



OPERATION MANUAL
CELBOT
Version 1.2

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CELBOT MANUAL

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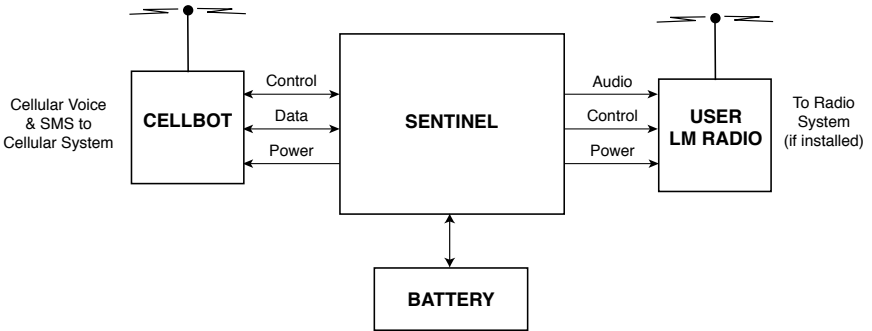
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1. SYSTEM GENERAL DESCRIPTION

The Celbot device is an accessory to the Sentinel Series 2200 Radio Alarm. The Sentinel Celbot is a SMS (Short Message Service) and a cellular phone device to provide a means to signal to your cellular network connected receiving device. It works essentially the same as sending or receiving a text message or making phone calls from the users cell phone. When installed, enabled and activated by a Sentinel alarm sensor, it will send text messages to selected receivers, such as smart cell phones, pads and computers connected to the cellular system. It is also capable of listening-in to the location of the Sentinel alarm in which the Celbot is installed.

The Celbot module contains everything for successful communication to and from the Sentinel. It is comprised of a controller with SD memory card, cellular modem with antenna and interface module which is interfaced to the Sentinel Alarm control circuit board. See Celbot Module Photo (3.1).

1.1 Celbot Block Diagram



Familiarity with the Sentinel Radio Alarm is required to use this device. Please refer to the Sentinel 2200 Series Radio Alarm user manuals before applying this accessory.

2. FEATURES

When the Sentinel alarm is activated and an alarm is tripped, The Celbot will send an alarm specific message, corresponding to the alarm tripped, to the authorized user's cellular phone or SMS device.

The Celbot can be used in conjunction with an installed Land Mobile Radio (LMR) system concurrently or individually in the Sentinel alarm system.

It will also receive messages, from a cellular or other device capable of sending SMS messages, for controlling the Sentinel. Such as the "Kill" function which will disable alarm inputs, not including low battery alarms, read cellular system signal strength or interrogate the battery status.

The Celbot will also allow the user to call the Sentinel and "Listen-in" to the audio space around the Sentinel Alarm case with a plug-in microphone using a cell phone or telephone as the receiving listening device.

All Celbot activities are recorded on the SD card in appropriate files. All the messages, listen-in activities, phone numbers, time stamp and data logging files are stored on the SD card. These can be edited and/or copied to a computer with a standard SD card slot.

3. THINGS TO DO BEFORE USING THE CELBOT ACCESSORY

If you haven't already become familiar the Sentinel Alarm, you should do so before attempting to use the Celbot. They work hand-in-hand. Familiarize yourself with the Scheduler and its menus. Also if using a LMR, you need to record voice messages on the Sentinel messages. Refer to the Sentinel 2200 series alarm and its Scheduler manuals for details.

SIM (Subscriber Identity Module) card and cellular providers:

A SIM card for the Celbot is required to use this device. It is essentially the same as one you would get for a cell phone. A standard size SIM card is required for the Celbot, not the micro or mini. This particular system uses a 2G protocol. Most internet service providers support it. You will need the IMEI number from the Celbot module circuit module. That can be read from the top of the Celbot module. This information can be obtained from Karas Technical Services during the ordering process to expedite the SIM card acquisition process. Karas Technical will install the SIM card and test the system if it is sent to us.

Get a cellular provider that will provide the most reliable service. Note that the cellular systems providing SMS texting/messaging is not 100% reliable. There may be delays or outages which may prohibit the message from being sent in a timely way. **This system is not intended for fail safe situations.**

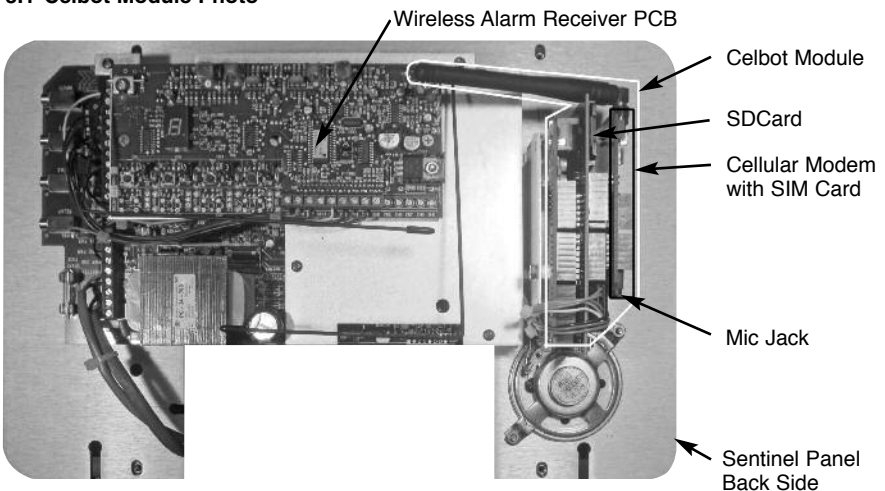
SIM card install:

The SIM card has to be installed in the SIM card slot on the Celbot cell modem card. See photo of Celbot stack. To install the SIM card, the cell modem circuit board has to be removed. Carefully remove the top circuit board of the Celbot stack. Insert the SIM card in the SIM card holder and reinstall the Celbot modem board just as it was before removing. See Celbot Stackphoto.

SD (Secure Digital) card install:

From the factory the SD card should be installed and ready to use. The user should remove the SD card and make a back up copy of as soon as possible. Should the user remove the card for reprogramming be sure to reinstall it, see Celbot stack photo. To install, insert the SD card into the SD card slot and press it in till it clicks. To remove it, press on the SD card and it will click and pop up to be removed.

3.1 Celbot Module Photo



When using without LMR installation, keep voice messages brief. Record a short silent dummy message in the first message, message 1. It will transmit the SMS message sooner this way. The SMS message is sent right after the first voice message is sent

4. DATA FILES SET UP

In order for the Celbot to communicate with the user, the Celbot needs a set of user created messages, call numbers and access numbers. Remove the SD card from the Celbot and plug into SD card slot on your computer or lap top. You will find examples of the files on the SD card root directory when you receive the Celbot unit. You may, during the assembly process, have Karas Technical Services do the initial messages and phone number lists.

Along with these files you will find the Sentinel Celbot Manual, the AT command manual for advanced users and any other manual associated with your system in the manual directory on the SD card.

Should you have to replace the SD card, the preferred SD card should be a Scan Disk brand or equivalent type supplied with the unit. If you change brands you may incur initialization problems.

All the system files listed below should be on the root directory. All other files, such as the manual folder, should be in file folders. You will find copies of the system manual in the manual folder. These can be copied for reference. Also there will be two message log files created by the Celbot that record all sent and received messages.

If you need to create or copy files to the SD card, file names are not case sensitive. If you do add files they should be 8.3 format. No more than 8 character name and a 3 character extension.

There are 5 system files on the root directory with different requirements as follows:

4.1. Alarm messages = (filename) = Alarmess.txt

These are messages assigned to each of the alarm sensors. Have no more or less than these 8 and in this order. Each message must be less than 30 characters or it will be truncated. These are the messages sent with SMS alarm transmission.

Such as the following, (example messages are in quotation marks) followed by their description. If no message is required for a particular zone, just do a carriage return<ENTER> and leave a blank message line. The End statement should be on the ninth line.

“Sentinel Radio Alarm”, Alarm preamble.

“Karas Technical Services”, Unit ID

“Intruder area one”, Message associated with alarm zone one.

“Intruder area two”, Message associated with alarm zone two.

“Intruder area three”, Message associated with alarm zone three.

“Main Battery low”, This message is sent when the main battery is low.

“Sensor Battery low”, This message is sent when a sensor battery is low.

“Check sensor status”, This message is sent when the sensor status is sent.

End

These alarm messages can and should be edited for their respective situations, but keep in mind that the SMS text messages are only 140 characters long. So the minimum number of alarm message strings is three of the message strings.

The Celbot always sends the Alarm preamble and Unit ID, plus any or all of the other messages, depending on which alarm is set. They are concatenated together into one message, i.e. if zone one was tripped and its sensor battery was low, the message sent would look to the receiver as follows,

“Sentinel Radio Alarm”

“Karas Technical Services”

“Intruder area one”

“Sensor Battery low.”

This is 84 characters and no characters would be dropped. As you can see if your messages are too long or you have too many alarms going off at once you may have a message too

long to send completely. So, if you are using multiple sensors with the potential for multiple sensor activations, remember to keep your messages as short as possible to ensure complete transmission without dropped characters. Although, usually only one or two alarm messages are sent at any one time.

4.2. Authorized numbers = (filename) = Authmess.txt

These are authorization access numbers such as the following, (put the numbers of your authorized users in place of these examples). Only these phone numbers can access the Celbot via the Celbot cellular connection. Although you may use 7 digit phone numbers, it is recommended that you use complete numbers with country and area code. Each number has to contain at least 7 digits, preferably 11 digits, including the 1 before the area code. Some cell systems do not include the prefix such as 1, so you may have to delete it from your listed number. You may want to list the number both ways, as shown in the example list below. This insures any SMS messages or callers from a different cellular provider are recognized. Some phone numbers coming from different service providers may have a non-numeric prefix on them. Do not use any other characters than numbers. Any other characters will be ignored. Also, it is necessary to put a carriage return<ENTER> at the end of each number. Also, put an end statement at the end of the file as shown. If you do not, it may not check the last authorized number. You can have as many as eighteen authorized user numbers, but it is better to have as few as necessary on the list.

```
83168xxx65
183168xxx65
183121xxx81
140835xxx23
1808234xxx1
End
```

4.3. Phone numbers to call file = (filename) = Phonenum.txt

These are the call numbers for alarm messages such as the following, (put the numbers of the intended recipients in place of these examples). Although you may use 7 digit phone numbers, it is recommended that you use complete numbers with country and area code, preferably 11 digits including the prefix such as 1 before the area code as shown in the example list below. Some systems require all 11 digits to make a proper call. Do not use any other characters than numbers. Any other characters will be ignored. Also, it is necessary to put a carriage return<ENTER> at the end of each number. The best way to do this is to put an end statement at the end of the file as shown. If you don't, it will not send the last phone number. It is recommended to keep your call list under six call numbers, although you can use up to eighteen.

Beware that it takes time to send each message. The first number on the list gets sent first, the second number sent second, etc. It may take 10 seconds or more to send to each number on the list. So last number on the list may not be sent for a minute or more after the first.

```
1831297xxx7
183168xxx65
183121xxx81
140835xxx23
1802234xxx1
End
```

4.4. Message log file = (filename) = Messlog.txt

This file is created by the Celbot and is a collection of messages with time and date stamp, plus the phone numbers called, etc.

The Message log file is an excellent way to track alarm activity. It can be read by removing the SD card from the Celbot and plugging it into a computer with an SD card slot. It can be read with most any editor.

Once you complete your file setup activities, reinstall the SD card.

5. OPERATION SET UP

There are four modes of operation for the Celbot. The first is messaging, second is listening-in, third is control and fourth is monitoring mode. Be sure to have all files set up on your SD card and installed in Celbot.

5.1 Message Mode

The messaging mode is when the Sentinel sends alarms automatically from sensor inputs. It will also receive SMS messages or phone calls automatically. The Celbot operates in this mode when the Sentinel is in the TEST or OPERATE modes. These are the modes for sending alarm messages. In these modes the Sentinel is powered ON only for the duration of the message transmission, which may be less than a minute or so.

To initiate message mode operation set the Sentinel controls to the following positions:

MODE switch to TEST or OPERATE. The difference between the TEST mode and the OPERATE mode, is the TEST mode does not turn on the LMR two way radio that may be installed, also the LMR messages are played through the speaker only. The Sentinel/Celbot will transmit the SMS message, if SMS is turned on, in either of these modes. Use TEST for set up and check out. Use OPERATE when the alarm is set up and ready for sending alarms on both the LMR two way radio and Celbot.

5.2 Typical Message Mode Setup

On the Sentinel panel, Put the READY switch in the OFF position.

To enable SMS Alarms, hold down the MODE and INC buttons, push the READY switch to POWER ON and release to Ready. This activates the Sentinel into the Scheduler menu mode. Repeat pushing the MODE button till you see the "SMS MESSAGING" on the display. Press the INC button and toggle the ON/OFF till you see "ON".



```
SMS MESSAGING
ON
```

If the SMS is turned OFF it will not transmit alarm SMS messages. It will be able to receive commands and respond to them, such as STATUS, as well as log all alarm activity.

Return the READY switch in the OFF position, This resets the system and takes it out of the Scheduler menu mode.

Set the MESSAGE NUMBER switch in position, Message 2 or higher. This allows enough time for the Celbot to initialize properly and send the SMS messages.

Set the MODE switch in either the TEST or OPERATE position, In test mode, only Celbot SMS messages are transmitted. No LMR transmissions occur, The messages associated with the LMR are played out the speaker. In OPERATE mode Celbot SMS messages are sent and the LMR transmissions occur. The voice messages will not be heard on the speaker.

Push the READY switch to POWER ON and release to READY position. You will hear on the speaker "Entrance exit delay". The Sentinel goes into the Entrance/Exit mode for 1 minute and the Sentinel and Celbot initialize. You will hear a "Status" voice message a few times and a "SMS TIME OUT" will show on the display while the Sentinel is checking the Celbot for status ready. If all goes properly you will see "SMS READY ON" on the Sentinel display and hear a "Ready" message on the speaker. Let the Sentinel finish its Entrance/Exit delay sequence, you will hear the speaker say "Ready". The Sentinel active light and display will go out and the unit is now ready to send alarm messages. If you do not get a "Ready" voice message and/or a "READY ON" or "READY OFF" on the display you may have a startup error. The display will indicate the error type and error message number. The error numbers are explained in the trouble shooting tips, Section 6.1. You may only need to reset and start the power on sequence again and wait for it to initialize and be ready. Occasionally it may take longer to get the Celbot to acquire the cell tower connection. Once established it is ready to go. Every time you do reset the Sentinel, the Celbot has to re-acquire the cellular system. Do not return the power on switch to OFF/RESET once a link is established. Leave it in the READY position, until you are ready to turn off the Sentinel Alarm.

5.3 Quick Start Up and Check Out, Celbot with Sentinel Scheduler

In order to use the Celbot, it needs to be enabled in the Sentinel Scheduler setup menu. Select the SMS MESSAGING menu and toggle INC button to show "ON" in the Sentinel display. This enables the Celbot.

To disable the Celbot messaging, press the INC button toggle SMS MESSAGING to OFF. The Sentinel alarm and Celbot accessory will operate normally but will not send SMS alarm messages. Refer to the Sentinel Scheduler manual on instructions for using the Scheduler menu.

Be sure the Scheduler is either OFF or, if the Scheduler is ON, it is in the operate time period of the schedule. See Scheduler manual to set up Scheduler.

READY switch in the OFF position, This resets the system and takes it out of the Scheduler menu mode.

Set the MESSAGE NUMBER switch in position, Message 2 or higher. This allows enough time for the SMS to be sent properly.

Set the MODE switch in either the TEST or OPERATE position, In TEST mode, only Celbot SMS messages are transmitted. No LMR transmissions occur, The messages associated with the LMR are played out the speaker. In OPERATE mode, Celbot SMS messages are sent and the LMR transmissions occur. The voice messages will not be heard on the speaker.

Push the READY switch to POWER ON and release to READY position. You will hear on the speaker "Entrance exit delay". The Sentinel goes into the Entrance/Exit mode for 1 minute and the Sentinel and Celbot initialize. If all goes properly you will see "SMS READY ON" on the Sentinel display and hear the "Ready" voice message. Let the Sentinel finish its entrance/exit delay sequence, you will hear the speaker again say "Ready". The Sentinel active light and display will go out and the unit is now ready to send or receive alarm messages and calls. If you receive an error message, refer to Section 5.2 and/or the Trouble shooting tips, Section 6.

It is worthwhile to test the Celbot and Sentinel in the TEST mode prior to activating the OPERATE mode. Activating a sensor should send a text message to the number/s you assigned in the phone numbers file. Also, voice messages would be sent over the speaker. If no voice messages are desired in the TEST mode, record a short silent dummy message in the first message, message 1. This eliminates any voice messages being played in the TEST mode. When using the Celbot with a LMR two way radio it would be practical to make the voice messages and the SMS messages very similar in context but it is not necessary.

5.4 Listen-in Mode

To use the listen-in mode, the microphone has to be plugged into the Celbot mic jack on the side of the Sentinel case. The listen-in mode is available to use whenever the Sentinel and the Celbot are in the READY mode. To activate the listen-in mode, the user only has to dial the Celbot phone number from a telephone. The Celbot will answer the incoming call and the user will be able to hear audio in the proximity of the Celbot microphone, if installed. This can be useful in many ways. The listen-in caller information will be logged on the SD card, Received message file, when it answers and again when the caller hangs up. No audio is recorded. The caller's number has to be on the authorized numbers list file to be able to activate the listen-in mode.

5.5 Control Mode

The Celbot control mode provides a number of Celbot control functions by sending text commands to the Sentinel Celbot. The caller/controller has to be on the authorized numbers list file to access and control the Sentinel/Celbot. These commands are case sensitive.

One, is to turn off the sensor alarm inputs from the Sentinel. Should the user need to disable the sensors inputs for whatever reason. The user sends the command as a text message, "Xkill" to the Celbot's phone number. This will be read by the Celbot and signal the Sentinel to disable alarm inputs. A successful execution response to the caller from the Celbot would

be the text message "Inputs Killed". These commands are sent back only to the caller.

Second, to re-enable the alarm sensor inputs, send a text message "Ready" to the Celbot. A successful execution response to the caller would be the text message "Inputs Ready".

Third, you may interrogate the Celbot by sending the command as a text message Status for certain status conditions such as the main battery charge, input status and cell signal strength. A successful SMS execution response to the caller would be the text message "Battery voltage: 12.63 volts", the alarm input Status, "Inputs Killed" or "Inputs Ready" and the Cellular Signal Quality, CSQ. Such as +CSQ: 21,0. The first parameter is the signal strength where 21 would be -72dbm. A very weak signal would be under 5, -100dbm. Anything above a CSQ of 10 should work well. Each increase by one increases the signal strength by 2 dbm. The second parameter is the bit error rate (BER) in percent. Zero is the best and BER is a good indicator of data path quality. More information on CSQ can be found in the SIM900 AT manual.

Resetting the Sentinel with the ON/READY/OFF switch will also restore input normal operation, inputs "Ready".

5.6 Monitor Mode: For advanced users

The monitor mode is used for testing and monitoring the system. A USB cable is required to connect the Celbot to a computer with host USB port. This will allow the user to access the cellular modem, SD card and other operations with the Celbot monitor program, which runs when powered up. This mode is usually used by advanced operators, but can be employed by the general user to check certain parameters, like signal strength of the cellular link and logging files among many others. These may be accessed with AT commands to monitor. This mode is operated in either the RECORD or PLAY modes. Using these modes keep the Sentinel powered on continuously, so you may use the Sentinel Celbot in the monitor mode without interruption of power, that occurs in the TEST and OPERATE modes. When in these modes, the Sentinel will work almost like normal, with the exception that the USB cable applies power to the Celbot and it doesn't always reset when switching from one Sentinel mode to another, i.e. TEST to PLAY. If the Monitor program stops operating when switching Modes, press the reset button on the Celbot interface circuit board to restart. Be sure to power on the Sentinel before plugging in the USB cable. Unplug the USB cable when using in the TEST/OPERATE modes.

This mode requires a computer with a USB port and a terminal monitor program installed such that you may use the keyboard to enter commands and data. There are a number of free monitor programs or use the one provided with your operating system. We use Terminal v1.9b or Termit 3.3, these are the terminal programs we use for our testing. This serial connection operates at 4800 baud, set up for 8 bits, no parity bit, 1 stop bit and no handshaking. To use the monitor program, a USB cable has to be connected to the Celbot and the terminal monitor computer, laptop, etc. The Sentinel panel has to be removed to access the Celbot USB port, see diagram for location. When everything is setup, do a POWER/ON/RESET to start Celbot. You should see the boot up prompt and other start-up data on your computer screen. Type "help" on your computer and you should see the Menu list print on the screen. You can use these commands to do assorted operations on the Celbot. Refer to the SIM900 AT Command manual stored on the SD card for all the Celbot AT commands. You will need to remove it from the Celbot and copy it to your computer to reference or download it from our web site, <http://karastech.com/documentation.php>. See addendum to this manual for other monitor commands and display information explanation. **Beware** that using the AT commands can cause the system to fail if you don't know what you are doing. More information using this mode can be obtained from Karas Technical Services.

6. TROUBLE SHOOTING TIPS

In most cases a simple reset of the POWER ON/READY switch will resync the Celbot and Sentinel as well as establish a link to the network.

6.1 Error messages

The Celbot has 7 error codes, as follows:

- 1 SD memory card failure; card is not installed or not initializing
Check that SD card is installed
Insure it has the correct files and numbers
It may need to be formatted if corrupted. Only format with SDFormatter.
- 2 No Modem response; modem not communicating with Celbot
- 3 Code 3 is both codes one and two
- 4 SMS link failure; No cellular connection
Insure SIM card is installed
Be sure your account has enough operating funds
- 5 Code 5 is both codes 1 and 4
- 6 Code 6 is both code 2 and 4
- 7 Code 7 is codes 1, 2 and 4

Also, "SMS time out" at the end of the Entrance/Exit sequence, indicates a code 2 modem failure to communicate with Celbot.

6.2 Other issues and solutions:

Unit will not go to Ready mode or hangs up:

Try resetting the Power On Reset switch.

Unit will not send alarm message:

Check Sentinel Scheduler settlings, it may not be enabled to send alarms in the scheduler table or the scheduler is off.

Check your phone number list (phonenum.txt) on SD card, be sure they are correct.
Be sure your cellular account has enough operating funds and is set up for both texting and voice.

Unit will not receive control message or listen-in calls:

Check your authorized phone numbers list (authNum.txt) on SD card, you may have to eliminate or add a 1 to the beginning of the phone number, such as 1 831 685 XXXX or 831 685 XXXX.

Be sure your cellular account has enough operating funds and is set up for both texting and voice.

If you have any persistent problem, please contact Karas Technical Services customer support at inquires@karastech.com or call 831 685 0816 and ask for customer service.

7. GENERAL SPECIFICATIONS

Cellular modem: 2G, Short message service, Compliant to GSM phase 2/2+, Control via commands (GSM 07.07, 07.05 and SIMCOM enhanced AT Commands), Quad-Band 850/900/1800/1900MHz, GPRS multi-slot class 10/8, GPRS mobile station class B, Class 4 (2W@850/900MHz), Class 1 (1W@1800/1900MHz)

Messaging: 8 user editable messages for alarms and status

Access authorization: Up to 18 access numbers may be use

Phone Numbers to Call: Up to 18 numbers may be called

Power Use and requirements: The Sentinel/Celbot will operate from 115 V.A.C. line power or the internal battery.

Celbot operates from Sentinel power system.

Battery life: Operating the Celbot reduces the operating time on the Sentinel main battery by about 30 percent. From approximately 240 hours to 170 hours. These are reference numbers only. Battery drain time may vary significantly depending on battery life, charge level, temperature, etc.



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