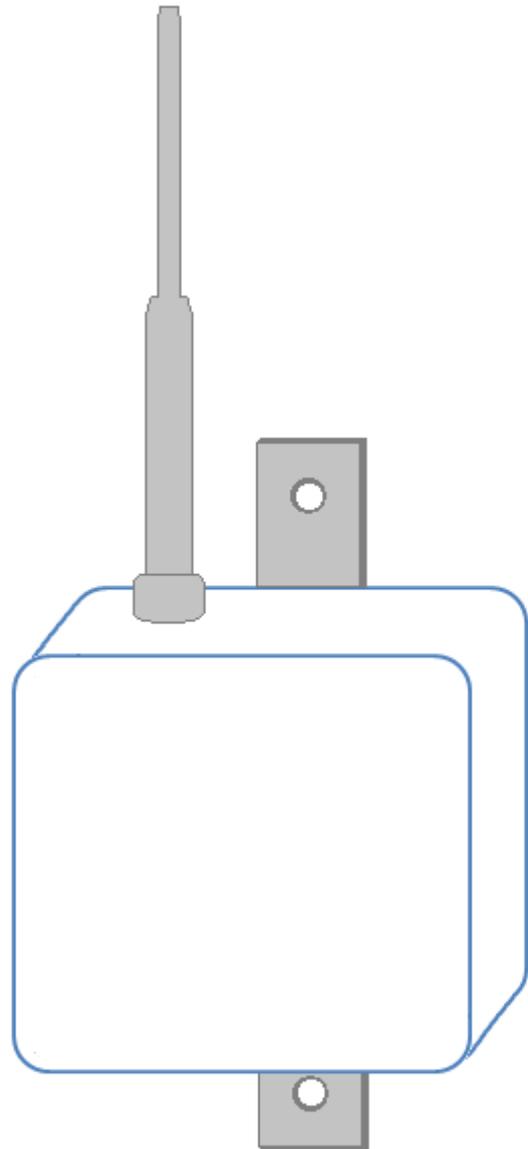


DFM Repeater Service Manual

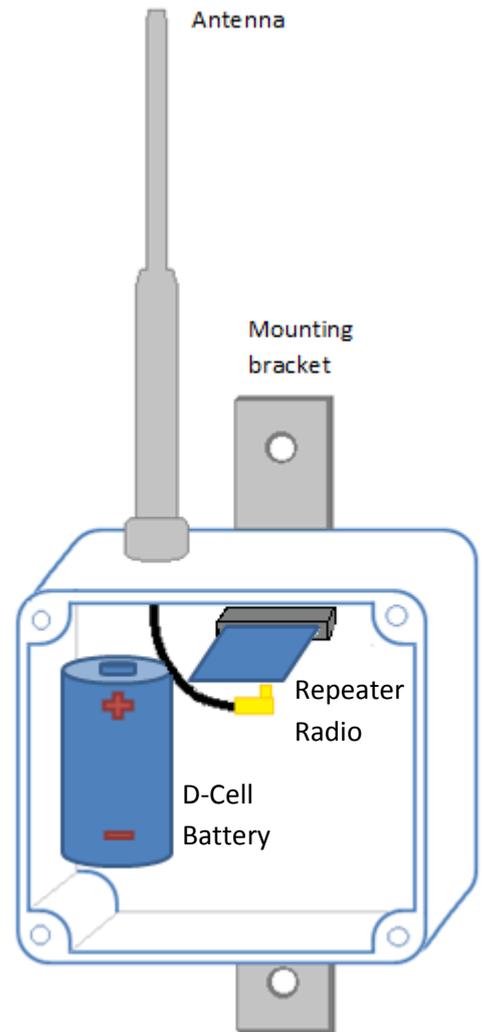


A service guide for DFM Repeaters version RPT-5.3

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DFM Repeater:



Probe setup:

The probe has to be configured, to send its data to the data repeater. Configure the probe settings on the probe setup menu screen as follows (Refer to the Logger Manual):

----{P123 }----		ENT	Shortcut keys: MENU: Save+Return to menu. Up/Dn: Scroll screen up/down. F1/F2: Move cursor in <i>[text]</i> . Scroll <i><option fields></i> . 0 to 9: Editing keys <i>[numeric]</i> . A to z: Editing keys <i>[text]</i> .
Block [blk]	Block number.		
SerialNo (123)	The probe serial number is read-only.		
Probe No [123]	The probe number can be changed, if so required.		
Interval [60]mi	Minutes read interval between probe readings.		
Dest [111]	Destination address for repeater system.	Set destination	
AutoSend <ON >	To automatically send data to destination, or not.		
Sleep mode <Off>	The probe will not take readings when sleep mode is <ON>.		
ComsType <RF >	The type of communication to send data to its destination.		
Beacons <ON >	To send radio beacons or not. Must be <ON> for logger.		
Crystal <16.0>pF	Crystal load capacitance required for accurate tuning.	Tune to logger	
Tune <±0 >kHz	Frequency adjustment for accurate tuning.	Tune to logger	
Freq <868>MHz	Frequency band, ZA and EU is 868MHz, America is 915MHz.		
Sensors (6x80) cm	Read-only: Type of probe and sensor population.		
Version (5.01)	Read-only: Probe firmware version number.		
User (UserNm)	Last edited by user.		
Date (dd/mm/20yy)	Last edited date.		
Save & Exit {OK}	Press ENT to save and return to probe menu.		

Enter the applicable block number, maximum of 8 letters. Do not change the probe number or serial number, it is only for special use. Make sure that the probe read interval is set to 60 minutes.

Update the (Dest) destination address, by entering the repeater serial number of the repeater the data should be sent to.

Make sure that the following settings are correct:

- Auto send data must be <ON>.
- Sensor sleep mode must be <Off>.
- Comms type has to be <RF>.
- Beacons should be <ON>.
- Frequency band has to be <868>.
- Crystal (load capacitance) <16> and Tune (frequency offset) <±0>kHz will be updated during the tuning process.
- Make sure that the probe date and time is correct.

Save the new settings.

It is important that the probe radio be tuned to the repeater radio frequency.

Make use of menu option (4) on the probe menu screen to confirm the destination address and test the signal quality (Refer to the Logger Manual).

Make use of menu option (5) on the probe menu screen to take a new reading, which will take about 15 seconds. Then use the menu option to 'Send Data' to the data repeater.

Repeater setup:

The repeater data path has to be configured.

----{Radio }----	<u>Description:</u>	<u>ENT key:</u>	<u>Shortcut keys:</u>
Block []	Block number	-	
Dest1 []	Send data to destination address.	Test signal	MENU: Save + Return
Dest2 []	Alternative destination address.	Test signal	Up/Dn: Scroll up/down
Supply <battery>	Power supply <battery> or <mains> (light-sleep or never-sleep).	Take reading	F1/F2: Cursor in <i>[text]</i>
TX type <20 dBm>	Type of radio installed, either <20 dBm> or <30 dBm>.	Tune radio	Scroll <i><options></i>
Crystal [184]	Crystal load capacitance required for accurate frequency match.	Tune radio	
Tune [+0 kHz]	Radio frequency adjustment value for accurate frequency match.	Tune radio	0 to 9: Editing <i>[numeric]</i>
Auto tune < no >	Radio should always adjust its frequency to match its destination.	Tune radio	A to z: Editing <i>[text]</i>
TX power <100%>	Radios transmit power as a percentage of maximum power.	Test signal	
Probe []	The probe that is linked to this repeater.	Setup probe	
Logging [60 min]	Logging interval, minutes between readings. (0 is midnight only)	Show records	
User ()	The name of the user that changed these settings.	Service records	
Date (dd/mm/20yy)	The date when these settings were changed.	Service records	
Exit {OK}	Return to menu screen.	Save + Exit	

Enter the block number where the repeater is installed, only the first 8 letters.

Enter the primary destination address (Dest1), which is the repeater serial number it should send its data to.

Enter an alternative destination address (Dest2). This is the serial number of a second data repeater in case the primary repeater is not available. Clear this field if there is no alternative route to the office.

Make sure that the following settings are correct:

- Supply <battery> for battery operated units.
- TX type <20dBm>
- Auto tune <No>
- TX power <100%>
- Logging **[0 min]**.

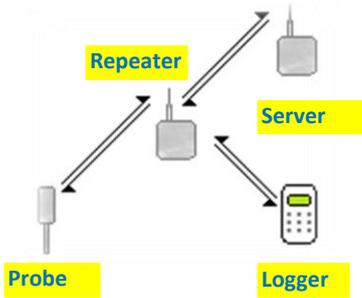
Make sure the date is correct.

The Crystal value should be a value of 203, 204 or 205. Do not change this value. It will be updated during the tuning process. Keep the Tune (frequency offset value) at 0 kHz.

When all the repeater settings are updated and saved, enter the applicable Probe Number it should be looking for. Press the ENT key once more, so that the repeater connects to the probe and updates its radio configuration.

Data Routing:

The data path (destination addresses) have to be configured on each probe and repeater.



1. The probe sends its new data to the designated repeater.
2. The repeater in turn sends the data to its primary destination (Dest1).
3. If the primary destination is not available, it will send it to Dest2.
4. All the data will be sent to the CPR (central point server).
5. The data set is then downloaded onto the PC from the CPR.

The probe stores its readings, and will only send the latest readings to the repeater. If the repeater is not available, it will retry communication 3 times, 1 minute apart, before terminating the attempts to send its data. After the next reading is taken, a hour later, the probe will try and send the latest data, including all readings that have not been sent yet, to its repeater. The probe time clock will be updated every time the probe connects with its repeater.

When the data is sent to the repeater, the repeater will store the information on its local on-board flash. After it has received all the data from its probe, it will attempt sending the data to its primary destination. All the probe readings will then also be available on the repeater flash. The repeater time clock will be updated every time the probe connects with its repeater.

Signal Quality:

It is important to ensure good signal quality between the repeaters. The following is important to ensure signal quality:

- Line of sight between the two repeaters. Try to minimize the number of obstructions (like trees) between the two repeaters.
- The distance between repeaters, because signal strength decreases exponentially by distance.
- Tuning the repeater radios. Receiver sensitivity decreases if the different radios are out of tune.
- Antenna and cabling. Antennas have to stand upright, because they have lateral directionality. Faulty antenna cables or plugs will also result in decrease in signal quality.
- Surface height clearance above ground and above trees. The repeater has to be installed at least 2 meter above ground and at least a clearance of 75cm above tree tops.
- Poles and masts should be made of Aluminium. Wooden poles can be used, but they show a reduction in signal strength. You cannot use any other type of metal or iron poles, it might damage the radio.
- Inconsistent or low battery supply will reduce receiver sensitivity.
- Temperature overcast and air moisture.
- High power lines. Radio signals cannot cross high power lines.

The signal strength should never be weaker than -96dB. Even though the receivers can pick up signals as low as -110db, it will not guarantee reliable communication. The ideal signal strength would be between -85 and -92dB.

The distance between Probe and Repeater should be between 5 to 10 meters, ideally 7meters.

Repeater Battery:

The repeater battery is a D-Size Lithium Chloride Bobbin long-life battery.

Lithium Chloride batteries consist of an unstable chemical substance that can result in batteries exploding if they are not handled with care. They should never be exposed to direct sunlight or other heat sources. Do not short-circuit the battery terminals. Do not expose them to any liquids and store them in a dry and dark place. These batteries have short shelf-life expectancy and should not be stored for long periods of time.

The repeater battery has a built-in protection circuit, to prevent overload on the batteries, which could lead to the battery exploding. Do not tamper with the protection circuit, it can lead to injuries.

The battery without load measures a voltage of between 3.55 and 3.62 Volts. Once a load is applied to cell, it will show a light voltage drop. On the repeater or with a D-Cell load tester this voltage should not be below 3.45 Volts under load. The battery should be replaced once the voltage under load drops below the 3.45 Volts, because it is a very short time before the battery will run too low. If the

voltage runs too low, the repeater flash memory might get corrupted, and invalid data will be transferred to the central point data server. The cut-off voltage is 3.0 Volts.

Lithium Chloride batteries require chemical activation after they have been in storage. You will need to use the D-Cell load tester to activate the battery chemistry inside the cell. Place the battery into the load tester. Connect the voltmeter to the terminals and measure the voltage. Press the Load button for 5 seconds and then monitor the voltage change. The Voltage should stabilize above 3.55 Volts. Once the voltage has stabilized, press the load button and monitor the voltage drop. Wait for the voltage to stabilize under load. This voltage under load should not be lower than 3.45 Volts.

