
OPERATING MANUAL FOR

MiniDMXter

SOFTWARE VERSION 1.00

Hardware: CE Certified



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TABLE OF CONTENTS

INTRODUCTION	1
0.0 SAFETY WARNING	1
0.1 PRECAUTIONS THAT WILL ASSURE THE BEST OPERATION OF YOUR MINI	2
0.1(1) USE A BLANKING PLUG IN UNUSED DMX CONNECTORS	2
0.2 GETTING STARTED - QUICKLY	2
1.0 CONVENTIONS	3
1.1 KEY CONVENTIONS	3
1.1(2) ACTION ON KEY UP	4
1.2 DISPLAY CONVENTIONS	4
1.3 NUMBER CONVENTIONS	4
2.0 TURNING ON	4
2.1 IF THE UNIT WILL NOT TURN ON... ..	4
2.2 THE OWNER IDENTIFICATION MESSAGE	5
3.0 FUNCTION SELECT MENU	6
3.1 COLORTRAN PROTOCOL SUPPORT	6
3.2 MiniDMXter's NAMING CONVENTIONS FOR THE CMX PROTOCOL	6
3.3 HOW TO TELL IF A MiniDMXter IS SET TO CMX PROTOCOL	6
4.0 TRANSMIT DMX	7
4.1 ADJUSTING ONE DIMMER	7
4.2 QUICK STEPPING THRU DIMMER AND LEVEL	7
4.3 AUTOFADING ONE DIMMER	7
4.4 ADJUST MULTIPLE DIMMERS (ADJUST SOME)	8
4.4(1) ADDED QUICK STEPPING OPTION IN ADJUST SOME	9
4.4(2) THE ADJUST SOME DISPLAY WHEN THE PROTOCOL IS SET TO COLORTRAN	9
4.4(3) RE-ENTERING ADJUST SOME	9
4.4(4) CLEARING ADJUST SOME	9
4.4(5) TRYING TO SET MORE THAN 64 DIMMER IN ADJUST SOME	10

4.5	ADJUST ALL DIMMERS	10
4.6	RETURN TO FUNCTION MENU	10
4.7	SEND FLAVOR	10
4.8	SETTING THE NUMBER OF DIMMERS IN A PACKET	11
5.0	RECEIVE DMX512	12
5.1	VIEWING RECEIVED LEVELS	12
5.2	HIGHEST NUMBER DIMMER DISPLAYABLE	12
5.3	RECEIVED DIMMER SUMMARY DISPLAY	13
5.4	<RIGHT> AND <LEFT> IN RECEIVE	13
5.5	DATA ERRORS WHILE RECEIVING	13
5.6	512 DIMMERS DISPLAYED AFTER AN ERROR IS DETECTED	14
6.0	CABLE TESTER	16
6.1(1)	ENDING CABLE TEST	17
6.2	CABLE TESTER WITH PROTOCOL SET TO CMX	17
7.0	SETUP OPTIONS	18
7.1	POWER DOWN TIMER OPTION	18
7.1(1)	RESTARTING AFTER A POWER DOWN TIME OUT	18
7.2	NUMBER FORMAT OPTION	18
7.3	OPEN LINE DETECTOR OPTION	18
7.5	RETURN TO FUNCTION MENU?	19
7.6	ENTERING THE USER IDENTIFICATION TEXT	19
8.1	REQUIREMENTS WHEN OPERATING FROM BATTERY (CE only)	21
8.2	USING A BATTERY ELIMINATOR	21
8.2(1)	WHEN RUNNING MINI FROM A BATTERY ELIMINATOR IN THE EUROPEAN UNION	21
8.3(1)	MEAL PENALTY	22
8.4	BATTERY OPERATING TIME	22
9.0	MiniDMXter TECHNICAL DISCUSSION	23
9.1	LINE TERMINATION	23
9.2	STANDARDS - DMX512, RS422 AND RS485	23

9.3 THE PERCENT SCALE	23
9.4 PERCENT TABLES	25
9.5 SELECTING THE CMX PROTOCOL	26
9.6 SPECIFICATION TABLES	27
9.7 SOFTWARE VERSION HISTORY	28
10.0 CE Declaration of Confrornity	29
11.0 FCC PART 15 STATEMENT	30
11.1 WARNING: YOU MUST CORRECT ANY HARMFUL INTERFERENCE CAUSED BY THIS DEVICE.	30
11.0 WARRANTY	31

INTRODUCTION

The MiniDMXter is a hand held tester for checking theatrical equipment using DMX512. It is also a cable tester for DMX512 cables, testing both continuity and data transmission. In many ways it is a simpler version of Goddard Design's Lil'DMXter. If you are familiar with the Lil'DMXter you will find using the MiniDMXter to be easy since as much as possible the two units share a common user interface. Likewise if you first learn the Mini you will find stepping up to the Lil'DMXter to be straightforward.

The difference between the MiniDMXter and the Lil'DMXter will determine which instrument is appropriate for you.

The Mini is pretty rugged - but the display is glass so please use reasonable common sense care.

Your MiniDMXter is a software based machine that uses a menu structure allowing you to step thru its features to get to the test you need to perform. Much of its operation is obvious. The purpose of this manual is to help you run it quickly, and to find the section you want easily.

0.0 SAFETY WARNING

The MiniDMXter must only be connected to DMX512 inputs or outputs that are fully isolated from the AC supply mains by a method that is approved by a recognized safety testing organization, such as UL, CSA, or DVE. The MiniDMXter is only designed for use with low voltage control signal lines. Any other use may be hazardous and must not be attempted.

Further, due to failure of either the dimmers or the console, or due to a short between the DMX512 line and power cables, it is possible that a DMX512 control cable may be connected to the AC mains. If connected to the AC mains, a DMX512 cable would be carrying hazardous voltages. If any conductor of a DMX512 cable is connected to the AC mains it is possible that the metal case of the connector is also connected to the AC line. Care should always be taken when testing an installed DMX512 cable that no hazardous potentials are present.

The user should note the following:

Testing of DMX512 lines that are shorted to the AC line is hazardous and should not be attempted.

The MiniDMXter does NOT indicate the presence of hazardous voltages on the DMX512 lines.

The impedance between the DMX512 lines entering the MiniDMXter and the metal frame is approximately 22 meg-ohms. The frame should not become "hot" if there is AC leakage on the DMX512 lines. But do not rely on this for your safety - check that YOUR DMX512 lines are not "hot".

If any wire in a DMX cable is hot IT IS POSSIBLE THAT THE SHELL OF THE DMX512 CONNECTOR MAY BE HOT. IF THE SHELL OF THE CONNECTOR IS HOT, THEN THE METAL FRAME OF THE Mini WILL BE HOT UNLESS THE MiniDMXter IS GROUNDED. If there is ANY likelihood that ANY of the DMX512 lines is "hot" to the AC line, the case of the MiniDMXter should be grounded at all times. This can be accomplished by connecting a ground wire from the case of a XLR style cord mount body of the proper sex, plugging into the unused connector on the Mini and connecting the wire to a water pipe ground.

0.1 PRECAUTIONS THAT WILL ASSURE THE BEST OPERATION OF YOUR MINI

The Mini is a sensitive piece of test equipment designed to receive and decode low power digital signals even when those signals are in an electrically noisy environment. It is also a piece of theatrical field service equipment. We know that field conditions in a theatre or studio are often as close to a war zone as most of us wish to get. The Mini is designed to work in this hostile environment.

One environmental threat that is always present particularly for a handheld piece of equipment is static electricity or ESD. On a dry winter day a person walking across a wool carpet may easily become charged to **8 to 10 thousand volts**. Touch a piece of conductive material and a large pulse of current will flow.

The MiniDMXter has been designed to deal with this fact. It's unlikely that normal ESD will damage the unit and if sensible precautions are taken ESD should not normally prevent it from operating normally.

0.1(1) USE A BLANKING PLUG IN UNUSED DMX CONNECTORS

When the unit is operating always have a plug in both the DMX OUT and the DMX IN connectors. Since the DMXter is often used with only one cable connection, the other connector should be capped with an un-wired XLR style plug. This plug must be of the metal body type and should either be totally un-wired or wired as a grounding connector (See **0.0 SAFETY WARNING** section above) The purpose of this plug is to prevent ESD discharge to the open connector pins. Such discharge is unlikely to harm the Mini but it may cause mis-operation possibly requiring power cycling to reset the unit.

0.2 GETTING STARTED - QUICKLY

So you want to play **NOW**? First read the **SAFETY WARNING** above. Then go right ahead. We feel that the operation of the MiniDMXter is fairly straightforward. But we would suggest that you read the following sections before you start taking our name in vain:

- 1.0 - 1.3 CONVENTIONS (all of it)
- 2.0 TURNING ON
- 3.0 FUNCTION MENU
- 4.0 TRANSMIT DMX - The most commonly used functions in **TRANSMIT** are:
 - 4.1 ADJUSTING ONE DIMMER
 - 4.5 SEND LOOK
- 5.0 RECEIVE DMX

1.0 CONVENTIONS

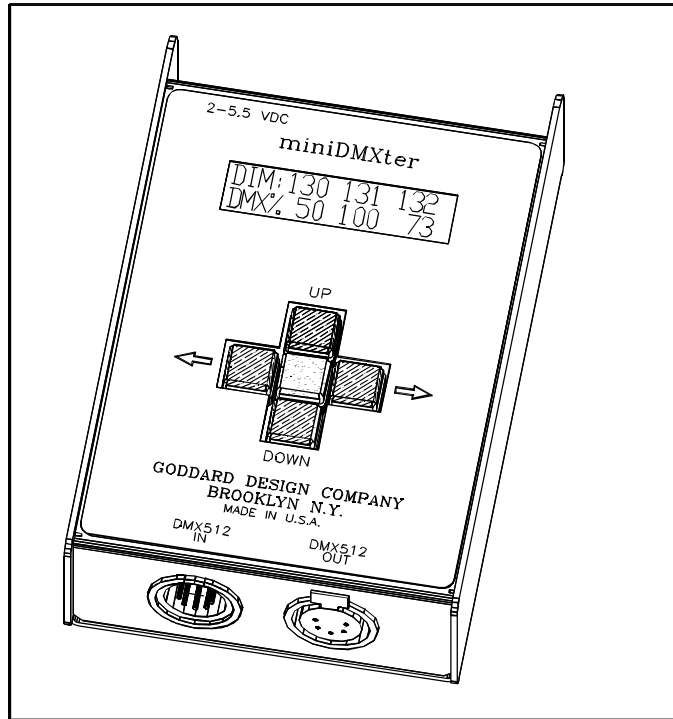
As with any software based device, we have set up some conventions.

1.1 KEY CONVENTIONS

There is a block of five buttons or keys on the front panel. They are laid out in a cross pattern of four black keys with one blue key in the center of the cross. The black keys are labeled by legends adjacent to them on the front panel. The blue key is not labeled but it is referred to in this manual as the **<YES/Q>** key.

<YES/Q>

The blue **<YES/Q>** key is the "YES" answer to queries and initiates the action that you have chosen in most cases.



When the MiniDMXter is performing functions where a yes/no answer would be inappropriate, there will no longer be a "?" in the display. At this point the **<YES/Q>** key will "Quit" the work you have been doing and generally put you back to the point in the menu at which you entered. There are some exceptions to this rule; quitting some functions will return you to different points in the menu. These will be pointed out later in the manual.

<UP>, <DOWN>

<UP> and **<DOWN>** are used to step thru items of the menus. When setting dimmer levels the MiniDMXter uses the **<UP>** and **<DOWN>** keys to raise and lower the numeric values.

They also function as the "no" to answer the queries of the menu. Pressing **<DOWN>** tells the MiniDMXter "no" to the current query, and advances you to the next choice. Pressing **<UP>** tells the MiniDMXter "no" to the current query, and backs you up to the previous choice.

<LEFT>, <RIGHT>

The right and left arrows are used in stepping thru dimmer numbers. While they are marked with arrows, for the remainder of this manual they will be referred to as **<LEFT>** and **<RIGHT>**.

The **<RIGHT>** and **<LEFT>** keys are also used to control the cursor when **ENTERING THE USER IDENTIFICATIONS TEXT**. They also position the section arrows used by the **NUMBER FORMAT OPTION** and **FLAVOR** routines.

1.1(1) THE MISSING **<TOP>** KEY

If you have used a Lil'DMXter you will notice the Mini is missing two keys, the **<OFF>** key and **<TOP>** key. As you look at the case the **ON/OFF** switch is mounted on the right side of the end. It replaces the **<OFF>** key and in some ways replaces the **<TOP>** as well. Turning the unit **off** and then **on** will always put Mini back at a known place in the software, i.e. the sign on message.

miniDMXter V1.00
GODDARD DESIGN

That is the major function of the Lil'DMXter's **<TOP>** key.

1.1(2) ACTION ON KEY UP

As a rule the MiniDMXter software takes action on key release not on key press. The exceptions to this rule include auto repeat functions. For brevity this manual will refer to "press <xx> key" even when action will take place after the key is depressed and released. When we feel it is important or where confusion is possible we will lay out the key strokes in detail.

1.2 DISPLAY CONVENTIONS

There are two different purposes of the display. One is to allow you to move around the menu structure to the area you need for the test you want to perform. Here the top line of the display will generally tell of actions. These displays are always in the form of questions and will contain a "?". With only 16 characters abbreviations and creative spelling are inevitable but we have tried to keep them readable.

The other purpose of the display is to give you information about the DMX512 system you are testing. This will be done either in 1 line or 2 line messages.

1.3 NUMBER CONVENTIONS

DMX512 uses an 8 bit binary byte to transmit dimmer levels and the start code. This allows 256 different dimmer levels and start codes from 0 to 255. Most lighting consoles display these levels as 0 to 100. This means that a console with a dimmer set to 50 does not transmit the number 50 on the DMX512 line, but a number that is 50% of 255, i.e. 127. The normal lighting console 0 to 100 representation of dimmer levels is really a percent scale and will be referred to as "percent" throughout this manual. Details of the percent conversion used by the Mini can be found in section 9.3.

The MiniDMXter can display numbers in three formats; decimal, percent, or hexadecimal. Decimal, percent, or hexadecimal notation are available for dimmer levels. Dimmer numbers are available in decimal notation only. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 7.2).

Any readout displayed in hex will be two hex digits ending with a lower-case "h". Any readout displayed in percent will contain a % sign in the display.

2.0 TURNING ON

Turning on the **ON/OFF** switch causes the Mini to turn on and display the following message:

```
miniDMXter V1.00  
GODDARD DESIGN
```

The message will be displayed for 2 seconds or until any key is pressed. This message includes the software version, which is important if you need to contact the factory with any questions. This manual is written for software Version V1.00. It is applicable for any software version that is V1.0x.

2.1 IF THE UNIT WILL NOT TURN ON...

If the unit will not turn on, but instead displays:

```
miniDMXter V1.00  
MEAL PENALTY
```

Or if the display remains blank, then the batteries have discharged to the point that they are not capable of supporting normal operation. It is time to replace the two AA batteries or to plug in the optional battery eliminator.

(new) If you find your Mini with the **ON/OFF** switch **ON** (toward the right) and the display blank it is likely that the Mini's **AUTO POWER DOWN TIMER** shut the Mini off. To restart the Mini you will need to turn

it off then wait for at least 10 seconds, and then turn the Mini back on. The pause is needed to allow the power supply to discharge so the micro-controller will see a power up reset.

2.2 THE OWNER IDENTIFICATION MESSAGE

You may program an owner identification message. If programmed the message will display until any key is pressed. A message might read:

PROPERTY OF
LITES ' R ' US

or any 2 lines of 16 alphanumeric characters. If not programmed this section will be skipped. This text is entered by an item in the users SETUP OPTIONS menu. **A warning: if you program this message it is permanent.**

3.0 FUNCTION SELECT MENU

The MiniDMXter works on a function menu. All tests and functions of the MiniDMXter are accessed by way of four FUNCTION MENUS. All menus are similar in appearance. The TRANSMIT menu item is shown below:

```
FUNCTION MENU
TRANSMIT DMX?
```

You can step thru the choices by pressing the <UP> or <DOWN> keys until you come to the function you wish to use. To select that function, press <YES/Q>. The functions you may choose from are:

TRANSMIT DMX?	TRANSMIT CTN?	Section 4
RECEIVE DMX?	RECEIVE CTN?	Section 5
CABLE TESTER?		Section 7
SETUP OPTIONS?		Section 8

3.1 COLORTRAN PROTOCOL SUPPORT

The MiniDMXter may be set to send and receive Colortran's proprietary digital protocol. To select this option the internal clock jumper must be moved. All units are shipped set for DMX512. (See section 9.5) Colortran protocol should be of great use to anyone servicing Colortran systems.

Colortran's protocol is usually referred to as CMX. It is the parent protocol on which DMX512 was based. The primary difference between CMX and DMX512 is that CMX uses a baud rate of 153.6K while DMX512 uses a baud rate of 250K. A side note: the baud rate of CMX has often erroneously been listed as 156K.

3.2 MiniDMXter's NAMING CONVENTIONS FOR THE CMX PROTOCOL

The MiniDMXter's software uses either "COLORTRAN" or "CTN" in its display messages to identify the CMX protocol. The reason for this is that at a quick glance CMX and DMX are easily confused in the block letter character set of the LCD display. This naming change is done only for clarity.

3.3 HOW TO TELL IF A MiniDMXter IS SET TO CMX PROTOCOL

As shown above, the Transmit and Receive menus change to show which protocol the Mini is set to. If you wish to change the current protocol setting see section 9.5.

4.0 TRANSMIT DMX

TRANSMIT DMX is one of the primary diagnostic tools offered by the MiniDMXter. The unit can transmit a DMX512 (or CMX) signal to allow you to check that the receive end of your transmission link is correctly receiving the signal.

DMX512 is a standard primarily intended to communicate level information to dimmers. It has provisions for non-level or non-dimmer communications by means of a "start code". For dimmer communication the start code has a value of 0, sometimes referred to as the "null start code". At present most non-dimmer data sent on DMX512 is sent as if it were dimmer data on start code zero. The current version of the MiniDMXter supports only the null start code. The Lil'DMXter supports settable start codes.

4.1 ADJUSTING ONE DIMMER

If you want to look at the output of one dimmer, or if you want to use the MiniDMXter as a focusing remote, you want to use the first choice in the **TRANSMIT DMX** menu.

```
TRANSMIT DMX
  ADJ ONE DIMMER?
```

If you choose <YES/Q>, you will get a new display reading

```
SENDING DIM      1
  TO LEVEL      0%
```

Change the dimmer number by using the <RIGHT> and <LEFT> keys. Use the <UP> and <DOWN> keys to set the level from 0 to 255.

The level may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 7.2). If percent is used the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case "h".

4.2 QUICK STEPPING THRU DIMMER AND LEVEL

The following multi-key sequences are available to make getting around easier and faster.

DIMMER - AUTO-INCREMENT: Hold down the <RIGHT> or <LEFT> keys to auto-increment or auto-decrement the dimmer numbers by one.

DIMMER - JUMP BY 10: Hold down the <YES/Q> key and press and release the <RIGHT> or <LEFT> key to increment or decrement the dimmer number by 10.

DIMMER - AUTO-INCREMENT BY 10: Hold down <YES/Q> and then press and hold the <RIGHT> or <LEFT> keys to auto-increment or auto-decrement by 10.

LEVEL - AUTO-INCREMENT: If you hold down the <UP> key, the dimmer levels will auto-increment towards full. If you hold down the <DOWN> key, the dimmer levels will auto-decrement towards zero.

LEVEL - BUMP: Hold the <YES/Q> button down while you press and release the <UP> key to jump to 255 (full). Hold the <YES/Q> button down while you press the <DOWN> key to jump to 0.

4.3 AUTOFADING ONE DIMMER

```
TRANSMIT DMX
  AUTOFADE DIMMER?
```

This menu item is a test that allows you to cycle dimmers up and down automatically. It has two modes; one cycles one dimmer continuously, the other cycles a dimmer once and then steps to the next dimmer. You may choose whether a dimmer cycles from off to full and back to off (fade UP) or cycles from full to off and returns to full (fade DOWN).

```
AUTOFADE DIMMER
ENABLE AUTOSTEP?
```

If you answer <YES/Q> to this question you will cause the Mini to cycle a dimmer once and then step to the next dimmer. If you answer <DOWN> to this question the Mini will cycle the same dimmer up and down continually. After pressing either <YES/Q> or <DOWN> the display will change to read:

```
AUTOFADE DM    1
TO LEVEL      0%
```

The display will be static. The Mini will have started to transmit. The level sent will be an unchanging zero. To start the autofade press either <UP> or <DOWN>. Pressing <UP> causes the Mini to start fading from zero up to full and then back to zero. Pressing <DOWN> causes the Mini to start fading with the dimmer set to full, fade the dimmer to zero and then back up to full. If you **ENABLE AUTOSTEP** and select <UP>, dimmer 1 will fade to full and then back to zero. When it reaches zero the dimmer number will increment to dimmer 2 and the level will start fading from zero to full. If you **ENABLE AUTOSTEP** and select <DOWN> dimmer 1 will bump to full, fade to zero and then back to full. When it reaches full it will bump to zero, the dimmer number will increment to dimmer 2, dimmer 2 will bump to full and start fading from full to zero. In either case the Mini will cycle through all the dimmers.

The <LEFT> and <RIGHT> keys operate in the same way as in **ADJUSTING ONE DIMMER** above and may be used to change which dimmers are autofaded. If you did not **ENABLE AUTOSTEP** you must use the <LEFT> or <RIGHT> key to select the dimmer to autofade. Pressing <LEFT> or <RIGHT> zeros the old dimmer and sets the new dimmer to the beginning of its fade, either full or zero depending on whether we are fading <UP> or <DOWN>.

You may temporarily stop the fade by pressing <YES/Q> and either <UP> or <DOWN>. Pressing <UP> forces the dimmer to full; pressing <DOWN> forces the dimmer to zero. With the fade stopped, pressing either <UP> or <DOWN> will restart the fade.

The level may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 7.2). If percent is used the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case "h".

4.4 ADJUST MULTIPLE DIMMERS (ADJUST SOME)

```
TRANSMIT DMX
ADJ SOME DIMRS
```

Pressing the <YES/Q> key will start sending a "512 dimmer look" or cue to the dimmers and will display the level of three of those dimmers. When the MiniDMXter's protocol is set to DMX512, and number format is set to percent, the display will be as shown below. On the top three dimmer numbers are displayed, below the level for each dimmer is displayed. The bottom line is labeled with the characters DMX to let you know that the present protocol setting is DMX. The percent sign lets you know that the current number format is percent.

```
DIM:    1    2    3
DMX%   51 100  50
```

You can edit this as you need: use the <RIGHT> and <LEFT> keys for changing the dimmer numbers. Use the <UP> and <DOWN> keys for changing the level of the dimmer displayed in the left-most position on the display.

ADJUST SOME is a single cue that you may build in the Mini. If you are familiar with the Lil'DMXter **ADJUST SOME** is similar to its "SNAPSHOT" with several important differences, as noted below.

! **ADJUST SOME** is a transmit only feature; it must be entered manually and cannot be recorded from the incoming DMX line.

! While 512 dimmers may be sent in every packet only 64 of them can be at a non zero level at any one time. This limitation will seldom cause you a problem. The number of dimmers in a packet is user settable by the flavor sub-menu.

! The **ADJUST SOME** look is not saved. Using any other Transmit, Receive or Cable test function that sends or receives data will overwrite it. However you can exit and go to **USER SETUP OPTIONS** to change the number display type and come back to restart the same look.

The levels may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 7.2). If percent is used DMX: is changed to read DMX%. If hex is used, the display will show two hex digits followed by a lower-case "h".

All of the features of <**RIGHT**> or <**LEFT**> keys explained above may used in **ADJUST SOME**. Additionally you can search for the next dimmer that you have set that has a level (see below).

4.4(1) ADDED QUICK STEPPING OPTION IN ADJUST SOME

SEARCH FOR NEXT DIMMER AT LEVEL: Press the <**DOWN**> key and either <**RIGHT**> or <**LEFT**> then release both keys. The MiniDMXter will search for the next higher (<**RIGHT**>) or lower (<**LEFT**>) dimmer with a level greater or equal to 1%. This function is somewhat unusual in that it requires both keys to be pressed and released before the function executes.

4.4(2) THE ADJUST SOME DISPLAY WHEN THE PROTOCOL IS SET TO COLORTRAN

When the protocol is set to CMX the display will be as shown below. The field that normally reads DMX is changed to read CTN to indicate the current protocol setting.

```
DIM:    1    2    3
CTN%   51  100  50
```

4.4(3) RE-ENTERING ADJUST SOME

On exiting **ADJUST SOME** the transmitter is turned off, but none of the stored dimmers are reset to zero nor is the current dimmer pointer reset. Therefore you may simply press <**YES/Q**> again and restart exactly where you left off. This means that a finger stutter on the keys is not a disaster. You may also pause during a focus session and return to where you were. You may go to the **USER OPTIONS** menu and change the display format with out resetting **ADJUST SOME**. Entering any other DMX test routine in **TRANSMIT**, **RECEIVE** or **CABLE TEST** will clear all dimmers set in **ADJUST SOME** and will set the dimmer pointer back to dimmer 1. You may set the flavor to either **SLOW** or **FAST** and re-enter **ADJUST SOME**, but changing the number of dimmers sent in a packet resets **ADJUST SOME**. Finally turning the Mini **OFF** and **ON** resets **ADJUST SOME**.

4.4(4) CLEARING ADJUST SOME

You can set all dimmers to zero as follows. Hold the <**YES/Q**> and <**DOWN**> keys. After about 3 seconds the display will change to read:

```
DIM:    25  26  27
CLEAR ALL DIMS?
```

The top line of the display will not change; only the bottom line is rewritten. Release both keys. Now pressing <YES/Q> will clear all the dimmers, pressing <UP> or <DOWN> will return you to the ADJUST SOME. If you were pointing to a dimmer with level it will be cleared. All other dimmers will remain unchanged.

4.4(5) TRYING TO SET MORE THAN 64 DIMMER IN ADJUST SOME

Using **ADJUST SOME** you can have only 64 different dimmers with non-zero levels at one time. If you try to bring up a sixty-fifth dimmer the display will momentarily change to the following:

```
MORE THAN 64  
TURN ONE OFF!
```

As soon as you turn off any dimmer you may add one to the look. It may be any dimmer, not necessarily the last dimmer turned on. It must, however, be taken all the way to 0

4.5 ADJUST ALL DIMMERS

This function allows you to set all the dimmers to the same level at once. Use the <UP> and <DOWN> keys. If you hold down the <UP> key, the dimmer levels will auto-increment towards full. If you hold down the <DOWN> key, the dimmer levels will auto-decrement towards zero.

The level may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 7.2). If percent is used the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case "h".

Note that the MiniDMXter will not allow you to bump all the dimmers to full. Many installations lack the power service to handle bumping everything to full at once, and we don't own a piece of any fuse or circuit breaker manufacturer.

4.6 RETURN TO FUNCTION MENU

This does exactly what you might think it does!

4.7 SEND FLAVOR

The MiniDMXter provides two different flavors of DMX512. The MiniDMXter's default "flavor" setting we call "**SLOW**". With this setting the MiniDMXter uses an 120uS break, a 20uS mark after break, when transmitting levels for all 512 dimmers it refreshes the dimmers at approximately 8 times per second. This flavor was selected because it conserves battery life and it is appropriate for a hand operated tester.

The other flavor provided we call "**FAST**". This flavor provides DMX512 at near the maximum rate while still providing generous safety margins. Again the break is set for and the mark after break is set for 20 uS. The 512 dimmer refresh rate is about 38 updates a second. This flavor consumes considerably more power. Hence using this flavor will shorten battery life.

The flavor select item will read:

```
FLAVOR IS SET TO  
▶SLOW◀ FAST
```

To set the flavor use <LEFT> or <RIGHT> keys to move the filled arrows so they point to the desired selection. The flavor will be set to whichever flavor is marked when you exit by pressing either <UP>, <DOWN> or <YES/Q>. The flavor setting is stored in non-volatile memory and is preserved when the unit is turned off.

4.8 SETTING THE NUMBER OF DIMMERS IN A PACKET

DMX512 does not require a transmitting device to send 512 dimmers. So long as certain timing requirements are met any number of dimmers from 1 to 512 may be sent. We allow you set the number of dimmers in a packet from 24 to 512 by way of the following menu item:

```
NMBR OF DMRS 512  
CHANGE IT?
```

After pressing the **<YES/Q>** key you may change the number of dimmers using either the **<UP>** or **<DOWN>** keys. If you use the **<YES/Q>** key as shift key you may bump **<UP>** to 512 dimmers or **<DOWN>** to 24 dimmers. When you set the packet length for a number less than 512 the ADJUST SOME display will wrap around to dimmer 1 after the highest dimmer number sent and not after 512 as it normally does.

Entering this routine clears all dimmer values and the current dimmer number pointer set in **ADJUST SOME**. The act of pressing **<YES/Q>** causes the values to be cleared even if you do not change the number of dimmers sent. The refresh rate will increase as the number of dimmers sent is decreased.

5.0 RECEIVE DMX512

Answering <YES/Q> to the RECEIVE DMX512? query puts you in **RECEIVE** but before the MiniDMXter starts to display levels there is one question you need to answer.

```
RECEIVE DMX
AT END OF LINE?
```

DMX512 systems may be wired as a "daisy chain" with multiple receivers (dimmer racks) connected in series by a cable going from the console to receiver 1, another cable going from receiver 1 to receiver 2, and then on from there until all the receivers are connected in a chain. The last receiver in the chain is required to terminate the line. For more information on termination, please see Section 9.1.

The MiniDMXter may be inserted at any point in the daisy chain. The DMX input of the Mini is always terminated. If you wish to daisy chain to additional receivers you will need to have the MiniDMXter's transmitter turned on. Your answer to the END OF LINE? question will control whether the Mini turns on its transmitter to act as a repeater or not. Answering <DOWN> will turn on the transmitter as a repeater. Note that turning on the transmitter raises power consumption to its highest level. None of the power saving methods that we employ in transmit can be used here. Don't turn on the transmitter when you are receiving unless you need it. Therefore you will generally wish to answer <YES/Q> to this question.

One difference between the Mini and the Lil'DMXter is that the end of line setting is not latched in the Mini. The transmitter will only stay on until you exit from **RECEIVE**. Also since we are using an active repeater and not a passive loop thru, data will only be repeated as long as the Mini is **ON** and has power left in the battery . Unlike the Lil'DMXter the Mini will restore the signal levels of marginal DMX512. Note that neither unit restores the bit timing of the DMX512 signal.

5.1 VIEWING RECEIVED LEVELS

Either answer will drop you thru into the **RECEIVE** routine, displaying 3 dimmer numbers on the top line and their levels below. If within 2.5 seconds the MiniDMXter does not receive DMX512 data, the display will change to

```
NO DIGITAL INPUT
OR NOT DMX
```

This is a latched display. After correcting the problem you may clear the NO INPUT display by restarting the **RECEIVE** routine. This is done either by using the <UP> or <DOWN> keys.

Using the <LEFT> or <RIGHT> key you may step thru the levels for all of the dimmers, displaying 3 at one time. When you reach the highest displayable dimmer number the display folds back to dimmer 1. If 512 dimmer are displayable and you are viewing dimmer 511 the display might look as below.

```
DIM: 511 512 1
DMX% 98 75 50
```

The levels may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 7.2). If percent is used DMX: is changed to read DMX%. If hex is used, the display will show two hex digits followed by a lower-case "h".

5.2 HIGHEST NUMBER DIMMER DISPLAYABLE

The highest number dimmer that can be displayed is 24 or the highest number dimmer in any zero start code packet received. When you enter **RECEIVE** the Mini is set to display dimmers up to 24. Each received packet of DMX512 is counted and the maximum displayable dimmer number is set to that number if it is higher than that of any previous packet. Once this number increases it will not decrease if the number of dimmers sent decreases. Unless you are currently viewing the last two currently displayable dimmers you will not be aware that the number has changed. In practice the number of displayable dimmers will change on

the first packet received and remain constant. This is because very few DMX512 transmitters change the number of dimmers sent in packets with the same start code.

It should be noted that sending the same number of dimmers in every packet with the same start code is not required by the DMX512 standard, but dynamically changing the length of packets is generally thought of as bad practice.

There is an exception to the rule that the number of dimmers displayed will match the number of dimmers received. When you have received a packet containing errors the display is expanded to 512 dimmers. For details see 5.6.

5.3 RECEIVED DIMMER SUMMARY DISPLAY

Hold down the <YES/Q> key and press <DOWN>. You will see the following display

```
 23 OF 256 >= 1%  
DIM:  2 TO 100
```

The top line of this display tells you the total number of dimmers received, in the case above, 256, and the number of dimmers having a level. In this case, 23 dimmers have a level greater than or equal to 1%. The bottom line lists the lowest dimmer and the highest dimmer to have a level greater than or equal to 1%.

5.4 <RIGHT> AND <LEFT> IN RECEIVE

AUTO-INCREMENT: Hold down the <RIGHT> or <LEFT> keys to auto-increment or auto-decrement the dimmer numbers by one.

JUMP BY 10: Hold down the <YES/Q> key and press and release the <RIGHT> or <LEFT> key to increment or decrement the dimmer number by 10.

AUTO-INCREMENT BY 10: Hold down <YES/Q> and then press and hold the <RIGHT> or <LEFT> keys to auto-increment or auto-decrement by 10.

SEARCH FOR NEXT DIMMER AT LEVEL: Press the <DOWN> key and either <RIGHT> or <LEFT> then release both keys. The MiniDMXter will search for the next higher (<RIGHT>) or lower (<LEFT>) dimmer with a level greater or equal to 1%. This function is somewhat unusual in that it requires both keys to be pressed and released before the function executes.

5.5 DATA ERRORS WHILE RECEIVING

Whenever the MiniDMXter is receiving DMX512 it checks for the following problems, parity errors, framing errors, the break is too short - less than 88uS, the mark after break is too short - less than 8uS, overflow i.e. the Mini has received more than 512 dimmers per packet, and finally, is one of the first three wires broken. DMX512/1986 called for a 4uS mark. DMX512/1990 requires a mark of 8uS or longer. We flag marks of less than 8uS as a warning of possible compatibility problems. If one of these errors is detected, the first three characters of the second line of the display will read ERR instead of DMX.

You may clear the ERR flag by pressing either the <UP> or <DOWN> keys. You may view the error and clear the ERR flag by pressing and holding <YES/Q> and then pressing <UP>. Which errors were detected are indicated by an * shown on the display under its code.

```
PE FE BK-MK O BW  
      *  *
```

The above display indicated that a MAB of less than 8uS was measured and a packet with more than 512 dimmers was received. The abbreviations used are:

PE = PARITY ERROR

FE = FRAMING ERROR
BK = BREAK TOO SHORT
MK = MARK AFTER BREAK TOO SHORT
O = OVERFLOW (more than 512 dimmers)
BW = BROKEN WIRE (The probable cause is Pin 2 or 3 of your cable is open. If this reads as B? it means that this feature is disabled. You may turn this feature on again thru the **USER SETUP OPTION**.)

If there is no problem, the bottom line will read

NO ERRORS FOUND

Technical Notes: We report a **PARITY ERROR** for any byte that does not have its first stop bit. DMX512 is a no-parity system and the 9th bit should always be high. To prevent false trips on the **BREAK TOO SHORT** and **MARK AFTER BREAK TOO SHORT** measurements, the trip points for these measurements are set as follows: a break must be measured as 87.5uS or less. A mark after break must be measured as 7.5uS or less. The CMX trip points for these measurements are set as follows: a break must be measured as ???.?uS or less. A mark after break must be measured as ?.?uS or less.

A limitation of the measurement routines in MiniDMXter should be pointed out. The break length of every packet is checked; if the break is at least 87.5 micro seconds long, then the length of the Mark After Break is checked. If the break is too short the Mini will report that fact, but the software design does not allow it to independently check the MAB after a short break. So when the break test fails we report that break and possibly also the MAB are out of spec. The display is shown below.

PE FE BK-MK O BW
* *

More detailed information regarding DMX timing is possible using the Lil'DMXter.

5.6 512 DIMMERS DISPLAYED AFTER AN ERROR IS DETECTED

If an error is detected during reception that causes ERR to be displayed the Mini will set the number of dimmers displayable to 512. That means that you can use <LEFT> or <RIGHT> keys to page thru all 512 dimmers regardless of how many dimmers are being received. This may be of use trouble shooting some failures. The display length will stay at 512 until you exit **RECEIVE** and re-enter. Clearing ERR does not reset the display length.

Technical Note: At any one time the Mini only stores in memory the three visible dimmers. Hence any data that is received for a dimmer you are not currently viewing is lost. The data displayed is the last data received for that dimmer. If all dimmers are refreshed in every packet the data can be no more that 2.5 seconds old. If on the other hand the transmitter sends short packets frequently and long packets rarely the value for a high dimmer may be of unknown age. This not a problem when working with a normal DMX512 system, but it might be good to keep this in mind when debugging a truly flaky system.

When using the <LEFT> or <RIGHT> keys to change the three visible dimmers all three are reset to zero. The display will remain zeroed until the next received level. If you are viewing a slow DMX512 transmitter this will be clearly visible. At normal update rates it just causes a slight flicker of the display.

5.7 BROKEN WIRE ERRORS

So you have gotten ERR display, you have gone to summary display and it has indicated a BW or Broken Wire error. The Error returns as soon as you go back to viewing levels, but you appear to be getting every dimmer correctly, what gives? In all likelihood one of the first three data pins is not connected all the way from the transmitter chip to the receiver in the Mini. Because of the way that RS485 is defined it is possible that some RS485 receivers (hence DMX512 receivers) will continue to work with one pin open. This effect is most likely to be seen if pin 1 is open. In fact a number of early DMX512 devices did not connect pin 1 on both ends. Operation with a pin open is also seen with pin 2 open. But operation without all lines properly

connected is intermittent at best. We say it only works without a paying audience present. Therefore it is important to know that even though you are seeing apparently good DMX512 if you do not have proper connections on all of the first three lines you are headed toward disaster. Goddard Designs' proprietary circuit to check for this potential problem is called the **OPEN LINE DETECTOR**. This circuitry flags seemingly good data when all the pins are not connected.

A BW error should be taken seriously. Check the DMX directly from the transmitter; if it is clean, check the cables. The open line detector measures the boolean "or" of pin 2 and 3 as referenced to pin 1. It should be pointed out that it is possible for DMX512 that is within spec but that has considerable negative common mode voltage to trip the open line detector. Tripping it does not mean the DMX is bad but it does mean that you had better be wary.

6.0 CABLE TESTER

The MiniDMXter includes a cable test feature. While DMX512 cables may be tested by a conventional cable tester for continuity, testing them for ability to pass high speed digital data is a little more complicated. DC cable testers may pass as "good" cables that will provide unreliable operation of DMX512. The Single ended cable test mode of the Lil'DMXter is not available on the miniDMXter.

Upon entering the cable test menu, your first choice is:

```
CABLE TESTER
TEST PINS 4 & 5?
```

Yes, we know, DMX512 thru DMX512-1990 doesn't use pins 4 and 5 but some manufacturers use them for non-DMX signalling. This is how some manufacturers signal over temperature on the dimmer racks. So we give you the option of testing these pins. Our tests of pins 4 and 5 are for continuity only, and do not attempt to send high speed digital data on these pins.

Non DMX512 use of pins 4 and 5, particularly non RS485 level use, is not a recommended practice since future versions of this standard may well use these pins.

Answering <YES/Q> will cause the test to start in a mode that tests all 5 wires. Pressing the <DOWN> key will cause the test to start testing only pins 1,2 and 3.

Once you begin the cable test, and assuming that your cable is good, the unit will step thru its procedure. After the Mini has completed one test sequence the top line of the display will change to read CABLE GOOD! An * will be written to the bottom line of the display. Each time the asterisk moves, the unit has completed one complete cable test and the cable has passed. A cable test consists first of checking for ground continuity, then checking for continuity and lack of shorts on Pins 2 and 3, then optionally continuity on Pins 4 and 5. Then a packet of DMX512-like data is transmitted and checked that it is received intact. If all of the above tests are successful, we consider the cable good. We move the asterisk one place in the display and start doing the test all over again.

Testing multiple cables: If you intend to test more than one cable at a time, after testing the first cable simply unplug it from the Mini without pressing any keys on the Mini. One of the error messages will appear, telling you that the "cable" has failed. Plug the next cable to be tested into the Mini and restart the test by pressing either the <UP> or <DOWN> keys. In this manner you may rapidly test multiple cables.

So it failed... If a cable fails the continuity test, the top line of the display will read **CABLE FAILED**. The text on the second line will tell you which pin(s) should be checked. The following display has all five pins list as failing. You will never see this exact display since a failure on pin one stops the test. This display is included to show all the field names.

```
CABLE FAILED
P1 P2 P3 P4 P5
```

P1 means that Pin 1 (shield) is open. If Pin 1 fails, the test terminates so you will have no way of knowing if there are problems with other pins of that cable. We suggest that in repairing the cable, you check all the pins for problems. After repairing the cable test it again.

SOME DMX512 USERS DO NOT WIRE PIN 1 ON BOTH ENDS OF THE CABLE. THIS CABLE TESTER WILL NOT TEST CABLES THAT DO NOT HAVE PIN 1 CONNECTED ON BOTH ENDS.

P2 means Pin 2 open or that Pin 2 is shorted to Pin 1.

P3 means Pin 3 is open or that Pin 3 is shorted to Pin 1.

2&3 REVERSED! obvious, huh?

P2 P3 means that either Pins 2 and 3 are both open or that they are shorted to each other.

If either Pin 2 or Pin 3 is open or shorted to ground or the other pin, the test will stop before testing Pins 4 and 5.

P4 means Pin 4 is open or that Pin 4 is shorted to Pin 1.

P5 means Pin 5 is open or that Pin 5 is shorted to Pin 1.

4&5 REVERSED! obvious, huh?

Px Px means that either both Pins are open or that the pins are shorted together.

P2 P3 P4 P5 means that either the pairs Pin 2/Pin 3 and Pin 4/Pin 5 are reversed or that Pin 2 is shorted to either Pin 4 or Pin 5, and that Pin 3 is shorted to Pin 4 or Pin 5. Pin 2 is not shorted to Pin 3 or the test would have stopped already.

If the data test part of the test fails, the display will read

```
CABLE FAILED
WON'T PASS DATA
```

This means that you have a fatal problem with your cable. It may pass DC but massive errors were encountered when high speed digital data was sent. This error stops the test. If you wish to try again, press the <UP> or the <DOWN> keys. If, on the other hand, occasional data errors are found which might be caused by an intermittent solder joint or a cable that is borderline for transmitting data, the top line of the display will read

```
DATA ERROR
#####
```

Once you've found a data error, the top line will continue to read DATA ERROR. The test will continue to run and the bottom line of the display will flash a black bar for about a second each time you encounter a data error.

6.1(1) ENDING CABLE TEST

To end cable test, press and hold the <YES/Q> key for about one second. Release the key and you will see the following message

```
TEST SUSPENDED
```

You may now use the <UP> or <DOWN> keys to restart the test. Pressing <YES/Q> again will return you to

```
FUNCTION MENU
CABLE TESTER?
```

6.2 CABLE TESTER WITH PROTOCOL SET TO CMX

The CMX version of cable test is operationally and display identical to the DMX version. The test is run at the CMX baud rate. This means that some cables may pass the data test that would fail the DMX test. This is appropriate since CMX makes lower demands of its cable.

7.0 SETUP OPTIONS

The MiniDMXter is intended to be versatile so we provide the option of allowing the user to set certain options that make life a little easier. These options affect more than one function or menu. The entry point on the main menu is

```
FUNCTION MENU
SETUP OPTIONS?
```

7.1 POWER DOWN TIMER OPTION

(new) Every time the Mini is turned **ON** the **AUTO POWER DOWN TIMER** is enabled. If enabled, the **AUTO POWER DOWN TIMER** turns the unit off after about 30 minutes. Depending on the current state of the timer you will see one of two displays.

```
POWER TIMER OFF
ENABLE TIMER?
or
POWER TIMER ON
DISABLE TIMER?
```

Pressing <YES/Q> reverses the state of the timer and displays the appropriate message. Pressing <YES/Q> will not step you to the next menu entry; it just reverses the timer state. To step to the next menu item you will have to press <DOWN>. This will preserve the current state of the timer.

7.1(1) RESTARTING AFTER A POWER DOWN TIME OUT

When a MiniDMXter has timed out most of the internal power consuming circuits are switched off and the micro-controller is stopped. Only the power supply and micro-controller continue to consume any power. Power consumption falls to less than four thousandths of the lowest normal operating power consumption. If a Mini has timed out the display will be blank as if the unit was switched off, but the **ON/OFF** switch will be on (toward the right). To restart the Mini you will need to turn it off then wait for at least 10 seconds, and then turn the Mini back on. The pause is needed to allow the power supply to discharge so the micro-controller will see a power up reset.

7.2 NUMBER FORMAT OPTION

The next menu item is the **NUMBER FORMAT OPTION**. Dimmer levels may be displayed in any one of three formats: decimal (DEC) , percent (%%%), or hexadecimal (HEX).

```
DISPLAY DATA IN
DEC ▶%%%◀ HEX
```

The current display format is the one pointed to by the filled arrows. To set the display format use <LEFT> or <RIGHT> keys to move the filled arrows so they point to the desired selection. The format will be set to which ever format is marked when you exit by pressing either <UP>, <DOWN> or <YES/Q>. The display format setting is stored in non-volatile memory and is preserved when the unit is turned off.

7.3 OPEN LINE DETECTOR OPTION

The next menu item is either:

```
OPEN LINE ON      OR      OPEN LINE OFF
DISABLE DETECT?   ENABLE DETECT?
```

The choice will depend on the current setting of this option. The power on default is **OPEN LINE ON**. Most users will want to leave this function enabled.

What is an Open Line Detector? The **OPEN LINE DETECTOR OPTION** is a proprietary Goddard Design Co. circuit to overcome a potential problem with the parent standard of DMX512, RS485. In RS485 it is possible to intermittently receive data from a cable that does not have connection of all of its pins. This can throw you off when trying to track down problems. Since the chance of passing data intermittently on a cable exists the MiniDMXter incorporates the **OPEN LINE DETECTOR OPTION**. This circuitry flags seemingly good data when all the pins are not connected.

There are some manufacturers and suppliers in the theatrical lighting field that have DMX512 cables that deliberately do not have pin 1 connected at both ends. Following upon majority interpretation of the DMX512 Standard this is a practice that Goddard Design Co. does not endorse. If the MiniDMXter is used on these cables the **OPEN LINE DETECTOR OPTION** will provide spurious "bad cable" readings and so we provide the option to disable it.

The following functions use the **OPEN LINE DETECTOR OPTION**:

RECEIVE - it is the feature we call "BW" for broken wire

DOUBLE ENDED CABLE TEST - it is inherent to this test and cannot be turned off. This test will not test cables where Pin 1 is not connected at both ends.

The current setting of the open line detector is stored in non volatile memory and stays the same until changed by this routine.

7.4 SOFTWARE COPY RIGHT NOTICE

This is not menu selection, it is just a statement that this software is copyrighted and the year that it was written. Press **<DOWN>** to step to the next selection.

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Dexter McNeil

7.5 RETURN TO FUNCTION MENU?

SETUP OPTIONS
FUNCTION MENU?

7.6 ENTERING THE USER IDENTIFICATION TEXT

We allow you to enter a text message to personally label your MiniDMXter. The two lines of the display provide space for a 32 character alphanumeric name. If you have previously entered, **but not burned in**, ID text you may edit it.

SETUP OPTIONS
ENTER ID TEXT?

This is the only setup menu item that requires **<YES/Q>** to get into a sub-menu. Also if the identification text is permanently entered (burned in) this item will not be seen.

ENTER 1ST LINE?
xxxxxxxxxxxxxxxxxxxx - old text if present

The first time you enter this routine the line will be blank. If you press **<YES/Q>** now the question mark is removed from the display and a cursor will appear under the first space on the bottom line. The old text, if present, will remain so you can edit it otherwise the second line will be blank.

ENTER 1ST LINE
-

Enter the text that you want to appear on the top line of your ID text display. Each press of the **<UP>** key will step you thru first a **<space>** then the numbers, 0-9, then the alphabet. Pressing the **<DOWN>** key steps you thru the same sequence backwards. When you have the right character, use the **<RIGHT>** and **<LEFT>**

arrow keys to move the cursor. When you are finished with your top line press <YES/Q>. The display will now read:

```
ENTER 2ND LINE?  
XXXXXXXXXXXXXXXXXX          - old text if present
```

If you press <YES/Q> now the question mark is removed from the display and a cursor appear under the first space on the bottom line. If instead you press the <UP> key you will move back to the **ENTER 1ST LINE** question.

```
ENTER 2ND LINE  
-
```

Now enter the second line of the ID text. At any time if you want to preview both lines together you may do so by pressing both the <LEFT> and <RIGHT> keys. When you like the text, press <YES/Q>. The display will now read:

```
BURN IN ID TEXT  
PERMANENTLY?
```

If you press <YES/Q> you are given one more chance to think better of it before the text is made permanent.

```
PRESS YES KEY  
FOR 10 SECONDS
```

If you now press and hold the <YES/Q> key down for 10 seconds you will have **permanently burned this text into the non-volatile memory. Yes we mean permanently!** To erase this message will require returning the unit to the factory. While you are holding the key, the number will count down 10...9...8...1...DONE. When the display changes to DONE when text is written. Releasing the key will cause the MiniDMXter to restart just as if you turned on the power switch. This will show you the new permanent ID text.

Doing anything other than pressing and holding the <YES/Q> for ten seconds will cause you to exit this routine without burning the text. The return point will be:

```
SETUP OPTIONS  
ENTER ID TEXT?
```

If you exit without burning the text it will be stored in non-volatile memory but in a way that it may be changed by this routine later.

If you wish this message to permanently mark your MiniDMXter as your property it is pointless not to burn the text in. On the other hand don't burn in the text until you're sure you like it and can live with it. **We charge to remove tatoos done at a weak moment.**

Pressing <YES/Q> takes you back to the function menu. Pressing <UP> takes you back to the previous item in the user options menu. Pressing <DOWN> takes you to the beginning of the user options menu.

The MiniDMXter is powered by 2 size AA batteries. We recommend the use of long life "alkaline" type batteries. While rechargeable batteries may be used no provision is made for them to be recharged in place. Also rechargeable batteries have a lower power density than similar sized non-rechargeable batteries and will therefore provide shorter run times between battery changes.

The Mini may also be powered by an optional external DC supply or battery eliminator. We expect that many users are going to find battery operation to be most convenient when troubleshooting equipment in the theater, and will prefer battery eliminator operation in the shop.

8.1 REQUIREMENTS WHEN OPERATING FROM BATTERY (CE only)

When the MiniDMXter is operated in European Union countries the following requirement applies. When operating from internal batteries the user should be certain that the provided insulating cap is in place in the battery eliminator connector to prevent ESD discharge to this connector.

8.2 USING A BATTERY ELIMINATOR

On the end of the Mini next to the **ON/OFF** switch is a 2.5mm battery eliminator jack. Goddard Design can provide a battery eliminator that matches the MiniDMXter's power requirements. While you can also choose to get your own, be warned that there are many different battery eliminators, some of which can damage the MiniDMXter. Others just won't work. Also, certain battery eliminators while working correctly will render the units more susceptible to mis-operation due to ESD discharge. In extreme cases the internal protection fuse may blow. Goddard Design battery eliminators present a high impedance to ESD pulses and thus prevent operation difficulty.

A battery eliminator must provide 2.5 VDC to 5 VDC. The absolute maximum voltage shall not exceed 6 volts. A 2.5 volt supply must be capable of supplying at least 350 MA. A 5 volt supply need only supply 200 MA. The connector must be a 2.5mm jack wired center positive. This jack is protected so that connecting a reverse polarity voltage should not damage the MiniDMXter. Connecting a voltage of greater than 6 volts to this jack will cause an internal fuse to blow. It may also do other damage to the Mini.

8.2(1) WHEN RUNNING MINI FROM A BATTERY ELIMINATOR IN THE EUROPEAN UNION

If the battery eliminator is to be used with the MiniDMXter it must be a CE unit. It must also present a high common mode impedance to ESD pulses. This last requirement can usually be met by placing a common mode choke in conductors from the supply. The choke is made by:

The twin lead wire carrying the low voltage DC current from the power supply to the DMXter is wound around a ferrite core. The core is a **Fair-Rite Products Corp.** part number # **2643802702**. Twelve (12) turns of the twin lead are wound on the core. The winding should be a neat single layer. The start and finish leads should tied to the core by separate nylon wires tie or equivalent. There should be as much distance as possible between the start and finish leads. At a minimum this should be 15 millimeters (.590 inches).

But we can only guarantee CE compliance if the external supply is provided by GDC.

8.3 THE BATTERY TALKS/POWER MANAGEMENT

Surprise! The MiniDMXter (like most battery-powered equipment) has a low battery warning. When you need to change the batteries the Mini DMXter will give you the following message every 20 seconds

```
! BATTERY LOW !  
PLEASE FEED ME!
```

This message lasts for about 2.5 seconds. While this message is displayed the MiniDMXter will continue transmitting levels to the dimmers if it is currently doing so. Autofades and any operation involving the user interface halts for the duration of this display.

8.3(1) MEAL PENALTY

About 15 minutes after you first see the BATTERY LOW warning the Mini will power down. As it powers down it will display this message:

```
miniDMXter V1.00  
MEAL PENALTY
```

This display will last for about 30 seconds. If you turn **OFF** and then back **ON** you will most probably see the Meal Penalty display again. It will last for about 30 seconds and then the display will go blank and the unit will shut down again. The unit must be switched OFF for at least ten seconds to assure that it resets.

If you wait a longer time (several minutes) the batteries may have bounced back far enough that the MiniDMXter will turn back on. But be warned you are running on borrowed time. If the batteries are very low the display will remain blank.

8.4 BATTERY OPERATING TIME

Approximate operating time on a set of fresh batteries:	
Powered down - switch ON	5000 hours
Receiving	20 Hours
Transmitting, SLOW	13 Hours
Transmitting, FAST	8 Hours
Receiving and Repeating	8 Hours
Cable Test	8 Hours

These battery times are estimates. They are subject to almost as many variables as the gas mileage estimates for automobiles. Intermittent use generally gets a little more life out of the batteries than just turning the unit on and letting it run until the batteries are dead.

9.0 MiniDMXter TECHNICAL DISCUSSION

Following are discussions of a few items of interest that we couldn't find a better place to put...

9.1 LINE TERMINATION

The MiniDMXter data input is terminated by 120 ohm load resistor at all times. This meets the requirements of DMX512 and RS485, that transmission lines be terminated by their characteristic impedance. DMX512 is most often run in 120 ohm cable. In the past 100 ohm cable was commonly used. 100 ohm cable is recommended for RS422. In practice the difference between 100 ohm and 120 termination is seldom of any import. If the user wishes to match a 100 cable accurately bridging the input with an additional 600 ohm resistor will bring the total termination value to 100 ohms.

The DMX512 on the input is not normally sent to the output connector. Using a Y cord to let the mini monitor a line being sent to a dimmer rack is not a good idea. If the last dimmer rack is terminated, as it should be, you will now have a doubly terminated line; worse the termination may be in the center of a long line which can cause ringing on the line.

To permit users to monitor a DMX line while passing data on to the dimmers we allow you to re-transmit the DMX512 signal. Answering **<DOWN>** to the AT END OF LINE? question will cause the Mini to turn on the transmitter re-transmitting the received data. This new signal is sent at full signal strength regardless of how marginal the received signal was. Also any termination problem downstream of the Mini will not affect the signal on input side of the Mini.

There are several "features" of this design to keep in mind. If the Mini times out when in this mode the data pass thru will also turn off. This mode requires much more power than just receiving. If you intend to use this mode with show critical data be sure that you have disabled the power time and have a battery eliminator securely plugged in. We estimate that battery life when re-transmitting data to be about 8 hours.

9.2 STANDARDS - DMX512, RS422 AND RS485

Detailed discussion of DMX512 is beyond the scope of this manual. We would recommend that persons wishing to know more obtain a copy of DMX512 Recommended Practice. This booklet is published by both PLASA (UK) and the USITT (USA) and is a collection of practical advice on the use of DMX512 in the field. Copies can be purchased from either PLASA, the USITT or GODDARD DESIGN CO.

Anyone doing DMX512 development or serious product evaluation should also have copies of the two relevant standard documents.

A copy of the DMX512 standard may be obtained from the US Institute for Theater Technology, 10 West 19th Street, New York NY 10011.

The electrical standards on which DMX512 is based are both RS422 and RS485. Many textbooks and catalogs discuss the features of these standards. Copies of these standards may be obtained from the Electronic Industries Association, 1722 Eye Street N.W., Washington D.C. 20006

PLASA is the Professional Light and Sound Association (UK) their address is: 7 Highlight House, St. Leonards Road, Eastbourne, East Sussex BN21 3UH England.

9.3 THE PERCENT SCALE

We have included a percent display mode in the MiniDMXter for the convenience of having a display that approximates the display seen on your lighting console. The percent display mode should not be expected to exactly match any particular console, and should not be used if it is important to know the actual level that you are receiving. It should not be assumed that a MiniDMXter transmitting 45% percent will transmit the same code as your light console set to "45".

DMX512 uses an 8 bit binary byte to represent a dimmer level: this is 256 possible levels, 0 to 255. Theatrical lighting has long used a 10 point scale, which with the advent of the digital control consoles became a 101 point scale, 0 to 100. There is no integer factor to convert 101 to 256. Therefore an integer conversion between these scales will be approximate. There is no universal agreement on exactly how the rounding should be done. The discrepancies manufacturer to manufacturer are seldom of great import in theatrical lighting although they are of some import when DMX512 is used to drive other devices, such as color scrollers.

Technical note: The conversions from percent to decimal and decimal to percent in the MiniDMXter are all table driven. When the MiniDMXter is set to the percent mode more than one received code will be displayed as the same percent value. For example 7Fh, 80h, and 81h are all displayed as 50%. The full receive conversion table is listed below.

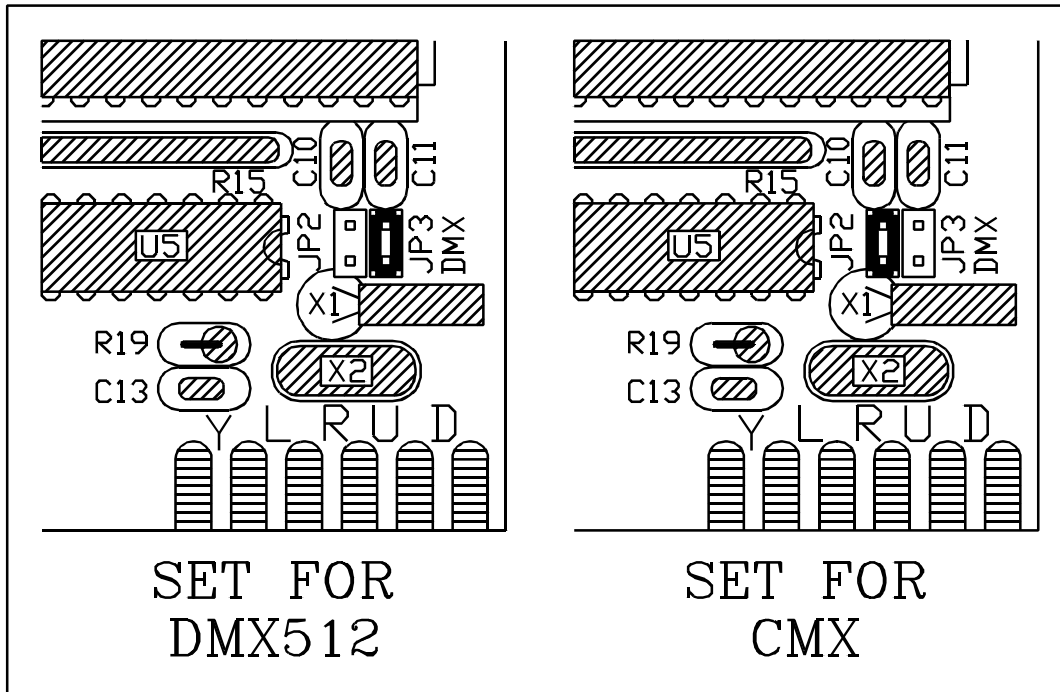
BUT when the MiniDMXter is in percent mode you can enter only one value for each percent step. To find the exact values see the transmit conversion table listed below.

9.4 PERCENT TABLES

%	REC'D	XMIT	%	REC'D	XMIT	%	REC'D	XMIT
0	00-02	00	34	57-58	58	68	AD-AF	AF
1	03-05	05	35	59-5B	5B	69	B0-B1	B1
2	06-07	07	36	5C-5D	5D	70	B2-B4	B4
3	08-0A	0A	37	5E-60	60	71	B5-B6	B6
4	0B-0C	0C	38	61-62	62	72	B7-B9	B9
5	0D-0F	0F	39	63-65	65	73	BA-BB	BB
6	10-11	11	40	66-68	68	74	BC-BE	BE
7	12-14	14	41	69-6A	6A	75	BF-C0	C0
8	15-16	16	42	6B-6D	6D	76	C1-C3	C3
9	17-19	19	43	6E-6F	6F	77	C4-C5	C5
10	1A-1B	1B	44	70-72	72	78	C6-C8	C8
11	1C-1E	1E	45	73-74	74	79	C9-CB	CB
12	1F-20	20	46	75-77	77	80	CC-CD	CD
13	21-23	23	47	78-79	79	81	CE-DO	DO
14	24-26	26	48	7A-7C	7C	82	D1-D2	D2
15	27-28	28	49	7D-7E	7E	83	D3-D5	D5
16	29-2B	2B	50	7F-81	81	84	D6-D7	D7
17	2C-2D	2D	51	82-83	83	85	D8-DA	DA
18	2E-30	30	52	84-86	86	86	DB-DC	DC
19	31-32	32	53	87-89	89	87	DD-DF	DF
20	33-35	35	54	8A-8B	8B	88	E0-E1	E1
21	36-37	37	55	8C-8E	8E	89	E2-E4	E4
22	38-3A	3A	56	8F-90	90	90	E5-E6	E6
23	3B-3C	3C	57	91-93	93	91	E7-E9	E9
24	3D-3F	3F	58	94-95	95	92	EA-EC	EC
25	40-41	41	59	96-98	98	93	ED-EE	EE
26	42-44	44	60	99-9A	9A	94	EF-F1	F1
27	45-47	47	61	9B-9D	9D	95	F2-F3	F3
28	48-49	49	62	9E-9F	9F	96	F4-F6	F6
29	4A-4C	4C	63	A0-A2	A2	97	F7-F8	F8
30	4D-4E	4E	64	A3-A4	A4	98	F9-FB	FB
31	4F-51	51	65	A5-A7	A7	99	FC-FD	FD
32	52-53	53	66	A8-AA	AA	100	FE-FF	FF
33	54-56	56	67	AB-AC	AC			

9.5 SELECTING THE CMX PROTOCOL

All MiniDMXter are shipped set for the DMX512 protocol. To change protocol you will need to open the unit and move a single program jumper. This jumper is installed at JP3 when the unit is set for DMX512. Turn the Mini **OFF** and open the bottom. Move the jumper to JP2 as shown in the drawing below. When you power the unit up the MiniDMXter will be set for the Colortran protocol. What you have changed is the clock speed. The Mini will determine that you changed the protocol when it is powered up if you take a simple precaution. When you first power the unit up after moving the jumper make certain you have no external cables plugged into the Mini. The unit will measure the clock speed and set the proper flag in non-volatile memory.



9.6 SPECIFICATION TABLES

TRANSMITTED DMX512 PARAMETERS

FUNCTION	MINIMUM	MAXIMUM
NUMBER OF DIMMERS	24	512

FLAVOR	SLOW DMX	FAST DMX	SLOW CMX	FAST CMX
BREAK	120uS	120uS	195.3uS	195.3us
BREAK JITTER	<100NS	<100NS	<100ns	<100ns
MAB	20uS	20uS	32.6uS	32.6uS
MAB JITTER	<100NS	<100NS	<100ns	<100Ns
FRAME TIME	50uS	50uS	84uS	84uS
INTER PACKET	98MS	6uS	81.5MS	12uS
512 DIM UPDATE	8	38	8	23

RECEIVED DMX512 PARAMETERS

FUNCTION	MINIMUM	MAXIMUM	NOTES
BREAK LENGTH	60uS DMX	-	
	98us CMX		
MAB LENGTH	3uS DMX	-	
	5us CMX		
NUMBER OF DIMMERS	1	512	OVFL reported for over 512 dimmers
BREAK-BREAK TIME	151uS DMX	3 SEC.	Limited only Break & MAB times
	245us CMX		

RECEIVED & TRANSMITTED BAUD RATE - DMX	250,000	as per DMX512
RECEIVED & TRANSMITTED BAUD RATE - CMX	153,600	as per CMX

VOLTAGE AND CURRENT LIMITS

	VOLTAGE OR CURRENT	NOTES
EXTERNAL BATTERY ELIMINATOR	2.5VDC -6 VOLTS MAX!!	5.5 VOLTS RECOMMENDED MAXIMUM
DMX512-OUT PINS 2&3 MAX VOLTS MAX CURRENT ESD (human body model)	+/- 6.8 VOLTS 100MA 8KW	Withstanding voltage & current without damage. Mis-operation possible
DMX512-IN PINS 2&3(2) MAX VOLTS MAX CURRENT ESD (human body model)	+/- 12 VOLTS 100 MA 8KW	Withstanding voltage & current without damage. Mis-operation possible
PIN 4&5 IN or OUT	+35 VDC -25 VDC	
Resistance Pin 1 of I/O Connectors to Metal Case	22 Meg Ohms	

9.7 SOFTWARE VERSION HISTORY

This manual is for the first release of this software. Most of the feature are based on the Lil'DMXter software version 1.60.

10.0 CE Declaration of Confrornity

Goddard Design Company does declare that the following equipment meets the requirements of the EMC Directive 89/336/EEC:



The MiniDMXter - Model Number FD DMX-5CE

This unit was certified for emissions under EN55022 as class B ITE device. This unit was certified for immunity under EN50082-1.

The certification was issued on the 31 of August 1996.

Robert M Goddard
Head of Electronic Design
Goddard Design Co.

11.0 FCC PART 15 STATEMENT

This device complies with Part 15 of FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

11.1 WARNING: YOU MUST CORRECT ANY HARMFUL INTERFERENCE CAUSED BY THIS DEVICE.

This device is professional test equipment and as such it is not intended for residential use.

If this device causes harmful interference it is the responsibility of the user to take action to eliminate this harmful interference. And if necessary discontinue use of this device in the environment where the interference occurred.

11.0 WARRANTY

The GODDARD DESIGN CO. warrants each unit it manufactures to be free from defects in material and workmanship under normal use and service for the period of 1 year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, disposable batteries (rechargeable type batteries are warranted for 90-days), or any product or parts which have been subject to misuse, neglect, accident or abnormal conditions of operations.

In the event of failure of a product covered by this warranty, GODDARD DESIGN CO. will repair a unit returned to us within 1 year of the original purchase provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may, at its option, replace the product in lieu of repair. With regard to any unit returned within 1 year of the original purchase said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident or abnormal conditions of operation, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. GODDARD DESIGN CO. SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHETHER IN CONTRACT, TORT OR OTHERWISE.

If any failure occurs, the following steps should be taken:

- 1 Notify the GODDARD DESIGN CO. giving full details of the difficulty, and include the serial number. On receipt of this information service data or shipping instructions will be forwarded to you.
- 2 On receipt of the shipping instructions, forward the unit, shipping prepaid. Repairs will be made at the GODDARD DESIGN CO. and the unit returned, shipping prepaid.

All shipments to GODDARD DESIGN CO. should be made via United Parcel Service or similar "best way" carrier prepaid. The unit should be properly packed either in its original container, or if in a substitute container, in one that is rigid and of adequate size to allow for suitable packing padding to protect the unit from shock.

The unit should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the unit is damaged in any way, a claim should be filed with the carrier immediately. Final claim and negotiations with the carrier must be completed by the customer.