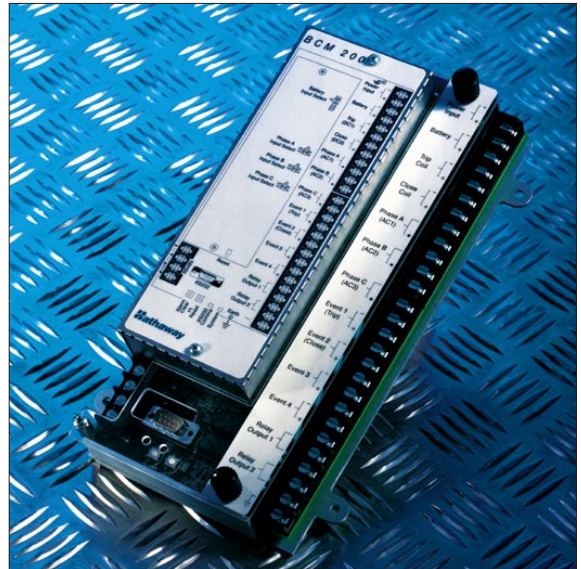


## **BCM 200**



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**BREAKER  
CONDITION  
MONITOR**

# Compact and affordable, the ideal breaker monitor

## COMPANY OVERVIEW

With over 30 years experience, Hathaway is a market leader in the development of instrumentation to address the specific needs of power utilities throughout the world.

Our areas of expertise include:

- Fault / Event Recording
- Power Quality Recording
- Fault Locating
- Circuit Breaker Testing
- Circuit Breaker Condition Monitoring
- Remote Terminal Units, Distribution Automation and SCADA Systems

The Manufacturing Division has been accredited to ISO 9001 which underlines the company's commitment to produce quality products for a global market.

Our expertise, experience and versatility allow us to introduce a high degree of systems flexibility.

This has resulted in the development of the BCM 200 Breaker Condition Monitor.

The BCM 200 - a low cost test system providing accurate information on the day-to-day condition of all types of breaker.

Replay 97 is a trademark of Hathaway Systems Limited.  
All other trademarks and registered trademarks are properties of their respective companies and are hereby acknowledged.

## A low cost condition monitoring system for circuit breakers BCM 200

A permanently installed monitoring system for implementation of condition based maintenance programs.

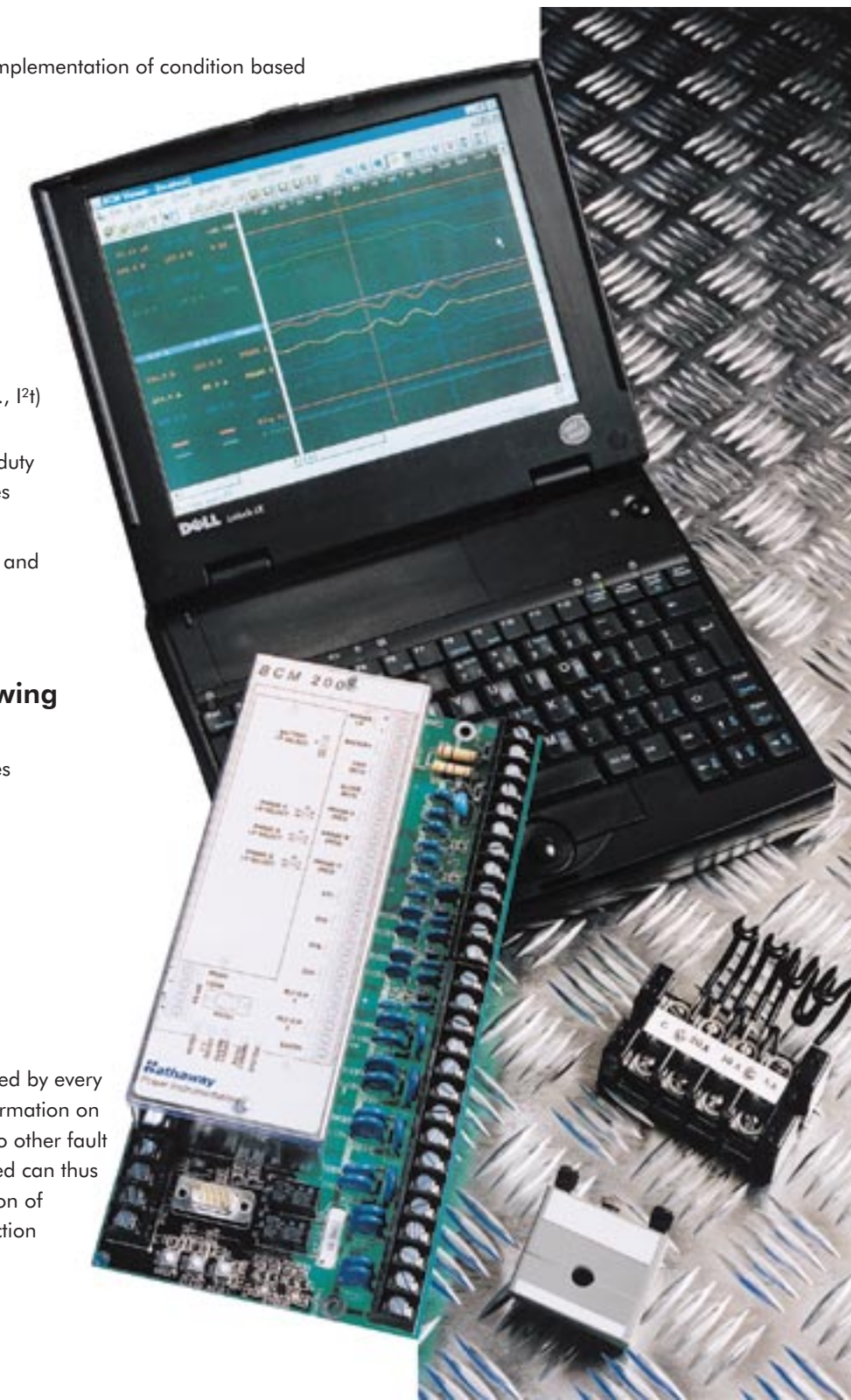
### This compact monitor features:

- Design that easily fits into breaker control cabinets
- Analysis performed on every breaker operation
- Automatic "fingerprint" comparison of breaker characteristics
- Accumulated fault current arcing time (e.g., I<sup>2</sup>t) calculated for each pole
- Alarms activated when maximum contact duty exceeded or breaker characteristic changes
- Local and remote communications
- Powerful Windows based communications and analysis software
- Manufactured to BS EN ISO 9001

### The system can acquire the following information:

- Auxiliary contact opening and closing times
- Auxiliary contact bouncing times
- Open and close coil current profiles
- Mechanism operating speed
- Maximum and minimum battery voltage
- Battery charger ripple
- 3 phase fault currents
- Restrike detection

Since the BCM 200 records the current interrupted by every breaker trip, it can provide fault monitoring information on distribution systems where there are generally no other fault recording devices installed. The records obtained can thus be used to determine the magnitude and duration of faults, detect recurring faults and monitor protection performance.



# The BCM 200, unbeatable performance and price . . . from the world leader

## TECHNICAL OVERVIEW

The BCM 200 is a microprocessor based condition monitoring system which provides diagnostic information and can be fitted to both existing and new circuit breakers.

After every breaker operation the BCM 200 performs a "fingerprint" analysis by comparing recorded data to a reference record with programmable limits which are held in memory. If any of the limits are exceeded, an alarm is activated to indicate the characteristics of the breaker have changed beyond those deemed to be acceptable.

Test records and summaries are stored within the BCM 200's internal memory and can be retrieved at a later date via direct computer link on site or remotely via modem. Up to 30 BCM 200s can be networked together in a substation where they can communicate through a single modem.

Records and summaries can be downloaded from the BCM 200 to *Replay '97*, a Windows based software package, where they can be analyzed and archived. The software also includes a configuration program to allow local or remote modification of BCM 200 parameters.



Record summaries are also stored in a Microsoft Access database table providing open access to all recorded data.

The BCM 200 has an expansion interface which allows modules with additional analog and digital inputs to be fitted. These additional inputs can be configured to monitor gas density, mechanism travel, temperature, pressure, motor current, heater circuitry, etc.

The system has been designed for use in high voltage substations and is immune to the high levels of electrical interference typically found in this environment.

## SPECIFICATION

### INPUTS

#### Analog inputs:

3 AC channels:-

Dedicated to measuring AC currents via split-core CTs.

CT burden:-

0.05VA

3 DC channels:-

Dedicated to measuring the open and close coil currents and station battery voltage.

Shunt resistance:-

0.2Ω (5A), 0.1Ω (10A), 0.05Ω (20A).

Analog accuracy:

Better than 1%.

Analog resolution:

10 bits.

Event inputs:

Four event channels. Ranges; 20 - 60Vdc, 80 - 150Vdc or 170 - 250Vdc with external resistor.

Event accuracy:

1ms.

### OUTPUTS

#### Alarms:

Two N/O relay contacts for BCM 200 Watchdog and Breaker Condition Alarms. Contact; 1 Form A, 5A @ 30Vdc or 250Vac.

#### RS232:

For communications to a PC or modem.

#### RS485:

For networking up to 30 BCMs to a PC or modem.

### RECORDING

2kHz sample rate.

### MEMORY

256k (expandable to 2Mb).

## TRIGGERING

Change in any event state or detection of over-current on any phase.

## PERFORMANCE

### Operating voltage:

85 - 264Vac, 80 - 340Vdc. (25 - 80Vdc optional).

### Isolation:

All inputs 2.5kVac channel to channel and channel to earth.

### Fast transient:

Class 4, 4kV IEC 255-22-4 (IEC 801-4).

### SWC:

(1MHz damped sine wave).

Common mode:- 2.5kV (IEC 255-22-1).

Differential mode:- 1.0kV (IEC 255-22-1).

### Impulse withstand:

Common mode:- 5.0kV, 0.5J (IEC 255-5).

Differential mode:- 5.0kV, 0.5J (IEC 255-5).

### Operating temperature range:

-30 to +60°C (-22 to +140°F).

## CONNECTIONS

All breaker connections are terminated on a 6/32" (4.76mm) terminal block.

### Expansion port:

Provides additional analog and event inputs and expansion memory up to 2Mb.

## PHYSICAL DIMENSIONS

267mm (10.5") x 130mm (5.12") x 54mm (2.13").

Weight: 2kg (4.5lbs).

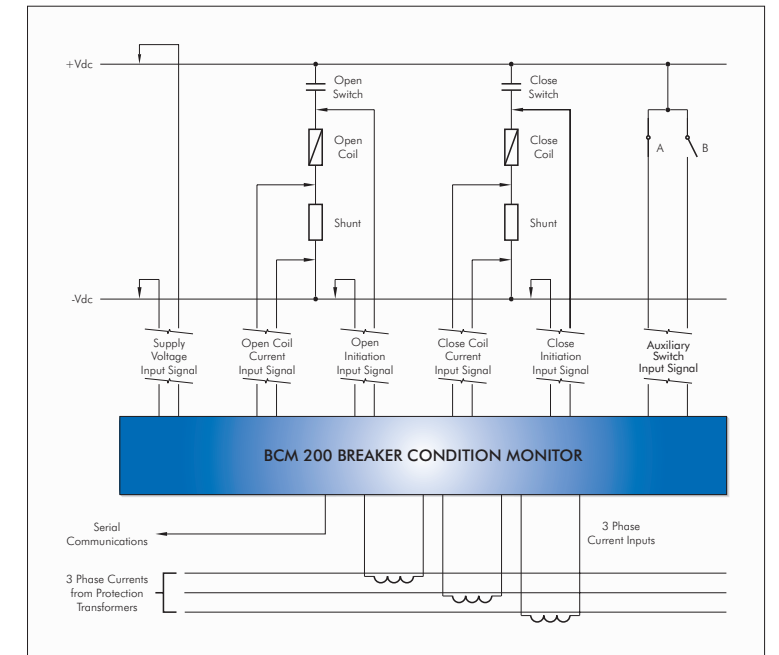
This specification may change due to our policy of continuous product development.

## CONNECTION AND INSTALLATION

The BCM 200 has been designed to allow it to be easily installed inside a breaker control cabinet. With an overall size of 267mm (10.5") x 130mm (5.12") x 54mm (2.13") it can fit into the cabinets of most breakers.

The system can be programmed with all the information relating to the breaker prior to installation, eliminating the need for a PC in the substation.

Connections are made as shown on the wiring schematic and shunts are added in series with the operating coils to allow coil current profiles to be recorded during an operation. Once installed, the BCM 200 can be programmed with the reference fingerprints which are used to compare against future operations.

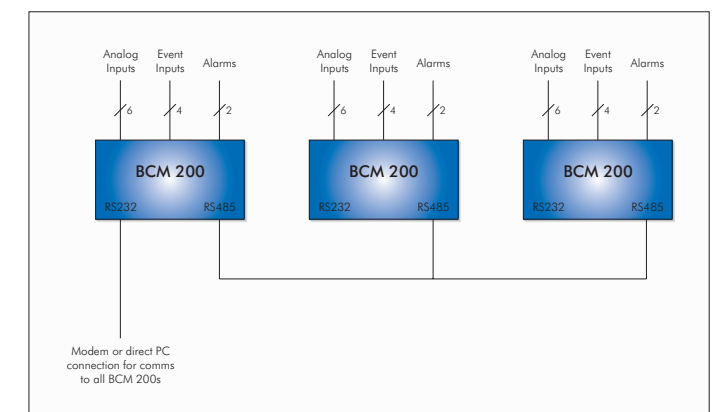


Connections to the BCM 200

## DATA RETRIEVAL

The BCM 200 has two serial ports - one RS232 port and one RS485 port. The RS232 port can be used to connect the BCM 200 directly to a PC, or via modem to a remote PC, for configuration and data retrieval.

The RS485 port can be used to provide multi-drop communications, allowing multiple BCM 200s to be connected to a single modem or PC. When the RS485 port is used, one BCM 200 in the network can be designated as the master which will transmit time sync commands to the other BCM 200s.



Typical Installation

# An advanced, intelligent monitor that provides analysis for *all* breaker types

## SYSTEM LAYOUT

Mounting Holes - the BCM 200 can be securely mounted onto a plate using the four holes on the edge of the PCB.

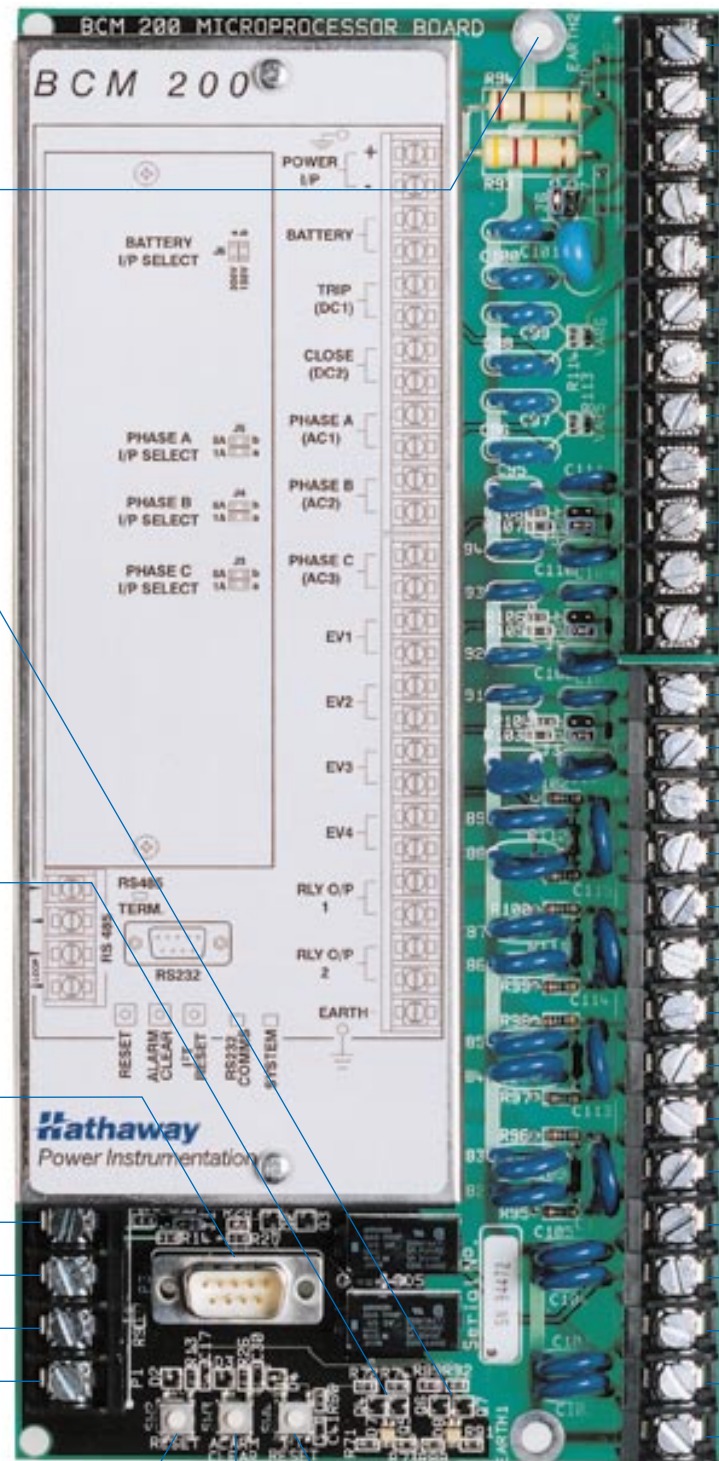
Status LEDs - flashes green every two seconds to indicate that the system is healthy.

RS232 Comms LEDs - flashes when communicating through the RS232 port.

RS232 - for local connection to a PC or modem.

RS485 - for networking up to 30 BCM 200s in one location.

Reset - allows the BCM 200 to be reset.



Power Input - ranging from 80 - 340Vdc, 85 - 264Vac.

Station Battery Input - 150 and 300Vdc ranges available.

Trip / Close Coil Current Inputs - connected directly across shunts in the coil circuits.

Phase Current Inputs - Connected via split-core CTs to the protection current transformers.

Event Inputs - used to trigger the BCM 200. Can be configured for trip initiate, close initiate, A and B contacts or motor run-time.

Relay Outputs - can be connected to an alarm or SCADA system to indicate a problem with the breaker or BCM 200.

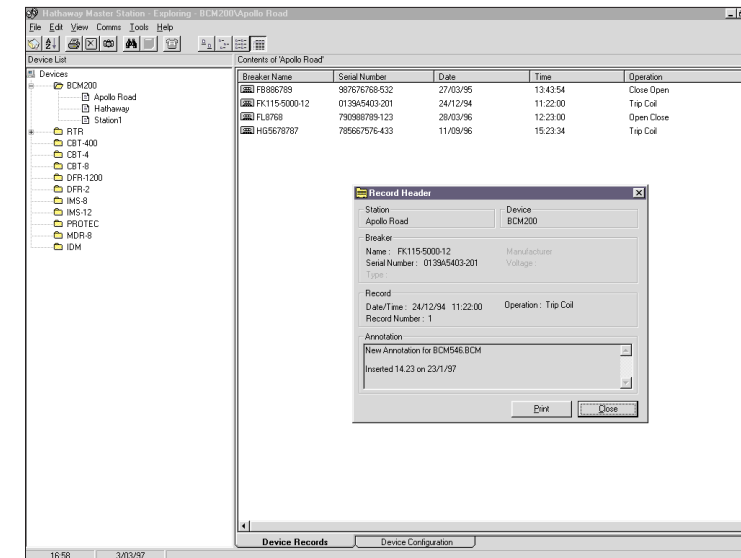
Earth Connection

! Reset - resets accumulated fault current.

Alarm Clear

## CONFIGURATION AND ANALYSIS SOFTWARE

Replay<sup>97</sup> is a master station software package running on Windows 95 or Windows NT. It allows the automatic retrieval of full records, record summaries and alarm data. The software also provides graphical manipulation of the full record data including time and magnitude zoom and the ability to overlay multiple records.



Easy file management with *Replay*<sup>97</sup> Explorer

## DATA MANIPULATION

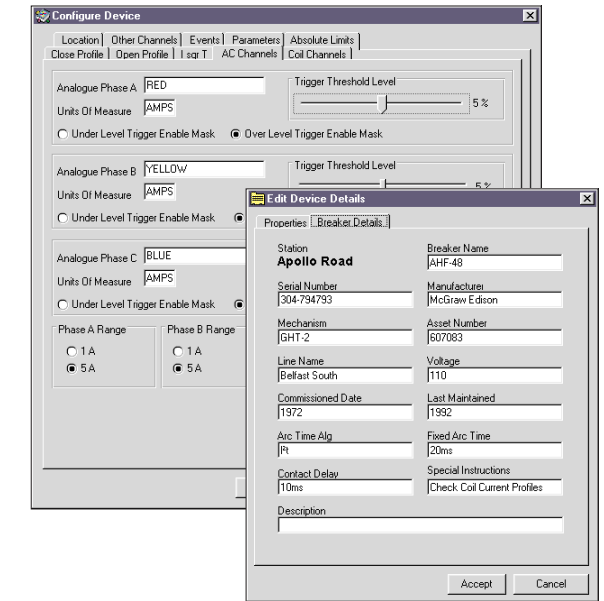
Replay<sup>97</sup> also provides automatic alarm logging and reporting and can also be used with Hathaway's complete range of circuit breaker testing and monitoring equipment.

All data from these devices is stored in a Microsoft Access database which provides a comprehensive range of tools that can be used to manage, analyze and present this data.

Reports are provided that automatically highlight breaker operations that are outside specification.

## COMMUNICATIONS

Replay<sup>97</sup> controls the communication between the BCM 200 and a PC. It can be configured to communicate either directly or remotely via modems. Replay<sup>97</sup> can also be configured to automatically poll each instrument at a defined time each day and retrieve any new data that has been recorded.



## CONFIGURATION

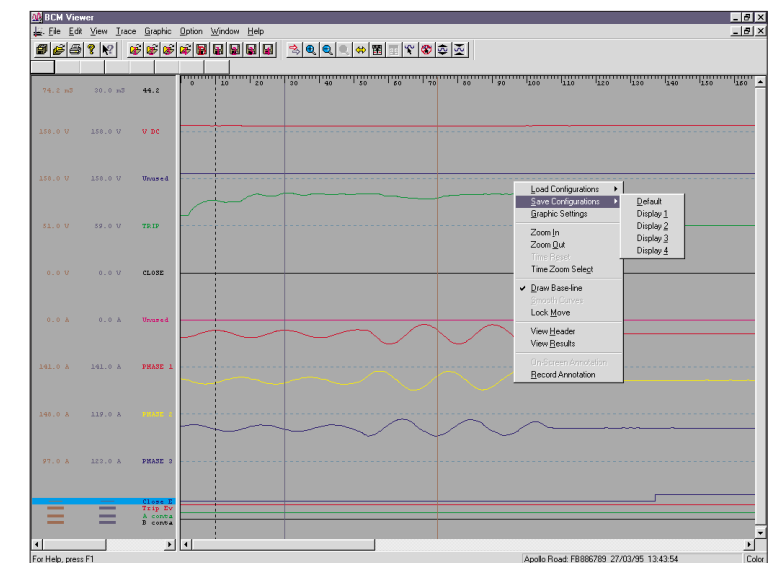
Replay<sup>97</sup> also incorporates a configuration facility for each supported Hathaway product.

This allows the configurable parameters to be edited, transmitted and archived in a controlled and efficient manner.

## DEMONSTRATION DISK

A demonstration disk of the *Replay*<sup>97</sup> software is available on request.

Contact Hathaway for details.



Display and Configure Records with the BCM Viewer



15 Wildflower Way  
Belfast  
BT12 6TA  
Northern Ireland  
Telephone: +44 1232 225200  
Fax: +44 1232 225225  
Internet: [www.hathaway-systems.com](http://www.hathaway-systems.com)

8228 Park Meadows Drive  
Littleton  
Colorado 80124  
U.S.A.  
Telephone: +1 303 799 8200  
Fax: +1 303 799 8880  
e-mail: [info@hathawaycorp.com](mailto:info@hathawaycorp.com)