

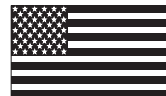
# The MCG-2 Micro Character Generator

Manual Version 2.01



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# MCG-2 Micro Character Generator

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# PART ONE

## Introduction:

The MCG-2 is a low cost B/W character generator for adding titles or captioning to NTSC or PAL Color or Monochrome video. The MCG-2 will automatically Genlock to either NTSC or PAL inputs with no adjustments or switch settings required. The MCG-2 outputs black or white characters (user adjustable), appropriate for logging and documenting experiments, video source I.D., camera and location display for security applications, time and date stamp from a PC (or the MCG-2 with the real time clock option), Patient monitoring, Information displays, and basic CG applications. The MCG-2 requires a video input to operate.

The unit displays a maximum of 180 characters (9 lines by 20 letters). Characters may be set to 4 widths and 4 heights for a total of 16 character sizes.

The character set includes upper case letters A–Z, numerals 0–9, and various punctuation marks and symbols as shown in the ASCII to MCG-2 Display Convert table. Characters may be set to have background or to flash or both. Characters and background brightness may be individually set with "screwdriver" adjusters on the rear panel.

The display memory holds 10 pages of text and is protected from power losses by a lithium cell that should last 10 years (3 years if RTC is installed). Stored on a page by page basis for each page is: the character size, display position, background on/off status, and the position of the Real Time Clock Display.

The MCG-2 may be controlled by either front panel controls or remotely by an RS232 link to a PC.

Multiple units may be chained together with standard 4-conductor RJ11 modular telephone cable and individually accessed from a PC. Easy to use two letter commands are sent to the MCG-2 from a PC

running a communication program (such as Procomm or Windows HyperTerminal) or from user written software.

The MCG-2 has 3 LEDs: Power, RS232 Activity (Remote), and On-Line status.

## About This Manual:

This manual is divided into three sections. Section One is a tutorial and describes initial setup and MCG-2 front panel operation. Section Two describes how to remotely control one MCG-2 or a network of MCG-2's from a Personal Computer. Also included in Section Two is a reference section describing how to use each of the two letter remote control commands. Section Three has information on specifications, troubleshooting, etc.

When reading the next section, the Tutorial, it is best to have the MCG-2 in front of you to get a full understanding of the operation of the MCG-2.

## Material Supplied:

In the shipping carton you should find:

1 MCG-2 Micro Character Generator

1 AC adapter 12 Vdc/500mA

1 Operations manual

1 Three foot modular telephone cable (RJ11 Type)

1 DB9 (RS232) to RJ11 (Telephone cord) adapter

1 Floppy Disk (Containing example software for remote control)

## Operation:

Power up the MCG-2 using the AC adapter or an external source of 12 Vdc. The MCG-2 has an auto polarity feature for the DC input

(polarity is unimportant). Connect a video source (black burst, VCR, live video, etc.) to the VIDEO-IN BNC connector. Connect the VIDEO-OUT BNC connector to a composite monitor. The REMOTE IN and OUT RJ11 connectors will be discussed in Section Two.

**WARNING!!! - DO NOT CONNECT YOUR MCG-2 UNIT TO A TELEPHONE SYSTEM. DAMAGE MAY RESULT AND YOUR WARRANTY MAY BE VOIDED.**

The RJ11 connectors are for remote control of the MCG-2 from a PC computer RS232 port, and not for direct connection to a telephone system. The MCG-2 may be controlled over phone lines with the use of a modem.

Switch the unit on. When the unit is powered up it goes to On Line status and displays the page it was set for the last time it was powered up. The Green POWER LED and the red ON LINE LED should glow. The page will appear blank if there is no text present. (If no text is displayed and the page is not blank or if the green Power LED is flashing, see the section on troubleshooting.)

The MCG-2 may be controlled either by front panel controls or via an RS232 link to a PC. This section will discuss front panel control. (Remote control via a PC is discussed in Section Two.)

Front panel controls use menus on the screen to guide the user in editing text or setting options. There are 3 menus:

## **MCG-2 MAIN MENU**

### **SCREEN CONTROL MENU**

### **UTILITY MENU**

As each new menu is brought up, move the arrow to the item of interest and read the manual description.

Press the MENU button now to go to the **MAIN MENU**. The UP and DOWN arrow buttons will move the arrow to select the different menu items. The following details each menu item.

## Main Menu:

### **EDIT PAGE**

Move the arrow to **EDIT PAGE**. Press the MENU key. A flashing cursor will appear. The cursor may be moved left or right with the arrow buttons, and up or down by holding SHIFT and pressing the arrow buttons. Holding the arrow keys for more than about a second will cause the key to repeat, moving the cursor across the screen.

Characters may be selected by pressing the PLUS or MINUS keys. Holding down the PLUS or MINUS keys will cause the characters to cycle up or down. The cycling will stop briefly at the beginning and end of: the alphabet, the numbers, the punctuation marks, and the symbols.

Characters may be set to flash by holding the SHIFT key and pressing the PLUS key. Flash mode is indicated by the cursor changing from a block to a special underline character. Now all subsequent characters set will flash. To exit flash mode, hold down the SHIFT key and press the MINUS key. The cursor now returns to the normal block character.

Individual characters that are already set on the screen may be set to flash by moving the cursor over the character, holding the SHIFT key and pressing the PLUS key. Press MENU to exit from **EDIT PAGE**. This also saves your text.

Try setting some titles to get a feel for using **EDIT PAGE**. To exit from **EDIT PAGE** press the MENU key.

### **DISPLAY PAGE**

Pressing the MENU key displays the currently selected page. Pressing the DISP key will cause the unit to toggle between on line and off line. Pressing the PLUS or MINUS keys will switch the unit to the next higher or lower page. There are ten pages that may be selected.

Once you have set text on all your pages, this is the menu item you will use to recall them. Press the MENU key to exit.

## **CHANGE PAGE**

This is another way to change pages. Pressing the PLUS or MINUS keys will change the current page and show the page number.

## **SET BACKGROUND**

Pressing the PLUS key will change the background for the current page, and pressing the MINUS key will turn it off.

Turn the background on or off and then go to **DISPLAY PAGE** to see what the page looks like.

## **SET VERT (Vertical) SIZE**

### **SET HORZ (Horizontal) SIZE**

This menu item sets the size of the characters displayed with **DISPLAY PAGE**. Move the arrow to **SET HORZ SIZE** or **SET VERT SIZE**.

Pressing the PLUS or MINUS keys will change the character size for the current page.

After setting a character size, go to **DISPLAY PAGE** to see what the characters look like.

Character size is stored on a page by page basis such that each page may have a different character size. On a given page, all characters are of the same size.

## Screen Control Menu:

### **SET HORZ (Horizontal) POS (Position)**

### **SET VERT (Vertical) POS (Position)**

This menu item sets the display position of the characters on the monitor. The display position may be set by either pressing the PLUS or MINUS keys, or by pressing the MENU key.

If you pressed the MENU key, the current page is displayed. You can move the page left and right by pressing the arrow keys, or up and down by pressing SHIFT and the arrow keys.

Display position is stored on a page by page basis such that each page may have a different display position.

Press MENU to exit.

### **CLEAR PAGE**

Pressing the MENU key clears only the currently selected page.

### **CLEAR ALL PAGES**

Pressing the MENU key clears all 10 pages. (Use this one with caution!)

### **DISPLAY ID ON SCREEN**

Pressing the MENU key will display, on the video in large print, the ID code used to access the MCG-2 in a network of linked MCG-2's. This is useful in setting up a network of MCG-2's.

Press MENU to exit.

### **CLOCK DISPLAY**

This menu item is used to set a display position for the Real Time Clock option. If this option is not installed, this item will default to **OFF**. For more information, see the **REAL TIME CLOCK** addendum that comes with the RTC option.



## Utility Menu:

### **NO CLOCK INSTALLED**

This menu item will change to **SET CLOCK** when the real time clock option is installed. For more information, see the REAL TIME CLOCK addendum that comes with the RTC option.

### **DIAGNOSTICS**

This item tests RAM, ROM, RS232 (Remote control) port, and checks if the real time clock is running, if installed. Note that the RS232 test requires a loop back plug. See Section Three for more information on building a loop back plug. Results of the tests will be either **PASSED!** or **FAILED**.

Pressing the MENU key runs the tests. To exit, press the MENU key after the test.

### **SET BAUD RATE**

Pressing the PLUS or MINUS keys will set the baud rate (1200, 1800, 2400, 4800 & 9600) for the RS232 link. The baud rate is stored in battery backed memory. Default is 9600.

### **SET DEVICE ID**

Pressing the PLUS or MINUS keys will set the ID code used to access the MCG-2 in a network of linked MCG-2's (The ID is stored in battery backed memory.) Values are 01-FF (1-255).

### **MASTER RESET**

Resets MCG-2 to factory defaults as follows:

Character size is set to smallest size for all pages.

Display position is centered for all pages.

Background is set to ON for all pages.

Baud rate is set to 9600 baud.

Device ID code is set to 01.

Clock display is set to OFF.

This menu item is useful if you want to “start over from scratch.”

This menu item should also be used after replacing the lithium battery, or to recover from a “Flashing Power LED” condition. (See Section Three for more information.)

Note that text pages are not erased by this menu item. If you want to erase all the pages, use **CLEAR ALL PAGES** on the Screen Control Menu.

## **VERSION NUMBER**

Pressing the MENU key will show the version number of the ROM firmware and a copyright statement. You may need this information if you need to call the factory for technical support.

## **Adjusting Display Brightness:**

On the back panel of the unit there are two adjustment controls for characters and background brightness; they are adjustable from 7.5 IRE (setup) to 100 IRE.

These adjustments are set at the factory for white (80 IRE) characters on a medium gray (30 IRE) background.

## PART TWO

### Remote Control Tutorial

WARNING!!! - DO NOT CONNECT YOUR MCG-2 UNIT TO A TELEPHONE SYSTEM. DAMAGE MAY RESULT AND YOUR WARRANTY MAY BE VOIDED.

The RJ11 connectors are for remote control of the MCG-2 from a PC computer RS232 port, and not for direct connection to a telephone system. The MCG-2 may be controlled over phone lines with the use of a modem.

Your MCG-2 may be controlled from a PC computer via the computer's RS232 (serial) port by sending the MCG-2 simple two letter commands (See the command reference for more information on commands).

We provide:

1 RJ11 cable

1 DB9 to RJ11 adapter

You will need the following:

1 PC computer with a RS232 Serial Port

1 terminal emulation program such as Procomm (ANSI.SYS compatible) or Windows HyperTerminal.

You will need to determine if you have one or two RS232 ports, and the name of the one you plan to use. The names will be **COM1:** or **COM2:**. If you have only one RS232 port then the correct name is **COM1:**.

We'll start by connecting the DB9-to-RJ11 adapter to the RS232 port you have chosen. Next, connect one end of the RJ11 (Telephone Type) cable to the DB9 to RJ11 adapter, and connect the other end to the RJ11 connector on the MCG-2 marked HOST. (It is assumed that the

MCG-2 is connected to a video source and a monitor, and that the MCG-2 is turned on.)

Next, run your communications program. You will need to set up the program for the following:

Set the COM port to either **COM1:** or **COM2:**

(Depending on what you chose earlier.)

Baud rate: 9600 baud

(Unless you changed it in the **Utility Menu**)

Stop bits: 1

Data bits: 8

Parity: None

Echo: Off (or Set Duplex to Full)

Note that other combinations may not work reliably or may not work at all, so please double check your connections and communications program setup. Also confirm that the MCG-2 **Device ID** code is set to **01**, in the utility menu.

If you did everything correctly, then when you type on your computer keyboard the **REMOTE** light should flash.

## Networking:

Your MCG-2 may be used as a stand alone unit, or in a network of linked MCG-2's. Networking allows more than one MCG-2 to be controlled from a single PC computer, over a single RS232 link.

A MCG-2 network is much like a telephone party line, where each subscriber may listen in but only one person is allowed to talk at any one time. Because of this, each MCG-2 may be put to sleep or woke up and in this way only one MCG-2 will talk at any one time.

Each MCG-2 in a network is assigned a unique ID number. (See "Set device ID" in the **UTILITY MENU** in Part One). This number is used to wake up an MCG-2 so you can send it commands.

## Waking Up the MCG-2

When first powered up the MCG-2 will be asleep, meaning that it will ignore any data sent to it except for a **WAKE** command. (However, the front panel keypad will work whether the MCG-2 is awake or asleep). The wake command format is as follows:

**>WK,id**

Where **id** is the device ID number. (Range 00 to FF Hex.)

After receiving a **WAKE** command the responding MCG-2 will send the following:

**#id READY**

**COMMAND?**

**>\_**

Again, the **ID** is the device number. At this time the MCG-2 is ready to receive commands.

To switch to another MCG-2 on the network, first issue a sleep command as follows:

**>SP**

This will put all MCG-2's on the network to sleep. Next issue a **WAKE** command using the ID number for the MCG-2 you wish to work with. Note that the **SLEEP** command does not use an ID number; instead, the **SLEEP** command puts all MCG-2's on the network to sleep.

## Notes On Cables:

Your MCG-2 uses standard 4-conductor RJ11 modular telephone cable. This type of cable was chosen because of its low cost and ease of use.

RJ11 cable (with connectors) is widely available in various lengths, or custom lengths can be fabricated. You can make you own cable; Radio Shack stocks cable, connectors, and the crimping tool.

The cable has four conductors and uses four conductor RJ11 connectors. The connectors should be attached so as to have the locking "snap" tab facing the same way on both ends of the cable. Use the sample cable that came with your MCG-2 as an example. Some cable has a rib along one side to aid in orienting the connectors.

## Connecting the MCG-2

To connect several MCG-2's together, proceed as follows:

Run an RJ11 cable from the PC computer to the RS232 HOST connector on the first MCG-2. Next connect another RJ11 cable from the LOOP connector on the first MCG-2 to the HOST connector on the next MCG-2. The process repeats for all MCG-2's on the network.

The RJ11 cabling should be a direct connection from one MCG-2 unit to the next. Do not use "Y" connectors or try to double up units. Also the computer MUST be first in line on the network.

If the layout of a building is such that the computer should be in the middle of the cabling, you might want to split the network between two COM ports on the computer.

## Video Cabling

Video cabling is set up a bit different than the RJ11 cables. If all units will be using the same video source, then a cable may be connected to each unit's VIDEO-IN connector using BNC T-adapters. Note, however, that the 75 ohm termination jumper on the MCG-2 (JP9) must be removed on all but the physically last unit on the cable (see JUMPER SETTINGS in Part Three). The rules for connecting the video cables to the MCG-2 units are the same as for connecting several monitors (without loop through) to one video source. The MCG-2 VIDEO-OUT connector is connected to a video monitor. The monitor should be terminated with 75 ohms.

If the MCG-2 units will use separate video sources, then connect each video source to its MCG-2, and leave the MCG-2 terminator jumper (JP9) in place.

If it is not convenient to run video cables over a long distance, and a black background video is acceptable, you may consider placing a black burst generator at the MCG-2 remote location. Burst Electronics manufactures a full line of black burst generators. Call for more information.

## COMMAND REFERENCE:

Your MCG-2 may be remotely controlled by sending two letter commands. The commands in this section are listed in alphabetical order.

All commands have the same basic format, as follows:

**CC,X,Y**

Where: **CC** is the two letter command itself.

**X** and **Y** are operation parameters.

Parameters are information the command needs to operate. These may be page and line numbers or something else. Parameters may be one or two characters long. Some commands take one parameter, others take two, and some don't use parameters at all.

An example:

The following command, **WRITE LINE**, will write a line of text to the MCG-2 memory:

**WL,8,3,THIS IS A TEST**

This sequence will write THIS IS A TEST to page 8, line 3 of the MCG-2.

To display the page that has this line, use the **DISPLAY PAGE** command:

**DP,8**

In this case we used only one parameter.

To get started, first be sure to read the remote control tutorial and **WAKING UP** the MCG-2. Then look over the command reference to get familiar with the remote control commands. If you will be controlling your MCG-2 manually then you will simply send the MCG-2 commands with a communications program. If you will be



writing your own software to control your MCG-2, look at the example programs on the floppy disk that came with your MCG-2.

These example programs show how to send commands and how to set up the serial port of a PC computer. See the **README.DOC** file on the floppy disk for more information.

The description of each command is formatted as follows:

**PURPOSE:** Tells what the command does.

**FORMAT:** Shows the correct format for the command. Keep in mind: Capital letters must be entered as shown, lower case letters are variable information (parameters), commas must separate commands and all parameters.

**DESCRIPTION:** Describes in detail how the command is used.

**EXAMPLE:** Shows one or more examples of how to use the command.

## Command List

<u>Name</u>	<u>Command</u>	<u>Action</u>
Background	<b>BG</b>	Sets background on/off.
Clear All	<b>CA</b>	Clears all pages.
Clock Display	<b>CD</b>	Turns TIME/DATE ON/OFF.
Clear PC Screen	<b>CL</b>	Clears PC Screen.
Clear Page	<b>CP</b>	Clears one page.
Character Size	<b>CS</b>	Sets character size.
Clear Video	<b>CV</b>	Clears only Video Display screen, not CP.
Date Location	<b>DL</b>	Date location on video.
Display Page	<b>DP</b>	Displays page on video.
Edit Page	<b>EP</b>	Allows editing of a page.
Help	<b>HE</b>	Displays help screen to PC monitor.
Display ID	<b>ID</b>	Displays MCG-2 network ID on video.
Mixer	<b>MX</b>	Sets Mixer to on or off line.
IBM PC Type	<b>PC</b>	Sets Control for IBM Type PC.
Page Position	<b>PP</b>	Sets position of page on screen.
Run Diagnostics	<b>RD</b>	Runs diagnostic tests.
Read Line	<b>RL</b>	Displays MCG-2 text line to PC monitor.
Set Current Page	<b>SC</b>	Sets the current page.
Set Date	<b>SD</b>	Sets the date to Real Time Clock.
Sleep	<b>SP</b>	Puts all devices on network to sleep.
Set Responds	<b>SR</b>	Turns responses from commands to on or off (for high speed communication).
Set Time	<b>ST</b>	Set time of day of Real Time Clock.
Time Format	<b>TF</b>	Display format of Time of Day.
Time Location	<b>TL</b>	Time Location on Video.
Update Page	<b>UP</b>	Update Page (No Char. Size Change)
Version Number	<b>VN</b>	Displays ROM software version number to PC monitor.
Wake	<b>WK</b>	Wakes up a device on the network.
Write Line	<b>WL</b>	Writes a line of text to the MCG-2.

## **BG BACKGROUND**

---

PURPOSE: Set the background video for a page.

FORMAT: **BG,p**

p = 1 for background ON

p = 0 for background OFF

DESCRIPTION: Sets the background status for the currently selected page. Background status is stored on a page by page basis.

EXAMPLE:

**BG,1**

Sets background ON

## **CA CLEAR ALL**

---

PURPOSE: Clears all 10 pages in the MCG-2 memory.

FORMAT: **CA**

DESCRIPTION: Clears all 10 pages in the MCG-2 memory. This command does not clear the MCG-2 screen (See the **CD, CLEAR DISPLAY** command). For obvious reasons this command should be used with caution. This command needs no parameters.

EXAMPLE:

**CA**

Clear All Pages

## CD CLOCK DISPLAY

---

PURPOSE: Turns time and date display on or off.

FORMAT: **DS,x**

x = T for TIME display only

x = D for DATE display only

x = B to display BOTH time and date

x = O (Not zero) to turn OFF both time and date display

DESCRIPTION: This command sets the on/off status for the date and time of day displays. This display status is stored on a page by page basis. If the RTC option is not installed, issuing this command will produce a **REAL TIME CLOCK NOT INSTALLED** error.

EXAMPLE:

**DS,B**

Displays T/D on selected page

## **CL (or CLS) Clear PC Screen**

---

PURPOSE: Clears the PC Screen.

FORMAT: **CL** or **CLS**

DESCRIPTION: This command will send back to the PC a **CLEAR SCREEN** code to clear the PC's video screen. This is useful when the PC screen gets cluttered up from previous commands. Note: this command is used only when the MCG-2 is being controlled through a communications program, and is not intended for use with user written software.

EXAMPLE:

**CL**

Clears the PC monitor of text.

## **CP CLEAR PAGE**

---

PURPOSE: Clears one page.

FORMAT: **CP,p**

p = page number 1 through 10

DESCRIPTION: Clears the page indicated. Page is cleared in the MCG-2 memory only. This command does not clear the MCG-2 screen (See the **CD, CLEAR DISPLAY**).

EXAMPLE:

**CP,4**                      Clears page 4 in MCG-2 memory.

## CS CHARACTER SIZE

---

PURPOSE: Sets character size for a page.

FORMAT: **CS,x,y**

x = Horizontal size 1 through 4

y = Vertical size 1 through 4

DESCRIPTION: Sets character size for the current page. There are 16 sizes available (4 horizontal, 4 vertical). Character size is stored on a page by page basis. If there are more characters on a page in memory than will fit on the screen for the current character size, as many characters as is possible from the upper left portion of the page will be displayed. The following tables will show how many characters and lines will be displayed for different character sizes.

<u>Horz. size</u>	<u>No. of characters (per line)</u>
1	20
2	12
3	8
4	6

<u>Vert. size</u>	<u>No. of lines (per page)</u>
1	9
2	6
3	4
4	3

EXAMPLE:

**CS,2,2**

Sets character size to display 12 characters  
by 6 lines.



## **CV CLEAR VIDEO**

---

PURPOSE: Clears the MCG-2 Video Display.

FORMAT: **CV**

DESCRIPTION: This command clears the MCG-2 Video display screen but not any of the ten pages of the MCG-2 memory.

EXAMPLE:

**CV**                      Clears video display of generated text.

## **DL DATE LOCATION**

---

PURPOSE: Sets the position of the date (RTC) display.

FORMAT: **DL,xx,yy**

xx = Two digit horizontal position, 01 through 13

yy = Two digit vertical position, 00 through 09

DESCRIPTION: Sets the display position for date display maintained in the Real Time Clock option. If this option is not installed, issuing this command will produce a **REAL TIME CLOCK NOT INSTALLED** error. The display position is stored on a page by page basis.

EXAMPLE:

**DL,01,09**

Places date on line 9, starting at 1st character position.

## **DP DISPLAY PAGE**

---

PURPOSE: Displays a page, in the MCG-2 memory, on the screen.

FORMAT: **DP,p**

p = Page to be displayed 1 through 10

DESCRIPTION: The MCG-2 holds 10 pages of text. This command copies any one page to the screen. The contents of the pages in memory are unaffected.

If the character size for the page is larger than size 1 vert., 1 horz., only a portion of the page may be displayed. (See the **CS**, character size, command for more details).

EXAMPLE:

**DP,7**

Copies page seven to the screen.

**EP EDIT PAGE**

---

PURPOSE: Edit a page from a remote location.

FORMAT: **EP,p**

p = Page to be edited 1 through 10

DESCRIPTION: This command displays, on the PC, a copy of the referenced page to the PC and allows editing of the page, on a line by line basis, on the computer screen.

Page 7 ID01

	4	3	2	1	Line #
	THIS IS A TEST				1
					2
4	PLEASE STAND BY				3
3					4
2					5
1					6
	ONE MOMENT PLEASE				7
					8
					9

ENTER LINE NUMBER?\_\_

Computer Monitor Screen

Type ^C for command line. (^ is the Control Button on your PC.)

Type ^F to toggle Flash.

Type ^B to toggle Background.

After issuing this command, the MCG-2 asks for a line number. Enter the desired line. (Line numbers are printed on the right side of the box.) The text line is reprinted in the second box, and the third box down then is blanked. Enter the text for this line in the third box, then press return. Now the new text is printed back to the first box. Continue this process until all desired lines are entered. To exit **EDIT PAGE** press ^C.

When entering a line of text you may press ^F to set a part of the line to flash. Press ^F again to turn flash mode off.

The numbers on the left and top of the first box are a guide to indicate how many characters will fit across the MCG-2 screen for different character sizes.

For example, in the above figure for character size 3 horizontal, 4 vertical: only the word **THIS** would be displayed on the MCG-2 screen. Similarly, if the character size were 1 horizontal, 2 vertical, then the words **THIS IS A TEST** followed by **PLEASE STAND BY** would be displayed. However the words on line 7, **ONE MOMENT PLEASE**, would not be displayed.

When the MCG-2 is asking for a line number, you may also enter a ^B to toggle the background for the page.

Notes: This command edits pages in the MCG-2 memory only. To display an edited page, exit from **EDIT PAGE** and issue a **DISPLAY PAGE (DP)** command from the desired page.

To blank a line, choose the line, and enter a space.

Use the percent sign (%) to set a non-background (transparent) space.

This command is intended for use with a communications program and not with user written software.

Front panel controls will be inoperative while this command is executing.

The communications software used must be ANSI.SYS compatible (most are); also, you must have the statement `DEVICE=ANSI.SYS` in your **config.sys** file. See the documentation that came with your communications program for more detail.

## **HE HELP**

---

PURPOSE: Displays a help screen to the PC monitor.

FORMAT: **HE** or **HELP**

DESCRIPTION: This command displays, on the PC, a brief list of all of the remote control commands and their parameters. This listing may be exited from at any time by pressing ^C on the PC keyboard.

Front panel controls will be inoperative while this command is executing.

EXAMPLE:

**HE**

All available commands are displayed on the PC monitor

## **ID DISPLAY ID**

---

PURPOSE: Displays the network ID code on the MCG-2 screen.

FORMAT: **ID**

DESCRIPTION: The network ID code is the code used to access the MCG-2 with a **WAKE** command. This command displays the ID code on the MCG-2 screen. This is useful in diagnosing a network spread over a large area.

EXAMPLE:

**ID**

Identification # on video monitor.



## **MX MIXER**

---

PURPOSE: Sets display overlay On or Off.

FORMAT: **MX,x**

x = 1 for Mixer On (ONLINE)

x = 0 for Mixer Off (OFFLINE)

DESCRIPTION: This command sets the ONLINE (Mixer ON, characters are present) and OFFLINE (Mixer OFF, characters are NOT present) status of the MCG-2. The looped though video is not affected (other than the character overlay). The contents of the MCG-2 page memory are not affected.

EXAMPLE:

**MX,1**

Sets MCG-2 to ONLINE. ONLINE LED ON.

## **PC SET FOR PC ORIENTATION**

---

**PURPOSE:** Sets Edit Page command to use IBM PC extended “Line Draw” characters.

**FORMAT:** **PC,x**

x = 1 for IBM PC

x = 0 for non IBM PC

**DESCRIPTION:** Sets whether or not the **EDIT PAGE** command will use IBM PC (XT, AT) extended ASCII characters to build the “edit” boxes. This command is used when the MCG-2 will be controlled through non-IBM PC equipment, such as a dumb terminal. The default for this command is 1 for IBM PC. This setting is maintained in battery back RAM.

## **PP PAGE POSITION**

---

PURPOSE: Sets the position of the page on the screen.

FORMAT: **PP,x,y**

x = Horizontal position

y = Vertical position

DESCRIPTION: This command sets the horizontal and vertical position of a page on the screen. The page position may need adjustment after changing a character size, or you may want to position text over an object on the incoming video (such as redoing a telephone number on a commercial).

The numbers used to specify the vertical and horizontal positions are arbitrary. Probably the best way to determine what position you may want, for a given situation, is to manually adjust an MCG-2 to the position you want, and use the numbers on the screen (in the **SCREEN CONTROL** menu) to send with this command.

## **RD RUN DIAGNOSTICS**

---

PURPOSE: Runs diagnostic tests from a remote location.

FORMAT: **RD**

DESCRIPTION: This command is exactly the same command used in the utility menu and as such it displays the results of the tests on BOTH the MCG-2 screen and the PC screen. The results of the RS232 loop test are not sent to the PC as a loop plug cannot be installed while the PC is connected to the MCG-2. However, if you would like your software to be able to conduct the RS232 loop test, simply echo back all characters sent by the MCG-2 after the results of the ROM test. The test string sequence, in ASCII, is as follows:

**(space)1234567890(space)abcdefghijklmnopqrstuvwxy**

**(space)1234567890(space)ABCDEFGHIJKLMNPOQRSTUVWXYZ**

Spaces are 32d (ASCII).

Possible results of the RAM and ROM tests are as follows:

Testing RAM...(space)RAM Test Passed!

Testing RAM...(space)RAM Test Failed.

Testing ROM...(space)ROM Test Passed!

Testing ROM...(space)ROM Test Failed.

Each line ends with a carriage return (13d), linefeed (10d).

One easy way to interpret the results of the tests is to look for either a period or an exclamation point just before the carriage return, line feed.

## RL READ LINE

---

PURPOSE: Reads one line from the MCG-2 memory.

FORMAT: **RL,p,l**

p = Page number 1 through 10

l = line number 1 through 9

DESCRIPTION: This command reads any line in the MCG-2 memory, given the page and line number. Results are in ASCII. However, if a character is displayed in bold (meaning **BG**-Background is On) or is flashing, the corresponding ANSI.SYS codes will also be sent.

Codes are defined as follows:

<u>Function</u>	<u>ANSI code</u>
Bold on	ESC[7m
Flash on	ESC[5m
All attr. off	ESC[0m

Note that ESC is ASCII code 27d.

EXAMPLE: If the string **THIS IS A TEST** is in the MCG-2 memory at page 1, line 1 and the word **IS** is flashing the sequence read by the command **RL,1,1** would be:

THIS ESC[5misESC[0m A TEST

followed by a carriage return (13d), and line feed (10d).

If there were no flashing or bolded characters the sequence read would be

THIS IS A TEST

again followed by a carriage return (13d), and line feed (10d).

## **SC SET CURRENT PAGE**

---

**PURPOSE:** Provides a means of setting the current page without affecting the video display.

**FORMAT:** **SC,p**

p = page number 1 through 9

**DESCRIPTION:** This command is used in conjunction with commands that affect the current page. This command allows the current page to be changed without affecting the video display, so that undisplayed pages may be changed or edited while another page is being displayed.

**EXAMPLE:**

<b>DP,1</b>	Display Page 1 to Video Screen
<b>SC,5</b>	Current Page is now 5
<b>BG,0</b>	Set Page 5 Background OFF
<b>PP,12,21</b>	Set Current Page (5) to 12 Horizontal, 21 Vertical
<b>DP,5</b>	Display Page 5

## **SD SET DATE**

---

PURPOSE: Sets the date maintained in the RTC option.

FORMAT: **SD,mm-dd-yy**

mm = Two digit month 01 through 12

dd = Two digit date 01 through 31

yy = Two digit year 00 through 99

DESCRIPTION: This command sets the date maintained in the RTC option. The Real Time Clock will automatically detect and adjust for leap year. If the RTC option is not installed, issuing this command will produce a **REAL TIME CLOCK NOT INSTALLED** error.

EXAMPLE:

**SD, 03-15-00** Sets RTC date to March 15, 2000

## **SP SLEEP**

---

PURPOSE: Puts all devices in the network to sleep.

FORMAT: **SP**

DESCRIPTION: This command is used when you want to switch control from one MCG-2 to another MCG-2 on the network. The sleep command causes all MCG-2's on the network to ignore all data sent to them except for the **WAKE** command. See the **WAKE** command.

The MCG-2 front panel controls are always active regardless if the MCG-2 is asleep or awake.

EXAMPLE: The following sequence will access two MCG-2's and send each some commands.

<b>WK,01</b>	Unit with ID 01 is awake
<b>DP,10</b>	Display page 10 on unit 01
<b>SP</b>	Put all units to sleep
<b>WK,02</b>	Now accessing unit 02
<b>CP,5</b>	Clears Page 5 of unit 02



## SR SET RESPONSES

---

PURPOSE: Turns responses from commands on or off.

FORMAT: **SR,x**

x = 2     “>” prompt

x = 1     Responses ON

x = 0     Responses OFF

DESCRIPTION: When responses are set to off, the corresponding MCG-2 will not send ANY data to the PC but will still accept commands. Also, the MCG-2 front panel controls become inoperative. There are basically three situations where you might want to use this command. First, if you want to send commands to more than one unit at a time (see the example below). This way, the MCG-2's on the network won't try to all talk at once. Second, if you want to send commands at high speed (9600 baud - no wait between characters). Because the MCG-2 won't have to spend time echoing back received characters or processing the signals from the front panel controls, it will have more time to process incoming characters at high speed. The third situation is to lockout the front panel controls on the MCG-2 to prevent unauthorized use.

Caution: When sending a **WAKE** command, it is possible to think that an MCG-2 is hung up because the **WAKE** command didn't send a response, when really the unit has had its responses set to off. Also if a unit is in **SLEEP** mode it will not respond to an **SR,1** command. When responses are set to **OFF**, the Yellow REMOTE LED will glow constantly as a reminder.

EXAMPLE: The following sequence will send a command to more than one unit:

<b>SP</b>	All units asleep
<b>WK,01</b>	Unit 01 is awake
<b>SR,0</b>	Responses for unit 01 are OFF
<b>WK,02</b>	Unit 02 is awake
<b>SR,0</b>	Responses for unit 02 are OFF
<b>WK,03</b>	Unit 03 is awake
<b>SR,0</b>	Responses for unit 03 are OFF
<b>WL,1,1,TESTING</b>	Write TESTING to all awake units
<b>SP</b>	Put all units to sleep
<b>WK,01</b>	Unit 01 is awake
<b>SR,1</b>	Responses for unit 01 are ON
<b>SP</b>	Put all units to sleep
<b>WK,02</b>	Unit 02 is awake
<b>SR,1</b>	Responses for unit 02 are ON
<b>SP</b>	Put all units to sleep
<b>WK,03</b>	Unit 03 is awake
<b>SR,1</b>	Responses of unit 03 are ON
<b>SP</b>	Put all units to sleep

## **ST SET TIME**

---

PURPOSE: Sets the time maintained in the RTC option.

FORMAT: **ST, hh:mm:xx**

hh = Two digit hour, 01 through 12 (or 01 through 23 for MT)

mm = Two digit minute, 00 through 59

xx = MT (Military 24 hour mode), AM or PM

DESCRIPTION: This command sets the time of day maintained in the RTC option. The Real Time Clock can operate in military (24 hour) or standard (12 hour) formats. To operate in military time use MT in place of xx above, to operate in standard time use AM or PM. If the RTC option is not installed, issuing this command will produce a **REAL TIME CLOCK NOT INSTALLED** error.

EXAMPLE:

**ST,04:59:PM** Sets RTC to 4:59 PM

## TF TIME FORMAT

---

PURPOSE: Sets the display format for the time of day.

FORMAT: **TF,x**

x = 1 for no seconds displayed (12:59)

x = 2 for AM/PM indicator (12:59 AM)

x = 3 for seconds display (12:59:59)

DESCRIPTION: This command sets the time of day display format. The time format is stored on a page by page basis. If the RTC option is not installed, issuing this command will produce a **REAL TIME CLOCK NOT INSTALLED** error.

EXAMPLE:

<b>TF,3</b>	Sets RTC for Seconds Display
<b>TL,13,09</b>	Time to be displayed in lower right corner
<b>CD,T</b>	Turn on Time display

## **TL TIME LOCATION**

---

PURPOSE: Sets the display position of the time of day (RTC) display.

FORMAT: **TL,xx,yy**

xx = Two digit horizontal position, 01 through 13

yy = Two digit vertical position, 00 through 10

DESCRIPTION: Sets the display position for the time display maintained in the Real Time Clock option. If this option is not installed, issuing this command will produce a **REAL TIME CLOCK NOT INSTALLED** error. The display position is stored on a page by page basis.

## **UP UPDATE PAGE**

---

**PURPOSE:** Displays a page, in the MCG-2 memory, on the screen.

**FORMAT:** **UP,p**

p = Page to be displayed 1 through 10

**DESCRIPTION:** The MCG-2 holds 10 pages of text. This command copies any one page to the screen. The contents of the pages in memory are unaffected.

If the character size for the page is larger than size 1 vert., 1 horz., only a portion of the page may be displayed. (**see the CS CHARACTER SIZE** command for more details).

This command operates exactly the same as **DP DISPLAY PAGE**, only it doesn't cause a flash on the video screen. Note that using this command to update a page that has a different character size than the currently displayed page may cause a brief over write of the sync in the video signal. Generally this over write is not long enough to cause any noticeable change in the displayed video. The over write will not occur if changing to a page with the same character size. The **DP DISPLAY PAGE** command will not over write sync.

**EXAMPLE:**

**UP,7**

Copies page seven to the screen.

## **VN VERSION NUMBER**

---

PURPOSE: Displays the ROM firmware version number to the PC monitor.

FORMAT: **VN**

DESCRIPTION: This command displays the version number of the ROM firmware and a copyright statement to the PC monitor. It is not displayed on the video out monitor.

EXAMPLE:

**VN**

Version # is displayed on PC monitor

## **WK WAKE**

---

PURPOSE: Wakes up an MCG-2 that is in sleep mode.

FORMAT: **WK,id**

id = Two digit network ID code

DESCRIPTION: This command is used when you want switch control of the PC to another MCG-2 on the network. The **WAKE** command causes the referenced MCG-2's to start accepting data after previously being asleep. See the **SLEEP** command.

Also see “Waking up the MCG-2” in the Remote control tutorial.

The ID code may be a hexadecimal number in the range 01 to FF.

EXAMPLE:

<b>WK,01</b>	Unit 01 is awake
<b>SP</b>	Unit 01 is asleep
<b>WK,F7</b>	Unit F7 is awake
<b>SP</b>	Unit F7 is asleep



## **WL WRITE LINE**

---

PURPOSE: Write a line of text to the MCG-2 memory.

FORMAT: **WL,p,l,text**

p = Page number (1 through 10) of where text will go.

l = Line number (1 through 9) of page where text will go.

text = Text to be sent to page, 20 characters max.

DESCRIPTION: This command will send one line of text to the MCG-2 memory.

To cause a character to flash, embed an underline (   ) in the text portion of the command. The first underline will turn the flash function ON, the second underline turns the flash OFF.

EXAMPLE:

**WL,2,5,THIS IS A TEST**

Will write THIS IS A TEST  
to page 2, line 5.

**WL,2,5,THIS IS FLASH!**

Will cause the text FLASH to flash;  
note that the exclamation point  
does not flash.

## ASCII Code to MCG-2 Display Convert Table

ASCII Code	ASCII Char.	Displayed Character	ASCII Code	ASCII Char.	Displayed Character
32	space	background space	70	F	F
33	!	!	71	G	G
34	"	"	72	H	H
35	#	telephone	73	I	I
36	\$	foreground box	74	J	J
37	%	transparent space	75	K	K
38	&	&	76	L	L
39	'	'	77	M	M
40	(	(	78	N	N
41	)	)	79	O	O
42	*	*	80	P	P
43	+	+	81	Q	Q
44	,	,	82	R	R
45	dash	dash	83	S	S
46	.	.	84	T	T
47	/	/	85	U	U
48	0	0	86	V	V
49	1	1	87	W	W
50	2	2	88	X	X
51	3	3	89	Y	Y
52	4	4	90	Z	Z
53	5	5	91	[	kanji (Year)
54	6	6	92	\	kanji (Month)
55	7	7	93	]	kanji (Day)
56	8	8	94	^	up arrow
57	9	9	95	underline	dash
58	:	:	96	'	hoarfrost symbol
59	;	;	97	a	A
60	<	left arrow	98	b	B
61	=	=	99	c	C
62	>	right arrow	100	d	D
63	?	?	101	e	E
64	@	raised dot	102	f	F
65	A	A	103	g	G
66	B	B	104	h	H
67	C	C	105	i	I
68	D	D	106	j	J
69	E	E	107	k	K

<u>ASCII Code</u>	<u>ASCII Char.</u>	<u>Displayed Character</u>
108	l	L
109	m	M
110	n	N
111	o	O
112	p	P
113	q	Q
114	r	R
115	s	S
116	t	T
117	u	U
118	v	V
119	w	W
120	x	X
121	y	Y
122	z	Z
123	{	(
124		down arrow
125	}	)
126	~	~
127	null	transparent space

Note: Codes from 0 through 31 and 128 through 159 are not used.  
Codes 160 through 255 display the same characters as 32 through 127 except the characters will be flashing on the Video output.

## RTC (REAL TIME CLOCK) OPTION

### Introduction:

The RTC (Real Time Clock) option for the MCG-2 allows the MCG-2 to maintain the date and time of day, and displays these on the video display. Time keeping is battery backed so the RTC will maintain time and date information when power to the unit is off. The RTC maintains date information as follows: month, date, and year. Leap year is detected and corrected for on leap years. For time information the RTC maintains hours, minutes, seconds and AM/PM status. The RTC will work in military time (24 hour format) or standard time (12 hour format).

### Installation:

The RTC option is a small printed circuit board that installs on the inside of the MCG-2. Proceed as follows:

1. Turn off the power to the MCG-2.
2. Remove the two screws on the face of the unit.
3. Gently pull the front cover plate forward.
4. Slide the top cover forward and remove.
5. Locate the lithium battery. It is positioned towards the front of the unit, it is silver, about the size of a quarter, and is sitting in a black holder. Directly behind the lithium battery (looking from the front of the unit) is a black connector with 20 holes. This is the connector for the RTC.
6. Remove the RTC board from its plastic bag. Note, to avoid damaging the RTC and the MCG-2 by static electricity, be sure to electrically discharge yourself before removing the RTC board from its bag.
7. With the power off, insert the RTC into the black 20 hole connector, long end toward the rear of the MCG-2. (You should still be able to see the lithium battery after the RTC is installed.)

- Be sure that none of the pins bend, and that all of the pins and connector holes line up, assuring that there is no misalignment.
8. Reassemble the unit being careful not to over tighten the screws. (Do not tighten more than 1/8 turn past seated).

## Resetting the RTC:

The very first time the RTC is powered up it must be reset (this only needs be done once) and then set to the proper time/date. Proceed as follows: Press and HOLD the **PLUS** button of the MCG-2 unit WHILE turning on the power switch. The screen should flash **RTC INSTALLED** followed by **RTC SET TO ZERO**. This message indicates that the MCG-2 found the RTC and that the RTC was installed properly. If you don't get this message then the RTC was not properly installed – go to the beginning of this section and make sure that you did everything correctly.

## Setting the Time and Date:

Go to the **UTILITY MENU** and select **SET CLOCK**. Using the **PLUS** or **MINUS** keys set **AM/PM** or **MT** for military time. Note, in setting the time, **AM/PM/MT** must be set first. Move to the other items to set hours, minutes, and the date. To exit press either the **MENU** or **DISPLAY** key. Upon exiting, the seconds will be set to **00** and the RTC will start (when in the setting mode the RTC is stopped).

## Turning on the Time and Date Display:

Go to the **SCREEN CONTROL MENU** and select **CLOCK DISPLAY**. The items for time and date display position are self explanatory, however the items **TIME FORMAT** and **DISP STATUS** will need some explanation.

**TIME FORMAT** sets the format for which the time of day is displayed.

If set for 1, only hours and minutes are displayed (**12:59**). If set for 2, an **AM/PM** indicator is displayed (**12:59 AM**). If set for 3, then hours, minutes, and seconds are displayed (**12:59:59**).

**DISPLAY STATUS** turns the Time and Date display On or Off. Cycling through with the PLUS or MINUS keys produces: **T** for Time display only, **D** for Date display only, **T&D** for both Time and Date display, and **OFF** to turn off both the Time and Date display.

Note that **TIME POSITION**, **DATE POSITION**, **TIME FORMAT** and **DISPLAY STATUS** are stored on a page by page basis, so it is possible to have a different setup for each page. Issuing a **MASTER RESET** will reset these items.

## NOTES ON **MASTER RESET**:

The **MASTER RESET** (found on the **UTILITY MENU**) resets the MCG-2 to factory defaults as follows (for all 10 pages of memory):

- Character size: Smallest.

- Display position: Centered.

- Background: OFF.

- Baud rate: 9600 baud.

- Device ID: 01.

- Clock display: OFF.

With the RTC installed:

- Date display position horizontal 04, vertical 09.

- Time display position horizontal 13, vertical 09.

- Time and date display status OFF.

- Time format set to #3 (seconds display).

The **MASTER RESET** can be used to recover from a FLASHING POWER LED condition, and may be needed after replacing the Lithium battery. If, after replacing the battery, improper operation is observed, then **MASTER RESET** is required. Be warned that using the **MASTER RESET** will set all page attributes to the factory default setting. It does not erase the text pages. If you want to erase all the pages, use **CLEAR ALL PAGES** on the **SCREEN CONTROL MENU**.

## TROUBLESHOOTING & FLASHING LED's:

Your MCG-2 was designed to be reliable and easy to operate, and features RAM Memory Error Detection. If an error in the battery backed RAM memory should occur, (may be caused by the internal battery being run down after a loss of AC power or by a glitch on the AC power line) the POWER (green) LED will flash rapidly indicating the error.

To recover from a flashing POWER LED condition issue a **MASTER RESET** from the **UTILITY MENU**.

If the error was detected on power up, the video screen will be blanked (so that possible garbage won't be displayed). Pressing the MENU button on the MCG-2 will automatically bring you to the **MASTER RESET** selection on the **UTILITY MENU**.

The **MASTER RESET** function is not available from remote control, and a flashing POWER LED condition is not detectable by remote control. The reason for this is that the serial baud rate information is stored in battery backed RAM; if the RAM contents have an error (the RAM scrambled) then the baud information is likely to be wrong, in which case serial communication would not be possible.

If your MCG-2 should not function as you think it should, try switching the power off and on again. Also you might try a **MASTER RESET**; however, be warned that character sizes, baud rate and other information will be reset. (See the section NOTES ON MASTER RESET for more information.)

If you are experiencing trouble with remote control, check the following:

Are you using the proper 4-conductor RJ-11 cable?

Are the RS232 connectors plugged into the correct positions?

On the MCG-2? On the computer?

Does the baud rate you are using match the number set in the utility menu?

Be sure that your PC is set for 8 data bits, 1 stop bit, and no parity.



Be sure that the command(s) you are using are correct. (Look them up in the COMMAND reference.)

In writing your own software, be sure to have a short delay between lines sent to the MCG-2. (See the **README.DOC** file on the example programs diskette for more information.)

If you are writing your own software, the MCG-2 may be reporting errors that you don't know about (your software may not read response information or responses have been turned off). One thing that is highly recommended in writing your own software, is to run a communications program on the PC computer, execute the commands that you think might be giving you trouble one by one, and see what responses (errors) come from the MCG-2. Executing the commands one by one also gives you a chance to see what exactly the MCG-2 does and/or needs in your particular circumstance.

## JUMPER SETTINGS:

The MCG-2 has two internal jumpers: J11 and J9. J9 is the 75 ohm termination for VIDEO IN. Jumper J9 installed terminates the incoming video with 75 Ohms. If J9 is not installed, the video input is HiZ. J11 sets the loop through for the RS232 connections. J11 is a two position jumper. Inserting the jumper toward the middle of the unit buffers the RS232 line, toward the outside is unbuffered. See the section on Battery Replacment for instruction on how to open the MCG-2.

From the factory the jumpers are set as follows: J9: IN (75 Ohms), J11: Unbuffered Position.

The 75 ohm termination is normally on. The only time it would need to be changed is if you are feeding several MCG-2 units from the same video source. (See VIDEO CABLING in Section Two for more information).

Normally the RS232 loop through is unbuffered. The only time you might want to set J11 for buffered is if you are using several MCG-2 units over VERY long cables.

## ERROR MESSAGES:

The RS232 remote control ROM software has five error messages as follows:

### **#1 Error - Unknown command.**

The MCG-2 did not understand the command you sent it. The command is probably misspelled. Look up the command in the Command Reference Section.

### **#2 Error - Bad parameter.**

One or more of the parameters in a command sent to the MCG-2 is either too large, or too small, or of the wrong type (letters were sent when the command wanted numbers or vice versa). Also this error can occur if not enough or too many parameters are sent. Look up the command in the Command Reference Section.

### **#3 Error - Real time clock not installed.**

This error occurs when a RTC command is issued but the RTC option is not installed.

### **#4 Error - Command unavailable.**

This is an error that you are not likely to see. It is only produced with custom ROM software and for special purposes at the factory.

### **#5 Error - Comma missing or misplaced.**

This error may be produced by not having enough commas in a command sequence. In issuing a command there must be a comma after the command to separate the command from its parameter(s).

Also if the command has more than one parameter a comma must separate each parameter. This error may also be produced if a comma is misplaced. This would be the case if a command wanted two digit parameters and was issued with single digit parameters. Example: The page position command (**PP**) needs two digit parameters. The command sequence **PP,9,6** would produce an error, while the command sequence **PP,09,06** would not.

## BATTERY REPLACEMENT:

Your MCG-2 uses a 3V Lithium watch battery (BR2325/CR2325 or equivalent). This battery should last 10 years (3 years if RTC is installed). Battery replacement is indicated by one or more of the following:

1. A “flashing power LED” condition whenever the unit is powered up.
2. Time and date (with the RTC option) and buffer information is not correctly maintained when power is off for any length of time.
3. Baud rate and other settings not correctly maintained when power is off.

If you take care in replacing the battery, with the Power On, then none of the stored data will be lost.

To replace the battery, proceed as follows:

1. Remove the two screws on the face of the unit.
2. Gently pull the front cover plate forward and down.
3. Slide the top cover forward and remove.
4. The battery is silver, about the size of a quarter, and is sitting in a black holder. Using a small screwdriver, gently remove the battery, being VERY careful not to over bend the metal tab holding the battery in place.
5. Locate the plus symbol (+) on the new battery and insert the new battery plus (+) side up. BE VERY CERTAIN THAT THE PLUS (+) SIDE IS UP.
6. Reassemble the unit being careful not to over tighten the screws. (Do not tighten more than 1/8 turn past seated).

The battery may be replaced with the power on to maintain the buffer data, and date and time (with the RTC option).

## SPECIFICATIONS:

Power: 12 to 15 volts DC at 300mA (Polarity insensitive) or via 120 Vac - 12Vdc wall module.

Size: 5.6W x 1.5H x 7.3D inches.

Video: Input - 1 volt PP composite terminated in 75 ohms.

Output - 1 volt PP composite with text overlay (short circuit protected).

Keyer: Internal keyer (overlay).

Background and character brightness separately adjustable from 7.5 IRE setup (Black) to 100 IRE (100% White)

Character Size: 16 height and width combinations, as follows:

Height 1 - 28 scan lines

Height 2 - 56 scan lines

Height 3 - 84 scan lines

Height 4 - 112 scan lines

Width 1 - 20 characters per line

Width 2 - 13 characters per line

Width 3 - 9 characters per line

Width 4 - 6 characters per line

Selectable background and blink modes.

Storage: 10 pages of 180 characters each (Battery backed).

Remote control:

May be remotely controlled or function as a stand-alone unit.

Remote control via RS232 link to PC computer.

Simple two letter remote control commands.

Units may be "daisy chained" to form a network controlled by one PC computer.

Uses inexpensive RJ11 (telephone) cable.

Accessories:

RS232 to RJ11 adapter

3 foot RJ11 cable

Remote control example programs diskette

User manual

120Vac - 12Vdc wall adapter

Options:

Real Time Clock (RTC) - Maintains time and date, battery backed.