Unique Micro Design
Advanced Thinking Products

Model 231 & 232
Customer Displays
User Manual

Revision History		
Date	Issue	Comments
07/08/95	1	First issue in new format

1. Introduction

This manual provides basic information about connecting and programming the Unique Micro Design Model 231 and Model 232 customer displays.

The *Unique Micro Design* Model M231 and Model M232 customer displays are attractive vacuum fluorescent units, designed for all Point of Service applications. The M231 feature a single line display of 20 characters, making it ideal for displaying item prices at a check-out. The M232 features 2 lines of 40 characters for applications where the customer requires more detailed information.

A feature of both displays is a stand alone carousel message mode. In this mode, messages may be stored in non-volatile memory, to be played back on call, or when the system is idle. This is excellent for promotional and advertising messages. The stand alone carousel message mode allows up to 8 separate messages to be stored in non-volatile memory. These messages, may be up to 256 characters each, or longer text may flow to the next message area. In this way it is possible to produce message sizes up to a single message of about 2000 characters. These may then be replayed at power up, when the system is idle, or when called by the software.

The M231 and M232 are available with either serial RS232C or parallel interfaces. They are ideal for connection directly to a PC port, the *UMD* M125ID intelligent cash drawers with the display option, or any of the *UMD* **ProtoLink** family of products. Power is provided from an external 9V DC plug pack which is supplied with the unit.

2. Connector Details.

There are 2 connectors on the M23x displays. These are for power and interface connection, and are at the rear of the display's base.
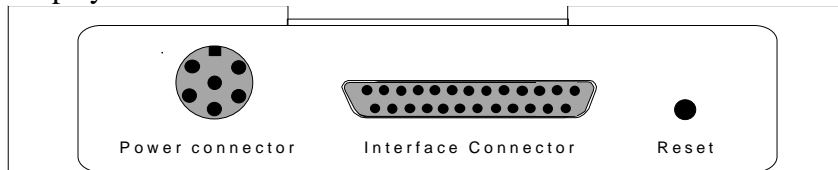

Location of connectors

2.1 Power interface connector

The display may be powered from either a 9V DC unregulated or a 5V DC regulated power source. When a 9V supply is used, the display provides a +5V DC regulated output on pin 4. (The 9V plug pack is supplied as standard.) The power connector is a 270° 6 pin DIN socket configured as per diagram below.

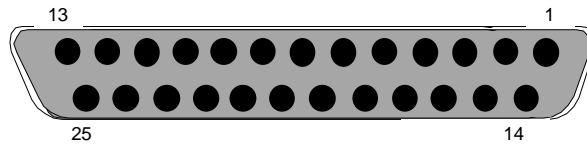| Pin	I/O	Description
1	-	Ground
2	i/p	Unreg +9V DC
3	-	reserved
4	o/p	+5V DC regulated out
5	i/p	+5v DC regulated in
6	-	reserved
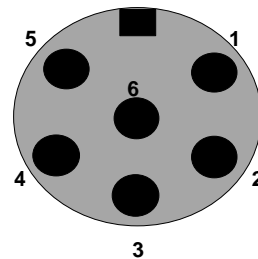
As viewed from rear of display

2.2 Reset button

The reset button physically resets the microprocessor, forcing the controller to perform a power up sequence. It will not clear the stored carousel messages.

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2.3 Interface connection

The interface connector is a DB25 socket as pictured below.

Caution: As both serial and parallel versions of the display use a DB25 connector, ensure a serial cable is used with the M23x-*S*M, and a parallel cable for the M23x-*P*M.

Interface connector on rear of display base

2.4 RS232 Interface.

The serial connection is only available on the M231-*S*M and M232-*S*M model displays.

Pin	I/O	Description
2	o/p	TxD (data out)
3	i/p	RxD (data in)
4	o/p	RTS (tied to +10V DC)
5	i/p	CTS
7	-	Signal ground
16	i/p	Data (sync mode) TTL level
17	i/p	Clock (sync mode) TTL level
20	o/p	DTR

DB25 female Serial Connections

Serial cable - CA205 (D9 to display)

D9F			**D25M**
TxD 2			3
CTS 5			20
DSR 6			
SG 7			7

2.5 Parallel interface.

 The parallel connection is only available on the M231-*P*M and M232-*P*M model displays. The UMD cable CA139, shown below, details the pin outs required.

PC parallel interface DB25M   M23x-PM parallel interface DB25M

Pin		Pin
1	Strobe	1
2	Data 0 (+)	2
3	Data 1 (+)	3
4	Data 2 (+)	4
5	Data 3 (+)	5
6	Data 4 (+)	6
7	Data 5 (+)	7
8	Data 6 (+)	8
9	Data 7 (+)	9
10	Acknowledge	10
11	Busy (+)	11
12	Paper end (+) tied low	12
13	Select (+) tied high	13
14	Autofeed (-)	14
15	Error (-) tied high	15
16	Initialise	16
17	Select input	17
18	Ground	18
19	Ground	19
20	Ground	20
21	Ground	21
22	Ground	22
23	Ground	23
24	Ground	24
25	Ground	25

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3. Programming

The customer displays accept ASCII characters from their input port. The on-board microprocessor interprets control codes and UMD standard <DLE> commands, and performs the required functions. All other ASCII characters are passed on to be displayed.

3.1 Control Codes

These control the movement of the cursor and allow for the selection of 2 different display modes.

The Model 231 and Model 232 customer displays respond differently within these 2 modes.

M231 display modes

ASCII	Hex	Dec	Function
DC2	12	18	**Horizontal scroll mode** When the cursor reaches the last position, all characters are shifted to the left with the new character displayed in the last position.
DC4	14	20	**Auto carriage return mode** When the cursor reaches the last position, it is repositioned to the first position without performing a line feed, ie. doesn't clear the display.

M231 Control Codes

ASCII	Hex	Dec	Function
BS	08	8	The cursor moves 1 position to the left (without deleting the existing character)
HT	09	9	The cursor moves 1 position to the right (without deleting the existing character)
LF	0A	10	**When in <LF> Valid mode** All characters are cleared while the cursor position remains unchanged **When in <LF> Ignore mode** no effect - control code is ignored
FF	0C	12	Clears the display and cursor returns to the home position
CR	0D	13	Moves cursor to the home position. (does not clear display)

M232 Display Modes

ASCII	Hex	Dec	Function
DC2	12	18	**Scroll mode** After all positions on the bottom line are written, the bottom line scrolls up to replace the top line and clears the bottom line. The cursor is postitoined to the first position on the bottom line.
DC4	14	20	**Normal Mode** When the cursor reaches the end of the second line, the cursor repositions to the first position of the top line. The display is not cleared, subsequent characters over-write the existing displayed characters

M232 Control Codes

ASCII	Hex	Dec	Function
BS	08	8	The cursor moves 1 position to the left (without deleting the existing character)
HT	09	9	The cursor moves 1 position to the right (without deleting the existing character)
LF	0A	10	**When in Normal mode** The cursor is moved to the same position on the other line. **When in Scroll mode** When the cursor is on the bottom line, all characters are shifted to the top line, the bottomline is cleared with the cursor remaining in the same position. When the cursor is on the top line, the cursor simply moves down to the same position on the bottom line (over writes display, does not clear the display) **When in <LF> ignore mode** no effect - the control code is ignored
FF	0C	12	Clears the display and cursor returns to the home position, ie position 1 top line.
CR	0D	13	Moves cursor to the home position. (does not clear display)

Note:
<LF> **Ignore** and <LF> **Valid** modes are selected by <DLE> commands as described in the next section.

3.2 <DLE> Command Codes

ASCII	HEX	DEC	Function
<DLE>	10	16	Pass single <DLE> to seleted destination
0	30	48	Output data to display (default device) Ends store message command
4	34	52	Output data to the display Ends store message command
5	35	53	Ends store message command
6	36	54	Ends store message command
>	3E	62	<LF> Ignore mode - (default for M231)
?	3F	63	<LF> Valid mode - (default for M232)
@	40	64	Enable XON/XOFF protocol (default)
A	41	65	Enable XON/XOFF protocol
N	4E	78	Store carousel message 0
O	4F	79	Disable display message 0 on power up
Q	51	81	Enable display message 0 on power up
R	52	82	Display carousel message 0 Ends store message command
S abcd	53	83	Interchange delay of ab.cd seconds
T abcd	54	84	Delay ab.cd seconds
X abcd	58	86	Position cursor at column ab line cd
n a	6E	110	Store carousel message number "a"
r a	72	114	Display carousel message number "a"

<DLE> Commands

These are primarily used to program the carousel display messages. The display's internal microcomputer checks the data for escape sequences. The escape character used by the display is the ASCII Data Link Escape (<DLE>) control code character (hex 10, decimal 16).

(<DLE>) - (10 Hex) - (16 Dec) - Pass single <DLE> to selected destination

This is the escape character which tells the internal processor the next sequence of data is a command and is therefore not passed onto be displayed. The <DLE> command must preceed all the commands in this section.

eg. To display carousel message 0 the ASCII command would be:
        <DLE> 4 <DLE> R

This example first tells the processor to send all output to the display (<DLE>4) then to output carousel message 0 (<DLE>R).

(0) - (30 Hex) - (48 Dec) Output data to display

It is necessary to tell the processor where to send the data. This command directs the data to the *default* device which is in this case is the display. It is not necessary to use this command each time data is sent to the display. Once the processor is told to send data to the display, all subsequent data will be directed to the display until redirected by another command.

This command will also terminate the "Store carousel message" comands (<DLE> N & <DLE> n a).

(4) - (34 Hex) - (52 Dec) Output data to the display
This command, as with <DLE> 0, directs all data to the display (whether it is the default device or not)
This command will also terminate the "Store carousel message" comands (<DLE> N & <DLE> n a).

(5) - (35 Hex) - (53 Dec)   End store carousel message command
This command will terminate the "Store carousel message" commands (<DLE> N & <DLE> n a).

(6) - (36 Hex) - (54 Dec)   End store carousel message command
This command will terminate the "Store carousel message" comands (<DLE> N & <DLE> n a).

(>) - (3E Hex) - (62 Dec) <LF> ignore mode
In this mode the display will ignore any Line Feed command. This is the default setting for the M231 display. (Refer to the control code section Page 8 of this manual for more detailed information.)

(?) - (3F Hex) - (63 Dec) <LF> Valid mode
In this mode all Line Feed commands are performed. This is the default setting for the M232 display. (Refer to the control code section Page 9 of this manual for more detailed information.)

(@) - (40 Hex) - (64 Dec) Enable XON/XOFF serial protocol
Enables XON/XOFF software handshaking. (Serial interface displays only.)

(A) - (41 Hex) - (65 Dec) Disable XON/XOFF serial protocol
Disables XON/XOFF software handshaking. (Serial interface displays only.)

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(N) - (4E Hex) - (78 Dec) Store carousel message 0

This code tells the processor that all following data is to be stored in carousel message area 0. Any previous messages stored in area 0 will be deleted. Data will be directed to this area until one of the "*End Store Carousel Message* commands" is sent. (ie. <DLE> 0, 4, 5, 6, R or r.) Message areas hold a maximum of 256 characters. If the data sent to a message area exceeds 256 characters, they will over-run into the next message area.

(O) - (4F Hex) - (79 Dec)   Display carousel message 0 on power-up

It is possible to have the contents of message area 0 displayed when the display is first turned on. This command disables this feature.

(Q) - (51 Hex) - (81 Dec)   Enable display carousel message 0 on power-up

When the display is turned on, it will, after initial self-diagnostics, display the carousel message 0.

(R) - (52 Hex) - (82 Dec) Display carousel message 0

This command will display the contents of carousel message area 0. It will also end the "store carousel message" comands.

(S abcd) - (53 Hex) - (83 Dec) Interchange delay

This command sets the delay time before each individual character is sent to the display. Delay times are in the order of ab.cd seconds, where "abcd" are ASCII digits in a range of 0 to 9. eg "<DLE>S 1900" means a delay of 19.00 seconds between the display of each character. This command is cancelled by specifying a delay of 00.00 secs. eg <DLE>S 0000.

Note: As the processor will normally execute <DLE> commands immediately, it is necessary to *embed* them in a message with the

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use of a second <DLE>. In this way, the delay will only take affect at the correct point in the message. eg.<DLE> <DLE>S1900.

(T abcd) - (54 Hex) - (84 Dec) Delay ab.cd seconds
This command sets a delay time before the next character is sent to the display or the next command is processed. Delay times are in the order of ab.cd seconds, where "abcd" are ASCII digits in a range of 0 to 9. eg "<DLE>T 1500" means a delay of 15.00 seconds before the next character is displayed.
Note: As the processor will normally execute <DLE> commands immediately, it is necessary to *embed* them in a message with the use of a second <DLE>. In this way, the delay will only take affect at the correct point in the message. eg.<DLE> <DLE>T1500.

(X abcd) - (58 Hex) - (86 Dec) Position cursor
The cursor may be moved to any position with this command. "abcd" is the location where ab represents the column number, and "cd" the line number. "0000" represents the home position. "abcd" are ASCII value from 0 to 9.

(n a) - (6e Hex) - (110 Dec) Store carousel message no. "a"
Use this command to store a message in any of the 8 message areas where "a" is an ASCII character from 0 to 7. All subsequent data is stored in the chosen message area. Previously stored data is cleared.

(r a) - (72 Hex) - (114 Dec) Display carousel message no. "a"
This command is used to display a stored carousel message, where "a" is an ASCII digit from 0 to 7.
It also ends the store carousel message command.

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4. Default Modes

On power-up, or when the display is reset, the customer display reverts to the following default settings.

M231 defaults:
- horizontal scroll mode
- <LF> ignore mode
- XON/XOFF protocol enabled (serial interface displays only)
- display carousel message "0" on power-up disabled

M232 defaults:
- scroll mode
- <LF> valid mode
- XON/XOFF protocol enabled (serial interface displays only)
- display carousel message "0" on power-up disabled

5. Carousel Messages

With the carousel message mode of operation, messages can be stored in non-volatile memory for later play back. Any messages stored will be retained permanently until over-written, even when the display is turned off. This facility is useful for displaying promotinal information during non-active periods.

5.1 Message areas

The carousel message memory is divided into 8 areas, numbered 0 to 7. Each seperate area can hold up to 256 characters.
Messages longer than 256 characters can be stored by one of two methods.
- by imbedding "display message number a" commands within a message.

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or

- by over-running a message into an adjacent area. This is done automatically if the mesage size is larger than 256 characters.

When a message over-runs into an adjacent area, the number for the next message area is still sequential, ie. if a large message is stored in message are "0", the next message area is still "1".

5.2 Clearing a carousel message area

Sending a "store carousel message" command to the display will clear the contents of that message area. eg To clear message area number 1 send <DLE>n1 <DLE>0. (<DLE>0 is used as an "end store carousel message" command.)

5.3 Storing carousel messages

When storing a carousel message, the first data be sent to the display should be a "Store carousel message" command, either <DLE>N (store carousel message 0) or <DLE>n a (store carousel message in area "a"). After the display receives this command, all subsequent data will be stored in the specified message area (until one of the "end store message" commands is received). It will also clear any information currently stored in that message area.

Commands which are not required to be executed immediately (eg <DLE>R, <DLE>T abcd, and others which are only to be executed when the message is played back) must be embeded into the message with the use of 2 <DLE> commands. eg To embed a delay of 2.5 seconds into a carousel message, the format would be "<DLE><DLE>T0250"

To endlessly repeat a message, a "<DLE><DLE>R" or "<DLE><DLE>ra" command would be added to the end of a message. In this situation, when the message reaches the end, the embeded command will tell the display to display the message again.

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5.4 Displaying carousel messages

Carousel messages may be displayed on power-up, or when called by the host system.

Message area 0 may be displayed at power-up by adding the command <DLE>0 at the end of the message (before the "end store message" command).

Any message area may be displayed with the use of the "display message" command <DLE>ra, where "a" represents the message area number to be displayed. Message area 0 may also be displayed with the use of <DLE>R ("display message area 0" command).

The display of a carousel message is ended whenever the display receives characters from its input port. This means, if a carousel messaging is taking place, it is recomended a <FF> be sent at the start of a message to clear the display of any carousel message information.

5.5 General Rules for Programming Carousel Mesages:

When writing messages, the order of <DLE> commands is critical to the correct operation of the carousel message. If a message doesn't display as expected, try rearranging commands.

- *Begin* with the "Store message command"
- *Embed* <DLE> commands within a message using 2 <DLE> commands.
- To repeat the message continually, (until data is sent to the display), embed a <DLE>R or <DLE>ra *at the end of the message*, before the "End store carousel message" command.
- Use an "End stored message" command *after* all text is entered. <DLE>0 or <DLE>4 are ideal as they also direct the message to be output to the display.
- To display message 0 on power up, place a <DLE> Q *after* "End store message" command.

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6. Specifications.

		M231	M232
Physical	Overall dimensions	280(w) x 233(h) x 105(d) mm	
	Base dimensions	180(w) x 38(h) x 105(d) mm	
	Stalk dimensions	50(w) x 100(h) x 25(d) mm	
	Display housing	280(w) x 95(h) x 34(d) mm	
	Weight	1.4 kg	
	Colour	Beige	
Display	Characters	1 line x 20 characters	2 lines x 40 characters
	Character size	6 x 9mm	3 x 5mm
	Font	5 x 7 dot matrix	
Power		9V DC @ 600mA	9V DC @ 800mA
Interface		Serial RS232C or parallel	

7. Ordering information and Accessories

Part Number	Model No.	Description
		Displays
9-0231-101-6	M231-SM	M231 - 1 x 20 display - serial interface
9-0231-201-2	M231-PM	M231 - 1 x 20 display - parallel interface
9-0232-101-1	M232-SM	M232 - 2 x 40 display - serial interface
9-0232-201-7	M232-PM	M232 - 2 x 40 display - parallel interface
		Cables and Accessories
2-5205-020-7	CA210-2	Serial cable - D9 socket 2 metres
2-5281-020-9	CA281-2	Serial cable - D25 socket 2 metres
2-5213-020-1	CA213-2	Serial - to *UMD* M125-ID cash drawer
2-5139-020-6	CA139-2	Parallel cable - 2 metres
1-6000-206-3	PP9D1000-D	Plug pack 9V 1A
		Documentation
6-0231-992-2	DOC-M231-PD	Product Description
6-0231-993-0	DOC-M231-UM	User manual (this document)

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