

Operation Manual
bloomice SIGNAL TESTER BM-03024
GSM Signal Analyser
Software Version 2

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I Description

The bloomice BM-03024 is a signal analyser for use with GSM and GPRS radio networks where automatic signalling equipment is used, including smart metering, any communication products. It may be used to position an aerial and to test the performance of aerial systems.

The bloomice BM-03024 GSM signal analyser displays mobile network information including; network provider names, cell identities, frequencies and signal strength. Jamming signals may also be detected.

The bloomice BM-03024 GSM signal analyser contains a battery allowing remote operation for up to 12 hours. The internal battery may be recharged from the supplied mains power supply or a suitable car charger.

To improve battery performance and life please ensure you charge the battery for a minimum of 12hours before first use.

If the bloomice BM-03024 GSM signal analyser is left switched on and unused, the unit will automatically switch off after a preset time.

The bloomice BM-03024 GSM signal analyser is contained within a strong protective sleeve and is supplied complete with a charger and manual.

2 bloomice BM-03024 GSM Signal Analyser



Bloomice BM-03024
GSM Signal Analyser

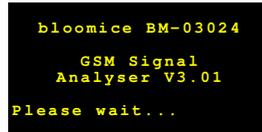
3 Quick Start Guide

1. Charge the battery before use
Connect the aerial (see section 16).



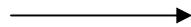
To switch on the signal analyser, press the On/Off button until the logo is shown.⁽¹⁾

2. This is followed by the **Start-up** screen (see section 6).



This screen is shown for about 30 seconds while the radio module is powering up.

3. If a SIM is fitted that requires a PIN, this screen gives the option to use the Saved PIN or enter a new PIN (see section 5.1).

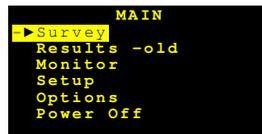


If not, the Main Menu screen will appear.

Once the Saved PIN is used or a new PIN is entered, the Main Menu screen will appear next.

4. **MAIN Menu**

(See section 7 for information).

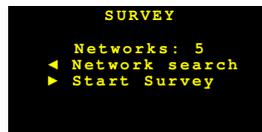


Press the right button to select the **Survey** screen.



5. **SURVEY Screen**

If Engineer mode is selected in Setup, the following screen will appear. If Surveyor mode is selected in Setup, the following



screen will appear.

(See section 10 for information)

Press the right button to start the survey.

The signal and network analyser will measure all detectable cells.

Do not move or touch the aerial.

The survey may take up to 3 minutes to complete.

Shows number of cells detected

Press the down button to select the results screen.

```
SURVEY
(Takes 2-3 minutes)
▶ Start Survey
```



```
SURVEY
Cells 0 OK 0
Please wait...
```

```
SURVEY
Cells 45 OK 15
Survey complete
▼ Results
```



(1) See Section 15 of this manual for Power-Up Functions.



Quick Start Guide (continued)

6. RESULTS Screen

(See note below and section II for information)

GSM cells will be displayed. The signal strength & quality will be displayed in decreasing order of signal strength.

If a number, and not the name of the network, is shown, another network search should be done.

Press the right button to display the next cell (weaker signal).

Press the left button to display the previous cell (stronger signal).

Press the down button to return to the Main menu.

In the main menu, scroll down then use the right arrow to enter the Monitor Screen.



```
RESULTS
◀ Index:2
GSM 1800 SIG:45%
ID:BC57837
T-Mobile UK
SIM: Not Fitted
```

(Surveyor mode)



```
MAIN
Survey
Results
▶ Monitor
Setup
Options
Power Off
```

7. MONITOR Screen

The display is updated every 6 seconds.
It will normally show the strongest cell.

This display is used to locate an area for the strongest signal strength.

Use this position when installing the aerial.

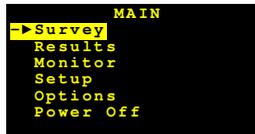
Press the down button to return to the Main Menu.



```
MONITOR
◀ UK Vodafone
GSM: 900 SIG: 30%
ID: BC57837 BAT: 100%
SIM: Not Fitted
```



8. Select a new survey etc... as required.



```
MAIN
▶ Survey
Results
Monitor
Setup
Options
Power Off
```

9. To switch off, select Power Off in the Main menu, or press the On/Off button until the Shutdown screen is displayed. "Battery Low" may be display instead when battery needs charging.



```
Shutting down...
```

NOTE: when first switched on, the bloomice BM-03024 will still retain the results from the last survey. These will be available until a new survey is started.

Operating Manual

4 Site Survey

It is recommended that a site survey is conducted prior to installation of any GSM or GPRS equipment and associated aerial system to confirm that an adequate radio signal is available at the site.

It is particularly important that a site survey is conducted when:

- a. There may be a weak signal strength at the proposed site;
- b. It is known that the aerial will be fitted inside a sheet metal covered building or under a sheet metal roof;
- c. The aerial will be on lower floors of buildings in heavily built-up areas.

The bloomice BM-03024 GSM radio signal analyser is ideal for surveying a proposed site for a suitable radio signal. Note the point of best signal. Install the aerial at this location.

Use the radio signal analyser to find the point of best signal. This means maximising the signal strength.

Full details on optimising signal strength are in section 16.

5 Fitting a SIM card

Note: Before inserting or removing a SIM card, please make sure the unit is switched off.

To access the SIM card holder, simply remove the bloomice BM-03024 GSM signal analyser out of the rubber sleeve from the bottom end. You will find a small yellow button - press on it with a pen and the SIM card holder will be ejected. Fit the SIM card onto the holder and push the latter back into the bloomice BM-03024.

When no SIM card is fitted, the unit will display results for all networks detected.

When a SIM card is fitted, the unit will be locked to that operator's network, unless unlocked via Network Options menu (see section **Error! Reference source not found.**).

5.1 Entering the SIM Card's PIN Number

When a SIM card is used that requires a PIN, the following menu will appear:



To use the Saved
PIN



Alternatively
scroll down and
then right to Enter
a new PIN



The following
screen will
appear to enter a
new PIN:



Following the on
screen
instructions to
enter your PIN
then press down
to validate.



Alternatively
pressing up twice
will take you back
to the use saved
PIN/enter PIN
menu



Enter the SIM card's PIN number the first time the SIM card is used. Once the bloomice BM-03024 has shut down, this PIN number will be kept in memory until another PIN is entered.

In case of an incorrect PIN number, the following screens will be shown:



```
Please wait...  
SIM: Wrong PIN
```

then



```
bloomice BM-03024  
GSM Signal  
Analyser V2.01  
Error: GSM Fault 5
```

Press Up  or Down  arrows to get to the Main Menu.

In order to enter the correct PIN number, turn the bloomice BM-03024 off then power it up again. The screen with the "Use saved PIN?" or "Enter PIN" options will appear. Choose "Enter PIN" and follow the instructions on the next screen.

NOTE: the SIM card will be locked after 3 failed attempts at entering the correct PIN code.

6 STARTUP Screen

```
bloomice BM-03024  
GSM Signal  
Analyser V2.01  
Please Wait...
```

If any errors are detected during power-up, a GSM fault number and description will be shown alternately (see section 18.1).

Press Up  or Down  arrows to get back to the **Main Menu**.

7 MAIN Menu

This is the menu from which all functions are selected.

```
MAIN
-> Survey
  Results -old
  Monitor
  Setup
  Options
  Power Off
```

- ▲ Up (highlight an option).
Then select the required option (see below).
- ▼ Down (highlight an option).
Then select the required option (see below).
- Select the highlighted option:
Survey (see section 10)
Results (see section 11)
Monitor (see section 12)
Setup (see section 8)
Options (see section 9)
Power off = switch off (same as Off button)
- ← Go to Start-up screen.
(See section 6)

Note: '-old' will be displayed next to RESULTS if a survey has not been performed since power up.

8 SETUP Screen

Settings to make the test set operate how you require.

```
          S E T U P
◀▶ Exit / Save
  Contrast:    70
   Delay:     0 secs
  Max Cells:  50
  Auto Off:   12 mins
  Mode: Engineer
  Load defaults
```

- ▲ Up (highlight an option)
Then select the option (see options below)
- ▼ Down (highlight an option)
Then select the option (see options below)
- ➡ **Right arrow** for the selection **Option**
Exit/Save = save settings then go to **Main** menu
Contrast = increase display brightness
Delay = increase delay before survey start, from 0 to 99 seconds ⁽¹⁾
Max Cells = increase the number of cells to find during survey ⁽²⁾
Auto Off = increase minutes to auto-power off
Mode = toggle between Engineer or Surveyor mode
Load Defaults = load factory default settings
- ◀ **Left arrow** for the selected **Option**
Exit/Save = **DOES NOT** save settings then go to **Main** menu ⁽²⁾
Contrast = decrease display brightness
Delay = decrease delay before survey starts, from 99 to 0 seconds ⁽¹⁾
Max Cells = decrease the number of cells to find during survey ⁽²⁾
Auto Off = decrease minutes to auto-power off
Mode = toggle between Engineer and Surveyor
Load Defaults = no action

Notes:

- (1) This allows positioning of the radio signal analyser in a location and for the surveyor to retreat before the survey starts.
- (2) The selected settings will remain active until the bloomice BM-03024 is switched off.
- (3) The default is 50 cells. This is the number of cells found, not the number of cells which are OK. Reducing this number will reduce the time to complete a survey in a high coverage area. If you are looking for a particular network's results, reducing this number may mean you will not see all available cells on your network. To perform a survey on a particular network, use the facility in the Monitor screen to lock onto a network, then do the survey.

9 OPTIONS

```
          O P T I O N S
◀ Exit / Save
Language: English
Sounder:  ON
Network Options
Advanced: OFF
GPRS Test
```

- ▲ Up (highlight an option)
Then select the option (see options below)
- ▼ Down (highlight an option)
Then select the option (see options below)
- ➡ Right arrow
Exit/Save = save settings then go to main menu
Language = toggle between available languages
Sounder = select On
Network Options = enters network menu (see section **Error! Reference source not found.**)
Advanced = select ON ⁽¹⁾ (Engineer mode only)
GPRS Test = test the GPRS link (requires a GPRS-enabled SIM card)



Left arrow

Exit/Save = DOES NOT save settings then go to Main Menu

Language = toggle between available languages

Sounder = select OFF

Network Options = no action

Advanced = select OFF ⁽¹⁾

GPRS Test = no action

IO SURVEY

This looks for all cells in the area and measures their performance. A survey can take up to 3 minutes.

```
SURVEY
(Takes 2-3 minutes)
▶ Start Survey
```

Engineer Mode

▲ Go to Main Menu

▶ Start the survey

The Survey screen shows quantity of cells

When complete, press the Down arrow to get the results of this survey (see section II)

```
SURVEY
Searching...
Please wait...
```

```
SURVEY
Cells 0   OK 0
Please wait...
```

```
SURVEY
Cells 45  OK 15
Survey complete
▼ Results
```

 Start the survey Go to the Results screen

Notes:

(1) – The network search is done automatically when a survey is started in Surveyor mode

II RESULTS

Displays the performance of all cells measured in the survey.

```
RESULTS
◀▶ Index: 2
GSM 1800    SIG: 60%
CELL: 45723
T-Mobile UK

SIM: Not Fitted
Surveyor Mode - GSM
```

- ↕ Swap between Summary (basic) and Detailed views (only in Engineer mode - see next page)
- ↕ Go to Main Menu (see section 7)
- Display cells in decreasing order of signal strength
- ← Display cells in increasing order of signal strength

NOTE: when first switched on, the test set will still retain the results from the last survey. These will be available until a new survey is started.

Summary (basic) View

GSM	The radio frequency band used by the displayed cell Radio signals using lower frequencies penetrate better into buildings
CELL	Cellular identification number (decimal) of the cell (GSM)
ID	Cellular identification number (hexadecimal) of the cell (3G)
INDEX	During the survey, each detected cell is given a number. The cell with the strongest signal is given number 1. Higher numbers = lower strength signal
NETWORK	The network name of the displayed cell ⁽¹⁾
SIG	Signal Strength Shown as a percentage - 33% and above is useable.
SIM	Current SIM status

Notes:

⁽¹⁾ - If the MCC and MNC codes are shown instead of the network name, do another network search (Engineer mode) or another survey.

RESULTS (cont'd)

Detailed View – available only in Engineer Mode

From the **Results** menu, press the up arrow to toggle between detailed view and summary view screens:

```
RESULTS
◀▶ Index:3
ARFCN:717   dBm:-73
CELL:45723  MMC:234
LAC:421     MNC:30
SIM: Not Fitted
```

Detailed View - GSM

```
RESULTS
◀▶ Index:3
GSM 1800   SIG:60%
CELL:45723
T-Mobile UK
SIM: Not Fitted
```

Summary View - GSM

INDEX	During the survey, each detected cell is given a number The cell with the strongest signal is given number 1 Higher numbers = lower strength signal
GSM	The radio frequency band used by the displayed cell Radio signals using lower frequencies penetrate better into buildings
ARFCN	Absolute Radio Frequency Channel Number
CELL	Cellular identification number (decimal) of the cell (GSM)
ID	Cellular identification number (hexadecimal) of the cell (3G)
SIG	Signal Strength Shown as a percentage - 33% and above is useable
LAC	Local Area Code - identifies the area in which the cell is situated
SIM	Current SIM status
dBm	FSSI Signal Strength - scale = decibels ref to 1mW
MCC	Mobile Country Code - a 3-digit number = country (234 = UK)
MNC	Mobile Network Code - a 2 or 3-digit number = network within the country (15 = Vodafone UK)

12MONITOR

The display is updated every 6 seconds. The displayed cell is the strongest on the selected network. As the aerial is moved, a different, stronger cell may be displayed.

```
MONITOR
T-Mobile UK
GSM 1800    SIG:60%
CELL:45723  BAT:100%
SIM: Not Fitted
Surveyor Mode - GSM
```

Go to Main menu

Additional options only available in engineer mode (see following pages for details).

Swap between Summary (basic) and Detailed views

When SIM card is fitted and Locked = no action

When SIM card is fitted and Unlocked = lock onto selected network

First highlight the network required (use left button), then... press the right button to select. Wait for network to be selected. (may take 2 minutes to change)

When SIM card is absent the device is unable to lock onto selected networks. Survey results will still be filtered to the selected network.

When SIM card is fitted and Locked = no action

When SIM card is fitted and Unlocked, or when SIM card is absent = highlight Network

```
MONITOR
>> Network Search
GSM 1800    SIG:60%
CELL:45723  BAT:100%
SIM: Not Fitted
```

Press repeatedly to highlight the required network, then press the right button to select.

```

MONITOR
>> Auto
GSM 1800      SIG:60%
CELL:45723    BAT:100%
SIM: Not Fitted
  
```

To obtain the list of network operators, select **Network Search** by pressing the left arrow, then press the right arrow.

To return to auto mode after having selected a particular network operator, select **Auto** and press the right arrow.

Summary of Terms (Surveyor mode)

GSM	The radio frequency band used by the displayed cell Radio signals using lower frequencies penetrate better into buildings
CELL	Cellular identification number (decimal) of the cell (GSM)
SIG	Signal Strength Shown as a percentage – 33% and above is useable.
BAT	% = charge remaining in battery – 100% = fully charged EXT = charger connected
SIM	Current SIM status

MONITOR (cont'd)

Detailed View for GSM – available only in Engineer Mode

From the Monitor menu, press the up arrow to toggle between the detailed view and summary view screens:

```
MONITOR
◀▶ T-Mobile UK
ARFCN:717    dBm:-73
BSIC:11     CSQ:19
CELL:45723  BAT:100%
SIM: Not Fitted
```

```
MONITOR
◀▶ T-Mobile UK
Min:-73     Max:-73
ARFCN:717   dBm:-73
BSIC:11     CSQ:19
CELL:45723  BAT:100%
SIM: Not Fitted
```



```
MONITOR
◀▶ T-Mobile UK
GSM 1800    SIG:60%
CELL:45723  BAT:100%
SIM: Not Fitted
```

```
MONITOR
◀▶ T-Mobile UK
Min:60%     Max:60%
GSM 1800    SIG:60%
CELL:45723  BAT:100%
SIM: Not Fitted
```

Advanced (in Setup) = OFF

Advanced (in Setup) = ON

NETWORK	The network to which the cell belongs, e.g. Vodafone
GSM	The radio frequency band used by the displayed cell Radio signals using lower frequencies penetrate better into buildings
ARFCN	Absolute Radio Frequency Channel Number
BSIC	Base Station Identity Code - identifies the beacon frequency
CELL	Cellular identification number of the cell (decimal)
dBm	RSSI Signal Strength - scale = decibels ref to 1 mW
CSQ	Signal Quality - scale = 0 - 31 (11 and above is acceptable)
SIG	Signal Strength Shown as a percentage - 33% and above is useable
Min	The minimum signal strength measured on this cell - if the cell number changes this value is reset
Max	The maximum signal strength measured on this cell - if the cell number changes this value is reset
BAT	% = charge remaining in battery - 100% = fully charged EXT = charger connected
SIM	Current SIM status

13 Jamming Detection

```
MONITOR
>> JAMMING <<
T-Mobile UK

GSM 1800      SIG:60%
CELL:45723    BAT:100%

SIM: Not Fitted
```

If a jamming signal is present of sufficient strength to block communication to the GSM base stations, the signal analyser will indicate this in the Monitor function with a flashing >>JAMMING<< message.

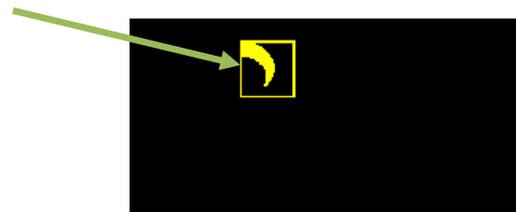
The signal strength indicator on the right hand side of the display will indicate the strength of the jamming signal.

By moving the meter around checking the signal strength, it may be possible to locate the source of the jamming signal.

14 SCREENSAVER

It reduces battery usage to a minimum.

Moving Logo



Press any button to return to the previous screen.

15 Power-Up Functions

By holding down the different keys, several functions are available to the user:

- Holding down the **UP** key = load defaults, clear survey log, clear network list
- Holding down the **RIGHT** key = delete saved SIM PIN
- Holding down the **LEFT** key = display the logo for 30 seconds
- Holding down the **DOWN** key = clear network list

16 Aerial Siting

ALWAYS do a site survey to find the point of best signal before installation.

The aerial should normally be mounted vertically at the point of best signal. This is usually the highest point in the building (often the loft area). For security applications, the position chosen should be inside the protected area.

Large metal structures can affect radio signals. Therefore, whenever possible, avoid installing the aerial directly under sheet metal roofs or within sheet metal covered buildings because this will reduce the signal strength. If this is unavoidable, the strongest signal will be found away from the metal roof or close to large external windows or skylights.

Many large buildings closely spaced together will reduce the signal strength, particularly for aerials on the lower floors, e.g. ground floor installation in city centres. The strongest signal will normally be found close to external windows or skylights as high as possible.

Wherever possible, do not install the aerial close (2 metres) to sources of interfering signals. These include: fluorescent or neon lighting, power distribution panels, power cable runs, fridges, freezers, air-conditioning and ventilation equipment as well as electronic equipment, e.g. photocopiers, fax machines, computers, televisions...

Reliable radio operation is unlikely with low signal strength, with an incorrectly installed aerial or with strong interfering signals.

Use the radio signal analyser to find the point of best signal. This means maximising the signal strength.

The supplied short black aerial is for hand-held use, i.e. site surveys.

OR

Use an aerial adapter to connect and test a remote aerial.

Remember: It is *always* easier to find the point of best signal before the equipment is fitted on the wall. Moving aerials, cables, trunking... after installation is wasted time and effort.

17 Battery and Charging

Before first use, fully charge the battery.

When charging, use only the supplied mains plug-top power supply.

Charging will typically take 3 hours. Please ensure a full charge is given as the battery state reading can be in error after a short charge.

A fully charged battery will operate the test set for up to 12 hours.

The battery state may be read on the Monitor screen. See page 16.

When the charger is connected, the unit is always on and the On/Off button will not turn the unit off. The charger can be left plugged in indefinitely.

When the charger is disconnected, the bloomice BM-03024 will automatically switch off within one minute or after the preset time has expired.

If the bloomice BM-03024 is left switched on and unused (no buttons are being pressed), the unit will automatically switch off after a preset time to preserve the battery life. The preset time may be changed in the **Setup** screen. See page 9.

The internal battery is a Solid Electrolyte Lithium long type that may be transported, charged and used in any orientation. It should be protected from frost and temperatures above 40°C.

As with all rechargeable batteries, over several years, its capacity to store power will degrade. If the operational life of the battery reduces below 1 hour, contact your supplier for replacement information.

Do not attempt to open the case or remove the battery.

18 APPENDIX I - Specification

Model	bloomice BM-03024 GSM Signal Analyser
Dimension (h x w x d)	135 x 78 x 33mm
Weight	210 grams (including aerial)
Temperature	-20°C to +60°C transit / -4°C to +40°C operating
Humidity	0 – 80% non condensing
Warranty	2 years
Radio Path	GSM
Battery	3.7 volt, 640mA/h Solid Electrolyte Lithium Ion
Charger	Nokia Type ACP-I2X or equivalent specifications
Power Consumption	Mains 50mA (operation and battery recharging)

International Radio Approval

The bloomice BM-03024 GSM signal and network analyser incorporates an independently tested and approved GSM/GPRS radio module that meets the requirements of European radio communication standards.

Approval Authority:

CE0168



18.1 GSM Faults

The list below shows all the faults that may be shown on power up:

Fault number	Meaning
1	Timeout waiting for PIN, Power off-on to re-enter the SIM PIN number.
2	No response from module, Power off then on to reset the radio module.
3	SIM not fitted (not a fault).
4	PUK required, contact SIM card provider for PUK number.
5	Wrong PIN, Power off-on to re-enter the SIM PIN number.
6	Not used.
7 - 10	Module fault.
11	Radio module failed to start, the battery may need to be charged.

19 APPENDIX 2 - Glossary of Terms

CELL – Cellular Identity Number

A number to uniquely identify each GSM/GPRS base station in the UK.

FSSI – Forward Signalling Strength Indication

This is a value indicating the radio signal strength received from the base station at a GSM communicator or the GSM radio signal analyser.

GPRS – General Packet Radio Service

A packet-based network, within the GSM system, where cost is determined by data quantity (as distinct from a circuit switched network, where cost is determined by time). Data rates range from 14.4kbps, using just one of the available TDMA time slots, up to a theoretical 115 kbps when all eight time slots are used. Being a packet-switched system, the bandwidth within each GPRS cell sector will be divided between all the subscribers.

GSM – Global System for Mobile communication

A second generation cellular telecommunication system, originally for Europe, now global. A circuit-switched network, where cost is determined by time. It operates in 3 frequency bands: 900MHz, 1800MHz and 1900MHz.

SIM – Subscriber Identity Module

This is usually referred to as a SIM card. The SIM is the user subscription to the mobile network. The SIM contains relevant information that enables access onto the subscribed operator's network.