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1 Introduction

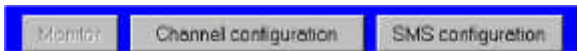
The PKWatch program is a MS ACCESS generated data base intended for monitoring and massive data logging applications using a PROLINK-4 as a signal measuring instrument.

It is very useful for long term permanent monitoring purposes in TV, radio, satellite or cable TV environments.

The program commands a PROLINK-4 following a measurement sequence previously selected by the user in a dedicated menu. All measurements available in the PROLINK-4 (signal level, video/audio ratio, carrier/noise ratio, digital channel power, Bit Error Rate) are also available through the PKWatch software.

Data acquired by the PKWatch software can be saved in files to be reviewed, stored or further processed. The program also includes data printout and graphic presentation capabilities.

Every desired measurement will have associated pass/fail limits which will be used during the monitoring process to determine whether a measurement is correct or not. If properly configured the PKWatch system has the capability to send a SMS message to a GSM phone informing about the fact that a test failure has occurred.

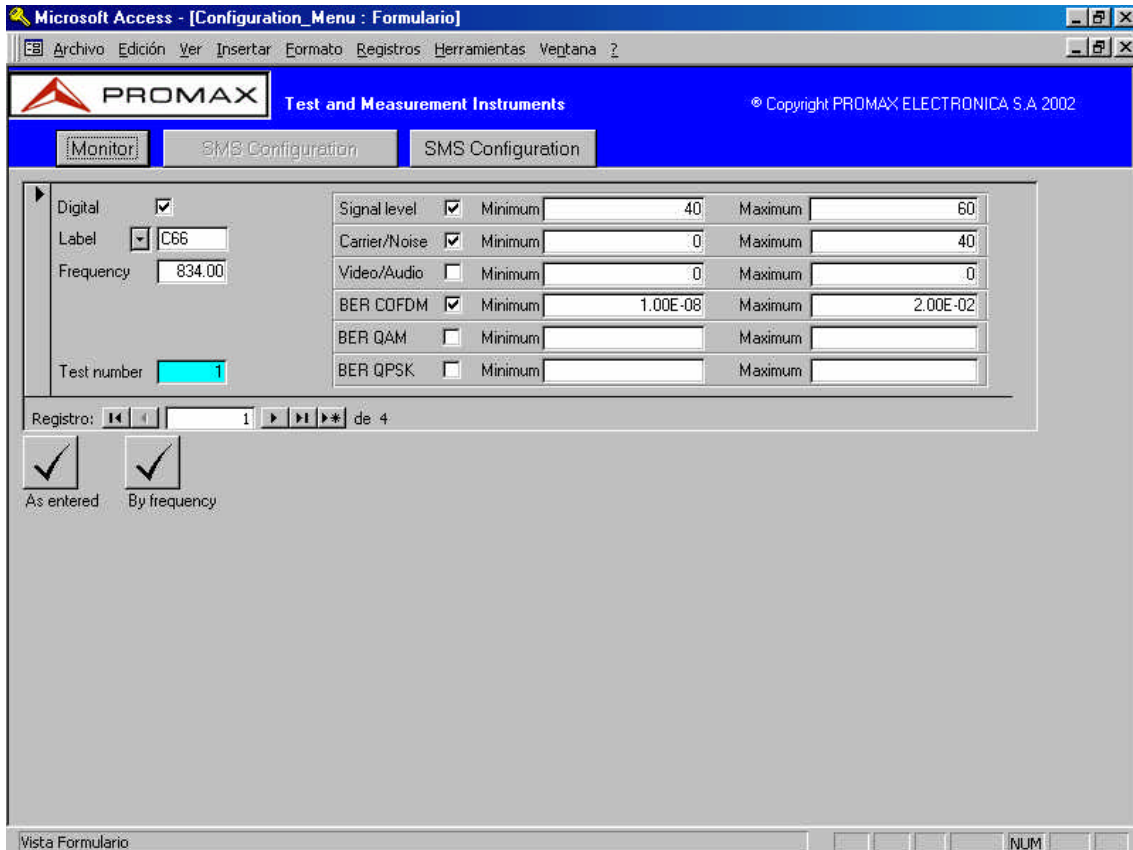


There are three main screens in this application program, the monitor, the channel configuration and the SMS configuration. Each of them can be easily accessed by clicking on the corresponding command button on the top of the screen.



2 Channel configuration

This menu allows the user to define a monitoring sequence including channel or frequency to be tested, measurement to be made and pass fail limits to be applied. All these data together form a test point.



Every test point must contain following information:



Digital. One of the first things to do if the test point refers to a TV channel is to determine whether it is digital or analogue. This is important since some of the functions will act accordingly. For example if the frequency is recalled using the label foldable list the tuning frequency will be the centre of the channel if this is digital and the video carrier frequency if it is analogue.



Label. Name given to the test point. It can be the TV channel or any 4 character name at will. This label will be used to identify the test point in the files, in the SMS messages, in the graphics,... It is possible to select the label and frequency from a foldable list. In this case the label will be the channel number in the list (C44 and 655.25 MHz for instance).



Frequency

Frequency. This will be the frequency to be tested. The format is XXX.YY. The PROLINK-4 will tune to that frequency during the test.

Test number

Test number. This will be assigned by the program once the 'as entered' or 'by frequency' verification buttons are pressed. It will be the sequence number in the monitoring process. For instance a test point with test number 5 will be executed after the test point with test number 4 is completed.

Signal level Minimum Maximum

Measurement. The possible measurements are those available in the PROLINK-4, signal level, carrier to noise, video to audio, digital channel power and bit error rate. Every measurement is associated with an allowed minimum and maximum value. If the measurement is within those minimum and maximum values the result of the test will be PASS and will be FAIL otherwise. Measurements for every test point are executed in the same order as shown on the CHANNEL CONFIGURATION. This is signal level will always be measured before carrier to noise for instance.

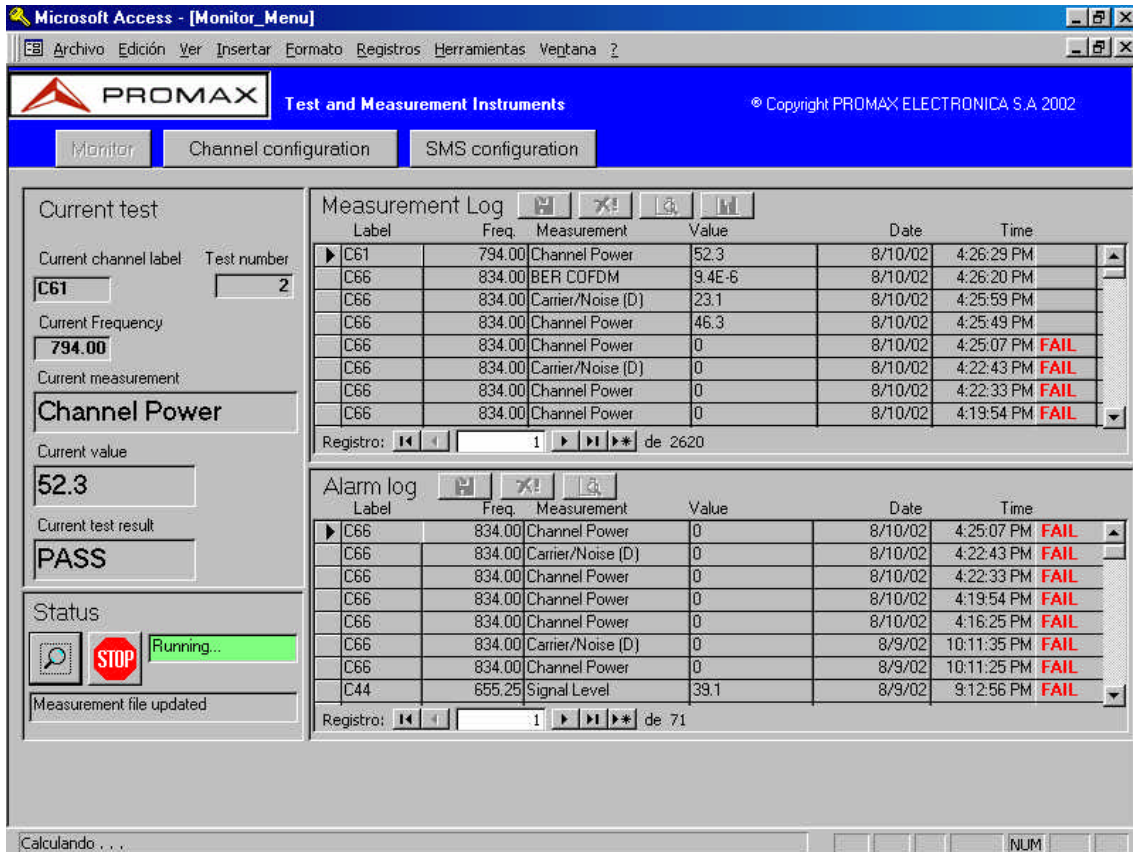
Once the complete test sequence is entered and configured the user must select if the test will go test point by test point as entered or sorted by frequency. This operation is also important because it is used to save the data so that the MONITOR MENU can use it.



The test point control bar helps to edit the different test points. The number in the centre indicates the test point being edited. Using the arrows one can go to the next or previous test point. The arrows with the vertical bar take to the first and last test points. It is possible to add new test points by clicking on the arrow with the star. The total number of test points appears on the right side of the bar.

3 Monitor menu

The monitor menu is the main application screen of the PKWatch monitoring software. It is made of four different areas:



3.1 Current test



It shows the data of the test being carried out by the PROLINK-4 in every moment. The program tunes the PROLINK-4 to the frequency and measurement previously selected under the channel configuration menu. The result of the measurement is then compared with the acceptance limits. If it is valid then the test result will be PASS and will be FAIL otherwise.

3.2 Measurement log

Label	Freq.	Measurement	Value	Date	Time
C61	794.00	Channel Power	52.3	8/10/02	4:26:29 PM
C66	834.00	BER COFDM	9.4E-6	8/10/02	4:26:20 PM
C66	834.00	Carrier/Noise (D)	23.1	8/10/02	4:25:53 PM
C66	834.00	Channel Power	46.3	8/10/02	4:25:43 PM
C66	834.00	Channel Power	0	8/10/02	4:25:07 PM FAIL
C66	834.00	Carrier/Noise (D)	0	8/10/02	4:22:43 PM FAIL
C66	834.00	Channel Power	0	8/10/02	4:22:33 PM FAIL
C66	834.00	Channel Power	0	8/10/02	4:19:54 PM FAIL

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The results of every test are stored into the measurement log file and shown in this area of the screen. The data stored include the test parameters, date and time of the measurement as well as the test result. The last test is shown on the top of the screen.



There are four command buttons in the measurement log area which are active only if the monitoring process is not running.



The first command button allows to save all the data in the measurement log to a file. The name of the file needs to be entered and it will be created in the C:\PROLINK_WATCH\FILES directory. The format of the file is MS EXCEL so that it can be opened and processed using that program.



There is no limitation with regards to how many tests the measurement log can hold other than available disk space. However it is advisable to save the data in a file on a regular basis. Once this is made data can be erased from the measurement log using this command button. After clicking on this button the program will ask for a confirmation since all data will be erased at once. If you are sure that your data is not useful or has been safely stored you will need to type YES to erase it all.



This button allows to print all the data in paper if required. The preliminary view of the page will be shown so that one can select page layout, margins, printer,...

Microsoft Access - [Measurements_report : Informe]

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PROLINK WATCH MEASUREMENTS REPORT

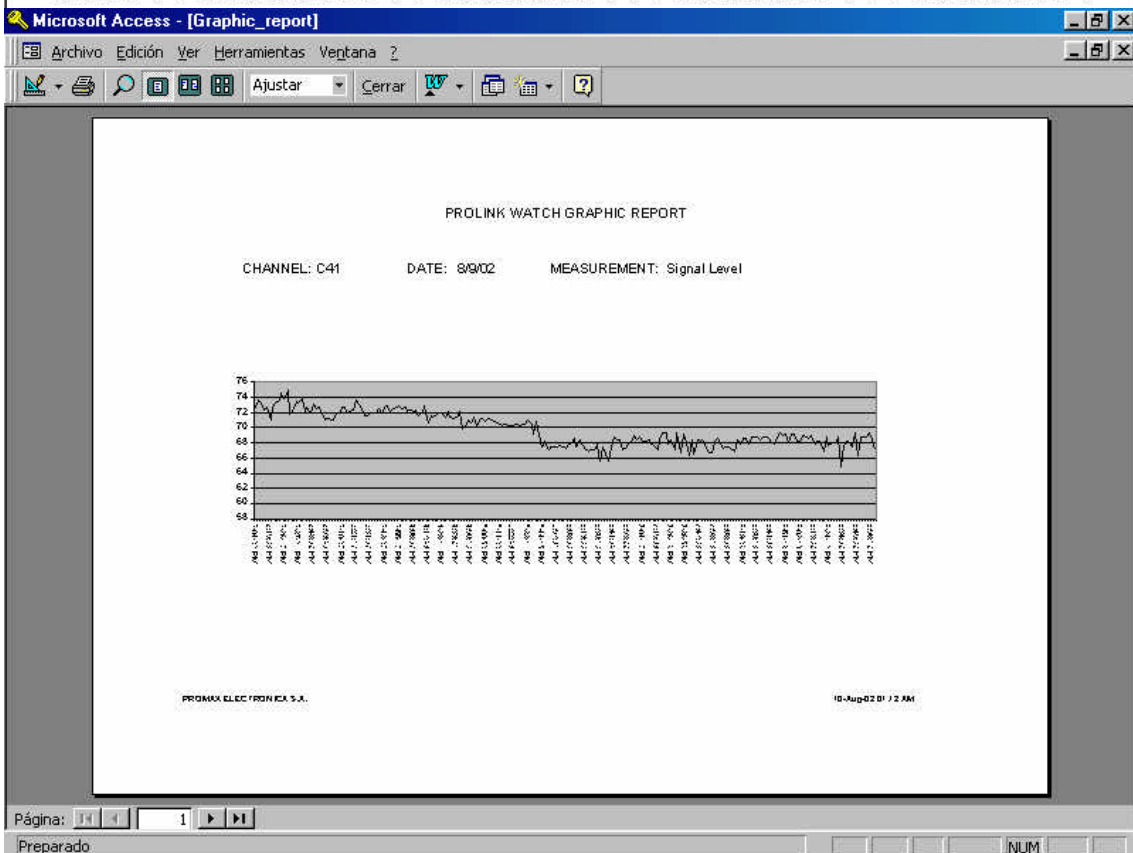
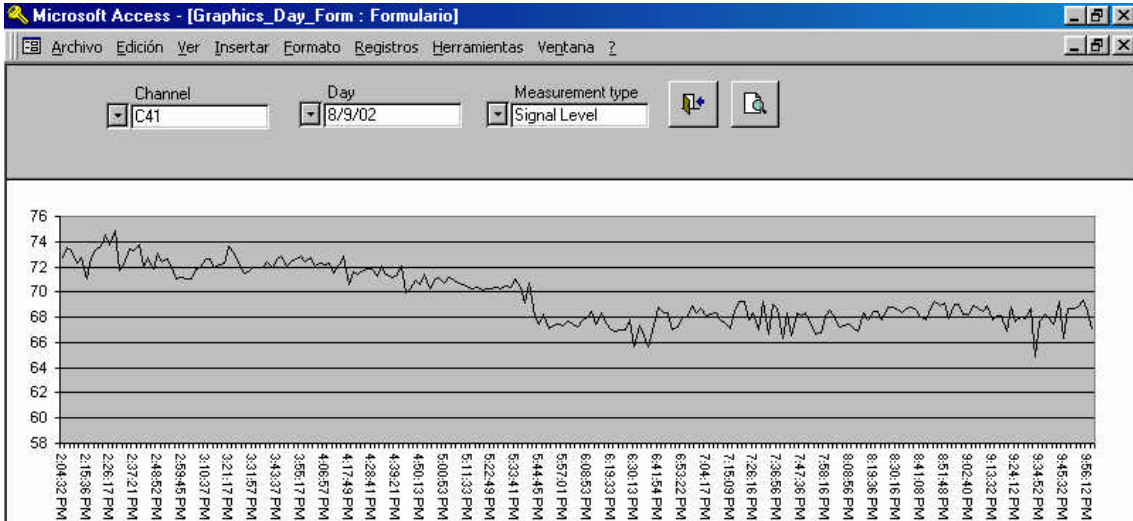
LABEL	FREQ.	MEASUREMENT	VALUE	DATE	TIME	ID	RESULT
C66	834.00	Channel Power	49.2	8/9/02	2:02:50 PM	1	
C66	834.00	Carrier/Noise (D)	24.6	8/9/02	2:03:00 PM	1	
C66	834.00	BER COFDM	4.0E-6	8/9/02	2:03:21 PM	1	
C61	794.00	Channel Power	52.4	8/9/02	2:03:30 PM	2	
C61	794.00	Carrier/Noise (D)	26.2	8/9/02	2:03:40 PM	2	
C61	794.00	BER COFDM	3.8E-6	8/9/02	2:04:01 PM	2	
C44	655.25	Signal Level	63.5	8/9/02	2:04:08 PM	3	
C44	655.25	Video/Audio	14.1	8/9/02	2:04:15 PM	3	
C44	655.25	Carrier/Noise	42.5	8/9/02	2:04:25 PM	3	
C41	631.25	Signal Level	72.7	8/9/02	2:04:32 PM	4	
C41	631.25	Video/Audio	13	8/9/02	2:04:39 PM	4	
C41	631.25	Carrier/Noise	48.5	8/9/02	2:04:49 PM	4	
C66	834.00	Channel Power	48.7	8/9/02	2:04:58 PM	1	
C66	834.00	Carrier/Noise (D)	23.3	8/9/02	2:05:08 PM	1	
C66	834.00	BER COFDM	3.1E-6	8/9/02	2:05:29 PM	1	
C61	794.00	Channel Power	52.5	8/9/02	2:05:38 PM	2	
C61	794.00	Carrier/Noise (D)	26.3	8/9/02	2:05:48 PM	2	
C61	794.00	BER COFDM	5.2E-6	8/9/02	2:06:09 PM	2	
C44	655.25	Signal Level	63.5	8/9/02	2:06:16 PM	3	

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Graphics of the daily evolution of any of the measured parameters are available just at the click of this button. The graphic is generated automatically after entering the channel label and desired date and measurement. All the graphics can also be printed.





3.3 Status



Two command buttons and two information windows form the status area in the monitor menu. The buttons should be used to start and stop the monitoring process. Note that some of the functions in the monitor menu such as graphics or save to file will not be available while the monitoring process is running.

The top information window shows the situation of the monitor, running, stopped, stopping, etc... while the bottom information window shows what is the program doing at any time, measuring signal level, updating file, sending SMS message,

It is recommended to stop the monitoring process before going to the other screens, channel configuration or SMS configuration.

The monitoring process is fully automatic and starts by clicking on the monitor button. The program will first look for a PROLINK-4 on COM1 and will display its firmware version in the bottom information window. Then the monitoring process will start following the test sequence test point by test point depending on the test sequence number. Once the program gets to the last test point it goes to the first and so on until the process is stopped by clicking on the stop button.

If PROLINK-4 is not present or is not detected due to a communication problem the monitoring will not continue.



3.4 Alarm log

Every time a measurement fails to be within the predefined acceptance limits the corresponding information is duplicated in the alarm log file and is shown in the alarm log screen area. It is actually duplicated because the same information will go to the measurement log file as well. The last alarm is shown on the top of the screen.

Label	Freq.	Measurement	Value	Date	Time	Status
C56	834.00	Channel Power	0	8/10/02	4:25:07 PM	FAIL
C56	834.00	Carrier/Noise (D)	0	8/10/02	4:22:43 PM	FAIL
C56	834.00	Channel Power	0	8/10/02	4:22:33 PM	FAIL
C56	834.00	Channel Power	0	8/10/02	4:19:54 PM	FAIL
C56	834.00	Channel Power	0	8/10/02	4:16:25 PM	FAIL
C56	834.00	Carrier/Noise (D)	0	8/9/02	10:11:35 PM	FAIL
C56	834.00	Channel Power	0	8/9/02	10:11:25 PM	FAIL
C44	655.25	Signal Level	39.1	8/9/02	9:12:56 PM	FAIL



There are three command buttons in the alarm log area which are active only if the monitoring process is not running.



The first command button allows to save all the data in the alarm log to a file. The name of the file needs to be entered and it will be created in the C:\PROLINK_WATCH\FILES directory. The format of the file is MS EXCEL so that it can be opened and processed using that program.



There is no limitation with regards to how many alarms the alarm log can hold other than available disk space. However it is advisable to save the data in a file on a regular basis. Once this is made data can be erased from the measurement log using this command button. After clicking on this button the program will ask for a confirmation since all data will be erased at once. If you are sure that your data is not useful or has been safely stored you will need to type YES to erase it all.



This button allows to print all the data in paper if required. The preliminary view of the page will be shown so that one can select page layout, margins, printer,...

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PROLINK WATCH ALARM REPORT

LABEL	FREQ.	MEASUREMENT	VALUE	DATE	TIME	ID	RESULT
C66	834,00	BER COFDM	4.5E-4	09/08/02	14:11:53	1	FAIL
C61	794,00	BER COFDM	3.5E-4	09/08/02	14:14:53	2	FAIL
C44	655,25	Signal Level	59.8	09/08/02	14:32:17	3	FAIL
C44	655,25	Signal Level	59.5	09/08/02	14:34:37	3	FAIL
C66	834,00	BER COFDM	7.4E-4	09/08/02	14:40:26	1	FAIL
C44	655,25	Signal Level	58.4	09/08/02	14:41:25	3	FAIL
C44	655,25	Signal Level	59.3	09/08/02	14:43:45	3	FAIL
C44	655,25	Signal Level	56.4	09/08/02	14:46:08	3	FAIL
C66	834,00	BER COFDM	1.0E-1	09/08/02	14:58:22	1	FAIL
C61	794,00	Channel Power	30.1	09/08/02	15:09:23	2	FAIL
C44	655,25	Video/Audio	8.9	09/08/02	15:35:56	3	FAIL
C44	655,25	Video/Audio	9	09/08/02	15:38:16	3	FAIL
C44	655,25	Signal Level	50	09/08/02	15:40:29	3	FAIL
C44	655,25	Video/Audio	9.1	09/08/02	15:40:48	3	FAIL
C44	655,25	Video/Audio	9.1	09/08/02	15:43:08	3	FAIL
C44	655,25	Signal Level	49.7	09/08/02	15:49:37	3	FAIL
C44	655,25	Video/Audio	7.8	09/08/02	15:49:56	3	FAIL
C44	655,25	Signal Level	49.6	09/08/02	15:52:09	3	FAIL
C44	655,25	Video/Audio	8.2	09/08/02	15:52:28	3	FAIL
C44	655,25	Video/Audio	8.8	09/08/02	15:54:48	3	FAIL

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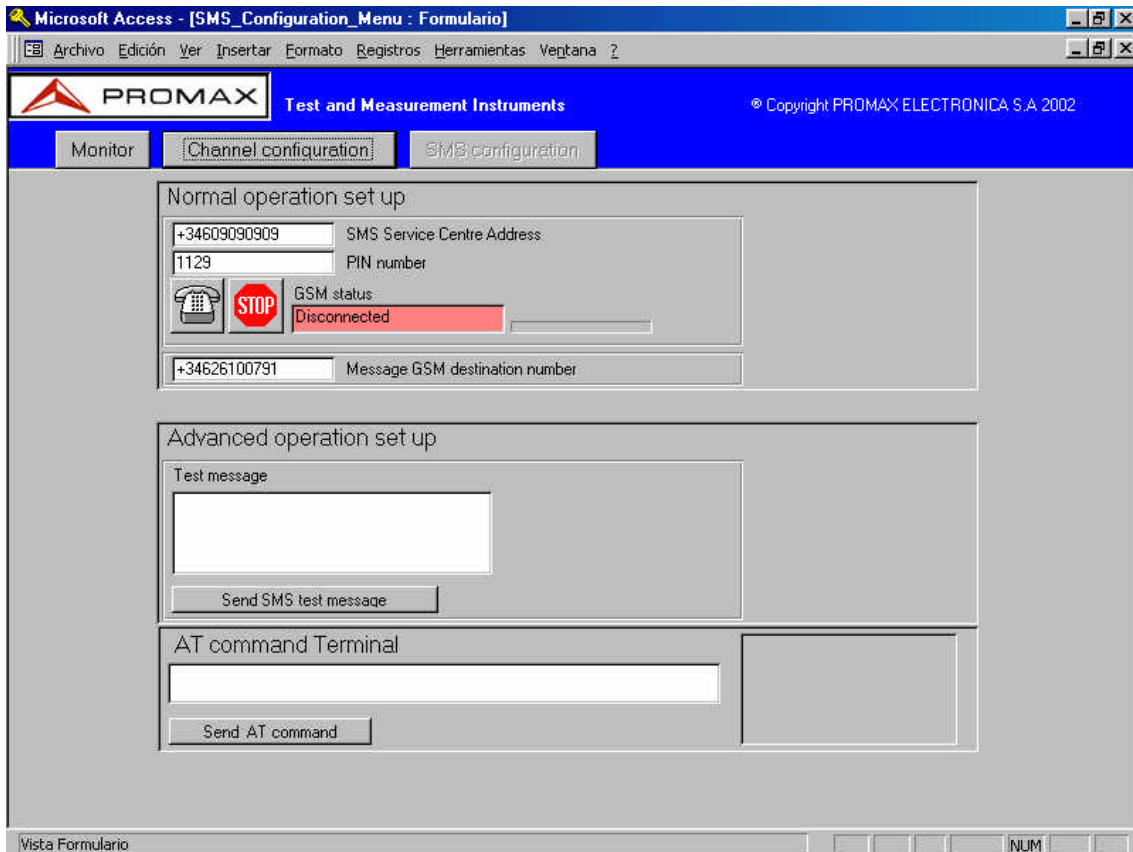
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4 SMS configuration

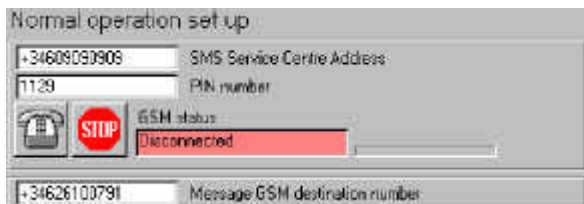
One of the most outstanding features of the PKWatch monitoring system is the capability to send messages through the GSM network including information about the measurement failures that may occur.

The system includes a GSM modem which needs to be properly configured to be able to send SUCH SMS messages. The SMS CONFIGURATION menu helps to go through all this process easily.



4.1 Normal operation set up

This section contains the most important and basic functions to permit normal SMS message operation in the PKWatch.



The GSM modem installed in the PKWatch system must contain the SIM card. Like any other GSM cellular phone the SIM card must be inserted while the



PKWatch system is OFF and must be compatible and active. SIM cards can be purchased from the GSM network operator and will have associated phone number, PIN number and PUK numbers.

The phone number is not relevant for this application and is not entered anywhere but the corresponding four digit PIN number must be entered in the appropriate field.

The PIN number (Personal Identification Number) is used as a security code to avoid unauthorised use of the GSM modem. Wrong PIN numbers can be entered three times only and the GSM modem locks up after that. If this happens PUK numbers should be entered using AT commands (refer to AT commands) to unlock the modem.

The SCA (Service Centre Address) is the phone number of the service centre in charge of processing and redirecting the SMS messages. This number must be obtained from the GSM network operator as well. It must be entered complete with the country and area codes. Most GSM network operators charge for every message sent and rates may vary from one to another (check rates with your GSM network operator). SMS message function will not work unless there is a valid SCA number entered.

The last basic datum that is required for the normal operation of the SMS message function is the GSM phone number of the person responsible to receive the messages and take action accordingly. This number must also include the country and area codes.

Once these three parameters are entered (Service Centre Address, PIN number and GSM destination number) everything is ready to log in the GSM network. All parameters regarding message formats, duration, validity, etc are set automatically by the program.

There are two command buttons to log in and log out from the network. By clicking on the log in button (the one with the picture of a telephone) all the process will start automatically. This process involves dialogue with the network and takes some time. There is a progress bar to inform about the remaining wait time.

At the end of the process the GSM status window will show "connected". Whenever it is necessary one can disconnect the modem from the network by clicking on the stop command button.

When the SCA or the PIN numbers change it is required to log out and log in the network again. The "Message GSM destination number" can be changed at any time without need to repeat the network log in.



4.2 Advanced operation set up



The first function available in the advanced operation section is to test the operation of the SMS message service once the modem has been logged to the network. This is made by manually sending a trial message. To do that just write the desired text in the "Test message" window and click on the "Send SMS



The AT commands are a standard set of commands that are used by GSM devices such as GSM modems. The GSM modem in the PKWatch system is compatible with GSM *at* commands (see Annex A).

AT commands can be used to enter PUK numbers, check network status, change configuration of SMS, etc... To send a command just write it in the box and click on the "Send AT command" button. AT commands sent and the responses received from the modem will be shown on the terminal window.