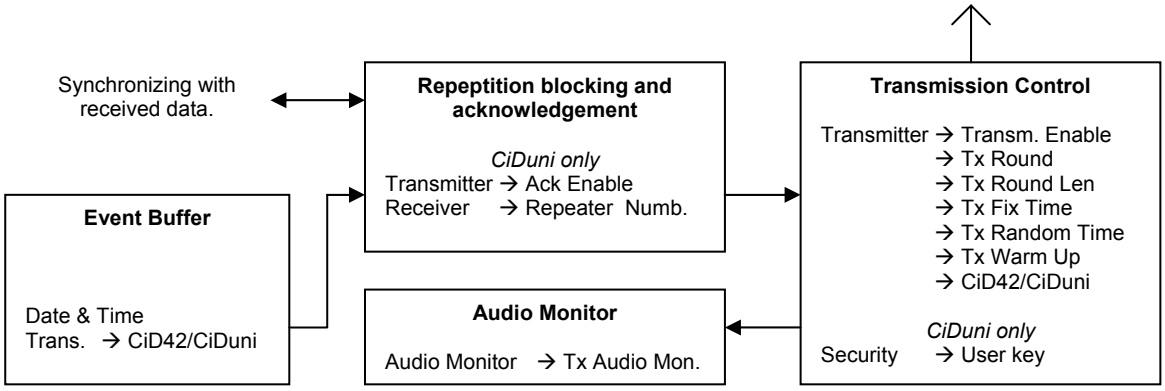
The reception process manages the continuous monitoring of the radio signal. The data pack received on the following way:

1. The fieldstrength gauge verifies that the signal passes the set receiver limit (Reciver→Level limit). If the fieldstrength does not reach the limit it will be ignored. The measured fieldstrength operates the Squelch circuit as well.
2. The system verifies that the received pack is processed or not, if the pack is processed it won't be processed again. (repetition blocking) The system files the last 128 packs. If the

acknowledge protocol is used the system synchronizes the packs with the packs in the transmission buffer. The receiver number (Receive→Repeater Numb.) sets an acknowledgement priority. The lowest value (0: receiver) acknowledges first. For further information, please, refer to the description of the Acknowledge protocol.

3. The first identified pack is processed by two parallel progress in CiD42 or CiDuni format. CiD42 progress can be disabled (Receive→Enable Old4/2) or converted into Contact ID format (Receive→4/2->ContactID). 4/2 formats can be necessary for the older CiD v1.x.xx or RT-44 receivers. Since the data speed of RT-44 receivers were 1150bps some hardware modification and new FW is required for them to be able to receive. In CiDuni format the 4/2, Contact ID and other signals can be transmitted. Since the format is encrypted the system verifies the match of the transmitter's User Key and the receiver's User Key (Security→User Key). The User Key customizes the system preventing unauthorized jamming and interception. The manufacturer uses another Key which country dependent. The version information contains reference to the manufacturer key.
4. Each data block contains a multi-functional receiver ID. It divides the area into receptive ranges, may define the route of the signal or may select the repeaters. The receiver contains a table consisting which receiver ID (1-15) requires reception and repetition. The data pack will be stored in the Event Buffer only if the reception is enabled. In case of repetition the Receiver ID can be modified. This method settles data dispatching and repeater selection. Please, refer to later examples.
5. The Event Buffer stores the events meeting the above requirements only. The time of store is recorded.

6.2 Transmission



Route of data during transmission

The transmission process manages the data transmission on the radio network. There are two supported formats:

- **CiD42**: Compatible with the older systems, only 4/2 events can be transmitted, acknowledge protocol is not supported.
- **CiDuni**: 4/2 and ContactID event transmission. Supports acknowledge protocol.

Before power up the transmitter "listens" the channel to verify it is free. Transmission begins only when the channel is not used. Busy channel means bit flow which is equal to physical coding (FSK1200). Consequently, either the transmitters with the same encrypting or the transmitters using the channel (CiD42 and CiDuni) will keep the transmission waiting. Other noise will be ignored.

The process of transmission:

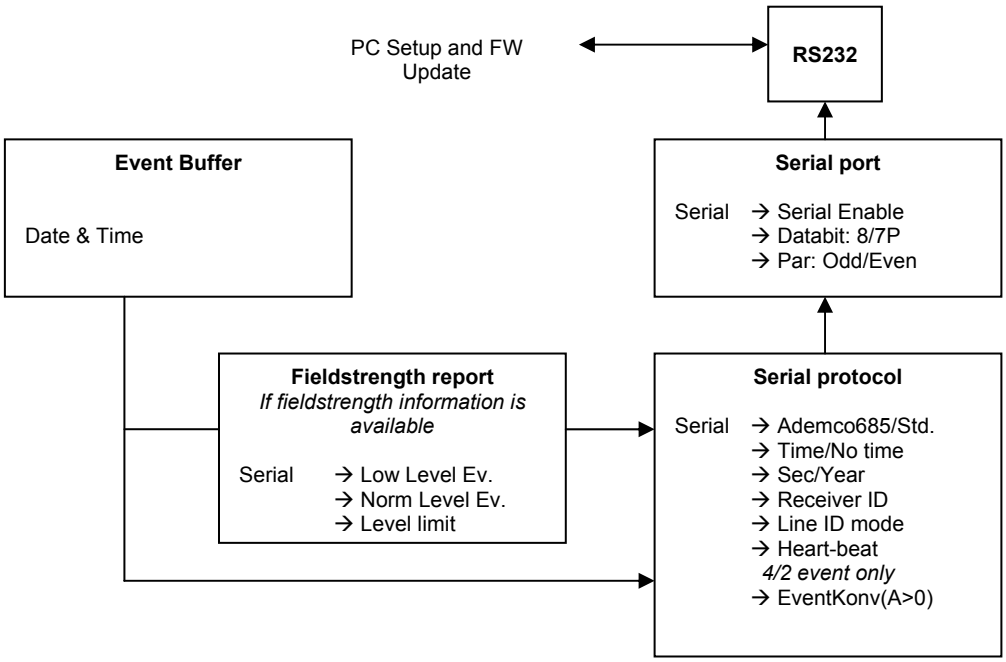
1. The oldest event in the Buffer will be examined first. If the (Transmitter→CiD42/CiDuni) option is enabled 4/2 events will be ransmitted only. With CiDuni coding each event will be transmitted.

2. In CiDuni format, if the acknowledge protocol is enabled (Transmitter→Ack Enable) the repeaters and the receiver (Receiver→Repeater Numb) is different. The repeaters repeats the entire content, the receiver sends an acknowledgement only. (The acknowledgement is shorter.) If, during the reception, the repeater closer to the receiver (or the receiver itself) repeats the block (or sends acknowledgement) the transmission will be cancelled. That is the reason the synchronization is needed.
3. The transmission parameters define the number and interval of event repetition. The acknowledge protocol uses these parameters also if it receives no acknowledgement.

The User Key (refer to section Reception) is also used in the transmission to encrypt the transmitted block. The transmission can be disabled (Transmitter→Trans. Enable). If the transmission is enabled again the new events will be transmitted only.

The speaker can be disabled during transmission (Audio Monitor→Tx Audio mon.)

6.3 Serial port



Route of data with serial protocol

Serial protocol is used by the receiver but it also can be useful when downloading repeater events. The serial protocol transmits log data in different formats through the RS-232 port of the device to the computer. The serial port and the protocol can be configured separately.

- Serial port: Databit 8 / 7+(even or odd) parity
- Protocol: Ademco 685 / Std (Basic)
- Date and Time supplement:Year or seconds

The protocol contains a Receiver ID required when more receiver is used by one computer. You can define the information contained by the LineID.

The "Heart-beat" signal verifies the PC connection by initializing periodic test transmission towards the PC. If no acknowledgement arrives within the defined interval the system reports communication trouble.

In 4/2 formats, in telephone systems the '0' and 'A' digits are the same and an option is able to convert the digit 'A' to digit '0'.

The serial protocol can be disabled by one single option. After enabling the option, the new events will be transmitted only. The transmitted events can be re-transmitted. (For detailed description please, refer to section Event Buffer, Hidden Menu)

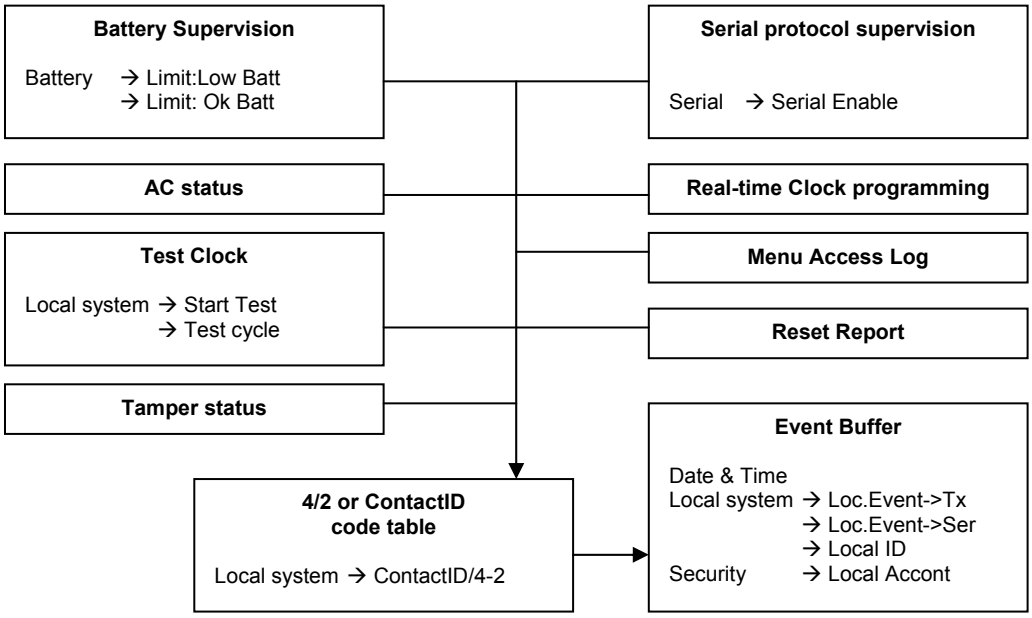
RS232 port (with custom protocol) is used to upload parameters, menus and for Firmware update. The function mentioned last don't depent on the port settings, the connection established automatically.

Fieldstrength report

Each received event has fieldstrength information measured by the first repeater or receiver. In the serial protocol the fieldstrength can be displayed in the line number field. Some monitoring softwares don't display this information. Optionally, the fieldstrength information can be compared to a defined value and the system is able to generate a new event right after the event containing the fieldstrength information. The new event containing the message: low or adequate. Each type can be disabled.

If you use acknowledge protocol the measured fieldstrength can be unadequate since the system tries to transmit the signals using the shortest possible way with the minimum possible repetition. This method minimizes the load of the radio network. Consequently, if the receiver is able to recognise a signal with low fieldstrength from a distant transmitter then the signal evades the nearby repeater causing that low fieldstrength appears on the PC. That means no antenna trouble. As the matter of fact, the fieldstrength value supplies adequate information of the transmitter antenna only in systems with no repeater. For proper fieldstrength information use test signal.

6.4 Local Events



Route of Local Events

Events generated by the receiver and the repeater according to their internal or external state called Local Events. There are more methods for the system to generate and transmit such events:

- In 4/2 or ContactID format.
- To the Event Buffer (it can be viewed on the LCD screen), to serial line (receiver only) and to transmit (remote report if repeater is applied).

Local Events will always be reported with "Local Accont" account ID and "Local ID" receiver ID.

6.5 Event Buffer

The event buffer has essential function in the system operation. It stores all received data and the system gathers reports for processing from here. The large Event Buffer uses FLASH memory. The FLASH memory is able to store data even in power off mode. Unfortunately, the number of writing cycles is limited, therefore, the firmware is up to reduce the FLASH cell writings to the minimum for the longest lifetime possible. The process has a special feature. The physical writing to the FLASH performed after every eight events. Before the writing, the software stores the events in a temporary memory. If you power down system before (or during) the writing the last 0-8 events may be lost. At start up the system scans for events to be „saved" and corrects the size of the event buffer. To increase the lifetime of FLASH there are regenerating programs running in background.

7. Radio Protocols

The primary function of radio protocols is to transmit events from the transmitter to the receiver regarding the followings:

1. Each data must be decoded
2. Prevent multiple transmission
3. Use the shortest possible route in the radio network
4. To achieve the transmission in the lowest cost
5. Several transmitter should be able to use the same channel
6. Reliable operation, no global collapse caused by false system accessories.
7. Sabotage-proof system

It is impossible to meet all mentioned criteria entirely but they should be realized within an acceptable limit.

7.1 One-way Protocol

The reason for existence of the One-way Protocol, besides its many disadvantageous features, is the criteria No.4. The large number of end-points (transmitters) should not be too expensive. The "LONG RANGE" and the narrow band radios are complex (especially the receiver).

The operation is simple: The transmitter broadcasts on a channel and the receiver receives the transmission. Since the transmitter is unable to verify if there is an other broadcasting transmitter collision may occur causing that the receiver is unable to decode any signal. To reduce the annoying effect of collision the transmitters repeat the data. To prevent simultaneous repetition the transmitters insert random intervals between the transmissions. There is another problem with repetitions, the receiver receives the signals several unwanted times. To prevent this each pack has unique ID and the receiver logs the latest received and decoded packs. The DRR system stores the last 128 packs. If the number of transmissions is high the data loss may increase caused by the large number of collisions.

The radio signal has a special feature, if two signals arrive in the receiver with different fieldstrength (if the difference is more then 8-10dB) the one with the higher fieldstrength suppresses the other with the lower fieldstrength. Consequently, the distant transmitters can't distrub the near transmitters. This feature may provide advantage for the near transmitters but it is a disadvantage for the distant transmitters. Install more receiver (repeater) at different sites of the radio range to prevent the problem. In that way, more receiver (repeater) will recognise the transmitter. The additional problem with the large number receivers is the route the signal is transmitted from the repeaters to the central receiver.

Conventional repeaters re-transmit the received signal. The new transmissions will load the channel and the repeater transmitting the repeated transmission resulting long-term repetition.

There is a technology preventing the repetition of the repeaters own signals. DRR system uses that technology in CiD42 compatible function.

7.2 Transforming Receiver ID and the Route Direction

As it mentioned above, more repeater generates further problems. On one hand, it its useful to apply more repeater but, on the other hand, it has disadvantage. Using more receiver ID can reduce the number of useless repetitions in one system. Then the system is divided into areas and a defined number of repeaters is assigned to each area. By the Receiver ID conversion the repeaters can transmit signal to the receiver on a defined route only preventing the useless load of the system. The disadvantage of the method is the following: since the transmitters must be programmed with the Receiver ID of the nearest repeater it must be done on site.

7.3 Acknowledge Protocol

With the above solutions it seems to be difficult, even impossible, to reach the desired (above detailed) aims. The compatible old 4/2 (CiD42, CiDold) protocol also limits the opportunities.

More receiver provide reliable reception exploiting the special characteristics of the radio network. The main problem is the repetition. Since the repeaters has in-built transreceivers they can continuously monitor the channel and transmit signals, send acknowledgements preventing useless repetition only in traffic-free period. If a transmission is received by several repeater a competitive situation occurs. The optimal solution of that situation could be one single repetition by the winner. In general, the Acknowledge Protocol solves the problem.

This sulotion is based on the concentric installation of the repeaters surrounding the central receiver. Each circle has a number according to the distance from the receiver (receiver is 0, first circle is 1, second is 2 ..etc.) . This way the receivers know their position. In case of a transmission, the repeater nearest to the receiver (or the receiver itself) repeates first. Since the repeaters monitor the channel they receive every repetition originating from a source near the receiver and containing the position information as acknowledgement. Therefor the far repeaters won't repeat. That is the reason why the received signal has low fieldstrength. The main advantage of this arrangement is the automatric use of the second shortest route if the shortest is blocked by collision. The backup is done! Competitive situation may occur between the repeaters in the same distance. Therefore the repeater calculates the delay of the transmission. For the calculation it uses the following parameters: the distance of the repeater from the receiver, measured fieldstrength and a random value (to prevent similar conditions).

Using the parameters a special algorythm calculates the time out. During transmission the message pack will contain the measured fieldstrength and the distance parameter.

There is no need to divide the system into areas when using Acknowledge Protocol (no nned to program the transmitters individualy according to on-site gauging). The repeaters can be installed closer to increase the reliability of data transmission.

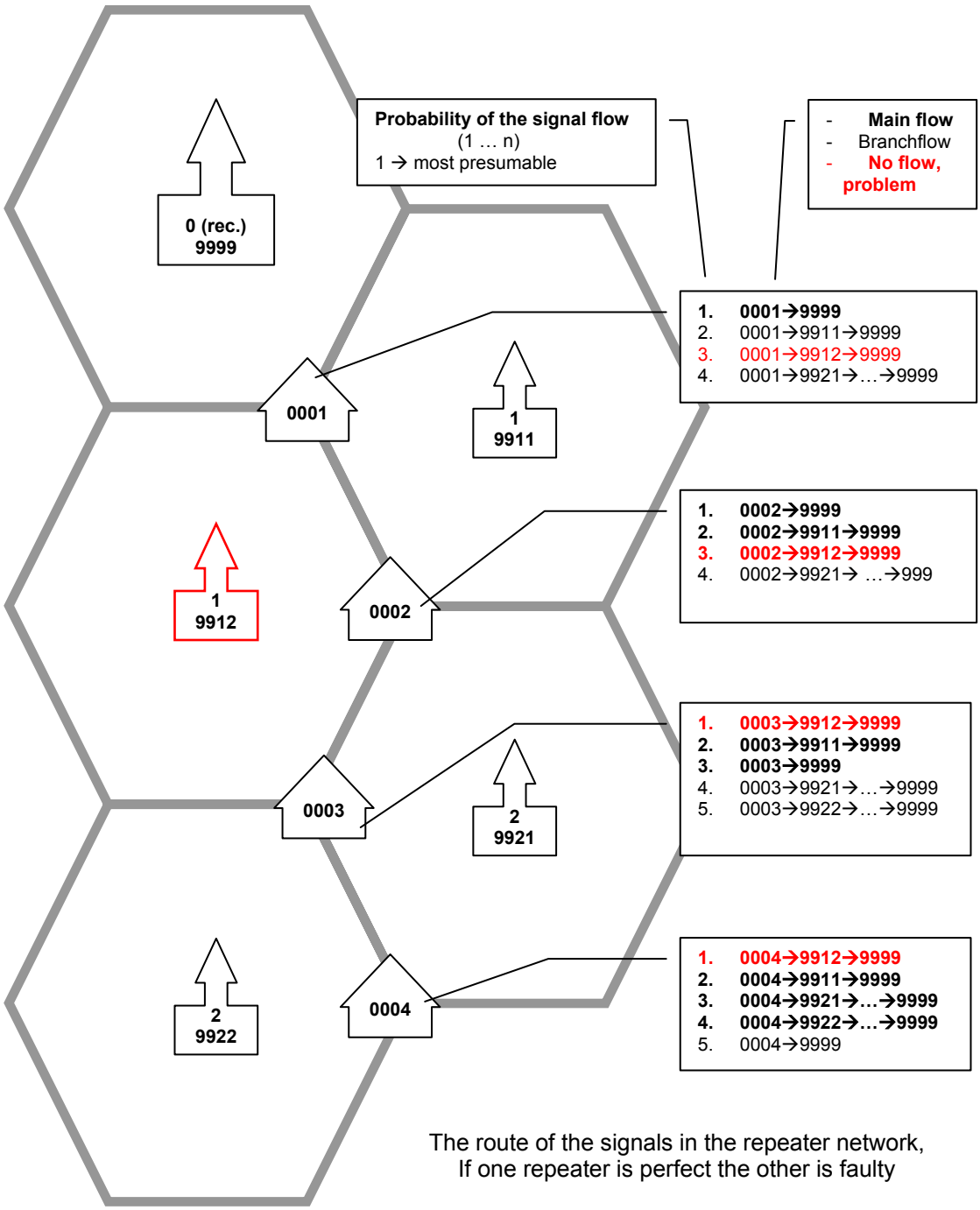
Refer to the below details why the Acknowledge Protocol meets the aims mentioned:

1. Each data must be decoded: Each transmitter recognises several repeaters of different site. This increases the chance of decoding.
2. No multiple transmission: Individualy numbered data packs prevent multiple reception.
3. The data must use the shortest possible time to pass the radio network: Acknowledge protocol always selects the shortest and fastest way.
4. To achieve the transmission in the lowest cost: Only the repeaters contain in-built transreceiver unit but larger amount of transmitters will not effect the cost seriously. Several end point can be formed without claiming more frequency.
5. Several transmitter should be able to use the same channel: The characteristics of the radio signal and large number of repeaters allows more traffic on the same territory.
6. Reliable operation, no global collapse caused by the false system accessories: One characteristic of the Acknowledge protocol is the automatic backup, in that way the false repeater causes no problem.

7. Sabotage-proof system: The CiDuni format can be encrypted bythe user.

The Acknowledge protocol makes the operation of the one-way radio network more effective and more reliable.

The figure presents a typical repeater configuration. The grey hexagons represent the primary



The route of the signals in the repeater network,
If one repeater is perfect the other is faulty

range of repeaters. The primary range means the range within the repeater (or receiver) is able to recognise the transmitters with adequate fieldstrength. Since the repeaters has better antennas they are able to recognise each other from a longer distance. There are many ways for the signal to reach the receiver, therefore, a lost receiver causes no problem. The radio network design needs more care if Acknowledge protocol is used. In the following section the elements of design will be introduced.

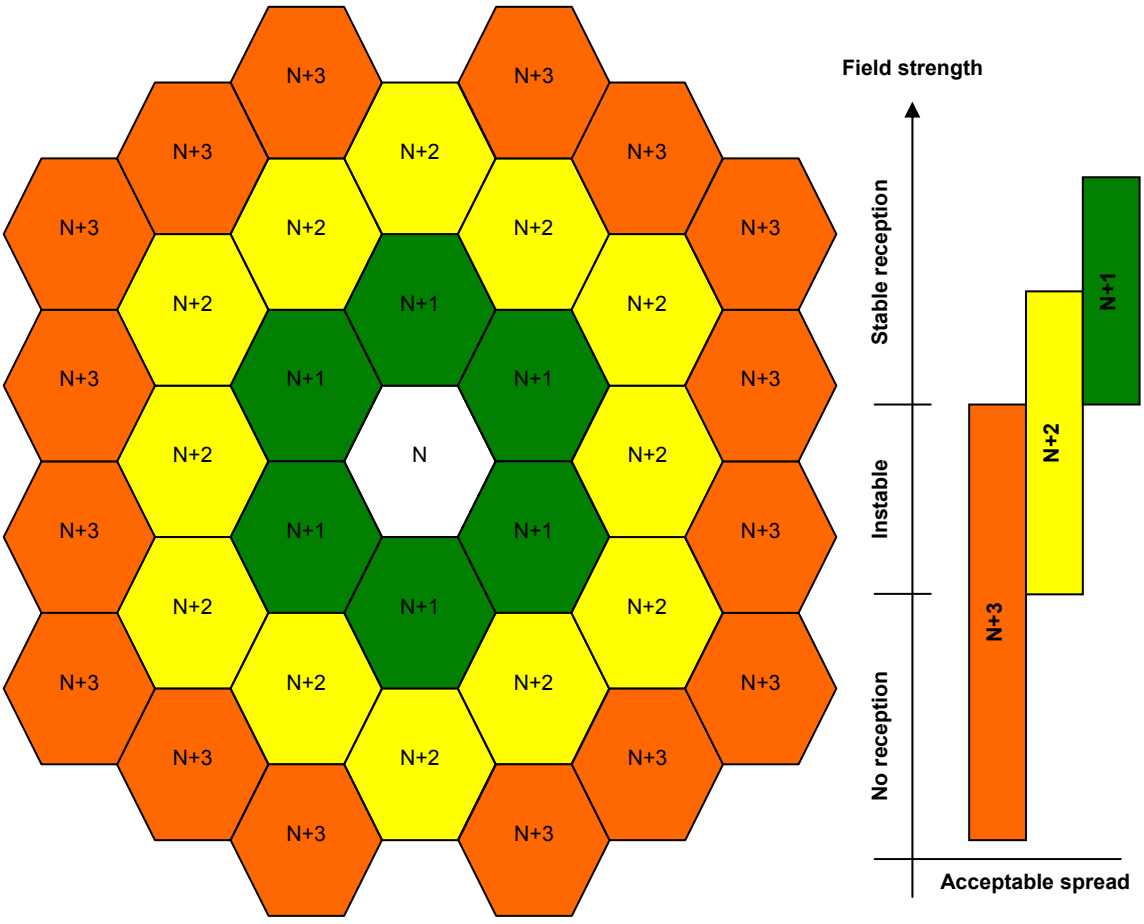
8. Elements of a Radio Network Design

The system reliability and the ability to bear the traffic is highly effected by the optimal location of repeaters.

8.1 Characteristics of the One-way network

As it detailed in the previous section, the special characteristic of the spreading of the radio signal can be used to build a reliable system. What size of overlapping should be used? Please, refer to the folowing section.

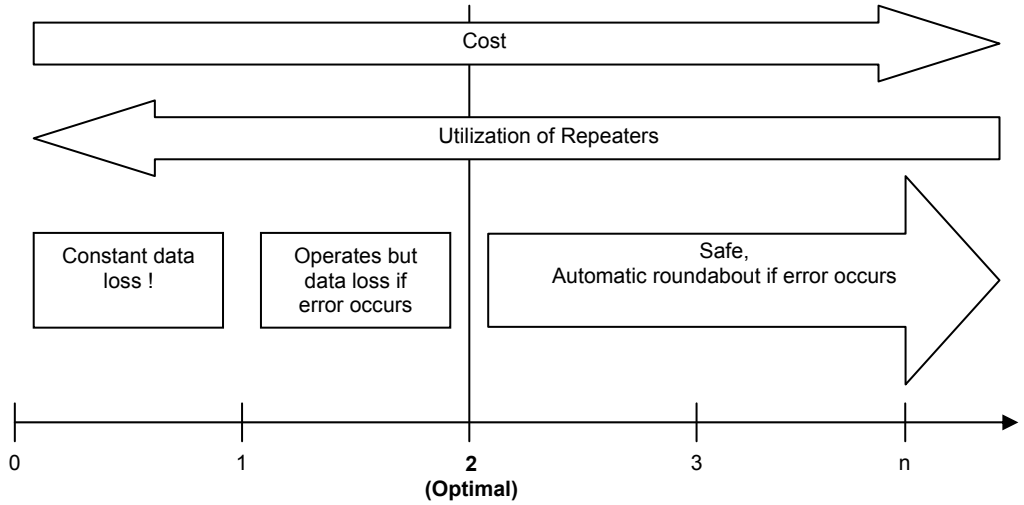
8.2 Cell configuration of the Two-way repeater network



Relative Reception Conditions

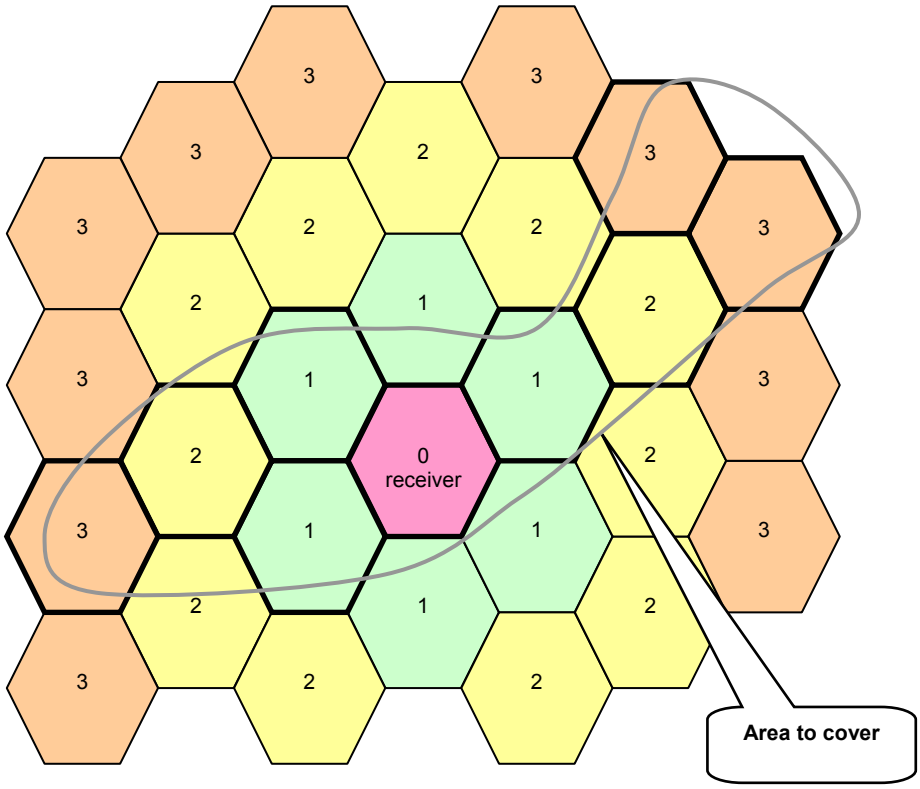
The above figure presents adequate the fieldstrength relation of a repeater to the other repeaters. "N" is the examined repeater or receiver, "N+1" is the first reception area, "N+2" is the second etc.. "N+number" represents not the number of the repeater! The figure on the side shows the acceptable spread in the reception areas.

There is an easy way to measure fieldstrength: If you active the Test function on the repeater (or on the receiver) (In the default screen press and hold ESC). Activate Test signal for the repeaters within the range to report the fieldstrength. The v2.x.xx version of the CiD radio transmitter can generate test signal as well. The above figure is relates to an omnibearing antenna. With Acknowledge protocol it is adequate for the receiver to recognise the repeaters but the receivers must recognise each other, as well:



The effect of overlapping (within the repeaters) on the operation, utilization and the cost

The following figure introduces the practical way of numbering the repeaters accoring to the



Numbering of repeaters on the area to cover according to the theoretical distribution

theoretic distribution:

It is recommended to start to draw the design with the repeaters installed in concentric circles around the receiver. Draw the borders of the area to cover to get the number of applied repeaters and the way of numbering them. It is recommended to use omnibearing antenna. Before drawing the theoretic plan, perform measurements on the territory. The measurements declares the physical size of the cell. Each repeater is supposed to „see" two units (own number +-2) even in an unreliable way! The shape of cells may differ according to the surface conditions but the fieldstrength conditions must be concentric. The signal goes from the repeater towards the receiver, never inversed!

Appendix

Menu Structure

Menu	DRR Default	DRR REP Default	Description
Event Buffer			**List of Events**
↳ All Event			Enter → Enter to Event list. The latest event appears first
Event Filter			**Event list with filter**
↳ Start Year			Define Start year
Start Month			Defne Start month
Start Day			Define Start day
Start Hour			Define star hour
Start Minute			Define start minute
Start Accont			Bottom limit of account number
Stop Accont			Top limit of account number
Event Search			Enter → Enter to event list. The latest event passes filter appears first.
Restart			**Restart**
↳ Clr all event			Do you want to clear the entire event buffer at restart? [*] → yes, [-] → no
Reset receiver			Enter → Restart device. No clock reset!
LCD param.			**LCD settings**
↳ Contrast			LCD contrast. Automatically applied on screen.
Light On: AC	*[*]*	*[*]*	Backlight is on if AC power is present. [*] → yes, [-] → no
Light On:Event	*[*]*	*[*]*	Backlight is on when new event arrives. [*] → yes, [-] → no
Light On: Key	*[*]*	*[*]*	Backlight is on if button is pressed. [*] → yes, [-] → no
Last Rx Event	*[*]*	*[*]*	Displays latest event when receives [*] → yes, [-] → no
Date & Time			**Date and Time settings**
↳ Set Year			Set Year (20[00] - 20[99]).
Set Month			Set Month.
Set Day			Set Day.
Set Hour			Set Hour.
Set Minute			Set minute. Enter reset seconds!
Audio Monitor			**Speaker enable**
↳ Rx Audio Mon.	*[*]*	*[*]*	Speaker on if receives. If enabled the squelch is activated! [*] → enabled, [-] → disabled
Tx Audio Mon.	*[*]*	*[*]*	Speaker on if receives. [*] → enabled, [-] → disabled
Local Setup			**Settings**
↳ **Receiver**			**Receiver Settings**
↳ Enable Old 4/2	[*]	[*]	Traditional formats reception is enabled (CiD42,CiDold) [*] → enabled, [-] → disabled
4/2->ContactID	[*]	[*]	4/2 format (CiD42,CiDold,CiDuni) can be converted into Contact ID by a predefined code conversion table. In CiD radio transmitters v2.x.xx it relatesto the 0th Conversion table only! [*] → converts, [-] → doesn't convert
Level limit	3	3	Reception limit, no reception under set fieldstrength.
Repeater Numb.	0	1	Repeater's distance from the receiver. Used not only by the acknowledge protocol! 0 → receiver, 1-15 → repeaters
ID 1-15:Receive	1-15 [*]	1-15 [*]	Should it receive data with the set ID only? It will be stored in event buffer and transmitted to serial line if enabled! [*] → yes, [-] → no
ID 1-15:Transfer	1-15 [*]	1-15 [*]	Should received data with the set ID be transmitted (repeated)? Only if the transmitter is enabled! [*] → yes, [-] → no
ID 1-15 -> TxID	1->[1] … 15->[15]	1->[1] … 15->[15]	ID transformation. If the repetition is enabled the received ID can be transformed.
↳ **Transmitter**			**Transmitter settings**
↳ Transm. Enable	[-]	[*]	Enable transmitter. [*] → enabled, [-] → disabled
Ack Enable	[*]	[*]	Enable Acknowledge protocol. Only in CiDuni format!

			[*] → enabled, [-] → disabled
CiD42/CiDuni	[-]	[-]	Define in which format the transmitter transmits. Conventional 4/2 (CiD42,CiDold) or new (CiDuni) universal format. [*] → CiD42, [-] → CiDuni
Tx Round	[2]	[3]	Number of repetitions, re-transmission. Maximum repetition with Acknowledge protocol if no acknowledgement.
Tx Round Len	[3]	[3]	Number of repetitions during transmission.
Tx Fix Time	[5]	[5]	Minimum time out in sec.
Tx Random Time	[7]	[15]	Random time out in sec. Values: 3,7,15,32,63 (other values decrease effectivity!)
Tx Warm Up	[0.0]	[0.0]	Transmitter warmup interval (tenth-) seconds. With in-built transmitter: 0.0 sec
↳ **Local system**			**Local Settings**
↳ Loc.Event->Tx	[-]	[*]	Only local events will be transmitted. Required for repeaters [*] → yes, [-] → no
Loc.Event->Ser	[*]	[*]	Local events to serial line. Required for receiver but can be useful for the repeater as well. [*] → yes, [-] → no
ContactID/4-2	[*]	[*]	Logged local event format. [*] → Contact ID, [-] → 4/2
Local ID	[1]	[1]	Local event ID when transmitted.
Start Test	[0]	[0]	Start Testclock. Test cycle starts at start
Test cycle	[0]	[24]	Testclock cycle. If 0 no cyclic test!
↳ **PGM output**			**PGM Output Functions**
↳ On: Serial Err	[-]	[-]	Serial communication failure activates PGM output [*] → yes, [-] → no
On: Low Batt	[-]	[-]	Low battery activates PGM output [*] → yes, [-] → no
On: AC Err	[-]	[-]	AC power failure activates PGM output? [*] → yes, [-] → no
Set On Time	[0]	[0]	Settings activate on time.
↳ **Serial prot.**			**Serial protocol settings**
↳ Serial Enable	[*]	[-]	Serial protocol output can be enabled. It is required for receiver but can be useful for repeater. [*] → enabled, [-] → disabled
Databit: 8/7P	[-]	[-]	Serial port databits. [*] → 8 bits no parity, [-] → 7 bits + parity
Par: Odd/Even	[-]	[-]	Serial port parity. In 7+P format only! [*] → even, [-] → odd
Receiver ID	[1]	[1]	Serial protocol receiver ID. It is useful with more receivers. It is used by monitoring softwares!
Line ID mode	[1]	[1]	The information of the receiver number can be defined: 0 → always 0 1 → fieldstrength (0-15, or 0-F) if no fieldstrength info it is 0. 2 → Receiver ID
Ademco685/Std.	[-]	[-]	Serial protocol format: [*] → Ademco685, [-] → Basic (SurGuard compatible)
Time/No time	[-]	[-]	Time correction (Clock Signal) [*] → yes, [-] → no
Sec/Year	[*]	[*]	Time correction setting: [*] → Month, day, hour, min., sec. [-] → Year, month, day, hour, minutes
EventKonv(A>0)	[*]	[*]	In 4/2 events 'A' digits can be converted to '0'. [*] → conversion, [-] → no conversion
Heart-beat	[30]	[30]	Cycle time of the Cyclic test signal is in seconds. If 0 no test signal!
Low Level Ev.	[-]	[-]	Fieldstrength report if low fieldstrength. [*] → report, [-] → no report
Norm Level Ev.	[-]	[-]	Fieldstrength report if fieldstrength is normal. [*] → report, [-] → no report
Level limit	[8]	[8]	Define the limit of low and normal fieldstrength.
↳ **Battery**			Battery limit voltages
↳ Limit:Low Batt	[12.0]	[12.0]	Low battery voltage value.
Limit:Ok Batt	[12.6]	[12.6]	Normal battery voltage value. Measured without charge, under load!
↳ **Default**			Default
↳ All Default			Enter, after pressing Enter all (Local Setup) settings reset to default. Other settings not effected.
Security			**Important and Confidential Settings**
↳ Local Accont	*[9999]*	*[9999]*	Local Account code of receiver or repeater. Local events use this code. 0000 is not recommended since account 0000 has special meaning in monitoring softwares!
User Key	*[*0000*]*	*[*0000*]*	This value encrypts CiDuni format. Can't be read! Valid

			between 0000 – FFFF
Set Password	*[*0000*]*	*[*0000*]*	Password for important settings. Can't be read! If you forget the password the system denies access since the modification requires the old password! In such case in the PC downloader software you can modify the password.
Service			**Service Functions and Statistics**
↳ Calibration			Battery measurement calibration. Scroll value until it matches the voltage measured on battery clamps.
Rec quality			Reception quality and other statistical values.
OS Status			Inner status of the Firmware. No meaning for users.
Clear Status			Delete inner values. No meaning for users.

Legend:

Menupoint	No password required
Menupoint	Password required (Not requested if the password is 0000i!)
[x]	Default: After production or update if the version greatly modified.
[x]	Default: Even "Default" function will be reset as well

DRR receiver and DRR REP repeater have the same menu structure. The difference is in the defaults!

Local Event Codes

Local Events	4/2 (CiD42)	Contact ID
AC failure	82	1 301
AC OK	62	3 301
Battery voltage low	81	1 302
Battery Voltage OK	61	3 302
Communication Failure (no PC connection)	8A	1 350
Communication OK (PC connection restored)	6B	3 350
Tamper Failure (Tamper input opened)	CE	1 137
Tamper Failure restored (Tamper input closed)	68	3 137
Clock Not Set	87	1 626
Clock Set	69	1 625
Parameter Modified (programming)	83	1 306
System Start (or Restart)	6A	1 305
Cycle Test Report	B3	1 602
Manual Test (Fieldstrength Request)	ED	1 601
Fieldstrength Answer	ED	3 601
Access Granted (Password accepted)	8F	1 421
Access Denied (Password denied)	6F	1 429

Examples for settings

In the folowing examples show the use of DRR system. Settings not mentioned remain in default.

Important! After completing settings it is recommended to restart by menu "Restart" option to clear transmitter and receiver buffers. It is recommended to clear buffers since they contains information of previous settings may cause dual interpretation. Perform restart in the following cases:

- Repeater number changed. (Restart required)
- Receiver ID maintenance changed (local ID also).
- Local account code changed.
- User Key changed.

1. 4/2 Repeater compatible with Enigma RCM and RT-44

The DRR (REP) system with ver: x.x.11 FW version fully compatible with Enigma RCM receiver, RT-44 and CiD (CiDold,FSK1150) transmitters. Therefore, DRR REP repeater can be used with conventional systems.

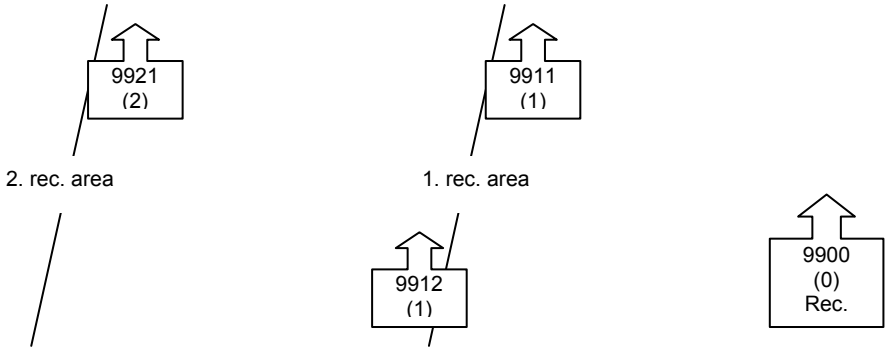
DRR REP (FW: v2.x.11) settings

Menu	Value	Description
Local Setup		
↳ **Default**		
↳ All Default		Reset all settings to default
↳ **Transmitter**		
↳ Ack Enable	[-]	Disable Acknowledge protocol
CiD42/CiDuni	[*]	Switch transmitter to 4/2 format (CiDold, RT-44, RCM)
↳ **Local system**		
↳ ContactID/4-2	[-]	Local reports in 4/2 format (according to CiD code table)

Receiver ID conversion can't be used with Enigma RCM receiver since it receives the different Ids as different reports!

2. Combined 4/2 and CiDuni system

These settings can be useful where DRR system is installed with large number of CiD (CiD42,FSK1200) radios. The repeater and the receiver firmware is updated but the CiD radio update takes more time. It is recommended to use higher version of CiDuni format with new radio transmitter installation. Signals of older CiD radios will be transmitted in CiD42 format until the first repeater receives them. Then the repeater transfers the signals into CiDuni before transmitting. The major difference is the use of global ContactID code and the User Key. In the network there is no difference between CiD42 and CiDuni coding.



In the above example, there are 3 DRR REP repeater installed in 2 received areas. The account number and the repeater number is indicateed.

Since repeater No. 9911 and No.9912 are in appr. the same distance from the receiver therefore, both have the repeater number 1. Repeater 9921 is further from the receiver therefore, its repeater number is 2.

Refer to the above mentioned design notes when numbering repeaters.

The radio network manages CiDuni format for this reason a User Key valid in the entire system (even in v2.xx.22 CiD transmitters) must be defined: let it be 1111

DRR receiver (9900) settings:

Menu	Value	Description
Security		
↳ Local Accont	[9900]	Define Account code. The account number has changed as example only!
↳ User Key	[1111]	Define User Key
Local Setup		
↳ **Default**		
↳ All Default		Set all settings to default (account code and User Key won't be cleared!)
↳ **Receiver**		
↳ 4/2->ContactID	[*]/[-]	*If enabled, transmitters in old formats will report in Contact ID format to the PC.

↳ **Transmitter**		
↳ Transm. Enable	[*]	Enabled transmitter (required for acknowledgement).
↳ **Serial prot.**		Modify serial setings only when you wish other than the default.

DRR REP repeaters (9911 and 9912) settings:

Menu	Value	Description
Security		
↳ Local Accont	[9911] [9912]	Define account code. The account number has changed as example only!
↳ User Key	[1111]	Define User Key
Local Setup		
↳ **Default**		
↳ All Default		Set all settings to default (account code and User Key won't be cleared!)
↳ **Receiver**		
↳ 4/2->ContactID	[*]/[-]	* If enabled, transmitters in old formats will report in Contact ID format to the PC.

DRR REP repeater (9921) settingsbeállítása:

Menu	Value	Description
Security		
↳ Local Accont	[9921]	Define account code. The account number has changed as example only!
↳ User Key	[1111]	Define User Key
Local Setup		
↳ **Default**		
↳ All Default		Set all settings to default (account code and User Key won't be cleared!)
↳ **Receiver**		
↳ 4/2->ContactID	[*]/[-]	* If enabled, transmitters in old formats will report in Contact ID format to the PC.
↳ Repeater Numb.	[2]	Second received area settings.

* Note: In older transmitters 4/2 can be converted to Contact ID (4/2 → Contact ID). For this function to work properly set all CiD transmitter to CiD42 report. If, even one transmitter is differs the conversion will be incorrect! Since the old CiD accounts are defined in 4/2 in the monitoring software it is recommended not to convert every account. In significant sites where the Contact ID is required the CiD radio firmware must be update to version v2.x.xx.

Use the following table to decide when to update the old CiD radios in the accounts:

CiD radio source	Valuation (Update, Noi need to update)
Local events and Contact inputs	CiD42 code table fully covers the functions, no need to update.
Local events, contact inputs and serialprotocol (any)	CiD42 code table fully covers the functions, no need to update. Update if the partition is used, or the panel connected to the serial input has more than 15 accounts.
Local events, contact inputs and Telcom: Ademco Express or other 4/2 format	CiD42 code table fully covers the functions, no need to update.
Local events, contact inputs and Telcom: Contact ID format	If the panel has less than 24 zones and less than 15 users the difference is not significant. If the partition information is desired to manage with one account number it is useful to update anyway.

The radio protocol encryption can only be executed by new CiD radio (v2.x.xx), and as for the system integration, in a long term progress (during regular maintenance) it is recommended to update all radio. It is useful to create the account with two different account numbers in the monitoring software. After maintenance, when the CiD radio is updated and reprogrammed the old acount nuber can be deleted (e.g. the old: 1234, the new: 2234, the only difference is in the thousand group)

3. Repeater identification in CiDuni system using Receiver ID

With Acknowledge Protocol the Receiver ID has no importance therefore, it's no use to change the default.

Events can be arranged by Receiver ID according to which repeater received it first. It is supposed that every transmitter reports with ID 1.

ID 2 is assigned to repeater No.9911.

ID 3 is assigned to repeater No.9912.

ID 4 is assigned to repeater No.9921.

The following settings must be executed in accordance with the aboves:

DRR REP repeater (9911) settings:

Menu	Value	Description
Local Setup		
↳ **Receiver**		
↳ ID 1-> TxID	[2]	Events with ID 1 will be converted to ID 2
↳ **Local System**		
↳ Local ID	[2]	Local events will also be reported with ID 2

DRR REP repeater (9912) settings:

Menu	Value	Description
Local Setup		
↳ **Receiver**		
↳ ID 1-> TxID	[3]	Events with ID 1 will be converted to ID 3
↳ **Local System**		
↳ Local ID	[3]	Local events will also be reported with ID 3

DRR REP repeater (9921) settings:

Menu	Value	Description
Local Setup		
↳ **Receiver**		
↳ ID 1-> TxID	[4]	Events with ID 1 will be converted to ID 4
↳ **Local System**		
↳ Local ID	[4]	Local events will also be reported with ID 4

DRR receiver (9900) settings:

Menu	Value	Description
Local Setup		
↳ **Serial prot.**		
↳ Line ID mode	[2]	Let Receiver ID replace Line number

Of course, there are other settings.The received areas can be assigned in several repeaters. If the fieldstrength information is required use the fieldstrength report function. Because of the characteristics of the Acknowledge protocol the fieldstrength information may be deceptive!

Changes in version v1.2.xx

DRR system has some new additional features.

- Simultaneous Remote Clock Synchronisation for repeaters
- Basic Seial Protocol compatibility
- Simplyfied CiDold (4/2) radio licence management for version vX.X.11

Update v1.1.xx → v1.2.xx

Only the FW has changed, therefore, no need to update the background files. Background files must be updated in versions prior to v1.1.xx!

After starting DRR, the current version will be displayed on screen in the status line by the PC downloader program after opening the port.

Clock Synchronisation

The clock has significant role in DRR system since the received events stored with date and time. Unlikely in prior FW versions where the clock could be set on site and it was recommended to correct the time regularly to log the events with the adequate time and date. With the new feature the clock can be synchronised remotely.

To synchronise the entire system (DRR receiver and repeaters) simply set the receiver's clock. It can be executed directly on the receiver (Date & Time menu) or by the monitoring software (Com-Sys or AlarmSys). After setting the receiver's clock (if the transmission is enabled), a special message will be generated. The repeaters in the first received area receive the message and set their clocks then they generate a further clock-synchronising message. And the process spreads until the entire network receives the message. The repeaters generate time setting reports which will be transmitted to the receiver.

The clock synchronising is a special message, it is not affected by Receiver ID settings (every repeater receives and transmits it). In a large system, the last message may be even a minute late because of the large number of repetitions. It might cause delay in the clock of the distant repeaters. To prevent this situation, at the moment of the transmission each repeater sends its own (corrected) time.

Note that only the receiver (Repeater Numb. = 0) is able to initiate clock synchronising! Time correction in a repeater won't synchronise the entire system!

Basic Protocol Reception

In DRR system with version higher than v1.2.xx the serial port is able to receive „Basic" protocol known by monitoring systems.

The protocol can only be received if meets the following format:

Parameter	Value	Description
Data Speed	9600 Baud	No deviation
Data Width	7 bits	No deviation
Parity	Even	No deviation
Stop Bit	1 (1.5 or 2)	
Protocol	• Basic 4/2 • Basic Contact ID • Basic 4/2 + Clock Signal • Basic Contact ID + Clock Signal • Heart-beat	With same frame format but different data formats (e.g. 3/1, 4/1, 4/3 and Debug) the message will be acknowledged but won't be repeated! Time data sent in Clock Signal format will be ignored, each event will be logged according to own clock!

Serial protocol can only be received if serial protocol transmission is disabled. (Local Setup → Serial prot. → Serial Enable = [-]) Then events can only be received in data format described above (Datbit: and Par: options are related to transmission only)

The reception of serial protocol is affected by the following options:

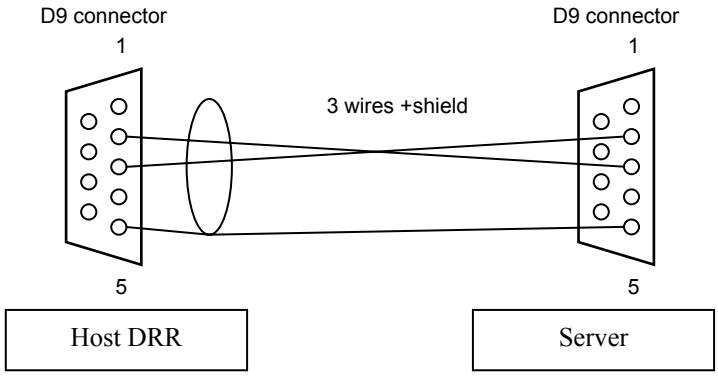
Parameter	Value	Description
Local setup →Serial prot. →Serial Enable	[-]	Disable Serial transmission!
Local setup →Serial prot. →Line ID mode	0 (or 3) 1 2	Every event will be transmitted as local event with Local ID. In case of two connected DRRs, fieldstrength information will be received and will be transmitted as repeated event with Local ID. DRC-2 (or other receiver with telephone): Every event will be transmitted as local event but the event ID will be defined by the telephone linecard number (Line 1 → 1, Line 2 →2, system event → 15)
Security → Local Accont	0001 - 9999	DRC-2 (or other receiver with telephone): the telephone receiver system events will be reported with Local Accont + (Receiver Numb.of the telephone receiver).
Local setup → Local system → Local ID	1 - 15	Used in the mode 0,1 and 3 stae of Line ID.
Local Setup → Serial prot → Heart-beat	0 – 59 [30]	An event (or Heart-beat signal) is supposed to arrive within the defined time (+ 5 sec). Recommended value: 30 sec (then the limit is 35 sec)

Devices connected through serial port (DRR - DRR, DRR - DRC-2) are able to synchronise the clock. If you set the clock of the host DRR the clock of the server DRR or DRC-2 will also be synchronised. This function can be used for radio network synchronisation, as well!

After the connection is initialised between two devices, the host DRR generates Comm OK report. Heart-beat singals verify the connection. If no event or Heart-beat signal arrives within the defined interval the Comm Error event will be generated.

After reset the host DRR will generate Comm Error trouble only if at least one serial message arrived previously. Otherwise, the serial port won't be tested! (The first message activates the protocol reception)

The server and host deveices can be connected with special serial cable:



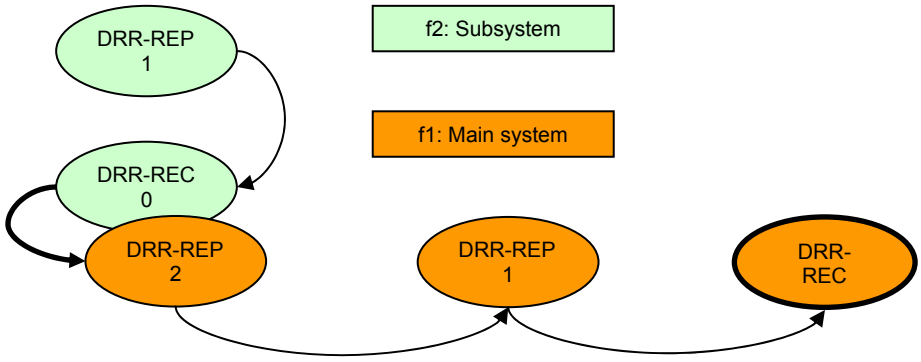
The shield must be connected to point 5 (GND) on one side only!

Connecting DRR to DRR

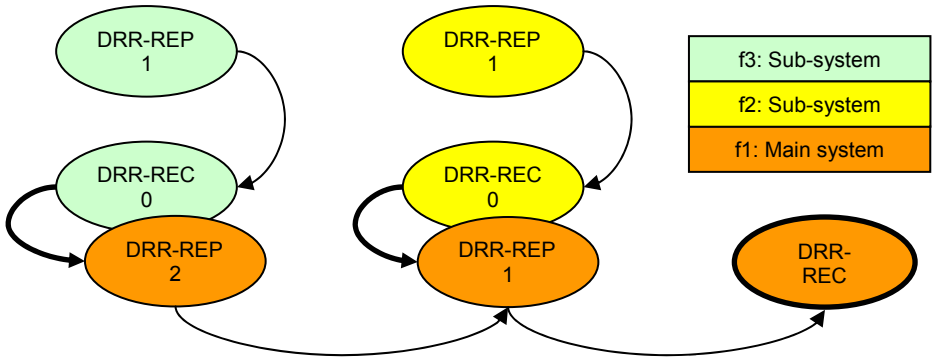
Either DRR desktop receiver or DRR-REP repeater is called DRR in common.

Connecting two DRR devices is useful when a system is used with different frequences. There are many reasons to do this:

1. The used carrier frequency is restricted in the extended received area but the messages received by the same monitoring station. There is no use to build a radio network using the second frequency in the extended area.



2. In busy data traffic, the repeaters can be unloaded by using an other carrier frequency.



The table below presents the typical settings of the host and the server DRR-REP. (The settings consist only the changes to the default)

Server DRR-REP settings:

Parameter	Value	Description
Local setup →Serial prot. →Serial Enable	[*]	Enabled Serial transmission!
Local setup →Transmitter →Tx Round	[2]	Settings for DRR receiver (adequate for acknowledgement)
Local setup → Transmitter →Tx Random Time	[7]	Settings for DRR receiver (faster acknowledgement)
Local setup → Receiver →Repeater Numb.	[0]	Settings for DRR receiver (this is the receiver of the subsystem)
Local setup → Local system →Loc. Event->Tx	[-]	Settings for DRR receiver (local events will only be transmitted by using serial)
Local setup → Local system →Test cycle	[0]	Settings for DRR receiver (no need to transmit test since the connection is tested via serial line)

*Note: If DRR receiver is used as server the above settings correspond to defaults.

Host DRR-REP settings:

Parameter	Value	Description
Local setup →Serial prot. →Serial Enable	[-]	Disable Serial transmission to enable reception! (corresponds to DRR-REP defaults)

It is recommended to program the local account number (Local Acc) of DRRs to different values.

With the above settings, after connecting the serial port, the communication will automatically be initialised and it will be acknowledged with Comm OK event generated either by the host or the server.

Synchronise clocks in the central receiver or the host.

Connecting DRR to DRC-2

Connecting monitoring receiver with radio to monitoring revceiver with telephone communicator can be useful when we install automatic receiver with telephone in a different location. It is recommended because of the reduced tlephone cost. (In that case the panels will dial local phonenumber)

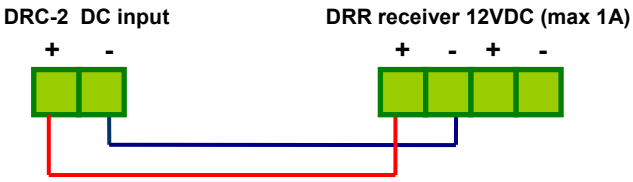
Systems with telephone may differ from radio systems, therefore, please pay attention to the followings before installation:

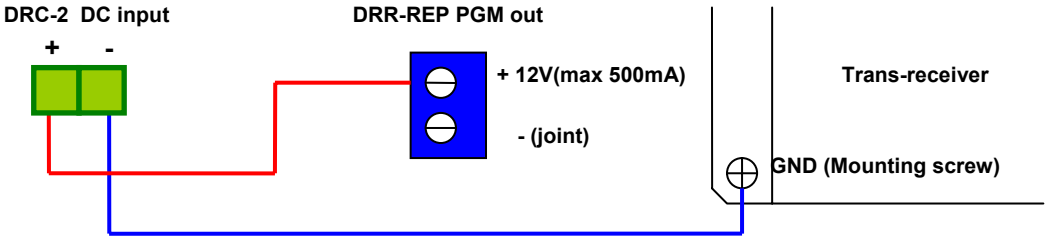
- Panels are recommended to communicate in Contact ID or 4/2 formats (use the first if possible) Other (3/1, 3/2, 4/1, 4/3) formats won't be transmitted by the system!
- Account codes of the panel may not collide with that of the radio.

If the system is installed recently it is recommended to use CiD42 code table with the 4/2 accounts, since it is decoded in text either by the repeaters or the receiver.

Prepare the data cable according to the previously detailed connection layout. The maximum length of the cable can be 15 meters. Use shielded cable only.

Since the DRR system has battery there is no need to connect 6V battery to DRC-2. With DRR receiver the power for DRC-2 is supported by the protected power output on the back plate (+ - + -), with DRR-REP supply the positive voltage from the protected +PGM terminal and the negative from the metallic casing inside (from the radio mounting screw). In the DRC-2 connect 12VDC (12 – 13.8V) to DC input, take care of the right polarity.





Transmitting Telephone Specialities via Radio Network:

In systems with telephone communicator the receiver station reports its own events with account code 0000 but this account not allowed on the radio network. DRC-2 contains Receiver ID also for the monitoring software to separate the receivers. (Defualt: 1.) DRR generates the radio version of account code 0000 accordning to the following method:

DRC-2(account code for radio) = DRR (local account code) + DRC-2(Receiver ID)

Consequently, if the local account code of DRR is 9000 and the DRC-2 Recever ID = 1 then DRC-2 reports its own events with code 9001.

Since DRR denies 0000, therefore, 9999 + 1 will be recognised as 0001!

The serial protocol contains the source of the event (Line ID):

0 – System Event, 1 – First telephoneline 2 – Second telephoneline

If you set „Line ID mode" parameter to 2 in the host DRR the receiver ID values of the events will change according to the following:

DRC-2 (Line ID)	DRR (Receiver ID)
0 – System event	15 (0 not allowed)
1 – First line	1
2 – Second line	2

If you want to keep DRR (Receiver ID) unchanged set „Line ID mode" parameter to 0. (Don't set to 1 otherwise Line ID will appear as fieldstrength)

The following table contains the connected devices settings: (based on default)

Host DRR-REP:

Parameter	Value	Description
Local setup →Serial prot. →Serial Enable	[-]	Disable serial transmission to enable reception! (same as DRR-REP default)
Local setup →Serial prot. →Line ID mode	[0] or [2]	DRC-2 Line ID will lost and the Local ID appears replacing the Receiver ID DRC-2 Line ID modifies the Receiver ID according to the above table.

If DRR receiver is the Host:

Parameter	Value	Description
Local setup →Transmitter →Tx Round	[3]	Setting similar to DRR-REP
Local setup → Transmitter →Tx Random Time	[15]	Setting similar to DRR-REP
Local setup → Receiver →Repeater Numb.	[1-15]	Setting similar to DRR-REP (according to the location of the repeater)

Local setup → Local system →Loc. Event ->Tx	[*]	Setting similar to DRR-REP (local events will be reported)
Local setup → Local system →Test cycle	[24]	Setting similar to DRR-REP (Test transmission required)
Local setup →Serial prot. →Serial Enable	[-]	Disable serial transmission to enable reception! (same as DRR-REP default)
Local setup →Serial prot. →Line ID mode	[0] or [2]	DRC-2 Line ID will lost and the Local ID appears replacing the Receiver ID DRC-2 Line ID modifies the Receiver ID according to the above table.

Server DRC-2:

DRC-2 with the default settings can be connected to DRR.

With the above settings, after connecting the serial port the communication initiated automatically acknowledged by Comm OK event by either the server or the host.

Clock synchronisation should be performed by the central receiver or the host DRR.

DRR receiver decodes DRC-2 events according to the CiD42 code table, therefore refer only to the „[2digit code]" value at event printing.

For DRC-2 evetns, please refer to DRC-2 manual.