PAG ▮▮

Professional Broadcast Equipment

PAG MC124

Battery Management System

PAG CMS

Charger Management Software

Model No. 9785

Instruction Manual

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SECTION 1

SAFETY

1.1   This manual contains important safety and operating instructions. Please read these fully before using the MC124.

1.2   The MC124 is rated for indoor use only. Do not expose it to water.

1.3   The MC124 is not intended for any use other than the charging of Nickel-Cadmium and Nickel-Metal Hydride batteries as detailed in Specification Section 2.

1.4   The MC124 is an extremely rugged appliance, designed for arduous service conditions. It should not be used, however, if it has received a severe drop or blow, or has been otherwise damaged in any way. It should be returned to your local Dealer, or direct to PAG Limited, London for service or repair.

1.5   Do not disassemble the MC124. There are no user-serviceable parts inside. Incorrect reassembly may result in a safety hazard.

1.6   Ensure that the ventilation slots are not obstructed e.g. do not site the MC124 on a deep pile carpet or cover when in use.

1.7   Disconnect the MC124 from the supply before attempting to clean the unit. Avoid using solvents or other chemical cleaners that may damage the case work. A soft cloth dampened with mild soap solution is recomm- ended. Avoid any ingress and dry the unit thoroughly before reconnecting.

1.8   Use the MC124 only with a suitable AC supply. See Specification Section 2.

1.9   Avoid the use of a long extension cord for the supply unless absolutely necessary. If an extension cord is used, ensure that it is properly wired, has a conductor cross-sectional area of a least 0.5mm and a length of less than 30 metres.

     Suitable extension cords should be classified as follows:

     Domestic and light commercial application: HO5 W-F.

     Industrial application: HO5RR-F or HO5RN-F.

1.10   **Care In The Workshop or Laboratory:**
Although the charger is reverse polarity and short circuit protected, extreme care should always be taken not to short circuit the battery itself. A Nickel-Cadmium battery can deliver power at a very high rate, and short circuiting even a partly charged battery could result in a fire or personal injury. For this reason extreme care should be taken when connecting a battery to the MC124 by means of loose wires or crocodile clips (a practice which should never be adopted as a standard method of charging odd batteries). PAG supply a range of connector leads for most charging requirements and do not accept responsibility for any other form of charging connection.

SECTION 2

SPECIFICATION

2.1   **Description:**
Model No. 9785 PAG MC124 microcomputer controlled four-channel battery fast-charger, incorporating PAG ACS (Advanced Charging System).

2.2   **Range of Batteries Charged:**
Nickel-Cadmium batteries of reputable manufacture, having nominal voltages of between 4.8V and 14.4V and nominal capacities of between 1Ah and 7Ah.

     PAG NMH batteries having nominal voltages of between 4.8V and 14.4V and nominal capacities of between 1Ah and 7Ah.

     NOTE: The PAG MC124 is not suitable for charging Nickel-Metal Hydride batteries other than those manufactured by PAG Ltd.

2.3   **Battery Connections:**
4 x Paglok connectors and 4 x PP90 (2.1mm) sockets.
Note: PP90 (2.1mm) socket - centre pin negative.

2.4   **Main Programs:**
The PAG MC124 has four channels, each of which may be set to one of the following main programs:

     ▶ Fast-Charge

     ▶ Discharge-then-Charge

     ▶ Revitalise

2.5   **Ancillary Programs:**
Balancing Charge, self-adjusting Maintenance Charge (automatically entered after charging), Recovery Charge (manually selectable).

2.6   **Self Test Program:**
The internal microcomputer constantly monitors the battery under charge or process as well as the operation of the charger's own functions which will be shut down to a safe condition should any of the tests fail.

2.7   **Charger Output Current:**
Constant current 4.0 amperes. Open circuit output voltage 30V absolute transient maximum. Charger output is protected against short circuit, open circuit, excess battery voltage and reverse polarity.

     NOTE: PAG Nickel-Metal Hydride batteries incorporate digital electronics circuits that communicate with the charger. These batteries take control of the charging output and optimise the charge rate to enhance performance and safety.

2.8   **Discharger Sink Current:**
Constant current 4.0 amperes.

2.9   Mains Input:
100 volts to 135 volts or 180 volts to 265 volts AC, frequency 50Hz to 60Hz. Mains range is autoselected. Maximum power consump-tion 120W.

2.10   AC Mains Failure Protection:
Should mains failure occur while a program is running, or whilst the charger is connected, it will shut down to a safe condition.

2.11   Capacity Measurement:
Battery capacities are measured by means of timed discharge. Capacity displays are accurate to ± 2%.

2.12   Charge Loaded Measurement:
Charge current loaded into a battery is measured to an accuracy of ± 2%.

2.13   Voltage Measurement:
Voltage measurements are accurate to ± 200mV.

2.14   Serial PC Interface:
Provision is made for connection to the serial port of an IBM compatible personal computer. Extended data storage and battery management can be undertaken using the PAG Charger Management Software (PAG CMS) which is included free of charge with the MC124.

2.15   User Interface:
The MC124 LCD screen has a display area of 75mm x 25mm, which displays 4 lines of text, with 20 characters per line.

The screen incorporates electro-luminescent backlighting with off/on control via the front panel soft function switches or via PAG CMS using the mouse.

The front panel soft function switches also provide for the selection of programs and interrogation of the MC124 information when being used as a stand alone unit.

2.16   Safety:
The MC124 has been designed to comply with Electrical Safety Standard EN 60335-2-29 (1991), and is double insulated.

Note: UK mains leads are fitted with a 1″ fuse to BS1362 rated 5A as standard.

2.17   Operating Temperature Range:
MC124:   0°C to 40°C.
Battery: 0°C to 50°C.

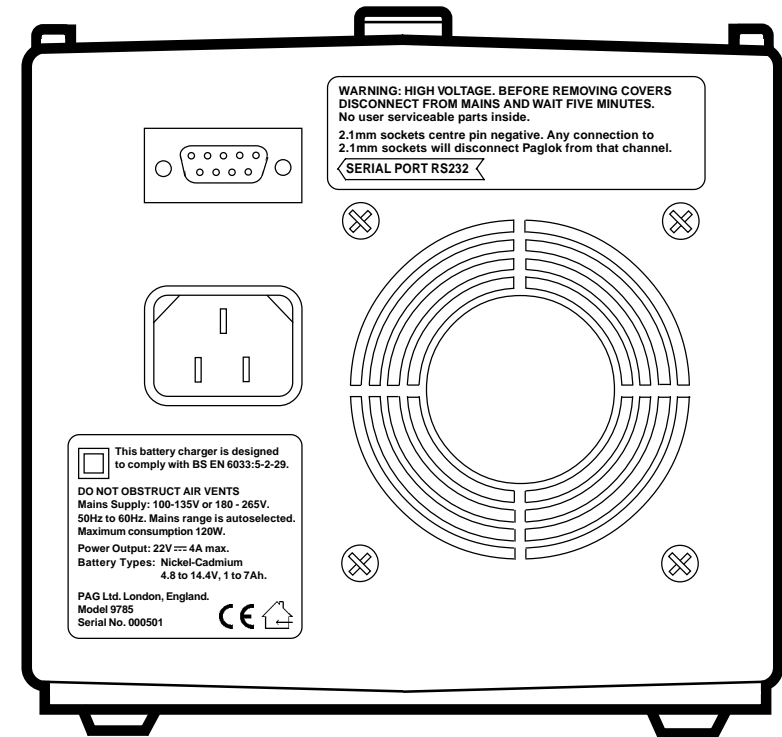**2.18   Weight:**
2.70kg (6.lbs approx.).

INSTALLATION

Illustration - MC124 Back Panel

3.1   The MC124 is fitted with a mains input socket conforming to CEE22 (IEC socket). This is situated on the back panel. Mains connection to the MC124 should only be made using the standard lead supplied with this equipment.

3.2   The MC124 has been designed for use on AC mains supplies world-wide, and automatically accepts supplies from 100 to 135V or 180 to 265V (autoselected). AC mains supply frequencies must be in the range 50Hz to 60Hz.

3.3   The MC124 may be operated from a vehicle 12V battery using the PAG Vehicle Battery-Power Converter, Model No. 9774.

PAG TECHNICAL SALES INFORMATION DESK:
For further information contact PAG Technical Sales and Information Desk on +44 (0)20 8543 3131 or your nearest PAG authorised service centre.

SECTION 4

PROGRAM DESCRIPTION

4.1 Main Charging Programs:
Fast-Charge; Discharge-then-charge and Revitalise.

4.2 Ancillary Programs:
Balancing charge, self-adjusting maintenance charge (automatically entered after charging), recovery charge (manually selectable).

4.3 Self-Test Program:
The microcomputer constantly monitors the operation of the MC124, which is shut down to a safe condition should any of the tests fail.

4.4 The Fast-Charge Program:
The fast-charge program charges the battery at a rate of 4 amperes. This continues until the MC124's microcomputer detects that the battery is fully charged. The software developed to do this is the most powerful and complex part of the charger section's design.

In order to achieve an extended working life and perform properly, batteries must be charged by exactly the right amount. Under-charging results in less than full capacity and consequently short running times, whereas overcharging can permanently damage the battery's cell chemistry, and in severe cases can buckle the plates.

The MC124 caters for a wide range of battery types, voltages and capacities, as well as the wide variation of battery characteristics found between cell manufacturers. To ensure that the fast charge current is stopped at the correct time, and in order to detect the responses associated with the many varied battery types, the PAG ACS microcomputer uses a combination of cut-off algorithms that give dependable operation in all cases.

4.5 The Discharge-then-Charge Program:
This program discharges the battery at a rate of 4 amperes until the MC124's microcomputer calculates that the battery has been discharged to a voltage equivalent to 1.0V per cell.

This end voltage figure is equal to the number of working cells in the battery. This information is displayed as the cut-off voltage and can be used as a convenient means of identifying battery packs containing true short-circuited cells.

After discharge the battery receives a rest, the duration of which is automatically calculated from the discharge phase. The rest period timer counts down and is displayed on the screen. The amount of current discharged from the battery is recorded and is available for display when the discharge is complete.

After the rest period the battery is automatically fast-charged unless the MC124 detects that the battery is faulty. The amount of current loaded into the battery is shown on the display.

4.6 The Revitalise Program:
The purpose of the Revitalise Program is to restore a battery which is suffering from low capacity or poor output to a condition where it will respond to full charge, and continue to perform to its maximum capability in subsequent charge/discharge cycles. See section 6.8 for program running time.

Cell Imbalance:
The most common cause of battery failure is cell imbalance, and is generally the result of repeated over-discharging. This has a cumulative effect which ends with the eventual voltage reversal of some of the cells. PAG chargers are designed to eradicate the many problems associated with the heavy and sometimes destructive use that broadcast batteries are subjected to.

Revitalising after storage:
The Revitalise Program should be applied to batteries which have been stored for long periods (i.e. more then 1 year). This reactivates the chemistry within the individual cells, reforming them and bringing about a transition from oxidised to active in the correct manner. This has a long term beneficial effect on the working life thereafter.

Periodic revitalise:
Batteries which have been in constant use may benefit from the Revitalise Program if applied periodically (every 50 cycles or whenever a loss of performance is experienced). It will prevent the build up of cell imbalance caused by the battery being taken into slight overdischarge.

Revitalising lost capacity:
In laboratory trials with batteries which have been returned from active duty and suffering from loss of capacity, increases in available capacity of as much as 30% to 40% have been achieved after a single application of the PAG Revitalise Program. This fact is worth bearing in mind before discarding a battery or having cells replaced.

4.7 The Balancing Charge Program:
When a charging phase has been completed, the MC124 will switch automatically to its balancing charge program. Imbalance between cells (caused by slight differences in cell charge acceptance and capacity) can be cumulative if not addressed. The duration of the balancing charge is dependent upon certain conditions detected during the analysis phase of the charging program.

4.8 The Maintenance Charge Program:
Charged batteries tend to self-discharge over a period of time. The rate varies with the type, size and temperature of the cell, and no one maintenance rate is ideal in all cases. The MC124 features a special adaptive maintenance charge which automatically compensates for this.

4.9   The Recovery Charge Program:
Batteries which have been over-discharged may be rejected by the charger and indicated as faulty: batteries in this condition are unsuitable for fast-charging. To overcome this the MC124 incorporates an ancillary Recovery Charge program. The selector switch for this program is located on the front panel.

After a period of one hour the MC124 automatically enters the fast-charge program which will run until the battery is fully charged. If a battery is severely faulty, and has not responded to treatment by the Recovery Charge program, it will be indicated as faulty when the fast-charge program is entered and will not be charged. Rejected batteries should be further investigated, see Section 4.6.

SECTION 5

OPERATING INSTRUCTIONS

5.1   **Powering Up:**
Connect the charger to a suitable supply using the standard lead. The LCD screen will illuminate and display the PAG logo briefly before entering normal operating mode. With no batteries connected all channels will indicate ABSENT.

The MC124 may be disconnected from the supply at any time in complete safety, and without damage to the charger or any batteries connected.

5.2   **Display Illumination:**
The display illumination may be switched between the ON and OFF states as desired by operation of the front panel switch as follows:

Hold the RECOVERY switch in until the alternative screen is displayed. Operation of the main program switch will now turn the illumination off or on.

5.3   **Program Selection:**
Connection of a battery will adopt the program selected on the right hand switch, and be indicated by a flashing display for that channel. The program will lock in after 3 seconds. Further batteries can then be added to other channels under different programs using the above procedure.

Note: Use of the 2.1mm socket overrides the Paglok connector for that channel.

To access recovery charge, hold in the left hand RECOVERY switch while connecting the battery.

5.4   **Rest Periods:**
These automatically follow a charge or discharge run and prevent the accumulation of temperature rise from one run to the next.

The rest period after a discharge is calculated by the MC124 from battery capacity, while after a charge the rest time is set to 40mins.

5.5   The MC124 continually monitors the status of all channels and provides this information for the front panel display as described in Section 6.

5.6   If the MC124 detects a severely faulty battery while a program is running, a FAULTY indication will be displayed. This could be caused by one of several conditions, such as a very old or damaged battery, a short circuit battery, or an excessively high or low voltage battery. An ABSENT indication will be displayed if a battery becomes open circuit while being charged. Conditions that could cause this include: a blown battery fuse, a battery's internal thermal cut-out operating, intermittent battery connections, or a disconnected battery.

5.7 The MC124 will not attempt to process batteries which are indicated as FAULTY, or which have completed a program. If a battery is disconnected, the status will revert to the ABSENT state. Another battery can now be connected to the free channel and a program chosen without affecting any of the other channels.

5.8 To the MC124 there is no difference between a disconnected battery and one that is open circuit. If the MC124 indicates that a battery is disconnected even though it is plugged in, check the battery fuse and any leads or adaptors before suspecting the MC124 of a fault.

5.9 The MC124 will charge a battery to its maximum available capacity and no advantage is to be gained from trying to charge it further. Although reapplication is safe, repeated attempts to overcharge a battery may cause internal damage to one or more of the cells, resulting in a shortened life.

5.10 If the AC mains power fails during operation, the MC124 will shutdown safely; no damage will occur to either the charger or to any connected batteries. When power is restored the MC124 will start by analysing each connected battery in sequence, applying the program selected on the front panel switch. For this reason it is recommended that if the MC124 is to be operated unattended i.e. overnight, the program select switch should be parked in the fast-charge position after the main sequence of functions has been entered. Should power fail, any partly charged or discharged batteries will be charged and ready for use on return of the operator, given adequate time. Any fully charged battery on the line will be recognised as such and will only receive the normal maintenance charge.

5.11 The PAG logo continuously displayed on the LCD screen indicates that the MC124 is in fail-safe shutdown mode. This could be a result of any number of undesirable situations from which the system is protecting itself, such as the obstruction of ventilation slots causing inadequate cooling, or the microcomputer's detection of an internal fault. In these cases the charger should be disconnected from the supply, any obstruction of the air vent system removed and allowed to cool before reconnecting to the supply. Should the charger re-enter the fail-safe shutdown mode more detailed investigation is required.

SECTION 6

SYSTEM OPERATIONS & DISPLAYS

FAST CHARGE

6.1 Select this program as described in Section 5.

Accepted selection of the fast-charge program is indicated by FAST CHARGE, until the process begins.

The charging process is indicated by CHARGE (flashing).

The balancing process is indicated by BALANCE (flashing).

At the end of the program the display indicates CHARGED along with the charge current loaded and voltage figures.

6.2 The charge current loaded into a battery can be a useful guide as to the battery's fitness for use. If a fully discharged battery only accepts a small amount of charge current against its rated capacity the battery will require further investigation.

The MC124 charge program is adaptive and may apply a charge of extended duration to a battery which is in a condition of severe cell charge imbalance.

DISCHARGE THEN CHARGE

6.3 Select this program as described in Section 5.

Selection is indicated by DISCHARGE.

During discharge, the display flashes DISCHARGE. At the end of discharge, the display indicates RESTING, with a count down indication of the rest period remaining. At the end of the rest period, a fast charge is applied as described in 6.1.

6.4 Capacity and voltage figures are displayed during both discharge and charge. At the end of the program the display indicates the charge current loaded figure. The previous discharge capacity will be displayed while the RECOVERY switch is pressed.

The discharge capacity figure is a measure of the capacity of the battery, and will vary depending upon the nominal capacity capability of the battery and its original state of charge. If a known fully charged battery exhibits a reduced capacity on the MC124, the battery may require maintenance (e.g. a revitalise) before being fit for service.

6.5 If a battery has completed the discharge phase of the program, and is waiting for the charger module to become available, the indication C WAITING is displayed.

REVITALISE

6.6   Select this program as described in Section 5.

Selection is indicated by REVITALISE.

During revitalise the display indicates REVITALISE __% to show progress through the program to its conclusion, indicating the battery has received the full 100% program.

6.7   The final capacity of the revitalised battery can now be displayed by pressing the RECOVERY switch. The capacity figure displayed will be that obtained from a discharge which takes place towards the end of the revitalise program.

When the RECOVERY switch is released, the final charge current loaded value is displayed briefly.

6.8   The 'time-sharing' feature in the MC124 ensures that the most efficient use is made of the charger and discharger modules, enabling the MC124 to revitalise two batteries in no more time than it takes to revitalise one battery. In practice a period of 14 hours should be allowed for the full revitalisation of two PAG SuperPack 5Ah batteries, or 30 hours for a set of four 5Ah batteries.

RECOVERY CHARGE

6.9   Select this program as described in Section 5.

Selection is indicated by RECOVERY.

A battery being recovered is indicated by RECOVERY (flashing).

After a period of one hour the MC124 automatically enters the fast charge program, with indications as described in Sections 6.1.

PAG NMH BATTERIES

6.10   PAG Nickel-Metal Hydride batteries are recognised by the charger and are identified in the display as 'NMH' during charge.

6.11   PAG Nickel-Metal Hydride batteries, which are outside of the acceptable temperature range for charging, will be identified, and the display will indicate 'WAIT °C'. The batteries should be left connected to the charger, and when the battery temperature comes within the acceptable range, fast charging will automatically commence.

SECTION 7

FAULT FINDING

7.1   The MC124 is based upon advanced electronics and does not require periodic maintenance. Consequently there are no user serviceable parts inside.

7.2   Qualified electronics engineers who wish to gain access to internal assemblies should note that parts of the power circuit retain a high voltage even after the mains supply has been disconnected. Wait for a period of five minutes following disconnection before commencing disassembly.

7.3   When the MC124 is correctly connected to a mains supply and the display is not functioning, it is an indication that a supply fuse has become open circuit.

7.4   Equipment supplied for use in the UK is supplied with a standard UK mains lead, with a moulded, fused plug. If this fuse has become open circuit it should be replaced by another of the correct rating (see Specification Section 2.16). USE ONLY A FUSE OF THE CORRECT RATING.

7.5   If the replacement of an open circuit fuse fails to correct the symptoms described in paragraph 7.3 do not attempt further fuse replacement. It is likely that a fault has developed. Seek advice from your nearest PAG dealer or direct from PAG Limited, London, by telephoning +44 (0)20 8543 3131.

7.6   Unqualified personnel should not attempt further investigation. Any such interference would invalidate the guarantee and invariably cause more damage then the original fault (see paragraph 7.1 above).

SECTION 8

PAG CMS - AN OVERVIEW

◗ The PAG CMS - Charger Management Software, allows the user remote operation of all the features of the charger.

◗ Detailed graphs are created as the MC124 processes the batteries. These graphs allow a deep insight into the condition of the battery pack. The graphs are stored on the hard disk of the computer, allowing the complete service history of a battery to be created.

◗ To ensure that connection has been established, connect the battery to a channel of the charger, and then press the corresponding channel selection button.

◗ The program is started from the control panel by using the Program Control Buttons.

◗ The Graph Display can be used to view the process in detail and print the resulting graph and capacity measurement.

◗ To receive on-line help, select help from the button bar.

SECTION 9

INSTALLATION

◗ The MC124 application has an installation utility on the program disk.

◗ The installation utility must be run from within the Windows environment.

◗ The installation utility will copy all the required files onto the computer and create a group and icon from which to run the MC124 application.

1. Insert the program disk into the disk drive of the computer.

2. From the Program Manager, select "FILE" then "RUN" in the menu.

   i. The Program Manager can be brought to the front by holding down the key marked "Alt" then pressing and releasing the key marked "Tab" until "Program Manager" is viewed in the centre of the screen, at this point release both keys. The title at the top of the screen should now read "Program Manager".

   ii. To select "FILE" hold down the key marked "Alt" then press and release the "F" key, then release "Alt".

   iii. To select "RUN" press and release the "R" key.

3. In the box labelled "Command Line:" enter the disk drive letter followed by ":install", then the "Enter" key e.g. if the drive letter was "A" then the command line would read "A:install". If the drive letter was "B" then the command line would read "B:install".

   *Note: there are no spaces.

   After entering this command line the computer should load the install utility from the program disk.

4. You should now be looking at the install utility. The install utility will automatically detect the location of the install disk and display this in the "Install from" box. The "Install to" box displays the destination directory for the MC124 application, and is set to the default "C:\PAG". Unless you wish to install the application to another disk drive or directory, these settings should be fine.

   Click the mouse pointer on the "Install" button, or press "Enter". The installation utility will install the application onto the computer, displaying progress on the strip progress meter.

5. The install utility will display the message "Installation complete" when it has finished. Click the mouse pointer on the "Quit" button or press the "Enter" key again to leave the install utility.

SECTION 10

CONNECTION

◗ When the MC124 is powered up it will automatically start the selected program with the connected batteries. For this reason it is best to link the CMS and MC124 before connecting batteries.

1. Connect the serial lead provided, using the 9-25 converter if required. If the MC124 is to be connected to a serial port numbered higher than four, the PAGCMS.INI "QTYPORTS" entry will need to updated to instruct the CMS to search on higher ports.

2. Ensure the MC124 is powered up.

3. Run the CMS application by double clicking on the icon.

◗ At this point the CMS will load, displaying 88.8V in all of the voltage displays, indicating a search is in progress. When the MC124 has been found the voltage displays will change to indicate the voltage of the battery connected to that channel. (00.0 V for no battery connected).

If the search fails the CMS will bring up a message box:

"No MC124 found, entering stand alone mode".

If the connection fails, the search can be restarted by pressing the reconnect icon from the button bar.

Note, if the CMS has successfully linked to the MC124 the reconnection icon will not be present on the button bar.

SECTION 11

CONTROL PANEL

◗ The Control Panel displays the status of all the batteries connected to the system, and controls the starting and stopping of the various charging and discharging programs.

◗ The display is split into two sections, left and right. The left hand side displays the voltages and status of the channels. The right hand side contains the buttons to start and stop the programs and the resulting tiny graph.
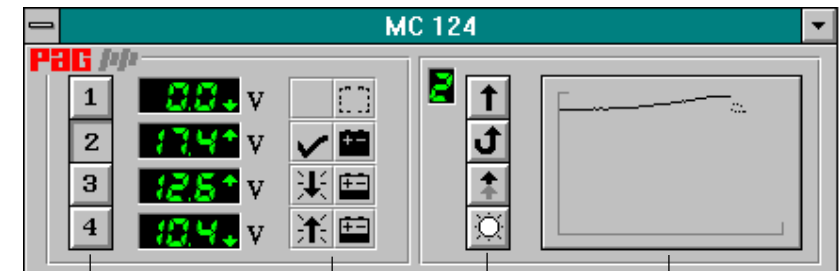
1. Channel Selection Buttons

2. Status Indicators

3. Program Control Buttons

4. Tiny Graphs

1. CHANNEL SELECTION BUTTONS
The channel selection buttons alter which channel the right hand side of the control panel represents. If channel two is selected then the program selection buttons will change the program selected to channel two. The tiny graph will display the current/last graph for the selected channel.

If the channel selection button for the current channel is pressed again, i.e. while it is already down, the tiny graph will change to an information screen. When the mouse button is released, the information screen reverts back to the graph.

Information screen contents:
Rest time remaining (if in rest).
Current graph file of the channel.
Running time.
Charge loaded (if in charge).
Capacity (if in discharge).

2. STATUS INDICATORS

|			
⤓↑ Charging	✋ User Stop		
⤓↓ Discharging	✔ Ready		
⧗ Waiting	⤒ Balance		
⏱ Resting			
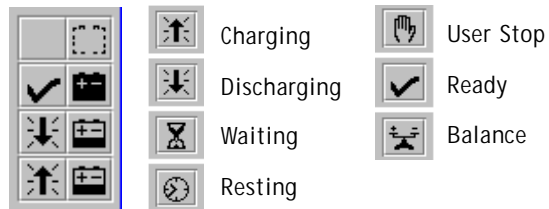
There are two columns of indicators:

The left hand column shows the current status of the program. As an example, for the Discharge then Charge program, the indicator will move from Discharging, to Resting, to Charging, to balance and finally to Finished.

The right hand column shows the present status of the batteries. As an example, at completion of a discharge it will show empty, or at completion of a charge it will show full. This is not a state of charge indicator.

Batteries which are out of specification (4 to 12 cells, 1 to 7Ah), or can not accept charge at full charge rate, may indicate Faulty or Out of Specification. See Recovery and Revitalise.

3. PROGRAM CONTROL BUTTONS

↑ Charge

↻ Discharge/ Charge

▲ Recovery Charge

☼ Revitalise
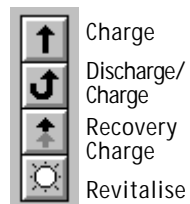
These buttons start or stop the activity on a particular channel. These dual position push-buttons can be pushed down to start a program or popped up again to stop a program. Any one of the four programs can be running at any time on each channel, each channel being independent of the other.

A program cannot be paused and then continued. If a program, which was stopped, is recommenced, it will start from the beginning of the program, and not from the point at which the program was stopped. An example is with the Discharge then Charge program. This program starts with a discharge. If the program is stopped during the charge phase, when it is started again it will automatically commence with a discharge. It is, however, completely safe to stop and restart a program at any time.

Once a program is started the application asks for a filename to store the graph. Each file can store as many graphs as are required. As a recommendation the serial number of the battery can be used as a

filename (or at least the last 8 digits can be used). Do not include leading zeros or all the names will begin with the same digit. This ensures that when the battery is next applied to the system the new graphs can be compared to the previous ones.

4. TINY GRAPHS

These display the present or most recent graph (charge or discharge) performed on that channel. The status indicators will denote whether the program is still running.

Pressing the left mouse button over the tiny graph will instruct the CMS to bring up the main graph window, to enable a more detailed study of graphs which have been recorded.

SECTION 12

BUTTON BAR

The button bar is a panel of buttons that allow the user to access other functions of the application. The button bar can be brought up from the main control panel by pressing the right mouse button over the application. The button bar can be removed by pressing the right mouse button again.

The buttonbar appears in the top left hand corner of the Control Panel. Items are selected by moving the mouse pointer over the desired button and pressing the left mouse button.

Once the CMS has established connection with the MC124 there are seven buttons available on the button bar:

On Top

Backlight button

Backlight Flash

All Stop

Exit

Information

Help

If connection has not been established with the MC124 the backlight control buttons will appear greyed and the stop button will be replaced by an image of a computer, representing reconnection:

ON TOP
When the on top function is active the button on the button bar will display a green and a greyed cross. While active, the application will remain visible at all times, allowing the computer to be used for other functions while never losing sight of the MC124 application.

To turn off the function bring up the button bar and re-select the On Top button; the tick will become grey and the cross will turn red.

This function can be made to default to on or off by altering the PAGCMS.INI file.

BACKLIGHT BUTTON
The second button from the left on the button bar will turn the backlit display of the MC124 on and off. The status of the backlight is represented by an image of a light bulb on the button. If the light appears as grey and empty then the backlight of the MC124 is off.

When the image of the bulb appears full and yellow then the backlight of the MC124 is on.

This function can be made to default to on or off by altering the PAGCMS.INI file

FLASH BACKLIGHT
To enable a particular unit to be identified when more than one is connected to the computer at the same time, the third button in the button bar will instruct the MC124 to flash its backlit display three times. After flashing the backlight will return to its original state, as indicated by the backlight button.

ALL STOP
Selecting the All Stop button from the button bar commands all channels to stop any program that they may be running. All the status icons will change to the user stop state and all the graphs will be saved to disk.

HELP
To bring up the help system, the '?' button can be selected from the button bar, or the Help button can be pressed from within the graph screen.

RECONNECTION
When communication is not established between the CMS and the MC124, pressing the reconnect button on the button bar instructs the CMS to search the serial ports for a MC124.

While the CMS is searching 88.8V will appear in each of the voltage displays and upon connection will display the voltage of the battery connected to that channel of the MC124. If the search for a MC124 should fail, CMS will bring up an error message.

The CMS searches through the amount of ports indicated in the PAGCMS.INI file.

EXIT

Before finishing the application all batteries that are running should be stopped (This will save any current graphs to disk).

Selecting the exit button from the button bar will cause the application to close. If any programs are running when exit is requested then the application will prompt for confirmation.

SECTION 13

GRAPH DISPLAY

GRAPH DISPLAY

This feature can be used to view, in detail, present and previous graphs. It allows a historical record of battery performance, and provides the facility to print any of the charge or discharge graphs recorded.

Pressing the left mouse button over the tiny graph will instruct the CMS to bring up the main graph window, to enable a more detailed study of graphs which have been recorded.

LOADING A BATTERY HISTORY

The present or most recent graph on any channel can be viewed and compared by selecting one of the channel buttons (numbered 1 to 4) to the left of the graph. If the program on the channel is finished the complete history will be loaded.

To display a graph (or battery history) that has been saved to disk the LOAD button should be selected. A graph must be selected from the list which will be displayed. Enter the filename into the edit box of select from the list provided.

The filename must consist of no more than 8 alphanumeric letters. There is no distinction made between upper and lower case letters. The name must not include a space, however an underscore "_" can be used.

Try loading the EXAMPLE graph and notice that the most recent graph of this test is displayed. To view its history use the scroll bar.

VIEWING A BATTERY HISTORY

All the graphs of a history or test can be viewed and animated by using the scroll bar to the left of the graph. Selecting the arrows, or using the arrow keys, will show every graph recorded. However, selecting the scroll bar inside the arrows, and using the PgUp and PgDn keys will show every other graph, i.e. each discharge (or charge) graph.

ZOOMING AND SCALING A GRAPH

The axes of the graph can be altered by selecting any of the axes buttons and typing in voltages or times.

The AutoScale button will enter values for the axes to guarantee that the graph is displayed. This is because it is possible to zoom in on a blank portion of a graph and hence not see it.

PRINTING A GRAPH

Selecting the Print button brings up the Printer Set-up dialogue which offers the choice of printing portrait (down the page) or landscape (across the page).

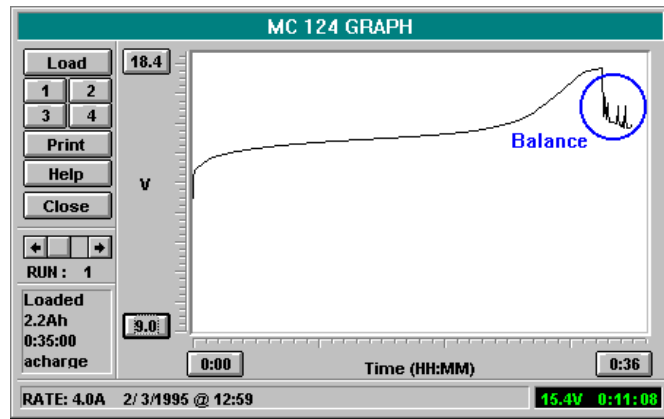To avoid printing the graph, select Cancel or use the Escape key.

RETURNING TO THE CONTROL PANEL
Use the Escape key or CLOSE button to return to the Control Panel.
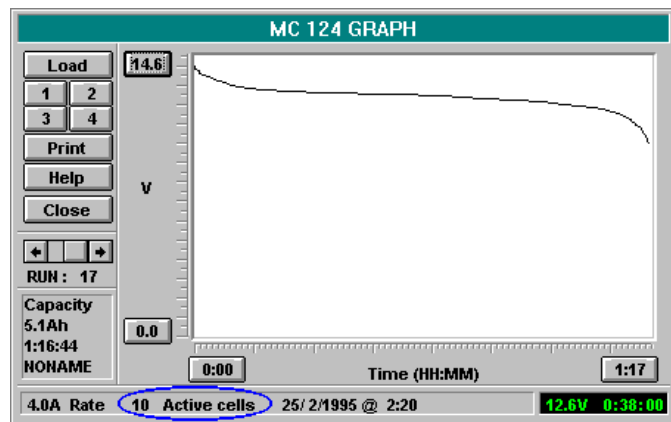
EXAMPLE GRAPHS
All of the graphs produced are of the battery voltage over time. Different graphs are produced with each of the available programs.
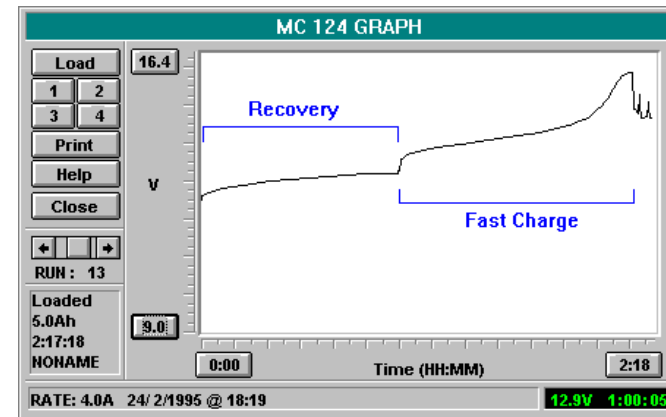
FAST CHARGE

When the PAG ACS detects the battery is ready the MC124 will enter balance. Balance will ensure that all the cells in the pack, are brought to the same fully charged state.

DISCHARGE

This is an example of a good discharge curve. The MC124 indicates the number of active cells detected in the pack.

RECOVERY

The recovery program will apply a period of slow charge to the battery followed by a fast charge. This will all appear on the one graph.

REVITALISE
The Revitalise program will produce five runs.
1. Special Charge.
2. Discharge
3. Special Charge.
4. Discharge
5. Special Charge.
The Discharges are normal and give a good visual indication of the battery state. The charge curves alter and may have peaks of varying voltage and current as the MC124 processes the battery.

SECTION 14

DYNAMIC ICON

ICON
When the CMS is minimised, the status of the four channels is graphically displayed on the icon. This feature is most effective when used with the ON TOP feature active, making it possible to watch the MC124 while running other applications full screen.

The icon is split into four. Each quadrant represents one of the four channels.

Channel 1   Channel 2

Channel 3   Channel 4

By setting the ON TOP option to 'YES' in the PAGCMS.INI file, the CMS will start in this form.

SECTION 15

CONFIGURATION

MC124.INI FILE
When run for the first time, the CMS will create a PAGCMS.INI file in the Windows directory on the computer. The PAGCMS.INI file contains set-up information for the CMS. To alter the set-up, edit the file with any text editor (notepad or write etc.).

An example of the default contents of the PAGCMS.INI file:

[CONFIG]

LIGHT=NO

ONTOP=YES

MINIMIZE=NO

QTYPORTS=4

The "LIGHT" line shows whether the backlight on the MC124 should start on or off at the start of CMS. "YES" instructs the CMS to ensure the light starts on, "NO" ensures the light starts off.

The "ONTOP" line will dictate whether the CMS is to remain "on top" of all the other application running on the computer system. "YES" means remain on top.

The "MINIMIZE" line, if set to "YES" will make the CMS start in its dynamic icon form.

The "QTYPORTS" line tells the CMS up to what port number you would like it to search to, four is the default. The maximum number of ports is eight, allowing for up to eight MC124s to be running at once. The CMS will search the ports in numerical order. To ensure the fastest connection it is best to connect the MC124 to the lowest numbered port available.

"YES" and "NO", must be in capital letters. If an entry is not understood it will replace it with the default.